1 February 2023
12h30 – 16h30 PM CET
Thon Hotel EU, Brussels

Accelerating the industrial decarbonisation with the REPowerEU
Heat pump and paper industries' networking event
A joint effort towards decarbonization of the industry

Thomas Nowak - EHPA
Annita Westenbroek – Cepi
In a fully decarbonised Europe, heat-pump technologies are the number one heating and cooling solution, being a core enabler for a renewable, sustainable and smart energy system.
European pulp and paper industries

500 pulp, paper and board producing companies
Keeping >72% of the fibres in the loop
60% of the energy consumption is biomass-based

32 Mt CO2 eq. annual carbon emissions
70% of which is related to paper drying
The urgency

• **We need to make our sector even less energy intensive**
  • the availability of sufficient renewable energy that is competitively priced and commonly considered irrefutable, is and will stay limited
  • doubling energy savings with available technologies might prove to be difficult

• **We need technological innovations… and a favourable environment…**
Useful energy demand in 2015 (EJ)

Industry sectors

- Chemicals
- Primary Steel
- Paper
- Food
- Ceramic & Glass
- Machinery
- Cement
- Transport Equipment
- Secondary Steel
- Non-Ferrous Metals
- Wood
- Textiles

Source: Madeddu et al (2020)
# Electricity powered technologies for industry electrification

<table>
<thead>
<tr>
<th>Temperature Range</th>
<th>Technology</th>
<th>Technological Maturity</th>
<th>Applications</th>
<th>Efficiency (COP)</th>
<th>Electrification Stages</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;100°C</td>
<td>Compression heat pumps and chillers</td>
<td>Established in industry (only &lt;100 °C)</td>
<td>Space heating, Hot water, Low pressure steam, Drying, Cooling and refrigeration</td>
<td>COP 2 – 5</td>
<td>1</td>
<td>28-30</td>
</tr>
<tr>
<td>100 – 400°C</td>
<td>Mechanical vapour recompression (MVR)</td>
<td>Established in industry</td>
<td>Energy recovery (e.g. in distillation, evaporation) to provide steam and process heat</td>
<td>COP 3 – 10</td>
<td>1</td>
<td>19,21, 31-34</td>
</tr>
<tr>
<td>400 – 1000°C</td>
<td>Electric boilers</td>
<td>Established in industry</td>
<td>Space heating, Hot water, Thermal oil Steam</td>
<td>0.95 – 0.99</td>
<td>1</td>
<td>18,19,21, 35,36</td>
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<tr>
<td>&gt;1000°C</td>
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How to accelerate the implementation of High Temperature Heat Pump technologies in the paper industry?
Main challenges

- High capex
- Complex integration
- Lack of knowledge (on both sides)
Amplification by cooperation

High ambition for energy savings, but...
- What is available?
- How to integrate?
- How to decrease costs?

Development of high temperature heat pumps, but...
- What is really needed?
- What size, source / sink temperatures?
- Where and how to apply?
Joint action

Policy & regulatory asks
- Industry’s access to abundant affordable clean electricity
- CCfDs for the opex
- Financial and R&D support for integration and exploitation
- De-risking process integration
- Accelerated certification

Technological efforts
- Redesign paper drying processes to allow integration
- Develop standardised heat pumps (compressors)

Training and awareness raising programmes
- Integration and exploitation
Virtual average paper mill

Ideal process design for integration of heat pumps

Insight in (variations in) steam needs in P&P industry

Working group agrees on potential standard elements

Discussion continues on process control and refrigerants
THROUGH PUMPS TO PULP: GREENING THE PAPER INDUSTRY’S HEAT

A joint paper by the European Heat Pump Association (EHPA) and the Confederation of the European Paper Industries (CEPI)

Already today, heat pumps are enabling energy savings for many industries. They provide about 30% of the total energy demand in the EU, saving €27 billion in energy costs and reducing CO₂ emissions by 121 million tonnes annually. In the paper industry, where heat is used for a wide range of processes, heat pump technology can play an even more significant role, especially when it comes to energy efficiency.

01 How paper-making works and why it ideally positioned to use heat pumps

In a paper mill, a wood-based natural product is converted into a marketable end product. A significant portion of the thermal energy used is generated by the paper mill’s own power plant. The thermal energy is then used on-site to process and produce paper. This energy can be recovered and reused by using heat pumps. The use of heat pumps in the paper industry can reduce emissions and energy costs. When heat pumps are used in conjunction with renewable energy sources, the carbon footprint of the paper industry can be significantly reduced.

02 How a heat pump works

Heat pumps are energy-efficient devices that transfer heat from a low-temperature source to a high-temperature sink. They use a small amount of electricity to transfer heat from one place to another, making them highly efficient. The heat pumps are designed to maximize the transfer of heat and minimize the electrical energy required. This makes them an ideal solution for the paper industry, where heat is used in various processes.

03 Why heat pumps are energy efficient

The efficiency of a heat pump is expressed as the coefficient of performance (COP). The COP is a measure of the ratio of the amount of heat delivered to the heat source. For absorption heat pumps, the COP is typically between 1.5 and 2.5. For vapor compression heat pumps, the COP can be as high as 5 or more. This makes heat pumps an attractive option for the paper industry, where energy efficiency is a top priority.

04 Heat pumps can be integrated into the paper manufacturing process

Heat pumps can be integrated into the paper manufacturing process in various ways, such as:

- Drying: Heat pumps can be used to reduce the moisture content of the paper, improving its quality and reducing energy consumption.
- Pre-heating: Heat pumps can be used to pre-heat the incoming water, reducing the energy required for the main heating process.
- Cooling: Heat pumps can be used to cool the paper, improving its properties and reducing the need for additional cooling systems.

Contact:

EHHP Secretary General
Renate Mauderer
EHPA
Rue de la Loi 220
1040 Brussels
Belgium

E-mail: secretariat@cepi.org
Website: www.ehpa.org