



Lebanon Energy Efficiency & Renewable Energy Finance Facility



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Sustainable Energy Investment ➤ *Improved Business Results*

Energy Efficiency and Renewable Energy in Food and Beverage Production

Food and Beverage production is one of the most energy intensive industries with diverse sub-sectors. This leaflet concentrates on technologies and management techniques that offer the greatest potential for energy saving and that are common to the widest range of sub-sectors. The relative importance of each area will also depend on the sub-sector. For example, refrigeration cost will make up a large proportion of energy bills in the frozen and chilled foods sub-sector. Equally, for a business that produces confectionery, boilers and heat distribution systems will make the largest contribution.

Please make sure that you contact the LEEREFF team for additional ideas and support.

OVERVIEW OF EXAMPLES FOR ENERGY SAVING AND RENEWABLE ENERGY INVESTMENTS IN FOOD & BEVERAGE PRODUCTION

PRODUCTION PROCESS

- Process control optimisation, including computer-based automatic control systems
- Replacement of process machinery, including cookers and ovens
- Distillation, drying and evaporation equipment
- Inter-process material and product handling and transport (e.g. conveyor motors)
- Compressed Air systems
- Installation of heat recovery system
- Water distribution pumps
- Steam generation (e.g. CHP)
- Refrigeration technology and cold storage rooms

AUXILIARY SYSTEMS

- Optimization of air conditioning and cold storage temperatures
- Minimising transmission and ventilation losses from cooled rooms, cold stores and freezing tunnels
- Heat recovery from cooling system
- Optimization of compressed air systems
- Application of combined heat and power technology, especially in processes that demand steam
- Optimization of insulation by selecting effective coating materials with low conductivity values and high thickness
- Installation of heat pumps for heat recovery from warm cooling water
- Use IEC2 class efficiency motors and variable speeds drives for the process and auxiliary equipment
- Reduction of the load on motors and drives by ensuring that regular servicing and basic maintenance steps such as lubrication of machinery are undertaken
- Improving the efficiency of a heat generator by reducing the heat losses through the chimney

PRODUCTION AND ADMINISTRATIVE BUILDINGS

- Insulation of the building envelope
- Energy efficient space heating and cooling
- Heat recovery
- LED lighting and motion sensors for on-demand lighting, especially in utility rooms, corridors and outside areas
- Solar PV on factory and administrative roofs for own energy production
- Solar Water Heaters for hot water used staff bathrooms, showers and to cover hot water needs

RENEWABLE ENERGY OPPORTUNITIES

- Use biogas and biomass boilers, which allows you to utilize production wastes to produce heat
- Install PV systems to supplement the energy you purchase off the grid with energy produced on your premises
- Use solar water heaters for warm water preparation

MINI CASE – BAKERY



A bakery installed a state-of-the-art efficient lighting system that includes both high-efficiency T5 fluorescent lamps and 35W metal halide lamps. The system provides the same lighting levels

as standard lamps, but with 64% less energy consumption. Additionally, the system is split into two circuits, with one being small enough to provide safe access when the bakery is not operational.

MINI CASE – CHEESE FACTORY



The project envisaged replacement of the old filtering system for cheese production. The old system was producing cheese by means of evaporation of the liquid semi-product, consuming large amounts of gas to heat up the liquid and evaporate it. The new nano-filtration system has a conceptually different approach based on mechanic separation of solid and liquid particles, eliminating heat and gas consumption in principle and, hence, being energy efficient. With the USD 1 million investment the company reduced its natural gas consumption by 7.6 million m³ per year and additionally saves over 25% of electricity (290 MWh per year). The project had a payback of less than one year.

MINI CASE – ICE CREAM MANUFACTURER



An Ice-Cream manufacturer undertook a comprehensive multi-measure energy efficiency project including:

- complete re-design and re-build of the ammonia refrigeration plant
- lighting improvements and lighting controls improvements
- installation of a new more efficient HVAC system for the production areas
- improved insulation and staging in the product storage and buffer areas

The project resulted in a 59% reduction in annual electricity consumption while simultaneously improving lighting, comfort, and productivity.

COMPRESSED AIR

Compressed air is used as a power source for many food and drink operations as it is a versatile, safe and flexible way to transmit energy. Compressed air is common in processes requiring conveyors and mixers. Other applications include blow molding plastic bottles in the soft drinks industry and using air knives to lift products off conveyor belts. Exchanging compressors can save up to 50% energy.

HEAT RECOVERY

Up to 90% of heat generated by compressors, production machinery and e.g. canning processes can be used to heat water or air. Consider whether the heat generated can be reused to provide space heating in warehouses or workshops and staffed production lines.

MOTORS AND DRIVES

Electric motors drive the vast majority of processes used in the food and drink industry. However, many sites have relatively inefficient motor operations. Improving the efficiency of a plant's motors can deliver significant energy and cost savings.

Example: A fully loaded motor consumes its own purchasing cost in electricity in 30 to 40 days of continuous running. Installing a variable speed drive can save up to 30% of running costs.

BOILERS AND HEAT DISTRIBUTION

By ensuring efficient steam generation and distribution, energy costs can be reduced by 30%. Almost all of the sub-sectors in the food and drink processing industry need some form of process heating. This is often supplied by on-site boilers. The boilers may be installed to supply hot water or steam (at various temperatures and pressures) depending on the process requirements.

COMBINED HEAT AND POWER

CHPs are a good alternative in cases where boilers need to be replaced, as they produce both, heat and steam. Steam is used in a variety of cooking applications and in the food canning process.

REFRIGERATION - CHECK YOUR PIPING

A refrigeration system for cold storage in food and beverage production consists of many components that act together as one system. Walk-in cold storage rooms and freezers for raw materials and finished goods, compressor racks, condensers, are the major energy consuming components. Walk-in cold storage chambers, freezers and compressors are typically located at the beginning (raw materials) and the end (finished goods) of the process whereas condensers are typically on the roof. In this conventional "remote condensing" refrigeration system configuration, an extensive network of piping delivers refrigerant gas from the compressor to the condenser to various cold and freezing chambers and back to the compressor, posing substantial opportunities for refrigerant leaks along the way. While the cold storage cases and compressors together account for about 85% of the system's energy consumption, engineering studies have identified "win-win" opportunities within extensive piping system to improve energy efficiency and net cost savings.



WHAT IS LEEREFF?

LEEREFF stands for 'Lebanon Energy Efficiency & Renewable Energy Finance Facility'. LEEREFF is a dedicated credit line for companies who wish to invest in sustainable energy including:

- Renewable energy
- Energy Efficiency in industry and commerce
- Green Buildings (Commercial)

LEEREFF offers investment support through loans from The European Investment Bank (EIB) and Agence Française de Développement (AFD), with interest rate subsidies provided by the Banque du Liban (BDL), and free technical assistance provided by an international team of engineers, financed by the EU.

Please visit our website to find out how you can benefit from and apply for a LEEREFF loan: www.leereff.com



3rd Floor Nassif Karam Building, 240 Badaro Street, Beirut | +961 1 389 588 | info@leereff.com | www.leereff.com

