LCA for Biomass-to-Liquid fuels.
An environmental in-depth assessment

(Ökobilanzen zu BTL: Eine ökologische Gesamteinschätzung)

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Summary

At present, BTL (Biomass-to-Liquid) fuels are the subject of various R&D projects on 2nd generation biofuels. However, the state of knowledge concerning the environmental impacts of BTL fuels is very limited. This gap has been filled by the IFEU Institute Heidelberg providing the first comprehensive study on the ecological assessment of BTL fuels. Applying life cycle assessment methods, BTL fuels have been compared to fossil fuels and other biofuels. Furthermore, the study evaluates the most promising BTL raw materials and production techniques and points out the most decisive life cycle steps.

Due to the complexity of the BTL systems and the various possibilities of bioenergy provision and use, a multitude of questions has been analysed. The most important results are:

- BTL fuels show significant environmental advantages regarding energy and greenhouse gas savings, but are rather disadvantageous regarding other environmental categories.
- Comparing BTL fuels to other biofuels leads to ambiguous results: BTL fuels are superior to a number of biofuels, but there are also biofuels that are performing better than BTL fuels.
- The evaluation of various BTL raw materials points out that from an efficiency point of view BTL fuels produced from residues such as waste wood and residual straw are more environmentally beneficial than BTL fuels produced from crops (triticale, short rotation coppice). Waste wood and residual straw perform almost equally, whereas short rotation coppice shows considerably better results than triticale.
- The analysed biomass conversion techniques differ slightly in their environmental impacts, but none of them outclasses the other ones from an ecological point of view.
- The answer whether biomass should be used for BTL production or rather for different purposes depends on specific conditions: there are some biomasses and utilisation paths that show a better environmental performance than BTL paths but others show a worse performance.
- By means of sensitivity analyses the influence of various parameters has been investigated showing that type of biomass, engine technology and the way of hydrogen provision offer the greatest ecological optimisation potential.

The results derived from this study show that BTL have a considerable ecological potential and that there are a number of possibilities for ecological optimisation. Beside this, BTL fuels compete with other ecologically attractive alternatives for bioenergy production and use. Therefore, a future implementation of BTL paths has to be considered and optimised in the context of the whole regional or national energy provision system including all renewable energies available.