Demonstration of a Modular Gas Turbine Cogeneration System

Northern Development

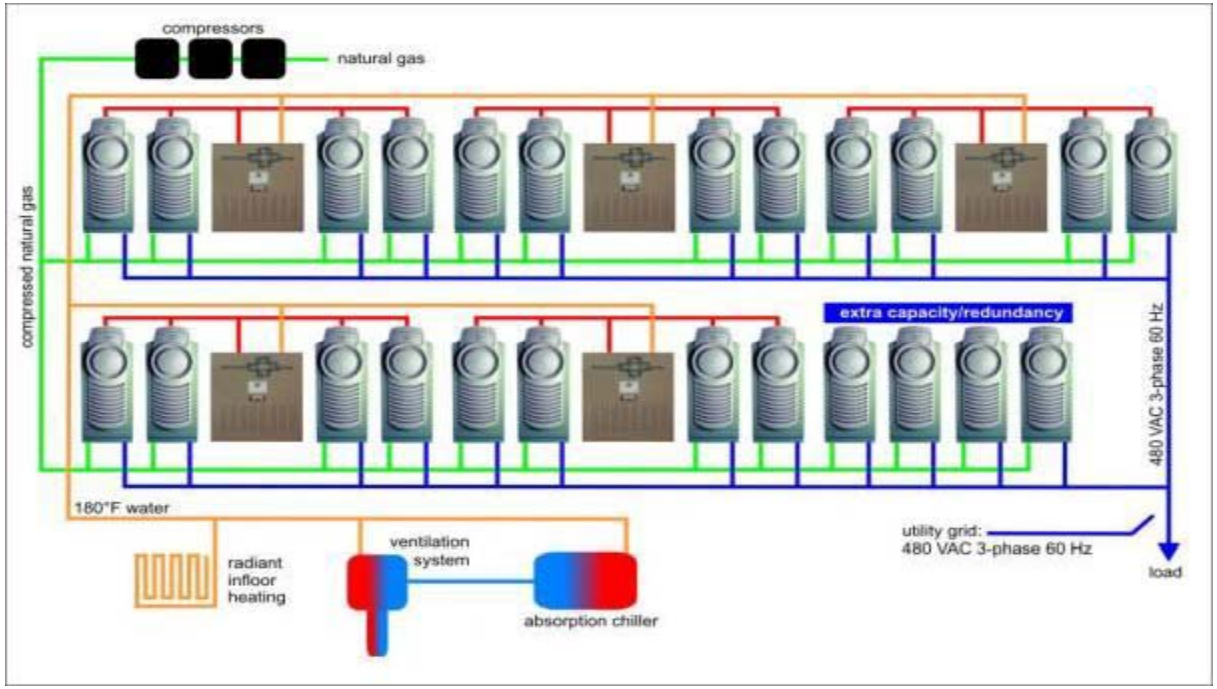
Modern Energy Technology

June 20, 2002

Features

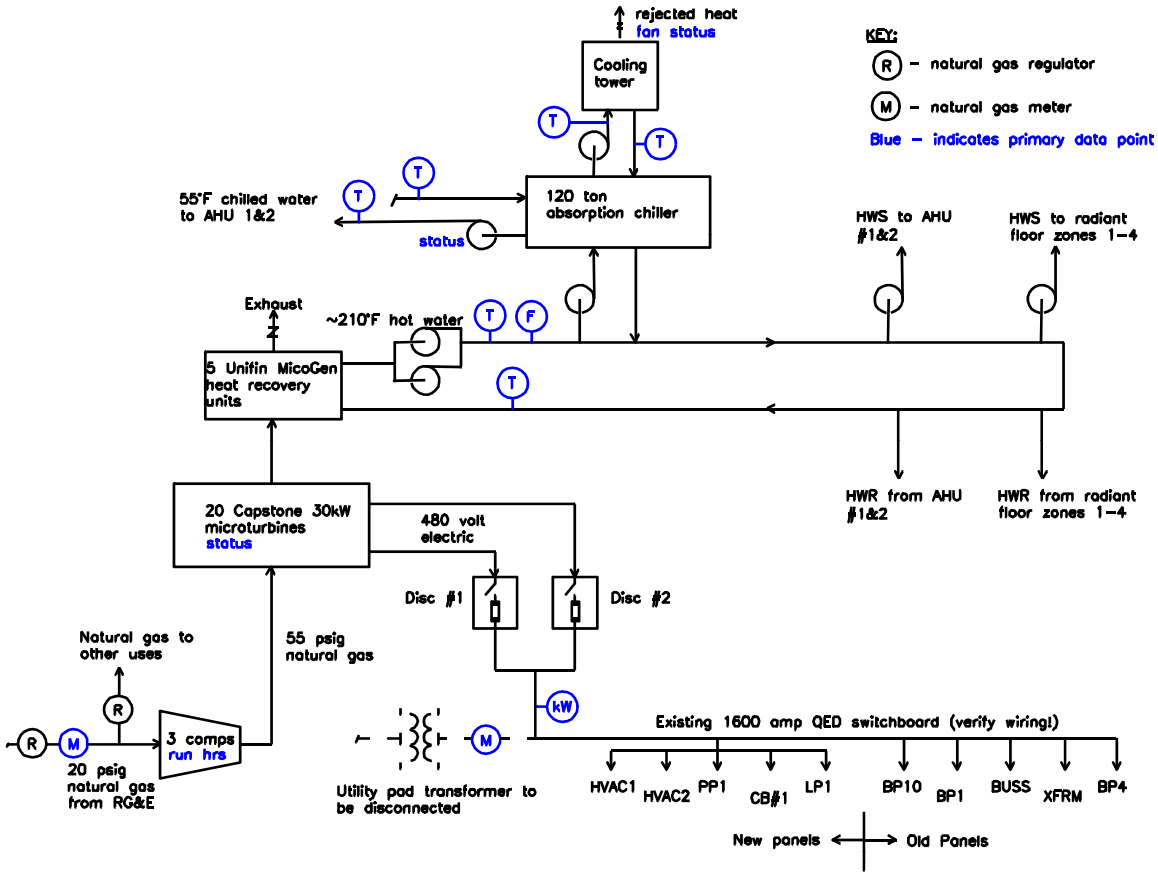
- First of Kind Installation Nationwide
- Plastics Injection Molding Plant
- Industrial Operating Environment
- Multiple Turbine Generators
- Redundancy, Lower Maintenance & Emissions Benefits

Cogeneration Plant Schematic

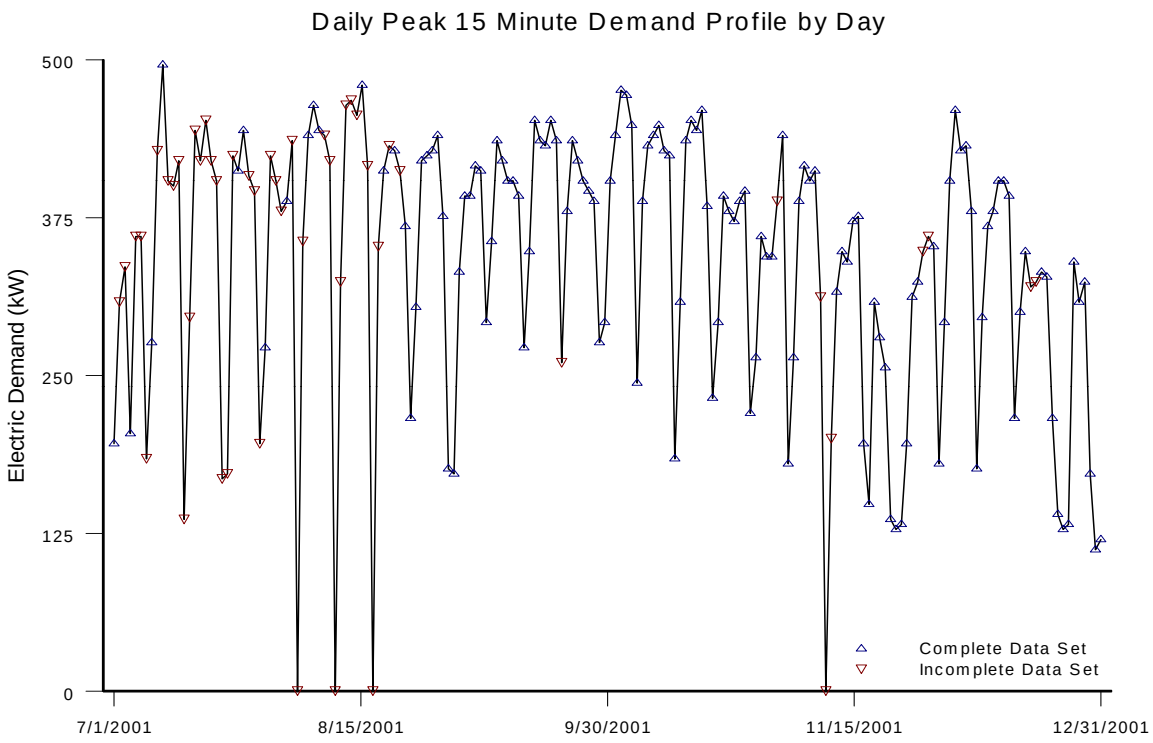


Cogeneration Plant

System Monitoring Points



Peak Demand Profile



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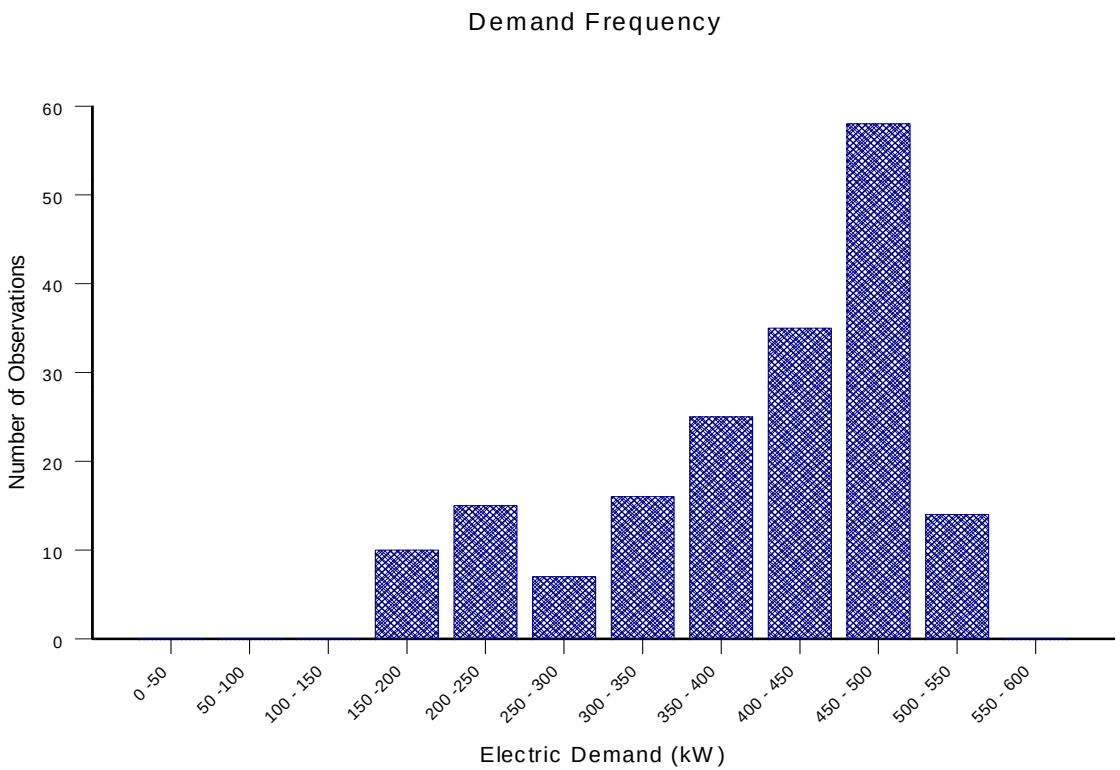
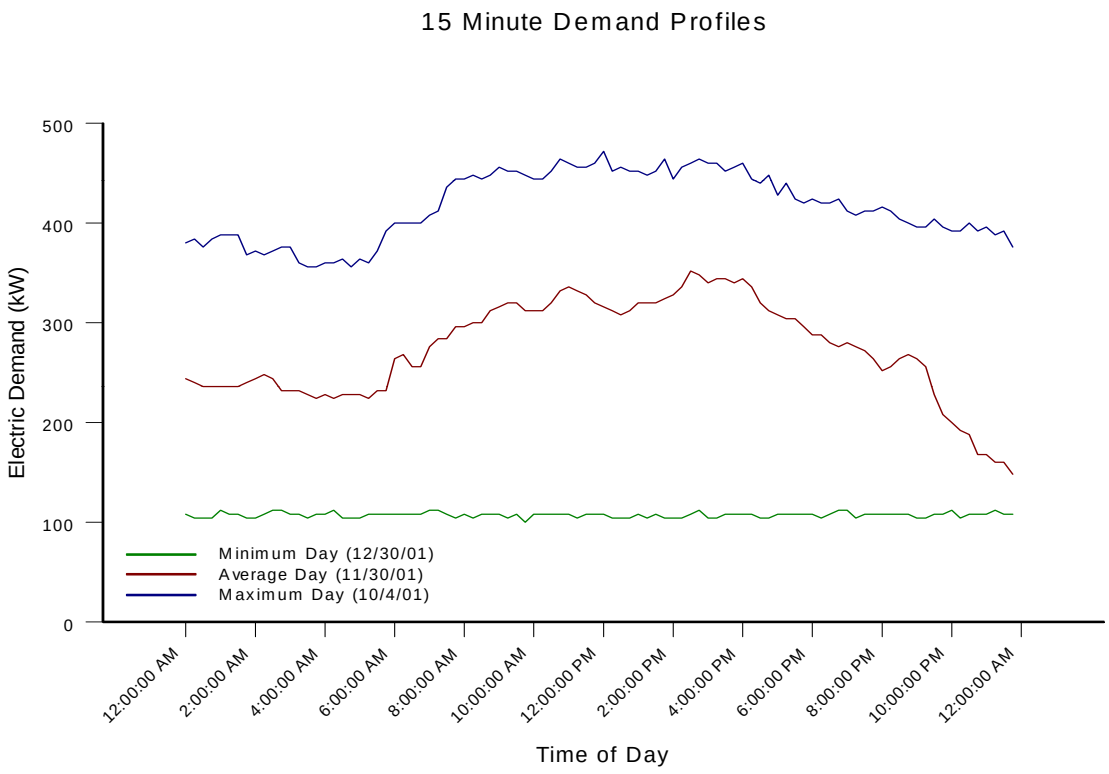
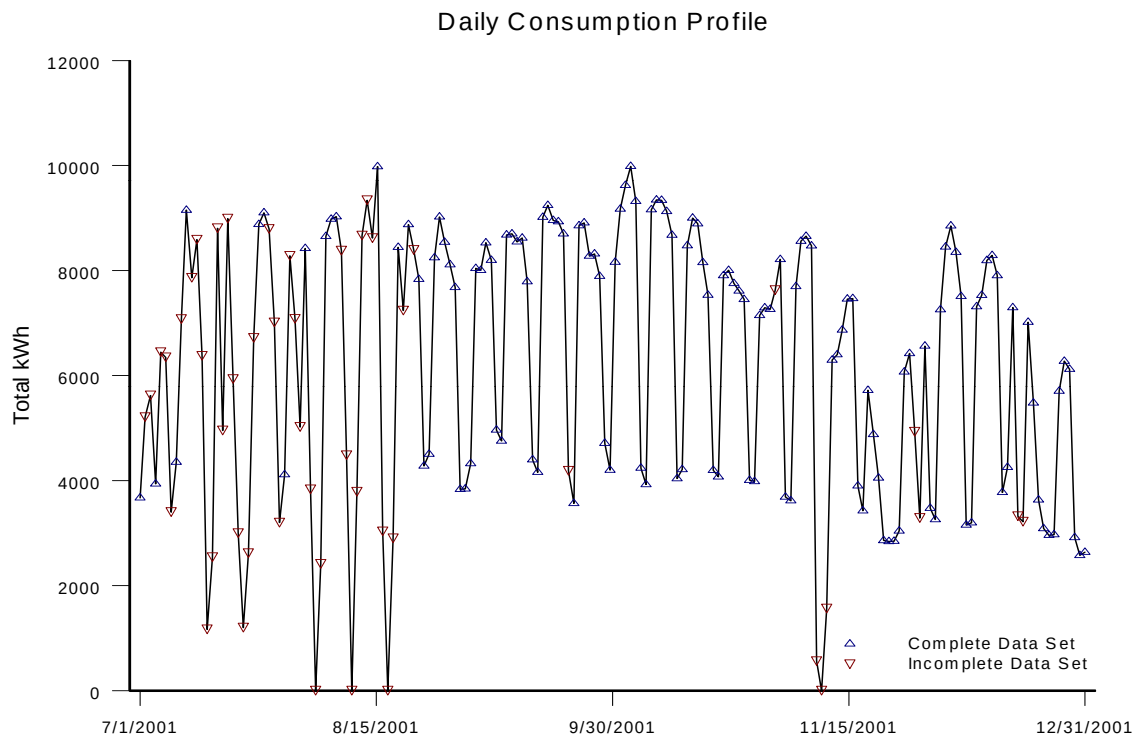


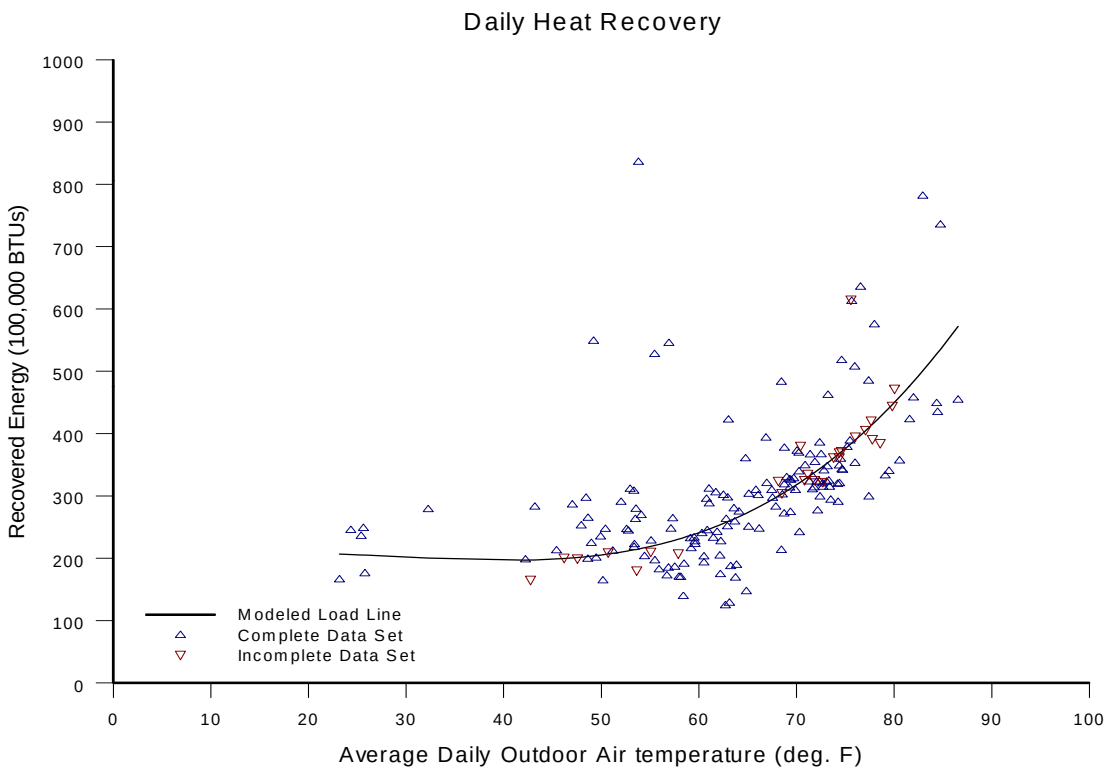
Daily Demand Profile



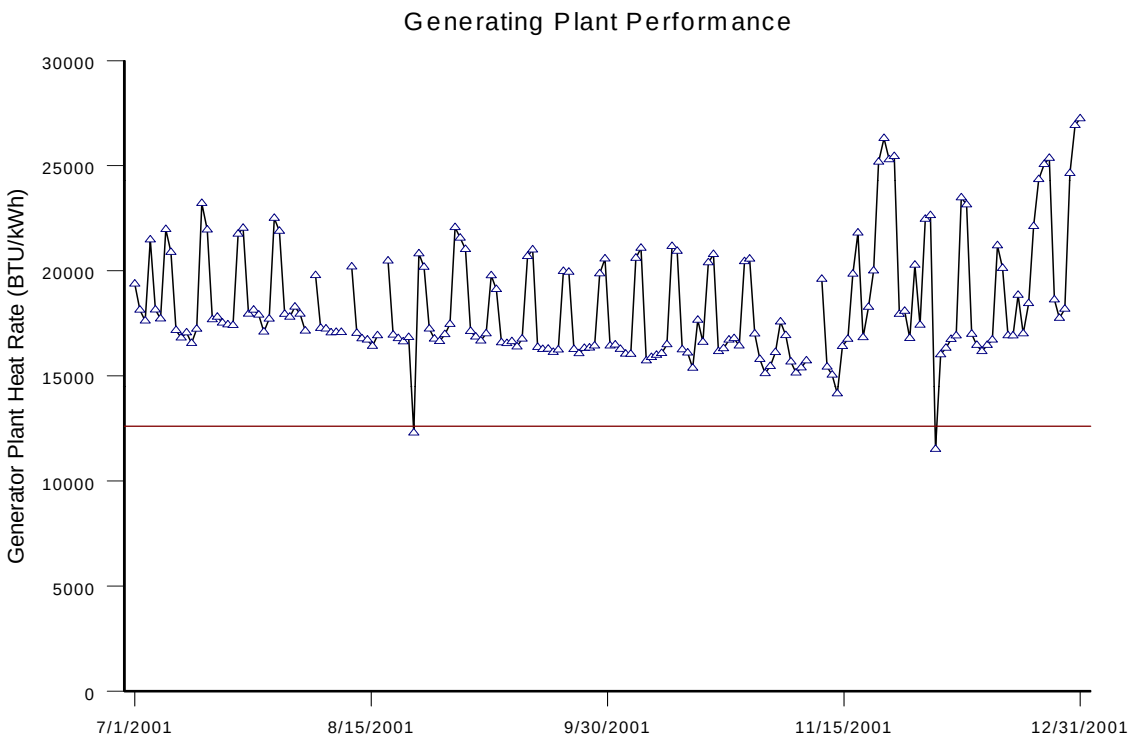
Electricity Consumption



Thermal Energy Requirements



Observed Heat Rate



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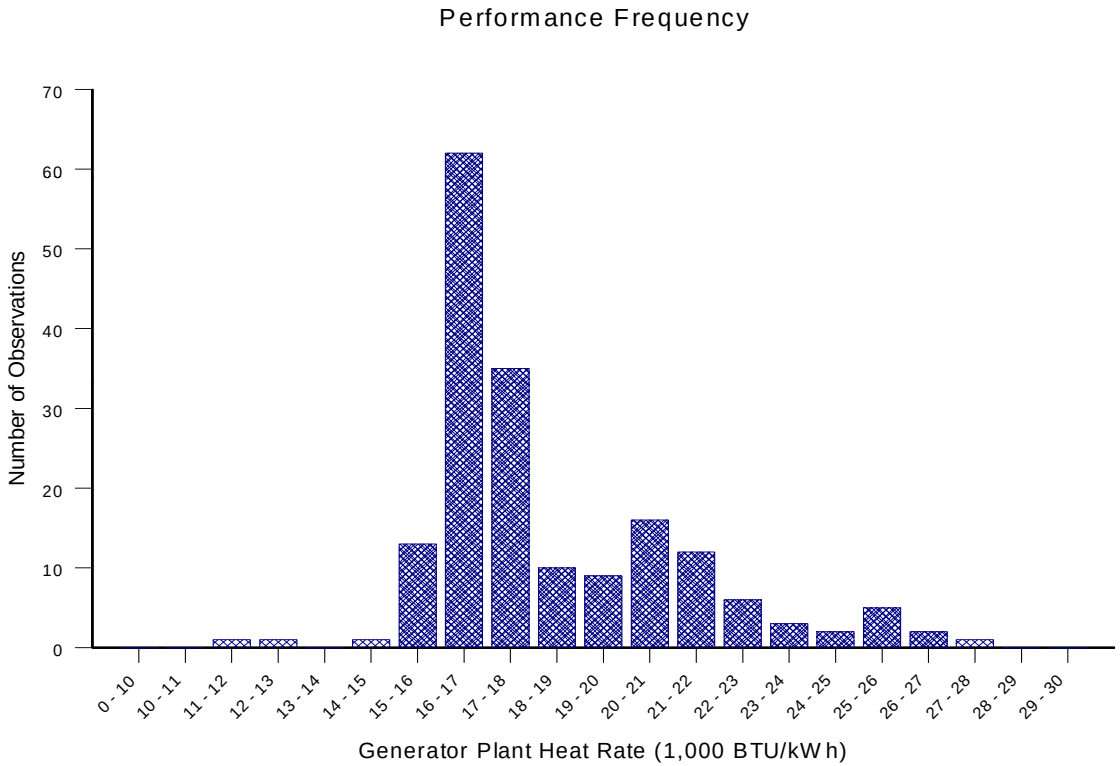
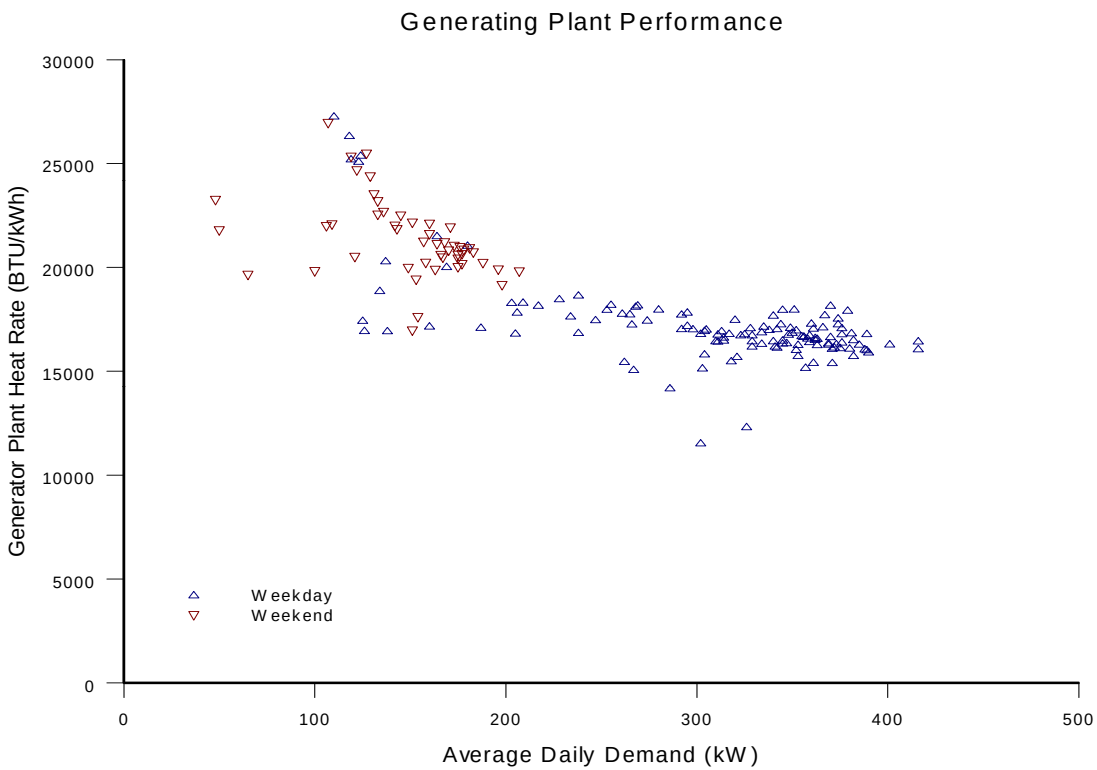
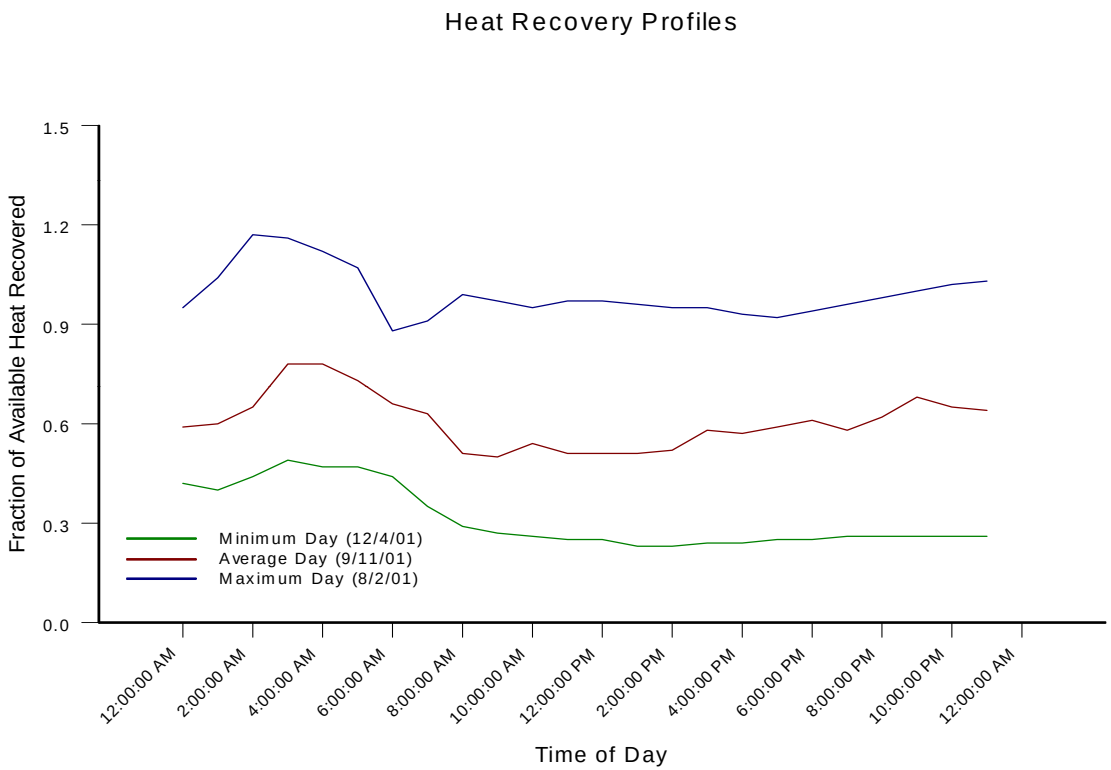


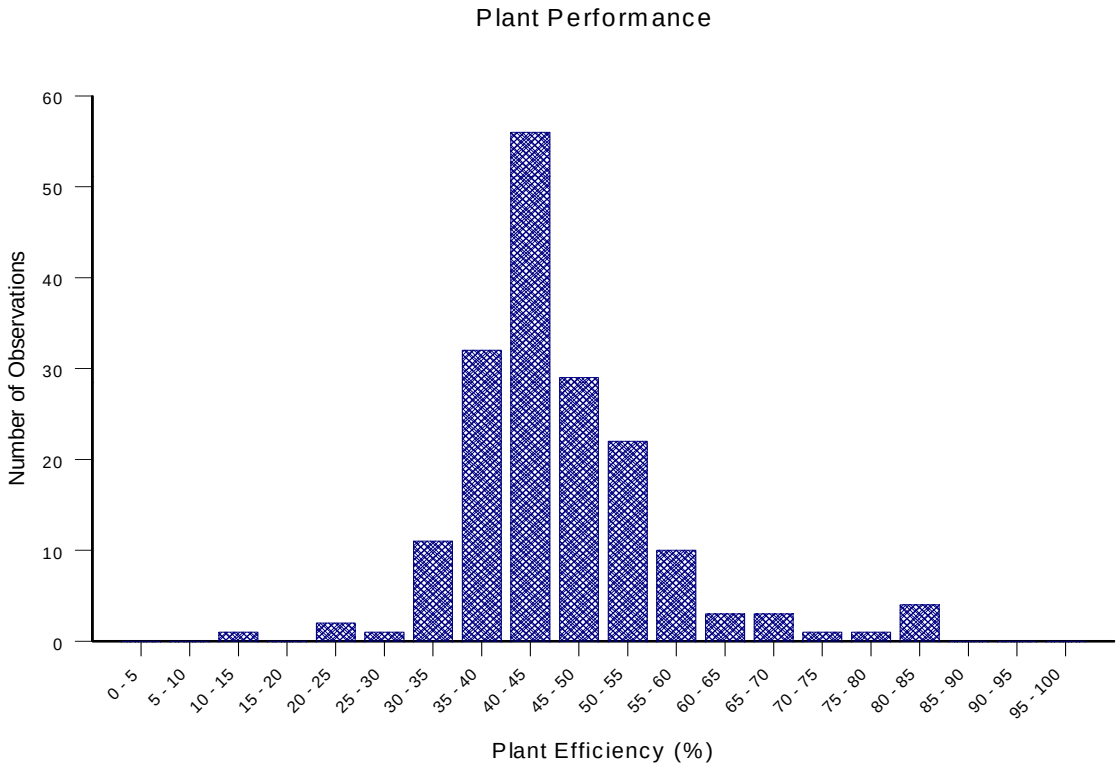
Effect of Average Electric Load



Daily Heat Recovery



Overall Cogeneration Efficiency



Micro-Turbine Performance

- Average 40% Load Factor
- NOx Emissions Reduction of 40%
- Observed Heat Rate of 17,490 BTU/kWh
- On Specification (16,800 BTU/kWh)

Cogeneration Performance

- Overall Efficiency 47%
- Payback Exceeding 10 Year Target
- Improve Operating Strategy (Dispatch)
- Increase Heat Utilization