

The cost-effectiveness of electrofuels in comparison to other alternative fuels for transport in a low carbon future

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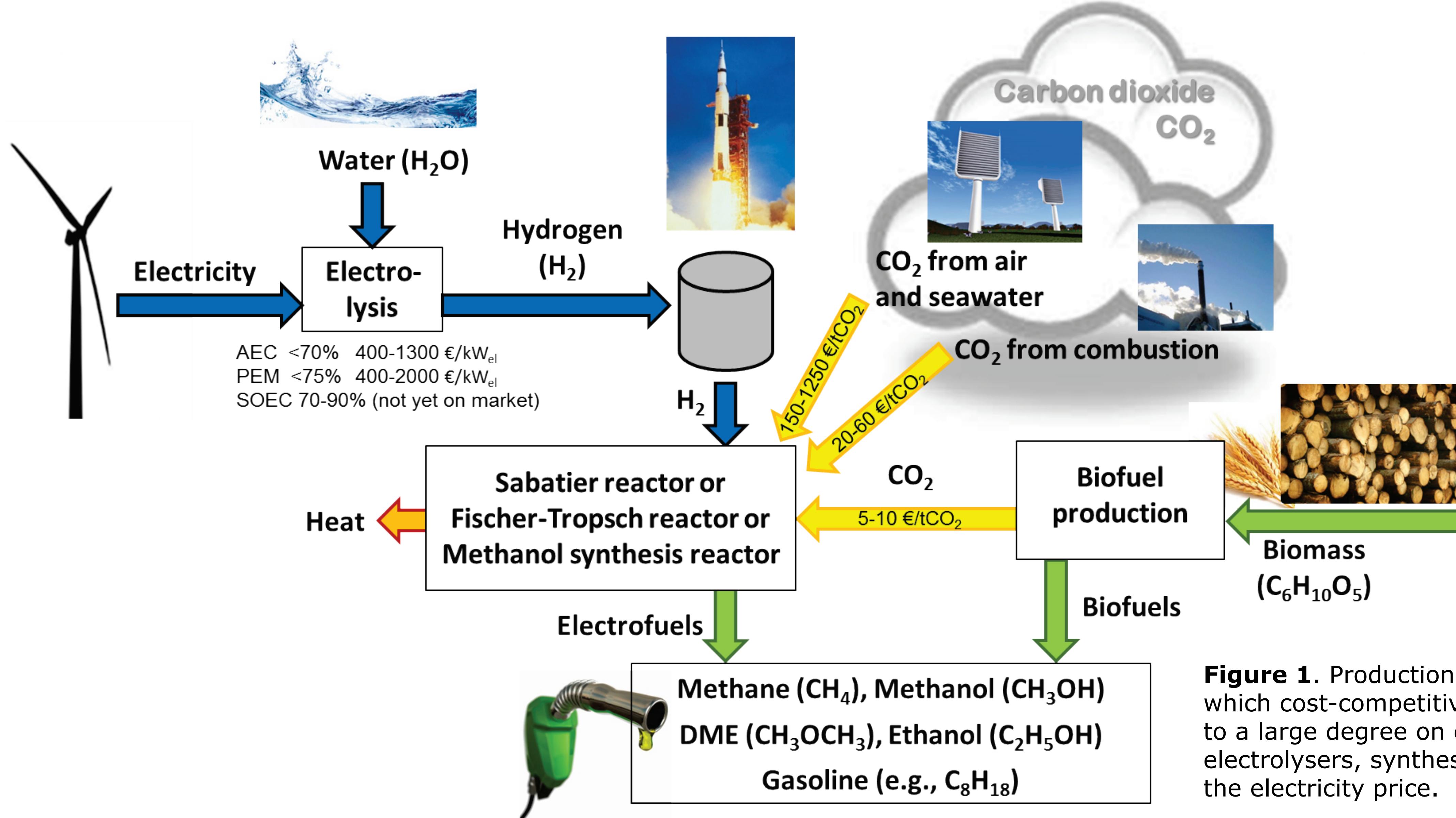


Figure 1. Production of electrofuels, which cost-competitiveness depend to a large degree on costs for electrolyzers, synthesis reactor, and the electricity price.

Aim: This project analyzes if there are conditions under which electrofuels are cost-effective compared to biofuels and other alternative fuels for transport in order to reach climate targets.

Initial key findings

Cost-competitiveness

- It is not likely that electrofuels can compete with current conventional fuels (unless higher taxes on fossil CO_2 -emissions or assuming future cost-reductions on electrofuel productions).
- Under some circumstances, electrofuels may be able to compete with battery electric vehicles and hydrogen used in fuel cells.

Resource perspective

- Electrofuels used in combustion engines demand significantly more energy compared to battery electric vehicles and hydrogen used in fuel cells.
- In a short term, renewable CO_2 does not seem to be a limiting factor.
- Demand for renewable electricity is challenging.

Climate perspective

- The results indicate that a more effective way to lower the atmospheric CO_2 concentration would be to store captured CO_2 underground (CCS). However, the CCS technology is currently struggling with public acceptance and it is not obvious that CCS will be a large scale available technology.
- To be determined as a sustainable solution, a large scale use of electrofuels can only exist in an energy system with abundant renewable electricity produced in a sustainable way.

What are electrofuels?

Electrofuels are synthetic hydrocarbons, e.g. methane or methanol, produced from carbon dioxide (CO_2) and water with electricity as primary energy source. The CO_2 can be captured from various industrial processes giving rise to excess CO_2 e.g. biofuel production plants, and fossil and biomass combustion plants. Electrofuels potentially provide an opportunity for biofuel producers to increase the yield from the same amount of biomass, see Figure 1.

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