Environmental sustainability assessment of bio-products based on agricultural crop and crop residue feedstock

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Background & objectives
The PhD project will focus on the environmental sustainability assessment of biorefinery products applying LCA methodology. A lot of work has been done for biofuels, but little research has focused on biobased non-fuel products. The largest challenges in the assessment of biobased products are:
• the large number of feedstock available and different conversion and separation process that can deliver different products
• Critical aspect regarding LCA methodology applied on biobased products. Such as: carbon storage, land use changes, water use

Research questions:
• How do bio-based products perform relative the conventional products, in terms of environmental sustainability?
• Is it possible to create a harmonised sustainability assessment framework, taking into account also the critical aspects highlighted above, for such wide range of products?
• Applying quantitative sustainability assessment methodologies is it then possible to propose further environmental performance optimization options for the value chain of bio-based products?

Methods
The PhD project will seek to assess and optimize biorefinery pathways in terms of environmental sustainability. The main focus will be on the value chain of the developed biobased products, from the regional feedstock storage to the disposal of the biobased products. Initially hypothetical systems, will be assessed and prioritized in terms of environmental performance. Eventually the shortlisted, optimized and tested processes are reassessed based on actual industrial scale inventories yielding reliable process specific environmental performance profiles for each feedstock/conversion process combination covering >15 environmental indicators.

Expected outcome
The work is expected to lead to a harmonized framework for environmental assessment of the biobased product. This framework will be used for the assessment of the product/value chain selected within the BioValue project.

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Funded by:
The Danish Council for Strategic Research and The Danish Council for Technology and Innovation SPIR

Start and completion date:
1 September 2014 to 31 August 2017