

# GE Saves Graphic Packaging International US\$500,000 Per Year in Boiler Treatment

## Kalamazoo Mill

### Challenge

The mill has operated a hot lime softening (HLS) system for boiler feed water treatment since it began production in the early 1920's. Inherent to most HLS systems, operators manually add chemicals, monitor and control effluent quality to a reasonable level. Recently, the operation of the HLS system became unreliable, forcing the plant to periodically bypass surface water directly to the sodium zeolite softeners in order to keep the mill operating. As a result, the two boilers (600psig field erected & 450 psig package) operate at 10-12 feedwater cycles.

### Solution

GE surveyed the boiler house operation and found significant opportunities to reduce fuel consumption by replacing the HLS system with a reverse osmosis (RO) system. The resulting improvement in boiler makeup water quality would allow operation at higher boiler feedwater cycles translating to a 15% reduction in makeup and a 75% reduction in blowdown. Because of the unique plant design, blowdown heat recovery is minimal. Consequently, the reduction in makeup results in a direct reduction in fuel consumption. The engineering study by GE estimated that about \$500,000 per year would be saved through reduction in fuel, labor, and consumables to support the HLS system. Since the mill did not have the necessary capital budget or space in the boiler house to install an RO system, an alternative approach was selected by GE to provide the RO in a mobile trailer that can easily be parked adjacent to the powerhouse and connected to the existing system.

### Results

City water is fed to the RO system for purification. The RO permeate is sent to a storage tank where it is then fed to the plants sodium zeolite softeners for final pretreatment. The polished RO water is then supplied to the powerhouse deaerators.

The resulting improvement in water quality has generated the estimated decrease in makeup water. Fuel consumption has been reduced by nearly 3% and consumables for the HLS have been eliminated. Additionally, salt consumption, softener regenerate volume and labor associated with the sodium zeolite softeners have all been reduced by 85%. These savings add up to over \$360,000 annually.

Because the boiler internal surfaces are gradually being cleaned due to the higher quality water, the customer will realize additional boiler efficiency improvements of up to 2%. Other ancillary effects such as improved condensate quality, reduced amine usage, reduced wear on steam turbine pumps, etc. will result in reduced mill maintenance costs. In all, the projected annual savings exceed US\$500,000.



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e-mailing [custhelp@ge.com](mailto:custhelp@ge.com).

**Global Headquarters**  
Trevose, PA  
+1-215-355-3300

**Americas**  
Watertown, MA  
+1-617-926-2500

**Europe/Middle East/Africa**  
Heverlee, Belgium  
+32-16-40-20-00

**Asia/Pacific**  
Shanghai, China  
+86 (0) 411-8366-6489

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