

## CASE STUDY—SOLAR THERMAL SYSTEMS

### Dairy Processor Carbon Reduction through Energy Efficiency (D-CREE)

U. S. Dairy Sustainability  
Commitment



## New England dairy taps solar energy and hot water recovery to reduce energy costs and carbon footprint.

### Best practice: Combining solar thermal and hot water recovery to reduce fuel costs and thermal waste.

#### Quick Facts

- *Solar process-heating systems are designed to meet the need for large quantities of hot water or space heating in commercial, industrial and institutional buildings.*
- *A typical system consists of several thousand square feet of ground-mounted collectors, combined with pumps, heat exchangers, controls, and one or more large-volume storage tanks.*

*Source: Department of Energy, Industrial Technologies Program*

#### Tools and Resources

- *Visit the U.S. Department of Energy's Industrial Technologies Program's Solar Heating site, [www1.eere.energy.gov/solar/sh\\_business\\_industry.html](http://www1.eere.energy.gov/solar/sh_business_industry.html), for more resources, including financing information.*
- *The DSIRE Solar Web site, [www.dsireusa.org/solar](http://www.dsireusa.org/solar), provides information on state, local, utility, and federal incentives and policies that promote the adoption of solar technologies.*

Driven by rising fuel prices and a growing concern for the environment, Oakhurst Dairy began exploring renewable energy options that would help the company's bottom line while reinforcing its carbon management strategy.

In the spring of 2008, the company became home to one of the largest commercial solar thermal systems in the northeastern U.S. With the help of Clean Air-Cool Planet and Ascendant Energy, Oakhurst Dairy installed 72 panels, approximately 2,500 square feet, on the roof of its headquarters in Portland, Maine.

When the sun is shining, the panels preheat water to temperatures as hot as 110°F. By reducing the energy required to heat water for case washing (150°F to 160°F), the system reduces the company's heating oil consumption by more than 5,000 gallons per year.

An extension of the project includes a hot water recovery system attached to the case wash. This allows the hot water, used for the case wash, to be routed through a heat exchanger and recover waste heat and recycle back into the solar panels. By capturing thermal units (from the hot water) that were literally flushed down the drain, records show that Oakhurst saves an additional 2,500 gallons of heating oil per year at a minimum.

#### Key Benefits

**Heating oil savings** — In the first year, early estimates indicate that approximately 7,500 gallons of No. 2 heating oil per year have been saved from the combination of solar thermal and waste heat recovery.

**Greenhouse gas (GHG) reduction** — The current savings in heating oil represent 223,840 pounds of CO<sub>2</sub> per year, equivalent to the amount of carbon sequestered annually by 23.1 acres of pine or fir forests. Sources: U.S. Energy Information Administration ([www.eia.doe.gov/oiaf/1605/coefficients.html](http://www.eia.doe.gov/oiaf/1605/coefficients.html)), Greenhouse Gas Equivalency Calculator ([www.epa.gov/solar/energy-resources/calculator.html](http://www.epa.gov/solar/energy-resources/calculator.html)).<sup>†</sup>

**Boiler life extension** — These systems do not replace the company's boiler. But preheating the water reduces the demands on the boiler, thereby reducing maintenance and extending service life.

**Employee pride and public perception** — One of the greatest benefits of the company's initiatives doesn't show up on the balance sheet. It's the morale booster that comes from employees' pride in the program. This also boosts public perception of Oakhurst Dairy, which the company features in its marketing.

**Payback** — The estimated simple payback is eight years (standard for many industrial solar thermal projects of this scale). Once paid for, *approximately 3 percent of the plant's total energy needs will be free and generated on-site.* (See reverse side for financial information.)

# Sustainability delivers benefits for the company and its community.

## Financial Information

<b>Investment</b>	\$220,000
<b>System includes</b>	72 solar panels.
	Installation.
	Piping.
	Hot water storage tanks.
	Heat exchangers.
<b>System life expectancy</b>	At least 30 years.
<b>Offsetting incentives</b>	\$10,500 State of Maine Energy Program.*
	\$60,000 Federal tax credit.*
<b>Payback period</b>	8 years (based on minimum of 7,500** gallons of No. 2 heating oil per year @ \$2.40 per gallon).
<b>Years of free energy</b>	18 to 20 years, valued at \$340,000 to \$360,000 at current prices for No. 2 heating oil.†

\*State and federal incentives will vary by plant.

\*\*Bill Bennett, Oakhurst spokesman, estimates that annual savings could be closer to 10,000 gallons as efficiencies improve and techniques, such as low-temp cleaning, are added. This would decrease the payback period to less than 10 years, at current prices for No. 2 heating oil.

†Energy cost savings were calculated at the time of project completion, based upon the regional cost of energy for the plant's location. Energy costs may fluctuate over time and by geographic region.

## Challenge area: Reducing hot water costs and thermal waste.

Fluid milk processing requires large quantities of hot water for cleaning cases and equipment (150°F to 160°F). Through a systems approach, Oakhurst identified critical control points for reducing thermal energy requirements and waste.

## Plant profile: Oakhurst Dairy

Oakhurst Dairy, located in Portland, Maine, has been family-owned since 1921. It processes 22,000,000 gallons of fluid milk per year, in addition to cultured milk, flavored milk, juices and other beverages.

Oakhurst has been a longtime proponent for environmental stewardship, and one of New England's environmental leaders. As part of the Governor's Carbon Challenge in 2004, the company set an aggressive goal of reducing carbon by 20 percent by 2010.

Other initiatives by Oakhurst Dairy include converting vehicles to biodiesel, improving refrigeration efficiency and upgrading rerouting software. In the near future, the company will be installing solar photovoltaic panels to reduce electricity costs and dependence on the grid.

### The Dairy Processor Carbon Reduction through Energy Efficiency (D-CREE) Project

is designed to increase U.S. milk processor awareness of and confidence in the economic feasibility of energy efficiency best management practices. The D-CREE program is one of 12 projects identified by the Innovation Center for U.S. Dairy sustainability initiative that aims to help reduce greenhouse gas emissions and increase business value across the dairy industry.

This is one of a series of validated case studies that has been proven to be economically viable in fluid milk processing plants. Together, these case studies help identify critical control points for energy efficiency and best management methods for improving efficiency and profit opportunities. For more information about D-CREE, or to join our mailing list, e-mail [dcree@rosedmi.com](mailto:dcree@rosedmi.com).

The Innovation Center for U.S. Dairy aligns the collective resources of the dairy industry to offer consumers nutritious dairy products and ingredients, and promote the health of people, communities, the planet and the industry.

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