

Energy mapping in the sawmill industry with focus on drying kilns

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Background

The forest industry accounts for approximately 11 % of Sweden's total export. However, the forest industry is energy intensive. In 2008, sawmill industry alone consumed almost 8,7 TWh of energy, corresponding to 5 % of the Swedish industries total energy consumption. Out of their total consumption, 2 200 GWh was electric power, 194 GWh heating oil, 4 229 GWh bio-fuel, 574 GWh district heating, and other fuels such as diesel 1 503 GWh.

Aim

The aim of this project is to demonstrate that it is possible to reduce energy use in the sawmill industry by at least 20 % per m³ sawn dried timber by 2020.

Methods

Energy mapping and monitoring, solutions identification and implementation of full scale demonstrations. Some examples of demonstrations include:

Reduced fan speed or intermittent operation

Increased electrical energy prices have created a demand for optimizing the fan speeds in proportion to the rate of moisture evaporation during kiln drying. The aim of this project is to create more detailed information of the relationship between total energy consumption and quality outcome. Three products of Scotch Pine will be dried using two different regulation methods, reduced or intermittent fan speed. The first kiln drying reference was conducted at the end of April 2013.

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Moisture content measurements in bio-fuel



SP tested two different techniques for moisture content measurement in bio-fuels in cooperation with Norra Timber, and Setra Malå. Pentronic demonstrated a NIR-instrument for measurement of moisture content in the biomass (in this example bark and chips) before it entered the boiler. SP has developed an innovative instrument that measures the moisture content in the flue gas after the boiler. Moisture content measurements were done at the same time with both methods and compared to the traditional oven dry method, giving a good evaluation of both methods.

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43 % Energy savings in lighting demonstration

The voltage over the fluorescent lighting in the planing mill at Bergs Timber in Mörlunda was reduced from 237 V to 193 V which reduced the energy use by 43 % with equipment from Wattguard. The demonstration also measured the illumination level, which fell about 15 % in measured lux. The business model, which is based on a monthly fee, resulted in a net profit from day one of the installation. This technology is mainly suited for large illuminated spaces.

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Accurate moisture content in wood drying



A project for weighing sawn timber packages started in April 2013. The aim of the demonstration is to improve accuracy in hitting the target moisture content in sawn timber by weighing the wood packages before drying. The package weight is used to optimize the drying program based on the ingoing material of each batch.

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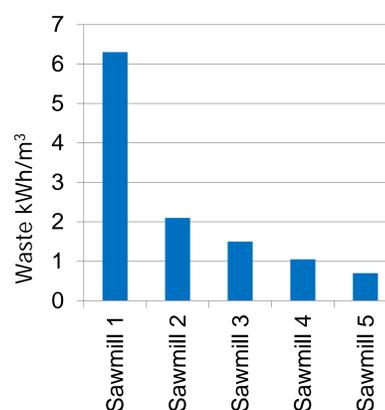
Simplified energy management system adapted to sawmills

A step by step guide to help sawmills with energy management certification has been created by summarizing the international standard ISO 50001. The next step in the demonstration is to interact with the participating sawmills that are interested in a simplified energy management system. The idea is to create a basic version of the energy management system which can be upgraded to the level that optimizes your profitability.

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Night watch – to reduce energy waste during nights and weekends



Night patrols were conducted at six sawmills during the autumn 2012 of which four were follow-ups. The observed waste of electricity varied between 0.7 and 6.5 kWh/m³ sawn product. Lighting is the most common and largest part of the waste during nights and weekends, closely followed by air leakage in pneumatic systems and ventilation fans. The energy savings can be reached with almost no investment, thereby possibility to improve net result is easy.

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Conclusion

- It has been shown that it is possible to reduce the energy consumption at most sawmills with up to 15 % with little or no effort.
- The lowest hanging fruits are related to user awareness and involvement. They often require no or small investments
- By better management of drying kilns, 30-50 % of electric energy can be saved per cubic metre dried timber.
- A systematic work, where the saw mill is divided into zones, and energy consumption is allocated to the zones is a very efficient way to visualize the energy use and to increase the involvement among staff to reduce waste of energy.
- By larger investments in innovative solutions, heat recovery from driers could decrease heat energy by up to 50 %. This however requires some technical innovations.