Power Generation at Generator Terminals (Gross) - 14.41 MWe

ACTUAL LOAD CASE STG CS TIME: 14/10/2015 10:58AM - 14.41 MWe	Units	HPT Inlet	HPT Ext1 (HPH2)	HPT Exhaust (MSR+HPH1)	LPT Inlet	LPT Ext1 (DEA)	LPT Ext2 (LPH3)	LPT Ext3 (LPH2)	LPT Ext4 (LPH1)	LPT Exhaust
Pressure	bar(a)	27.0	10.4	5.1	3.9	0.4	0.2	0.2	0.1	0.069
Temperature	DegC	266.27	193.29	184.73	217.7	100	61	56	50	39
Superheat	DegC	39	12	33	76	24	0	0	1	1
Dryness fraction		Enth OOR	0.99	0.94	Enth OOR	0.97	0.94	0.93	0.92	0.90
Enthalpy (with actual blade group eff.)	kJ/kg	2918.1	2747.3	2621.2	2898.3	2571.8	2476.0	2442.9	2401.0	2337.1
Specific Entropy	kJ/kg.DegC	6.45	6.50	6.51	7.26	7.47	7.48	7.49	7.50	7.53
Isentropic Enthalpy (hs)	kJ/kg	2719.1	2613.1	2590.2	2495.2	2468.7	2439.7	2394.7	2324.3	2250.6
Actual DP by blade group		2.59	2.04	5.29	9.47	1.95	1.26	1.39	1.75	
BASE CASE DP by blade group for comparison only		2.49	2.44	6.08	1.91	2.05	2.93	2.08	6.63	
Blade group Efficiency (derived from BASE Case HMBD)	%	85.828%	93.931%		81.004%	92.949%	91.087%	86.889%	83.341%	
Mass Flow rate	kg/s	31.72	31.6		13.1	4.1	4.1	3.9	3.8	
Actual Power O/P Stage wise	MW(mech)	5.4	4.0		4.3	0.4	0.1	0.2	0.2	
Generator Eff. (at 50% Load at brushless excitation and Rated PF)	%	98.28%								
Actual Power O/P Stage wise	MW(elec)	5.3	3.9		4.2	0.4	0.1	0.2	0.2	
Actual Power O/P Total (Calculated)	**MW(elec)**	14.38								
Steam Rate (Actual) Stage wise	T/MWe	21.44	29.05		11.22	38.22	110.81	87.38	57.30	
Steam Rate (Actual) Overall	T/MWe	7.94								

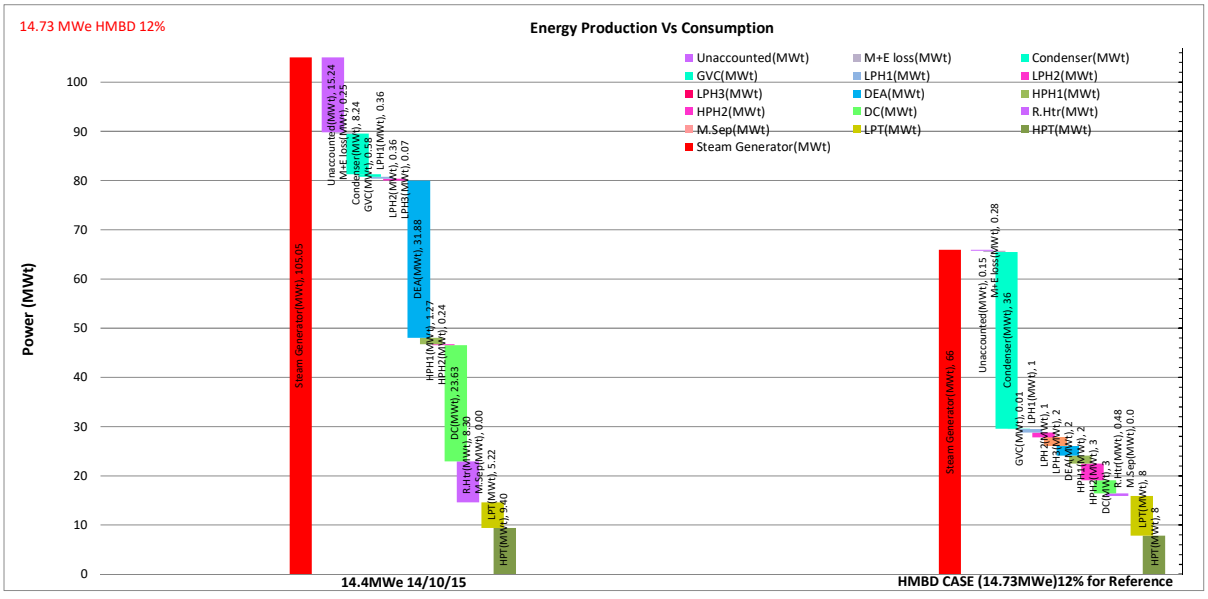
Isentropic Power O/P Stage wise	MW(mech)	6.3	4.2		5.3	0.4	0.1	0.2	0.3	
Isentropic Power O/P Stage wise	**MW(elec)**	**6.2**	**4.2**		**5.2**	**0.4**	**0.1**	**0.2**	**0.3**	
Isentropic Power O/P Total	**MW(elec)**	16.61								
Steam Expansion Turbine Efficiency (Isentropic Vs Actual)	**%**	86.55%								
Isentropic Efficiency (expansion) for reference	%	100.00%								
Isentropic Vs Actual Power O/P difference (stage wise)	%	14.2%	6.1%		19.0%	7.1%	8.9%	13.1%	16.7%	
Isentropic Vs Actual Power O/P difference Total	**%**	**12.1%**	98.7%							
Steam Rate (Theo) Stage wise	T/MWe	18.40	27.29		9.09	35.52	100.93	75.93	47.76	
Steam Rate (Theo) Overall	T/MWe	6.87								

Feed water Heater Power Table:

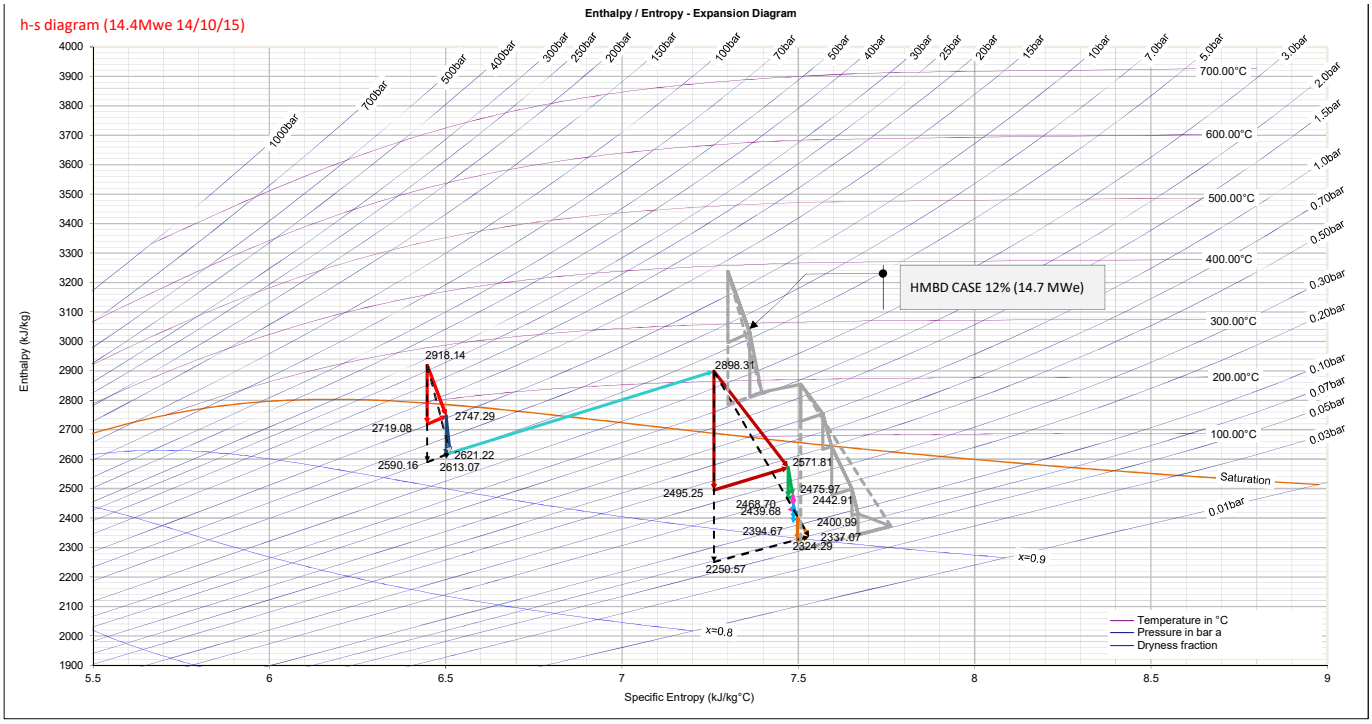
ACTUAL LOAD CASE STG CS TIME: 14/10/2015 10:58AM - 14.41 MWe		DC	HPH2	HPH1	DEA	LPH3	LPH2	LPH1
FW/Condensate Temp I/L to Heater	DegC	147.8	147.77	142.77	43.9	43.66	42.28	40.89
FW/Condensate Enthalpy I/L to Heater	kJ/kg	623	623	601	184	183	177	171
FW/Condensate Flow I/L to Heater	TPH	237	237.00	237.00	224	224	224	225
FW/Condensate Flow I/L to Heater	kg/s	66	66	66	62	62	62	62
Heater drain Temp	DegC	143	130	109	N/A	38	37	32
Heater drain Enthalpy	kJ/kg	601	545	457	N/A	160	154	133
Bleed steam Flow	kg/s	N/A	0.11	0.6	8.99	0.0	0.2	0.2
Bleed steam Flow	TPH	N/A	0.4	2.3	32.4	0.1	0.6	0.6
Bleed steam Power Equivalent	**MWe**	**N/A**	**0.07**	**0.3**	**19.7**	**0.1**	**0.3**	**0.3**
Bleed Steam Heat (MWt)	MWt	N/A	0.2	1.4	17.7	0.1	0.4	0.4
STG O/P lost for FWH (MWe)	MWe	N/A	0.2	0.9	5.3	0.01	0.04	0.03
FW heat gain/STG Power O/P	%	N/A	22%	35%	70%	85.1%	88%	93%

Notes:

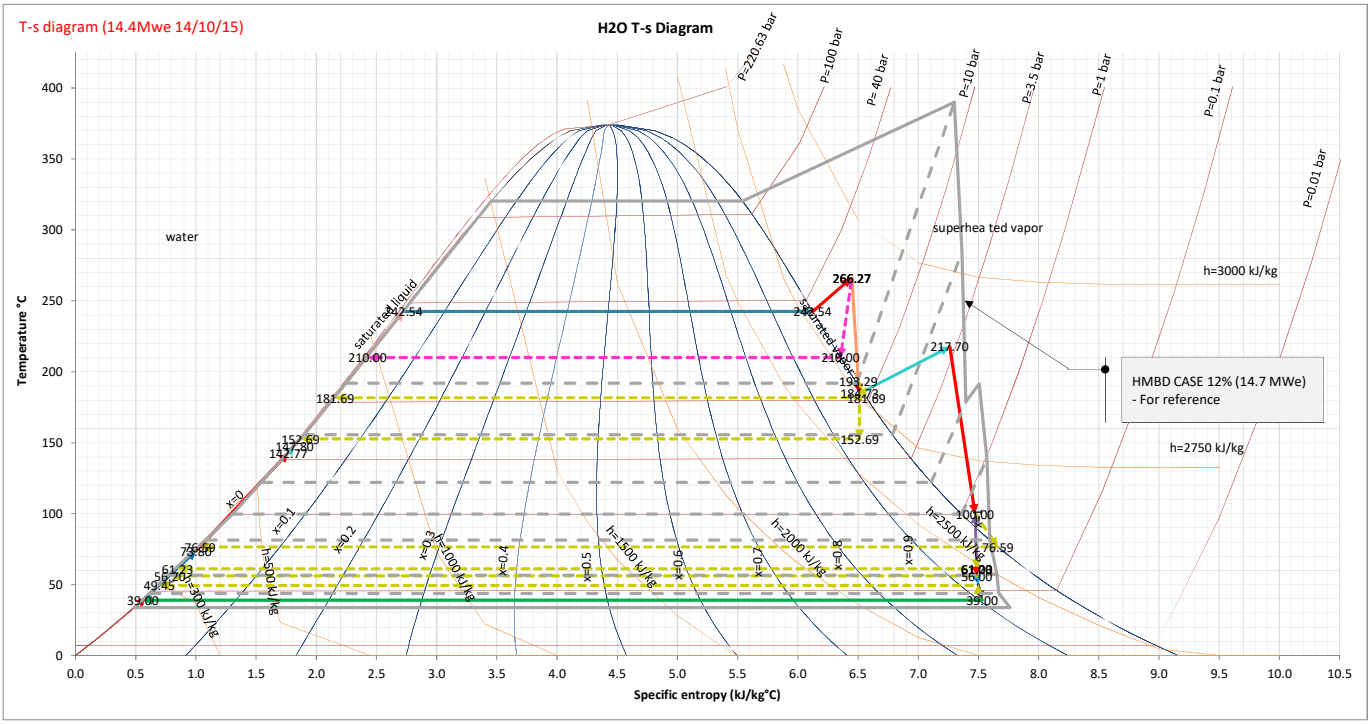
1. Condensate flow across LPH2, LPH3 and I/L to DEA is not ascertainable. The Drain FW pumps are provided with CV in series shall continuously vary the condensate flow at the I/L of LPH2.
2. HPH1 can be taken OOS only when HPH2 is OOS.
3. Different steam connection points and vent operation of DEA makes practical limitation to ascertain bleed steam consumption of DEA from LPT.



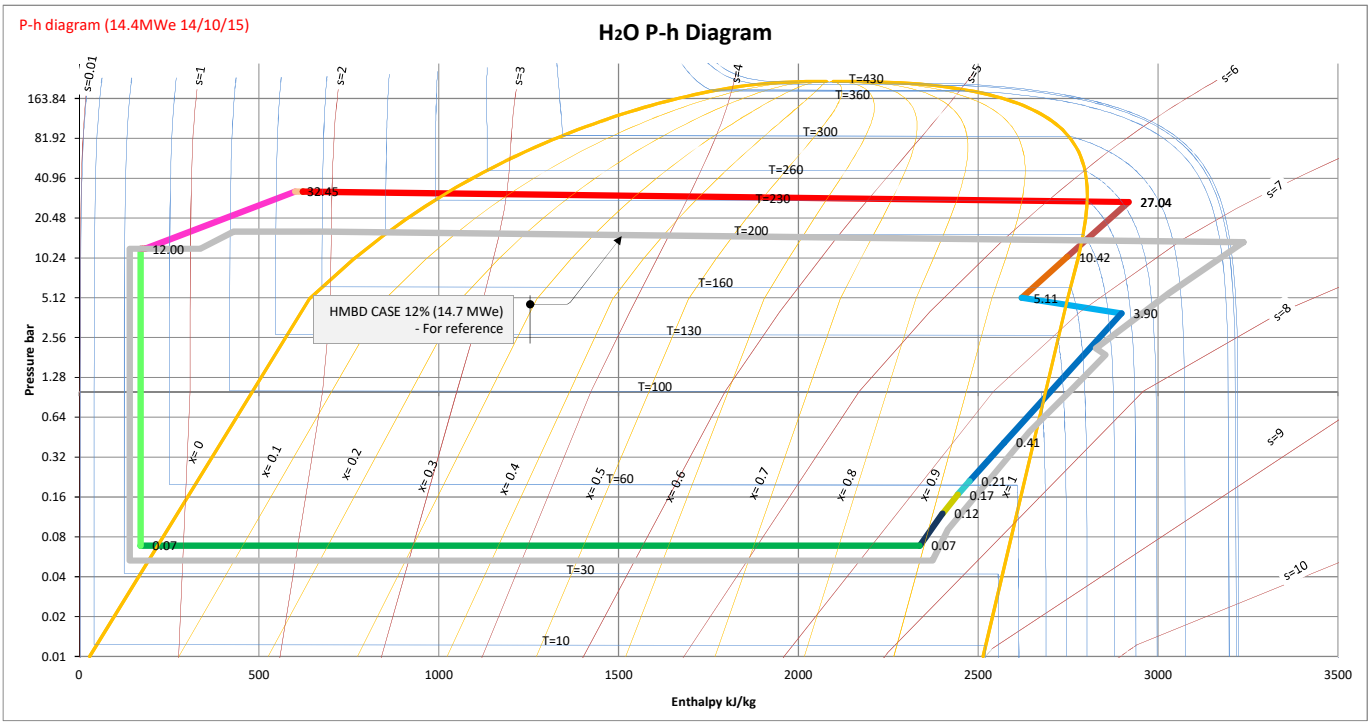
h-s diagram (14.4Mwe 14/10/15)



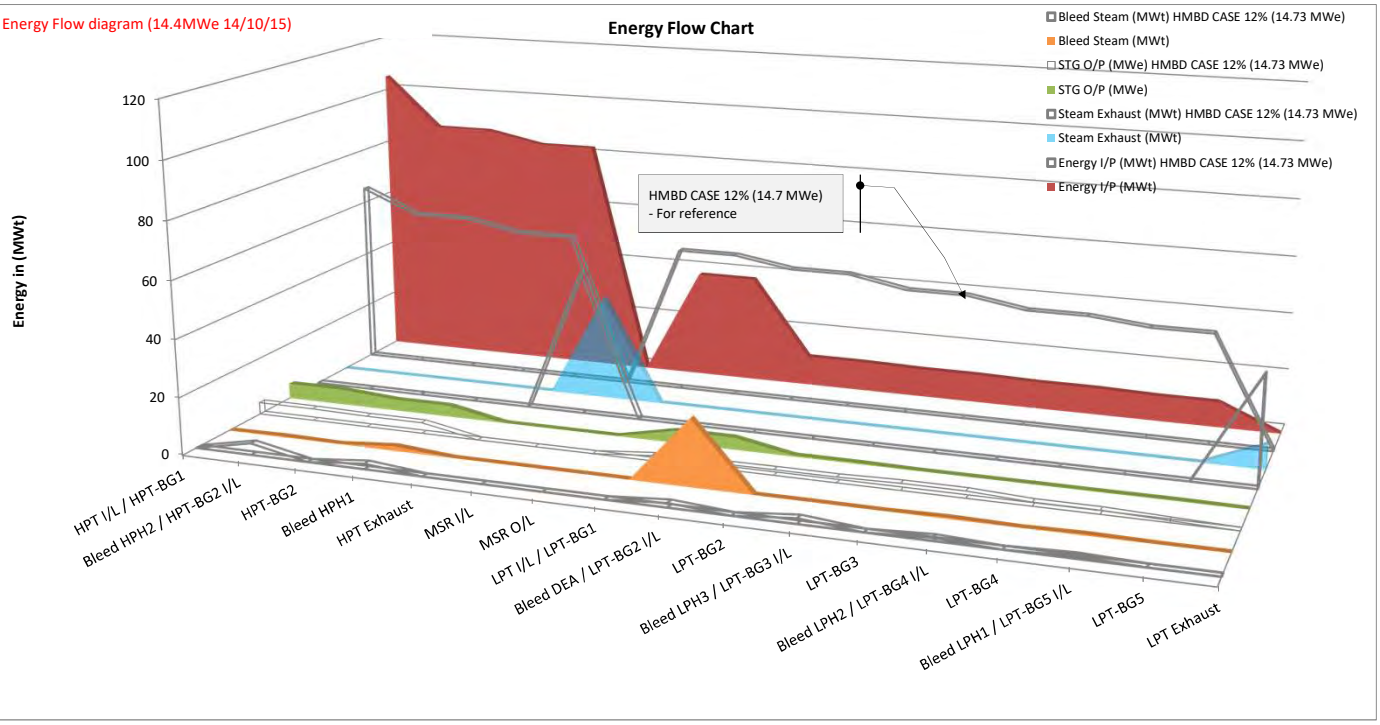
T-s diagram (14.4Mwe 14/10/15)



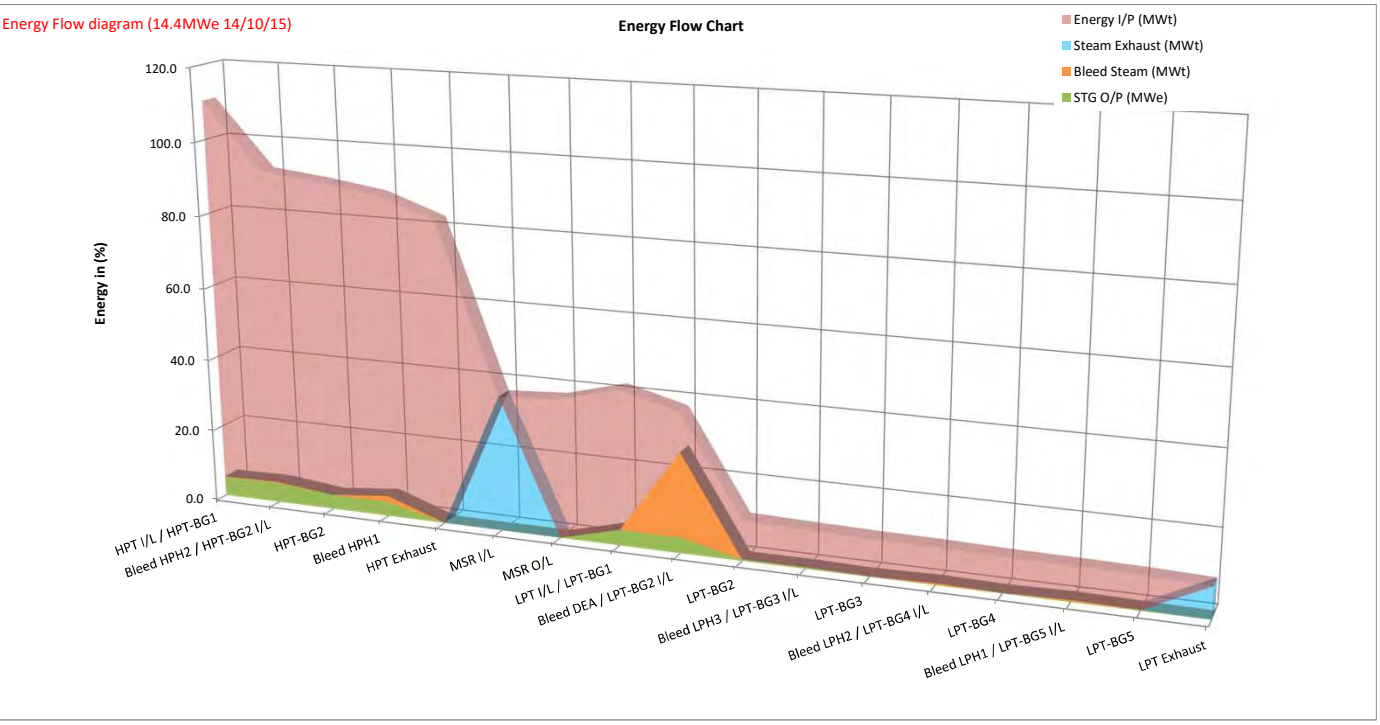
P-h diagram (14.4MWe 14/10/15)



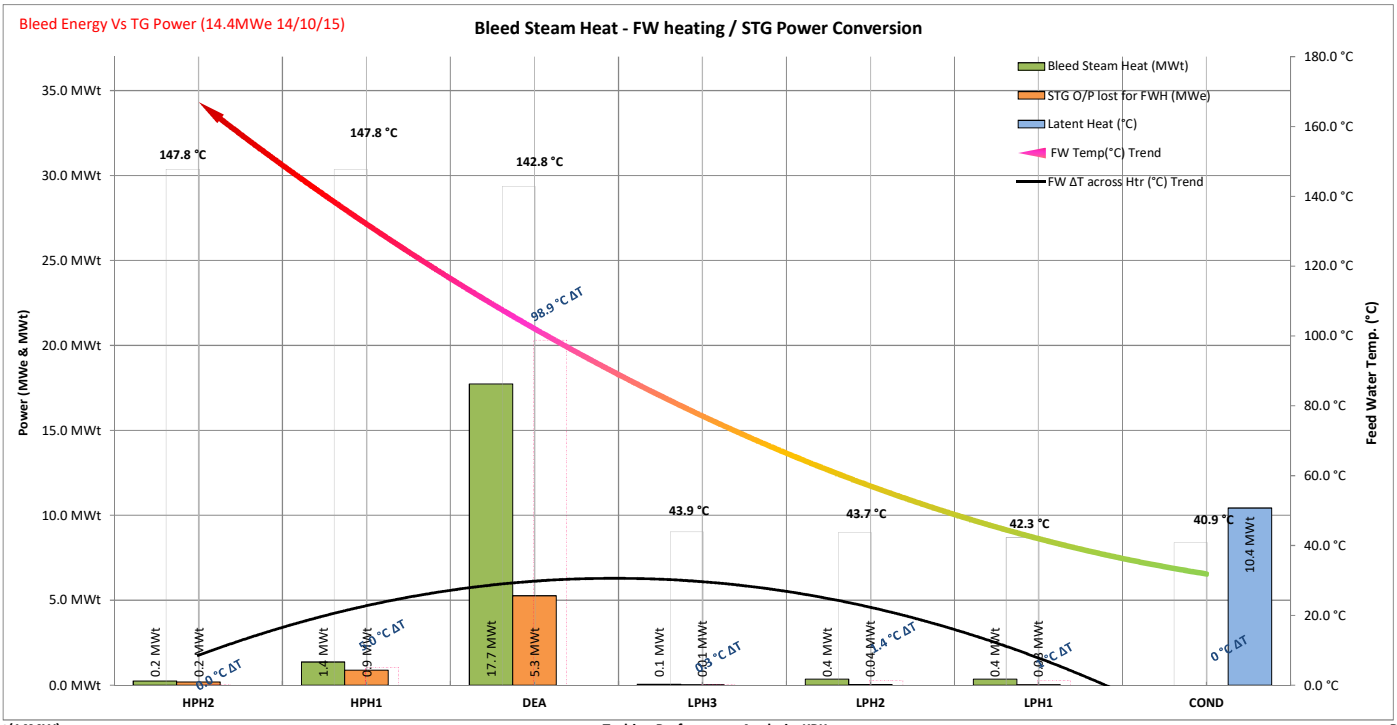
Energy Flow diagram (14.4MWe 14/10/15)



Energy Flow diagram (14.4MWe 14/10/15)



Bleed Energy Vs TG Power (14.4MWe 14/10/15)



Power Generation at Generator Terminals (Gross) - 35.38 MWe

ACTUAL LOAD CASE STG CS TIME: 14/10/2015 11:28AM - 35.38 MWe	Units	HPT Inlet	HPT Ext1 (HPH2)	HPT Exhaust (MSR+HPH1)	LPT Inlet	LPT Ext1 (DEA)	LPT Ext2 (LPH3)	LPT Ext3 (LPH2)	LPT Ext4 (LPH1)	LPT Exhaust
Pressure	bar(a)	27.8	11.6	5.0	3.7	1.4	0.8	0.6	0.2	0.066
Temperature	DegC	288.23	192.39	193.46	216.9	150	104.2	90	70	37.9
Superheat	DegC	60	7	43	77	41	12	5	10	0
Dryness fraction		Enth OOR	Enth OOR	0.96	Enth OOR	Enth OOR	0.99	0.98	0.93	0.90
Enthalpy (with actual blade group eff.)	kJ/kg	2973.8	2808.9	2654.5	2897.4	2738.8	2641.2	2598.6	2452.6	2325.7
Specific Entropy	kJ/kg.DegC	6.54	6.59	6.60	7.28	7.37	7.38	7.38	7.44	7.51
Isentropic Enthalpy (hs)	kJ/kg	2781.6	2644.6	2623.3	2701.6	2633.8	2594.5	2430.6	2300.3	2251.5
Actual DP by blade group		2.38	2.35	5.59	2.63	1.80	1.31	3.00	3.04	
BASE CASE DP by blade group for comparison only		2.49	2.44	6.08	1.91	2.05	2.93	2.08	6.63	
Blade group Efficiency (derived from BASE Case HMBD)	%	85.828%	93.931%		81.004%	92.949%	91.087%	86.889%	83.341%	
Mass Flow rate	kg/s	58.61	58.1		33.8	30.2	28.7	27.6	26.9	
Actual Power O/P Stage wise	MW(mech)	9.7	9.0		5.4	2.9	1.2	4.0	3.4	
Generator Eff. (at 50% Load at brushless excitation and Rated PF)	%	98.28%								
Actual Power O/P Stage wise	MW(elec)	9.5	8.8		5.3	2.9	1.2	4.0	3.4	
Actual Power O/P Total (Calculated)	**MW(elec)**	35.00								
Steam Rate (Actual) Stage wise	T/MWe	22.21	23.74		23.09	37.54	86.05	25.09	28.85	
Steam Rate (Actual) Overall	T/MWe	6.03								

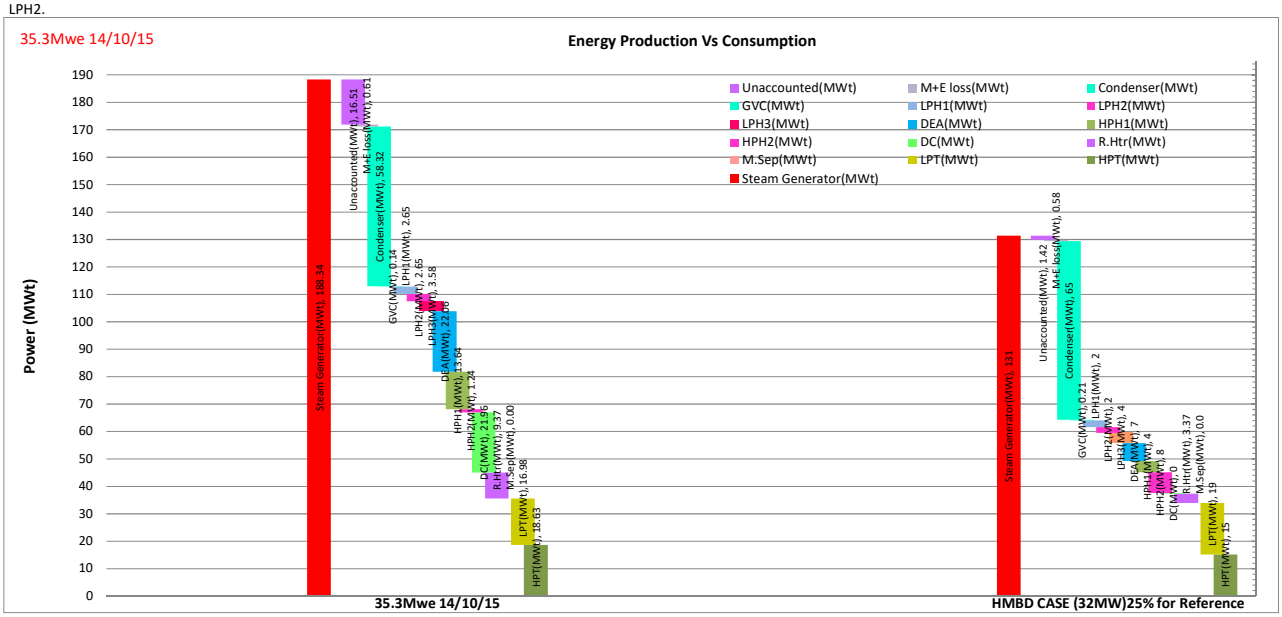
Isentropic Power O/P Stage wise	MW(mech)	11.3	9.5		6.6	3.2	1.3	4.6	4.1	
Isentropic Power O/P Stage wise	**MW(elec)**	**11.1**	**9.4**		**6.5**	**3.1**	**1.3**	**4.6**	**4.0**	
Isentropic Power O/P Total	**MW(elec)**	39.98								
Steam Expansion Turbine Efficiency (Isentropic Vs Actual)	**%**	87.54%								
Isentropic Efficiency (expansion) for reference	%	100.00%								
Isentropic Vs Actual Power O/P difference (stage wise)	%	14.2%	6.1%		19.0%	7.1%	8.9%	13.1%	16.7%	
Isentropic Vs Actual Power O/P difference Total	**%**	**12.1%**	99.7%							
Steam Rate (Theo) Stage wise	T/MWe	19.06	22.30		18.70	34.89	78.38	21.80	24.04	
Steam Rate (Theo) Overall	T/MWe	5.28								

Feed water Heater Power Table:

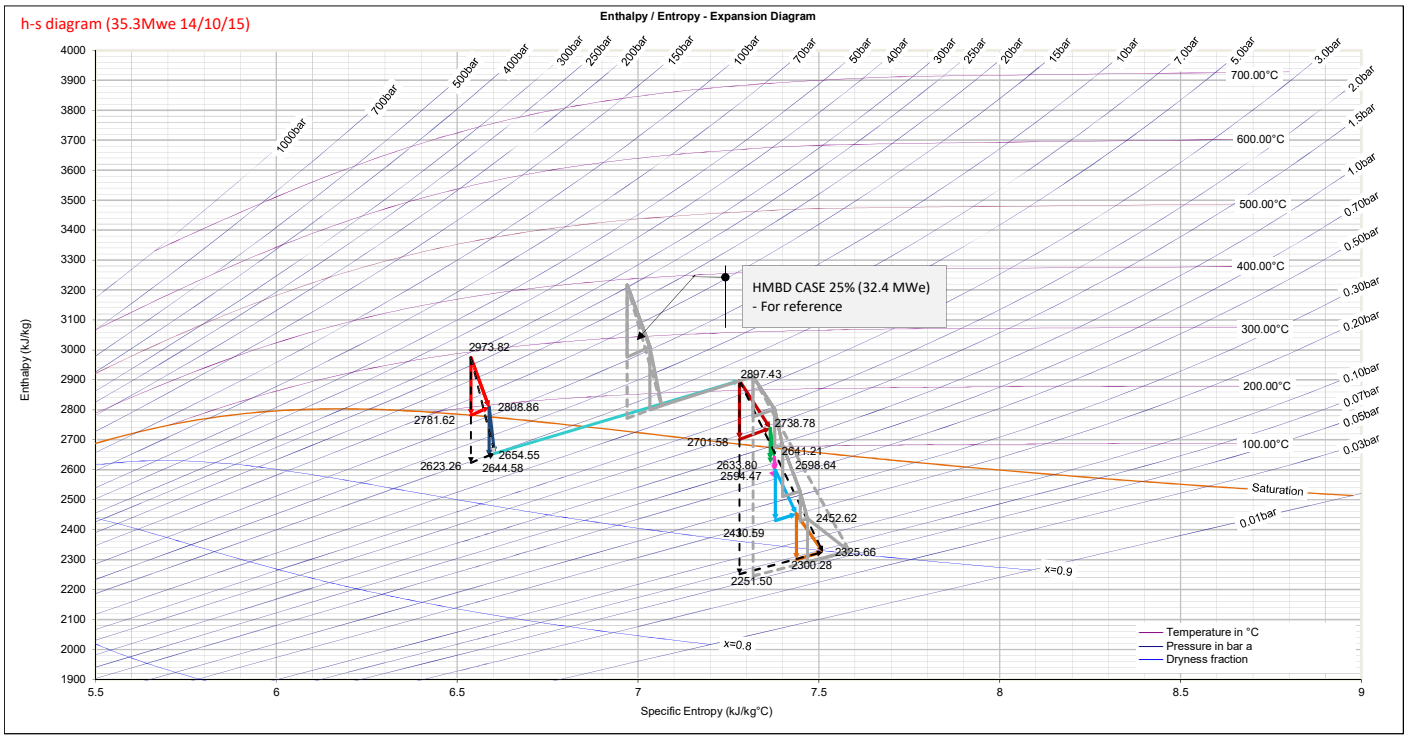
ACTUAL LOAD CASE STG CS TIME: 14/10/2015 11:28AM - 35.38 MWe		DC	HPH2	HPH1	DEA	LPH3	LPH2	LPH1
FW/Condensate Temp I/L to Heater	DegC	151.6	147.71	95.12	72.9	59.12	48.92	38.71
FW/Condensate Enthalpy I/L to Heater	kJ/kg	639	622	398	305	247	205	162
Condensate Flow I/L to Heater	TPH	226.39	226.39	226.39	224	223	224	140
Condensate Flow I/L to Heater	kg/s	63	63	63	62	62	62	39
Heater drain Temp	DegC	148	139	123	N/A	44	43	38
Heater drain Enthalpy	kJ/kg	624	585	518	N/A	184	178	160
Bleed steam Flow	kg/s	N/A	0.56	6.4	3.64	1.5	1.1	0.7
Bleed steam Flow	TPH	N/A	2.0	23.0	13.1	5.2	3.9	2.6
Bleed steam Power Equivalent	**MWe**	**N/A**	**0.3**	**3.1**	**8.5**	**3.3**	**2.4**	**1.4**
Bleed Steam Heat (MWt)	MWt	N/A	1.2	13.6	8.5	3.6	2.6	1.6
STG O/P lost for FWH (MWe)	MWe	N/A	1.0	9.1	3.7	1.14	0.74	0.23
FW heat gain/STG Power O/P	%	N/A	19%	33%	56%	68.0%	72%	86%

Notes:

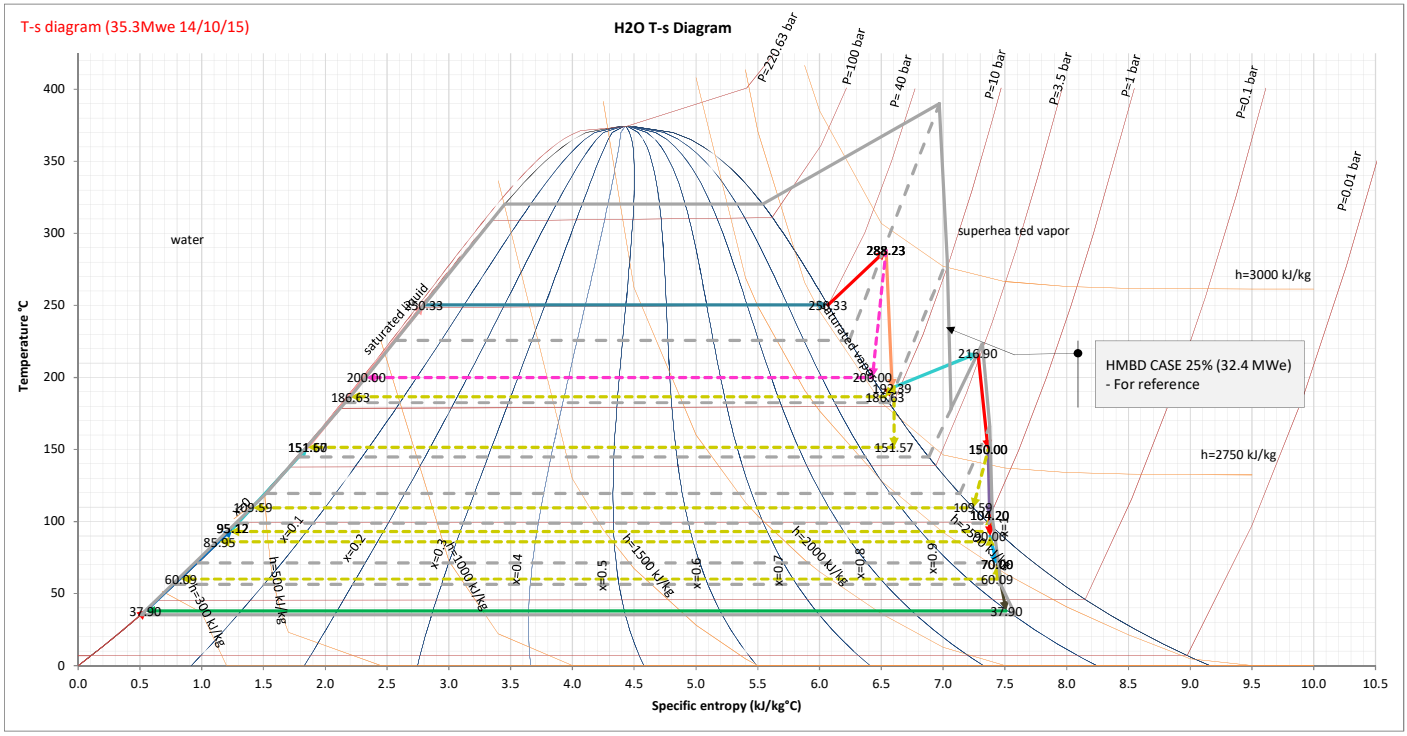
1. Condensate flow across LPH2, LPH3 and I/L to DEA is not ascertainable. The Drain FW pumps are provided with CV in series shall continuously vary the condensate flow at the I/L of LPH2.



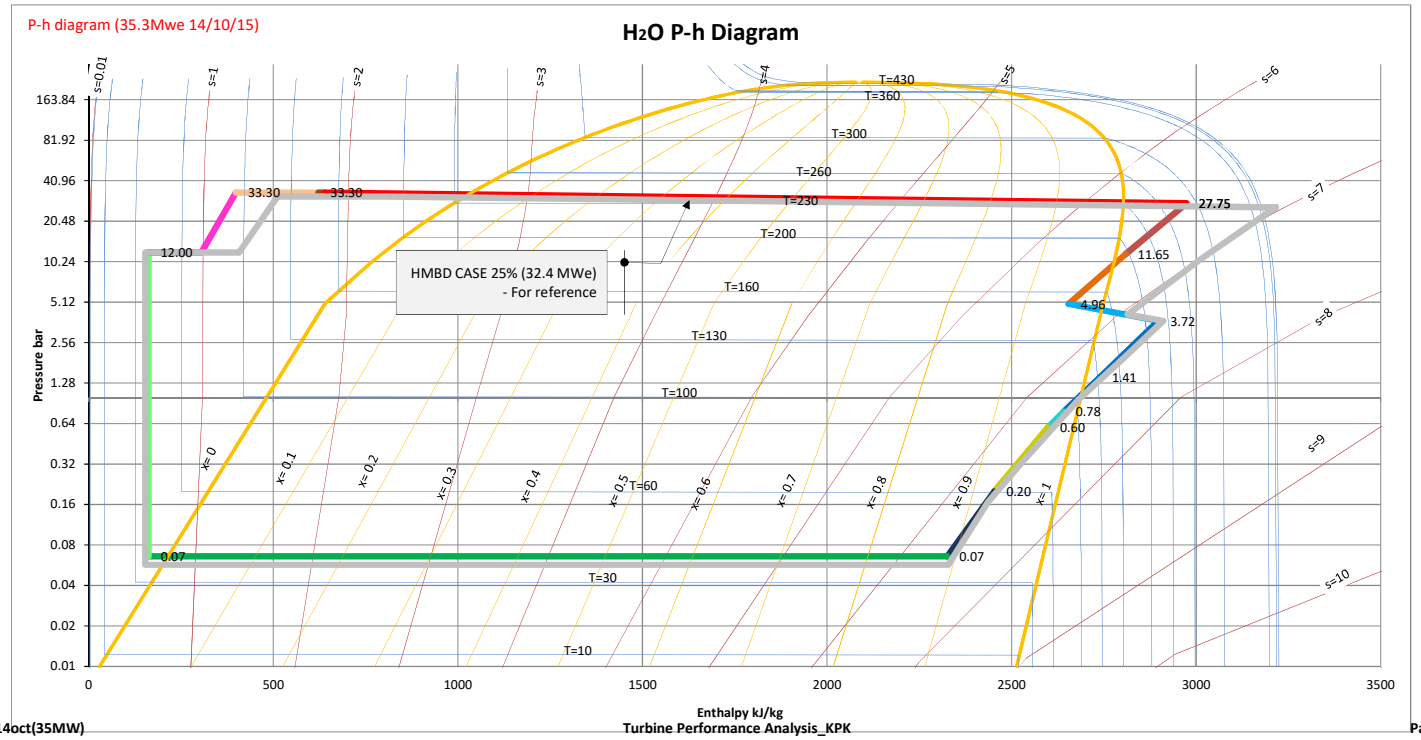
h-s diagram (35.3Mwe 14/10/15)



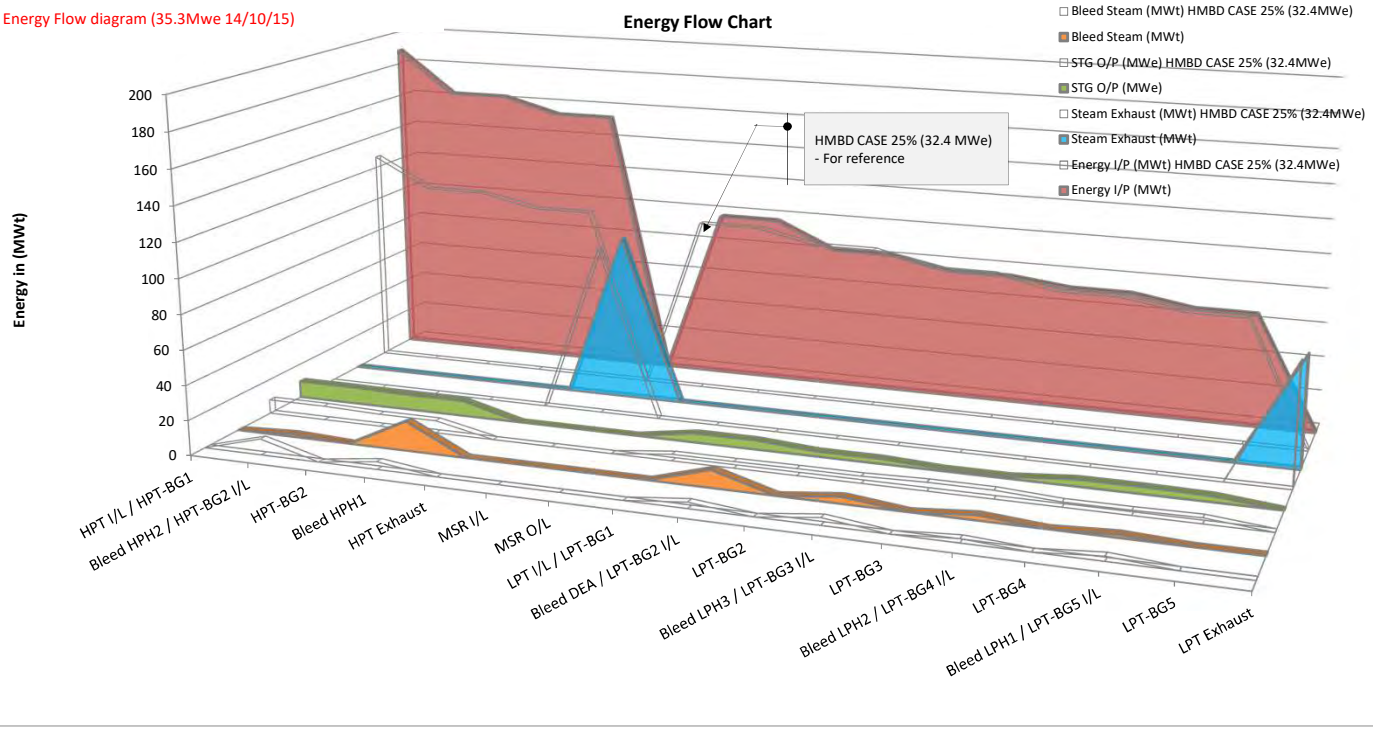
T-s diagram (35.3Mwe 14/10/15)



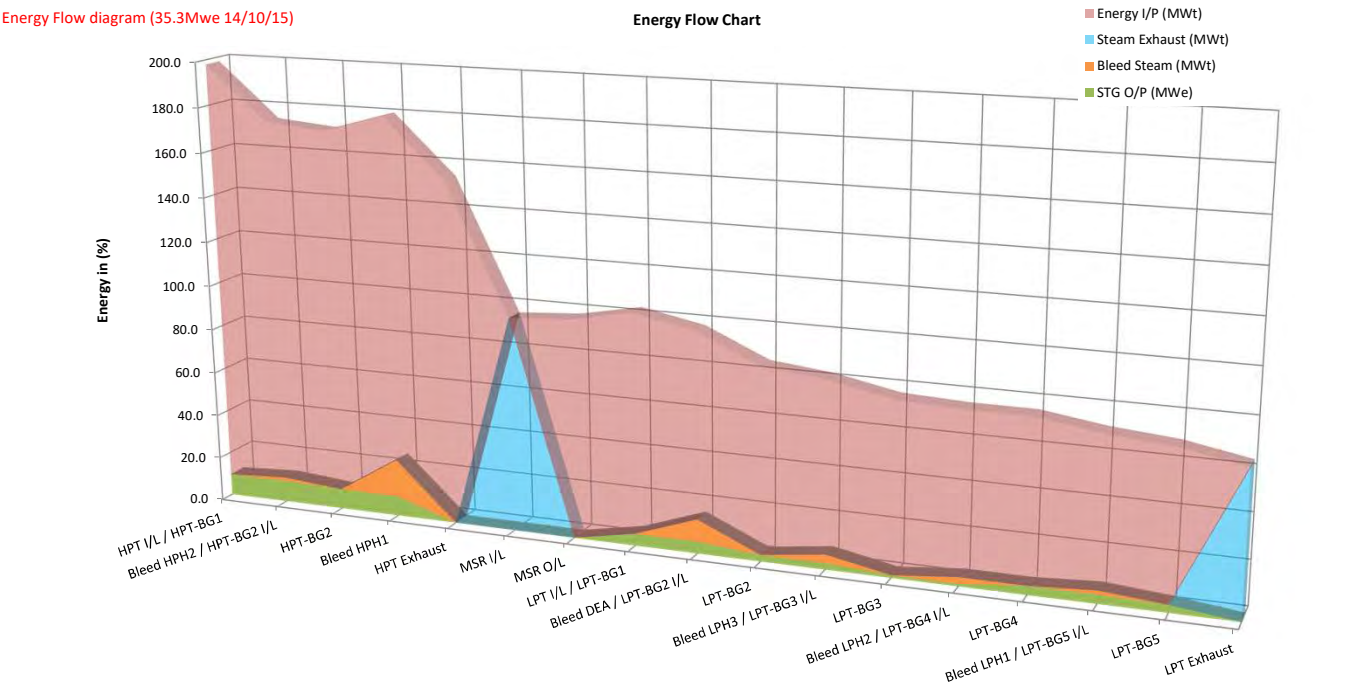
P-h diagram (35.3Mwe 14/10/15)



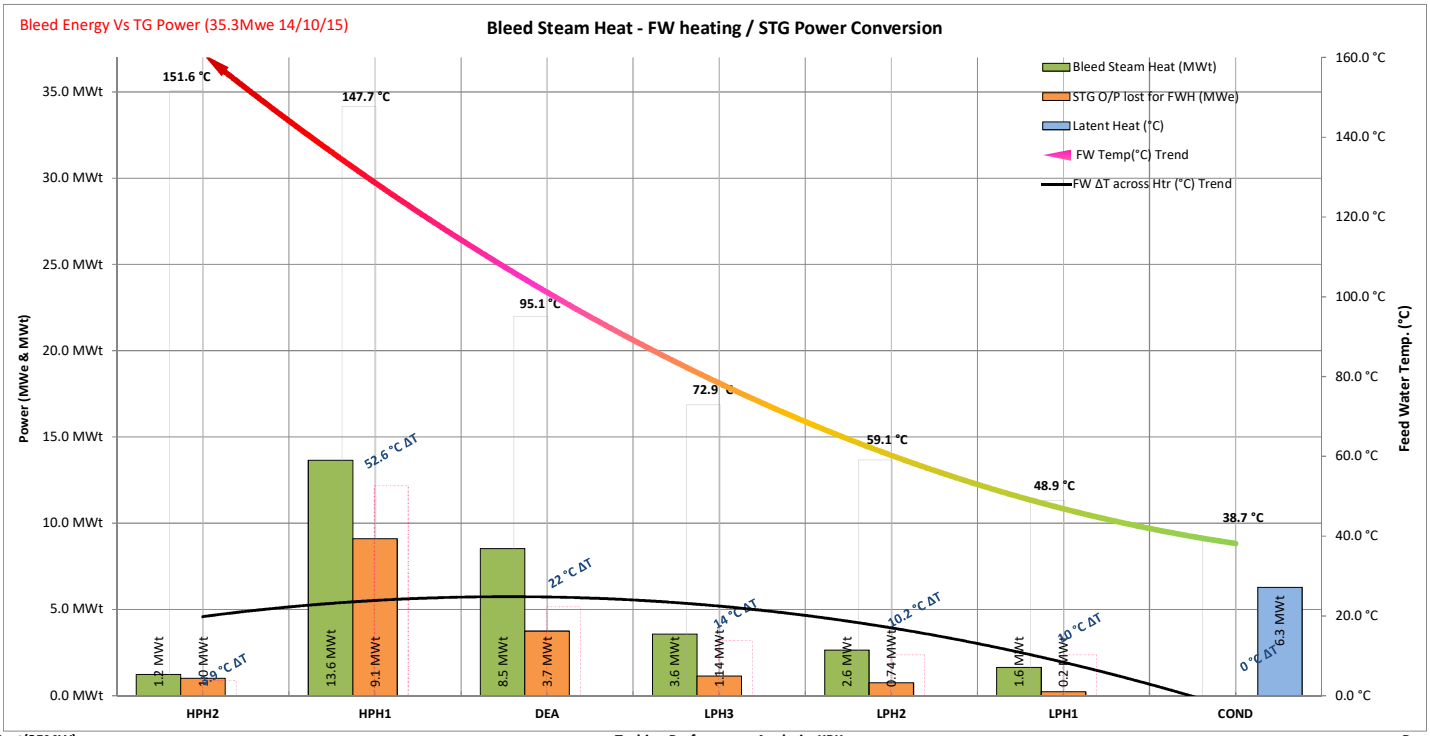
Energy Flow diagram (35.3Mwe 14/10/15)



Energy Flow diagram (35.3Mwe 14/10/15)



Bleed Energy Vs TG Power (35.3Mwe 14/10/15)



Power Generation at Generator Terminals (Gross) - 64.08 MWe

ACTUAL LOAD CASE STG CS TIME: 29/9/2015 1:33PM	Units	HPT Inlet	HPT Ext1 (HPH2)	HPT Exhaust (MSR+HPH1)	LPT Inlet	LPT Ext1 (DEA)	LPT Ext2 (LPH3)	LPT Ext3 (LPH2)	LPT Ext4 (LPH1)	LPT Exhaust
Pressure	bar(a)	44.3	17.5	6.3	5.2	3.0	1.5	0.7	0.4	0.074
Temperature	DegC	326.8	218	210.7	240	185	130	115	90	40.1
Superheat	DegC	72	13	51	87	52	20	25	18	0
Dryness fraction		Enth OOR	Enth OOR	0.95	Enth OOR	Enth OOR	Enth OOR	0.97	0.94	0.89
Enthalpy (with actual blade group eff.)	kJ/kg	3025.9	2842.5	2654.8	2939.8	2841.7	2708.8	2597.9	2498.4	2317.8
Specific Entropy	kJ/kg.DegC	6.43	6.48	6.50	7.21	7.25	7.27	7.29	7.33	7.44
Isentropic Enthalpy (hs)	kJ/kg	2812.2	2642.7	2619.4	2818.6	2698.7	2587.0	2483.4	2281.7	2245.8
Actual DP by blade group		2.53	2.78	7.04	1.71	2.07	2.03	2.06	4.75	
BASE CASE DP by blade group for comparison only		2.49	2.44	6.08	1.91	2.05	2.93	2.08	6.63	
Blade group Efficiency (derived from BASE Case HMBD)	%	85.828%	93.931%		81.004%	92.949%	91.087%	86.889%	83.341%	
Mass Flow rate	kg/s	77.678	77.1		52.9	50.7	50.7	50.6	50.4	
Actual Power O/P Stage wise	MW(mech)	14.2	14.5		5.2	6.7	5.6	5.0	9.1	
Generator Eff. (at 50% Load at brushless excitation and Rated PF)	%	98.28%								
Actual Power O/P Stage wise	MW(elec)	14.0	14.2		5.1	6.6	5.5	4.9	9.0	
Actual Power O/P Total (Calculated)	**MW(elec)**	59.37								
Steam Rate (Actual) Stage wise	T/MWe	19.97	19.51		37.33	27.56	33.03	36.84	20.28	
Steam Rate (Actual) Overall	T/MWe	4.71								

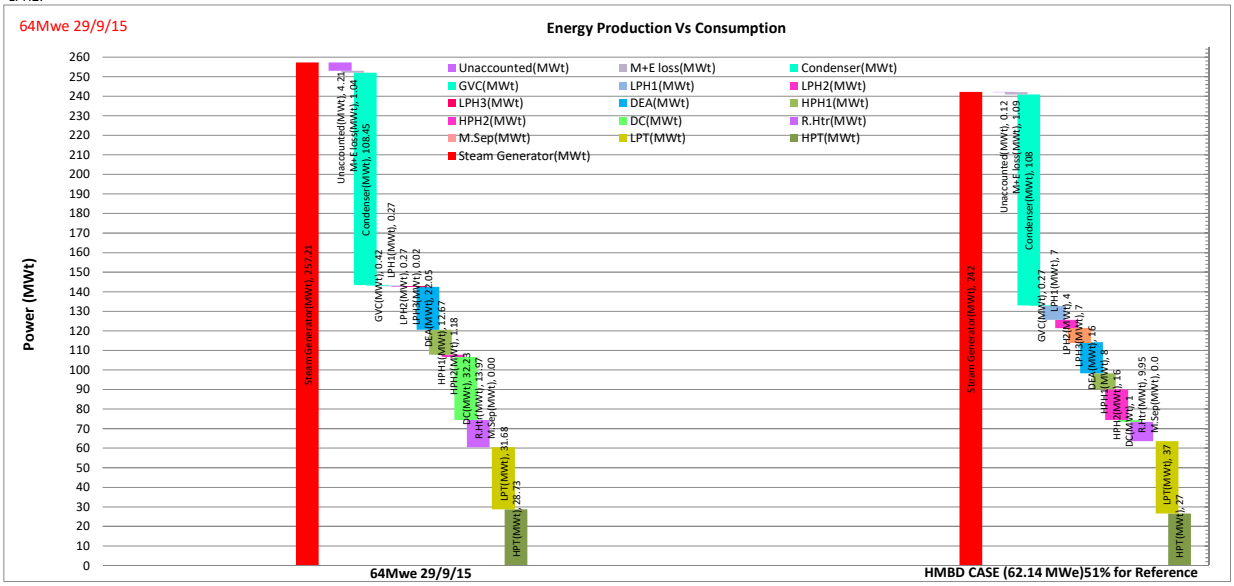
Isentropic Power O/P Stage wise	MW(mech)	16.6	15.4		6.4	7.2	6.2	5.8	10.9	
Isentropic Power O/P Stage wise	**MW(elec)**	**16.3**	**15.1**		**6.3**	**7.1**	**6.1**	**5.7**	**10.7**	
Isentropic Power O/P Total	**MW(elec)**	67.38								
Steam Expansion Turbine Efficiency (Isentropic Vs Actual)	**%**	88.12%								
Isentropic Efficiency (expansion) for reference	%	100.00%								
Isentropic Vs Actual Power O/P difference (stage wise)	%	14.2%	6.1%		19.0%	7.1%	8.9%	13.1%	16.7%	
Isentropic Vs Actual Power O/P difference Total	**%**	**12.1%**	100.3%							
Steam Rate (Theo) Stage wise	T/MWe	17.14	18.33		30.24	25.62	30.08	32.01	16.90	
Steam Rate (Theo) Overall	T/MWe	4.15								

Feed water Heater Power Table:

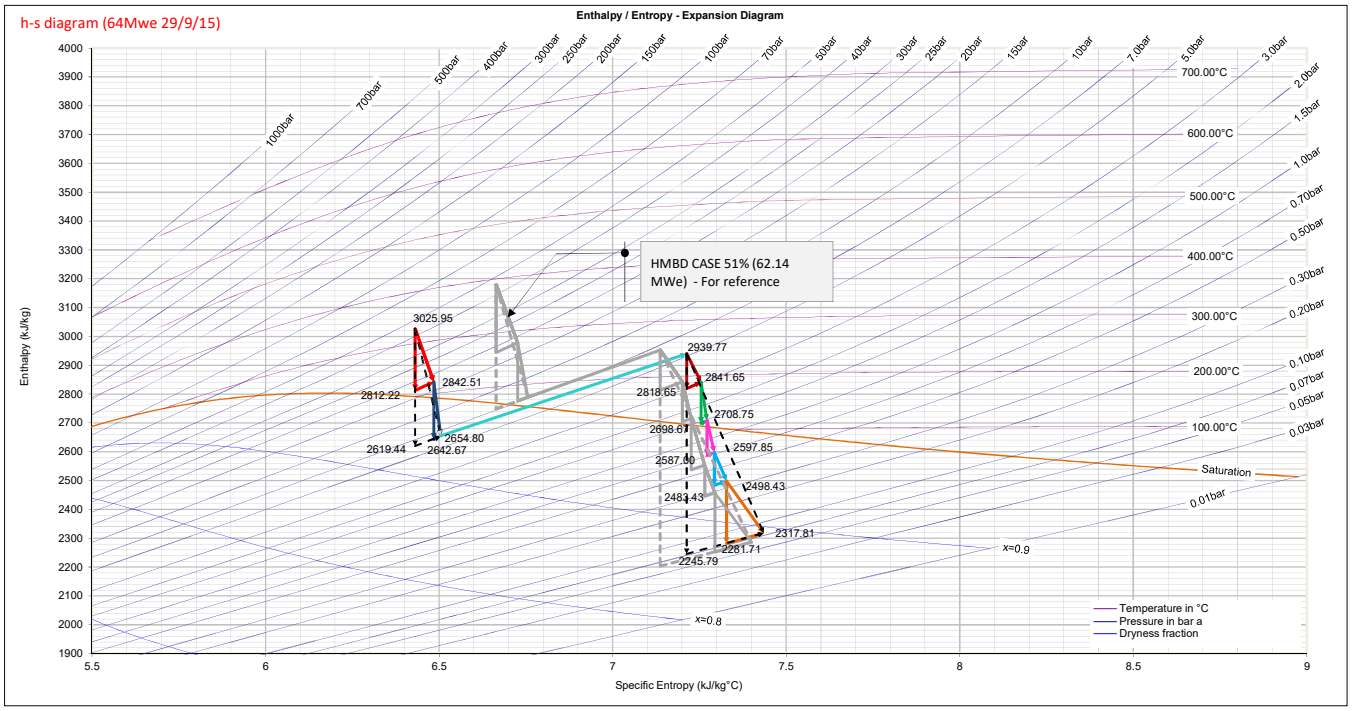
ACTUAL LOAD CASE STG CS TIME: 29/9/2015 1:33PM		DC	HPH2	HPH1	DEA	LPH3	LPH2	LPH1
FW/Condensate Temp I/L to Heater	DegC	169.3	167.1	130.6	44.0	43.9	42.85	41.79
FW/Condensate Enthalpy I/L to Heater	kJ/kg	716	706	549	184	184	179	175
Condensate Flow I/L to Heater	TPH	289	289	289	224	224	224	224
Condensate Flow I/L to Heater	kg/s	80	80	80	62	62	62	62
Heater drain Temp	DegC	170	160	161	N/A	39	35	59
Heater drain Enthalpy	kJ/kg	718	676	680	N/A	163	147	249
Bleed steam Flow	kg/s	N/A	0.55	6.4	2.17	0.0	0.1	0.1
Bleed steam Flow	TPH	N/A	2.0	23.1	7.8	0.0	0.4	0.5
Bleed steam Power Equivalent	**MWe**	**N/A**	**0.4**	**3.4**	**5.2**	**0.0**	**0.2**	**0.3**
Bleed Steam Heat (MWt)	MWt	N/A	1.2	12.7	5.0	0.0	0.3	0.3
STG O/P lost for FWH (MWe)	MWe	N/A	1.1	9.9	2.8	0.01	0.08	0.06
FW heat gain/STG Power O/P	%	N/A	7%	22%	43%	61.7%	72%	80%

Notes:

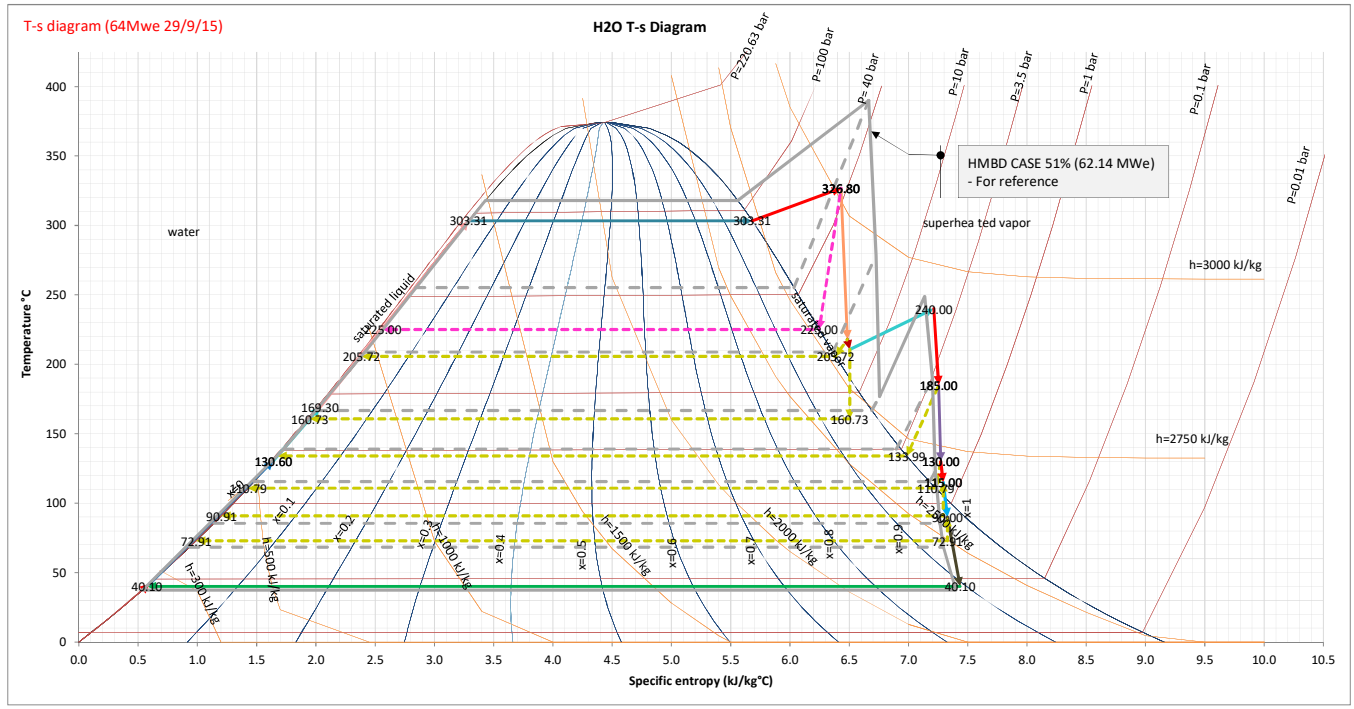
1. Condensate flow across LPH2, LPH3 and I/L to DEA is not ascertainable. The Drain FW pumps are provided with CV in series shall continuously vary the condensate flow at the I/L of LPH2.



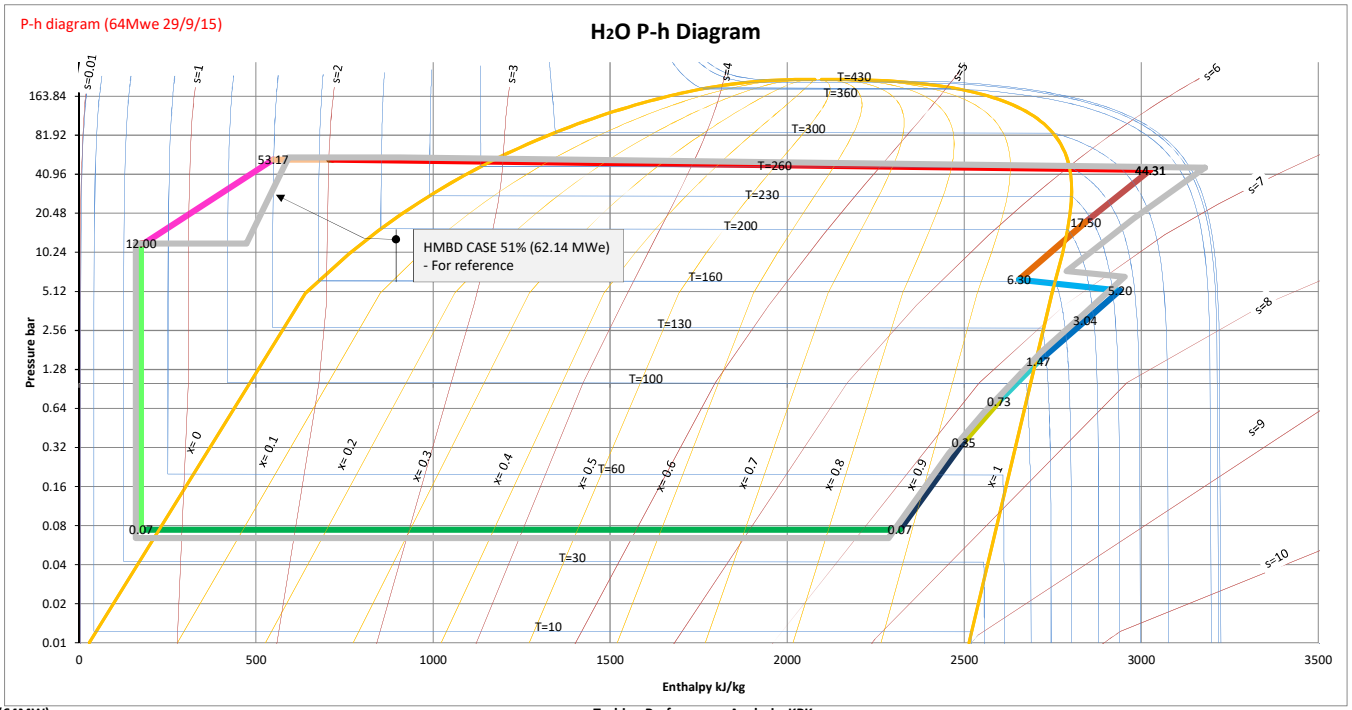
h-s diagram (64Mwe 29/9/15)



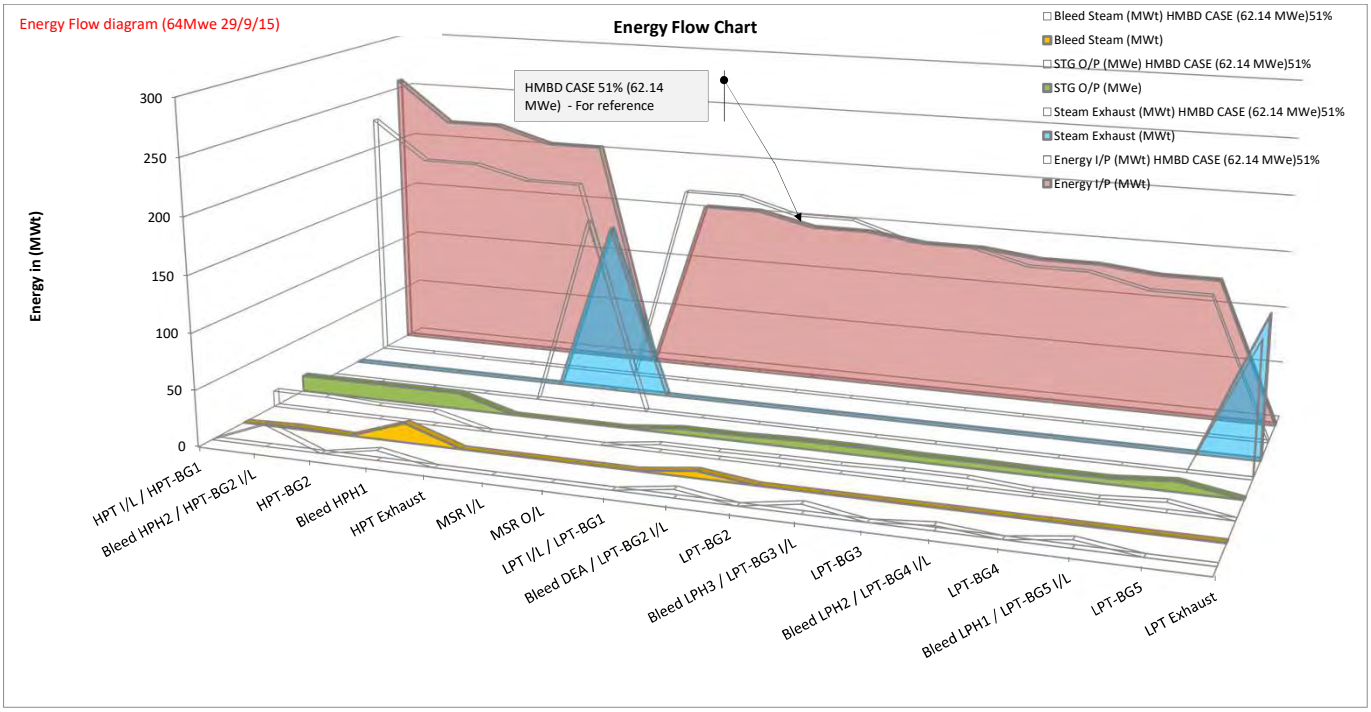
T-s diagram (64Mwe 29/9/15)



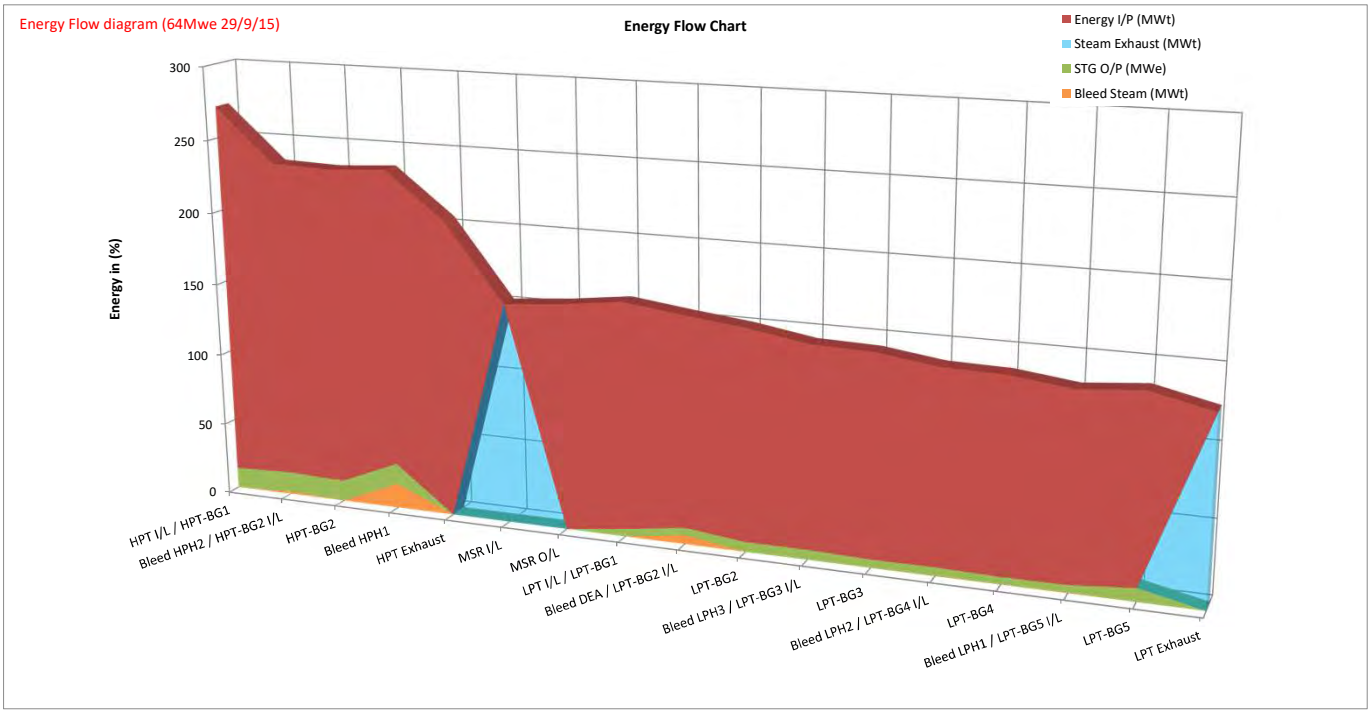
P-h diagram (64Mwe 29/9/15)



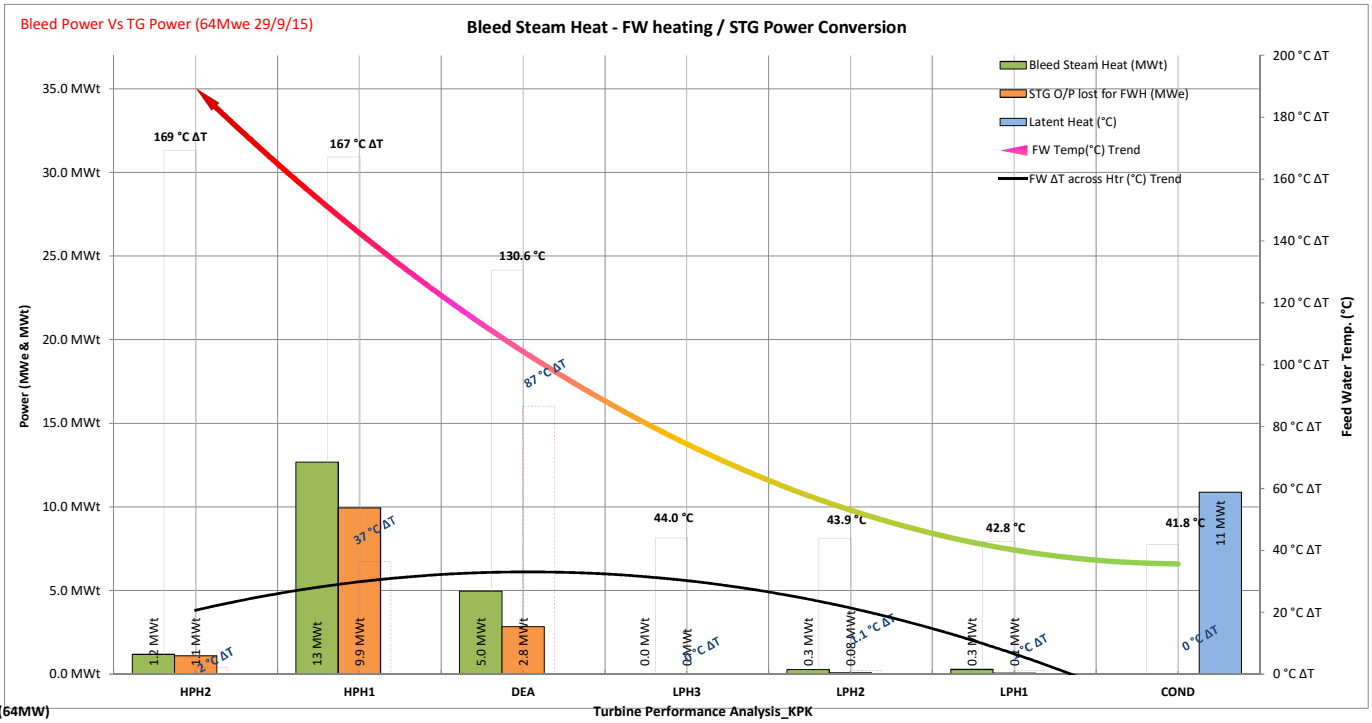
Energy Flow diagram (64Mwe 29/9/15)



Energy Flow diagram (64Mwe 29/9/15)



Bleed Power Vs TG Power (64Mwe 29/9/15)



Power Generation at Generator Terminals (Gross) - 83.25 MWe

ACTUAL LOAD CASE STG CS TIME: 16/10/2015 1:05PM	Units	HPT Inlet	HPT Ext1 (HPH2)	HPT Exhaust (MSR+HPH1)	LPT Inlet	LPT Ext1 (DEA)	LPT Ext2 (LPH3)	LPT Ext3 (LPH2)	LPT Ext4 (LPH1)	LPT Exhaust
Pressure	bar(a)	56.7	23.3	11.0	8.9	3.5	1.5	1.000	0.8	0.078
Temperature	DegC	350.16	243.5	228.5	256.4	186.5	126.32	105	98	41
Superheat	DegC	80	24	45	82	48	15	6	5	0
Dryness fraction		Enth OOR	Enth OOR	0.976	Enth OOR	Enth OOR	0.98	0.96	0.95	0.877
Enthalpy (with actual blade group eff.)	kJ/kg	3058	2876	2731	2962	2799	2654	2587	2553	2280
Specific Entropy	kJ/kg.DegC	6.38	6.43	6.44	7.01	7.09	7.11	7.12	7.13	7.29
Isentropic Enthalpy (hs)	kJ/kg	2846.5	2721.1	2698.2	2761.3	2642.8	2580.5	2548.1	2225.6	2190.0
Actual DP by blade group		2.43	2.13	5.17	2.51	2.32	1.52	1.25	10.20	
BASE CASE DP by blade group for comparison only		2.49	2.44	6.08	1.91	2.05	2.93	2.08	6.63	
Blade group Efficiency (derived from BASE Case HMBD)	%	85.83%	93.93%		81.00%	92.95%	91.09%	86.89%	83.34%	
Mass Flow rate	kg/s	95.16	94.7		75.3	71.4	71.4	71.4	71.4	
Actual Power O/P Stage wise	MW(mech)	17.2	13.8		12.2	10.4	4.8	2.4	19.5	
Generator Eff. (at 50% Load at brushless excitation and Rated PF)	%	98.28%								
Actual Power O/P Stage wise	MW(elec)	16.9	13.6		12.0	10.2	4.7	2.4	19.1	
Actual Power O/P Total (Calculated)	**MW(elec)**	78.97								
Steam Rate (Actual) Stage wise	T/MWe	20.22	25.10		22.55	25.16	54.81	108.28	13.42	
Steam Rate (Actual) Overall	T/MWe	4.34								

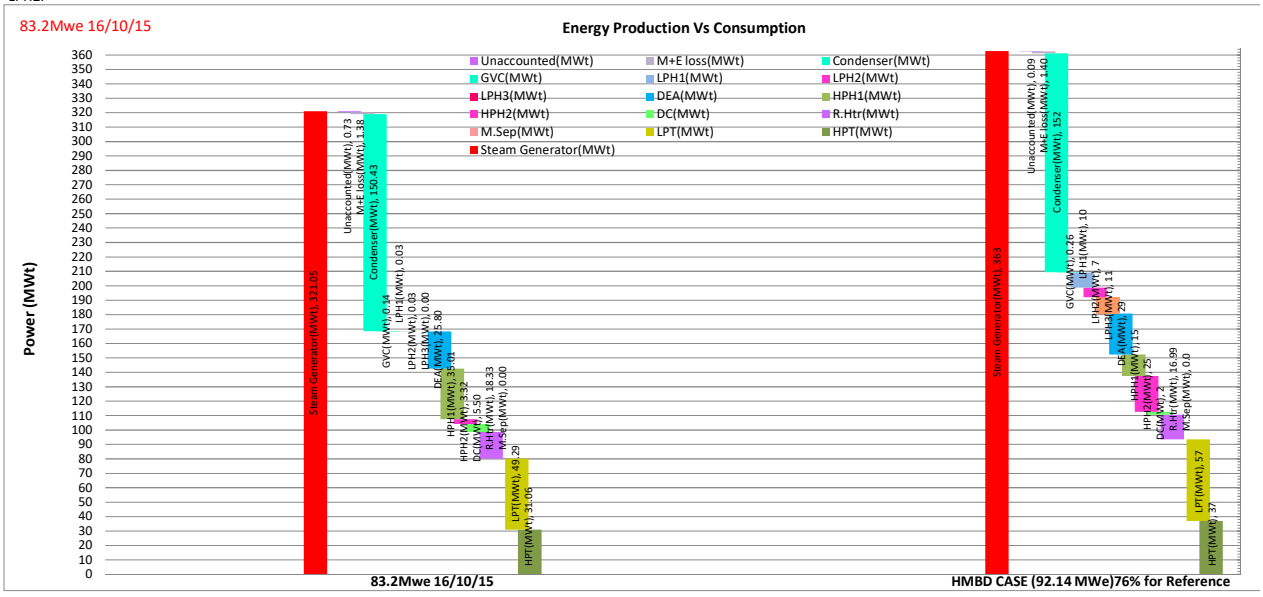
Isentropic Power O/P Stage wise	MW(mech)	20.1	14.7		15.1	11.2	5.2	2.8	23.4	
Isentropic Power O/P Stage wise	**MW(elec)**	**19.7**	**14.5**		**14.8**	**11.0**	**5.1**	**2.7**	**23.0**	
Isentropic Power O/P Total	**MW(elec)**	90.89								
Steam Expansion Turbine Efficiency (Isentropic Vs Actual)	**%**	86.89%								
Isentropic Efficiency (expansion) for reference	%	100.00%								
Isentropic Vs Actual Power O/P difference (stage wise)	%	14.2%	6.1%		19.0%	7.1%	8.9%	13.1%	16.7%	
Isentropic Vs Actual Power O/P difference Total	**%**	**12.1%**	99.0%							
Steam Rate (Theo) Stage wise	T/MWe	17.35	23.58		18.27	23.39	49.92	94.08	11.18	
Steam Rate (Theo) Overall	T/MWe	3.77								

Feed water Heater Power Table:

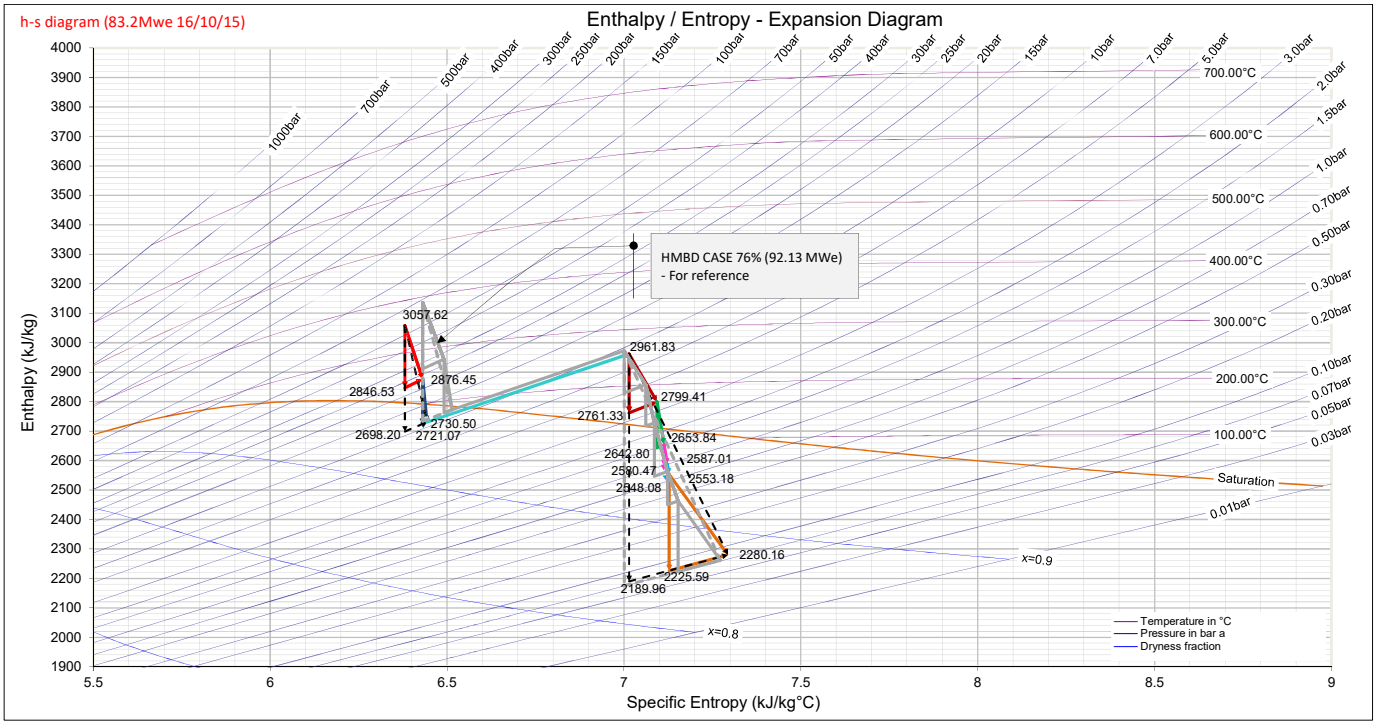
ACTUAL LOAD CASE STG CS TIME: 29/9/2015 1:33PM		DC	HPH2	HPH1	DEA	LPH3	LPH2	LPH1
FW/Condensate Temp I/L to Heater	DegC	150.8	148.9	142.1	41.6	41.64	41.57	41.5
FW/Condensate Enthalpy I/L to Heater	kJ/kg	636	627	598	174	174	174	174
Condensate Flow I/L to Heater	TPH	407.8	407.8	407.8	338	338	338	338
Condensate Flow I/L to Heater	kg/s	113	113	113	94	94	94	94
Heater drain Temp	DegC	151	149	148	N/A	41	38	36
Heater drain Enthalpy	kJ/kg	636	629	623	N/A	173	157	151
Bleed steam Flow	kg/s	N/A	0.44	1.6	3.91	0.0	0.0	0.0
Bleed steam Flow	TPH	N/A	1.6	5.6	14.1	0.0	0.0	0.0
Bleed steam Power Equivalent	**MWe**	**N/A**	**0.3**	**0.9**	**9.3**	**0.0**	**0.0**	**0.0**
Bleed Steam Heat (MWt)	MWt	N/A	1.0	3.3	8.6	0.00	0.03	0.03
STG O/P lost for FWH (MWe)	MWe	N/A	0.9	2.7	5.1	0.00	0.01	0.01
FW heat gain/STG Power O/P	%	N/A	8%	19%	41%	#DIV/0!	69%	72%

Notes:

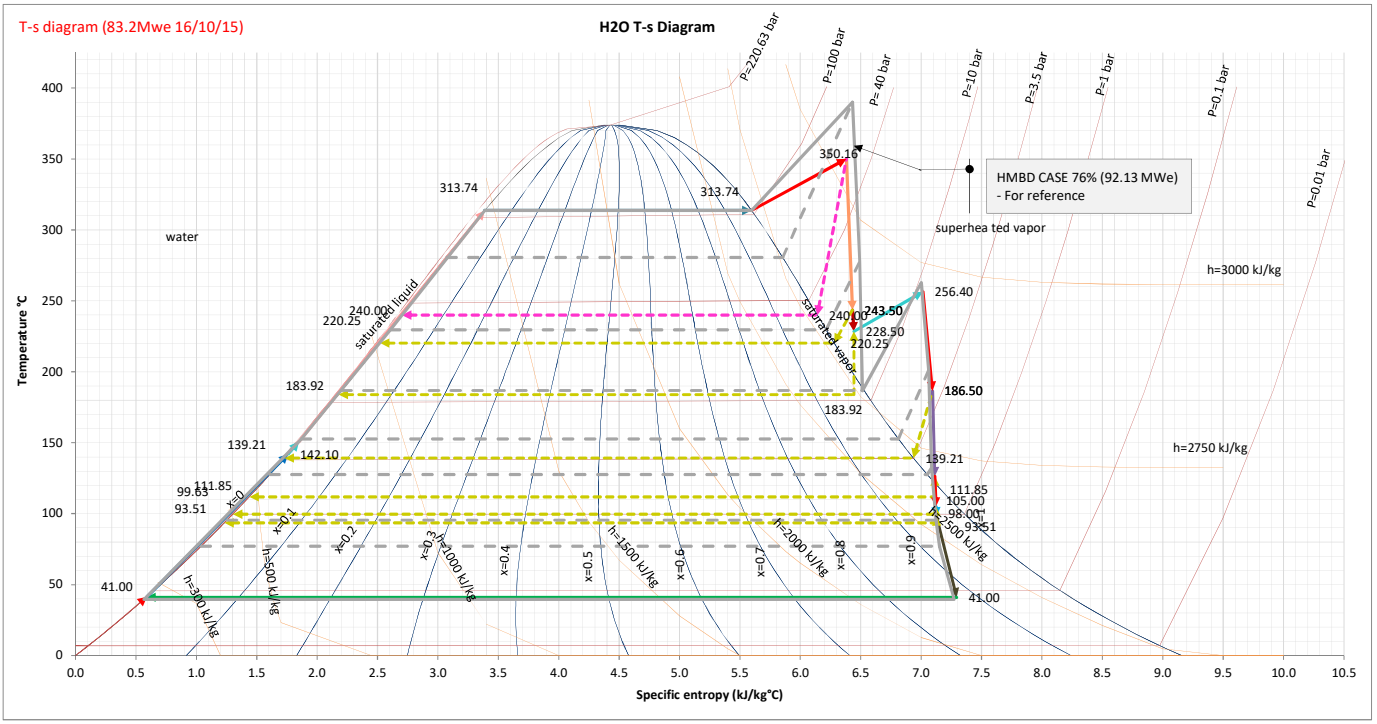
1. Condensate flow across LPH2, LPH3 and I/L to DEA is not ascertainable. The Drain FW pumps are provided with CV in series shall continuously vary the condensate flow at the I/L of LPH2.



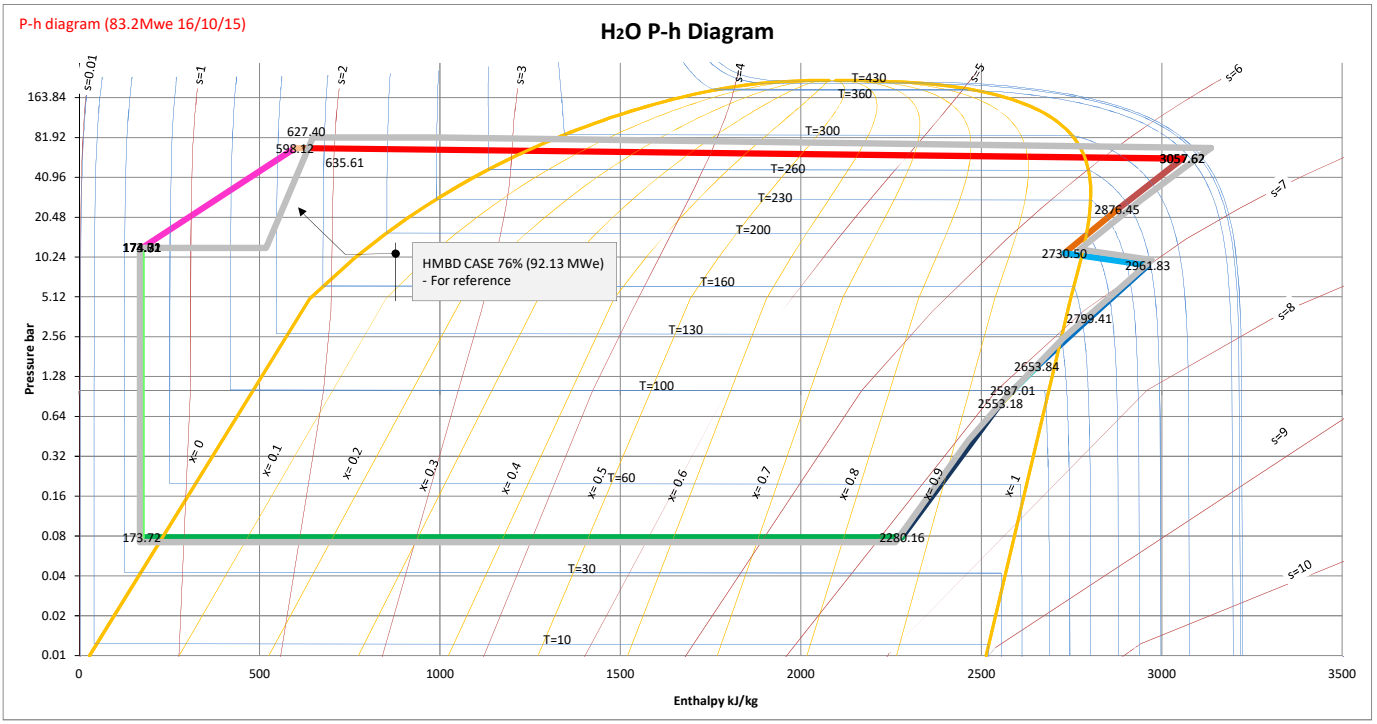
h-s diagram (83.2Mwe 16/10/15)



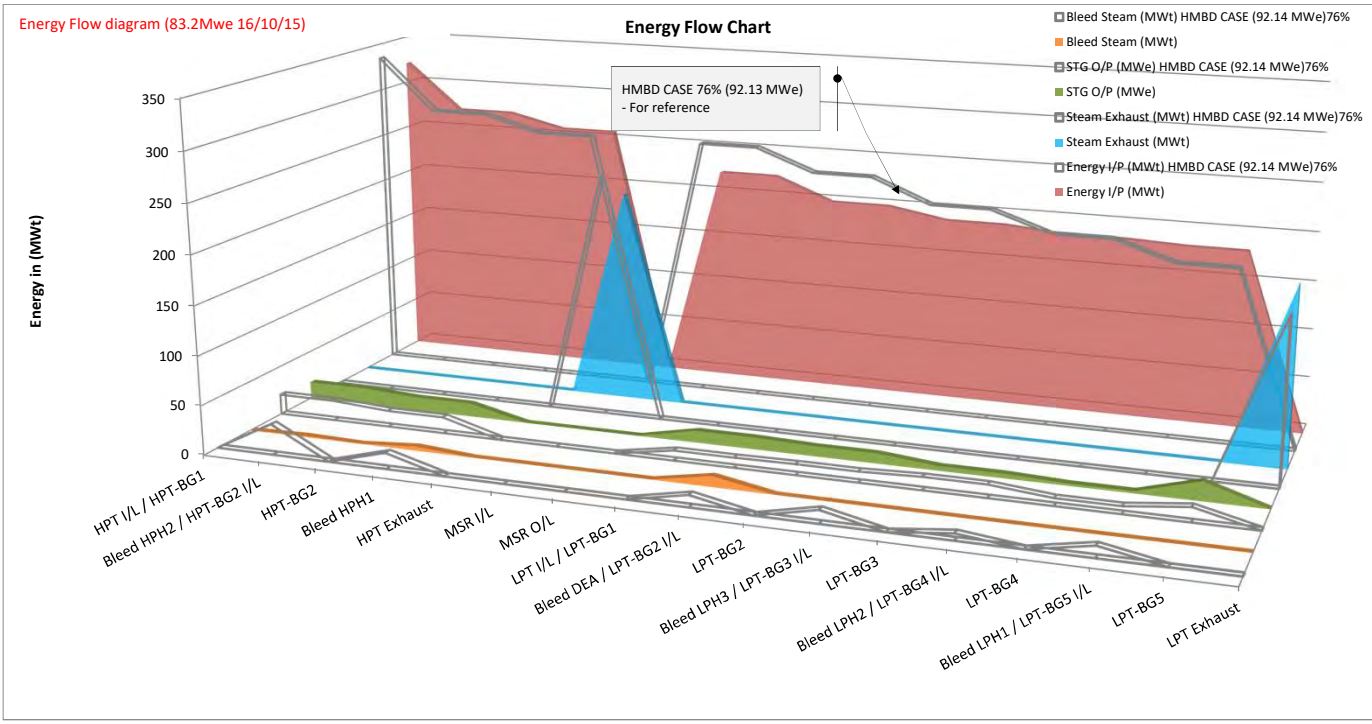
T-s diagram (83.2Mwe 16/10/15)



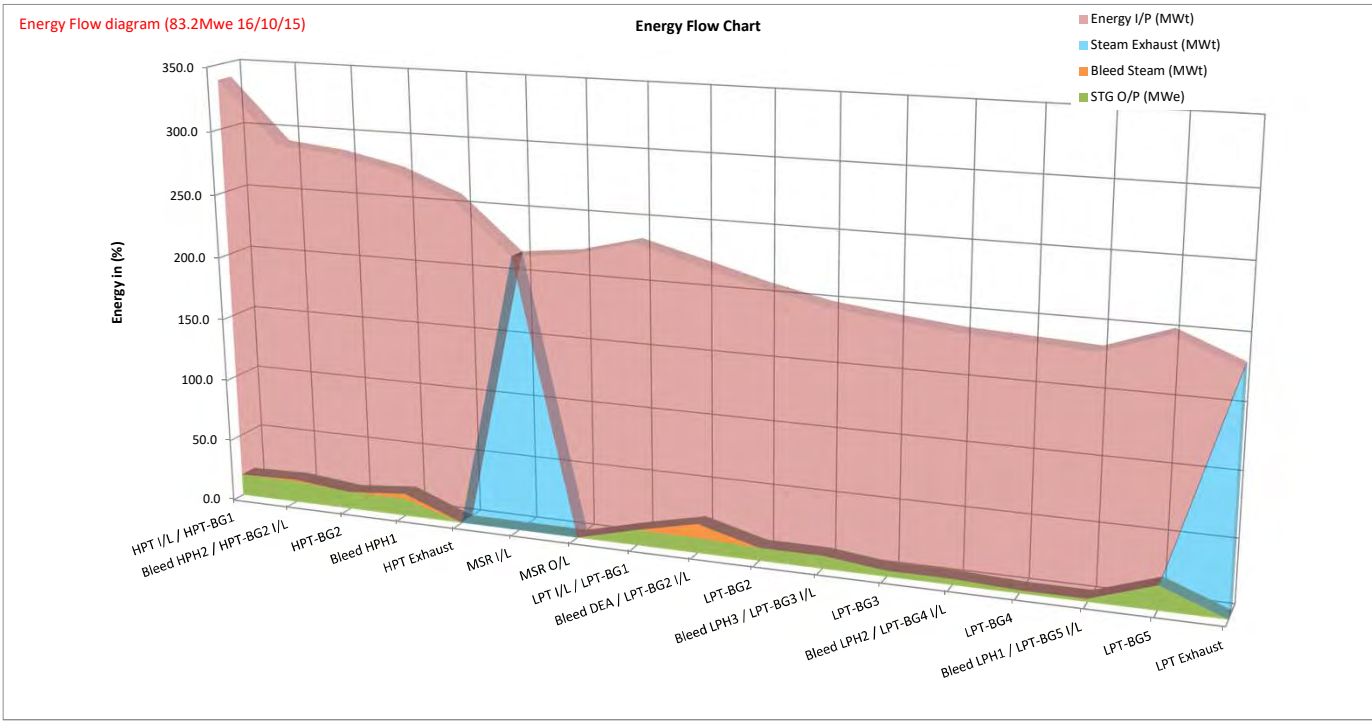
P-h diagram (83.2Mwe 16/10/15)



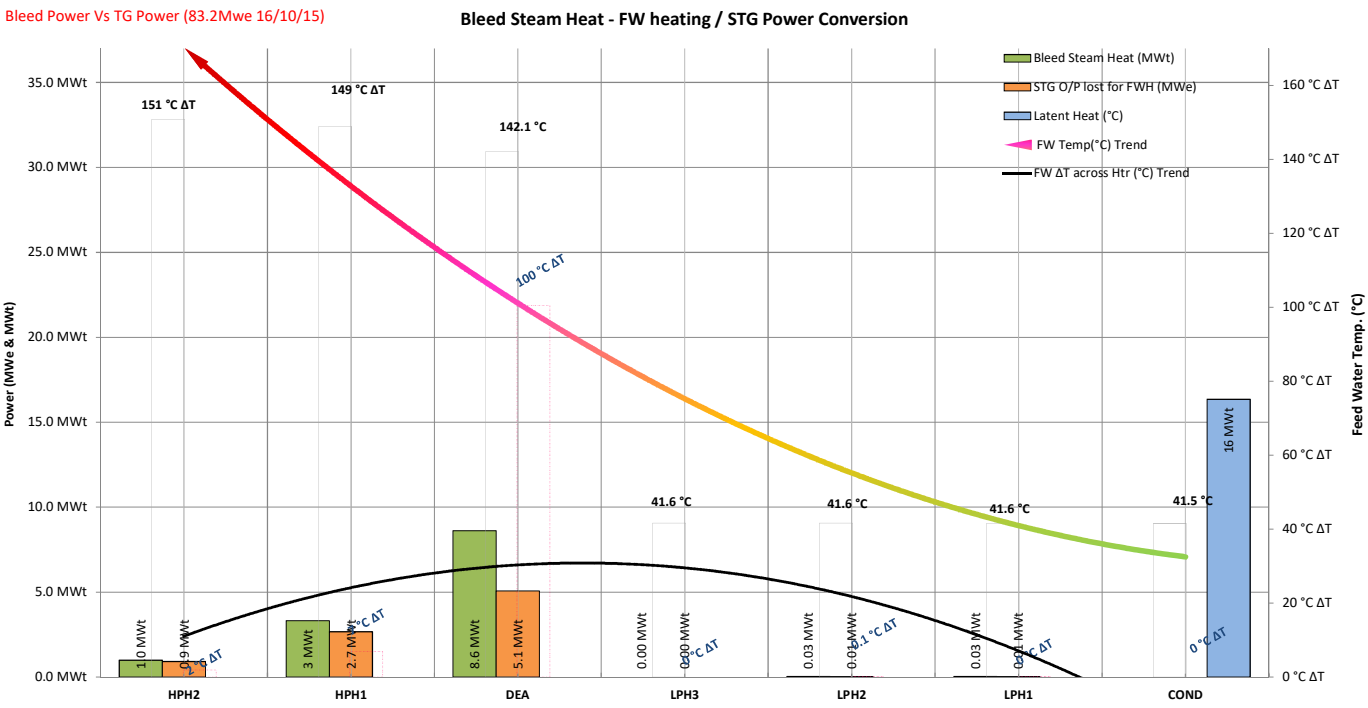
Energy Flow diagram (83.2Mwe 16/10/15)



Energy Flow diagram (83.2Mwe 16/10/15)



Bleed Power Vs TG Power (83.2Mwe 16/10/15)



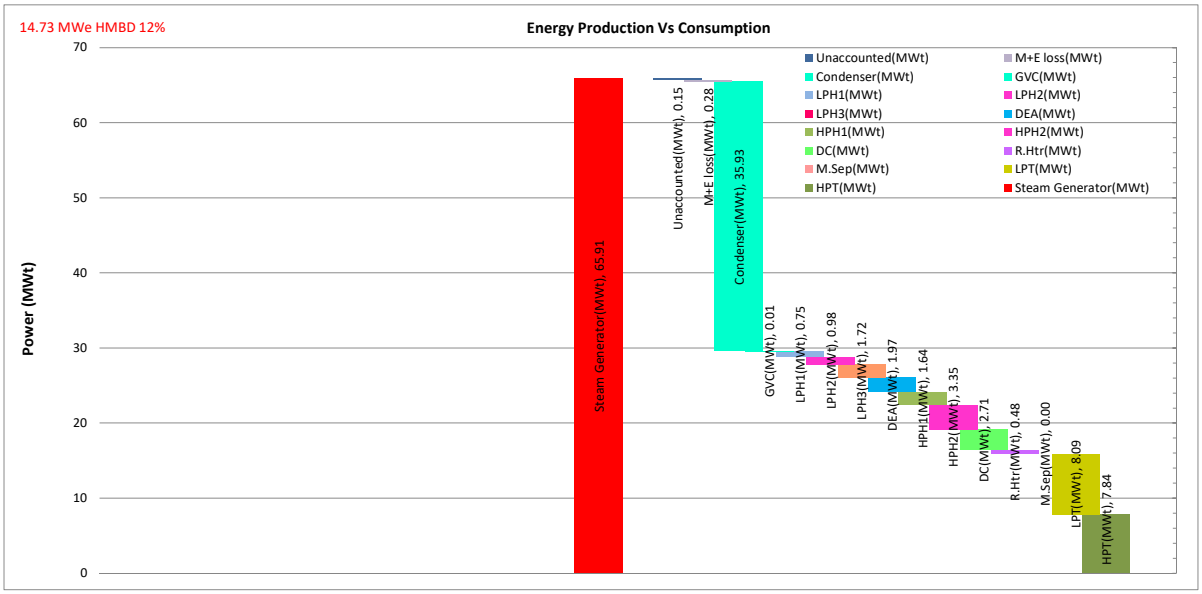
HMBD CASE 12% Min Load (14.73 MWe)	Units	HPT Inlet	HPT Ext1 (HPH2)	HPT Exhaust (MSR+HPH1)	LPT Inlet	LPT Ext1 (DEA)	LPT Ext2 (LPH3)	LPT Ext3 (LPH2)	LPT Ext4 (LPH1)	LPT Exhaust
Pressure	bar(a)	13.46	5.53	2.12	1.89	1	0.5	0.17	0.09	0.053
Temperature	DegC	390	284	178.8	191.5	138.7	81.3	57.2	43.9	33.8
Superheat	DegC	197.7	129.1	57.3	73.7	39.6	0.4	1.0	0.5	0.2
Enthalpy (with actual blade group eff.)	kJ/kg	3237.3	3030.0	2827.2	2854.1	2754.0	2642.8	2498.5	2415.0	2373.2
Dryness fraction		1.00	1.00	1.00	1.00	1.00	1.00	0.96	0.94	0.93
DP by blade group		2.43	2.61	**6.35**		1.89	2.00	2.94	1.89	**1.70**

Mass Flow rate	kg/s	20.16	18.73		18.09	17.53	16.81	16.41	16.10	
Actual Power O/P Stage wise	MW(mech)	4.2	3.8		1.8	1.9	2.4	1.4	0.7	
Generator Eff. (at 50% Load at brushless excitation and Rated PF)	%	98.28%								
Actual Power O/P Stage wise	**MW(elec)**	**4.1**	**3.7**		**1.8**	**1.9**	**2.4**	**1.3**	**0.7**	
Actual Power O/P Total	**MW(elec)**	15.9	108.1%							
Power O/P mentioned in HMBD (for reference)	MW(elec)	14.73								
Steam Rate (Actual) Stage wise	T/MWe	17.67	18.06		36.61	32.94	25.38	43.87	87.63	
Steam Rate (Actual) Overall	T/MWe	**4.56**								

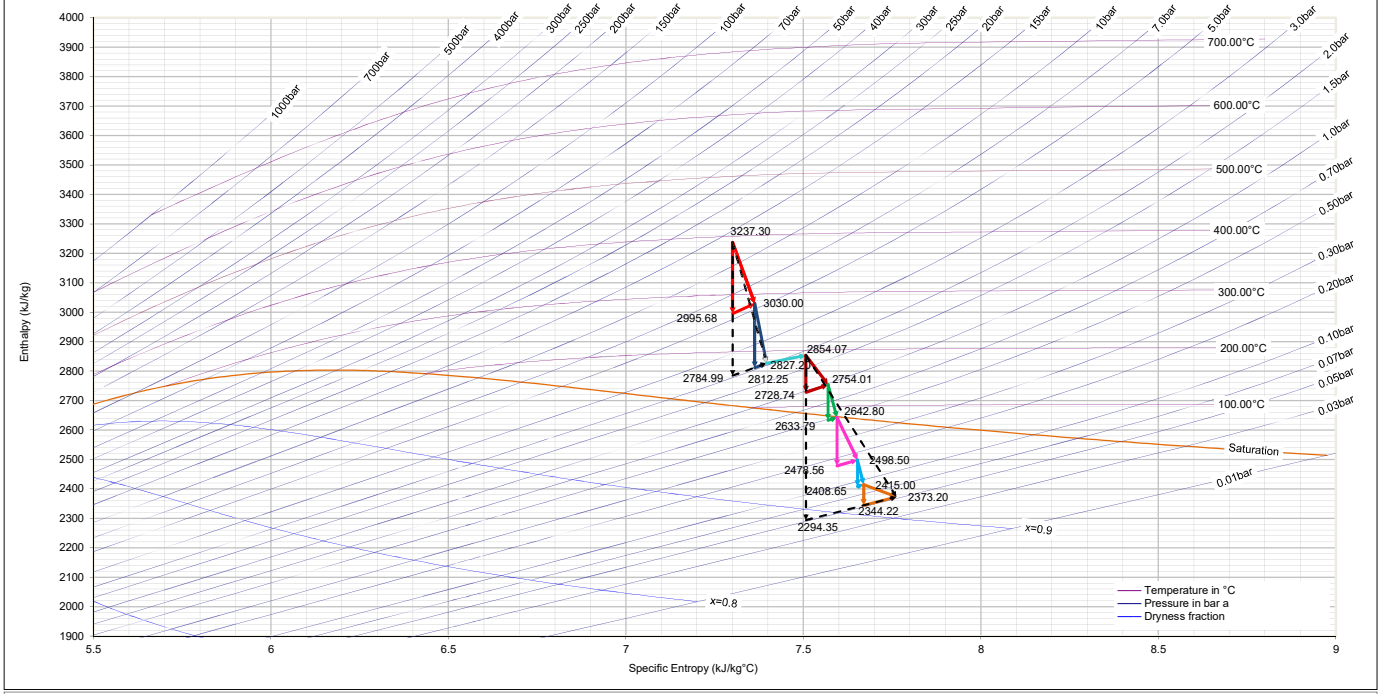
Specific Entropy	kJ/kg.DegC	7.3	7.4	7.4	7.5	7.6	7.6	7.7	7.7	7.8
Isentropic Enthalpy (hs)	kJ/kg	2995.7	2812.2	2785.0	2728.7	2633.8	2478.6	2408.6	2344.2	2294.4
Blade Group Efficiency	%		85.80%	93.13%		79.84%	92.51%	87.86%	92.93%	59.06%
Isentropic Power O/P Stage wise	MW(mech)	4.9	4.1		2.3	2.1	2.8	1.5	1.1	
Isentropic Power O/P Stage wise	**MW(elec)**	**4.8**	**4.0**		**2.2**	**2.1**	**2.7**	**1.4**	**1.1**	
Isentropic Power O/P Total	**MW(elec)**	18.4								
Steam Expansion Turbine Efficiency (Isentropic Vs Actual)	**%**	80.15%								
Isentropic Efficiency (expansion) for reference	%	100.00%								
Isentropic Vs Actual Power O/P loss (stage wise)	%	14.2%	6.9%		20.2%	7.5%	12.1%	7.1%	40.9%	
Total Isentropic Vs Actual Power O/P loss	**%**	**15.6%**	95.71%							
Steam Rate (Theo) Stage wise	T/MWe	15.16	16.82		29.23	30.47	22.30	40.77	51.75	
Steam Rate (Theo) Overall	T/MWe	**3.95**								

Feed water Heater Power Table:

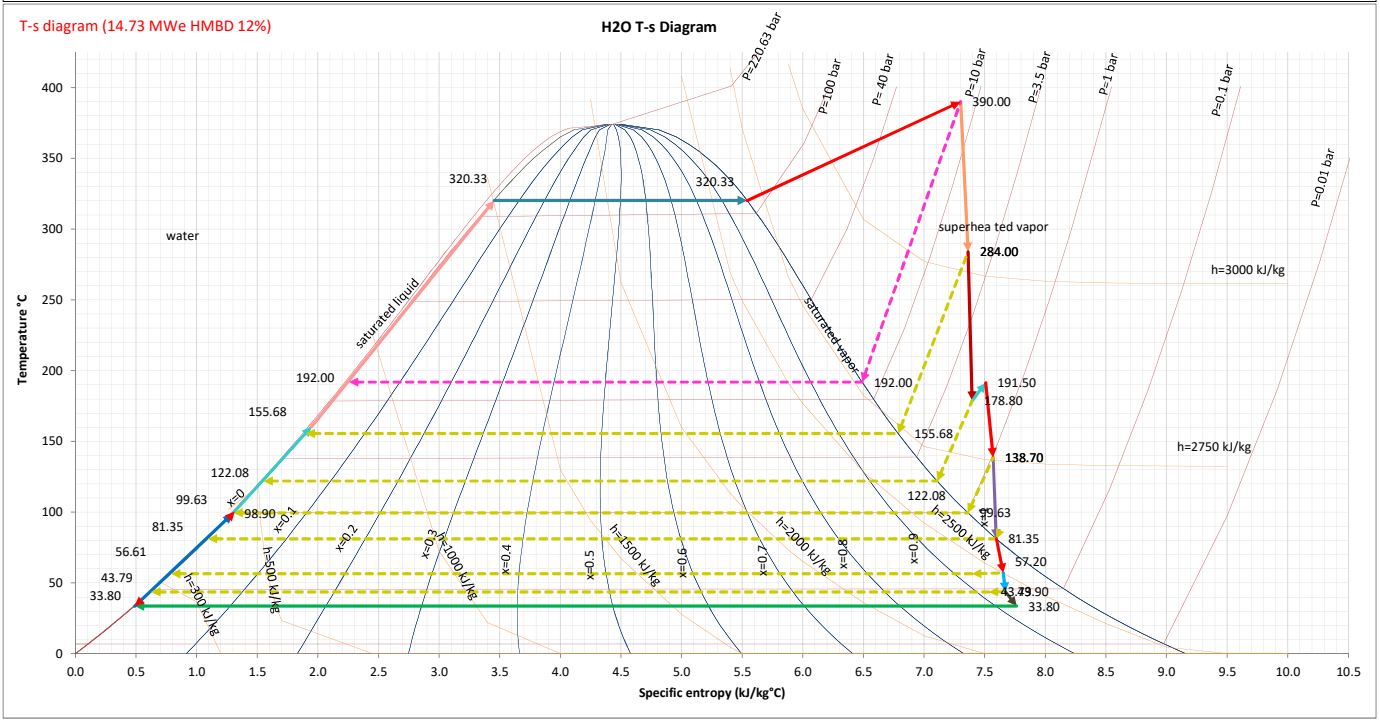
BASE CASE HMBD		DC	HPH2	HPH1	DEA	LPH3	LPH2	LPH1
FW/Condensate Temp I/L to Heater	DegC	160.4	121.2	100.5	80.6	57.2	43.9	33.7
FW/Condensate Enthalpy I/L to Heater	kJ/kg	683.4	516.5	429.4	337.4	239.4	183.8	141.1
Condensate Flow I/L to Heater	kg/s	20	20	20	18	18	18	16
Condensate Flow I/L to Heater	TPH	188	196	199	174	177	178	164
Heater drain Enthalpy	kJ/kg	699.2	509.3	421.5	N/A	239.3	183.9	183.9
Bleed steam Flow	kg/s	N/A	1.3	0.7	1.0	0.7	0.4	0.3
Bleed steam Flow	TPH	N/A	4.5	2.6	3.7	2.6	1.5	1.1
Bleed steam Power Equivalent	**MWe**	**N/A**	**0.7**	**0.3**	**0.3**	**0.15**	**0.08**	**0.02**
Bleed Steam Heat (MWt)	MWt	N/A	3.5	1.6	1.3	1.7	0.9	0.7
STG O/P lost for FWH (MWe)	MWe	N/A	0.9	0.3	0.2	0.2	0.05	0.01
FW heat gain/STG Power O/P	%	N/A	74%	80%	84%	89.0%	95%	98%



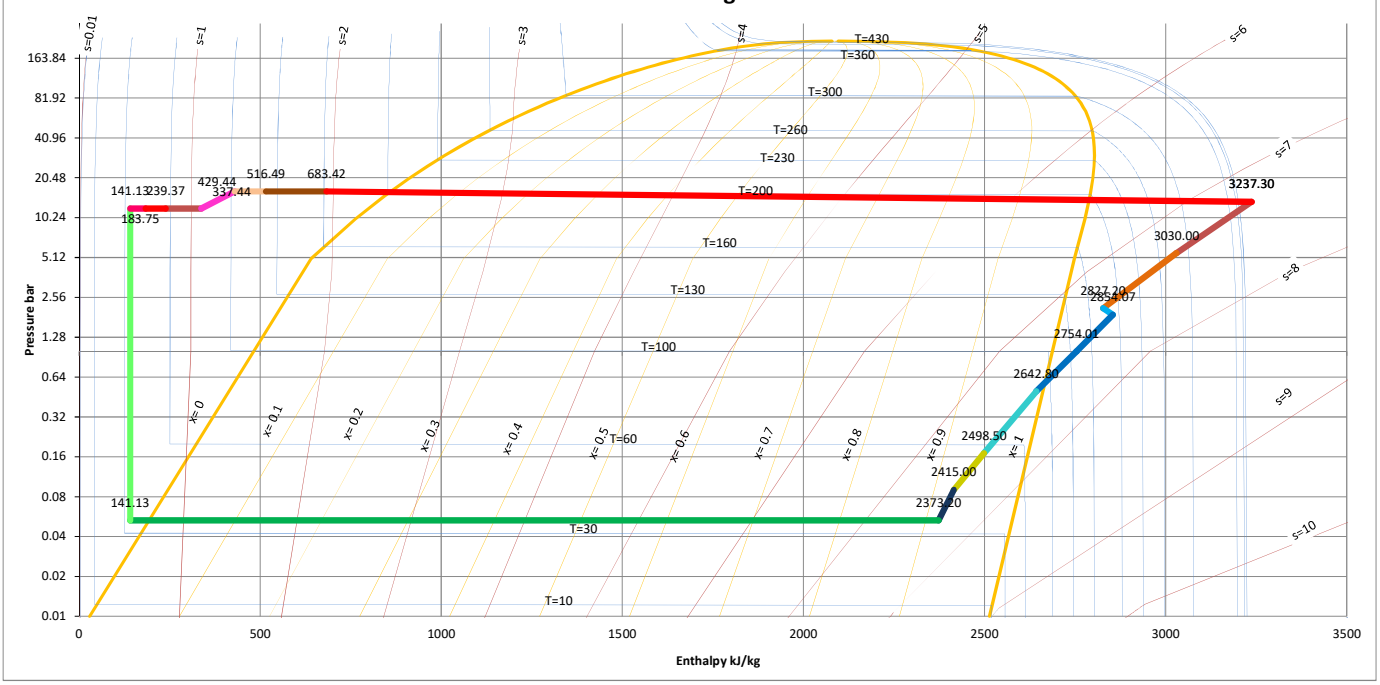
h-s diagram (14.73 MWe HMBD 12%)



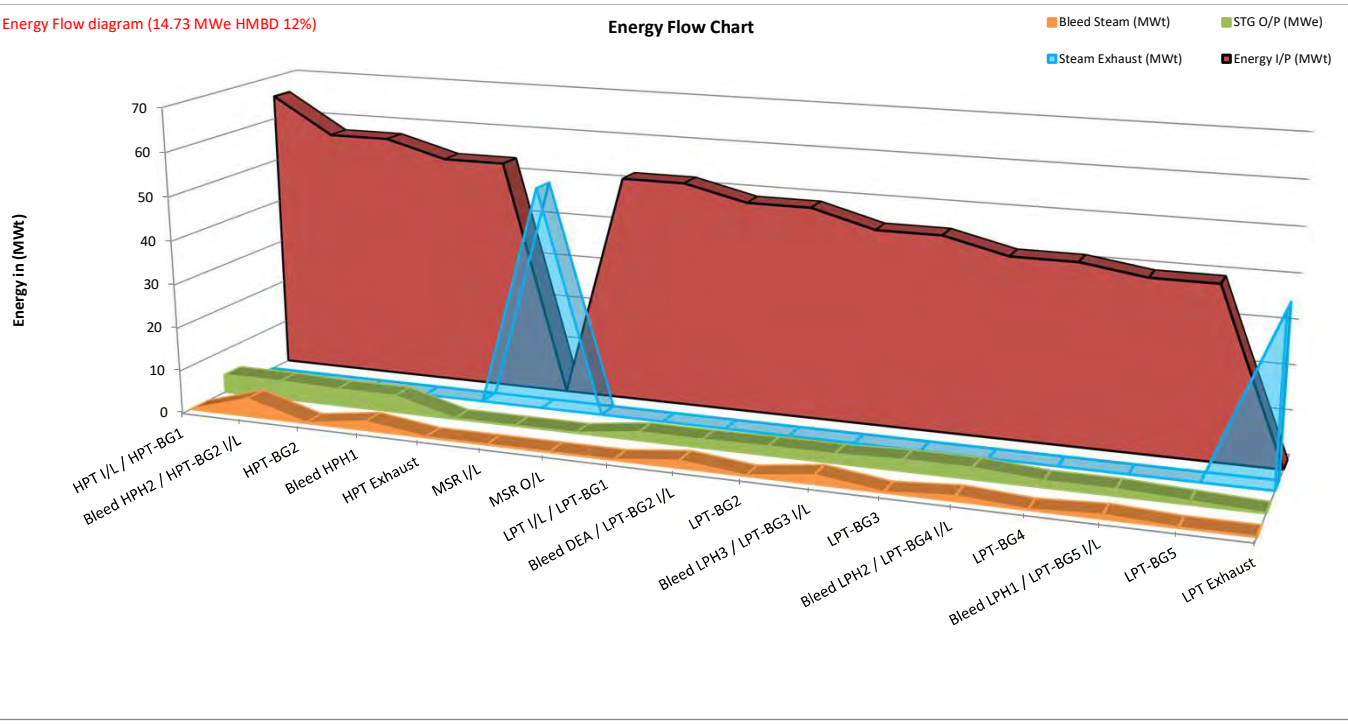
T-s diagram (14.73 MWe HMBD 12%)



P-h diagram (14.73 MWe HMBD 12%)

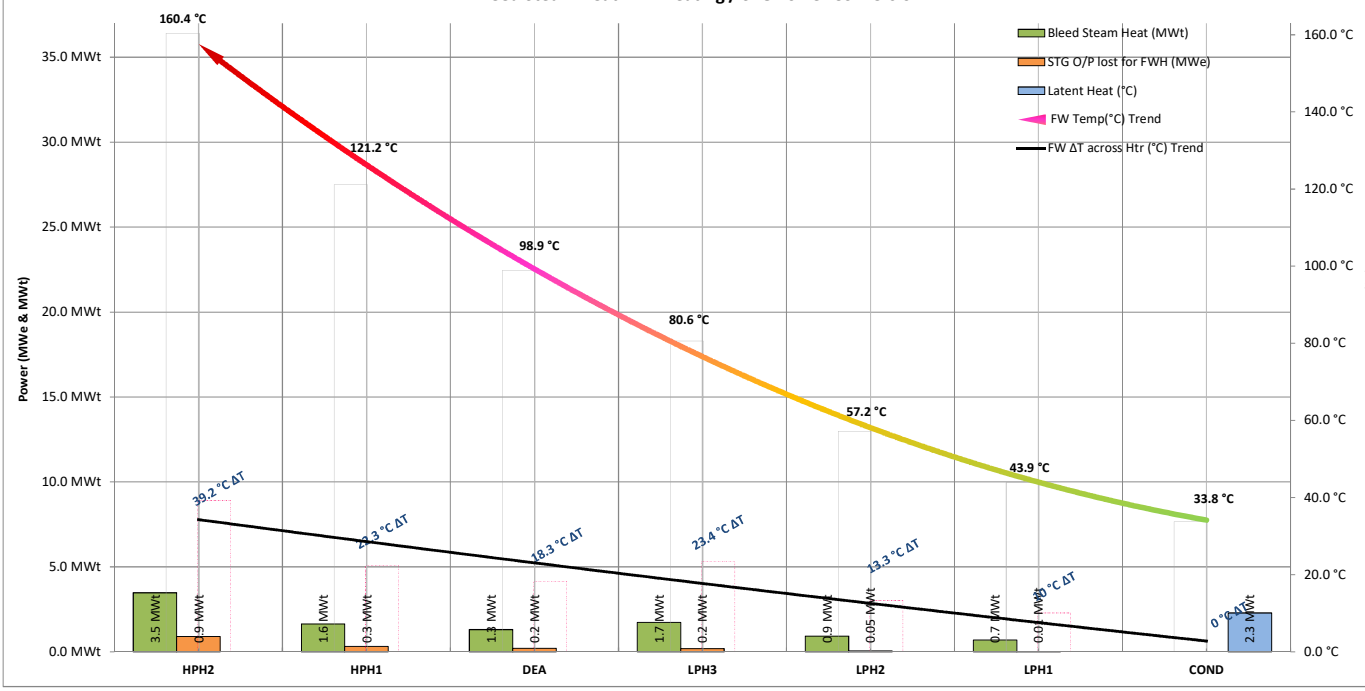


Energy Flow diagram (14.73 MWe HMBD 12%)



Energy Flow diagram (14.73 MWe HMBD 12%)

Bleed Energy Vs TG Power (14.73 MWe HMBD 12%)



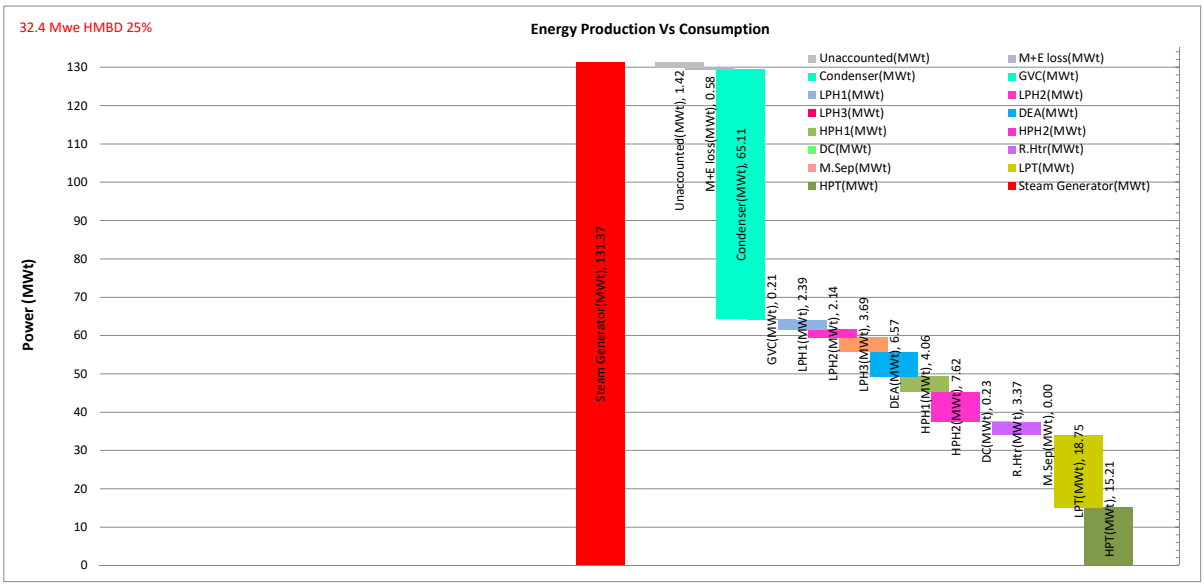
HMBD CASE 25% (32.4MWe)	Units	HPT Inlet	HPT Ext1 (HPH2)	HPT Exhaust (MSR+HPH1)	LPT Inlet	LPT Ext1 (DEA)	LPT Ext2 (LPH3)	LPT Ext3 (LPH2)	LPT Ext4 (LPH1)	LPT Exhaust
Pressure	bar(a)	26.03	10.62	4.13	3.71	1.95	0.97	0.33	0.17	0.057
Temperature	DegC	390	281.8	178.2	223.4	165.9	102.8	71.5	56.2	35.3
Superheat	DegC	164.9	100.1	34.1	83.2	47.1	4.6	0.6	0.2	0.4
Enthalpy (with actual blade group eff.)	kJ/kg	3215.8	3010.7	2814.0	2910.9	2802.0	2681.9	2528.2	2436.8	2328.2
Dryness fraction		1.00	1.00	1.00	1.00	1.00	1.00	0.96	0.94	0.91
DP by blade group		2.45	2.57	**6.30**		1.90	2.01	2.94	1.96	**2.95**

Mass Flow rate	kg/s	39.35	36.31		34.64	33.39	31.84	30.95	29.86	
Actual Power O/P Stage wise	MW(mech)	8.1	7.1		3.8	4.0	4.9	2.8	3.2	
Generator Eff. (at 50% Load at brushless excitation and Rated PF)	%	98.28%								
Actual Power O/P Stage wise	**MW(elec)**	**7.9**	**7.0**		**3.7**	**3.9**	**4.8**	**2.8**	**3.2**	
Actual Power O/P Total	**MW(elec)**	**33.38**	103.0%							
Power O/P mentioned in HMBD (for reference)	MW(elec)	32.40								
Steam Rate (Actual) Stage wise	T/MWe	17.86	18.62		33.62	30.50	23.83	40.08	33.73	
Steam Rate (Actual) Overall	T/MWe	**4.24**								

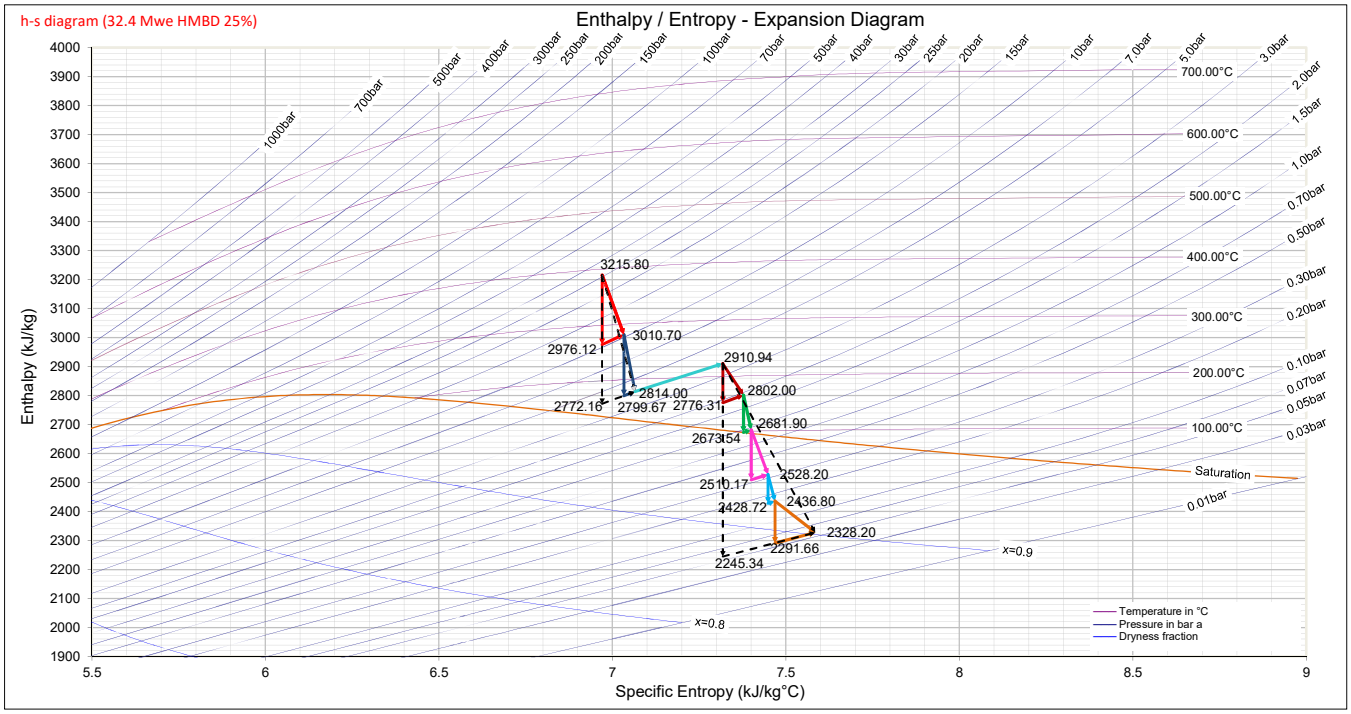
Specific Entropy	kJ/kg.DegC	6.97	7.03	7.06	7.32	7.38	7.40	7.45	7.47	7.58
Isentropic Enthalpy (hs)	kJ/kg	2976.1	2799.7	2772.2	2776.3	2673.5	2510.2	2428.7	2291.7	2245.3
Blade Group Efficiency	%		85.57%	93.21%		80.92%	93.50%	89.50%	91.88%	74.82%
Isentropic Power O/P Stage wise	MW(mech)	9.4	7.7		4.7	4.3	5.5	3.1	4.3	
Isentropic Power O/P Stage wise	**MW(elec)**	**9.3**	**7.5**		**4.6**	**4.2**	**5.4**	**3.0**	**4.3**	
Isentropic Power O/P Total	**MW(elec)**	**38.3**								
Steam Expansion Turbine Efficiency (Isentropic Vs Actual)	**%**	84.69%								
Isentropic Efficiency (expansion) for reference	%	100.00%								
Isentropic Vs Actual Power O/P loss (stage wise)	%	14.4%	6.8%		19.1%	6.5%	10.5%	8.1%	25.2%	
Total Isentropic Vs Actual Power O/P loss	**%**	**12.9%**	97.63%							
Steam Rate (Theo) Stage wise	T/MWe	15.28	17.36		27.21	28.52	21.33	36.82	25.24	
Steam Rate (Theo) Overall	T/MWe	**3.70**								

Feed water Heater Power Table:

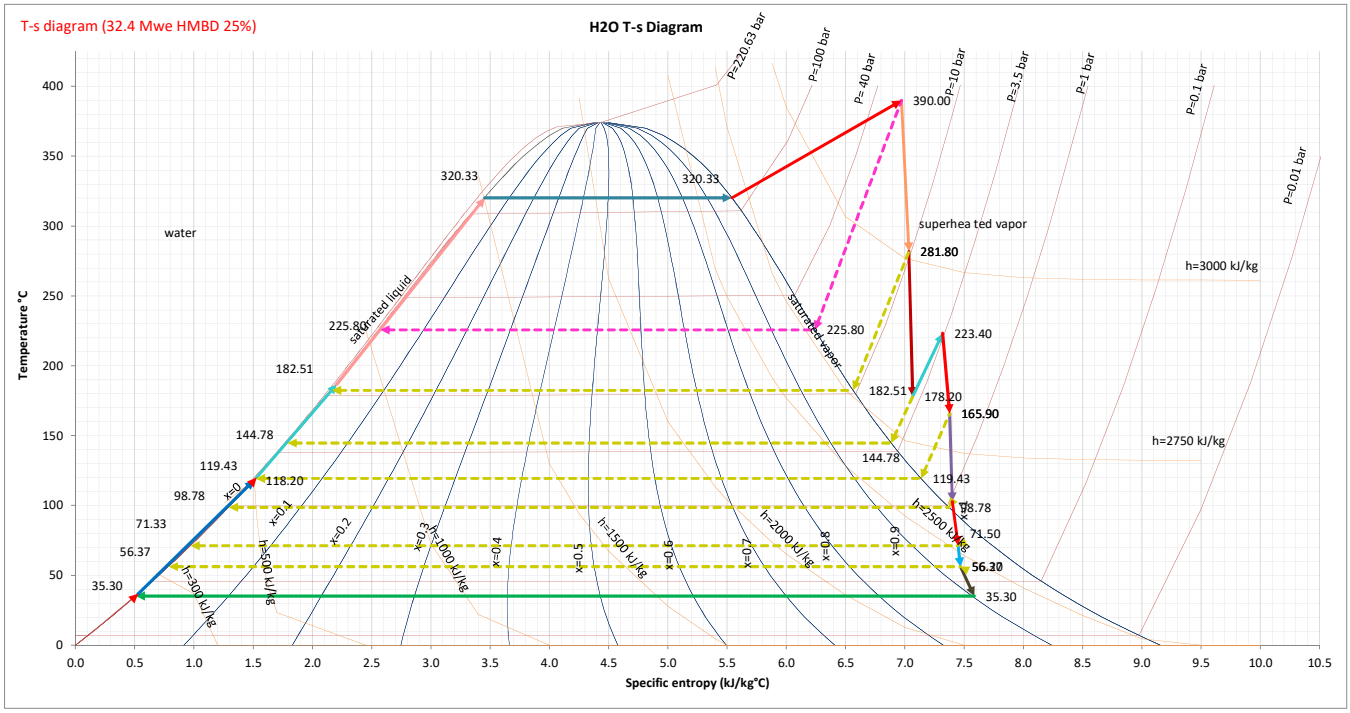
BASE CASE HMBD		DC	HPH2	HPH1	DEA	LPH3	LPH2	LPH1
FW/Condensate Temp I/L to Heater	DegC	186.7	143.5	120	97.3	71	55.8	36.7
FW/Condensate Enthalpy I/L to Heater	kJ/kg	797.7	611.0	511.4	407.7	297.2	233.5	153.7
Condensate Flow I/L to Heater	kg/s	41	41	41	33	33	33	30
Condensate Flow I/L to Heater	TPH	366	384	393	328	334	336	304
Heater drain Enthalpy	kJ/kg	815.6	604.7	504.3	N/A	298.3	233.7	234.2
Bleed steam Flow	kg/s	N/A	2.9	1.7	1.1	1.6	0.9	1.1
Bleed steam Flow	TPH	N/A	10.5	6.1	3.9	5.6	3.3	3.9
Bleed steam Power Equivalent	**MWe**	**N/A**	**1.6**	**0.8**	**0.4**	**0.5**	**0.3**	**0.2**
Bleed Steam Heat (MWt)	MWt	N/A	7.6	3.6	2.9	3.7	2.0	2.4
STG O/P lost for FWH (MWe)	MWe	N/A	2.3	0.9	0.6	0.5	0.2	0.1
FW heat gain/STG Power O/P	%	N/A	70%	75%	80%	85.4%	91%	95%



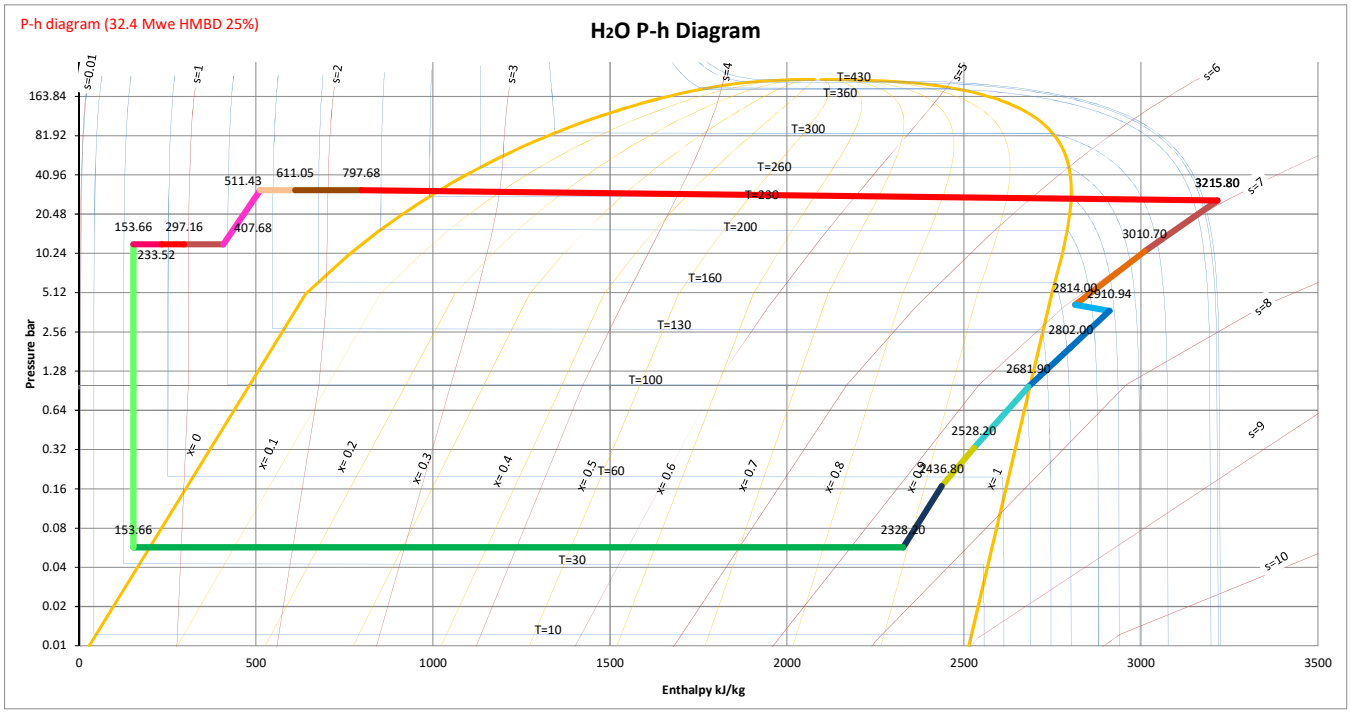
h-s diagram (32.4 Mwe HMBD 25%)



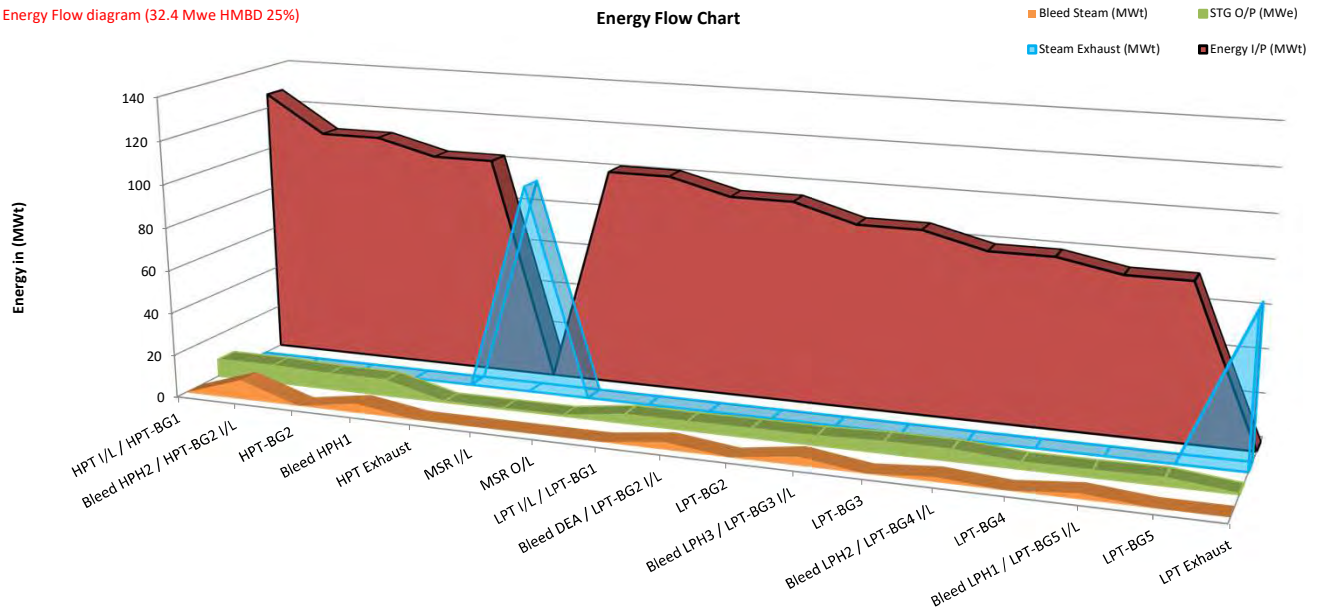
T-s diagram (32.4 Mwe HMBD 25%)



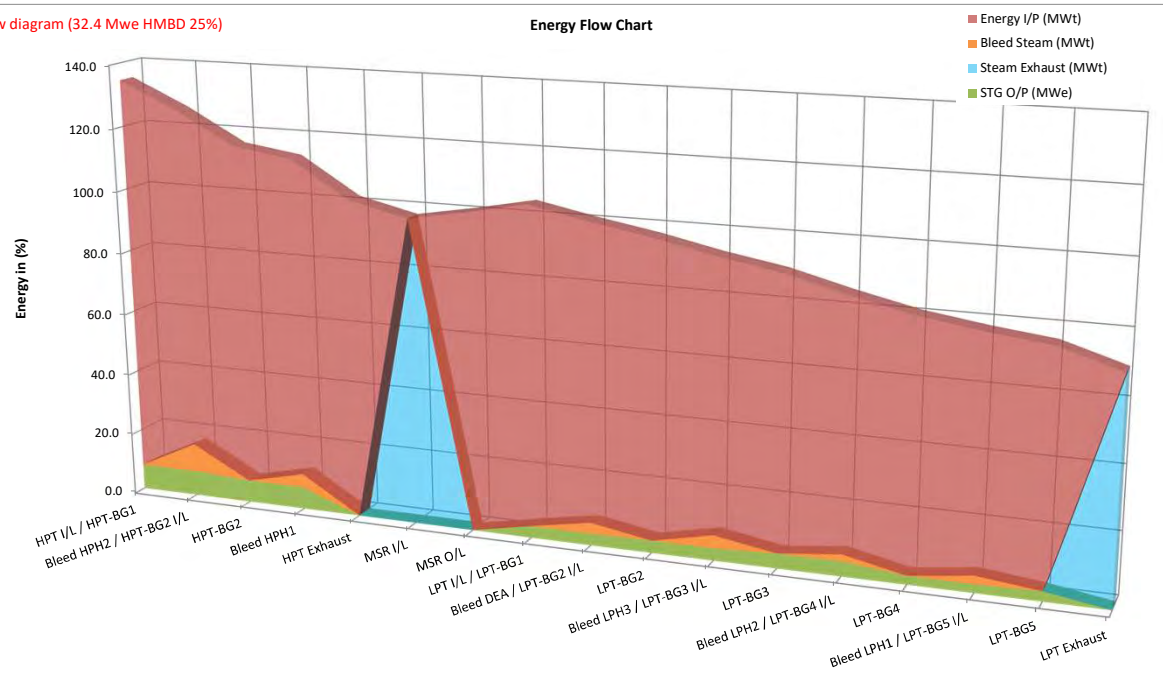
P-h diagram (32.4 Mwe HMBD 25%)



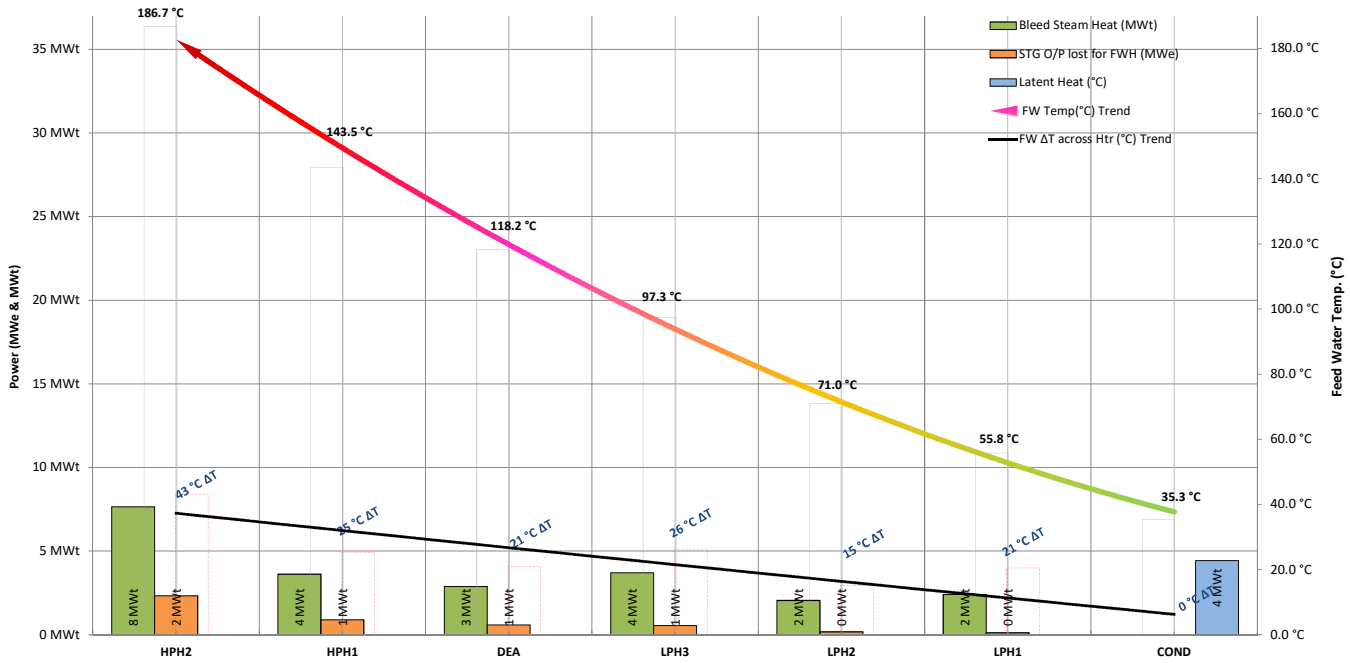
Energy Flow diagram (32.4 Mwe HMBD 25%)



Energy Flow diagram (32.4 Mwe HMBD 25%)



Bleed Energy Vs TG Power (32.4 Mwe HMBD 25%)



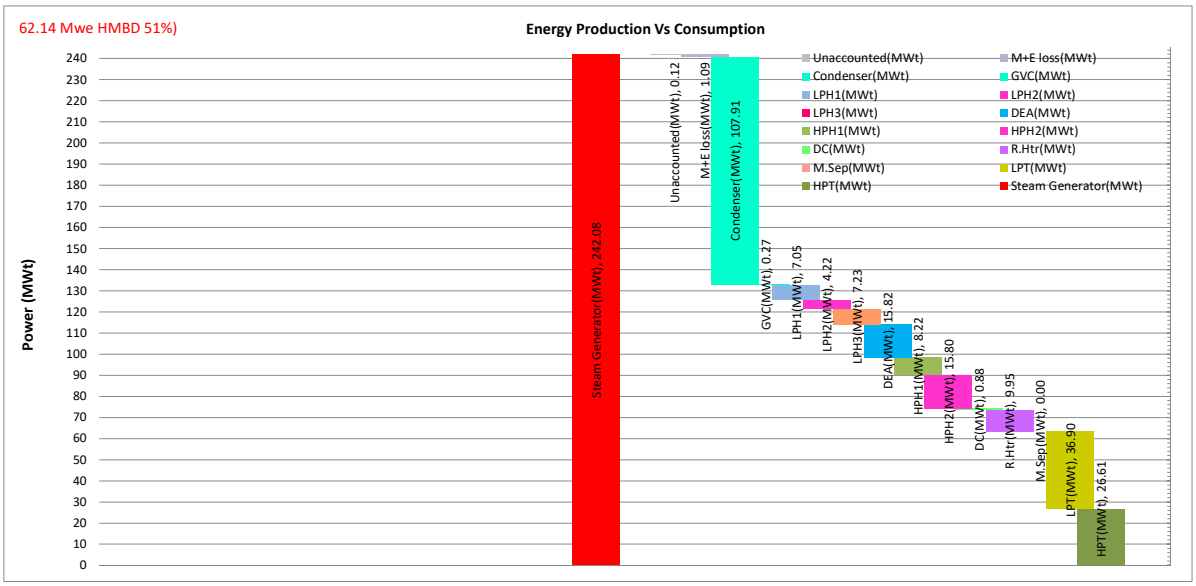
HMBD CASE 51% (62.14 MWe)	Units	HPT Inlet	HPT Ext1 (HPH2)	HPT Exhaust (MSR+HPH1)	LPT Inlet	LPT Ext1 (DEA)	LPT Ext2 (LPH3)	LPT Ext3 (LPH2)	LPT Ext4 (LPH1)	LPT Exhaust
Pressure	bar(a)	46.05	18.61	7.32	6.64	3.51	1.72	0.59	0.29	0.064
Temperature	DegC	390	278.6	176.8	248.8	190	122.9	85.5	68.3	37.4
Superheat	DegC	132.4	70.8	10.8	86.7	51.7	8.0	0.5	0.4	0.4
Enthalpy (with actual blade group eff.)	kJ/kg	3179.4	2978.5	2789.2	2952.9	2842.7	2715.2	2553.8	2457.2	2286.1
Dryness fraction		1.00	0.999	1.000	1.00	1.00	1.00	0.96	0.94	0.89
DP by blade group		2.47	2.54	**6.29**		1.89	2.04	2.92	2.03	**4.53**

Mass Flow rate	kg/s	71.33	64.89		60.9	58.32	55.25	53.49	50.7	
Actual Power O/P Stage wise	MW(mech)	14.3	12.3		6.7	7.4	8.9	5.2	8.7	
Generator Eff. (at 50% Load at brushless excitation and Rated PF)	%	98.28%								
Actual Power O/P Stage wise	**MW(elec)**	**14.1**	**12.1**		**6.6**	**7.3**	**8.8**	**5.1**	**8.5**	
Actual Power O/P Total	**MW(elec)**	62.42	100.5%							
Power O/P mentioned in HMBD (for reference)	MW(elec)	62.14								
Steam Rate (Actual) Stage wise	T/MWe	18.23	19.35		33.24	28.73	22.70	37.92	21.41	
Steam Rate (Actual) Overall	T/MWe	**4.11**								

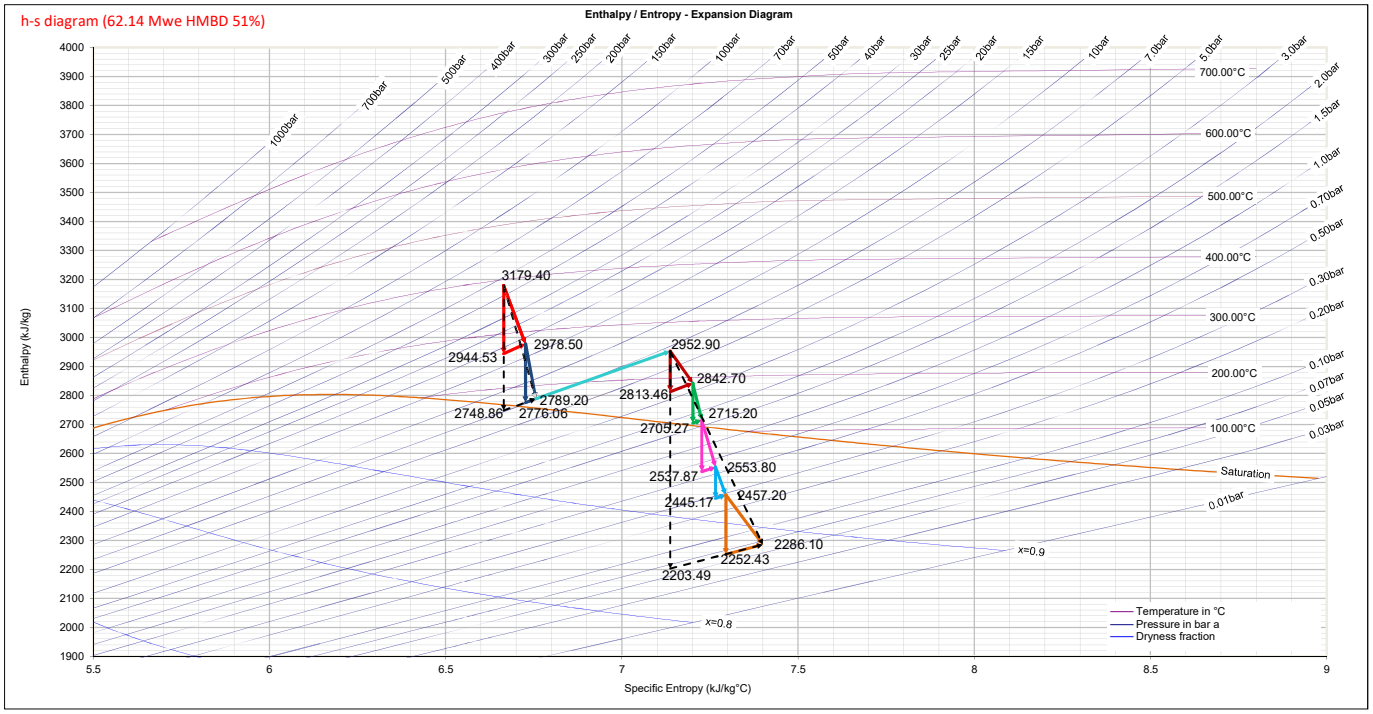
Specific Entropy	kJ/kg.DegC	6.7	6.7	6.8	7.1	7.2	7.2	7.3	7.3	7.4
Isentropic Enthalpy (hs)	kJ/kg	2944.5	2776.1	2748.9	2813.5	2705.3	2537.9	2445.2	2252.4	2203.5
Blade Group Efficiency	%		85.54%	93.51%		79.03%	92.77%	91.02%	88.93%	83.56%
Isentropic Power O/P Stage wise	MW(mech)	16.8	13.1		8.5	8.0	9.8	5.8	10.4	
Isentropic Power O/P Stage wise	**MW(elec)**	**16.5**	**12.9**		**8.3**	**7.9**	**9.6**	**5.7**	**10.2**	
Isentropic Power O/P Total	**MW(elec)**	71.1								
Steam Expansion Turbine Efficiency (Isentropic Vs Actual)	**%**	87.35%								
Isentropic Efficiency (expansion) for reference	%	100.00%								
Isentropic Vs Actual Power O/P loss (stage wise)	%	14.5%	6.5%		21.0%	7.2%	9.0%	11.1%	16.4%	
Total Isentropic Vs Actual Power O/P loss	**%**	**12.2%**	99.59%							
Steam Rate (Theo) Stage wise	T/MWe	15.60	18.09		26.27	26.65	20.66	33.72	17.89	
Steam Rate (Theo) Overall	T/MWe	**3.61**								

Feed water Heater Power Table:

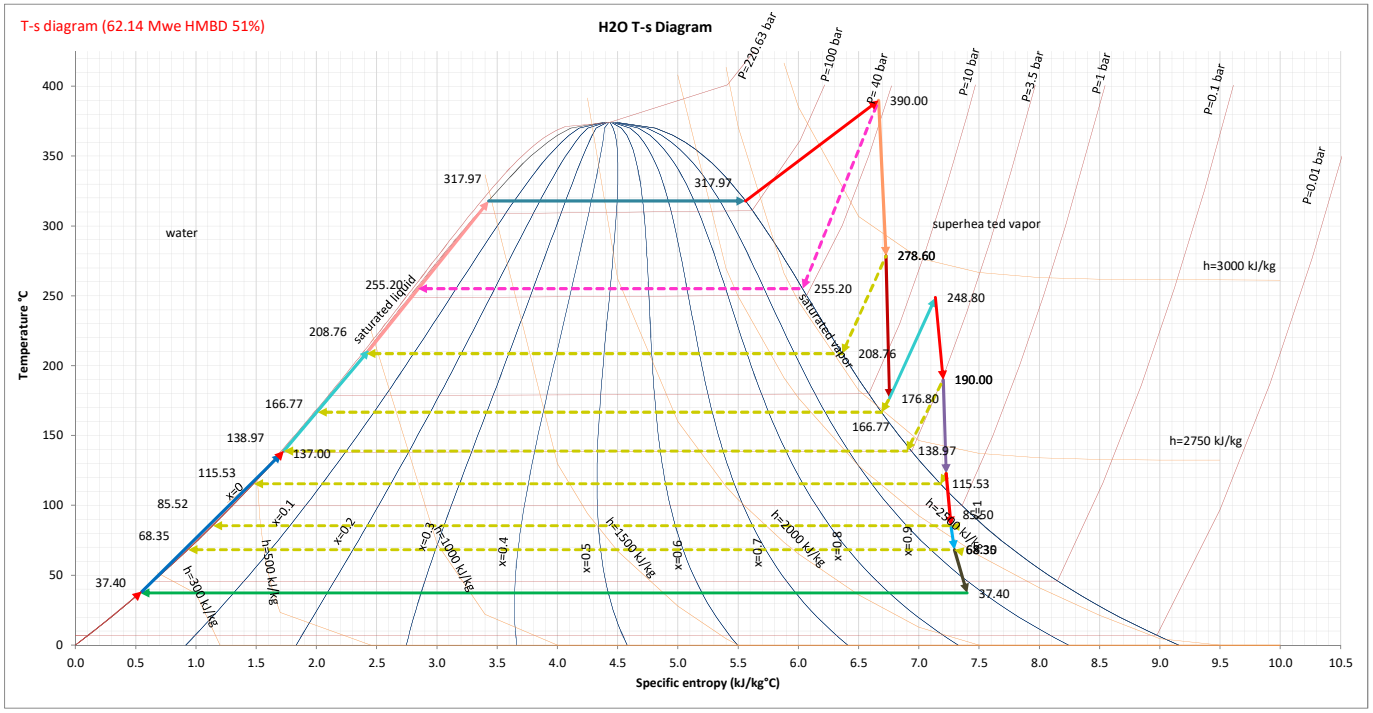
BASE CASE HMBD		DC	HPH2	HPH1	DEA	LPH3	LPH2	LPH1
FW/Condensate Temp I/L to Heater	DegC	211.4	164.2	139	112.9	83.9	66.9	38.4
FW/Condensate Enthalpy I/L to Heater	kJ/kg	907.3	699.6	591.7	473.6	351.3	280.0	160.8
Condensate Flow I/L to Heater	kg/s	76	76	76	59.12	59.12	59.12	51.49
Condensate Flow I/L to Heater	TPH	661	701	720	572	584	590	521
Heater drain Enthalpy	kJ/kg	927.6	697.1	588.3	N/A	356.7	283.1	283.4
Bleed steam Flow	kg/s	N/A	6.3	3.6	2.2	3.1	1.8	2.8
Bleed steam Flow	TPH	N/A	22.7	12.8	7.9	11.0	6.5	10.2
Bleed steam Power Equivalent	**MWe**	**N/A**	**4.7**	**2.0**	**1.07**	**1.14**	**0.65**	**0.62**
Bleed Steam Heat (MWt)	MWt	N/A	15.5	7.0	5.8	7.2	4.0	6.1
STG O/P lost for FWH (MWe)	MWe	N/A	5.4	1.6	1.4	1.3	0.5	0.5
FW heat gain/STG Power O/P	%	N/A	65%	78%	76%	82.1%	88%	92%



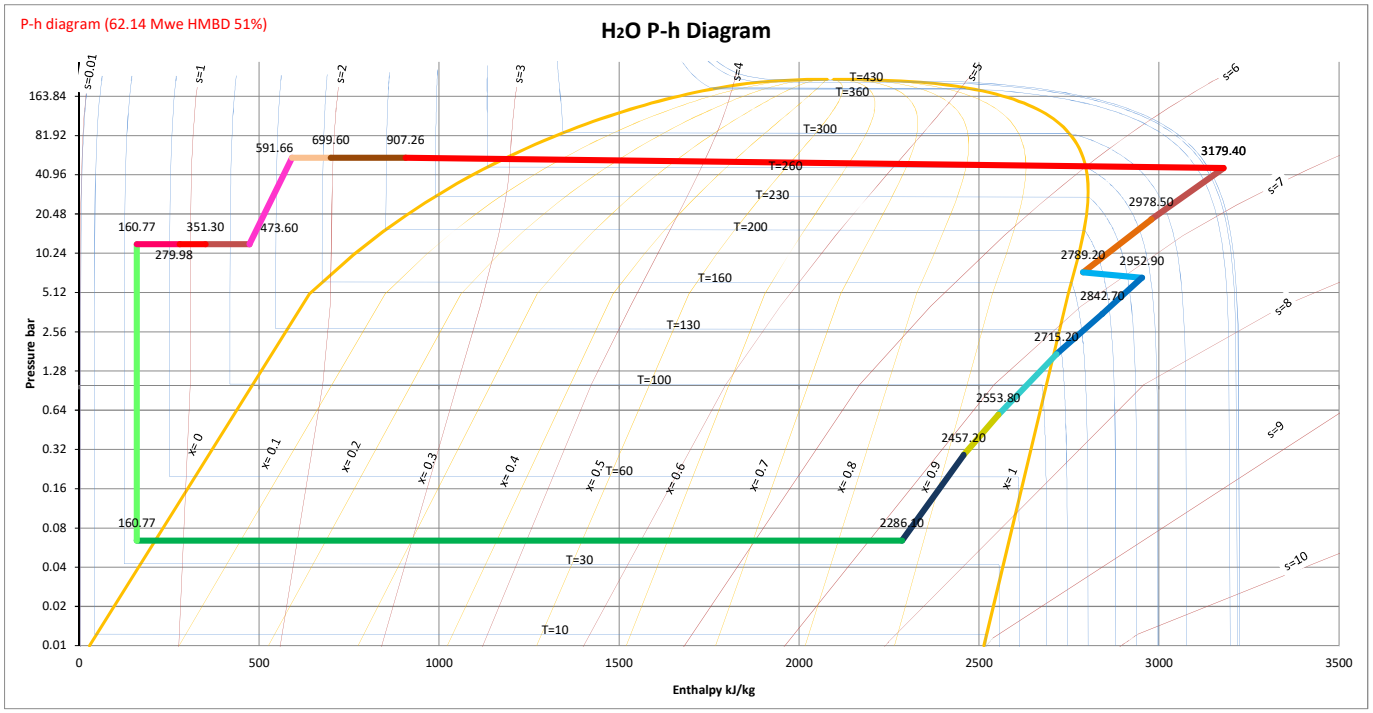
h-s diagram (62.14 Mwe HMBD 51%)



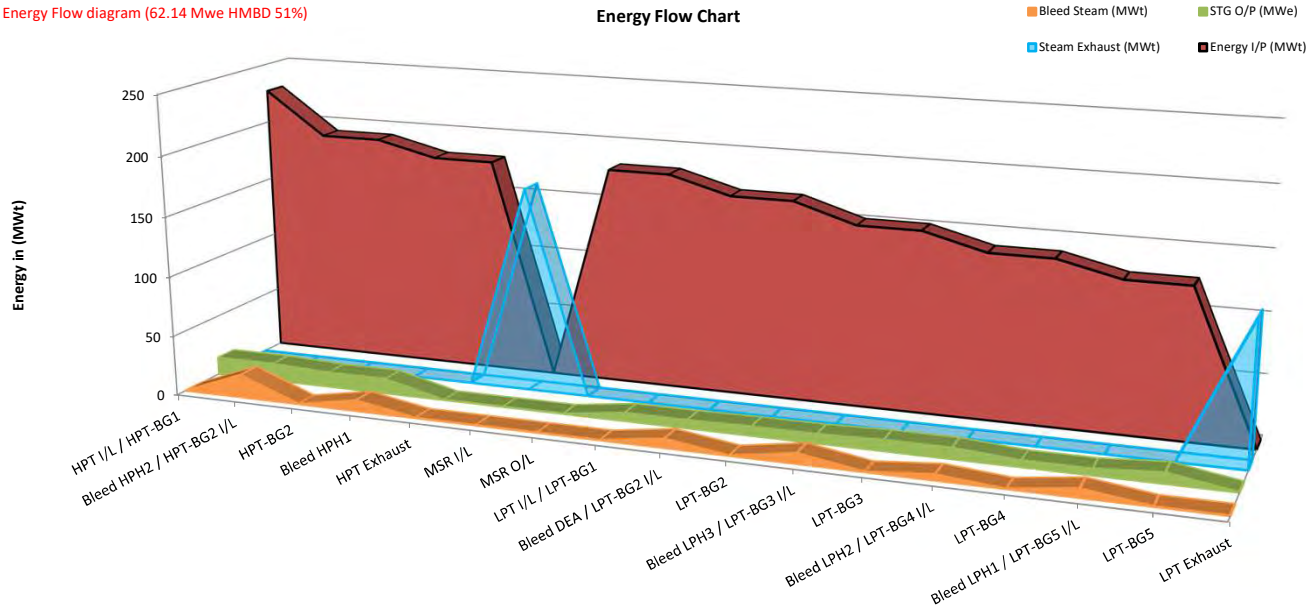
T-s diagram (62.14 Mwe HMBD 51%)



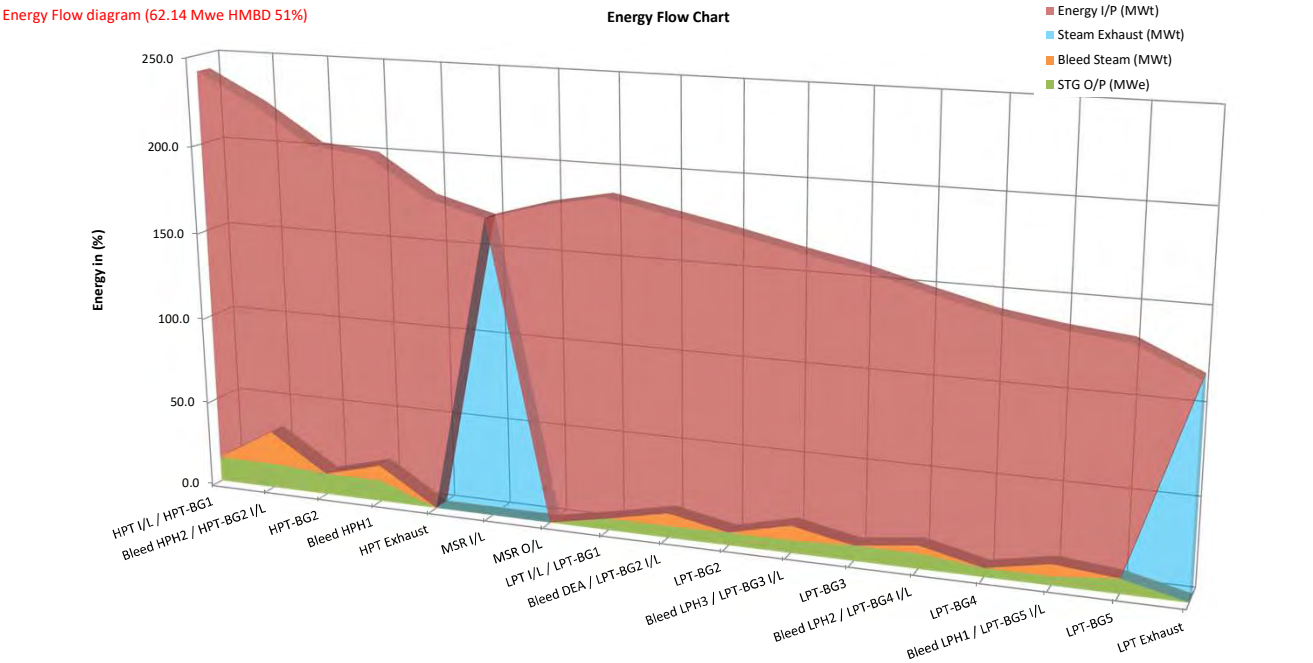
P-h diagram (62.14 Mwe HMBD 51%)



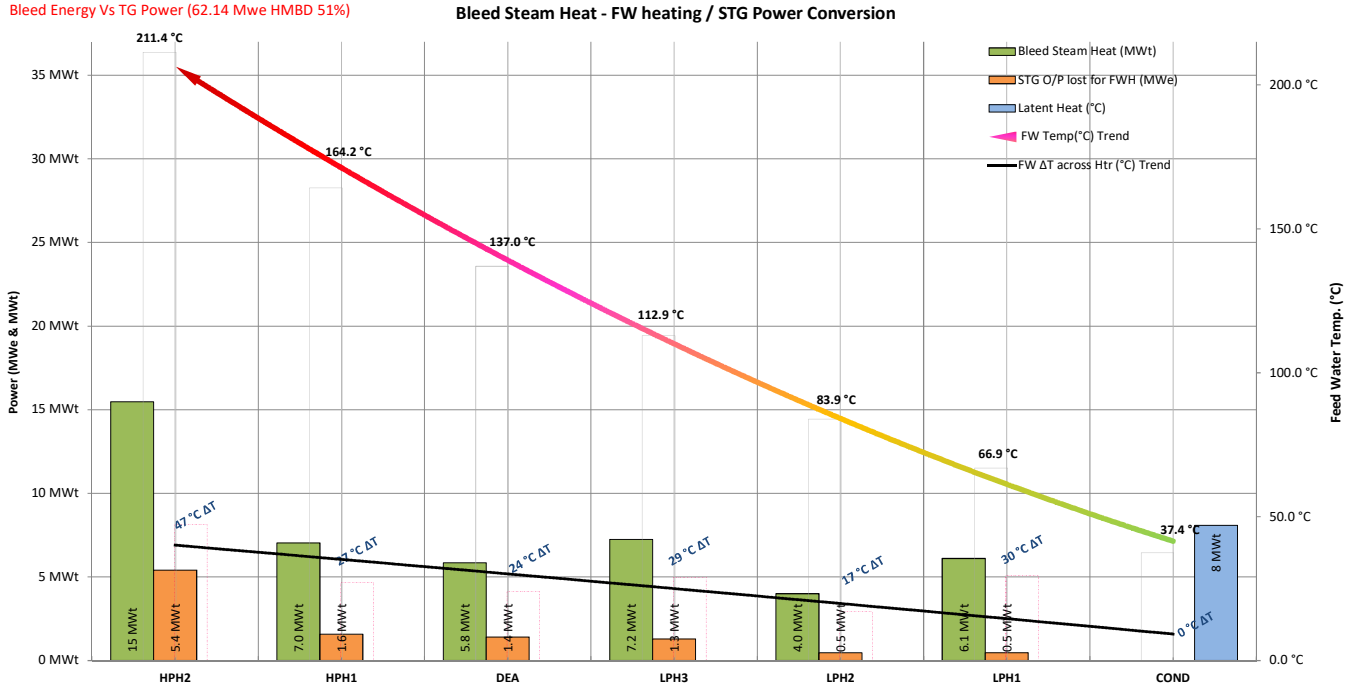
Energy Flow diagram (62.14 Mwe HMBD 51%)



Energy Flow diagram (62.14 Mwe HMBD 51%)



Bleed Energy Vs TG Power (62.14 Mwe HMBD 51%)



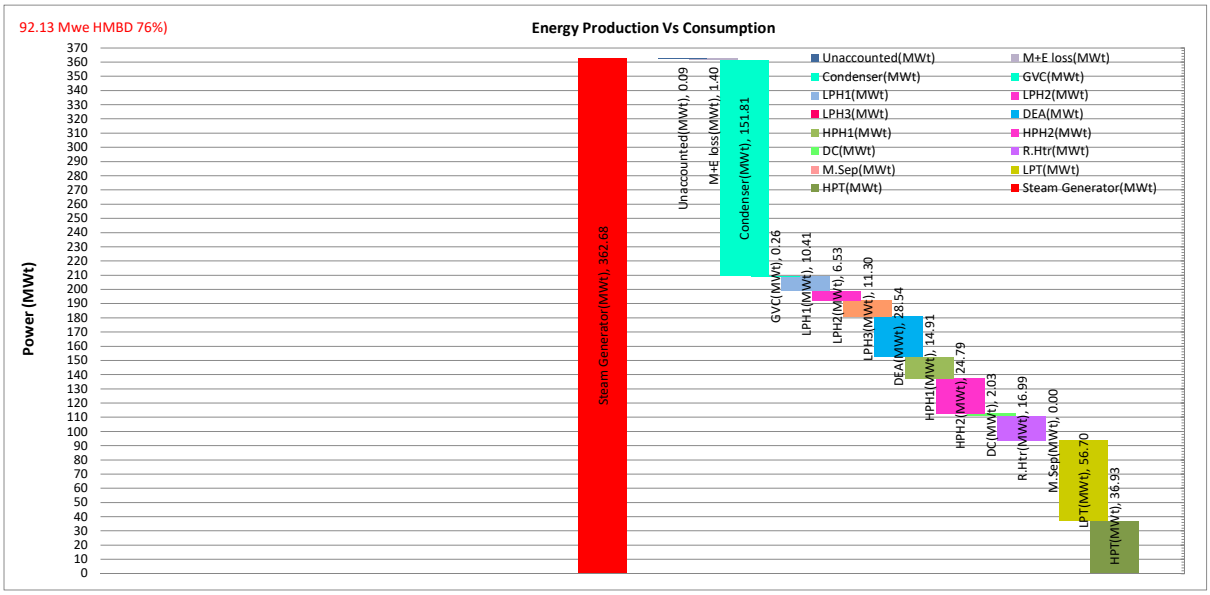
HMBD CASE 76% (92.13 MWe)	Units	HPT Inlet	HPT Ext1 (HPH2)	HPT Exhaust (MSR+HPH1)	LPT Inlet	LPT Ext1 (DEA)	LPT Ext2 (LPH3)	LPT Ext3 (LPH2)	LPT Ext4 (LPH1)	LPT Exhaust
Pressure	bar(a)	68.22	27.77	11.7	9.75	5.12	2.51	0.86	0.42	0.072
Temperature	DegC	390	277.6	186.8	262.9	201	132.4	95.3	76.7	39.6
Superheat	DegC	107.3	49.1	0.9	85.0	49.0	5.5	0.4	0.1	0.4
Enthalpy (with actual blade group eff.)	kJ/kg	3135.7	2944.0	2772.7	2972.3	2857.3	2727.4	2562.4	2463.2	2261.6
Dryness fraction		1.00	0.999	0.996	1.00	1.00	1.00	0.96	0.93	0.88
DP by blade group		2.46	2.37	**5.83**		1.90	2.04	2.92	2.05	**5.83**

Mass Flow rate	kg/s	106.7	96.19		88.98	84.79	79.94	77.2	72.4	
Actual Power O/P Stage wise	MW(mech)	20.5	16.5		10.2	11.0	13.2	7.7	14.6	
Generator Eff. at 75% Load at brushless excitation and Rated PF	%	98.51%								
Actual Power O/P Stage wise	**MW(elec)**	**20.1**	**16.2**		**10.1**	**10.9**	**13.0**	**7.5**	**14.4**	
Actual Power O/P Total	**MW(elec)**	92.24	100.1%							
Power O/P mentioned in HMBD (for reference)	MW(elec)	92.135								
Steam Rate (Actual) Stage wise	T/MWe	19.06	21.33		31.78	28.13	22.15	36.84	18.13	
Steam Rate (Actual) Overall	T/MWe	**4.16**								

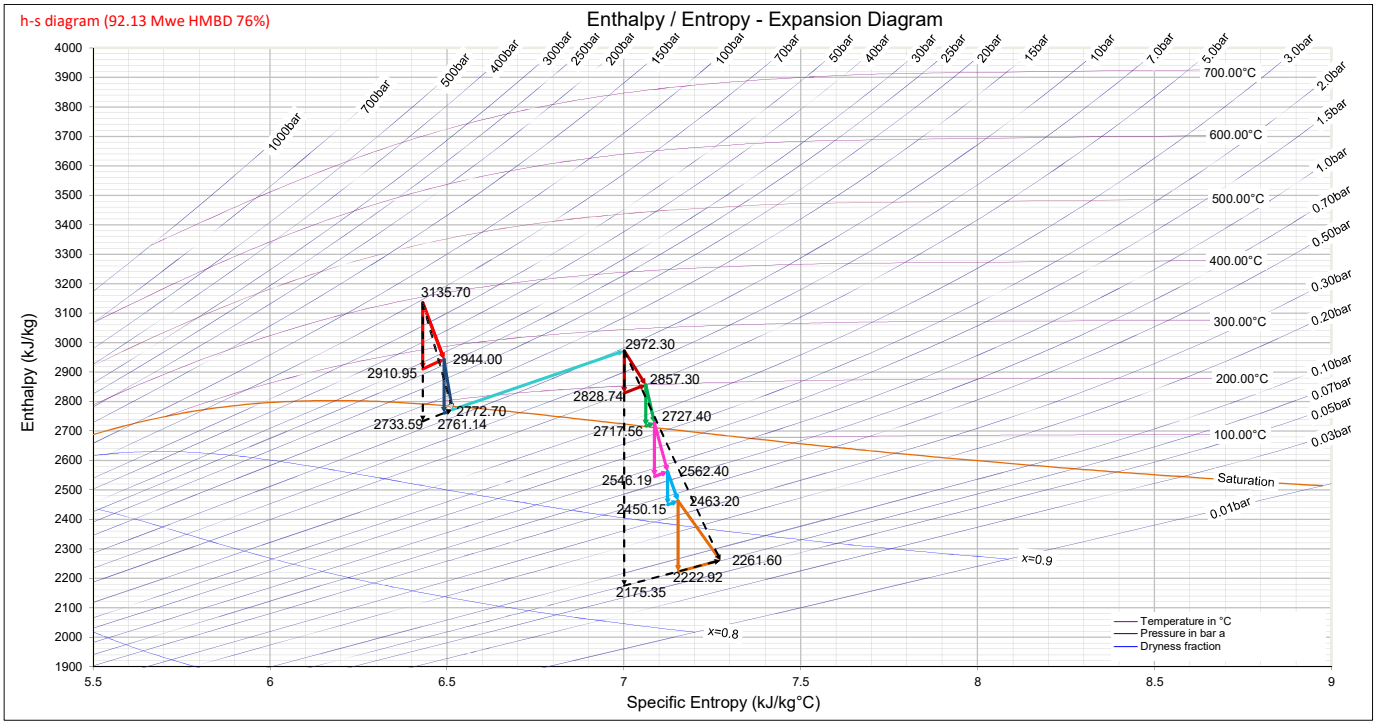
Specific Entropy	kJ/kg.DegC	6.4	6.5	6.5	7.0	7.1	7.1	7.1	7.2	7.3
Isentropic Enthalpy (hs)	kJ/kg	2910.9	2761.1	2733.6	2828.7	2717.6	2546.2	2450.2	2222.9	2175.3
Blade Group Efficiency	%		85.29%	93.68%		80.10%	92.96%	91.06%	88.38%	83.90%
Isentropic Power O/P Stage wise	MW(mech)	24.0	17.6		12.8	11.8	14.5	8.7	17.4	
Isentropic Power O/P Stage wise	**MW(elec)**	**23.6**	**17.3**		**12.6**	**11.7**	**14.3**	**8.5**	**17.1**	
Isentropic Power O/P Total	**MW(elec)**	105.2								
Steam Expansion Turbine Efficiency (Isentropic Vs Actual)	**%**	87.61%								
Isentropic Efficiency (expansion) for reference	%	100.00%								
Isentropic Vs Actual Power O/P loss (stage wise)	%	14.7%	6.3%		19.9%	7.0%	8.9%	11.6%	16.1%	
Total Isentropic Vs Actual Power O/P loss	**%**	**12.1%**	99.70%							
Steam Rate (Theo) Stage wise	T/MWe	16.26	19.99		25.46	26.15	20.17	32.56	15.21	
Steam Rate (Theo) Overall	T/MWe	**3.65**								

Feed water Heater Power Table:

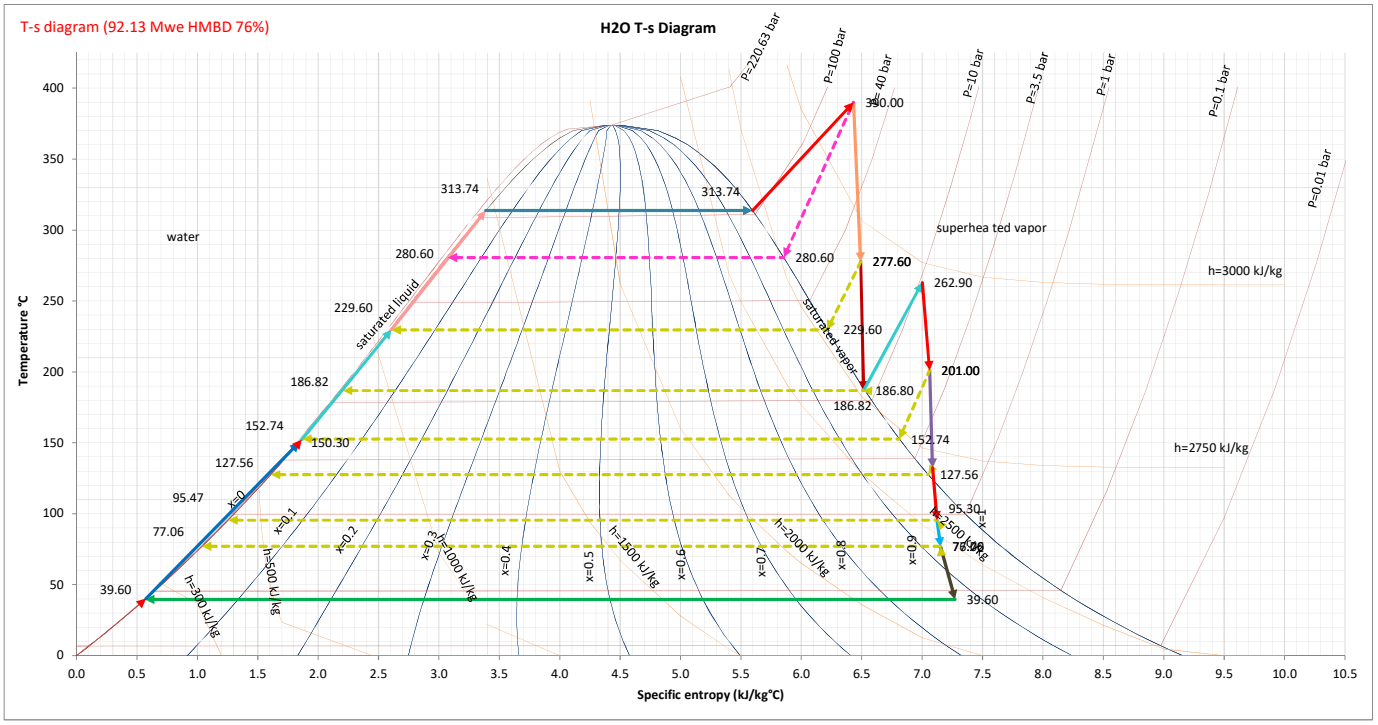
BASE CASE HMBD		DC	HPH2	HPH1	DEA	LPH3	LPH2	LPH1
FW/Condensate Temp I/L to Heater	DegC	229.8	182	152.2	123.3	92.1	73.9	40.2
FW/Condensate Enthalpy I/L to Heater	kJ/kg	990.9	776.6	647.6	517.8	385.8	309.3	168.3
Condensate Flow I/L to Heater	kg/s	116	116	116	86	86	86	73
Condensate Flow I/L to Heater	TPH	976	1043	1079	822	842	853	742
Heater drain Enthalpy	kJ/kg	1013.4	782.4	652.7	N/A	398.6	320.7	318
Bleed steam Flow	kg/s	N/A	10.4	6.6	3.7	4.9	2.8	4.8
Bleed steam Flow	TPH	N/A	37.3	23.9	13.2	17.5	10.2	17.3
Bleed steam Power Equivalent	**MWe**	**N/A**	**8.0**	**4.1**	**1.9**	**1.96**	**1.12**	**1.20**
Bleed Steam Heat (MWt)	MWt	N/A	24.3	12.5	9.3	11.3	6.1	10.2
STG O/P lost for FWH (MWe)	MWe	N/A	9.1	4.1	2.5	2.2	0.8	0.9
FW heat gain/STG Power O/P	%	N/A	62%	67%	74%	80.3%	87%	91%



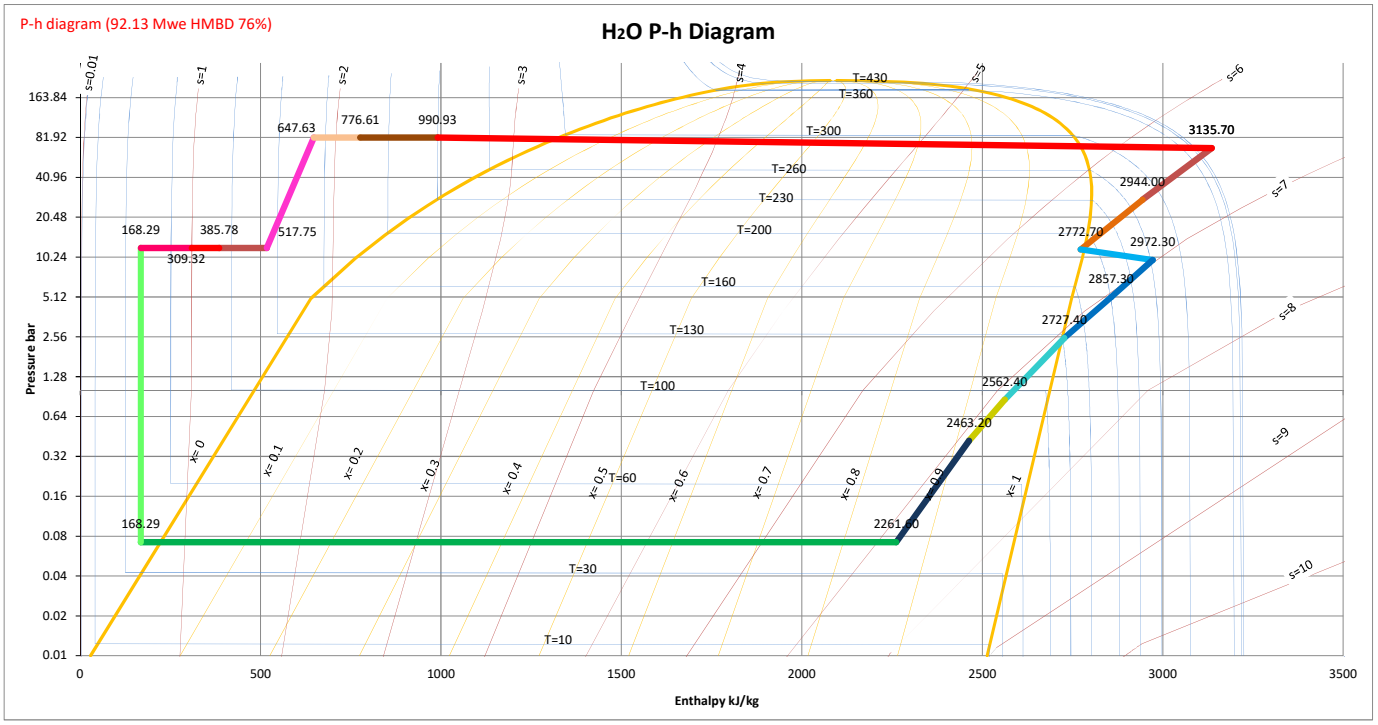
h-s diagram (92.13 Mwe HMBD 76%)



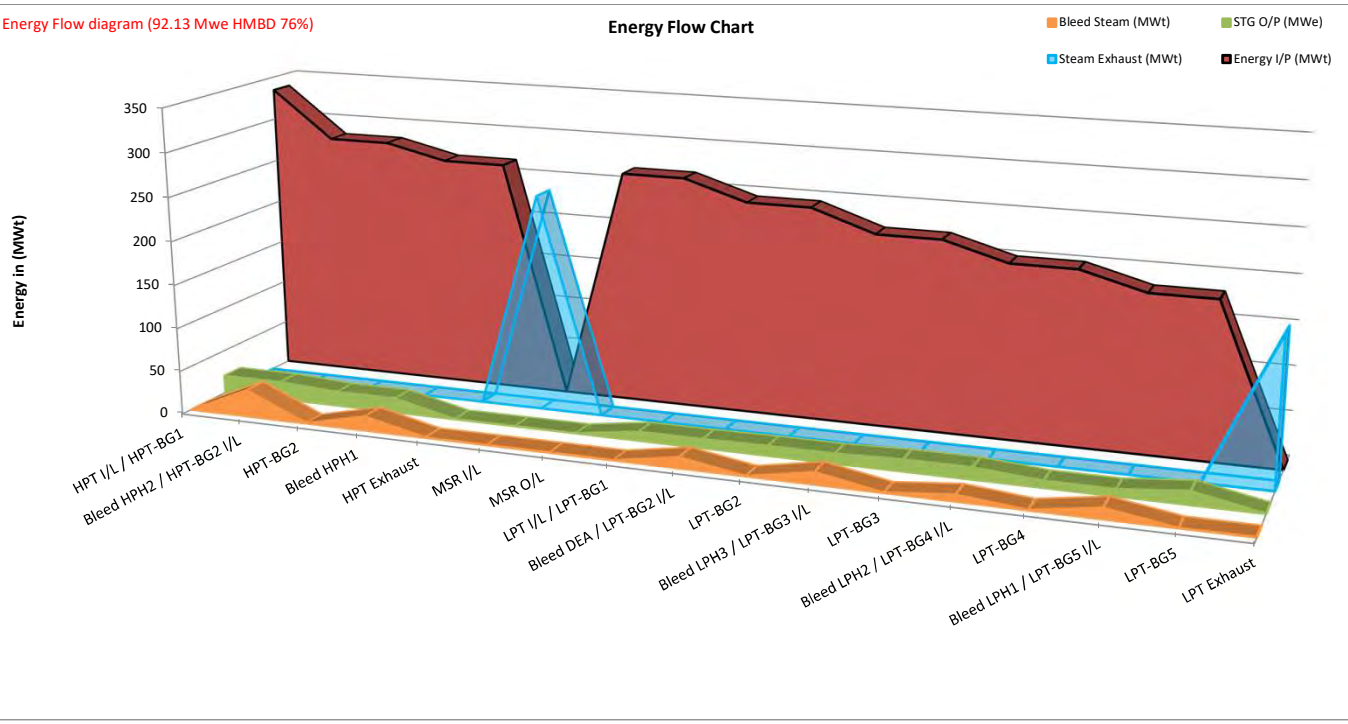
T-s diagram (92.13 Mwe HMBD 76%)



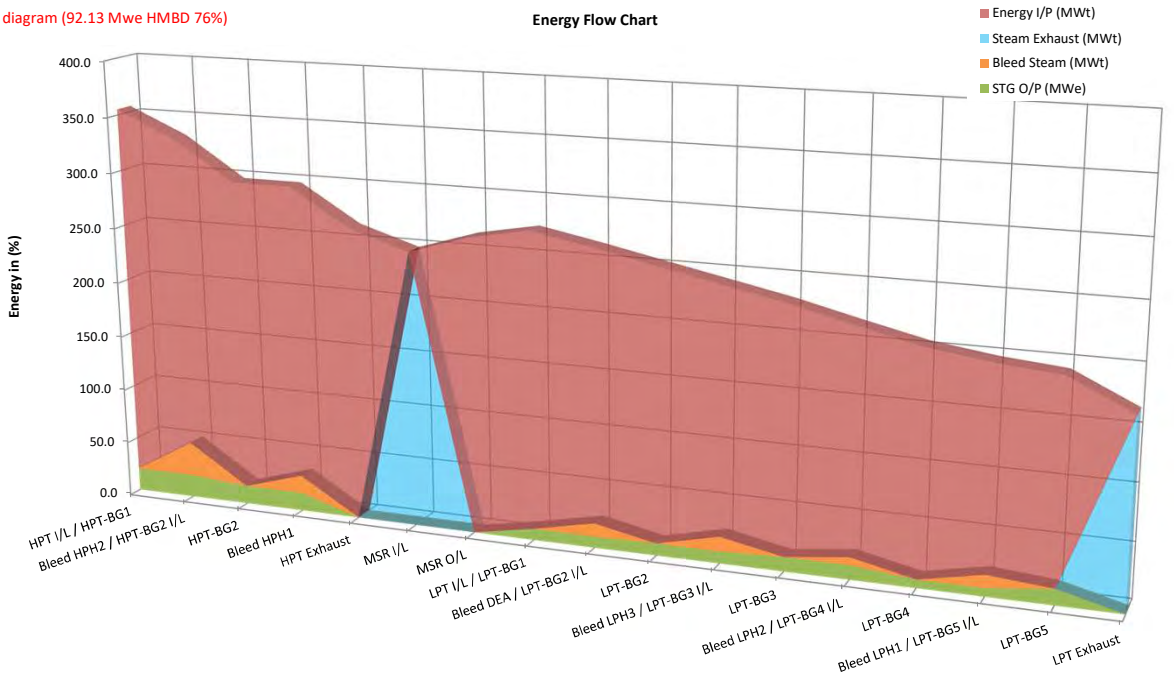
P-h diagram (92.13 Mwe HMBD 76%)



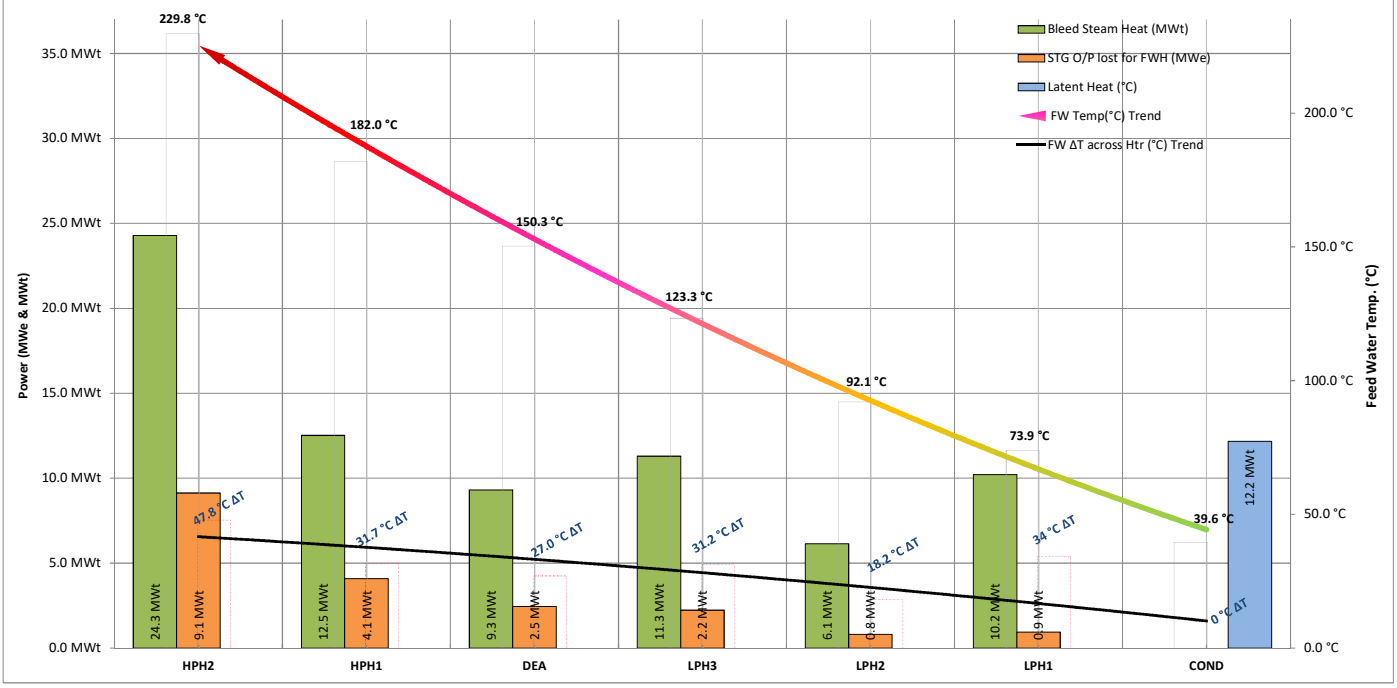
Energy Flow diagram (92.13 Mwe HMBD 76%)



Energy Flow diagram (92.13 Mwe HMBD 76%)



Bleed Energy Vs TG Power (92.13 Mwe HMBD 76%)



BASE CASE HMBD (121.37 MWe)	Units	HPT Inlet	HPT Ext1 (HPH2)	HPT Exhaust (MSR+HPH1)	LPT Inlet	LPT Ext1 (DEA)	LPT Ext2 (LPH3)	LPT Ext3 (LPH2)	LPT Ext4 (LPH1)	LPT Exhaust
Pressure	bar(a)	89.91	36.08	14.8	12.59	6.59	3.22	1.1	0.53	0.08
Temperature	DegC	390	274.4	197.7	273.3	209.1	139.4	102.2	82.7	41.6
Superheat	DegC	88.2	31.2	1.0	84.0	47.3	4.1	0.4	0.4	0.4
Enthalpy (with actual blade group eff.)	kJ/kg	3093.0	2905.4	2734.7	2986.7	2868.3	2736.4	2568.6	2467.7	2251.8
Dryness fraction		1.00	1.00	0.98	1.00	1.00	1.00	0.96	0.93	0.87
DP by blade group		2.49	2.44	**6.08**		1.91	2.05	2.93	2.08	**6.63**

Mass Flow rate	kg/s	143.6	127.39		114.37	108.59	101.99	98.32	91.8	
Actual Power O/P Stage wise	MW(mech)	26.9	21.7		13.5	14.3	17.1	9.9	19.8	
Generator Eff. at 75% Load at brushless excitation and Rated PF	%	98.51%								
Actual Power O/P Stage wise	**MW(elec)**	**26.5**	**21.4**		**13.3**	**14.1**	**16.9**	**9.8**	**19.5**	
Actual Power O/P Total	**MW(elec)**	**121.6**	100.1%							
Power O/P mentioned in HMBD (for reference)	MW(elec)	121.37								
Steam Rate (Actual) Stage wise	T/MWe	19.48	21.42		30.88	27.69	21.78	36.22	16.93	
Steam Rate (Actual) Overall	T/MWe	**4.25**								

Specific Entropy	kJ/kg.DegC	6.26	6.31	6.33	6.91	6.97	7.00	7.03	7.07	7.20
Isentropic Enthalpy (hs)	kJ/kg	2874.4	2723.7	2696.7	2840.6	2726.4	2552.2	2452.5	2208.7	2160.7
Blade Group Efficiency	%		85.83%	93.93%		81.00%	92.95%	91.09%	86.89%	83.34%
Isentropic Power O/P Stage wise	MW(mech)	31.4	23.1		16.7	15.4	18.8	11.4	23.8	
Isentropic Power O/P Stage wise	**MW(elec)**	**30.9**	**22.8**		**16.5**	**15.2**	**18.5**	**11.2**	**23.4**	
Isentropic Power O/P Total	**MW(elec)**	**138.5**								
Steam Expansion Turbine Efficiency (Isentropic Vs Actual)	**%**	87.61%								
Isentropic Efficiency (expansion) for reference	%	100.00%								
Isentropic Vs Actual Power O/P loss (stage wise)	%	14.2%	6.1%		19.0%	7.1%	8.9%	13.1%	16.7%	
Total Isentropic Vs Actual Power O/P loss	**%**	**12.1%**	99.75%							
Steam Rate (Theo) Stage wise	T/MWe	16.72	20.12		25.02	25.74	19.84	31.47	14.11	
Steam Rate (Theo) Overall	T/MWe	**3.73**								

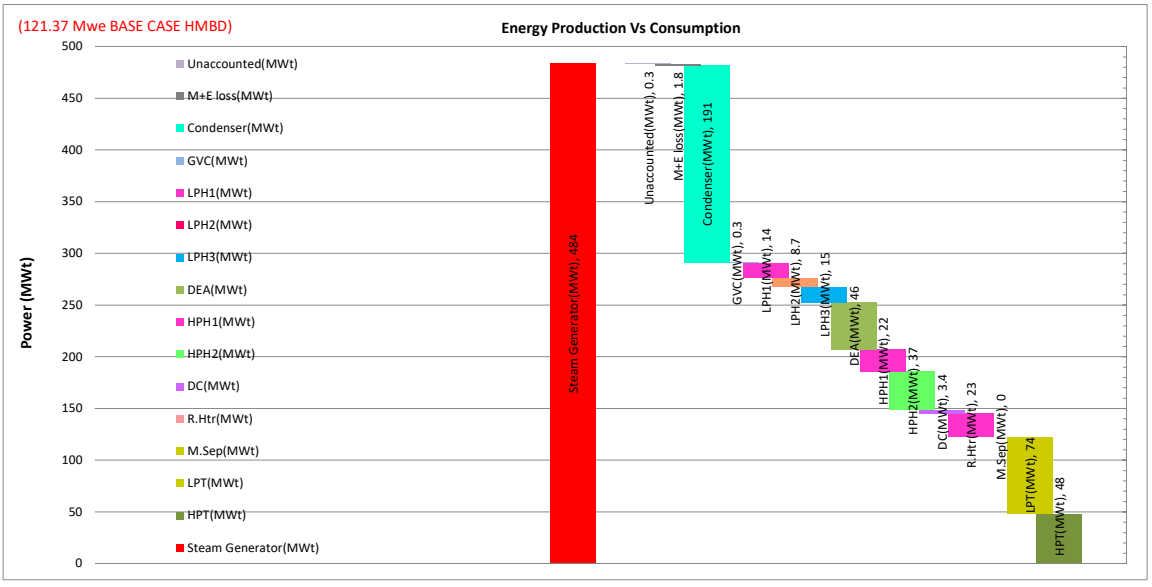
Feed water Heater Power Table:

BASE CASE HMBD		DC	HPH2	HPH1	DEA	LPH3	LPH2	LPH1
FW/Condensate Temp I/L to Heater	DegC	244.4	192.7	161.2	130	97.2	78.4	42
FW/Condensate Enthalpy I/L to Heater	kJ/kg	1058.9	823.4	686	547	408.1	329.1	176.9
Condensate Flow I/L to Heater	kg/s	157	157	157	110	110	110	93
Condensate Flow I/L to Heater	TPH	1290	1395	1447	1046	1074	1088	940
Heater drain Enthalpy	kJ/kg	1082.7	830.4	692	N/A	428.5	349.2	342.5
Bleed steam Flow	kg/s	N/A	15.9	9.9	4.9	6.6	3.8	6.6
Bleed steam Flow	TPH	N/A	57.1	35.5	17.6	23.8	13.6	23.9
Bleed steam Power Equivalent	**MWe**	N/A	12.5	6.2	2.6	2.7	1.5	1.7
Bleed Steam Heat (MWt)	MWt	N/A	36.1	17.6	12.7	15.2	8.1	13.9
STG O/P lost for FWH (MWe)	MWe	N/A	14.4	6.2	3.5	3.1	1.1	1.4
FW heat gain/STG Power O/P	%	N/A	60%	65%	72%	79.3%	86%	90%

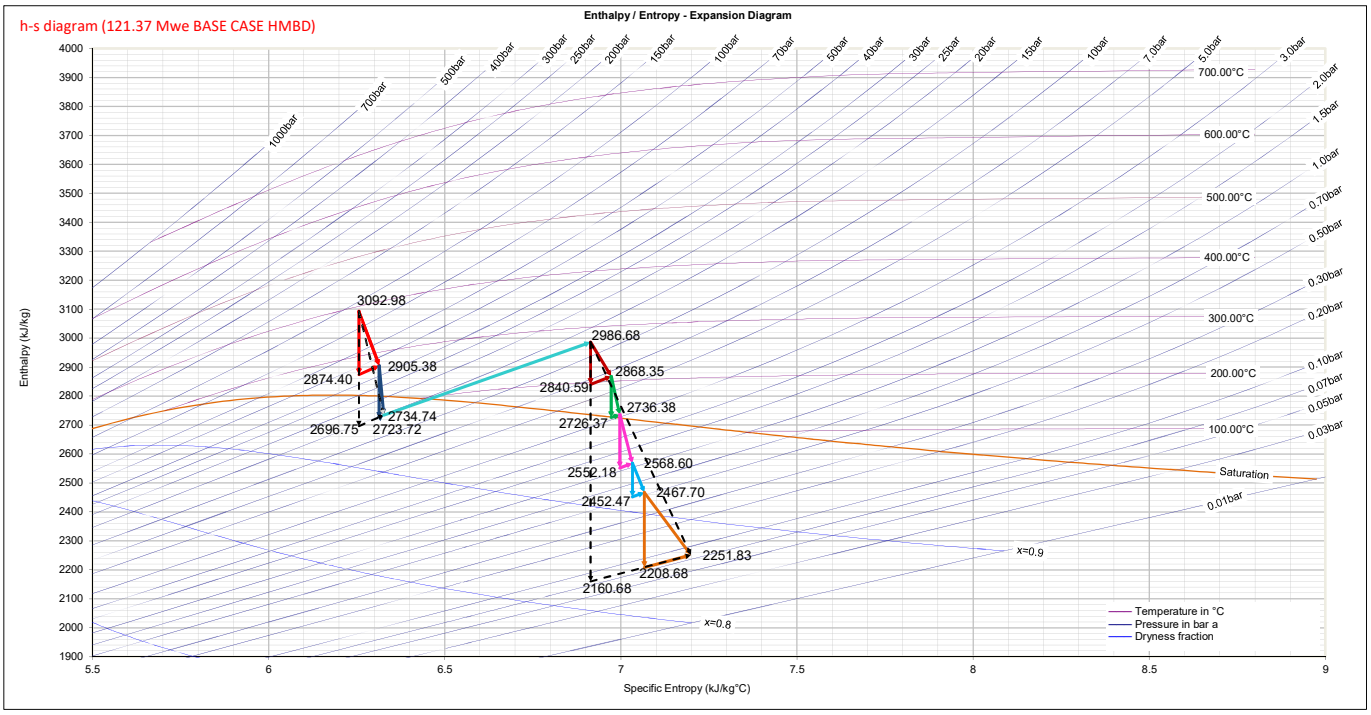
Derived Blade Group Efficiencies from HMBD	HPT Inlet to HPT Ext1 group eff.	HPT Ext1 to HPT Exhaust group eff.	LPT Inlet to LPT Ext1 group eff.	LPT Ext1 to LPT Ext2 group eff.	LPT Ext2 to LPT Ext3 group eff.	LPT Ext3 to LPT Ext4 group eff.	LPT Ext4 to LPT Exhaust group eff.
HMBD CASE Over Load (Top HPH OOS) (133.16 MWe)	89.872%		81.001%	92.757%	90.113%	86.072%	82.358%
105% HMBD Case (127.4 MWe)	87.098%	94.745%	80.935%	92.895%	90.460%	86.955%	83.396%
BASE Case HMBD 121.35 MWe	85.828%	93.931%	81.004%	92.949%	91.087%	86.889%	83.341%
76% HMBD Case (92.13 MWe)	85.294%	93.680%	80.103%	92.961%	91.057%	88.376%	83.901%
51% HMBD Case (62.14 MWe)	85.538%	93.508%	79.033%	92.772%	91.018%	88.929%	83.559%
25% HMBD Case (32.4 MWe)	85.574%	93.209%	80.917%	93.495%	89.499%	91.879%	74.824%
12% HMBD Case Min Load (14.73 MWe)	85.612%	93.134%	79.840%	92.507%	87.859%	92.932%	59.055%

Generator Data Sheet Efficiency:

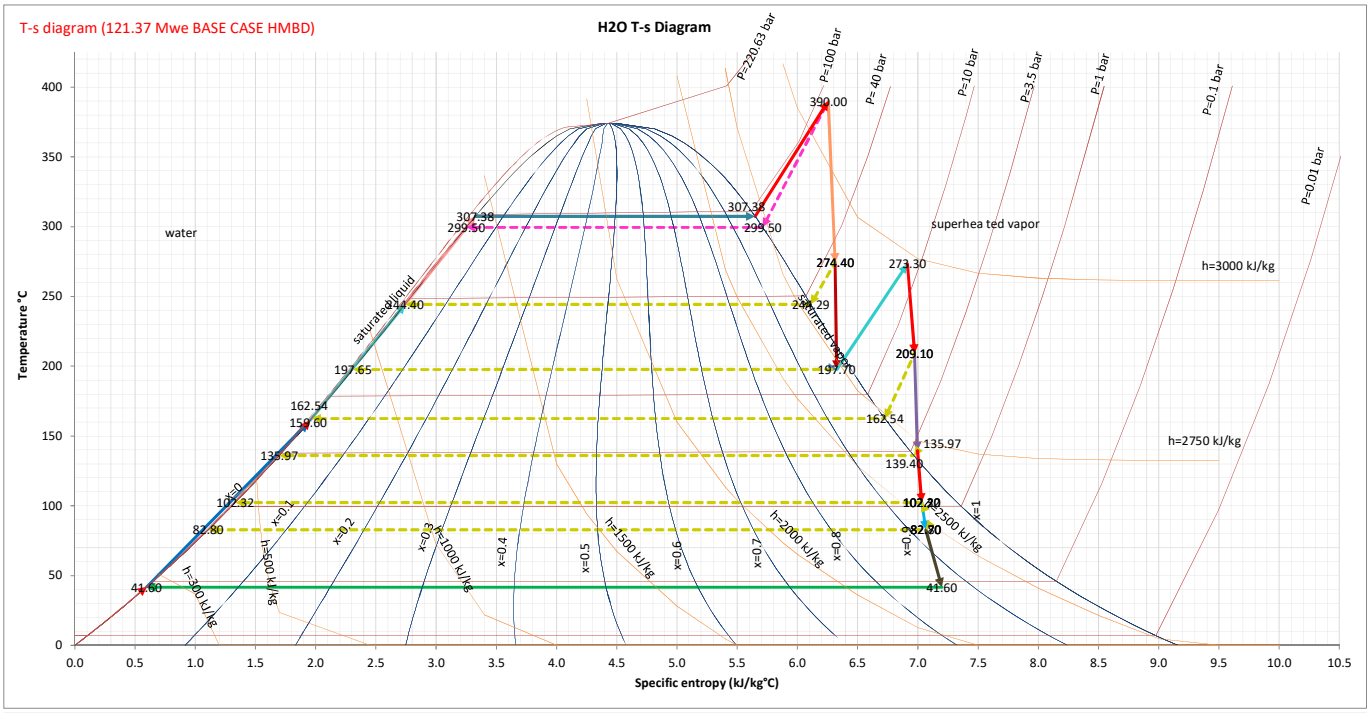
Efficiency at 100% Load at brushless excitation and Rated PF (121.35 MWe)	%	98.65
Efficiency at 75% Load at brushless excitation and Rated PF (92.13 MWe)	%	98.51
Efficiency at 50% Load at brushless excitation and Rated PF (62.14 MWe)	%	98.28



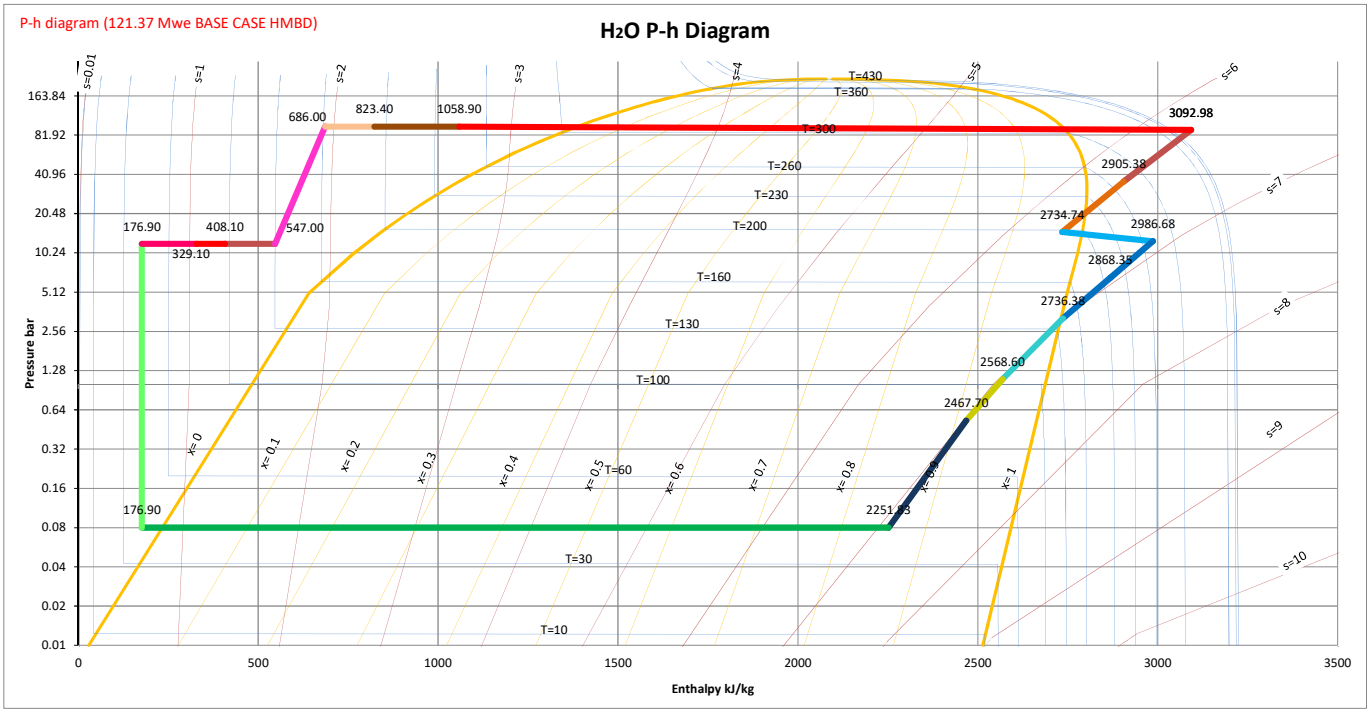
h-s diagram (121.37 Mwe BASE CASE HMBD)



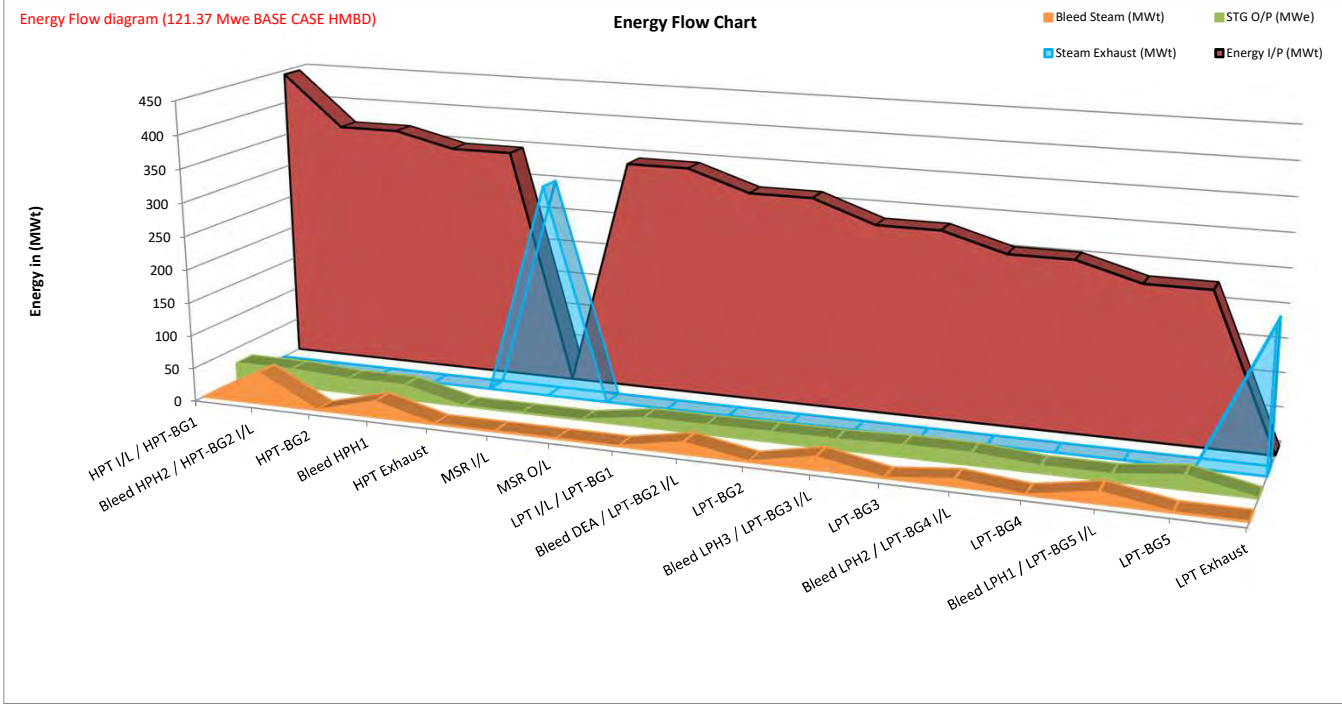
T-s diagram (121.37 Mwe BASE CASE HMBD)



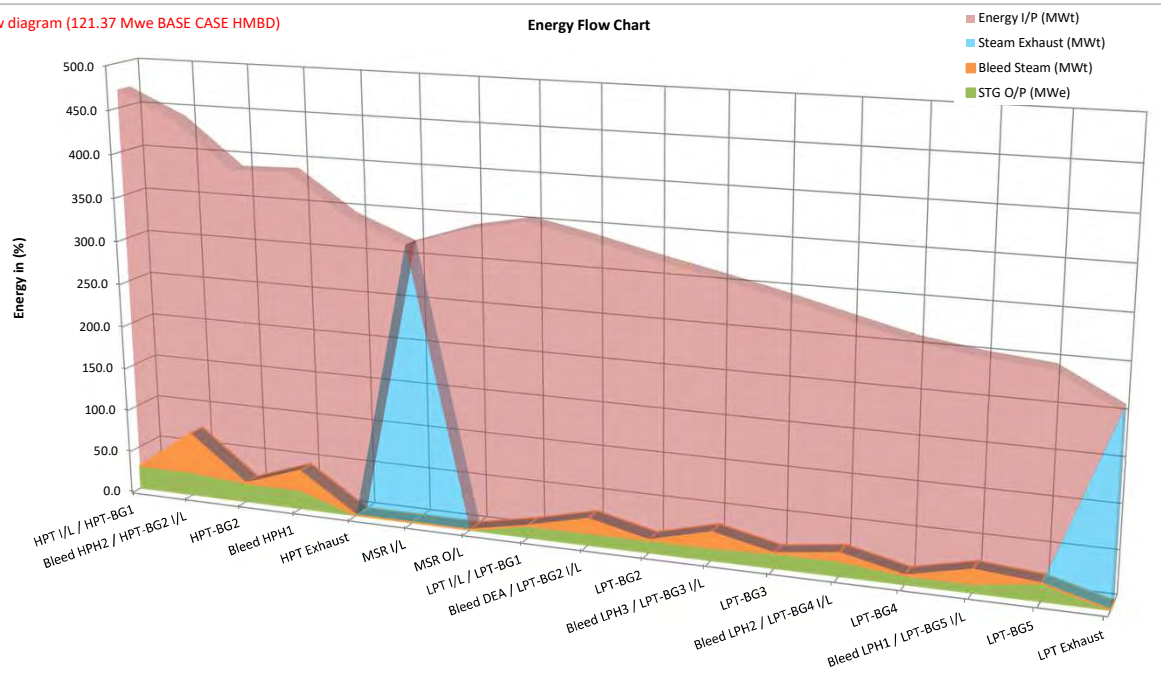
P-h diagram (121.37 Mwe BASE CASE HMBD)



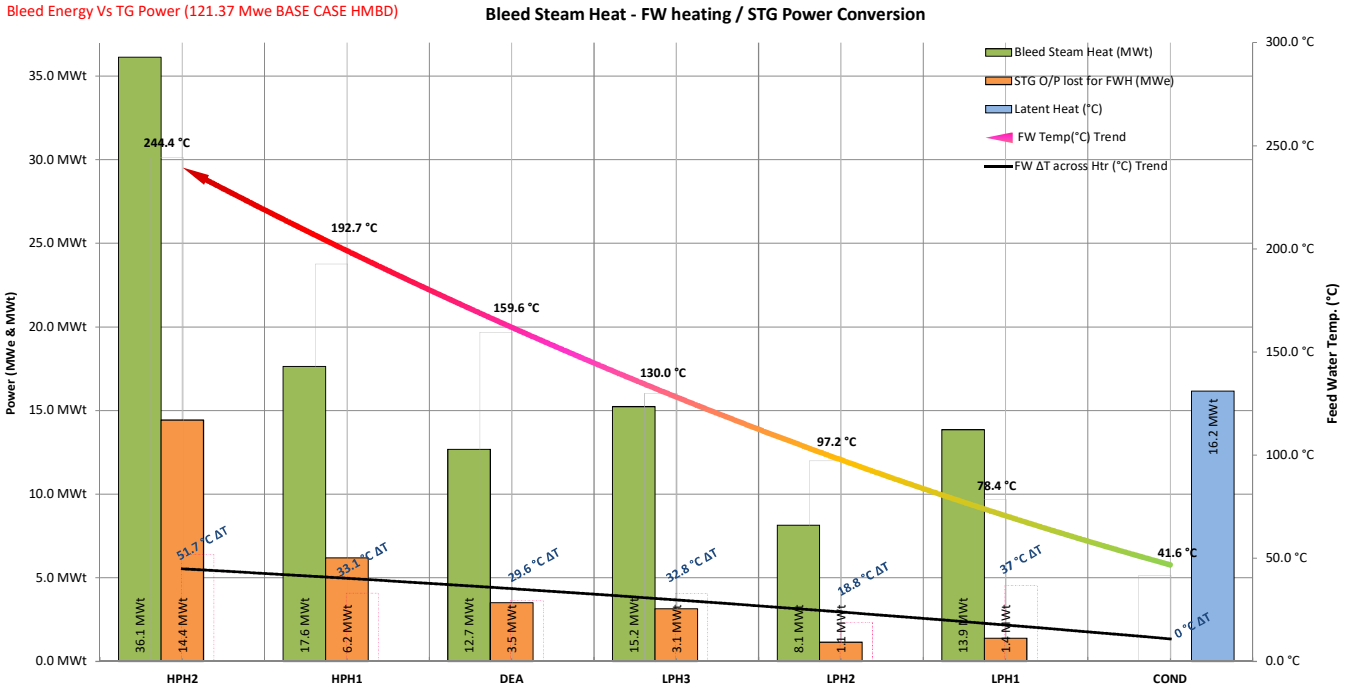
Energy Flow diagram (121.37 Mwe BASE CASE HMBD)



Energy Flow diagram (121.37 Mwe BASE CASE HMBD)



Bleed Energy Vs TG Power (121.37 Mwe BASE CASE HMBD)



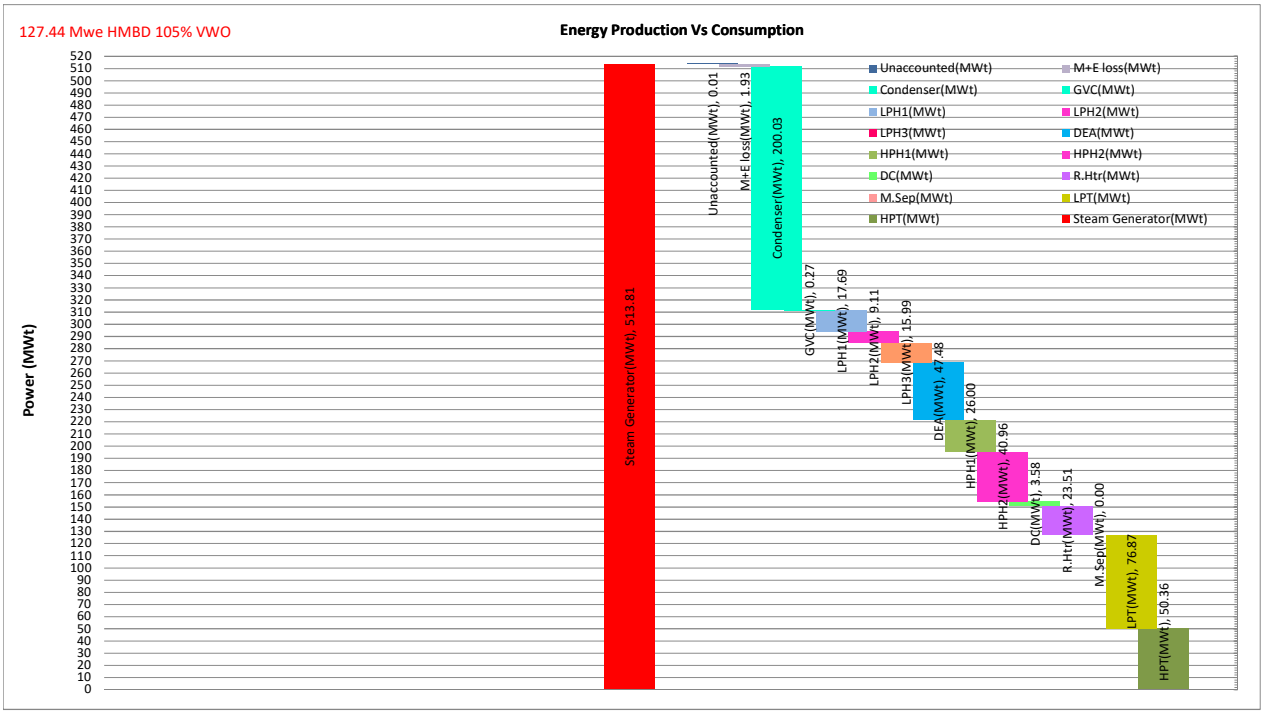
HMBD CASE 105% (127.44 MWe)	Units	HPT Inlet	HPT Ext1 (HPH2)	HPT Exhaust (MSR+HPH1)	LPT Inlet	LPT Ext1 (DEA)	LPT Ext2 (LPH3)	LPT Ext3 (LPH2)	LPT Ext4 (LPH1)	LPT Exhaust
Pressure	bar(a)	95.31	38.03	15.41	13.11	6.85	3.35	1.14	0.55	0.082
Temperature	DegC	390	273.5	199.6	273.3	208.9	139.3	103.4	83.6	41.9
Superheat	DegC	84.0	27.3	1.0	82.2	45.6	2.6	0.6	0.4	0.3
Enthalpy (with actual blade group eff.)	kJ/kg	3076.8	2891.1	2721.3	2984.2	2865.8	2734.3	2567.0	2466.0	2248.5
Dryness fraction		1.00	1.00	0.97	1.00	1.00	1.00	0.96	0.93	0.87
DP by blade group		2.51	2.47	**6.18**		1.91	2.04	2.94	2.07	**6.71**

Mass Flow rate	kg/s	153.16	134.97		119.36	113.16	106.21	102.34	95.4	
Actual Power O/P Stage wise	MW(mech)	28.4	22.9		14.1	14.9	17.8	10.3	20.8	
Generator Eff. at 75% Load at brushless excitation and Rated PF	%	98.51%								
Actual Power O/P Stage wise	**MW(elec)**	**28.0**	**22.6**		**13.9**	**14.7**	**17.5**	**10.2**	**20.4**	
Actual Power O/P Total	**MW(elec)**	127.3	99.9%							
Power O/P mentioned in HMBD (for reference)	MW(elec)	127.44								
Steam Rate (Actual) Stage wise	T/MWe	19.68	21.52		30.87	27.79	21.84	36.18	16.80	
Steam Rate (Actual) Overall	T/MWe	**4.33**								

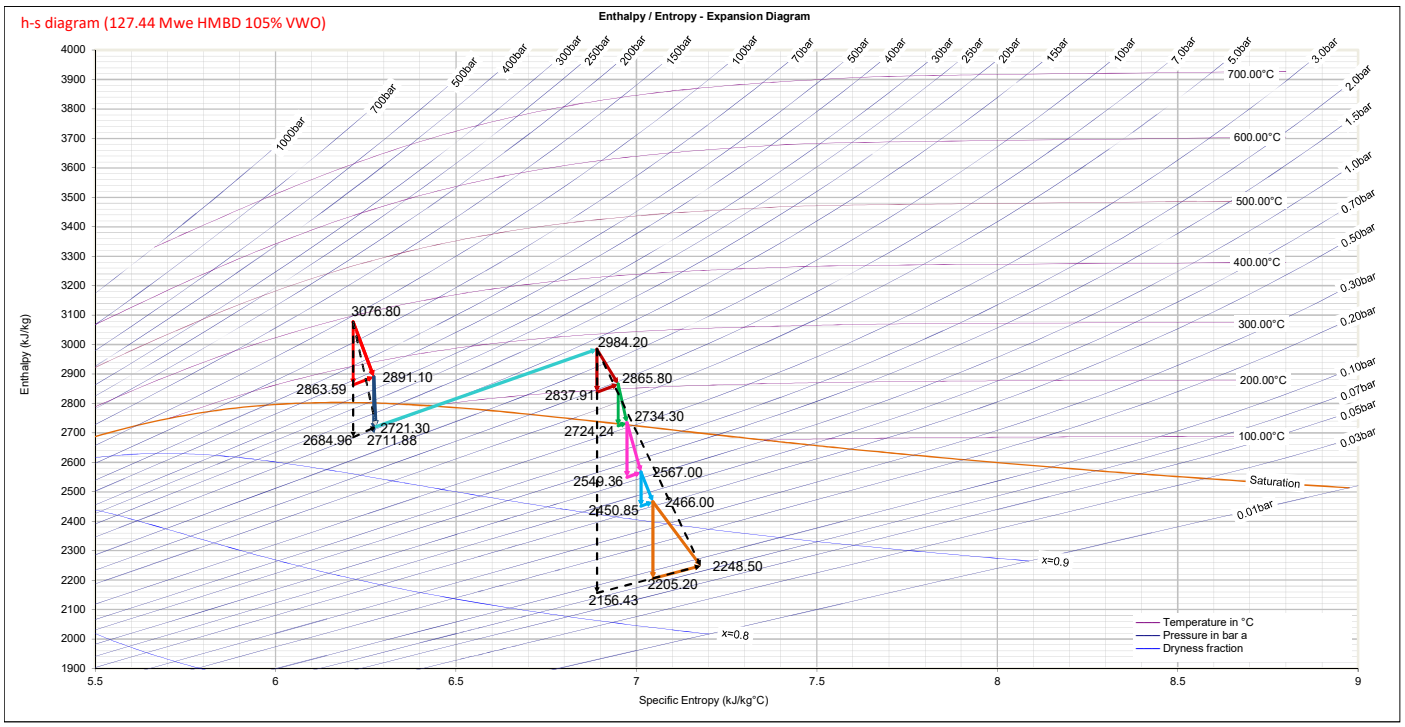
Specific Entropy	kJ/kg.DegC	6.2	6.3	6.3	6.9	6.9	7.0	7.0	7.0	7.2
Isentropic Enthalpy (hs)	kJ/kg	2863.6	2711.9	2685.0	2837.9	2724.2	2549.4	2450.8	2205.2	2156.4
Blade Group Efficiency	%		87.10%	94.74%		80.93%	92.90%	90.46%	86.95%	83.40%
Isentropic Power O/P Stage wise	MW(mech)	32.7	24.2		17.5	16.0	19.6	11.9	24.9	
Isentropic Power O/P Stage wise	**MW(elec)**	**32.2**	**23.8**		**17.2**	**15.8**	**19.4**	**11.7**	**24.5**	
Isentropic Power O/P Total	**MW(elec)**	144.6								
Steam Expansion Turbine Efficiency (Isentropic Vs Actual)	**%**	88.16%								
Isentropic Efficiency (expansion) for reference	%	100.00%								
Isentropic Vs Actual Power O/P loss (stage wise)	%	12.9%	5.3%		19.1%	7.1%	9.5%	13.0%	16.6%	
Total Isentropic Vs Actual Power O/P loss	**%**	**11.9%**	100.09%							
Steam Rate (Theo) Stage wise	T/MWe	17.14	20.39		24.98	25.82	19.76	31.46	14.01	
Steam Rate (Theo) Overall	T/MWe	**3.81**								

Feed water Heater Power Table:

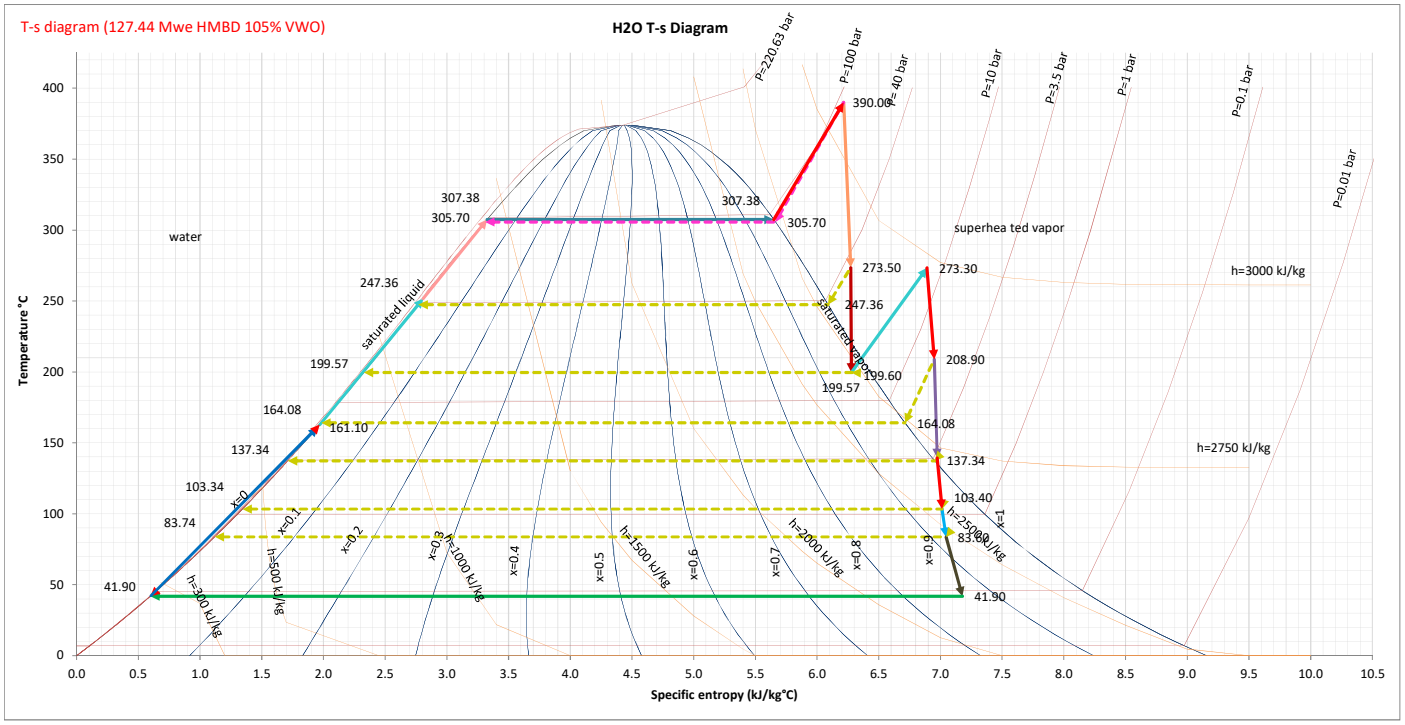
BASE CASE HMBD		DC	HPH2	HPH1	DEA	LPH3	LPH2	LPH1
FW/Condensate Temp I/L to Heater	DegC	251.7	198.3	162.8	131.4	98.3	79.3	42.3
FW/Condensate Enthalpy I/L to Heater	kJ/kg	1094.0	848.1	692.7	552.3	411.9	332.0	177.1
Condensate Flow I/L to Heater	kg/s	167	167	167	114	114	114	96
Condensate Flow I/L to Heater	TPH	1357	1476	1540	1087	1117	1132	975
Heater drain Enthalpy	kJ/kg	1117.9	845.8	688.1	N/A	433.3	353.2	346.5
Bleed steam Flow	kg/s	N/A	17.7	11.8	5.2	7.0	4.0	7.0
Bleed steam Flow	TPH	N/A	63.8	42.6	18.9	25.1	14.3	25.3
Bleed steam Power Equivalent	MWe	N/A	13.9	7.5	2.8	2.90	1.62	1.84
Bleed Steam Heat (MWt)	MWt	N/A	40.2	21.0	13.5	16.0	8.6	14.6
STG O/P lost for FWH (MWe)	MWe	N/A	16.2	7.5	3.8	3.3	1.2	1.5
FW heat gain/STG Power O/P	%	N/A	60%	64%	72%	79.2%	86%	90%



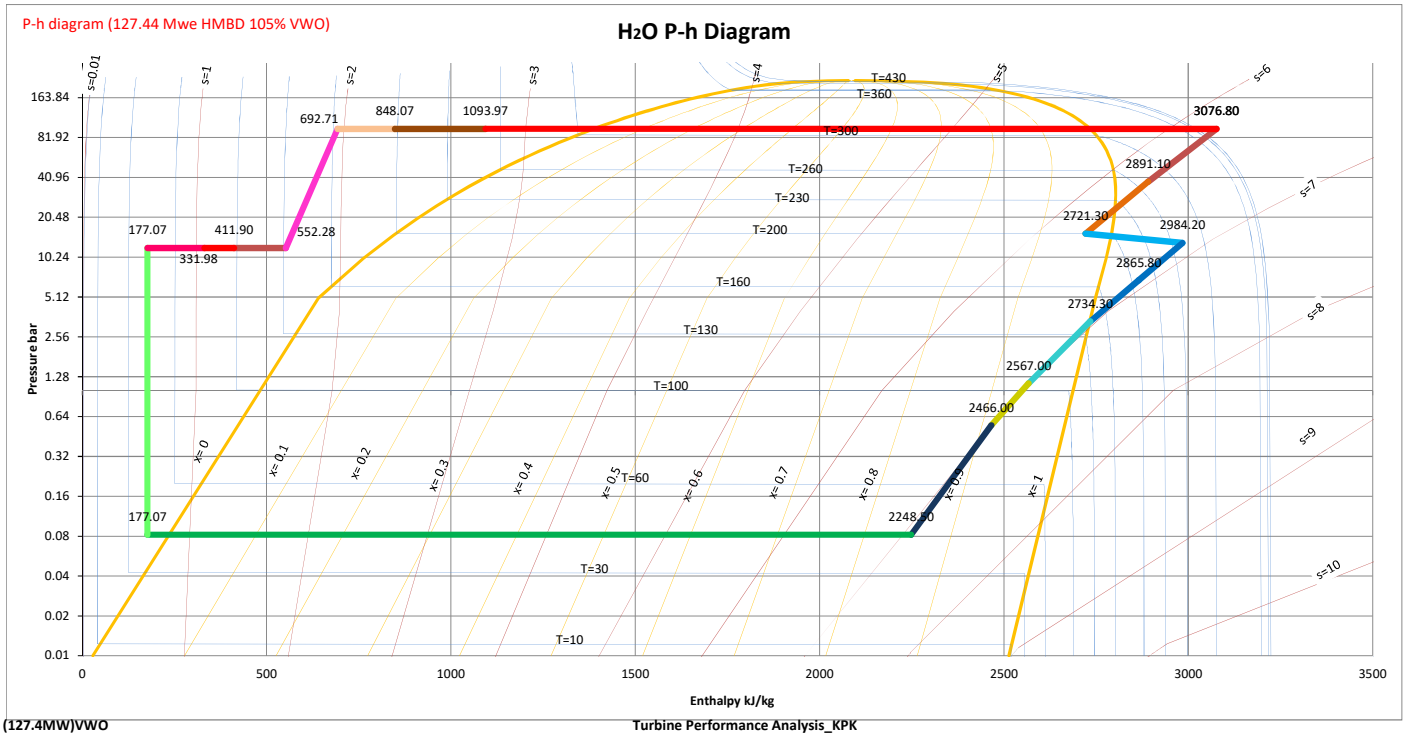
h-s diagram (127.44 Mwe HMBD 105% VWO)



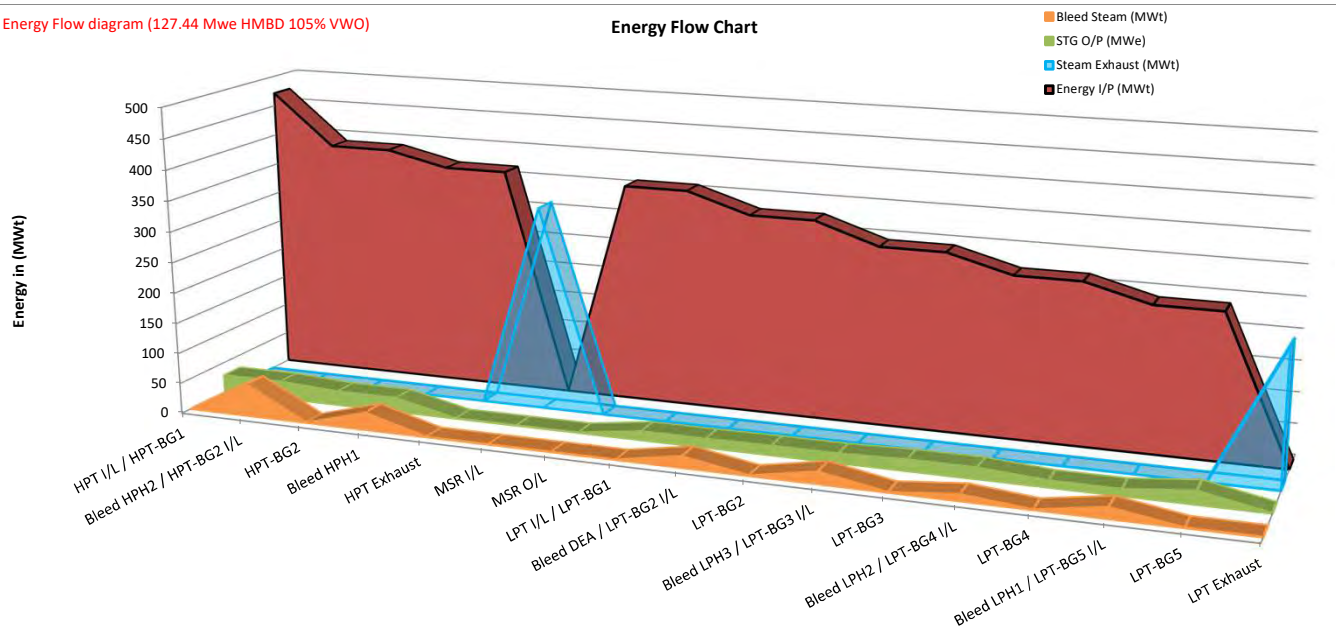
T-s diagram (127.44 Mwe HMBD 105% VWO)



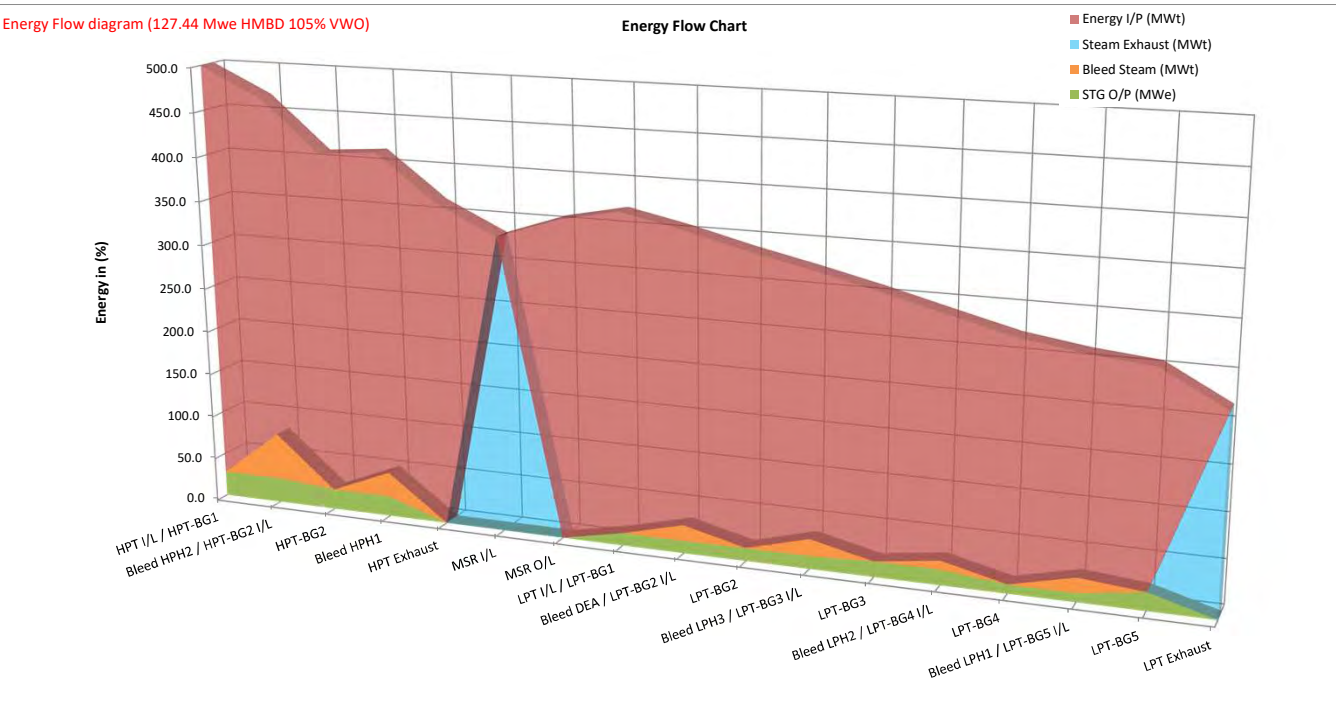
P-h diagram (127.44 Mwe HMBD 105% VWO)



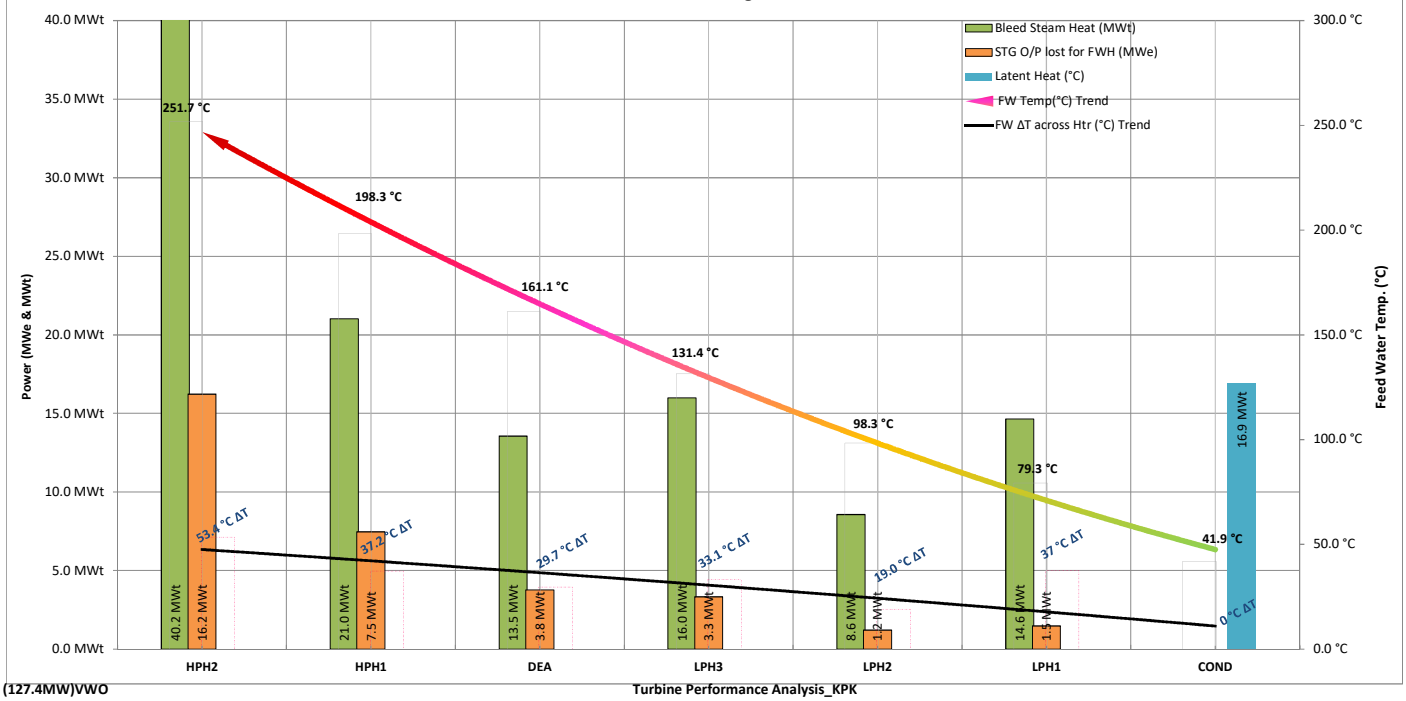
Energy Flow diagram (127.44 Mwe HMBD 105% VWO)



Energy Flow diagram (127.44 Mwe HMBD 105% VWO)



Bleed Energy Vs TG Power (127.44 Mwe HMBD 105% VWO)



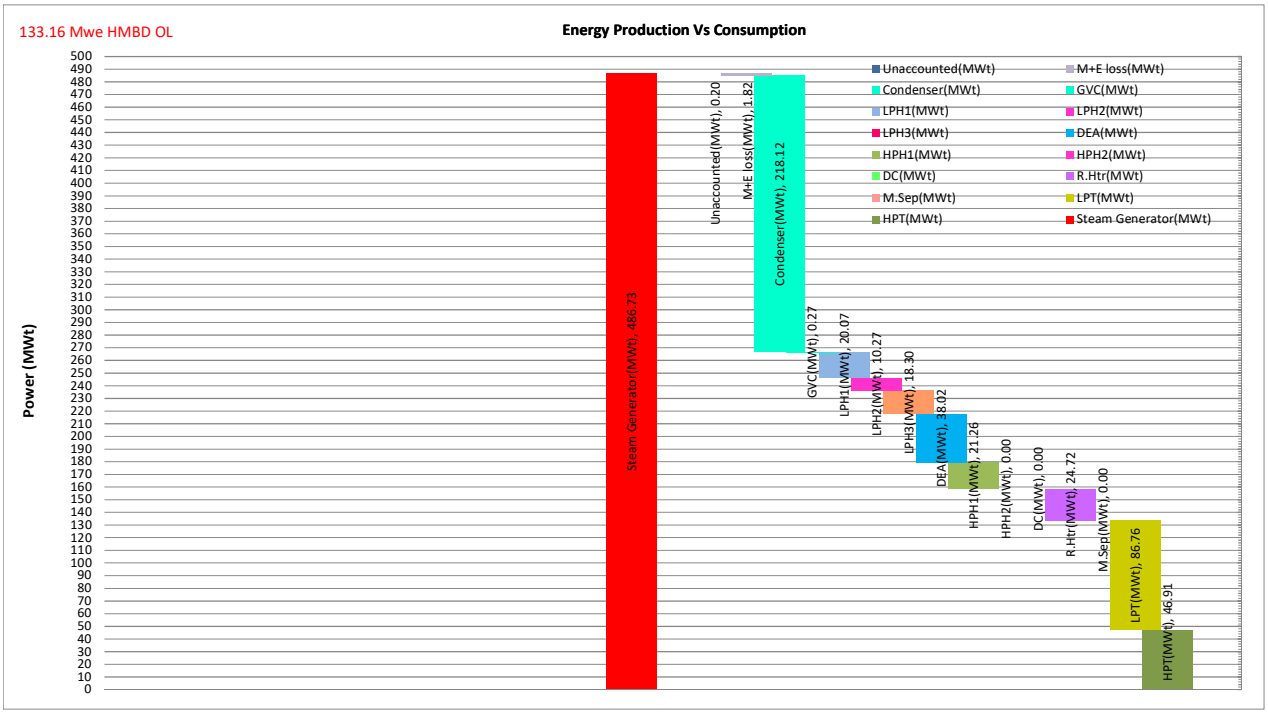
HMBD CASE Over Load (Top HPH OOS) (133.16 MWe)	Units	HPT Inlet	HPT Ext1 (HPH2)	HPT Exhaust (MSR+HPH1)	LPT Inlet	LPT Ext1 (DEA)	LPT Ext2 (LPH3)	LPT Ext3 (LPH2)	LPT Ext4 (LPH1)	LPT Exhaust
Pressure	bar(a)	92.55	NA	17.04	14.6	7.62	3.73	1.27	0.61	0.086
Temperature	DegC	390	NA	204.4	272.1	207.6	141.2	106.4	86.3	42.9
Superheat	DegC	86.1	NA	0.9	76.0	40.0	0.8	0.5	0.4	0.4
Enthalpy (with actual blade group eff.)	kJ/kg	3083.1	NA	2747.7	2976.8	2859.0	2728.7	2561.6	2460.5	2239.5
Dryness fraction		1.00	NA	0.983	1.00	1.00	1.00	0.95	0.93	0.87
DP by blade group		5.43	NA	**5.43**		1.92	2.04	2.94	2.08	**7.09**

Mass Flow rate	kg/s	143.74	142.64		133.38	126.06	118.06	113.67	105.9	
Actual Power O/P Stage wise	MW(mech)	48.2			15.7	16.4	19.7	11.5	23.4	
Generator Eff.	%	98.65%								
Actual Power O/P Stage wise	**MW(elec)**	**47.6**			**15.5**	**16.2**	**19.5**	**11.3**	**23.1**	
Actual Power O/P Total	**MW(elec)**	133.15	100.0%							
Power O/P mentioned in HMBD (for reference)	MW(elec)	133.16								
Steam Rate **(Actual)** Stage wise	T/MWe	10.88			30.98	28.01	21.84	36.10	16.51	
Steam Rate **(Actual)** Overall	T/MWe	**3.89**								

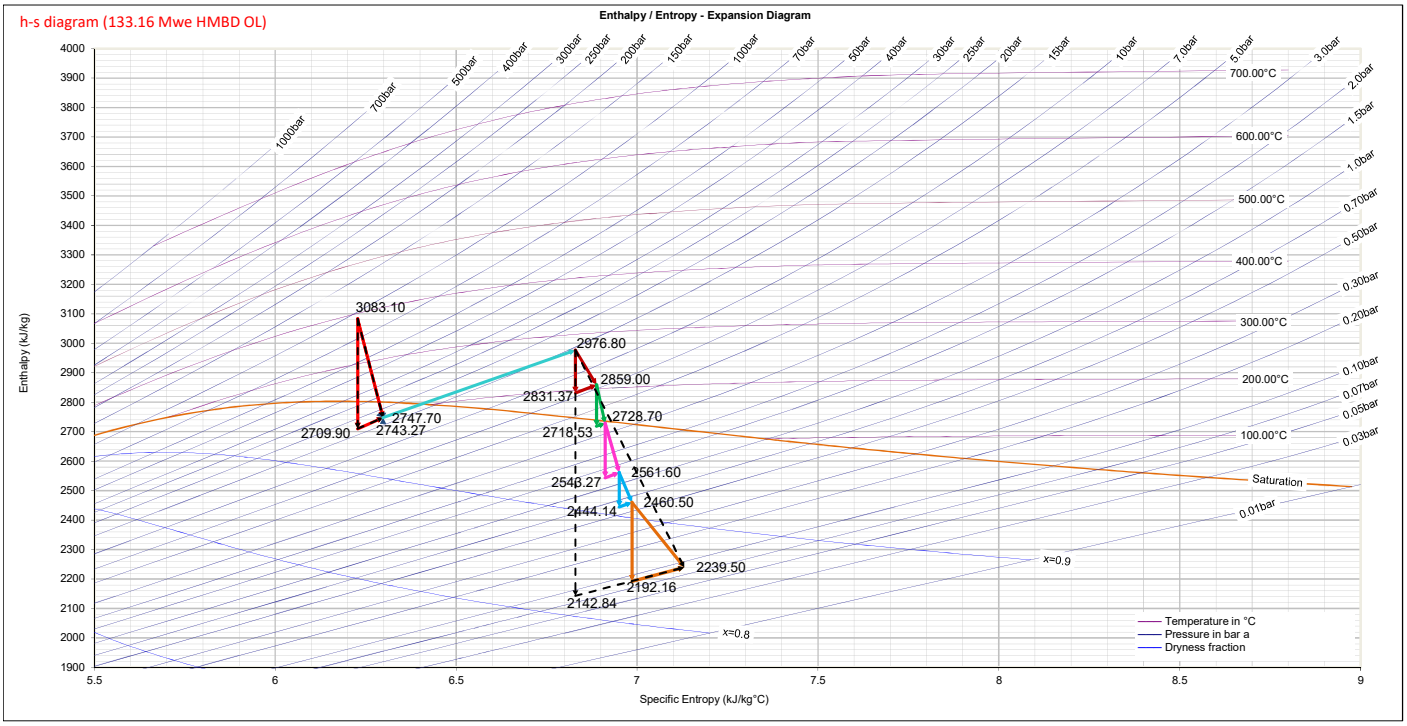
Specific Entropy	kJ/kg.DegC	6.2		6.3	6.8	6.9	6.9	7.0	7.0	7.1
Isentropic Enthalpy (hs)	kJ/kg	2709.9	2743.3	2709.9	2831.4	2718.5	2543.3	2444.1	2192.2	2142.8
Blade Group Efficiency	%		89.87%			81.00%	92.76%	90.11%	86.07%	82.36%
Isentropic Power O/P Stage wise	MW(mech)	53.6			19.4	17.7	21.9	13.4	28.4	
Isentropic Power O/P Stage wise	MW(elec)	52.9			19.1	17.5	21.6	13.2	28.0	
Isentropic Power O/P Total	**MW(elec)**	152.3								
Steam Expansion Turbine Efficiency (Isentropic Vs Actual)	**%**	87.42%								
Isentropic Efficiency (expansion) for reference	%	100.00%								
Isentropic Vs Actual Power O/P loss (stage wise)	%	10.1%			19.0%	7.2%	9.9%	13.9%	17.6%	
Total Isentropic Vs Actual Power O/P loss	**%**	**11.1%**	98.54%							
Steam Rate **(Theo)** Stage wise	T/MWe	9.78			25.09	25.98	19.68	31.07	13.60	
Steam Rate **(Theo)** Overall	T/MWe	**3.40**								

Feed water Heater Power Table:

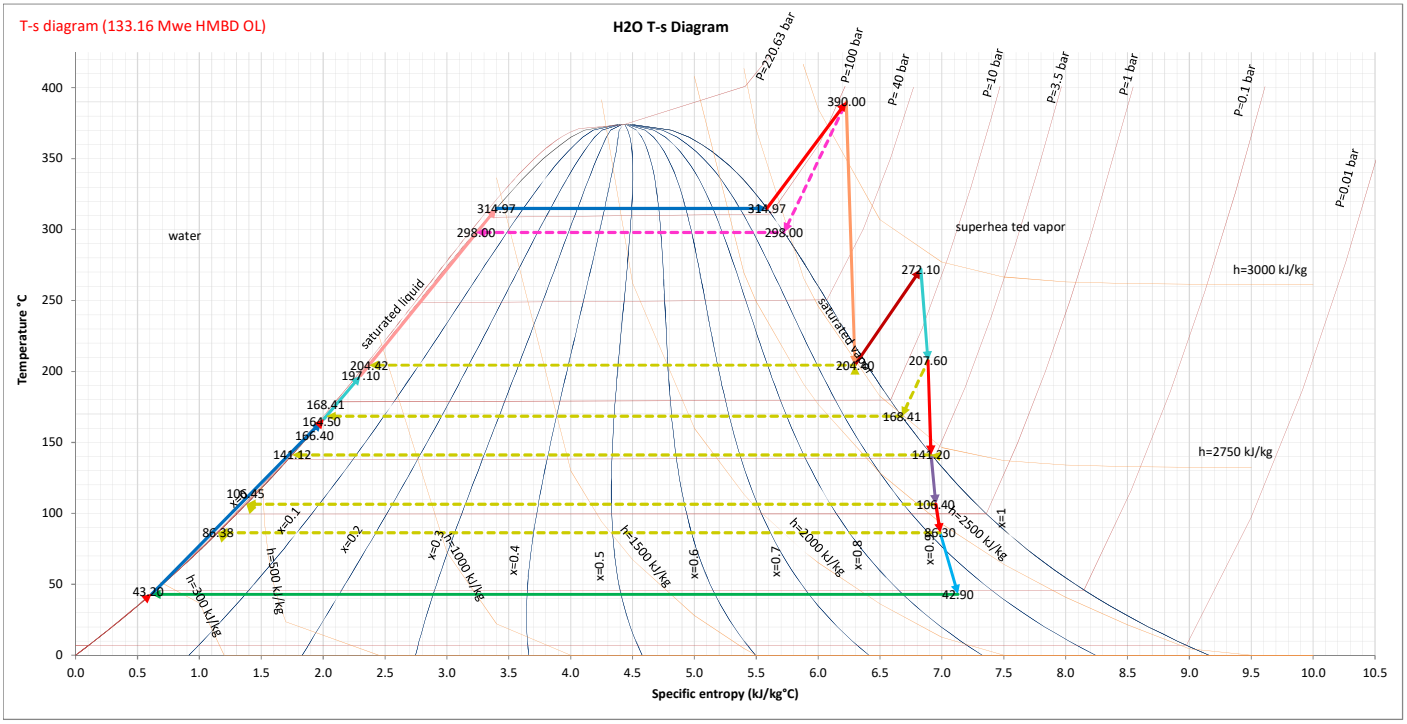
BASE CASE HMBD		DC	HPH2	HPH1	DEA	LPH3	LPH2	LPH1
FW/Condensate Temp I/L to Heater	DegC	197.1		166.4	134	100.1	80.9	43.2
FW/Condensate Enthalpy I/L to Heater	kJ/kg	843.2		708.9	563.4	419.5	338.7	180.8
Condensate Flow I/L to Heater	kg/s	158		158	127	127	127	107
Condensate Flow I/L to Heater	TPH	137	0	142	118	122	123	106
Heater drain Enthalpy	kJ/kg	0	0	709.8	N/A	447	367.1	357.2
Bleed steam Flow	kg/s	N/A	0.0	6.1	6.1	8.0	4.5	8.0
Bleed steam Flow	TPH	N/A	0.0	21.9	22.1	28.9	16.3	28.8
Bleed steam Power Equivalent	**MWe**	**N/A**	**0.0**	**3.8**	**3.3**	**3.34**	**1.84**	**2.09**
Bleed Steam Heat (MWt)	MWt	N/A	0.0	12.5	15.8	18.3	9.6	16.4
STG O/P lost for FWH (MWe)	MWe	N/A	0.0	4.4	4.5	3.9	1.4	1.7
FW heat gain/STG Power O/P	%	N/A	0%	65%	72%	78.8%	86%	90%



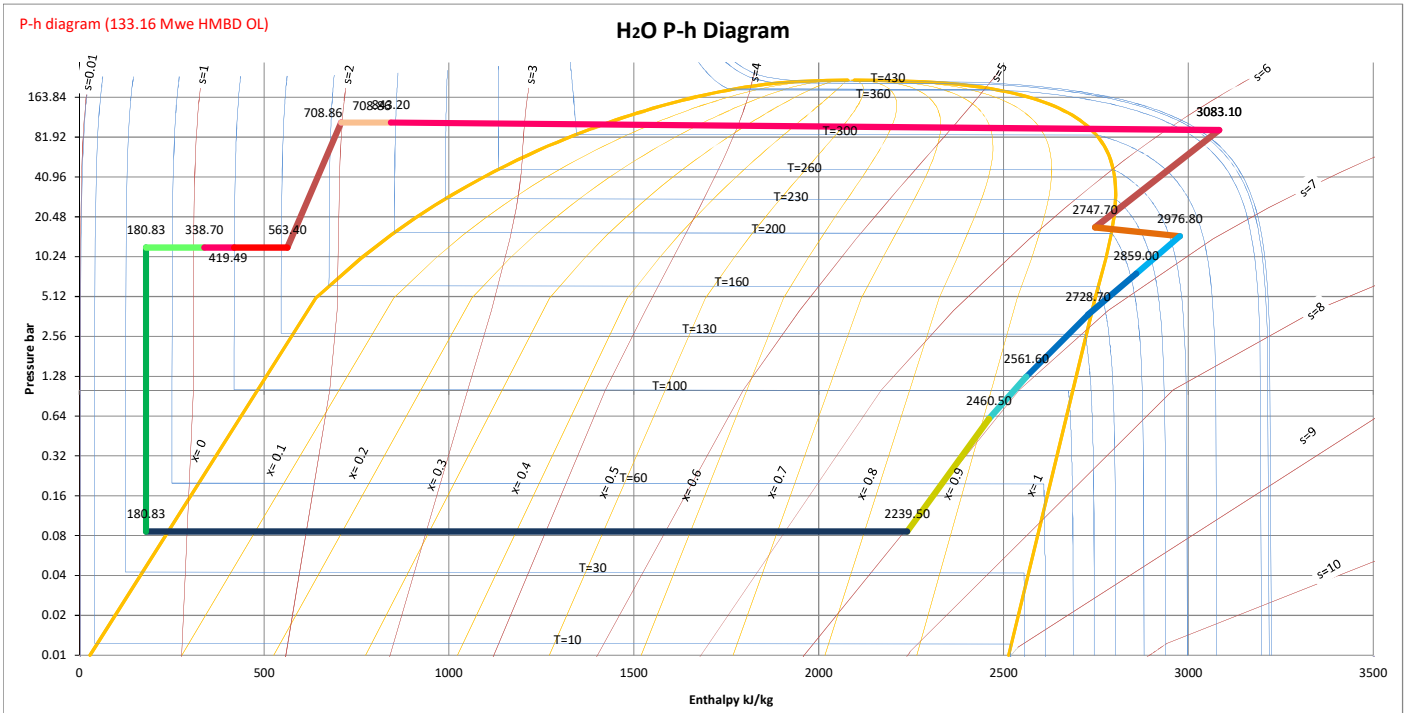
h-s diagram (133.16 Mwe HMBD OL)



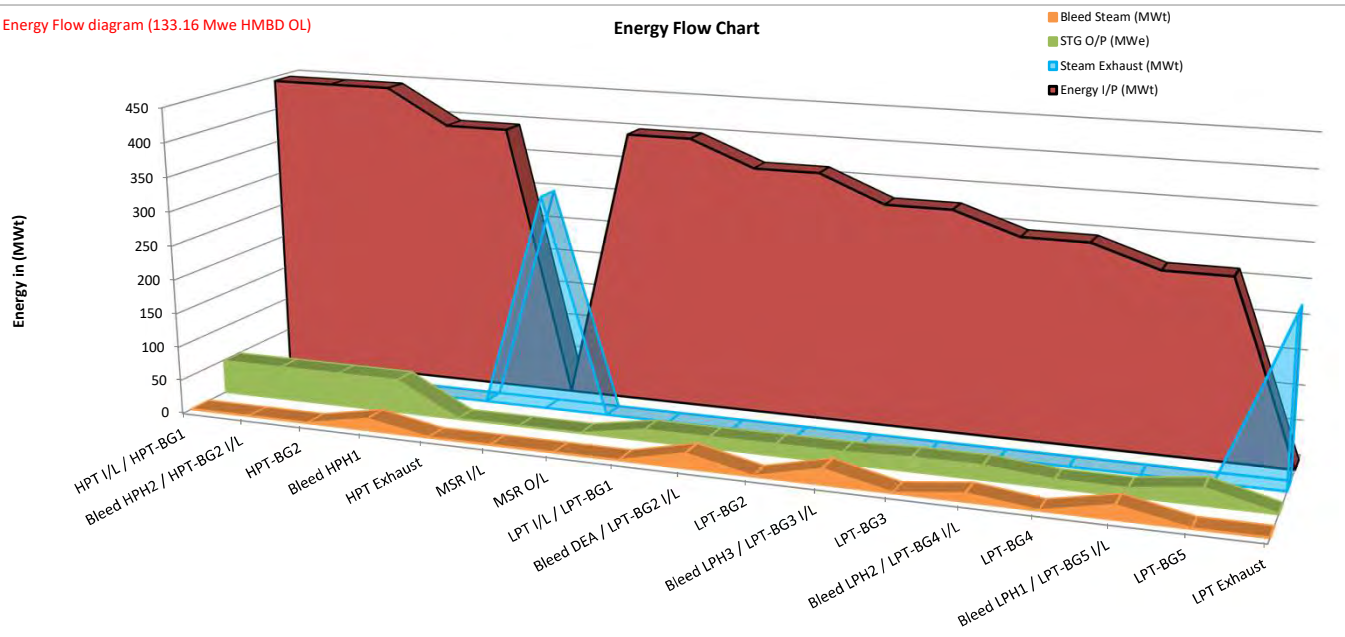
T-s diagram (133.16 Mwe HMBD OL)



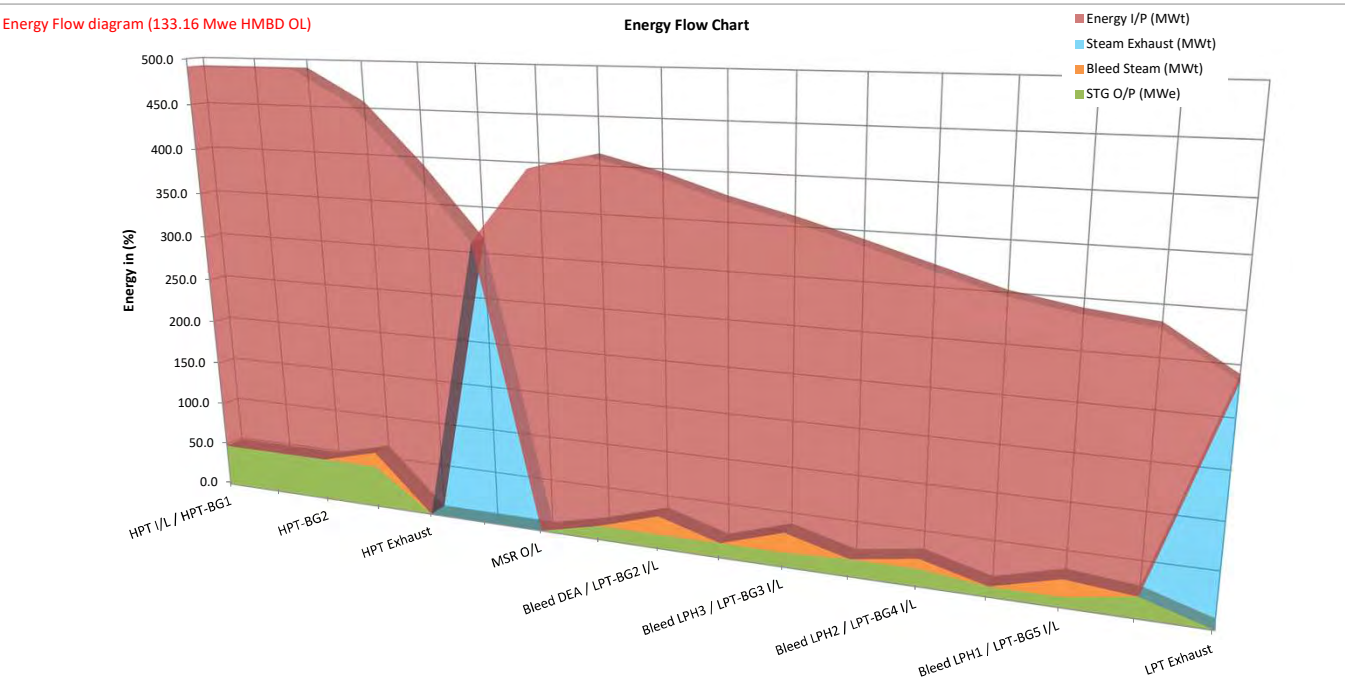
P-h diagram (133.16 Mwe HMBD OL)



Energy Flow diagram (133.16 Mwe HMBD OL)



Energy Flow diagram (133.16 Mwe HMBD OL)



Bleed Energy Vs TG Power (133.16 Mwe HMBD OL)