

Interest-free loan helps food group upgrade its refrigeration and see cold hard savings

£ Loans

£26,400

annual cost savings

121 tonnes

annual CO₂ savings

Business focus

Established in 1991, Euro Foods Group processes, imports, exports and distributes frozen seafood, meat, poultry, vegetables and herbs supplying an extensive range of top quality Asian foods to caterers, wholesalers and supermarkets. It has several factories in Bangladesh and distributes products from its depots in Sunderland and Barking and head office in Newport, South Wales.

The Newport site has a large cold store and processing facility, including two refrigeration packs which are responsible for a large proportion of the site's energy consumption, and a blast chiller. Keen to reduce the energy bills, and the site's environmental impact, Euro Foods reviewed where it could make efficiencies.

"Although it's important for us to be environmentally conscientious," says General Manager Andrew Miller, "we needed to make sure that any changes made would not have any detrimental effect on our processes."

Andrew invited a specialist refrigeration consultancy on site to help identify the most promising energy saving measures, and the installation of liquid pressure amplification (LPA) was recommended as a result.

Calculations showed this would save £26,400 per year and cut the site's carbon emissions by 121 tonnes per year.

Based on these figures, Euro Foods successfully applied for a Carbon Trust interest-free business loan of £72,000 to finance the installation.

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The loan has effectively allowed us to install a tried and tested technology and cut our energy bills. This has meant that we not only protect the bottom line, but also continue to deliver the level of customer care our customers expect and invest in our growth plans for new product lines. ”

Andrew Miller
Euro Foods Group

The technology

Considerable energy savings can often be made in refrigeration systems by reducing the 'lift'; the difference between the evaporating and condensing temperature. In simple terms, for every 1°C reduction in lift, you get a 2-4% cut in energy consumption, and increased cooling capacity.

For Euro Foods this was achieved by installing the LPA pump in the liquid line between the condenser and evaporators. The pump increases the pressure in the liquid line to overcome losses in the pipe work and allows the compressor discharge pressure, and in effect temperature, to be reduced.

LPA also overcomes the issue of 'flash gas' which reduces the system capacity and thereby efficiency. Flash gas is the partial re-evaporation of condensed liquid refrigerant in the liquid line, which can occur when compressor discharge pressure is decreased.

The existing design of the refrigeration system positions the evaporators 14.5 meters above the receiver. This required relatively high head pressures to be maintained which was achieved through the use of a number of air-cooled condenser fans.

Following the modifications funded by the loan, the system now operates at a low head pressure. As condenser control is far more critical when operating at low head pressure, an inverter was installed on each condenser to control the fans. These are now operated simultaneously and their speed is modulated to provide accurate pressure control. The optimum pressure is calculated and adjusted dependant on compressor loading and ambient temperature.

Installation

Before installation, all three refrigeration systems were monitored to establish their condition and efficiency before any work commenced, to ensure that the system change did not have any detrimental effect on the company's processes. The work was carefully planned and shutdown periods were kept to a minimum.

The system has been designed to fail to a safe operating condition should any single component fail. In the event of an LPA pump lockout (generally as a result of low refrigerant levels), the inverter will raise the discharge pressure to avoid starving the expansion valve of liquid refrigerant. Should the inverter go to a fault condition a bypass contactor is energised and fan control reverts to the pre-existing system.

Making the most of low ambient temperatures

The UK has ambient temperatures of 10°C or lower, for two-thirds of the year but most conventional refrigeration system operate at a fixed condensing temperature regardless of the ambient temperature.

With LPA, for much of the year condensing temperature can be floated to 5-15°C above ambient temperatures. This ability to control head pressure is probably the most significant area of cost savings.

[Download How to apply liquid pressure \(CTL055\)](#) for more on LPA.



Figure 1 Refrigeration system with liquid pressure amplification

