

Hard to Decarbonise Technologies Special Interest Group

**Biomass
Conversion: Challenges and Opportunities**
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Panel

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Challenges

- Biggest challenge: Understand how to assess and measure biofuel sustainability
- Understanding the environmental impact of biofuel feedstocks. Beside land use, water use is an important challenge for the production of biomass that is converted to biofuel.
- Scalability of biofuel plants
- Clean combustion of biofuel and curbing or capturing emissions.
- Accelerating technologies that convert waste to biofuel.

Discussion Points

- The discussion focused on the production and availability of biofuels, feedstock sources and their sustainability, and the best biofuel applications. In order for biofuels to achieve net-zero by 2050, expanding advanced biofuels is important.
- Biofuel sustainability: the EU renewable energy directive has set out sustainability criteria. Debate remains around sustainable feedstocks options, but those related to food are being phased out. By 2050, 60% of bioenergy supply is anticipated to be based on waste and residues.
- Prioritising limited biofuel supply: in principle, shipping and aviation are good candidates for biofuel use, but we need to better understand what technologies are available and their feedstock sustainability. Biofuels are already being used by heavy vehicles and ships. Shipping will initially have larger potential for biofuel consumption as it is more flexible in how it uses the fuel and it has fewer restrictions than aviation on fuel quality.
- The market will eventually decide how biofuel use will split by sector, but that might not coincide with what is optimum from a system perspective. Ultimately, what matters is energy density and energy released per volume – it is ideal if you can carry the energy with you.
- An alternative way of looking at division of fuels by sector is based on the fuel's carbon content. For example, from a systems perspective, ammonia is interesting for marine transport because it provides fuel with the carbon used for aviation. The caveat is that it also produces tonnes of NO_x which need to be cleaned up, however, we have some understanding of how to manage NO_x and particulate emission from biofuels such as diesel.
- Government intervention could help, as the first commercial plant will be the key to going forward. Global efforts to commercialise synthetic biofuels have resulted in a few demonstration plants. However, blue prints for commercial plants have received little investment, as there are other cheaper options.

Opportunities

- UoC research on novel catalytic systems to produce better biofuels in terms of usefulness, efficiency and CO₂ intensity
- UoC collaboration with industry to calculate pathways and CO₂ impacts of various biofuel pathways.
- Study to determine the best uses of biofuels in different sectors if CO₂-free biofuels are likely to be limited in production.
- Combustion and abatement research on ammonia systems with focus on NO_x reduction.

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