CONSTANT FOCUS ON FINDING THE FIRST FUEL - ENERGY EFFICIENCY

When producing malt, a large share of the costs is consumed by energy use. The malt houses thus have a great motivation to reduce energy consumption and thereby save costs. At Danish Malting Group (DMG) motivation has been taken into action. Efficient energy management has cut back 43% electricity usage and 30% heat usage of the bottom line.

SYSTEMATIC ENERGY MANAGEMENT HAS MADE DMG ONE OF THE WORLD'S MOST ENERGY EFFICIENT MALT HOUSES

Since 1996 DMG has had an agreement with the Danish Energy Agency to implement energy efficient measures. DMG has among others committed to introduce energy management and implement all energy reducing projects with a simple payback time less than four years.

DMG is certified according to the energy management standard ISO 50001. The major cost in the production of malt is the raw material barley. But if this is subtracted, utility costs, including energy taxes, make up the far largest part of the remaining costs (approximately 57%). The fact that energy makes up such a large part of the cost motivates to make energy savings.

This motivation was taken seriously at DMG and a comprehensive optimization effort for the processes of the malting house was initiated with assistance from the international energy management standard ISO 50001. The result was a 43% reduction in electricity consumption and 30% in heat consumption for the period 1997-2014 – illustrated by figure 1 and figure 2. The energy saving efforts have made DMG one of the malt houses of the world using least energy per ton produced malt.

ENERGY MANAGEMENT PUTS FOCUS ON PROCESS OPTIMIZATION

Through energy management DMG in this way has had a distinct focus on energy savings since the end of the 1990's. This has contributed to a focus on the energy consumption of the production processes and to get the work with process control and optimization started. Energy management has contributed to get the energy optimization started and to improve the results.

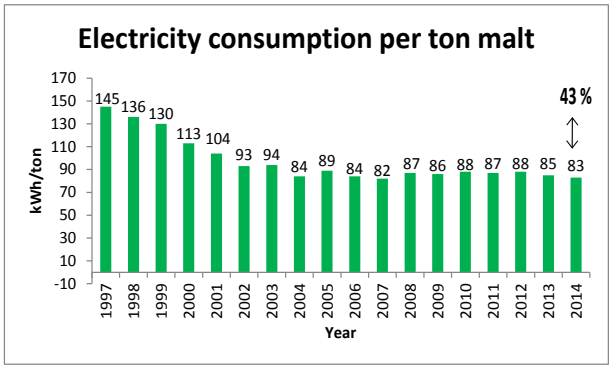

Figure 1 - Development in electricity consumption per ton malt.

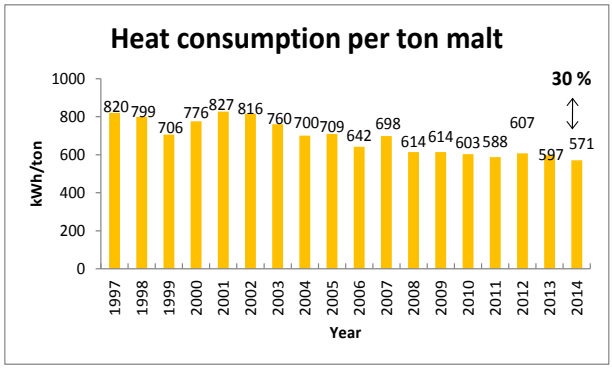

Figure 2 - Development in heat consumption per ton malt.

DANISH MALTING GROUP

DRYING MALT DEMANDS LARGE AMOUNTS OF ENERGY

The most energy-intensive part of the malting process is the malt kilning. Here the grain (green malt) is dried and the most important aromatic components of the malt that contribute to the taste of later brewed beer are developed. The drying process demands large amount of energy. In fact 99,8% of the plant's heat consumption and 58% of its electricity consumption is consumed by the processes of drying.

ELECTRICITY CONSUMPTION CAN BE REDUCED BY OPTIMIZING DRYING TIME AND THE FAN SPEED

The large share of electricity was especially consumed by the fans that blow hot air through the grain to dry it. However, at DMG it has been realised that the fans only use one eighth of power if they are put on half speed. So even a smaller decrease in speed has a big reducing effect on the energy consumption.

In some parts of the malting process cooling is needed and this also weighs heavily in relation to the electricity consumption. At DMG like at other malt house facilities the cold outdoor air is utilised in the winter as free cooling. In the summer period cooling with an energy consuming system is necessary and DMG has moreover established intelligent control of the facility so electricity is only used when demand is actually there.

HEAT CONSUMPTION REDUCED BY OPTIMIZING THE HEAT SUPPLY

Heat consumption has especially been reduced by optimizing the facilities that produce process heat for the malt house. The most of the time a gas boiler is providing heat to the malt house. The gas boiler's efficiency has been increased from 90% to 103% by establishing an exhaust gas heat exchanger. It utilises the condensed heat from the exhaust gas which explains the efficiency over 100%.

	DMG	DMG Poland	Russia	China
Electricity (kWh/tonne)	83	77	130	124
Heat (kWh/tonne)	571	665	670	1066
Water (m3/tonne)	1,6	4.4	3.7	6.8

Chart 1 - Seen in the chart is consumption numbers for DMG's malting houses in Denmark and Poland compared to similar malt houses in Russia and China, which have modern facilities with same construction as DMG.

FACTS ABOUT DANISH MALTING GROUP (DMG)

- One of Europe's largest malt houses
- The plant was completed in 1996 and is owned by Carlsberg Breweries
- Annually produces 115.000-125.000 ton of pilsner malt
- Has 24 employees
- Has an annual electricity consumption of 10.229 MWh (2014) and an annual gas consumption of 6.407 million Nm3 (2014)
- Annually emits 15.522 ton CO_2 (2014)

EVEN LOWER NUMBERS THAN MODERN MALT HOUSES

Today DMG only uses 83 kWh of electricity and 571 kWh of heat per ton malt which is impressive numbers compared with similar malt houses. From chart 1 it is seen that the numbers are significantly higher at similar Russian and Chinese malt houses which in fact have newer and more modern facilities and thus have the opportunity to be even more efficient. The leading position of DMG is alone due to the systematic optimization of the malt house's processes so that they match the actual demand of the malt house.

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