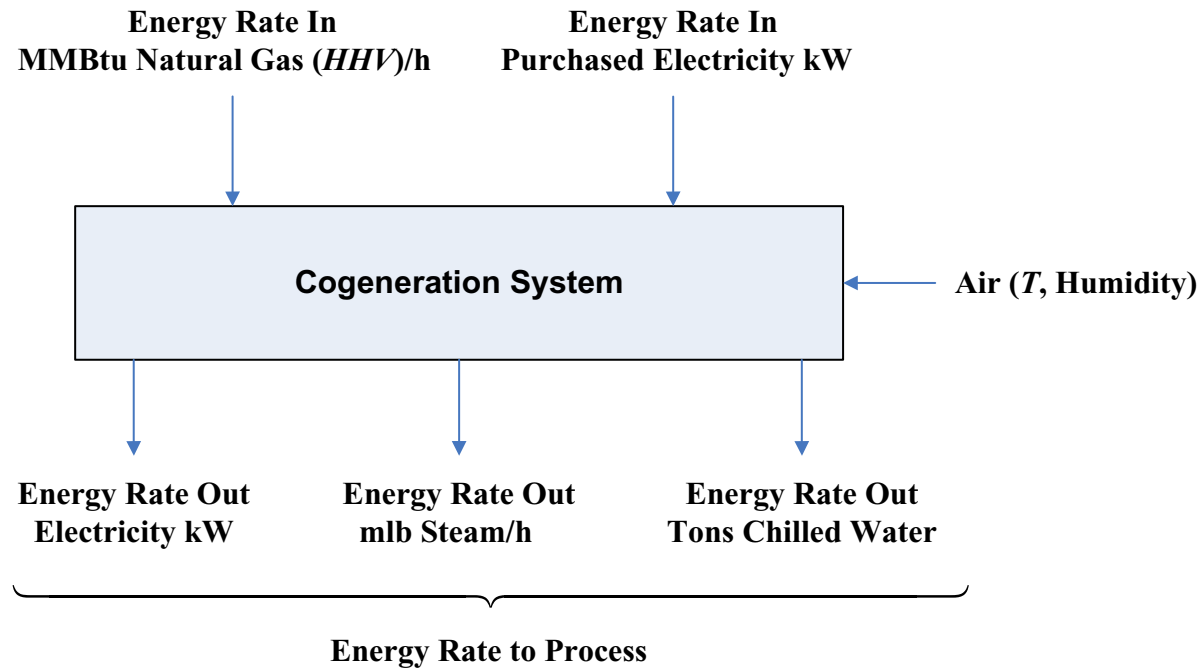
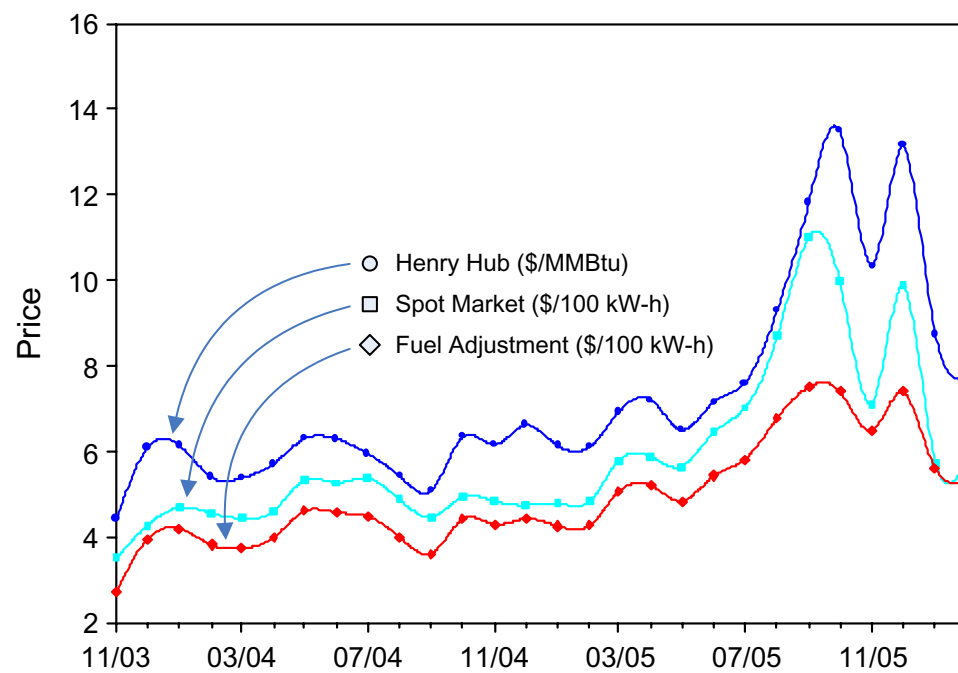


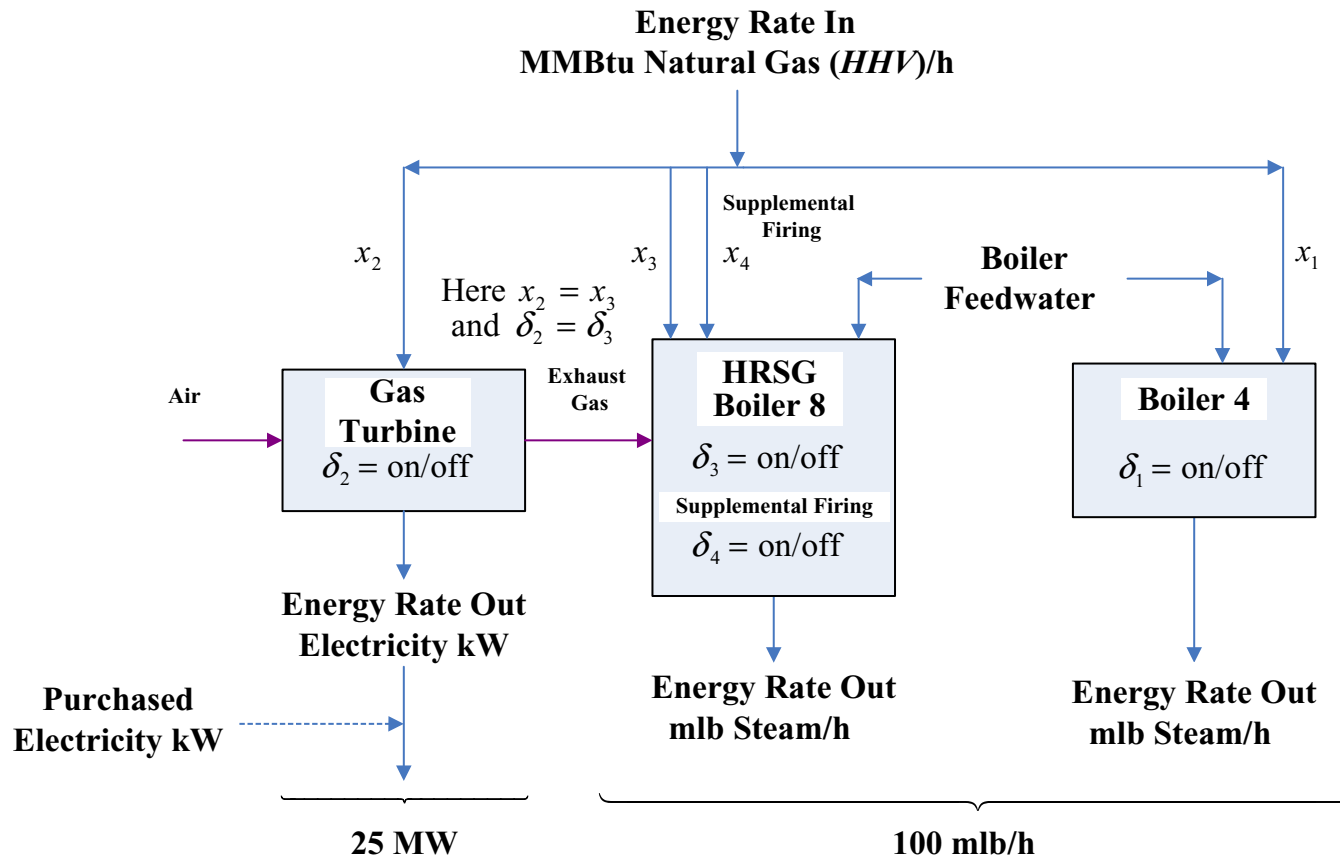
**FIGURE 12.1**



**FIGURE 12.10**



**FIGURE 12.11**



**FIGURE 12.12**

	A	B	C	D	E	F	G	H	I	J	K	L						
1	Process Energy Dispatch Optimization																	
2																		
3	Predicted						INPUTS											
4	NATURAL GAS																	
5	LSU NG Price Delivered (HHV)			7.781	\$/MMBTU			Campus Electricity Demand			25000	kW						
6	NG Purchased (HHV)			235.15	MMBTU/hr			Campus Steam Demand			100	mlb/hr						
7	Natural Gas (HHV)			1054.8677	BTU/SCF													
8	NG flow rate (based on NG_HHV)			222.92	mSCF/hr													
9	NG Cost			1829.68	\$/hr													
10																		
11	VARIABLE ELECTRICITY																	
12	Rate			0.06119	\$/kW-hr													
13																		
14	Electricity Purchased			4900.0	kW													
15	Electricity Cost			299.831														
16	TOTAL COST			2129.51	\$/hr													
17																		
18																		
19																		
20	ELECTRICITY BALANCE						STEAM BALANCE											
21	PRODUCED (kW)			USED (kW)			PRODUCED (mlb/hr)			USED (mlb/hr)								
22	GE Gas Turbine	20100		Campus	25000		Boiler 8	89.6		Campus	100.0							
23	Imported	4900					Boiler 8 Supp.	10.4										
24	SUM	25000		SUM	25000													
25							Boiler 4	0.0		SUM	100.0							
26							SUM	100.0										
27																		
28																		
29							NATURAL GAS											
30							PURCHASED (MMBTU/hr)			USED (MMBTU/hr)								
31							SUM			235.1	GE Gas Turbine	224.4						
32											Boiler 8 Supp.	10.8						
33											Boiler 4	0.0						
34											SUM	235.1						
35																		
36																		
37	EQUIPMENT SELECTION																	
38	NAME	ON/OFF	IN		OUT	EFFICIENCY		MAX CAPACITY		MIN CAPACITY								
39	Boiler 4	0	34.6	MMBTU/hr	29.6	mlb/hr	85.9 %	100	mlb/hr	20	mlb/hr							
40	GE GasTurbine	1	224.4	MMBTU/hr	20100	kW	30.6 %	20100	kW	4000	kW							
41	Boiler 8	1	224.4	MMBTU/hr	89.6	mlb/hr	40.3 %	89.6	mlb/hr	36.2	mlb/hr							
42	Boiler 8 Supp.	1	10.8	MMBTU/hr	10.4	mlb/hr	97.9 %	60.4	mlb/hr	0.0	mlb/hr							
43																		
44	CONSTRAINTS for use in What's Best Solution																	
45	NAME			CONSTRAINT														
46	GE Gas Turbine = Boiler 8 binary				=													
47	GE Gas Turbine = Boiler 8 mcf/hr				=													
48	Boiler 8 Supp <= Boiler 8 binary				<=													
49	Electricity Imported >= 0				>=													
50	Electricity Produced = Consumed				=													
51	Steam Produced = Consumed				=													
52	Natural Gas Purchased = Used				=													
53																		
54	Equipment Capacity			MAX		MIN												
55		Boiler 4		<=		>=												
56		GE Gas Turbine		<=		>=												
57		Boiler 8		<=		>=												
58		Boiler 8 Supp.		<=		>=												

FIGURE 12.13

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	<b>Process Energy Dispatch Optimization</b>												
2				Predicted									
3	<b>NATURAL GAS</b>												
4	LSU NG Price (HHV)			7.781	\$/MMBTU								
5	NG Purchased (HHV)			167.36	MMBTU/hr								
6	NG flow rate (based on NG_HHV)			158.65	mSCF/hr								
7	NG Cost			1302.20	\$/hr								
8													
9	<b>VARIABLE ELECTRICITY</b>												
10	Base Rate			0.01034	\$/kW-hr								
11	Fuel Adjustment			0.05085	\$/kW-hr								
12	Electricity Purchased			17500.0	kW								
13	Variable Electricity Cost			1070.79	\$/hr								
14													
15	<b>FIXED ELECTRICITY</b>												
16	Facilities Charge			35.45	\$/hr								
17	Demand Rate			6.49	\$/kW-month								
18	Demand Billing Load			13125	kW								
19	Demand Charge			118.31	\$/hr								
20	Fixed Electricity Cost			153.76	\$/hr								
21													
22	<b>TOTAL COST</b>			2528.75	\$/hr								

#### INPUTS

Henry Hub (NYMEX) Price	7.601	\$/MMBTU
Natural Gas (HHV)	1054.8677	BTU/SCF
Campus Electricity Demand	25000	kW
Campus Steam Demand	38	mbb/hr
Campus CHW Demand	12500	tons
Ambient Air Temperature	91	deg F
Relative Humidity	42	%
Electricity Base Rate	0.01034	\$/kW-hr
May-Oct Demand Rate	6.49	\$/kW
Nov-Apr Demand Rate	5.67	\$/kW
Contract Power	17500	kW
Prior Monthly Average NYMEX	7.061	\$/MMBTU
Prior Monthly Average Spot Market	0.05731	\$/kW-hr
Predicted Fuel Adjustment	0.05085	\$/kW-hr
Peak Period	1	0 or 1
Off Peak Period	0	0 or 1
May-Oct	1	0 or 1
Nov-Apr	0	0 or 1

**FIGURE 12.14**

	A	B	C	D	E	F	G	H	I	J	K
24	ELECTRICITY BALANCE					STEAM BALANCE					
25	PRODUCED (kW)		USED (kW)		PRODUCED (mlb/hr)			USED (mlb/hr)			
26	GE Gas Turbine	11735	Campus	25000	Boiler 8	61.8	Campus	38.0			
27	Imported	17500	Chiller 1	1034	Boiler 8 Supp.	0.0	Chiller 8	0.0			
28	SUM	29235	Chiller 2	0	Boiler 7	16.6	Chiller 9	17.3			
29			Chiller 3	604	Boiler 7 Supp.	0.0	Chiller 10	23.1			
30	MAX IMPORTED (kW)		Chiller 4	1080	Boiler 4	0.0	SUM	78.4			
31		17500	Chiller 5	825	SUM	78.4					
32			Chiller 7	693							
33			SUM	29235							
34											
35	CHILLED WATER BALANCE					NATURAL GAS					
36	PRODUCED (tons)		USED (tons)		PURCHASED (MMBTU/hr)			USED (MMBTU/hr)			
37	Chiller 1	1600	Campus	12500	SUM	167.4	GE G T	146.8			
38	Chiller 2	0	Air Cooler	361	592.01		Boiler 8 Supp.	0.0			
39	Chiller 3	1000	SUM	12861			Allison G T	20.6			
40	Chiller 4	1700					Boiler 7 Supp.	0.0			
41	Chiller 5	1260					Boiler 4	0.0			
42	Allison Chiller	2611					SUM	167.4			
43	Chiller 7	1100									
44	Chiller 8	0									
45	Chiller 9	1529									
46	Chiller 10	2060									
47	SUM	12861									

**FIGURE 12.15**

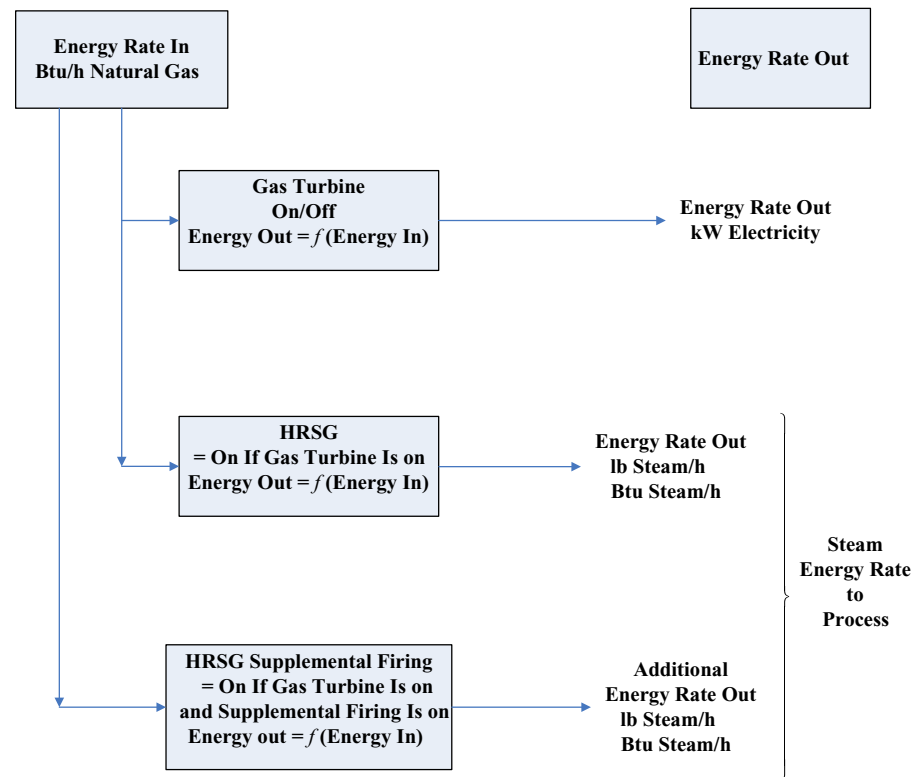
	A	B	C	D	E	F	G	H	I	J	K	L
49	<b>EQUIPMENT SELECTION</b>											
50	NAME	ON/OFF	IN		OUT		EFFICIENCY		MAX CAPACITY		MIN CAPACITY	
51	Chiller 1	1	1033.6 kW		1600.0 tons		544.4 %		1600 tons		320 tons	
52	Chiller 2	0	276.2 kW		400.3 tons		509.7 %		2000 tons		400 tons	
53	Chiller 3	1	604.0 kW		1000.0 tons		582.3 %		1000 tons		200 tons	
54	Chiller 4	1	1079.5 kW		1700.0 tons		553.8 %		1700 tons		340 tons	
55	Chiller 5	1	825.2 kW		1259.8 tons		536.9 %		2000 tons		400 tons	
56	Chiller 7	1	693.0 kW		1100.0 tons		558.2 %		1100 tons		220 tons	
57	Chiller 8	0	5.7 mlb/hr		500.0 tons		93.5 %		2060 tons		500 tons	
58	Chiller 9	1	17.3 mlb/hr		1529.5 tons		94.1 %		2060 tons		500 tons	
59	Chiller 10	1	23.1 mlb/hr		2060.0 tons		95.1 %		2060 tons		500 tons	
60	Boiler 4	0	23.7 MMBTU/hr		20.3 mlb/hr		85.9 %		100 mlb/hr		20 mlb/hr	
61	GE Gas Turbine	1	146.8 MMBTU/hr		11735 kW		27.3 %		20100 kW		4000 kW	
62	Boiler 8	1	146.8 MMBTU/hr		61.8 mlb/hr		42.5 %		89.6 mlb/hr		36.2 mlb/hr	
63	Boiler 8 Supp.	0	0.3 MMBTU/hr		0.3 mlb/hr		97.9 %		60.4 mlb/hr		0.0 mlb/hr	
64	Allison G T/Chill	1	20.6 MMBTU/hr		2611 tons		152.1 %		6400 tons		2500 tons	
65	Boiler 7	1	20.6 MMBTU/hr		16.6 mlb/hr		81.0 %		22 mlb/hr		16.6 mlb/hr	
66	Boiler 7 Supp.	0	0.2 MMBTU/hr		0.2 mlb/hr		97.9 %		71.5 mlb/hr		0 mlb/hr	

**FIGURE 12.16**

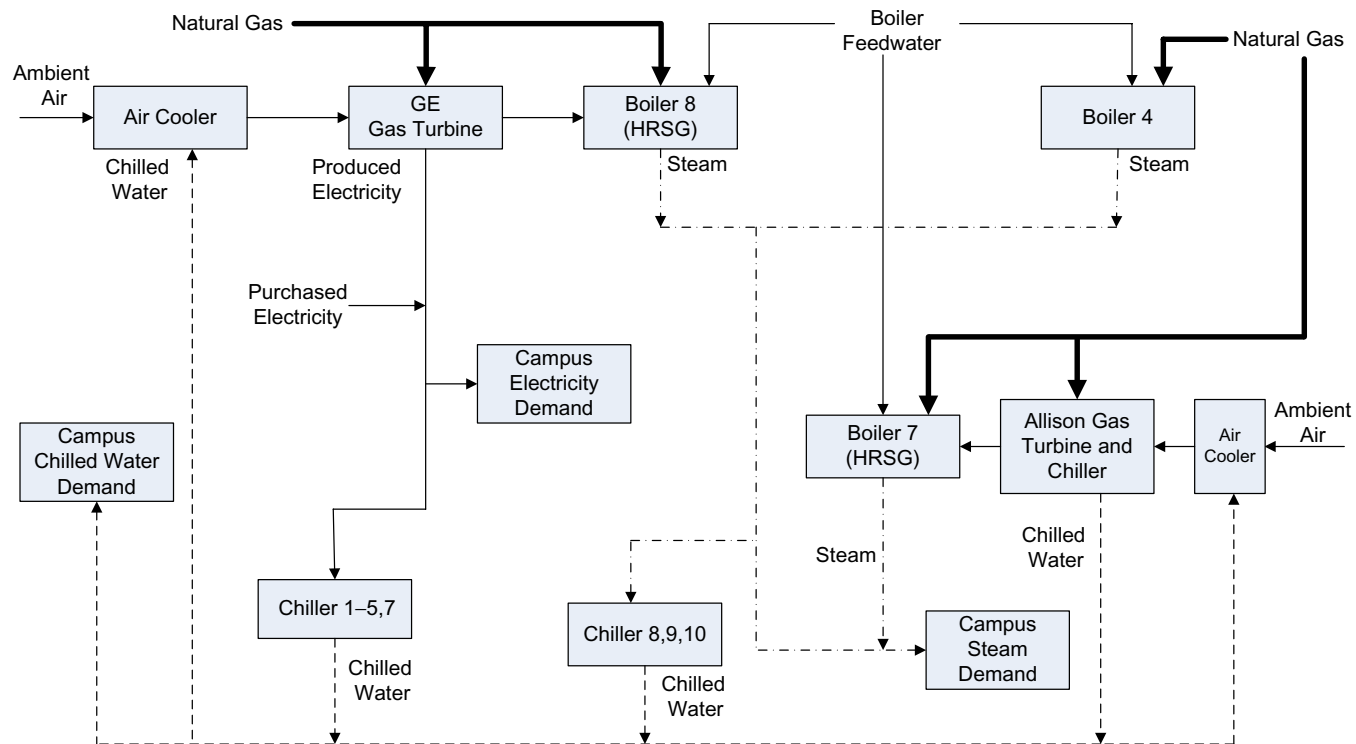
### INPUTS

Henry Hub (NYMEX) Price	9.41	\$/MMBtu
Natural Gas (HHV)	1054.8677	Btu/SCF
Campus Electricity Demand	23735	kW
Campus Steam Demand	40.731	mlb/h
Campus CHW Demand	3526	tons
Ambient Air Temperature	33	°F
Relative Humidity	33	%
Electricity Base Rate	0.01034	\$/kW-h
May-October Demand Rate	6.49	\$/kW
November-April Demand Rate	5.67	\$/kW
Contract Power	17500	kW
Prior Monthly Average NYMEX	13.157	\$/MMBtu
Prior Monthly Average Spot Market	0.09897	\$/kW-h
Predicted Fuel Adjustment	0.07396	\$/kW-h
Peak Period	0	0 or 1
Off-Peak Period	1	0 or 1
May-October	0	0 or 1
November-April	1	0 or 1

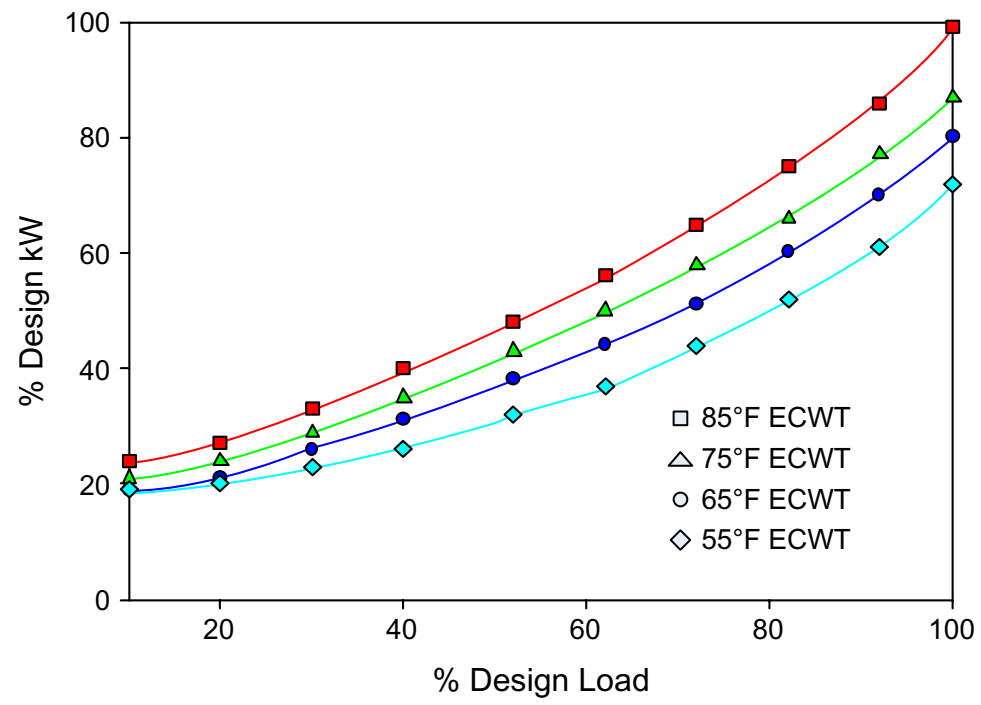
**FIGURE 12.17**



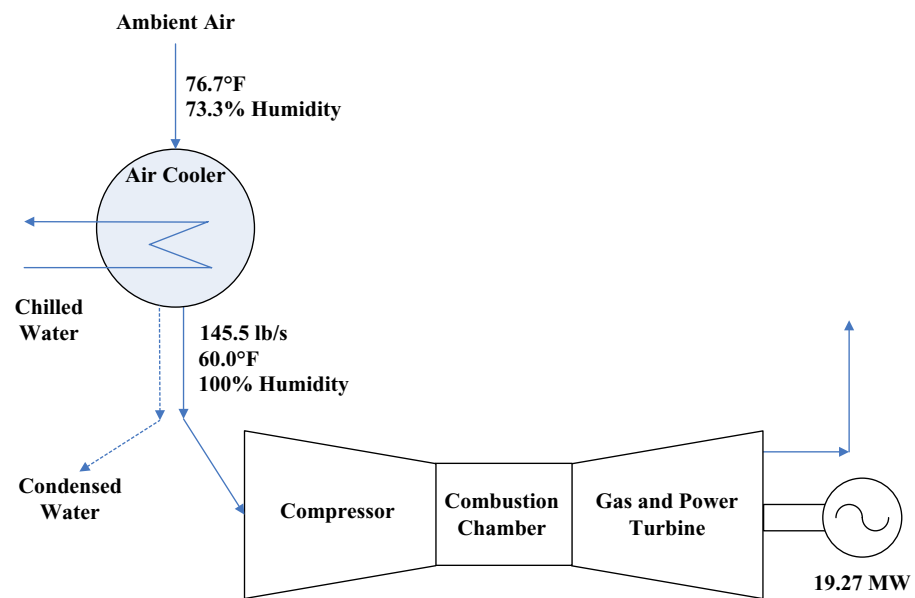
**FIGURE 12.2**



**FIGURE 12.3**



**FIGURE 12.5**



**FIGURE 12.6**

