

Dissertation release

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## Progress in process industry residue utilisation - what are the possibilities and barriers?

**Title of the dissertation** Opportunities and Barriers in the Beneficial Utilisation of Process Industry Residues

**Contents of the dissertation** The great challenge today is to determine whether integration in the paths of environmental sustainability and economic growth can be achieved, and if so, how. Simply doing more with less would help balance the environmental impacts of growth with the carrying capacity of our environment. *Ecological thinking* can be useful here, where saving raw-materials via maximising the utilisation of residues and reducing the environmental impacts of resource extraction and waste, might be the *win-win-win* situation for our industry, us as stakeholders and our environment. The utilisation of forest and steel industry process industry residues needs to be encouraged via support for innovative beneficial utilisations and symbiosis opportunities. Researching the material characteristics of residues and identifying material utilisation possibilities needs to be supported by new thinking on industrial cooperation and the policies and legislation needed to enable progress and overcome barriers. It is this multi-faceted approach and the notion that ecological thinking can help that is the subject of this research.

A multi-disciplinary approach describes some novel material efficiency possibilities, residue characteristics, as well as novel inter-industry symbiosis product ideas and their environmental performance. The important issue of how to encourage such thinking is also explored and timely yet practical recommendations made include requiring new approaches based on the waste hierarchy and life-cycle thinking, as well as further clarification of the implications of *End-of-Waste* legislation and criteria for product systems with multiple residue streams. Other recommendations cover the application of best available techniques approaches to material efficiency and waste recovery in environmental regulation and guidance, as well as addressing the implications of the chemical safety of residue-based products. An overarching theoretical effort in this dissertation also asks whether efficiency seeking is capable of delivering sustainable systems under our current '*business as usual*' approach or whether there is a need for systemic change.

**Field of the dissertation** Environmental Technology within Process Industry

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