# Coping Strategies for reducing the vulnerability to energy market disturbances – the case of the Austrian paper and pulp industry.

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## Aims and Objectives

The paper and pulp industry is characterized by highly energy-intense production processes and simultaneously by large amounts of energy outputs as side-product. Thus, it is not surprising that the paper and pulp industry has been highly motivated to deploy a sophisticated energy management in order to optimize the energy supply of a mill, to improve energy efficiency, or to find solutions for cascading energy within the production processes. Here, the main focus usually lies on the economic idea of saving energy costs through reduced energy consumption, since energy prices have increased constantly in recent years. However, the objective to reduce energy costs by optimizing the corporate energy system is a two-sided coin. On the one side it is a rather static concept that calls for minimizing energy costs, for example by selecting a cost minimal energy mix based on current or expected market prices. On the other side, energy intense enterprises need to assess and find ways to reduce their vulnerability against sudden and high volatilities on the energy market. In other words, they need to increase their resilience. Thus, the objective of this paper is to identify the most important internal and external factors that determine the strategic planning options for an energy intense industry like the paper and pulp industry, with regards to its vulnerability against energy market disturbances.

## Methods

We applied a two-step approach: First, we conduct an explorative case study analysis in order to gain better understanding on the SWOT-factors that are relevant for companies in the paper and pulp industry with regards to their vulnerability against energy market disturbances. Second, we conduct an expert survey asking decision makers in the paper and pulp industry for their judgement on the relative importance of these factors. The results of this survey are then analysed using an AHP (Analytical Hierarchical Processing) approach.

## Preliminary Results

In a first step, SWOT factors have been identified. Strengths for example include the high energy efficiency rates in most mills, and flexibility in using different energy carriers. A certain dependency on the gas market and prices, and a lack of possibilities to produce as

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much renewable energy as needed on-site can be seen as potential weaknesses. Additionally, more heat than needed is produced on-site, but way too less electricity. Identified opportunities comprise the usage of higher amounts of natural gas, and the potential delivery of electricity and heat to the public grid in cooperation with energy companies. Potential threats include rising energy costs (in particular gas) due to the implementation of the EU Emission Trading Scheme, and the expected shrink of markets for pulp and paper products.

## References


Abdelaziz, E. A., Saidur, R., Mekhilef, S. (2011) A review on energy saving strategies in industrial sector. Renewable and Sustainable Energy Reviews 15, 150-168.

Kong, L., Price, L., Hasanbeigi, A., Liu, H., Li, J. (2013) Potential for reducing paper mill energy use and carbon dioxide emissions through plant-wide energy audits: A case study in China. Applied Energy 102, 1334-1342.

Laurijssen, J., Faabij, A., Worrell, E. (2012) Energy conversion strategies in the European paper industry - A case study in three countries. Applied Energy 98, 102-113.

Marshman, D. J., Chmelyk, T., Sidhu, M. S., Copaluni, R. B., Dumont, G. A. (2010) Energy optimization in a pulp and paper mill cogeneration facility. Applied Energy 87, 3514-3525.