HARBEC™
PLASTICS INC
TECHNICAL INNOVATION WITH ENVIRONMENTAL RESPONSIBILITY

Combined Heat and Power (CHP) for Primary Power and HVAC in Manufacturing

Agenda

- Who is Harbec Plastics, Inc.?
- Reasons for seeking the CHP alternative.
- Problems to overcome.
- The Harbec CHP Project.
  - Microturbine choice
  - Steps to implementation
  - Components used
- What lies ahead?

Who is Harbec Plastics, Inc.?

- Established in 1977
- Located in Ontario, NY (Rochester)
- Precision Custom Injection Molder
  - Engineering Models / Quick Manufacturing Solutions (QMS®)
  - Precision Moldmaking
  - Custom Injection Molding of typically complex component parts
    - Insert molding
    - High tolerance molding
    - Highly engineered resins
- ISO 9002, QS 9000, ISO 14001 certified
- “Technical Innovation with Environmental Responsibility”
- Proponent of sustainable manufacturing using eco-economic measures and practices.

The Reasons for seeking the CHP alternative

- High energy costs
  - #1 reason for businesses leaving New York State
  - Competing in world market means constant pursuit of cost effectiveness and competitive pricing.
- Need to improve electrical power reliability.
- Need to improve environmental control of manufacturing facility.
  - Consistent product quality year round.
- Desire to incorporate renewable energy potentials.

Problems to Overcome

- Utility related problems with Distributed Generation in New York State.
  - No Net Metering
  - Standby Tariffs
  - Utility obstacles and road-blocks
- Difficult to secure financing
  - More than 30 bank rejections
  - No existing economic models
  - Projected 7 to 10 year payback
- Difficult to find engineering partner willing to work with Microturbines.

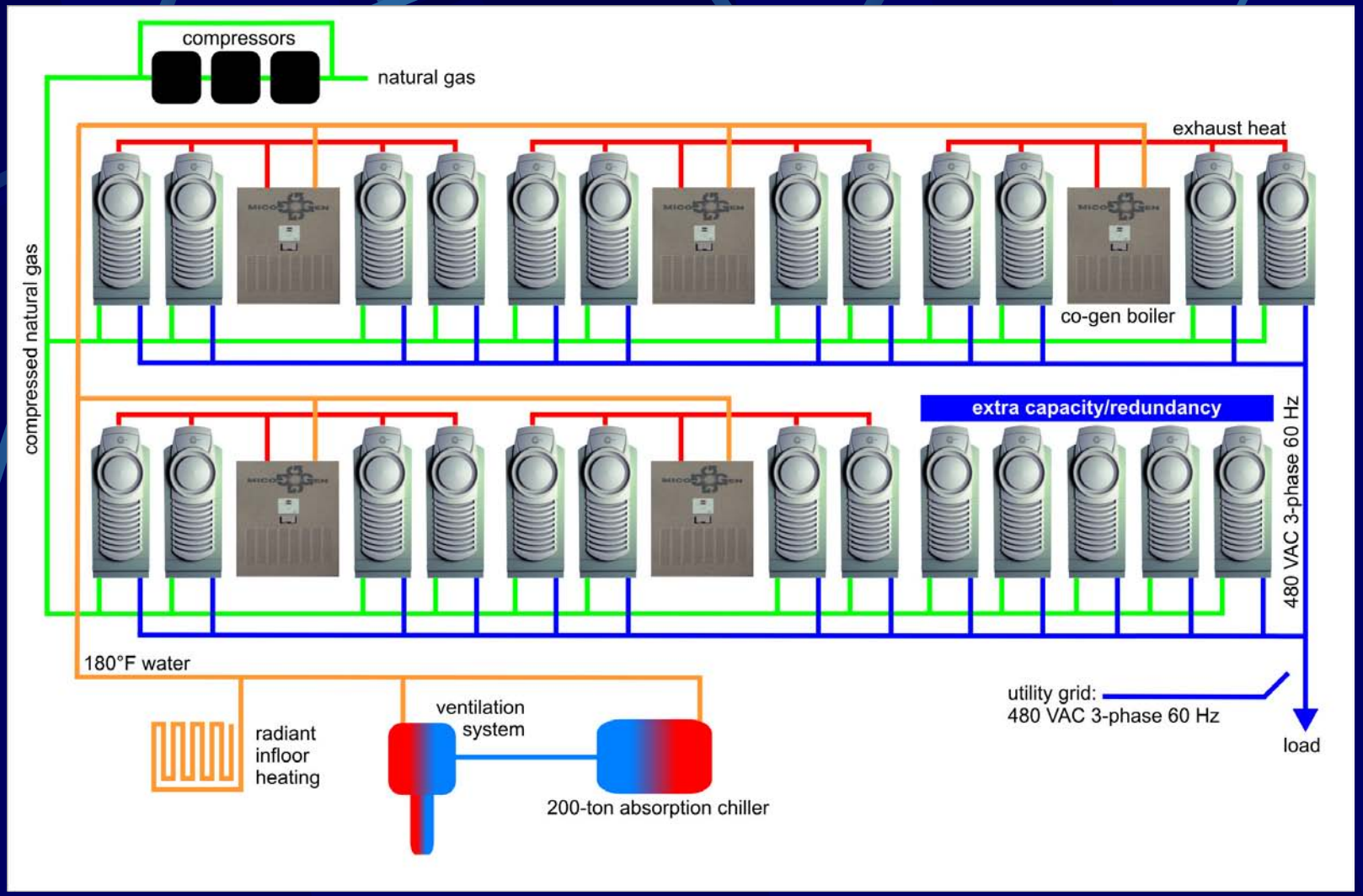
The Harbec CHP Project

- Microturbines were selected engine solution
  - Increased reliability
  - Decreased maintenance requirements
  - No increase in staff
  - More positive environmental impact - ISO 14001
    - Lower Emissions
    - No lubricants, filters, or coolants to deal with

The Harbec CHP Project

- Implementation requirements
  - Found IBC Engineering company
  - Developed banking solution
  - Combined CHP plant with needed warehouse expansion

The Harbec CHP Project



The Harbec CHP Project

- 25 CNG fueled 30kW Microturbines
  - 750 kW max potential
  - 500 kW Harbec's maximum load requirement
  - 250 kW redundance

The Harbec CHP Project

- 5 Heat exchangers
  - 1 unit per four microturbines

The Harbec CHP Project

- 1 Absorptive Chiller
  - Converts 210° water to 44°-47° water

The Harbec CHP Project

- 3 - 10 hp CNG rotary Compressors

The Harbec CHP Project

- 17,000’ of 1” Diameter tubing for radiant floor heating

The Harbec CHP Project

- Computer controlled sensing and delivery system

The Harbec CHP Project

What Lies Ahead?

- 2002
  - Addition of 250 kW wind generator to accomplish wind/microturbine hybrid.
  - Anticipated joint development project with NYSERDA to research methods for improving CHP system efficiency.
- Beyond…
  - Increased utilization of thermal potential for application to manufacturing process heat requirements.
  - Implementation of Stuart Electrolyzer to store excess wind as hydrogen (hythane) for use in microturbine or future fuel cells.

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Q & A

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Thank You.

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