

**Manchester Schools**

**COGENERATION ANALYSIS WITH PEAK/ OFF PEAK ANALYSIS**

**1 100 KW COGEN UNIT:**

**100 KW TOTAL**

**CALCULATION PARAMETERS:**

**EXISTING THERMAL LOAD USE**

CONVERSION FACTOR	100,000	Btu/therm natural gas
CONVERSION FACTOR	150,000	Btu/gallon FUEL
Boiler Plant Efficiency	70%	
EXISTING AVERAGE COST PER GALLON OF FUEL		
PROPOSED AVERAGE COST PER GALLON OF FUEL		
BOILER EQUIVALENT COST PER THERM	\$0.7093	Boiler Gas rate
COGEN EQUIVALENT COST PER THERM	\$0.7093	Cogen Gas Rate
DEDUCTION FOR EXISTING FUEL OIL FIRED EQUIPMENT:	0	

**EXISTING ELECTRIC USE**

AVERAGE COST PER ON-PEAK KWH (WITHOUT DEMAND) + GRS	\$ 0.0817	
AVERAGE COST PER OFF-PEAK KWH (WITHOUT DEMAND) + GRS	\$ 0.0817	
AVERAGE BLENDED COST PER KWH (WITHOUT DEMAND), INCLUDES GRS	\$ 0.0817	
COST PER DEMAND KW (WEIGHTED AVERAGE)	\$ 10.000	
<b>BLENDED COST DURING PEAK HOURS</b>	<b>\$0.1294</b>	Per/KWH

**COGENERATION EQUIPMENT**

TYPE OF COGEN UNITS	<b>Natural Gas Fired</b>			
COGEN THERMAL OUTPUT PER UNIT:				
THERMAL OUTPUT	AT 100%	AT RATING	% used	
<b>HW/Heating</b>	<b>728,000</b>	<b>691,600</b>	<b>100%</b>	691,600 Btu/hr
	0	0	0%	0 Btu/hr
80 psig HPS	0	0	0%	0 Btu/hr
<b>TOTAL OUTPUT =</b>	<b>728,000</b>	<b>691,600</b>	<b>100%</b>	<b>691,600</b> Btu/hr efficiency =

<b>COGEN THERMAL INPUT AT AVERAGE RUNNING POWER</b>	<b>1,176,100</b>	Btu/hr
COGEN THERMAL INPUT AT 100 % RATING	<b>1,238,000</b>	
COGEN UNIT FULL RATED OUTPUT	<b>100</b>	KW/hr
<b>COGEN KW PER UNIT AVERAGE RUNNING POWER</b>	<b>95</b>	KW/hr efficiency =
<b>NUMBER OF COGEN UNITS</b>	<b>1</b>	
MAX UP TIME PER COGEN UNIT	<b>95%</b>	(or input in column)
<b>MAINTENANCE COST PER KWH PRODUCED</b>	<b>\$0.02</b>	<b>(full maintenance contract)</b>

**ABSORPTION EQUIPMENT**

HOURLY LOAD PER TON	17,140	BTU/ton
<b>AVG KW / TON OF DISPLACED CHILLERS</b>	<b>1.30</b>	<b>KW/ton</b>
Total Chiller Plant	<b>20</b>	<b>Tons</b>

**OTHER**

AVERAGE TOTAL HOURS PER MONTH	730.0	
PEAK AND SHOULDER HOURS PER MONTH	438	Coned
<b>OFF PEAK HOURS PER MONTH</b>	<b>292</b>	

**EXISTING ENERGY USE:**

MONTH	THERMAL EQUIVALENT (Therms)	PEAK DEMAND (KW)	ON-PEAK + SHLDR (KWh)	OFF-PEAK USE (KWh)	TOTAL USE (KWh)	TOTAL Electric Cost	Avg Cost Per Kwh
Jan-09	Fuel 25,870	468.0	65% 101,985	35% 54,915	156,900	\$15,452	\$0.098
Feb-09	20,046	513.0	105,690	56,910	162,600	\$15,730	\$0.097
Mar-09	16,702	486.0	103,740	55,860	159,600	\$15,631	\$0.098
Apr-09	8,656	459.0	91,260	49,140	140,400	\$14,177	\$0.101
May-09	2,592	462.0	88,725	47,775	136,500	\$14,061	\$0.103
Jun-09	1,100	474.0	94,965	51,135	146,100	\$17,159	\$0.117
Jul-09	530	444.0	89,700	48,300	138,000	\$17,301	\$0.125
Aug-09	109	384.0	91,845	49,455	141,300	\$17,494	\$0.124
Sep-09	1,096	480.0	100,620	54,180	154,800	\$20,041	\$0.129
Oct-09	8,596	498.0	96,525	51,975	148,500	\$18,644	\$0.126
Nov-09	14,922	453.0	100,230	53,970	154,200	\$18,079	\$0.117
Dec-09	21,460	504.0	113,100	60,900	174,000	\$20,574	\$0.118
<b>TOTALS</b>	121,679	5,625	1,178,385	634,515	1,812,900	\$204,342	
<b>COST</b>	\$86,305	\$56,250	\$ 96,274	\$ 51,840	\$ 148,114		
<b>UNIT COST</b>	<b>\$0.709</b>	<b>\$10.00</b>	<b>\$ 0.08170</b>	<b>\$ 0.08170</b>	<b>\$ 0.08170</b>		
<b>AVERAGE</b>		469					
<b>TOTAL Electric cost at these rates:</b>		<b>\$204,364</b>	<b>Cost from Load Profile =</b>		<b>\$204,342</b>		
<b>BLENDED COST DURING PEAK HOURS</b>			<b>\$0.129 Per/KWH</b>				
<b>Average KW per hour=</b>		<b>207 KW</b>	<b>Total blended electric =</b>		<b>\$0.1127 Per kwh</b>		