Day & Campbell receives support from Union Gas every step of the way as it strives to save energy and reduce costs. Union Gas conducted a preliminary fast-track energy audit and provided support for a more detailed process energy audit and feasibility analysis. Union Gas also provided incentives at the capital phase. Union Gas Account Manager Joseph Lee and Project Manager Bernie Leland have all provided ideas and technical expertise. Union Gas provided $20,096 in efficiency incentives for the heat recovery project.

Call the energy experts at Union Gas

Union Gas is committed to helping industrial energy users make energy efficiency part of their business planning. If you’d like to learn more about our financial support for plant energy audits, feasibility studies and installation of energy efficient equipment, contact your Account Manager or visit enersmart.com/largebusiness.

Energy efficiency projects pay you year after year!
Union Gas gave me good ideas that put money in the bank. The new system will give us big savings and was definitely worth the investment. It is a huge benefit for us, really helping us remain competitive in the industry.

Justin Campbell
Plant Supervisor, Day & Campbell
Hamilton, Ontario

“Union Gas - Working with you
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Summary
Thanks to a Union Gas supported retrofit, brick producer Day & Campbell is capturing waste heat from two post-combustion and the gases. Thus, the facility was discharging hot condensate to the municipal sanitary sewage, losing most of the energy and pushing the limits for compliance with sewage regulations. A new reverse osmosis wastewater treatment system recycles this water and energy consuming solution to comply with sewage regulations. A new reverse osmosis wastewater treatment system recycles this water and energy consuming solution to comply with sewage regulations.

Challenge
By 2004, the facility was using large amounts of natural gas despite an existing heat recovery system installed in the 60’s. At the invitation of Union Gas, Day & Campbell prepared a Plant Assessment. Union Gas staff conducted a plant walkthrough assessment to identify potential natural gas savings. The report identified an opportunity to re-circulate steam condensate from the autoclaves as boiler makeup water. In the existing system, this condensate exited the autoclaves at 210°F and was not through a heat recovery unit that recovered some of the heat and reduce the water temperature to around 190°F. But the energy savings were small (only $25 to $35/day) while wastewater was too contaminated for the storm sewers and too hot (over 140°F) to meet new sanitary discharge standards. Re-circulating all of the steam condensate to the boiler seemed like a viable solution for recovering waste heat and reducing wastewater.

Background
Day & Campbell has been producing autoclaved concrete and clay blocks in Westminster for over sixty years. In that time their operation has grown along with the town in construction and landscaping. Thick red competitive pressures and the need to control input costs.

The curing process is the plant’s main energy consumer: Wet blocks are fed into one of two curing processes at the plant, both heated with boiler (76% efficiency). Most of the blocks are cured in four, 110-foot-long autoclaves where temperature and steam pressure are increased to 600°F. Steam is run through a heat recovery unit that recovered some of the heat and reduced the water temperature to around 190°F. But the energy savings were small (only $25 to $35/day) while wastewater was too contaminated for the storm sewers and too hot (over 140°F) to meet new sanitary discharge standards. Re-circulating all of the steam condensate to the boiler seemed like a viable solution for recovering waste heat and reducing wastewater.

Why spend money to treat boiler feedwater only to throw the condensate down the drain? Today new water treatment technologies and natural gas energy efficiency solutions are working hand in hand to recapture heat and energy. Union Gas staff conducted a plant walkthrough assessment to identify potential natural gas savings. The report identified an opportunity to re-circulate steam condensate from the autoclaves as boiler makeup water. In the existing system, this condensate exited the autoclaves at 210°F and was not through a heat recovery unit that recovered some of the heat and reduce the water temperature to around 190°F. But the energy savings were small (only $25 to $35/day) while wastewater was too contaminated for the storm sewers and too hot (over 140°F) to meet new sanitary discharge standards. Re-circulating all of the steam condensate to the boiler seemed like a viable solution for recovering waste heat and reducing wastewater.

Environmental Benefits
• greenhouse gas reductions of 15,768,000 L/year (equivalent to removing 21,012 cars from the road in a year)
• Projected water savings of 15,768,000 L/year
• Projected chemical treatment savings of 2,600 gallons
• Load reduction on sewer system

Business Benefits
• Energy cost savings of $344,000
• Projected natural gas savings of $105,000/year
• Reduced water and sewage charges by 70%
• Lower water treatment chemical costs by 25%
• Full regulatory compliance for water discharge

Figures 1-3: Before/After comparison of energy efficiency devices installed at Day & Campbell

Retrofitting an old system has challenges and rewards. Squeezing the most out of your equipment can really pay off.
enercase

Condensate & Flue Gas Heat Recovery

Solution

Klenzoid pre-filtration, Klenzoid KCD05-15 Cartridge filters, and Klenzoid KRE007T condensate removal equipment combined with a Reverse Osmosis Machine (capable of 25,000 US Gallon/hr permeate production) and customized chemical treatment program to make condensate safe for reuse in the boiler.

Trade Mark Industrial Inc. worked with Day & Campbell’s new initiatives to install the Cain’s Industrial stack economizer purchased from MarkBros Engineering. The autoclave operation went from less than 50% return of condensate to 65% return. Better condensate return eliminated the need for the original condensate heat exchanger and reduced requirements for boiler makeup water, natural gas, and water treatment chemicals. The flue gas heat recovery added to the natural gas savings. Union Gas estimated the flue gas savings as around 5% per annum. Actual savings have been closer to 15% at the same time that heat has increased. Campbell is working with Union Gas to plan further energy efficiency improvements for the facility including installation of low-pressure knits and infrared heating for plant areas.

Background

Day & Campbell has been producing autoclave-cured concrete blocks in therm for over sixty years. In that time their operations have grown along with the boom in construction and landscaping. By 2006, the facility was using large amounts of natural gas despite as existing heat recovery system installed in the 80’s. As the operation of Justin Campbell, Day & Campbell’s Firest Superintendent, Union Gas staff conducted a plant walk-through assessment to identify potential natural gas and emissions savings. The report identified an opportunity to re-circulate steam condensate from the autoclaves as boiler makeup water. In the existing system, this condensate exited the autoclave at 200 °F and was not through a heat recovery unit that recovered some of the heat and reduced the water temperature around 100 °F. But the energy savings were small (only $25 to $30 per day) while wastewater was too contaminated for the storm sewers and too hot (over 140 °F) to meet new sanitary discharge standards. Re-circulating all of the steam condensate to the boiler seemed an ideal solution for recovering heat and reducing wastewater. However, the condensate had a high pH and was contaminated with solids from steam circulation around the blocks. Therefore an effective water treatment system would be needed to make the water suitable for re-circulating to the boiler.

Union Gas recommended treating and filtering the condensate so that it would meet industry standards (ASME) for feedwater quality and also meeting regulatory requirements for boiler makeup water, natural gas, and water treatment chemicals. The flue gas heat recovery added to the natural gas savings. Union Gas estimated the flue gas savings as around 5% per annum. Actual savings have been closer to 15% at the same time that heat has increased. Campbell is working with Union Gas to plan further energy efficiency improvements for the facility including installation of low-pressure knits and infrared heating for plant areas.

Challenges

Retrofitting an old system has challenges and rewards. Squeezing the most out of your equipment can really pay off. Why spend money to treat boiler feedwater only to throw the condensate down the drain? Today new water treatment technologies and natural gas energy efficiency solutions are working hand in hand to increase heat and water in industries that are large steam users. Union Gas offers a 50% donation to a maximum of $10,000 toward installation of high efficiency equipment including steam services projects. Eligible project costs could include items such as engineering costs, fan upgrade costs and water treatment upgrades associated with an economizer installation, piping costs, etc. Total incentives cannot exceed $20,000/year per site.

Any business that has mid-to high-temperature processes can recover condensate or exhaust heat. Other industries that could use this approach include:

• Food and beverage manufacturers
• Automotive
• Metal manufacturers
• Chemical plants
• Pulp & paper

Wins & Highlights

• Actual results exceed estimated natural gas cost savings of 15%
• Estimated total cash savings of 27%
• Water consumption reduced by 15,760,000 l/year
• Full compliance with wastewater regulations
• Greenhouse gas reduced by 348 tons/year

Benefits

• Energy cost savings of $344,660
• Projected water savings of $156,062
• Reduced water and sewage charges by 76%
• Lower water treatment chemical costs by 25%
• Full regulatory compliance for water discharge
• Greenhouse gas reductions of 548 tons per year (equivalent to restoring 2176 acres of forest or removing 26,000 cars from the road in a year)
• Projected water savings of 15,760,000 l/year
• Projected chemical savings of a $6,000/year
• Less load on sewer system

Cost

$30,000 toward installation of high efficiency equipment
$15,000 for a stack economizer
$10,000 toward installation of high efficiency equipment excluding steam services projects
$5,000 toward installation of high efficiency equipment

Cost savings:

Projected natural gas savings of 258,420 m³/year
Projected chemical savings of 6,800 lbs/yr
Payback of 2.5 years from natural gas savings alone
Projected customer savings of 250,000 US Gallons/year

Environmental Benefits

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Business Benefits

Any business that has mid-to high-temperature processes can recover condensate or exhaust heat. Other industries that could use this approach include:

• Food and beverage manufacturers
• Automotive
• Metal manufacturers
• Chemical plants
• Pulp & paper
The autoclaves are in operation for 12 to 15 hours a day, five days a week, in a tightly controlled process ensuring both product strength and energy efficiency. Most of the blocks are cured in four, 110-foot long autoclaves where temperature and steam pressure are increased to around 210 °F. But the energy savings were substantial: 45% of 200 °F steam could be recovered as boiler feedwater. A boiler economizer, installed in the stack, captures heat from the flue gases to further boost the incoming water temperature. This twofold heat recovery system substantially reduces costs for natural gas, water and water treatment chemicals while eliminating water discharge problems.

**Challenge**

By 2006, the facility was using large amounts of natural gas despite an existing heat recovery system installed in the 1980s. At the invitation of Justin Campbell, Day & Campbell’s Plant Supervisor, Union Gas staff conducted a plant walkthrough assessment to identify potential natural gas savings. The report identified an opportunity to re-circulate steam condensate from the autoclaves as boiler makeup water. In the existing systems, this condensate exited the autoclaves at 210 °F and was then used in a heat recovery system. But much of the heat was recovered at 190 °F and the energy savings were substantial—about 25% of the energy in the flue gases was recovered. The facility was discharging hot condensate to the sewer at temperatures up to 210 °F, but the energy savings were significant.

**Background**

Day & Campbell has been producing autoclaved cement and clay blocks in Brantford for over sixty years. In that time their operations have grown along with the town in construction and landscaping. Boilers have been upgraded to improve heat efficiency. The company is now Facebook, and the municipal government have introduced stricter standards for water discharge.

**Summary**

Thanks to a Union Gas supported retrofit, brick producer Day & Campbell is capturing waste heat from its natural gas boilers to increase condensate return. They proposed a condensate and flue gas heat recovery system as a course of action for condensate recovery. The report identified an opportunity to re-circulate steam condensate from the autoclaves as boiler makeup water. In the existing systems, this condensate exited the autoclaves at 210 °F and was then used in a heat recovery system. But much of the heat was recovered at 190 °F. The energy savings were substantial—about 25% of the energy in the flue gases was recovered. The facility was discharging hot condensate to the sewer at temperatures up to 210 °F, but the energy savings were significant.

**Solution**

- **Klenzoid pre-filtration,** Klenzoid KC010-14S Condensate polishers, and Klenzoid KR1025 contaminant removal equipment combined with a Reverse Osmosis Machine (capable of 25,000 US Gallons per minute production) and customized chemical treatment program to make condensate safe for reuse in the boiler
- **Cain Industrials boiler stack economizer** was used to extract heat from stack gases and further boost temperature of boiler feed-water

Trade Mark Industrial Inc. used a multistage retrofit with Day & Campbell’s retrofit to install the Cain Industrials stack economizer purchased from Markpars Engineering. The automatic operation went from less than 10% return of condensate to 65% return. Better condensate return eliminates the need for the original condensate heat exchanger and reduced requirements for boiler makeup water, natural gas, and water treatment chemicals. The flue gas heat recovery added to the natural gas savings. Union Gas estimated the energy cost savings at around 5% per year. Actual savings have been closer to 15% at the same time that heat use has increased. Campbell is working with Union Gas to plan further energy efficiency improvements for the facility including installation of low-pressure kilns and infrared heating for plant areas.

**Environmental Benefits**

- **Greenhouse gas reductions of 548 tonnes per year** (equivalent to removing 21% of Oakland’s 1,000-vehicle roadway network from the air in a year)
- **Projected water savings of 15,768,000 liters**
- **Projected chemical savings of 4,920 liters**
- **Less load on sewer system**

**Any business that has mid-to-high temperature processes can recover condensate or exhaust heat. Other industries that could use this approach include:**

- **Food and beverage manufacturers**
- **Auto manufacturers**
- **Metal manufacturers**
- **Chemical plants**
- **Pulp & paper**

**Why spend money to treat boiler feedwater only to throw the condensate down the drain? Today new water treatment technologies and natural gas energy efficiency solutions are working hand in hand to maximize heat and reuse water in industries that are large steam users.**

Union-Gas offers a 30% investment in a minimum of $50,000 toward installation of high efficiency equipment including water pre-treatment projects. Eligible project costs could include items such as engineering costs, fan upgrade costs and water treatment upgrades associated with an economizer installation. tied-up costs. Total incentives cannot exceed $250,000 a year per site.

**Wid & Campbell**

- **Actual results exceeded estimated natural gas cost savings of 54%**
- **Estimated total heat savings of 27%**
- **Water consumption reduced by 65,768,000 liters/year**
- **Full compliance with wastewater regulations**
- **Greenhouse gases reduced by 548 tonnes/year**

**Other industries that could use this approach include:**

- **Food and beverage manufacturers**
- **Auto manufacturers**
- **Metal manufacturers**
- **Chemical plants**
- **Pulp & paper**

**Bolters that exceed 100 boiler horsepower, operating at pressures exceeding 75 psi or above, and that are significantly loaded for 15 years or more may be good candidates for a stack economizer.**

Most economizers raise water temperature by 100°F to 140°F and lower exhaust gas temperature by 500°F to 650°F. Boiler feed savings typically pay for equipment and installation in two to three years of average use. Actual savings and payback will vary depending on the application, amount of blow down, water temperature and other operating constraints.
Condensate & Flue Gas Heat Recovery

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