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**Research area: General aims**

Energy // Energy use

**Key words:**

Paper for recycling, pulping, high temperature, heat pump, energy concepts, waste heat

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**TITLE:****Upgrading of waste heat to process heat for different industries (From Waste Heat to Process Heat) (W2PHeat)****Background/Problem area**

Often a lot of industrial waste heat is dissipated completely or partially into the environment while there is still need for process heat in the form of warm or hot water, low-pressure steam or warm air. By using heat pumps, waste heat can be upgraded to a higher temperature level. Even though heat pumps are long known, they can be rarely found in industrial environment. The maximum output temperature of approximately 80 to 90°C and the unfavourable electricity/fuel price ration are predominant reasons for the lack of heat pump applications in industry.

**Objectives/Research results**

The overall goal of the project is to show the economical use of heat pumps in industrial environment. A new technology (high temperature heat pump – HT HP) is to be developed, aiming at upgrading process heat by the use of unavoidable waste heat. Making this available, it could be a key-technology to decrease the excess of waste heat into the environment and to reduce the energy demand for energy-intensive industries like pulp and paper, food, brick, chemical and textile.

For the development of the heat pump and suitable processes following steps will be performed: literature research, on-site investigations, simulation works, laboratory tests, and demonstration with the help of test facilities. The project will provide information about the feasibility to reverse the ORC process, achievable output temperatures of high temperature heat pump, economic and environmental aspects of industrial heat pump applications.

Upgrading waste heat to process heat gives industry the opportunity to achieve higher process temperatures at constant or lower production costs. Processes will be developed to create a suitable process environment for integrating the heat pump technology in the paper industry. The aim of that process development is to investigate the influence of higher process temperatures on process optimisation, product quality, and production costs.

In the first year of the project the literature research the on-site investigations in different paper mills and in a brewery, the first simulation works and laboratory test with a heat pump and the first investigations about pulping recycled paper with higher temperatures were done and presented in different workshops and symposia.

**Application/Economic benefits**

Integrating waste heat into the process by using high temperature heat pump can reduce energy costs and make an important contribution to reduce greenhouse gases. Suppliers of heat pumps, heat exchanger, compressor and driving machines, like gas motors or gas turbines, plant engineers and designers can use the project results to cover new markets if the implementing of heat pumps will increase. Results will be transferred to SMEs from two different European countries/regions in regional SME User Committees, by directly involving industrial partners from targeted sectors, by performing case studies, by website, organizing workshops and seminars.

**Period of time: 01.01.2012 – 31.12.2013**

**Remarks**

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