Efficient technical solutions bring cost reduction and improve product quality and safety

This technical solution may be an example for other dairies looking for cost reduction.

BEFORE
Old CIP station

The main CIP circuit was used for cleaning of several production departments including milk reception, milk preparation, skinned milk production, and butter production. All utilized washing water, soda and chemical solutions were discharged without recovery. This led to high consumption of water and chemicals for washing:
- 10,116 m³/year of water;
- 9.27 tons/year of caustic soda;
- 5.96 tons/year of hydrochloric acid.

AFTER
Upgraded CIP station

The CIP station was upgraded with a CIP return circuit including:
- additional tanks for soda and acid;
- a rinse water tank to feed the water for washing of floors;
- a new filtering system for the recovered rinse water;
- an additional control and regulation system.

The new system enables recovery of caustic soda and acid solution and would lead to saving:
- 7.91 t/year of soda;
- 5 t/year of acid;
- about 1,100 m³/year of fresh water used in the solutions (if the latter are discharged after 6-7 cleaning cycles).

Rinse water, except water from the first rinse cycle, would be used for floor cleaning. In this case, the total amount of fresh water saved from the project implementation is about 4,500 m³/year (including 1,100 m³/year by the recovery of soda and caustic solutions, and 3,400 m³/year by the rinse water recycling).

BE EFFICIENT – IT PAYS OFF

Improving resource efficiency in a dairy can result in an increased profit margin and higher product quality and safety

Manufacturers often underestimate benefits of resource efficiency and mistakenly assume that efficiency improvements require unaffordable investments. In fact, sizeable input savings may be achieved through low- or even no-cost operational measures, and investments in resource efficiency do pay off.

COMPANY

DAIRY IN THE CAUCASUS

Sante GMT Products is a dairy and juice manufacturer in Georgia processing about 100 tons of raw milk per day to produce over 100 products such as milk, cheese, butter, and yogurts. The company is committed to continuous advancement and has significantly progressed in bringing its operations to international standards. In 2011, Sante GMT worked with IFC focusing on reducing consumption of energy, water and other resources while enhancing quality and safety of its produce.

CHALLENGE

MINIMIZE UTILITY BILL

The costs of inputs, namely water, gas and electricity, are relatively high in Georgia. Sante GMT was interested in learning how to use them more efficiently to have lower bills. IFC worked with the company to identify opportunities and decrease production costs while also increasing quality and safety of the dairy products. By investing $1.4 mln the company can reduce its spending on energy and water and generate new revenue, with a total benefit of $630,000 annually. Sante GMT has taken a phased-in approach to the implementation of resource efficiency improvements focusing on measures with the triple-effect of reduced operational costs, higher product quality, and greater environmental safety: Cleaning-in-Place system (CIP) rehabilitation, product cooling system improvement, waste processing into a valued output.

SOLUTION

How can the company gain $630,000 per year?
Sante GMT followed the IFC's two-step assessment methodology and started by finding out how much it could save on input costs. As the diagnostics showed, Sante GMT consumes about twice as much energy and water as industry good practice standards. Subsequently, by raising efficiency of its energy and water use, Sante GMT can materialize significant cost savings. In addition, whey – a liquid by-product discharged as waste, could be processed into a new valued product and generate additional profit. Energy and water efficiency and waste management were identified to bring the largest and most attractive savings for the manufacturer.

### WHAT IS FEASIBLE TO ACHIEVE?

The same volumes of dairy output could be produced with just about half of Sante’s energy and water costs.

**The proposed program of measures would contribute to measures and set priorities for projects implementation.** At the next stage, IFC helped the company analyze improvement measures and set priorities for projects implementation. The proposed program of measures would contribute to reduction in Sante’s energy and water use to 4.9 m³ and 512 kWh per ton of raw milk, respectively.

In total, a targeted investment of $1.4 million would lead to $630,000 annual benefits including savings on:
- 140,000 m³ of gas
- 735 MWh of electricity
- 23,000 m³ of water
- 550 tons of CO₂ reduction

**WHAT IS FEASIBLE TO ACHIEVE?**

At the next stage, IFC helped the company analyze identified opportunities, select viable technical measures and set priorities for projects implementation. The proposed program of measures would contribute to reduction in Sante’s energy and water use to 4.9 m³ and 512 kWh per ton of raw milk, respectively.

In total, a targeted investment of $1.4 million would lead to $630,000 annual benefits including savings on:
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### ASSESSMENT: ELABORATE VIABLE IMPROVEMENT MEASURES

Once the diagnostics is complete, it may be worthwhile to conduct an in-depth assessment to:
- analyze technical and financial viability of the identified priority areas;
- come up with a list of specific technical improvement measures.

A clear resource efficiency action plan is developed to pursue the identified enhancement opportunities.

### DIAGNOSTICS: BENCHMARK YOUR PERFORMANCE

The two-step assessment approach proved to be a good strategy for any company willing to control its use of resources. The first step – diagnostics:
- evaluates the company’s current performance;
- assesses potential improvements;
- identifies priorities for seizing efficiency opportunities.

For this, a company needs to collect data on its resource consumption and analyze against industry averages the so-called Resource Efficiency benchmarking. Potential for reduction is evaluated.

### SEIZE THE OPPORTUNITY AND ACT

The three resource efficiency measures allowed the company to enjoy the greatest bulk of savings and impact on product quality and new income. Other measures proposed to Sante GMT include, for instance, installation of variable speed drives on water supply pumps, condensate recovery, milk-cooling water recycle, renewal of the transformers station.

**Some actions to consider in the dairy sector**

- **Good housekeeping.** No- and low-cost operational improvements help minimize consumption of resources and bring substantial savings of up to 20% on energy and water costs. In addition to greater productivity, such measures contribute to better product quality and safer working environment. By eliminating water leakages, improving insulation, paying attention to staff training, the company may significantly enhance efficiency. For instance, low-cost measures implemented by Sante would bring about $30,000 of annual savings.

- **Synergies between cooling and heating.** An efficient cooling system enables rapid milk and semi-finished products cooling and is critical for product quality and a longer shelf life. Large savings of energy may be achieved through heat recovery for both heating and cooling operations in milk pasteurizers and heat exchangers, waste heat recovery from the refrigeration plant, compressors, and boilers. For example, Sante GMT may use heat from chillers for the hot storage rooms and space heating needs.

- **Water reuse and recycling.** Good practices for facility cleaning, e.g., automated CIP system should be adopted. CIP is a system designed for automatic cleaning of equipment and helps maintain hygiene during dairy processing, which is critical for food safety, product quality, and shelf life.

- **Upgrade of outdated utilities.** It is common for manufacturing companies to have state-of-the-art production equipment, while overlooking inefficient facilities that occur in outdated utilities generating steam, chilled water and electricity for production purposes.

- **Efficient waste management.** Whey is a liquid by-product of the cheese making process. If discharged untreated, as is often the case, whey causes high water pollution. When properly managed, whey may generate additional revenue, being used for production of food, feed, energy, or for recovery of valuable nutrients.