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September 11, 2006

Technical/Economic Case Study of the Seneca Niagara Falls Casino/Resort 6 mw CHP Facility

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- Seneca Niagara Falls Casino - Background
  - 2003 –Operating a 100,000 square ft casino in a recently refurbished Niagara Fall Convention Center
  - Site Master Plan called for the development of additional gaming space, restaurants, new garage, shops and 600 room tower for opening in 2005
  - Land Space at a premium
  - Electric Utility Infrastructure “Tired” and “Capacity Restricted”
  - Experienced the August 2003 Grid failure

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Project Concept

- CHP Development would be in coordination with the new Central Energy Center and site development master plan.
- Electrical generation will be able to operate parallel with existing grid or island mode.
- Generation will provide sufficient power to provide 100 % reliability.
- Marina Energy/DCO to design, procure and oversee installation of CHP; coordinate with Central Plant designer and installation contractor.

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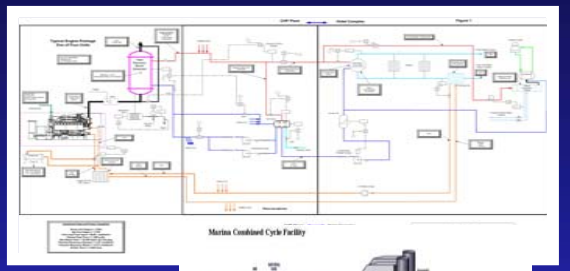
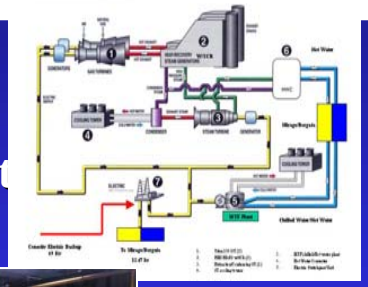
Development Issues

- Load Profile Analysis
  - Existing Casino
  - Projected Expansion
- Unit Sizing/Plant Configuration
  - Gas Turbine vs. Engine–Generators
- Engineering / Construction Issues
  - Utility Interfaces/ Electric Infrastructure Cost
- Environmental Issue
- Economic driver
    - Real Time Electric pricing
    - The Outage of August 2003 loses
    - Natural Gas Cost





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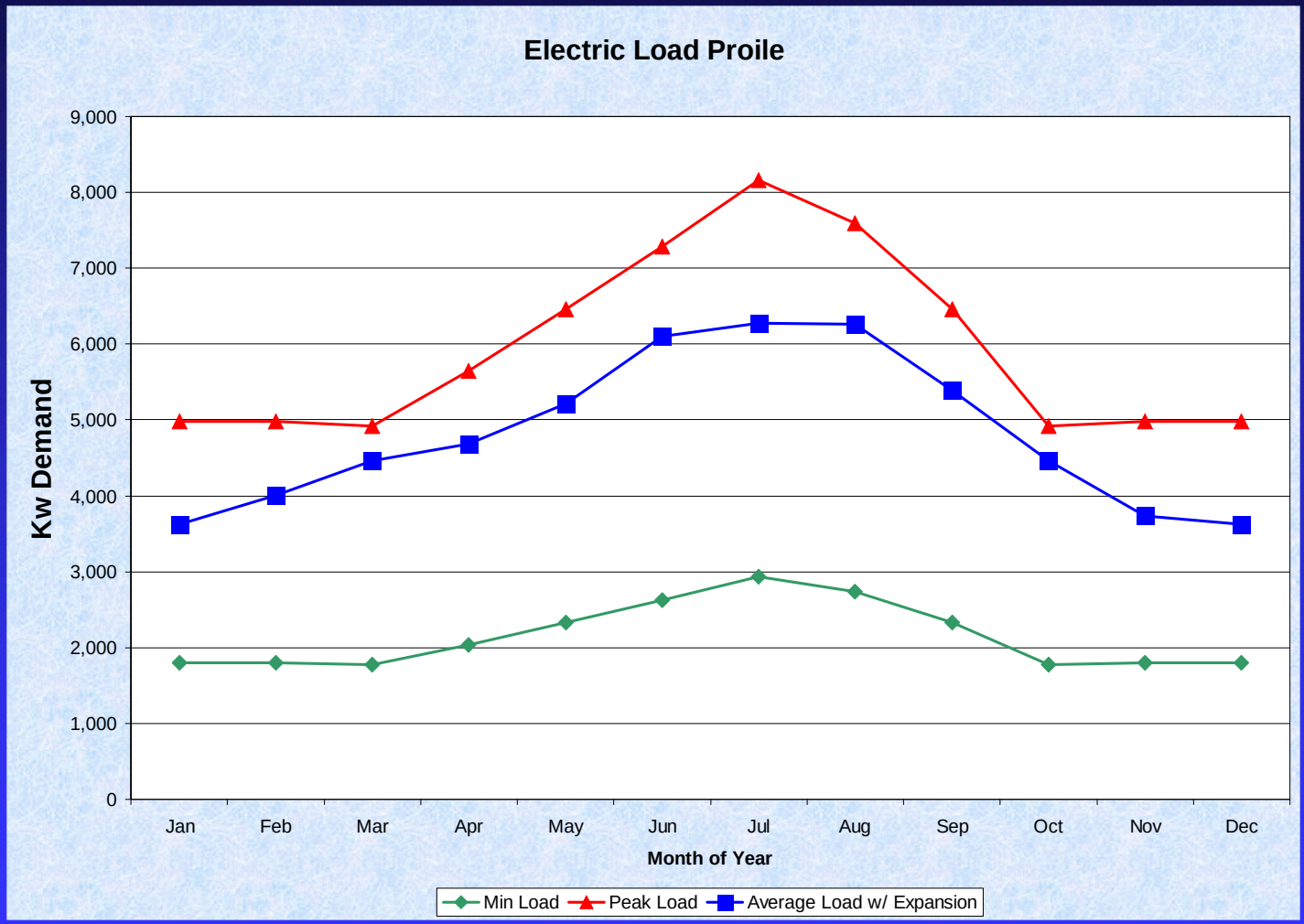

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Monthly Profile and Engine Performance

Bin	Frequency	Kw	Hours	kwh	Generation Required	Number Generators	% Generato Load	Generator Kwh	Generator w/Avail	Gen Fuel w/ Avail mmbtu y = 20.083x + 2.0097	Heat Recovery w/Avail MMBTU y = -1.7558x2 + 5.0121x + 0.6222
0	0	0	-	-	-	1	0%	-	-	-	-
50	0	200	-	-	200	1	9%	-	-	-	-
100	0	400	-	-	400	1	18%	-	-	-	-
150	0	600	-	-	600	1	26%	-	-	-	-
200	0	800	-	-	800	1	35%	-	-	-	-
250	0	1000	-	-	1,000	1	44%	-	-	-	-
300	0	1200	-	-	1,200	1	53%	-	-	-	-
350	0	1400	-	-	1,400	1	61%	-	-	-	-
400	0	1600	-	-	1,600	1	70%	-	-	-	-
450	0	1800	-	-	1,800	1	79%	-	-	-	-
500	19	2000	5	9,500	2,000	1	88%	9,500	7,355	72	13
550	5	2200	1	2,750	2,200	1	97%	2,750	2,129	21	4
600	0	2400	-	-	2,400	2	53%	-	-	-	-
650	39	2600	10	25,350	2,600	2	57%	25,350	19,626	203	44
700	338	2800	85	236,600	2,800	2	61%	236,600	183,174	1,878	398
750	574	3000	144	430,500	3,000	2	66%	430,500	333,290	3,385	702
800	678	3200	170	542,400	3,200	2	70%	542,400	419,923	4,229	860
850	416	3400	104	353,600	3,400	2	75%	353,600	273,755	2,737	545
900	314	3600	79	282,600	3,600	2	79%	282,600	218,787	2,173	424
950	203	3800	51	192,850	3,800	2	83%	192,850	149,303	1,474	281
1000	282	4000	71	282,000	4,000	2	88%	282,000	218,323	2,144	401
1050	106	4200	27	111,300	4,200	2	92%	111,300	86,168	842	154
1100	1	4400	0	1,100	4,400	2	97%	1,100	852	8	1
1150	1	4600	0	1,150	4,556	2	100%	1,139	882	9	2
1200	0	4800	-	-	4,556	2	100%	-	-	-	-
1250	0	5000	-	-	4,556	2	100%	-	-	-	-
1300	0	5200	-	-	4,556	2	100%	-	-	-	-
1350	0	5400	-	-	4,556	2	100%	-	-	-	-
1400	0	5600	-	-	4,556	2	100%	-	-	-	-
1450	0	5800	-	-	4,556	2	100%	-	-	-	-
1500	0	6000	-	-	4,556	2	100%	-	-	-	-
1550	0	6200	-	-	4,556	2	100%	-	-	-	-
1600	0	6400	-	-	4,556	2	100%	-	-	-	-
	2976		744	2,471,700				2,471,689	1,913,566	19,175	3,829
								% load	77.42%		
								Operating Heat Rate		10,021	
				Thermal Produced		3,829			Average Thermal Produced		5.15
				Faciilty Req`uired		18,972			Facility Average		25.50
				Dump ( ) or Need +		15,143			Dumped Heated		-

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Peak Load	8,081
Average Load	5,503
Min Load	2,650
Kwh	44,265,000

Hours < Generator	7,880
Average kw	5,255
Kwh	41,409,418
Max kw	5,820
Min Kw	1,820

Hours>generator	420
Average kw	6,823
Kwh	2,865,582
Max kw	8,081
Min Kw	5,503

Import Kw	
Gen produce	41,399,418
Peak Kw	5,820
Average Kw	4,897
KWH	2,865,582

Export Kw	
Gen produce	42,504,576
less outage	1,105,158
Net gen	41,399,418
Peak Kw	5,820
Average Kw	4,988
KWH (*)	-

6 Mw of Generation

Electric Balance	
Customer Required	44,265,000
Generated	41,399,418
Imported	2,865,582
Exported	-
Total	44,265,000
Net	-

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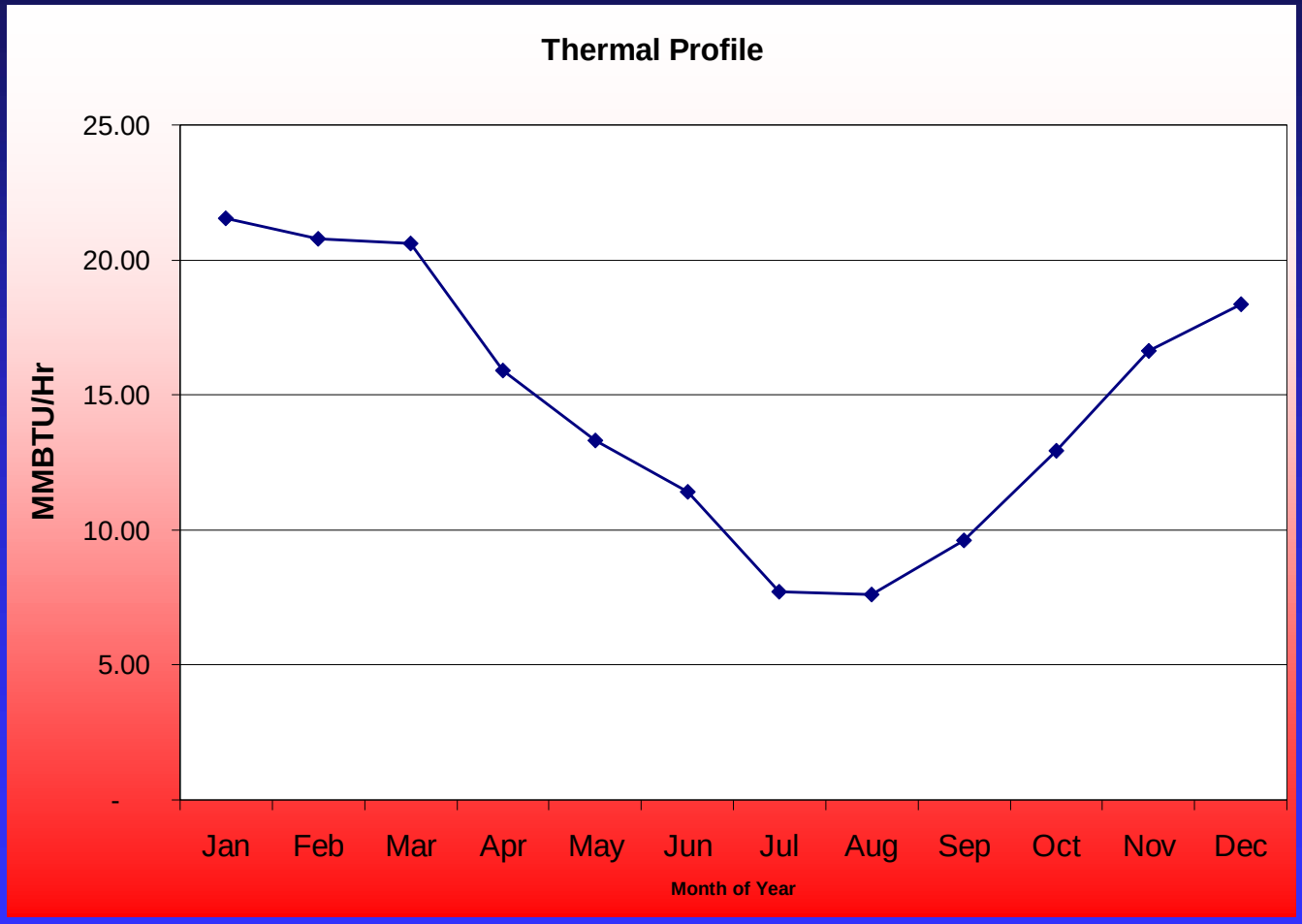

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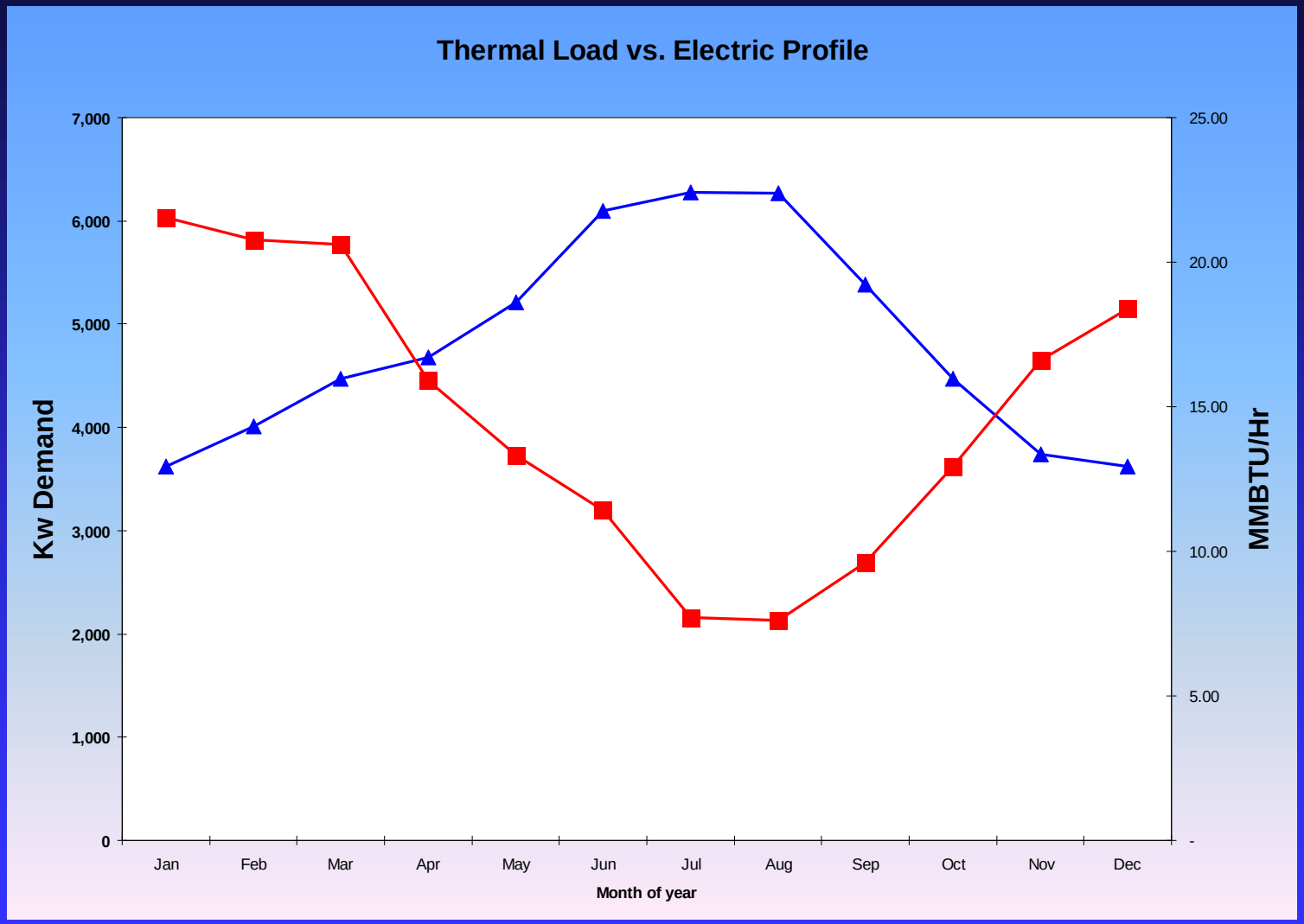

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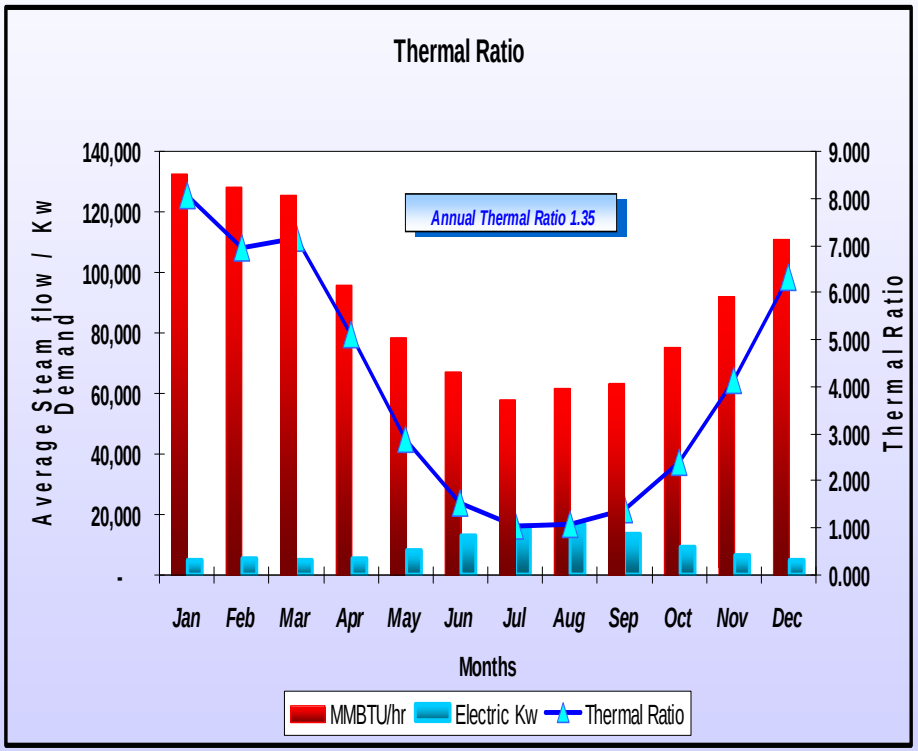
Thermal Electric Ratio (TER)

Average BTU/hr

Average kw demand times 3412

Thermal to Electric Ratio	System Configuration
3-20	Steam Turbines
1-10	Gas Turbines
.5 -1.5	Gas Engines



Engine Choose

3 – 2mw Engine Generator vs. 2 –3 mw Engine Generator

Engine Selection

- 3 – 2 mw Engine Generators
  - More Selections of Engines – CAT 3520C
  - Lower Cost
  - Increased reliability
  - Better load following w/better heat rate

- Engineering/Construction Issues
  - Full Heat Recovery vs. Partial Heat Recovery
    - Partial Heat Recovery (jacket water/aftercoolers)
      - Space limitation
  - Cooling Sources
    - Radiators vs. Cooling Towers
      - Cooling Tower
      - Lower aftercooler temperatures
        - Improved efficiency

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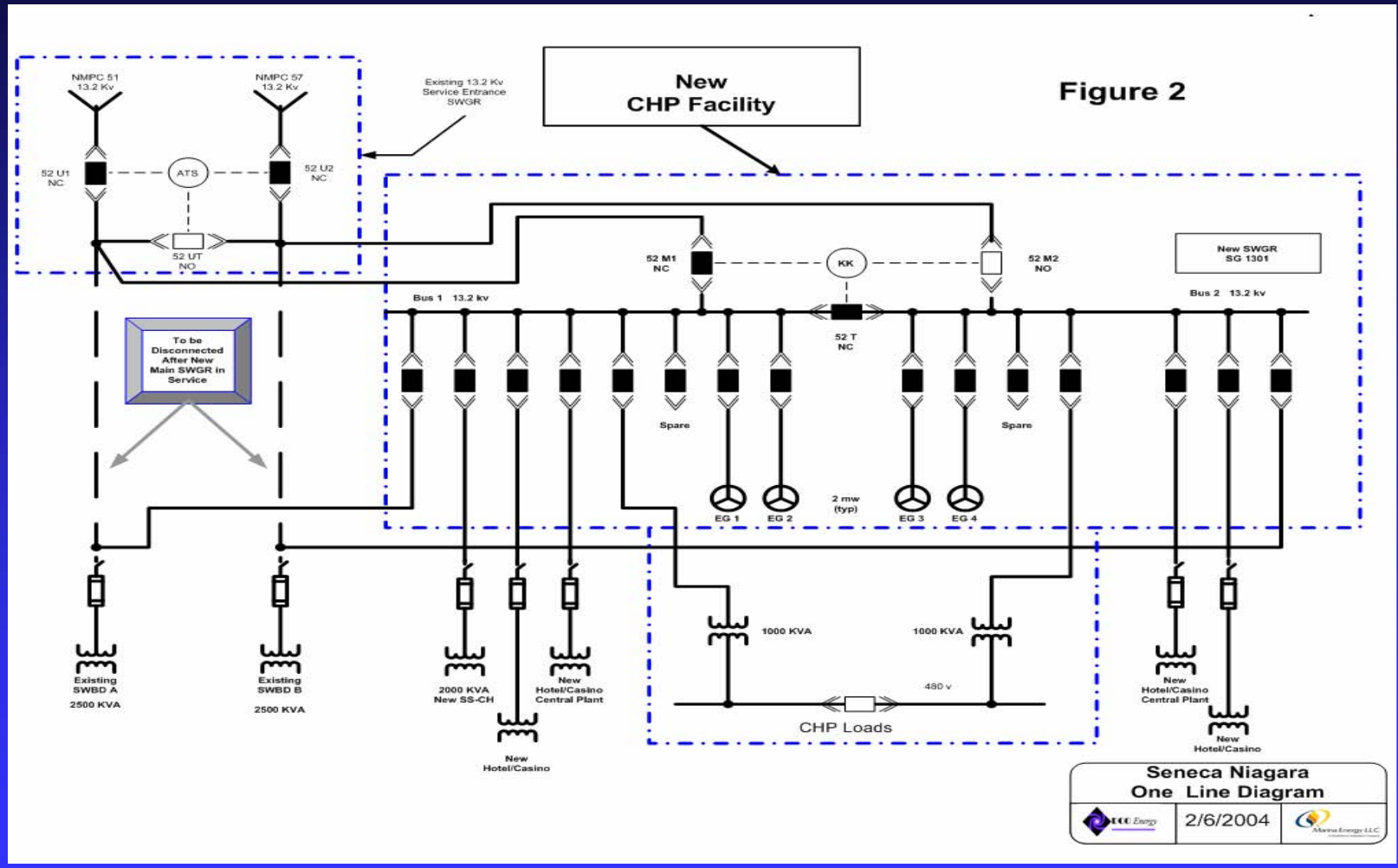
- Engineering/Construction Issues
  - Ventilation
  - Noise
  - Electric Grid Isolation
    - Grounding issues
  - Electric Utility Interconnection
    - Tripping Sequence
    - Fault tolerance issues
  - Load Shedding and Sequencing
    - Black Start capable
  - Disaster Migration and Recovery

Engineering/Construction Issues



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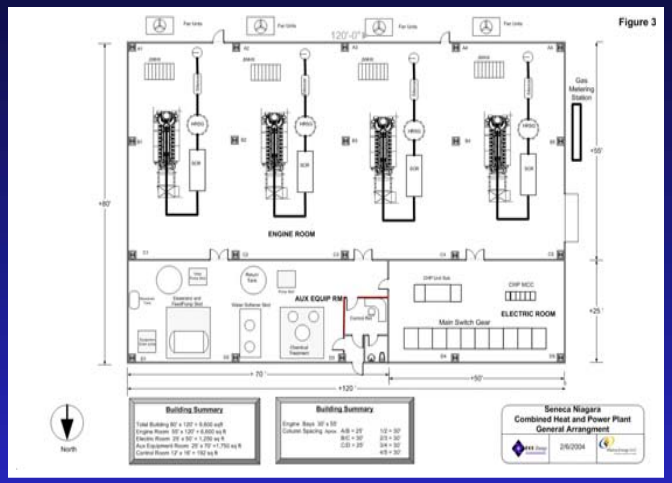

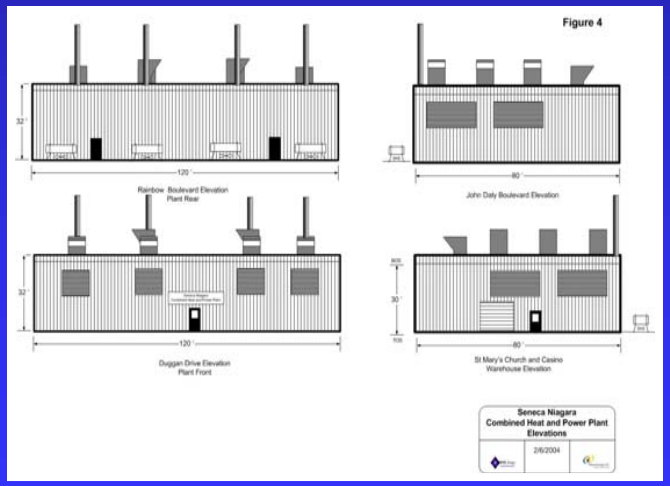

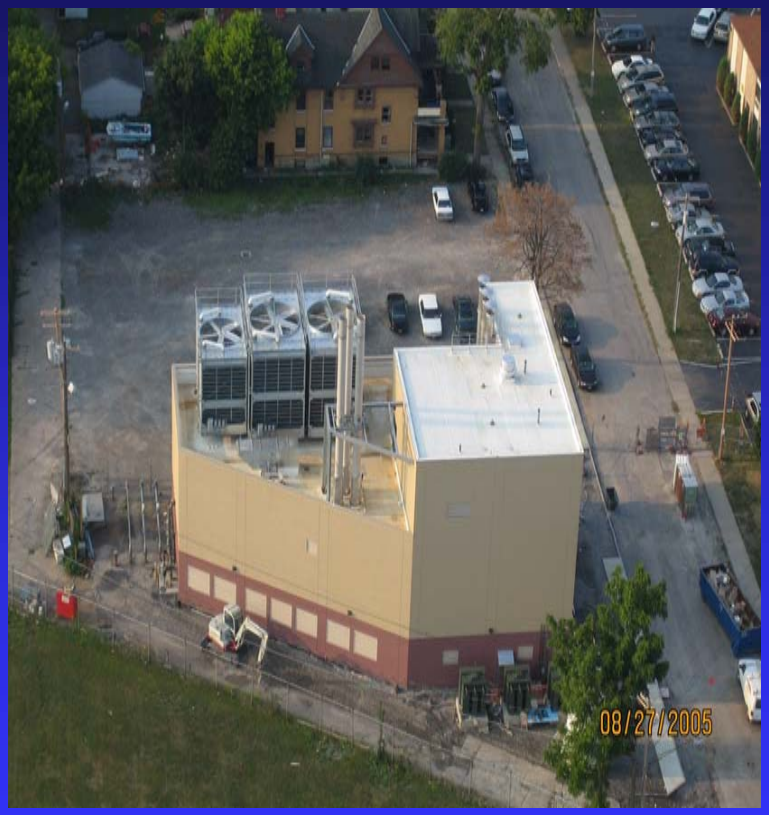

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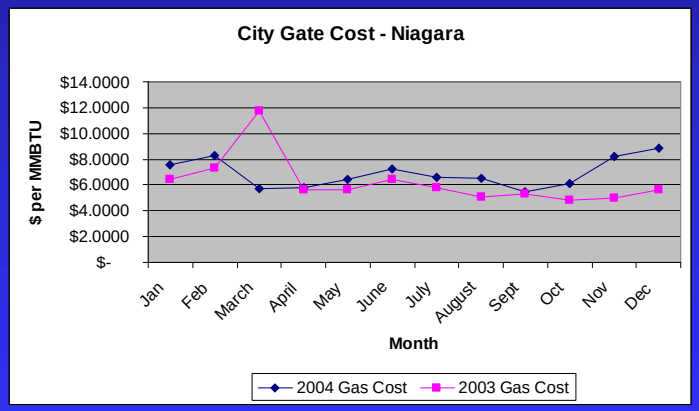
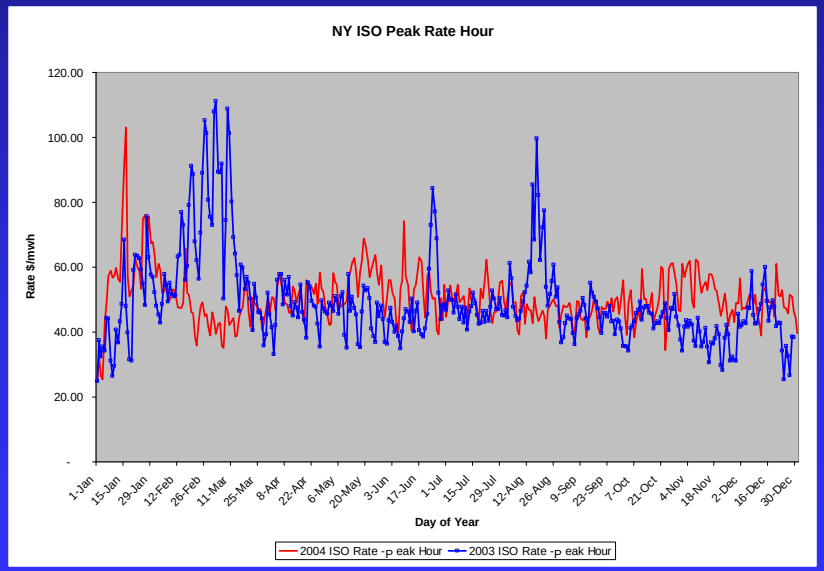
Environmental Considerations

- Regulated By EPA not State of New York
- Designed to meet NY SOTA
- Not a Major Source
- Post Emissions Technology
  - Lean Burn Engine
  - SCR
  - Oxy-Cat

Economic Drivers

- Real Time Electric Pricing
- Outage Cost
- Natural Gas Cost





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Seneca Niagara Hotel and Casino
CHP Financial Analysis

Energy Required			
Casino Hotel kwh Required		44,265,000	kwh
Casino Thermal Energy Required- Hot Water		80,322	mmbtu/yr

Energy Cost without cogeneration			
NIMO Purchased		44,265,000	kwh
National Fuel Purchased Natural Gas to make Hot Water		100,403	mmbtu/yr
Electric Price	$	0.0966	$/kwh
Burner Tip fuel Price	$	7.4685	$/mmbtu

20 year Life Cycle Cost (x1000)	$	128,576
Present Value (x 1000)	$	53,337

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Seneca Niagara Hotel and Casino
CHP Financial Analysis

Cogeneration Plant Output	41,399,418	kwh
Cogeneration Heat Recovery	52,100	mmbtu/yr
NIMO Purchased Standby and Supplemental	2,865,582	kwh
National Fuel Boiler Natural gas	34,170	mmbtu/year

20 year Life Cycle Cost (x1000)	$	107,413
Present Value (x 1000)	$	42,410

CHP Savings		
20 year Life Cycle Cost (x1000)	$	21,163
Present Value (x 1000)	$	10,927

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Financial Summary

Project Cash Flow		
Project Investment w/IDC	$	(7,287,088)
IRR		21.76%
NPV @ Discounted Rate of 10 %	$	3,309,150
Simple payback (yrs)		4

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Operating Experience

In-service – Dec 2005

90 + reliability

No boiler operation in summer

Issues

- Engine Stability
- Area cooling @ extreme temperature
- Cooling Tower turndown - winter

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