

RECYCLING WASTE ENERGY INTO HEAT

THE TASK OF MAKING HEAT work harder to harness its inherent energy is not new. However, the high cost of using heat to cook, bake and otherwise process snack food products leads to innovative, imaginative methods of boosting energy efficiency.

As a result, many snack food manufacturers are turning to new ways of recovering and recycling the heat that is generated during processing.

WASTE HEAT TOASTS CORN CHIPS

Frito-Lay North America, Inc.'s 350,000-sq.-ft. complex in Perry, GA, for example, turns out voluminous amounts of corn chips and snack specialties in heat-producing, gas-fired ovens. The ovens, on three parallel processing lines, use equally vast quantities of heat to toast corn chips. Until recently, however, once its mission was accomplished, the heat was simply stack-vented from the plant's roof.

Realizing that the same heat could be recovered, converted to steam, and re-introduced into the plant's main steam supply stream, management at Frito-Lay quantified the energy cost reductions this strategy could realize and researched available heat recovery technology.

Energy-efficient steam generators play several key roles at Frito-Lay. Guest author Andrew Wales describes how recycling heat used in processing saves money.

BOILERS RECYCLE ENERGY

Frito-Lay addressed the challenge by contacting Clayton Industries, of City of Industry, CA, a steam generator and heat recovery systems manufacturer and designer. After examining the operation, Clayton recommended three roof-installed heat recovery boilers, each serving its own toasting oven.

This customized suggestion was offered because roof installation, which can be done over a long weekend, generally provides greater cost savings. The other option, ground installation, tends to be more expensive because of the necessity for concrete work. If the recovery boilers can be installed directly over the ovens, a simple steel frame is all that is needed to support the units, with little concrete pouring.

Clayton heat recovery boilers were subsequently installed at the Frito-Lay plant in the fall of 2007.

In the new recovery system, the toaster ovens are positioned in long conveyor systems that deliver corn chips already formed and cut. Here, toasting adds

the "crunch" that appeals to snack lovers, and heat is subsequently channeled to a vertical chamber much like an exhaust hood outlet, and introduced into a heat recovery boiler.

The heat generates steam in the boiler core which is then routed to a remotely located separator, which in turn sends it to the processing supply stream. The heat is captured and returns as processing heat.

Typically Clayton heat recovery boiler systems have a payback of less than 18 months.

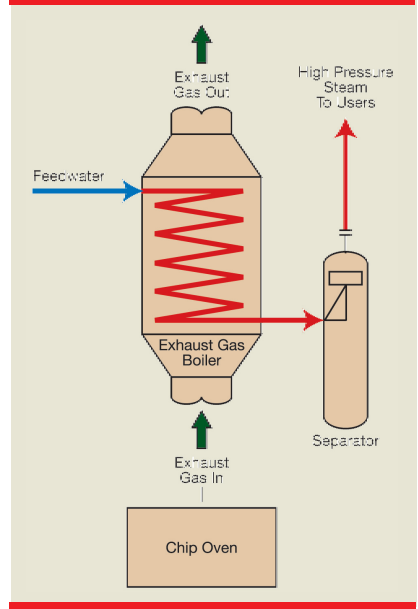
The cost benefit to Frito-Lay has been the recovery of otherwise lost heat energy, producing steam that is added back into the plant's steam system, and burning less fuel in the main boilers. After the capital cost is recovered, it's free steam.

There is almost no maintenance with these units and as long as the ovens run they are putting steam into the header. As the cost of British Thermal Units (BTUs) goes up, this type of unit becomes more attractive.

The economies Frito-Lay has enjoyed as a consequence of the installation have confirmed the accuracy of its management's predictions, and the company's capital investment was recovered in less than two years.

With recovery systems successfully installed in Perry, GA, and Charlotte, NC, Frito-Lay is now looking into similar projects in Jonesboro, AR, and two of its plants in California.

SYSTEMS DIAGRAM



At Frito-Lay's facility in Perry, GA, Clayton heat-recovery boilers capture heat from toasting ovens, convert it to steam and re-introduce the energy into the main steam line. The system paid for itself in less than two years.



Steam generators, an essential part of a heat recovery system, capture gasses that would be exhausted and use that heat for boiler systems.

ABOUT THE AUTHOR

Andrew Wales is Clayton Industries' western regional sales manager. He has more than 33 years' experience in capital equipment sales, energy services and project development activities.

Clayton Industries' Thermal Products Division manufactures a direct-fired and waste heat steam generators, and its Chemicals Division supplies chemicals used to treat steam generator feedwater. Wales can be reached at XXX XXX XXXX.

