Overview of advanced biofuels and potential cost reductions

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Role of advanced biofuels

- “Advanced biofuels” play an important role in future biofuels scenarios because they are needed:
  - To improve GHG balances
  - Use residues effectively and avoid ILUC
  - Provide “drop in fuels” for new applications including aviation

- Definitions of what is an advanced biofuel differ!

- They involve a heterogeneous set of technologies products at different stages of maturity and with different barriers to wide deployment.
Project Aim and Methodology

- Project under Task 41 of IEA Bioenergy, funded by EC with in-kind contributions from Sweden, Netherlands and Germany
- Update and extend the SGAB Cost study to provide estimates of the current costs of producing a selection of relevant novel advanced biofuels.
- Collect/update information from industry and other sources on current costs, and scope for cost reduction (89 companies contacted)
- Normalise and rationalise the data on current costs (capital/operation/feedstock) in final product cost
- Evaluate potential for cost reduction
  - For next x plants based on data information from industry
  - Sensitivity to lower cost capital
  - Extrapolate to large scale deployment
- Compare with future fossil fuel price scenarios with and without policy support
Potential for cost reduction - Project Team

Advisory Group - IEA Bioenergy ExCo

- SGAB Project
- Lars Waldheim
- Ingvar Landälv
- CNPEM Brazil
- Antonio Bonomi
- Bruno Klein
- IEA Bioenergy Task 39
  - Jack Saddler
  - Jim McMillan
  - Mahmood Ebadian

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Current cost estimates

Production cost EUR/MWh

- Cellulosic ethanol
- Cellulosic ethanol "1 1/2 Gen"
- Methanol and methanobiomass
- Methanol and methane-wastes
- FT Liquids – Biomass
- FT Liquids – Wastes
- Bio-oil - coprocessing
- Bio-oil - standalone
- HVO
- AD
Current cost estimates

![Production cost EUR/MWh chart with current fossil price range and various categories such as Cellulosic ethanol, Cellulosic ethanol 1/2 Gen, Methanol and methanol-biomass, FT liquids - biomass, FT liquids - wastes, Bio-liquid - SA, Bio-liquid - CP, HVO, AD - Biomethane.]
Scope for cost reduction - medium term

Production cost EUR/MWh

- Cellulosic ethanol
- Bio based meoh/methane
- Waste based meoh/methane
- Bio based FT Liquids
- Waste based FT liquids
- Bio-oil coprocessing

Current costs
After improvements
Lower finance

Current fossil price range
Long term cost reduction potential

• Contribution of advanced biofuels in lower carbon scenarios implies massive ramp up in production

• Over 4000 large scale (200MW output) plants to provide 25 EJ as in long term 2DS scenario

• Learning curve approach used to examine potential impact on costs
Long term cost reduction potential

Future fossil price range plus carbon value

Current fossil price range

Production cost EUR/MWh

Cellulosic ethanol
Methanol/Methane
FT Liquids
Biooil and processing
Conclusions

• Currently a significant cost gap.

• Scope for medium term cost reductions of between 20 - 50% due to technical advances and improved financing terms - still a gap for many pathways.

• In the longer term technologies may become competitive in the context of anticipated fossil and carbon prices.

• Large scale deployment will depend on continuing policy support.
  • Industry support during the demonstration commercialisation
  • Continuing strong support will be needed either via strong carbon price signals, or by incentivising low carbon fuels.
• https://www.ieabioenergy.com/publications/new-publication-advanced-biofuels-potential-for-cost-reduction/

Thanks!