

STEAM STACK HEAT RECOVERY AT FRITO LAY CANADA

Challenge

The primary objective of the steam stack heat recovery project was to recover a large portion of the available heat from the steam stacks on the potato chip manufacturing lines in Frito Lay Canada's (FLC) Cambridge facility. As potato slices are fried, a significant portion of the energy consumed is released to the atmosphere in the form of steam via the fryer steam stacks. By capturing this waste energy and using it to offset energy loads throughout the plant, FLC was able to reduce natural gas consumption and its carbon footprint, while improving their bottom line.

Strategy

A considerable amount of infrastructure was needed to recover the waste heat from the fryer steam stacks. New duct work was designed, procured and installed to redirect the discharged steam to a rooftop liquid heat exchanger. The heat exchanger transfers the heat in the steam into a thermal fluid loop that runs

throughout the facility. Processes requiring heat can then draw energy from the thermal fluid ring and offset thermal loads that would normally be satisfied by burning fossil fuels.

With the thermal fluid loop in place, several processes throughout the plant were modified to extract heat from the loop. Existing air handling units were modified to accommodate the heat recovery system. Two new hot water tanks were purchased and

**The steam stack heat recovery system
saves nearly 13.5 million BTUs each hour**

installed for sanitation water. Supplementary heat exchangers were commissioned to preheat water for the corn and wheat wash processes and to preheat oil for the potato chip manufacturing line. Furthermore, control devices were installed to regulate the heat transfer.

Under standard operating conditions, steam normally exhausted at over 250°F in absence of the system will be emitted at well under 200°F with the heat recovery in place.

Finally, all exposed surfaces and piping were insulated. The insulation minimizes heat loss and maximizes energy savings.

Results

While the project carried a price tag of over \$2 million, the annual savings were considerable and resulted in a project that was good for business and good for the environment. The savings stem predominately from decreased natural gas consumption, offsetting roughly 13.5 million BTUs each hour of operation, thus reducing FLC's CO₂ emissions substantially. The project demonstrated a simple payback period of less than 4 years, proving again that investment in sustainability projects is not only effective at reducing the carbon footprint of the organization, but can also contribute to the bottom line of the company,

Did you know?

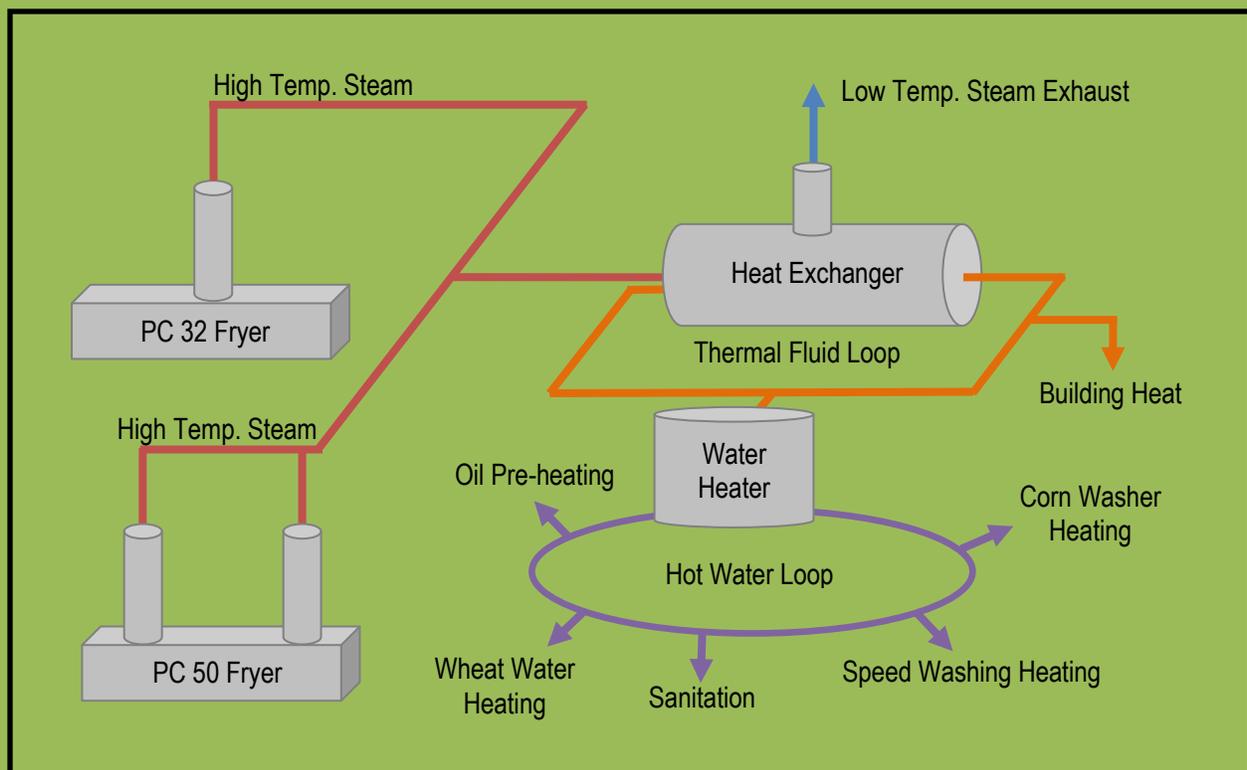
FLC now has some form of heat recovery in all five of its Canadian manufacturing facilities. The primary applications for recovered waste heat are:

- Building heat
- Water heating for:
 - Corn / wheat washing
 - Sanitation
 - Kettle water
 - Speed washer
- Starch drying
- Oil preheating

The heat recovery systems have allowed FLC to strategically take natural gas boilers offline and reduce the company's annual energy consumption by billions of BTUs.

FLC's heat recovery projects, along with many other resource conservation efforts, have enabled the company to reduce its manufacturing fuel consumption by more than 20% since 1999.

How the Process Works





HIGH-EFFICIENCY FLEET AT FRITO LAY CANADA

Challenge

An efficient vehicle fleet can have a profound positive impact on the environmental sustainability of an organization. Frito Lay Canada (FLC) has one of the largest private fleets in Canada. In turn, the vehicle fleet accounts for a large portion of FLC's carbon footprint. The company is continually improving the efficiency of its fleet to reduce carbon emissions and minimize operating costs.

Strategy

FLC has taken several approaches to improving the efficiency of its vehicle fleet. Foremost, local delivery

**Two-thirds of the FLC tractor fleet
has been upgraded since 2007**

vehicles are custom designed to enhance their performance. These vehicles are engineered to weigh

approximately 4,600 lbs less than comparable models through the use of lightweight materials. The lighter vehicles achieve greater fuel efficiency, reducing carbon emissions and fuel costs. FLC's sales fleet has also added over 140 Dodge Sprinter vehicles, complete with a custom lightweight body weighing 3,700 lbs less than the standard Sprinter. These models achieve up to 50% better fuel economy while reducing emissions versus comparable vehicles.

FLC has also been active in improving the efficiency of its tractor fleet. FLC's tractors are continually being replaced with the latest low-emission models, with nearly two-thirds of the tractors equipped with 2007 or newer engine technology. The FLC tractor fleet has also been equipped with several energy saving technologies, including infrared spot heaters, top-speed limiters, idle shutdowns, auxiliary power units, engine re-flash and programming upgrades.

Furthermore, FLC's trailers have been outfitted with low-drag mud flaps and belly fairings, while new drop-frame trailers have been added to improve the fuel efficiency of the tractor fleet.



FLC Sprinter Vehicle

FLC also employs various logistics optimization tactics to enhance fleet efficiency. Partnerships have been formed to establish systematic backhaul routes and increase the utilization of vehicles. Common carriers are also considered to minimize costs throughout the supply chain. Cube maximization tactics have allowed FLC to improve the utilization of volume on fleet vehicles, and in some cases have allowed the company to adopt smaller fuel-efficient vehicles on advantageous routes. Moreover, route optimization and the sequencing of stops have resulted in a mileage reduction with the re-engineered layouts.

Several teams have been developed to focus on key performance indicators and identify areas for improvement and best-practice sharing. Through our continuous improvement process we are constantly working towards improving our economic and environmental bottom line.

Results

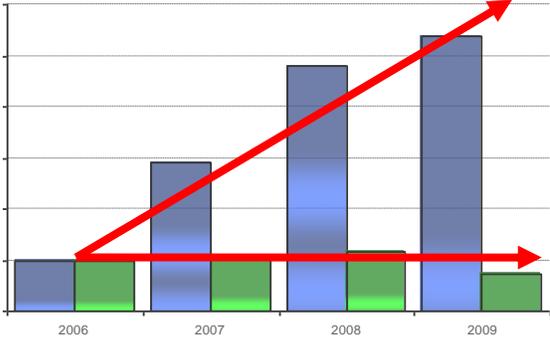
FLC's vehicle improvements combined with logistics optimization tactics have yielded tremendous savings; both environmental and financial. The company is committed to providing industry leading service levels, consistency of service and no out of stock situations. FLC's Supply Chain Optimization (SCO) team is constantly working to reduce vehicle kilometres

Did You Know?

FLC was awarded the 2009 Supply Chain and Logistics Canada (SCL) Green Supply Chain award, sponsored by Transport Canada. Recipients of the annual award are selected on the basis of strong environmental leadership and their firm commitment to promoting green transportation standards.

The award was announced by Canada's Transport Minister, John Baird, who remarked, "This award recognizes the environmental leadership Frito Lay Canada has shown in every aspect of its business operations. The company is a model of corporate responsibility and is an example to others."

traveled while maintaining their high level of service. Through route and cube optimization methods, FLC has been able remove trucks from the road while being one of the fastest growing consumer packaged goods companies in Canada in each of the past 4 years. Strategic sequencing of vendors on routes has reduced vehicle kilometres traveled by 3%. Adding these operational successes to FLC's vehicle fleet upgrades, the company has attained a 7% reduction in diesel consumption versus a year ago. This directly translates into decreased carbon emissions. And with rising energy costs, FLC's improved fuel consumption has a significant positive effect on the economic bottom line of the organization.



FLC has grown sales while reducing the size of its delivery fleet

A large, chaotic pile of various types of waste, including metal scraps, plastic, paper, and electronic components, under a clear blue sky.

JOURNEY TO ZERO WASTE AT FRITO LAY CANADA

Challenge

Frito Lay Canada (FLC) has long been working to reduce waste sent to landfill, and has established a goal of reaching zero landfill (ZLF) status (which we define as sending less than 1% of manufacturing waste to landfill) in all of its manufacturing facilities. The program was founded on three pillars: (1) to reduce/eliminate the use of non-reusable and non-recyclable materials in FLC plants; (2) to reduce waste to landfill from FLC operations to zero; and (3) to transform waste disposal costs into material revenues. While the program has obvious environmental benefits, the FLC ZLF initiative also focused on decreasing waste expense and increasing recycling revenue.

Strategy

The first step in the journey to zero landfill was to establish plant-level ZLF teams. The goal of ZLF is a large undertaking, thus cross-functional teams are

necessary to lead the program effectively. With plant-level teams established, team members focused on identifying predominant waste streams and developing scorecards to track all waste leaving the facility. Once FLC's waste streams were identified and quantified, a database of waste generation and related costs and revenues for each stream was established.

With the waste streams identified, the focus of the program shifted to the separation of waste. Appropriate receptacles were strategically placed around the facilities to separate and collect the waste. Employee training sessions were held to raise awareness of the various separation techniques. With the waste streams separated, the ZLF teams shifted their attention to finding end-users for the waste and identifying material revenue opportunities. The following is a list some of the FLC programs designed to divert production waste from landfill:

- Waste oil used to make biofuel
- Food waste used as animal feed
- Potato starch recovered and sold
- Packaging cartons reused several times and then recycled into new cartons
- Waste packaging film recycling
- Cardboard recycling
- Damaged pallets recycling
- Plastics and metal recycling

While diverting waste away from landfill is an excellent practice, reducing waste and eliminating the use of non-recyclable materials is superior. FLC employees are continually working to improve processes to reduce resource consumption and use more environmentally friendly materials.

FLC's ZLF teams process data and review their program every 4 weeks on a local level. Best practices are then shared nationally as part of the company-wide effort to reduce FLC's manufacturing waste to landfill to less than 1%.

Results

FLC has had tremendous success with its ZLF program to date. In 2009, FLC has diverted over 92% of its manufacturing waste away from landfill sites. That equates to over 28 million kg of waste diverted away from landfill annually. The FLC Kentville, NS, site is on pace to achieve ZLF status by the end of the year with over 99% of manufacturing waste diverted from landfill.

Frito Lay Canada diverts more than 92% of manufacturing waste away from landfills

In addition to the obvious environment benefits of landfill diversion, FLC's ZLF program has also yielded exceptional financial returns. The company generates considerable revenue from starch, food waste, used oil and cardboard reuse streams. Furthermore, by diverting 28 million kg of waste away from landfill FLC will avoid the corresponding landfill charges. The net result is that waste disposal has been transformed

SunChips® Compostable Bag

In early 2010, the SunChips® brand will introduce the world's first 100% compostable chip bag of its kind. Instead of using non-renewable materials to make its packaging, SunChips® will begin using packaging made from more than 90% renewable, plant-based PLA material.



This new package will completely break down into compost in a hot, active compost bin. To learn more about the new renewably-sourced, compostable package and what a hot, active compost bin is, visit www.sunchips.ca.

from a operating cost into a revenue source; proof that what is good for the planet can also be good for business.

In nature there is no waste, and FLC is striving to employ biomimicry to learn from nature and transform its manufacturing operations to function without producing any unusable waste.

Going forward, active teams in each facility will continue promoting and directing FLC's ZLF initiative. Our goal is to achieve ZLF across all of our facilities within the next three years.



SUNCHIPS® COMPOSTABLE PACKAGING

Challenge

Packaging is the most visible interaction that consumers have with packaged goods brands. As Canada's largest snack food manufacturer, Frito Lay Canada (FLC) sells millions of bags of product each year. These bags are recyclable but facilities to recycle them do not currently exist in Canada, so most often the bags are placed in the trash and end up in landfills. FLC is continuously working to find solutions to make its packaging more environmentally sustainable.

Strategy

Frito Lay Canada is on a journey to reduce its environmental impact. The company is committed to environmental sustainability and to the projects that will have long term benefits for Canadians and the

environment. Over the last ten years, FLC has rolled out a number of highly successful production and manufacturing initiatives which are not visible to the public, but that have had a significant impact on the environment.

FLC recognized that it would need to find more sustainable packaging solutions in order to continue to reduce its environmental impact and share its journey with consumers. After four years of research and testing, in March 2010 Frito Lay Canada launched the world's first 100% compostable chip bag of its kind across North America from the SunChips® brand.

Instead of using non-renewable materials to make its SunChips packaging, FLC is now producing SunChips multigrain chips in bags made from more than 90%

Current snack food packaging has three layers: a printed outer layer with packaging visuals/graphics, an inner layer which serves as a barrier to maintain the quality and integrity of the product, as well as a seal to shut the bag, and the middle layer that joins the outer and inner layers together.

Frito Lay Canada launches the world's first 100% compostable snack chip bag

From 2008 to 2009, Frito Lay ran a successful limited US test pilot using PLA on the outer layer of the package but still had to develop two key technologies to make the middle and inner layers compostable while still meeting the company's high performance expectations (maintaining the quality and integrity of the product). The launch of the compostable packaging marks the company's success in using PLA on all three layers.

The new SunChips 100% compostable packaging will completely break down into compost in a hot, active home or industrial compost pile in approximately 14 weeks. The new SunChips bag will also break down in several municipal green bin programs but it depends on the municipality and its program as to whether or not they will accept the bag. FLC partnered with the Compost Council of Canada to educate Canadian municipalities about the 100% compostable chip bag and how it can fit into municipal green bin programs. As well, the SunChips website (www.sunchips.ca) directs consumers to the Compost Council of Canada's website where they can learn about industrial and home composting.

Visit us on the web

SunChips at:

- www.sunchips.ca

FLC Environmental Sustainability:

- www.pepsico.ca/en/Purpose/es_eng_flc.html

Frito Lay Canada's Journey to Zero Waste

- <http://sharegreen.ca/?p=91>

Results

By August 2010 the new compostable packaging rolled out across the entire SunChips take-home portfolio (225 gram and 425 gram bags) in Canada. This represents approximately 17 million bags annually. Due to limited packaging availability, the compostable packaging rollout began with the SunChips brand only. Frito Lay Canada is committed to exploring sustainable packaging options for its other brands.

As its current packaging cannot be recycled in Canada, the company is celebrating the 100% compostable bag as a revolutionary breakthrough because it allows FLC's packaging to have a different lifecycle than existing technology allows.



Canadian consumers, government and environmental stakeholders have responded very positively to the new 100% compostable packaging. The environmental impact of this new packaging has yet to be measured as the full rollout has only just been completed.

Frito Lay Canada has seen positive sales results for SunChips multigrain chips since the compostable packaging launch and hopes that its efforts will inspire other Canadian manufacturers to consider sustainable packaging in the future.



ZERO-EMISSION ELECTRIC DELIVERY VEHICLES

Challenge

As Canada's largest snack food manufacturer, Frito Lay Canada (FLC) sells millions of bags of product each year. These bags are transported to thousands of retail customers each day through the company's extensive direct to store delivery network. To service customers from coast-to-coast, FLC operates one the country's largest private fleets, which accounts for a significant portion of FLC's carbon footprint. For many years, the company has been committed to continually upgrading improving its delivery vehicle fleet with new and innovative technologies to support its overall supply chain environmental sustainability goals.

Strategy

FLC has made great strides in making its delivery fleet more efficient by improving its existing trucks (improvements include anti-idling mechanisms, more efficient cabin heating systems, skylights in the trailers

efficient cabin heating systems, skylights in the trailers to reduce the need for artificial lighting, etc), introducing new lighter-weight, more efficient Sprinter vehicles, and by optimizing delivery routes to reduce kilometers driven. Due to these efforts, since 2005 FLC has avoided growing its fleet by 250 vehicles and has actually reduced its fleet size by 55 vehicles while sales have grown.

In June 2010, the company announced its latest fleet innovation with the introduction of zero-emission, all-electric trucks into its delivery fleet. These were made

Canada's first food manufacturer to introduce fully-electric delivery vehicles

possible through a partnership with Transport Canada and the Ontario Ministry of Transportation, making

FLC the country's first food manufacturer to introduce fully-electric vehicles into its delivery fleet.

The six electric vehicles are based at FLC's major distribution centres across the country – three in Brampton (ON), one in Ottawa (ON), one in Surrey (BC) and one in Laval (QC). Each of the six zero-emission electric vehicles has a 60 kilometer per day



FLC's electric delivery trucks charge with a simple plug at the loading dock

The zero-emission electric vehicles were made by Smith Electric Vehicles, the world's leading manufacturer of electric vehicles. The six electric vehicles are powered by electricity from the grid, offset by renewable energy credits, and at the end of the battery lifespan (3-5 years or longer) they will be returned to Smith Electric for recycling. As the company purchases renewable energy credits to offset the usage of these vehicles, the electric trucks operate with zero on-road carbon emissions. They also produce zero pollutants and particulate emissions, unlike traditional fossil fuel engines.

The fully electric vehicles feature a 120 kW induction motor that produces virtually no engine noise. A 40 kWh battery pack gives the vehicle a 60 km range and regenerative braking charges the battery while the

truck decelerates. The top speed of the electric trucks is governed at 80 km/h to help maximize its range, which makes the vehicles suitable for urban delivery routes.

Results

The new zero-emission electric trucks are now servicing customers in the Brampton, Ottawa, Surrey, and Laval areas. The government, media and public response to these vehicles has been overwhelmingly positive.

Six electric vehicles introduced in 3 provinces – BC, Ontario & Quebec

Frito Lay Canada will continue its journey to improve its delivery fleet. As electric trucks are not suitable for every area of the country and every route type, the company will continue to work towards a fleet that's comprised of several types of highly-efficient vehicles that meet its various route needs and driving distances across the country.

Visit us on the web

FLC Environmental Sustainability:

- www.pepsico.ca/en/Purpose/es_eng_flc.html

Soundbite from Marc Guay, FLC President:

- <http://www.youtube.com/watch?v=jumhSN7Njkl&feature=channel>

Soundbite from Helmi Ansari, FLC Sustainability Leader:

- <http://www.youtube.com/watch?v=sliQ-4bDRY>

Frito Lay Canada's Journey to Zero Waste

- <http://sharegreen.ca/?p=87>

