The IsoButanol Rotterdam Platform Project

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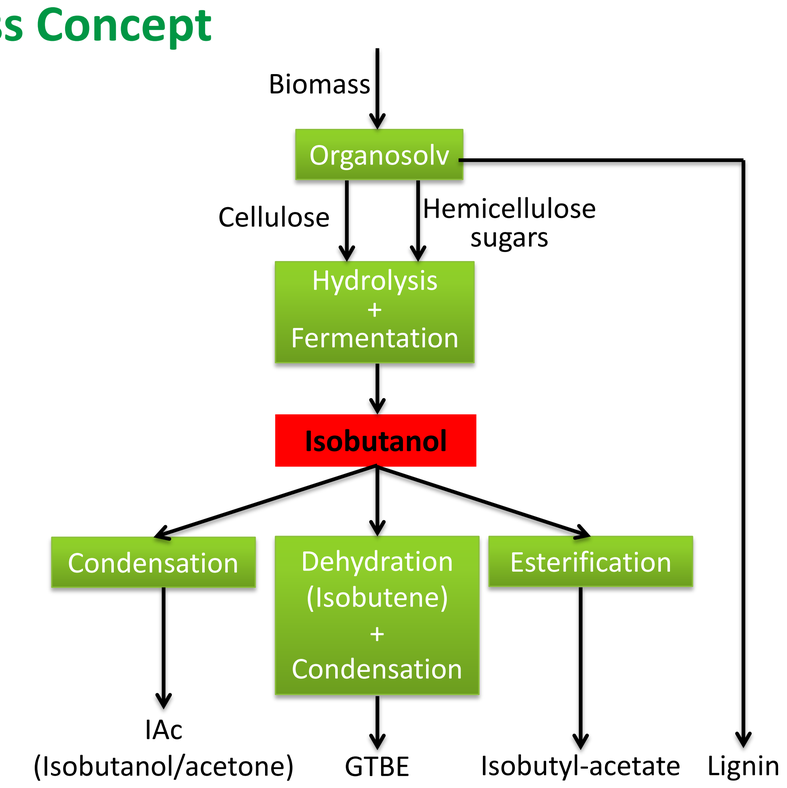
Objective and Consortium

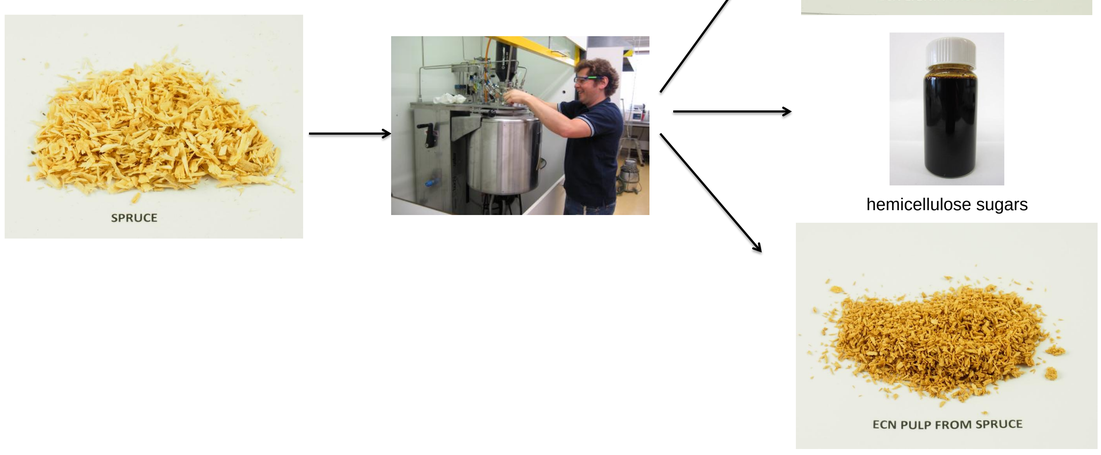
The IsoButanol Platform Rotterdam (IBPR) consortium aims to develop an environmentally benign, economically viable process to produce high-value chemicals and fuel (additives) from sustainable lignocellulosic biomass sources via the platform molecule isobutanol.

Process Concept



Organosolv Fractionation

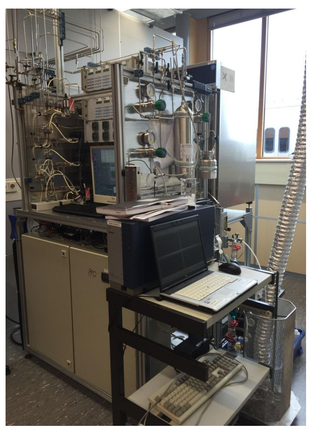
Successful fractionation of spruce and poplar biomass using ECN organosolv technology producing multi-kg scale batches of cellulose, hemicellulose sugars and high-purity lignin.



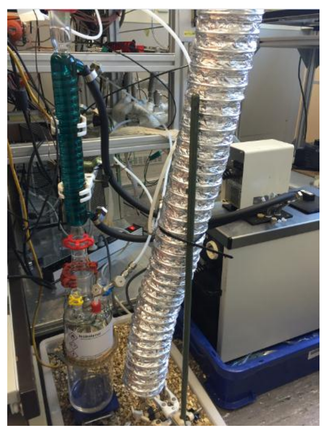
Final Products

- Successful experimental proof-of-principle and catalyst testing

Isobutanol ➔ Isobutene ➔ GTBE



Multi-reactor test rig



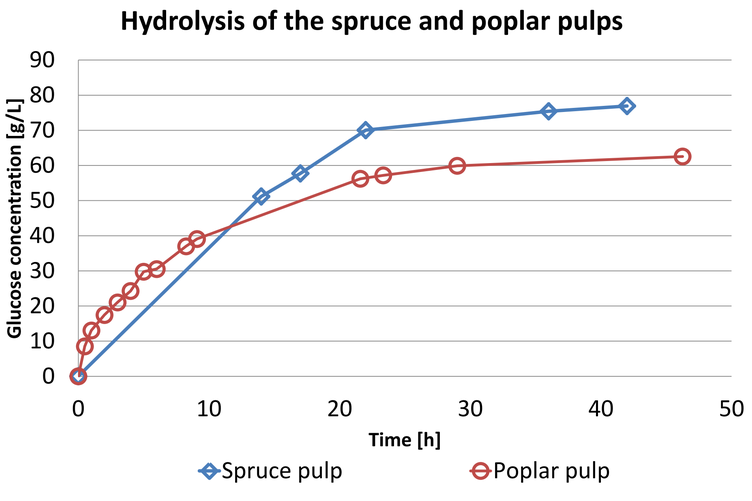
Isobutene condenser

- Successful conversion of isobutanol to IAc
- Successful esterification of isobutanol to isobutylacetate

➔Complete process concept from biomass to products demonstrated

Hydrolysis and Fermentation

Organosolv pulp hydrolysed at lab-scale using a commercial cellulase cocktail, yielding up to 90 g/L glucose for spruce and 60 g/L glucose for poplar wood.



Isobutanol from wood

Hydrolysates from organosolv-pretreated spruce and poplar wood fermentable to isobutanol at almost similar performances as control fermentations. (acknowledgement: GEVO)

Techno-Economic Evaluation and Life Cycle Analysis

TEE: A full process design with a techno-economic evaluation of the chain from biomass to all three targeted products. The preferred process produces lignin, isobutanol acetone condensate and GTBE. The latter was shown to be a more attractive product than isobutyl acetate. Best case pay-out time is 6 year.

LCA: The systems shows significant impacts on agricultural land occupation. In return, the isobutanol concept shows advantages in comparison to the petrochemical platform for the impact categories:

- non-renewable energy use (NREU): 33-35% advantage
- climate change (GHG): 8% advantage
- fresh water depletion: 34-44% advantage

Acknowledgements

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