

C & F Packing
A CHP Case Study

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Combined Heat *and* Power Workshop
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C&F Packing

Lake Villa, IL

- C&F is a custom sausage making and meat processing company
- They supply fast food chains, frozen pizza manufacturers, and prepared meat retailers
- C&F started on the west side of Chicago in early 1900s



Why C&F considered CHP

- C&F's Issues
 - Repeated power outages
 - high electric costs
 - growing business
 - space constraints
- Nicor's interest
 - Retaining the gas load
 - C&F was being lured by Wisconsin
 - cheaper land
 - lower electric rates than Illinois

Reliability Implications

- Outages disrupt production
 - Loss of product
 - Cost of re-sanitizing after each power failure
 - Employee morale
- C&F lives in a just-in-time industry
 - Missed deliveries - penalties
 - Lost customers

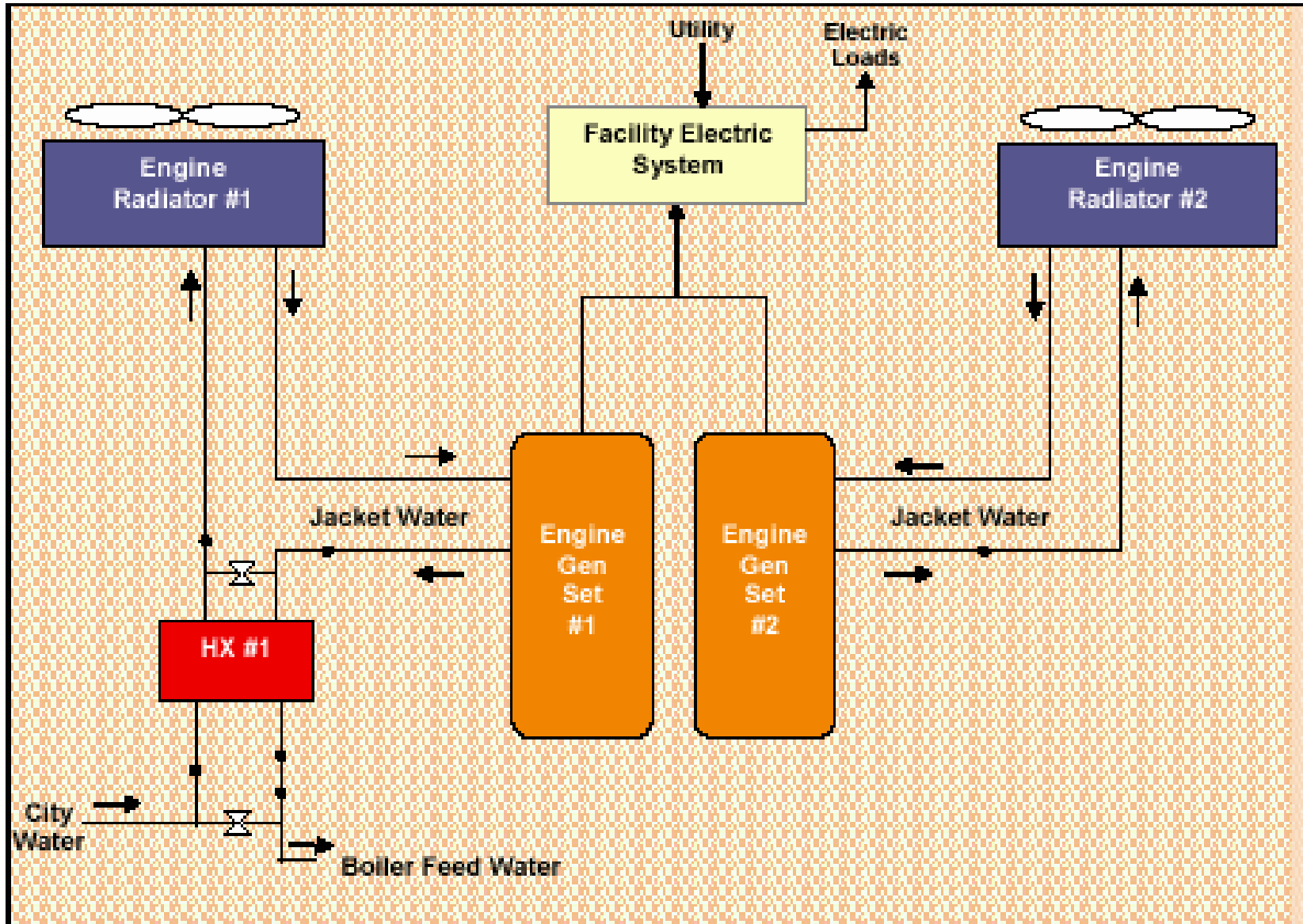
CHP to the Rescue

- Request for help from DCCA
 - At stake
 - 150 Illinois jobs
 - \$20-25MM investment in Illinois
- The solution seemed to be CHP
- Nicor analyzed electrical and thermal loads and performed feasibility engineering
- A greenfield design

The System

- Two 1125kW Waukesha engine generators
 - 480 volt, with 4,160 v stepup transformer
- Jacket water recovered for boiler makeup
- Paralleling switchgear and automatic transfer capability
- On peak operation 9 a.m. to 10 p.m. Monday - Friday
- Emergency backup during off peak times[®]
- Modular design allows for future expansion

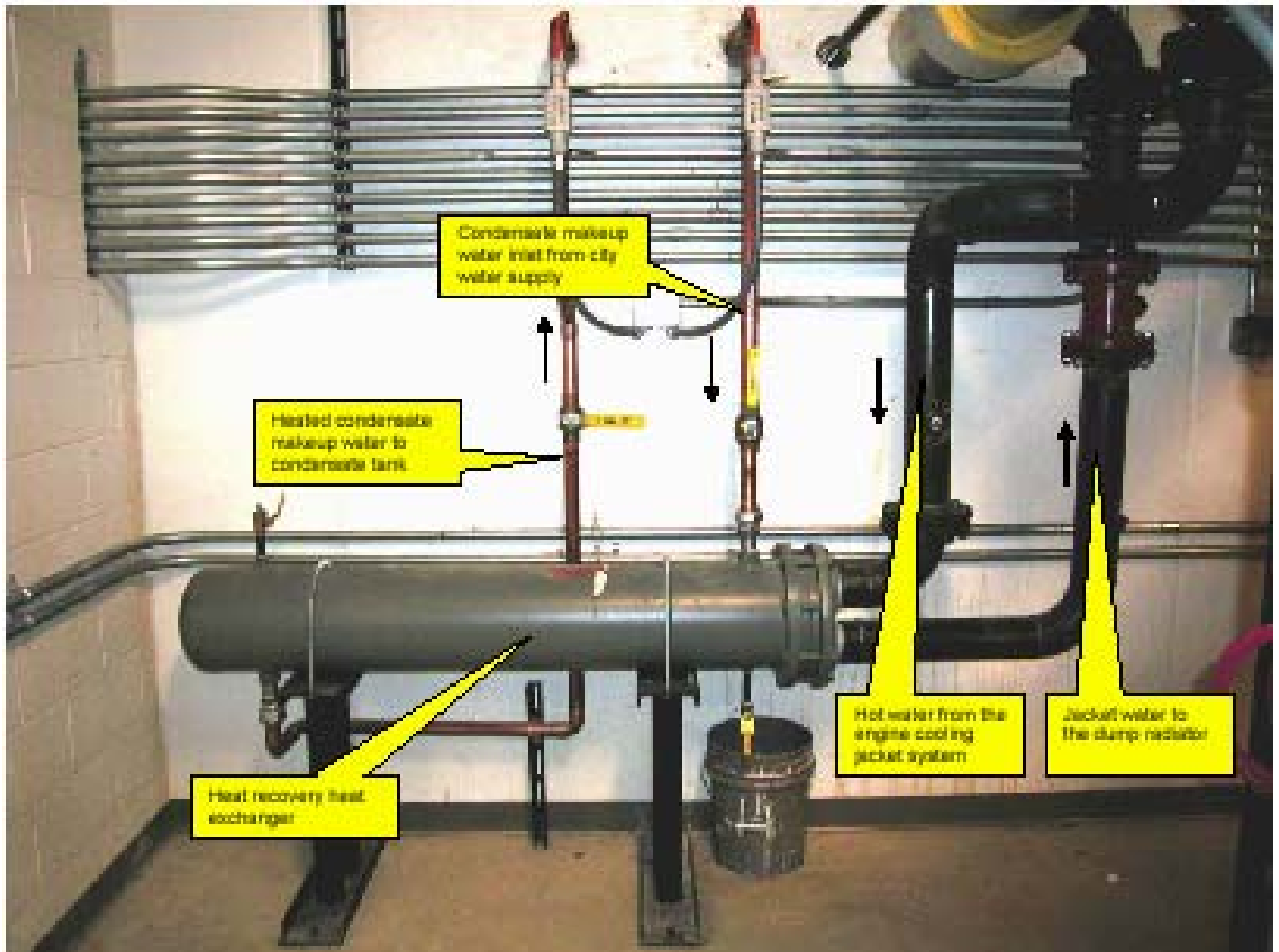
CHP System



The Engine Generators



Heat recovery equipment



Boiler Room



A Look at Costs (\$000)

- Installation (approx.)
 - Gen sets
 - Switchgear
 - Heat recovery
 - Interconnect
 - Installation, Engineering
 - Total \$2.1MM approx.
- *Operation - before
 - Electric \$890 yr
 - Gas \$44 yr
 - Maintenance \$0 yr
 - Total \$934 yr
- *Operation - after
 - Electric \$250 yr
 - Gas \$253 yr
 - Maint. \$91 yr
 - Total \$594 yr
- *Savings \$340-400 yr

*Proforma figures typical of a project like this based on a \$0.34/therm gas cost.

Savings range dependent on actual load factor and project financial structure. Proforma operating costs are used. Plant has just recently gone into service and therefore no useful operating data is currently available.

A Look at Costs

- **'Before' purchased peak power**
 - Peak kWh \$
 - Demand \$
 - Divided by total Peak kWh
 - **12.5 cents/peak kWh**
- **'After' generated peak power**
 - Fuel cost
 - Rate 18 cost
 - Maintenance (\$0.015/generated kWh)
 - Divided by generated peak kWh
 - **6.5 cents/peak kWh**

Financial Implications

- Energy savings alone can typically generate positive cash flows
- 4-6 yr payback on energy savings alone is typical
- Equipment is long life, proven technology
- Should you finance, pay cash, lease?
- But energy savings alone is not the whole picture


Financial Implications

- Implications costs may outweigh energy savings
- The implications of reliability
 - no downtime or employees sent home
 - no resanitizing
 - no lost customers due to power failures
- Use CHP to win *new* customers
- Use CHP to lock in gas *and* electric costs[®]
- Use CHP to position you to optimize the benefits of deregulation

The Results

- Power plant went on line 1st Q 2002
- C&F is making sausage
- C&F knows what their energy costs will be
- Reliability is not an issue anymore
- C&F's CHP plant is a sales tool
 - retain current customers
 - attract new ones
- C&F has *taken control* of electric deregulation - "make or buy."




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**Thank you for
your attention**