

## **Organic residues for cofiring in a coal fired CHP-Plant - a case study on markets, prices and potentials in Baden-Württemberg, Germany**

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### **Abstract**

**Background and purpose.** The Heat and Power Plant Pforzheim (Heizkraftwerk Pforzheim GmbH) followed the goal of co firing biomass residues in a fluidised bed hard coal CHP plant. Thus, a study was carried out in collaboration with IER, focussed on the search for suitable biomass fuels. The frame assumptions were:

- Substitution of 20.000 t/a (25 %) of hard coal should be achievable
- Fuel costs should be comparable to hard coal
- The biomass fuels should be available in the region of Baden-Württemberg
- Used wood, sewage sludge and meat and bone meal were excluded for co firing

**Assessment approach.** A literature overview turned out, that particularly industrial biomass residues had not been studied in detail before under energy use aspects for Baden-Württemberg. Thus, the literature review and available study results were used as starting point for own investigations by questionnaire and personal contacts with industry. A special focus was set on residues from food processing industries like malt houses, breweries, fruit and vegetable juice industries or oil mills. Besides the evaluation of the availability also fuel properties like water content, nitrogen, sulphur and chlorine content, available quantities, current market prices and details of process chains/by product disposal were studied. To get an idea of expectable prices for those residues, their potential energy content was taken for reference. By this way the existing market prices for the raw materials were recalculated as approximate costs for one MWh of energy (as lower heating value at direct combustion or as lower heating value of the attainable biogas output).

**Results and innovation.** The study provides a comprehensive overview on selected biomass residues from several industries in Baden-Württemberg. The processes were analysed for emerging biomass residues, their properties with respect to application as fuel or raw material in biogas production, structure and geographical distribution of production as well as available quantities.

For all investigated residues it was stated, that they would not be applicable for co firing in the CHP-plant under the restrictions set above. As reasons occurred:

- the market price actually achievable by existing ways of use was too high
- the moisture content of the raw materials was too high for co-combustion
- the available quantities were too small or accumulated seasonally
- the optional residue was excluded from application by definitions set above

**Conclusions.** The application of some of the available residues in biogas plants occurred as one possible option for energy production instead of direct combustion. By this way proven theoretical potentials of energy supply from selected organic residues for Baden-Württemberg were calculated as 10.430 GWh lhv/a. They build a share from the overall available biomass energy potential of Baden-Württemberg.