

SECTOR	COUNTRY	THEME	TOPIC
Food and Beverages	USA	Energy management	Energy management systems

Darigold is a dairy and food processing company based in the United States. By implementing an energy management system across their business, they have been able to make huge cost savings and reduce their greenhouse gas emissions. Here's how they did it.

#### KEY LESSONS FROM DARIGOLD'S EXPERIENCE WITH ENERGY MANAGEMENT SYSTEMS

- Having an energy management system (EnMS) in place can lead to significant operational cost savings.
- EnMS provides a platform for identifying and prioritizing energy efficiency projects that can generate capital.
- Cooperation between utilities, government, industry and academia
  on the development of new business models for energy efficiency
  delivery and implementation helps industry achieve energy savings
  and continuously improve energy performance.
- Frequent employee engagement and training is critical to maintaining ongoing energy savings.

- Catalysts for successful EnMS adoption within companies include:
  - support by executive leadership
  - o establishing a tangible and achievable goal for energy reduction
  - dedicating personnel to lead and sustain the EnMS program
     (e.g. an energy champion, energy manager or energy engineer)
  - receiving government subsidies for EnMS activities that achieve energy savings, which could be progressively phased-out.
- EnMS must be aligned with a company's business objectives and operational priorities.

### **Company snapshot**

People: 1400 employees throughout the Northwestern United States (Idaho, Montana, Oregon and Washington)

Facilities: 12 production facilities averaging 24,000–45,000 square meters

Products: Annual production of 3.6 billion kilograms of bulk milk yields; 130 million kilograms of butter; 182 million kilograms of milk powder; 88.5 million kilograms of cheddar cheese; 341 million liters of packaged milk; and 20 million kilograms of cottage cheese, sour cream and yogurt

Energy sources: Electrical power (grid) and natural gas

Energy use breakdown: Boilers - 32% of total annual energy cost;

dryers – 28% of total annual energy cost; electrical – 38% of total annual energy cost (air compressors, refrigeration, etc.)

Energy management system: Similar to ISO 50001 Global Energy Standard but they don't use a standard or certification

Energy intensity goal: 25% energy intensity reduction in 10 years (2009–2019)

Energy intensity by unit of product gains: 18% (1.6% per year)
Electrical utilities serving Darigold's facilities: Avista, Benton
REA, Idaho Power, Lewis County PUD, Northwestern Energy,
Pacific Power, Portland General Electric, Puget Sound Energy,
Seattle City Light

### **About Darigold**

Darigold is a subsidiary of the Northwest Dairy Association, and is the fourth largest dairy cooperative in the United States based on milk volume. The company was founded in 1918 and is headquartered in Seattle, Washington, where it is one of the largest privately-held organizations in the state.

Darigold produces primarily dairy-based products for wholesale, retail, grocery, and foodservice customers. These include butter, cheese, milk powder and whey products, fluid milk, cottage cheese, yogurt, sour cream, half and half/creamers, whipping cream and buttermilk.

More than 500 dairy farmer owners collectively invest in Darigold's continuous improvement, ensuring it stays at the top of its game. Darigold's 12 production facilities represent the bulk of energy and emission reduction potential. As a result, they are the focus of this case study.



# Darigold's commitment to energy and the environment

Darigold continuously seeks innovative ways to reduce waste, conserve natural resources and fine tune complex energy processes throughout the lifecycle of its products — from the farm to facility, and storefront to the kitchen table.

Energy management plays a central role in Darigold's corporate business strategy — not just because of the associated operational efficiencies and energy cost savings, but also because it is a mechanism to reduce GHG emissions, demonstrate leadership with key customers (through corporate social responsibility), and recruit a workforce keenly interested in sustainable business operations and energy innovation.

Darigold believes that, first and foremost, a successful energy management program must focus on personnel. More than upgrading motors, boilers or electrical equipment, building general employee awareness and making training available to them create a foundation for the company to continuously improves its energy performance.

Energy performance is part of the day-to-day activities at Darigold, meaning significant operational improvements are continually identified and implemented. Plant managers and staff also monitor energy consumption on a daily basis.

## The business case for energy management

As in many agri-business sectors, dairy margins are slim and energy is treated as a controllable cost. Therefore, energy efficiency has long been viewed as a necessity. While the cost of energy may be relatively small in the Pacific Northwest when compared to the cost of other production inputs, it's one of Darigold's single largest expenditures — representing 10 percent of the company's total operating costs.

#### Adopting an energy management system (EnMS)

After ten years of implementing individual equipment upgrades to improve energy efficiency, Darigold decided in 2011 to adopt an EnMS, which has greater potential for savings and productivity gains. Beyond the energy benefits, using a systems approach has enabled the company to meet its carbon reduction goals, meaning there are lower financial risks of future penalties or taxes on emissions (energy use can account for up to 90 percent of Darigold's greenhouse gas emissions).

# EnMS as a means for Darigold to achieve its sustainability goals

#### 1. To control energy cost volatility

Electricity rates in the Pacific Northwest region are relatively low compared to other US regions. However with electricity rates projected to increase by 3–6 percent over the next 1–3 years, Darigold needs to keep energy costs an operational priority. Darigold's production facilities are spread across a variety of utility service territories (and rates). By having an EnMS in place, Darigold has better forecasting and operational predictability relative to the rise and fall of rates and electrical grid loads. It is also able to standardize the implementation of its energy efficiency projects across the entire organization. Darigold purchases natural gas on the open market, meaning it can take advantage of price drops.

#### 2. To respond to customers

Some of Darigold's largest wholesale customers require sustainability reporting and verification of emission reduction across the supply chain. Energy management is helping Darigold measure and reduce its energy consumption so it can meet these requirements.

#### 3. To reduce carbon

Darigold is preparing for any costs associated with future GHG emissions legislation or carbon markets. For example, by measuring and baselining energy use, Darigold is cutting its operational costs, meaning it can reduce future risks and costs associated with carbon taxes.

#### 4. To lead markets

Darigold has built a company brand upon the environmental stewardship and legacy of its farmer-owners. A commitment to carbon reduction, sustainable practices and energy efficiency is core to the Darigold business model. For example, in 2010, Darigold issued its first Corporate Social Responsibility Report,<sup>2</sup> which publicly documented the company's performance in the economic, environmental and social areas that matter most to its stakeholders.

### 5. To engage the workforce

An aging workforce motivates Darigold to develop successionplanning strategies to maintain competitive advantage and industry knowledge. Through its commitment to energy management, Darigold hopes to attract a next-generation workforce known to be technologically innovative, tied to local land stewardship, and passionate about sustainability and energy innovations.

### Darigold's energy reduction strategy

### Introduction of a company-wide, strategic EnMS

In 2011, Darigold made an executive-level commitment to formalize the company's energy program — moving from incremental projects and energy data tracking to an energy management system modeled on the ISO 50001 Global Energy Management Standard. In 2012, Darigold started using ISO 50001 as a guideline for the implementation of their energy program, but it may review formal certification options in the future.

At the corporate level, Darigold looks at energy as a resource that can be effectively managed, just like any other business costs like labor or raw materials. However, it recognizes there still needs to be an effective energy reduction strategy in place.

#### Core principles and practices of Darigold's EnMS

Darigold's corporate energy management strategy has the following core practices and principles.

#### 1. Set an energy saving goal

Setting an achievable goal is a strategic first step. Darigold made a voluntary pledge when it joined the US Department of Energy's (DOE) initiative, Better Buildings, Better Plants.<sup>3</sup> The goal was to reduce energy intensity by 25 percent over 10 years. Using this target, Darigold executives and employees put in place resources and strategies specific to their business needs. Darigold has a dedicated energy engineer who works with each of the production facilities to translate the 10-year goal into manageable annual goals — around 2.5–3 percent reduction each year.

#### 2. Collaborate with strategic partners

Darigold has collaborated with a number of organizations on its energy management program, ensuring it has a wealth of expertise and support.

For example, Darigold's pledge and partnership with DOE qualified it to receive additional resources — such as a technical account representative who checks progress, reviews data points and assists with regression modeling (the latter looks at variables like weather and production volume). DOE also subsidized training

<sup>1</sup> When compared to the rest of the United States, utility costs in the Pacific Northwest region are relatively low, with 2011–2012 blended rates ranging from US\$0.04/kwh to US\$0.08/kwh, depending on the utility.

<sup>2 2010</sup> Darigold Corporate Social Responsibility Report: http://corporate.darigold.com/press/csr\_DG\_2010.pdf

<sup>3</sup> Better Buildings, Better Plants supports commercial and industrial building owners by providing technical assistance and proven solutions for energy efficiency.

on energy system optimization. The training, which is done on-site at the plant, is a relatively new approach to developing energy expertise within companies. The purpose is to enhance participants' training experience.

DOE also offers free energy audits through its Industrial Assessment Centers and energy analysis software tools, such as Airmaster, Motormaster, PSAT and SSAT. These software programs are designed to assess electric motors, compressed air, steam and pumping systems, and they are all downloadable from the DOE website.<sup>4</sup>

DOE, through the Northwest Food Processors Association, is also funding an energy monitoring initiative that Darigold is involved in.

Darigold's other critical partner is the Bonneville Power Administration (BPA), a federal wholesale power marketer in the Northwest that works through local utility providers to deliver energy products and services to customers. For example, BPA's High Performance Energy Management program funds the Northwest Food Processors Association and private sector energy contractors to provide key expertise to firms. They assisted Darigold to implement a Green Energy Management System (GEMS), which is designed to help food processors quantify energy savings and analyze energy efficiency data. By introducing software and other technology monitoring platforms like GEMS, energy management efforts are directly linked to data, a necessary component to communicating metrics and ensuring persistent energy savings.

Ten local electrical utilities serve Darigold, and each provides a range of technical resources and financial incentives to help subsidize the cost of larger capital improvements — such as lighting, motors and compressed air (see Table 1). While each utility program is customized to the geographic service territory, most programs are similar and offer a range of savings, sometimes up to 50–70 percent of the total project cost of the efficiency upgrade. Utility subsidies come from 'public benefit charges' that are added to customer utility bills and returned in the form of energy efficiency and renewable energy programs to offset the environmental effects of electricity production.

Darigold is an EPA Energy Star partner. It participates in monthly conference calls and annual meetings with other partners and national leaders — such as 3M, Anheuser–Busch Companies, American Cement Company and other executives. Together they share high–level information on effectively implementing, managing and monitoring a successful industrial energy management program.

4 https://save-energy-now.org/Pages/default.aspx

Darigold is a member of the International Dairy Foods Association, an organization that is also working on energy efficiency improvements with their members.

TABLE 1: Darigold's energy efficiency improvement, 2007–2011
Since 2001, Darigold has been systematically tracking its electricity and gas use, and working to reduce it. Energy audits provided by DOE through the Industrial Assessment Centers were conducted in some of the company's 12 plants with recommendations for energy improvements<sup>5</sup>

Project	Energy savings (annual kWh)	
Lighting retrofits and controls	4,927,883 kWh	
Refrigeration and chiller modifications	3,814,837 kWh	
Compressors: VFDs/VSDs	2,687,239 kWh	

#### 3. Monitor, track, measure and report energy data

Darigold's energy savings are tracked in British thermal units per pound (BTU/lb). This key performance indicator is reported on daily, as shown in Figure 1, helping Darigold's plants to monitor and measure progress. This type of information also helps identify better systems and achievable energy performance targets.

Darigold uses utility invoices to review total energy consumption, which are compared to monthly production throughput. This is also compared to the daily energy reports to ensure the data matches. Darigold is investigating sub-metering different energy systems so that it can pinpoint the equipment or processes that are using the most energy and make changes accordingly.

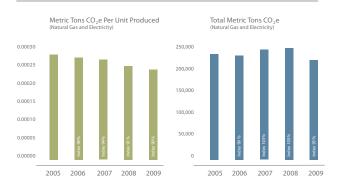
Darigold now also monitors, tracks and reports energy data. Most of the company's facilities have the ability to log onto their respective utilities and obtain daily energy consumption data. Electrical data is typically provided every 15 minutes and gas is monitored on an hourly basis. The utilities provide this data free of charge, but the information is always from the previous day. Darigold is currently evaluating real-time monitoring that provides instantaneous power consumption data. However, it requires time and capital to install.

Easy access to utility company data allows Darigold to create daily energy intensity reports that compare total energy usage to production throughput. These reports are more precise so individual production facilities can make adjustments quickly, and they can be used to compare production facilities against another, and against their annual goals.

<sup>5</sup> Darigold measures energy consumption in BTU/Unit (pound) produced in cheese, powder, and butter plants and BTU/Unit (gallon) in bottling plants. These measures are converted to the amount of CO2 produced in metric tons.

FIGURE 1: Example of Darigold Energy Team Meeting and  ${\rm CO_2}$  Progress Report

#### Processing Plants' Carbon Footprint (All Plants Combined)





4. Establish an energy management team

Darigold is in the process of incorporating strategic energy management into the company culture. Its employees are both encouraged and empowered to deliver energy savings strategies that can be easily transferred and replicated to other facilities. This is orchestrated by Darigold's Energy Management Team.

The team, which builds upon the ISO 50001 framework, manages the company–wide energy strategy, decisions about Darigold's facilities, and best practices. The team also acts as the steering committee for the company's energy efficiency initiatives. It comprises one representative from each facility, plus key personnel with diverse skillsets from other parts of the company. The team provides guidance, assesses energy–training requirements, establishes annual goals and objectives, and conducts internal audits of the energy program. It also takes the lead in corporate awareness and recognition programs.

Each Darigold facility also has a Plant Energy Team, whose main function is to investigate energy-saving opportunities in respective facilities and ensure all plant employees are engaged in the energy program. Employee awareness is very important and is a continuous effort.

### **DARIGOLD ENERGY TEAMS**

Darigold recognizes that a diverse team of personnel, supported by senior leadership, managers and plant leaders will ensure that energy goals are well understood and prioritized throughout the organization, every step of the way.

### Attributes of a successful energy team

- Leadership: Identify a charismatic and passionate leader, although one who is not necessarily a plant manager, to ensure decision-making autonomy and innovative idea advancement.
- Diversity: Include a variety of business unit representation, such as production engineers, operators, financial representatives, procurement and marketing to ensure company-wide awareness and adoption of energy goals.
- Knowledge: Ensure team members have a clear understanding of the role energy plays in creating bottom line advantage. Look for knowledge of energy management systems, and people able to coordinate and understand

- different teams, work processes, production, and organizational development.
- Commitment: Assess participation ability. Team members meet regularly, develop clear, updated action plans and learn to act as opportunity arises.
- Communication: Team members effectively convey information through daily energy reports that are readily understood by others and mirrored by their actions.
- Flexible: Open to adapting to mid-course changes, disruptions and other fluctuations in production processes.
- Motivators/Influencers: Team members are leaders within their work unit and must have the ability to overcome inertia and motivate their peers to follow them.
- Executive support: Darigold's executive team supports a work environment where energy teams advance energy goals through training and education.

Daily production meetings emphasize energy issues as part of the agenda, and provide employees with a means of contributing energy efficiency improvements. Much like long-established industrial quality or safety initiatives, energy issues are now part of the day-to-day decision-making at the company.

Energy team meetings often yield important, money-saving production-efficiency strategies. For example, a Darigold facility in Idaho identified how they could save US\$20,000 annually by adjusting a milk cooling protocol. Plant engineers determined a way to increase the silo cooling temperature without compromising the product quality, and the net result was significant energy and cost savings. Raising these issues in an open, collaborative forum creates an opportunity to evaluate, implement and customize ideas in other facilities.

Secure executive commitment to resources and organizational change

Darigold's energy saving pledge to the DOE, coupled with its strategic partnerships and technology investments, ensured executive-level commitment to the energy management plan.

Human resources personnel were also involved throughout the process, ensuring that any future recruitment aligns with the corporate energy strategy and reduction goals. For example, Darigold hired a full-time energy engineer in 2011. The energy engineer is part of the management team and is responsible for the creation and implementation of a company-wide energy management system. This includes overseeing facility energy audits (conducted by a third-party provider but subsidized by DOE), <sup>6</sup>the engineering analyses, calculations of energy efficiency operations, and energy modeling and analyses. The energy engineer is also responsible for managing relationships with local utilities to capture cost-sharing and energy conservation funding opportunities.

6. Enhance communication and behavior change strategies
Effective, company-wide communications planning is an important mechanism for sustaining momentum and interest in energy management. A systematic communications approach establishes common, consistent threads of information that move seamlessly across the entire organization. The "boardroom to boiler room" approach involves integrating business priorities with energy management system activities and providing the tools necessary to implement them.

Darigold delivers consistent, frequent and timely information to

6 DOE subsidized all Darigold's audits. However, utilities, extension partnerships and university programs also fund energy audits.

employees. It does this through educational activities, such as training and incentive programs, and by enlisting new ideas from staff at team meetings and through the internal website and bulletin boards.

Through ongoing communication about the business case and value of energy management, Darigold ensures employees take ownership of the strategy and contribute towards the energy reduction goal.

"Since 2005, Darigold has reduced CO2 emissions by 15 percent, due in large part to their investment in energy reduction measures."

-Darigold Corporate Responsibility Report 2010

# Darigold's future commitment to energy management

Despite energy cost volatility and constantly changing utility rates, Darigold's energy strategy has resulted in a 21 percent energy intensity reduction (BTU/lb) since 2001. Over the same period, production increased 42 percent, demonstrating that significant product efficiency improvements might be linked to the introduction of strategic energy management.

The following non-energy benefits can also be indirectly attributed to the introduction of their strategic energy management system:

- Increased reliability: Replacing older equipment with new equipment typically increased reliability as well as efficiency.
- Improved safety: Newer, more reliable equipment decreased the risk of work-related injuries associated with operating machinery.
- Reduction in workforce turnover and increased morale: People were more engaged because they could contribute to a worthwhile cause. Everybody understood that saving energy is also good for the environment.

#### **Challenges**

Darigold's biggest challenge — which is shared by many other companies in the industrial manufacturing sector — is achieving a reasonable return on investment for capital projects. Even with incentives by US utility companies to be more energy efficient, the cost of upgrading equipment is often beyond what companies can

afford. Each upgrade has to be carefully considered and researched to ensure it provides the expected savings. This process begins by looking at the entire company's energy system, and its operation, rather than just replacing equipment incrementally.

This challenge is magnified by Darigold's geographic footprint, which stretches across four states. Ten electric utilities service the company's 12 facilities, making it more difficult to accurately manage electricity rate fluctuations, program offerings and incentive allocations.

Another challenge for Darigold is having enough resource and staff time to continuously manage its energy efficiency initiatives. While the company often relies on free, third-party offerings advice and support from local and national government and NGOs, orchestrating and managing the scheduling and timing of these third party offerings requires in-house resources.

As part of a continuing improvement process, the energy program requires constant attention. Darigold, like other companies, has to sustain interest and momentum in energy reduction activities while other business priorities compete for attention and resources.

It is has proven to be difficult to link the energy performance improvements that Darigold has achieved with the implementation of EnMS, particularly given it is a relatively new program at Darigold. There is currently no standard measurement and verification protocol for qualitatively assessing energy savings from operational and maintenance improvements, or the incremental capital energy efficiency projects resulting from instituting an EnMS standard. That said, studies emerging from Pacific Northwest organizations — such as the Northwest Energy Efficiency Alliance, Energy Trust of Oregon and the Bonneville Power Administration — suggest that energy intensity can be reduced 2–10 percent with little capital investment, and that these savings could continuously improve. Energy savings would come directly from behavioral changes such as:

- operational and maintenance improvements
- incremental increases in capital energy-efficiency projects (i.e. more lighting efficiency)
- additional capital projects that would not otherwise have been considered (i.e. process changes, consideration of energy efficiency in all capital efforts)
- improved persistence of energy savings associated with capital projects.

# Diffusing knowledge and transforming the market

The catalyst for Darigold's strategic investment in energy efficiency involved a fundamental shift from being aware of the issues to instituting an urgent and focused discussion of the tools required to design and implement a sustainable energy management plan.

Once energy efficiency practices are ingrained in a company's organizational culture, ongoing investment in larger improvements — such as replacing equipment with models that are more energy efficient — is more likely to be approved by upper management.

Darigold is just one example of a company making positive changes. Now, more than ever, there is an unprecedented level of cooperation among utilities, government, industry and academia to work together to develop new business models for energy efficiency delivery in industry. They are doing this through research and technology development, best-practice sharing and energy management plan implementation. In this way, the market for energy efficiency is being effectively transformed.

Case study prepared by Market Shift Strategies





2200 Pennsylvania Avenue, N.W., 4th Floor, East Tower, Washington, D.C. 20037 U.S.A. iipnetwork.org | info@iipnetwork.org | Twitter.com/iipnetwork

<sup>7</sup> ACEEE White Paper #128. "The Evolution of Continuous Energy Improvement Programs in the Northwest: An Example of Regional Collaboration." Authors: Ted Jones, Consortium for Energy Efficiency, Kim Crossman, Energy Trust of Oregon, Jennifer Eskil, Bonneville Power Administration, John Wallner, Northwest Energy Efficiency Alliance.