Energy efficiency in European industry

Pulp & Paper sector

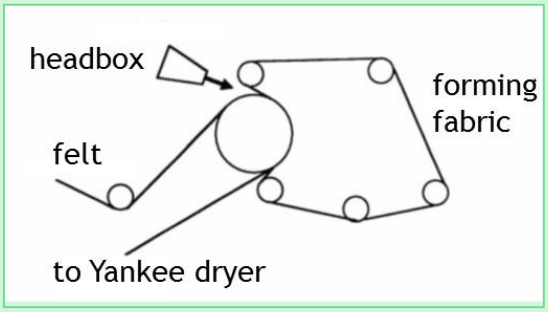
Introduction to the pulp and paper sector

The pulp and paper sector consists of the NACE sector code C17 (*"Manufacture of paper and paper products"*). In many sources, the related printing sector C18 (*"Printing of reproduction of recorded media"*) is included in the same analysis. In the European Union, about 19,400 enterprises are active in the pulp and paper industry. The printing sector consists of many more, but often smaller, businesses: 109,100.

GP Single-header headbox

The headbox is the equipment that carries the pulp into the forming section, and has the function to distribute uniformly and with regular thickness the pulp onto the wire. The proposed intervention involves a modification to the headbox from a dual-header to a single-header one, with also a replacement of the forming fabric, in order to increase the consistency of the pulp and reduce the pulp flowrate, so reducing pressure drops and power consumption. This also allows to remove one of the two fan pump/selector systems, without decreasing paper production.

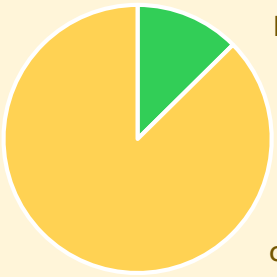
At the production site in Italy where this intervention has been applied, it has led to 54%. energy savings. The payback time of the measure was less than one year. *more info*



GP Mechanical pulping teethed defibration plate

This efficiency improvement is applied to the mechanical pulping process (groundwood grinding). The intervention consists of the realisation of a new grinding plate with teethed surface, with improved cutting qualities, thanks to a new geometry that allows the pulp to be distributed on the sides of the grinder. The reduction of electricity consumption is linked to the reduction of the need for re-grinding. The design of the plate is customized to a specific Italian plant, making it a unique case. However, the benefits of this solution can be replicated in other plants. In the Italian case, the intervention led to direct energy savings of 20%, with implementation costs of €326,000, leading to a payback time of only 6 months. *more info*

Statistics EU pulp & paper sector



Pulp, paper, printing*: **12.6%** of EU industry energy consumption

Statistics for the pulp and paper industry sector (NACE code C17):

- **19,400 enterprises**
- **588,000 people employed**
- **Gross added value € 42 billion**
- **Final energy consumption: 34,265 ktoe per year (12.6% of EU industry energy consumption)***

Europe accounts for about 24% of world pulp production, with more than 60% of Europe's production taking place in Sweden and Finland alone. 26% of the world paper/board production takes place in Europe, led by Germany (25%), Finland, Sweden (11% each) and Italy (10%).

The upstream activities in the sector are the most energy-intensive, with 73% of energy use in subsector C17.1 (*"Manufacture of pulp, paper and paperboard"*) and most of the rest in subsector C17.2 (*"Manufacture of articles of paper and paperboard"*).

* The energy consumption statistics cover both the pulp and paper industry (C17) and the printing sector (C18). However, the pulp and paper industry accounts for over 90% of energy use.

Recommendations: low costs, limited savings

The five Good Practices included on this factsheet are all relatively cheap interventions with low payback times (on average about 6 to 12 months). This shows that in the pulp and paper sector, various 'quick wins' are possible that directly lead to energy savings and financial benefit, especially in the pressing and drying sections of the papermaking process.

These 'quick wins', however, in many cases lead to relatively limited energy savings, of about 10 to 20%. These interventions will therefore need to be complemented by more far-reaching and complex measures in the future, in order to contribute to the European Union's decarbonization targets.

GP **Suction cylinders in drying section**

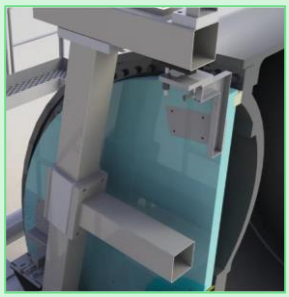
The drying process is the most energy-consuming process of the paper machine, using up to 80% of the thermal demand of the entire process, both in the form of steam and natural gas. Practical examples show that a few relatively cheap interventions, with a short payback time (0.7 years), lead to energy savings of about 15%. These interventions include a revamping of the steam section; replacement of a drying cylinder with a suction cylinder; modification of the geometry of the first drying battery with a slalom configuration; and installation of three neutral rollers in the second and third battery of the drying section, in order to increase the winding angle on the cylinders and increase the drying surface. *more info*

GP **Yankee hood optimisation**

The Yankee Dryer is a specific kind of dryer section used in machines for tissue paper. It uses a very large steam cylinder surrounded by an air cap (hood), under pressure. The hood supplies hot, high velocity air that impinges on the sheet. This way, drying is accomplished by a combination of conduction (the steam drum) and convection (moving air).

A range of interventions can be implemented to revamp the drying section and at the Yankee hood of the continuous machine in order to increase the dryness of the paper. A key intervention is the installation of a thermal insulation on the Yankee hood in order to reduce the thermal dispersion through the walls. Other possibilities include the installation of a new thermos-compressor, installation of stabilization boxes, installation of inverters on the electrical equipment, and installation of a moisture sensor to control the air system.

The energy savings depend on the exact interventions carried out, but have on average been 16%. On average, the costs per energy saved were rather low, and payback time limited. The image shows hood insulation applied. *more info*



GP **Double scraper in press section**

0.8 years payback time

The (tissue) papermaking process involves two key steps of drying: the press section (using a scraper to press the surface of the wet paper) and the drying section (heating by the use of steam). The installation of a second scraper in the continuous paper machine allows to reduce the thermal energy consumption in the drying section. The efficiency is represented by the installation of a second blade in series with the already existing one, which allows to increase the amount of water removed at this stage, thus decreasing the amount of water to be evaporated through the use of thermal energy.

By installing the second scraper in practice, an energy consumption improvement of 18% could be achieved. With a payback time of only 0.8 years, this intervention could be identified as a 'quick win'. *more info*

Recommendations: renewable energy

Apart from interventions for the improvement of energy efficiency of the pulp and paper industry, the sector is also becoming more sustainable by increasing the use and production of renewable energy. Already more than 95% of the electricity used in paper mills is generated using combined heat and power on site, and bioenergy accounts for 56% of the energy used in the sector. Some pulp mills even export electricity to the public grid.

The issue of bioenergy provides the pulp and paper sector with both opportunities and threats. On the one hand, pulp and paper plants can provide additional products to the market, including electricity, district heating, and biofuels. This improves the energy intensity performance of the plants as well as the profitability of the businesses.

However, the growing global demand for bioenergy leads to growing competition for biomass supply, including wood. This may result in rising prices for the key feedstock used in the pulp and paper industry.

Policies

In many EU Member States, the pulp and paper industry is covered by an energy efficiency obligation (EEO) scheme, but also alternative measures have been implemented, including financial schemes and fiscal measures.

In various countries, voluntary agreements have been made between the government and the chemical sector (or all energy-intensive sectors). Such agreements have been made for example in Belgium (both Flanders and Wallonia), Finland, Ireland, the Netherlands, Sweden, and the UK. In voluntary agreements, enterprises often receive tax rebates in return for energy consumption improvements. One of the objectives of such agreements is often also to decrease the energy intensity of the production process, while protecting the market position of domestic industries in the face of international competition.

The EU-MERCI project

EU-MERCI is an EU-funded project aimed at supporting the growth of energy efficiency in industry processes. The project shares good practices of energy efficiency measures, helps industry actors to overcome expected barriers and maximise benefits, and supports policy makers. → eumerci.eu.

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