

# Electricity consumption matches actual demand at Danish Malting Group A/S

Energy accounts for a substantial share of production costs in malt production. The incentive to save energy is therefore high. Danish Malting Group A/S (DMG) acted on this incentive. Efficient energy management has cut 40% electricity costs and 25% heat costs from the company's bottom line.

## Systematic demand management turned DMG into one of the world's most energy-efficient malthouses

The biggest cost of malt production is the cost of the raw material, barley. Energy, however, accounts for by far the majority of the remaining costs, namely 43%, and this provides incentive to save energy. DMG acted on this incentive and initiated comprehensive process-optimisation efforts, as a part of the Danish energy management standard DS 2403. The out-come was a 40% reduction in electricity consumption and a 25% reduction in heat consumption in the period 1997-2007 which places DMG as one of the world's most efficient malt producers in terms of energy per tonne of malt produced.

## One of the largest malthouses in Europe

DMG has one of the largest and most modern malthouses in Europe. The malthouse produces 115,000-120,000 tonnes of pilsner malt each year. It was built in 1996 and employs 24 staff. The malthouse is owned by Carlsberg Breweries A/S.

DMG has had an agreement with the Danish Energy Agency on energy efficiency since 1996. Under this agreement, DMG has committed itself to e.g. introducing energy management and to carrying out all energy-saving measures with a payback period of less than four years. DMG is certified under the Danish Energy Management Standard DS 2403.

## Energy management puts the spotlight on process optimisation

So, via its energy management, DMG has been concentrating on energy savings since the late 1990s. This has brought attention to energy consumption in the production process, and encouraged process control and optimisation. Although some of the energy-saving

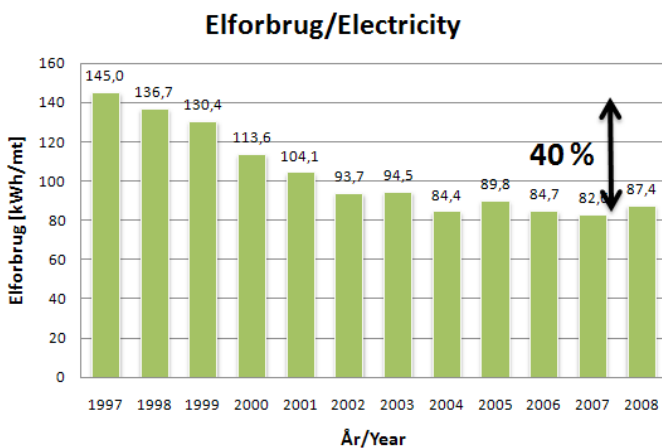


Figure 1: trend in electricity consumption per tonne of malt

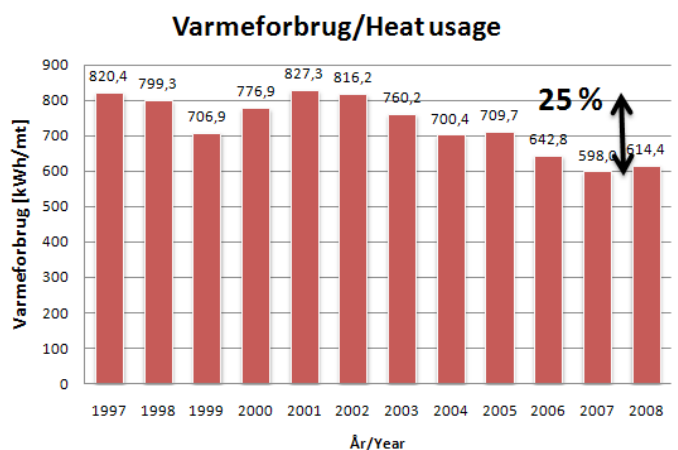


Figure Y - trend in heat consumption per tonne of malt



measures would probably have been implemented even without an energy management system, the system has been instrumental in launching energy optimisation and improving results.

### Drying malt requires large amounts of energy

The 'kiln' stage is the most energy-intensive part of the malt production process. This is when the barley grains are dried and the important aroma characteristics develop, which add to the taste of the beer eventually produced from the malt. The drying process requires large amounts of energy.

### Reducing electricity consumption

by optimising the drying period and airflow

Large amounts of electricity were used by the fans that blow hot air through the barley grain to dry it. At DMG, however, they have found out that the fans use only one-eighth of the electricity consumption, if the speed of the airflow is halved. Halving the speed of the fans is not always possible, but even smaller adjustments save electricity as well.

	DMG	DMG PL	Russia	China
Electricity (kWh/tonne)	87,4	77,4	130	124
Heat (kWh/tonne)	614,4	665	670	1066
Water (m <sup>3</sup> /tonne)	2,04	4,4	3,69	6,8

Table X shows consumption figures for DMG's malthouses in Denmark and Poland compared with corresponding malthouses in Russia and China with modern plants with the same construction as DMG's.

At some stages of the malting process, cooling is required which also adds substantially to the electricity bill. During the winter DMG exploits the cold outdoor air for cooling, as is also common practice at many other malthouses. During the summer, when an energy-consuming cooling plant is required, DMG has set up intelligent control of the plant so that it will only use electricity for cooling when there is a real need for it.



### Facts about Danish Malting Group (DMG)

- One of Europe's largest malthouses
- Was built in 1995-1996 and is owned by Carlsberg Breweries A/S
- Produces 115,000-120,000 tonnes of pilsner malt annually
- Employs 24 staff
- Consumes 10,180MWh electricity and 6.517Nm<sup>3</sup> gas annually
- Emits 17,190 tonnes of CO<sub>2</sub> annually.

### Heat consumption reduced through optimisation

Heat usage has been reduced by optimising the installations that produce process heat for the malthouse. The majority of the time, the malthouse is supplied with heat from a gas boiler, the efficiency of which has been increased from 90% to 103% by establishing a flue-gas heat exchanger. The heat exchanger uses the condensation heat in the flue gas, which explains the efficiency of more than 100%.

### Lower consumption figures than more modern malthouses

The results of DMG's efforts are incontestable. Today DMG uses only 87kWh electricity and 614kWh heat per tonne of malt - quite impressive figures compared with similar malthouses. Table X illustrates the notably higher figures of comparable Russian and Chinese malthouses, both of which have newer and more modern plants and therefore should have better opportunities for being even more energy-efficient. DMG owes its leading position solely to the fact that they have been systematic in optimising the malting processes, so that they match the malthouse's actual energy demand.