Renewable fuels of non-biological origin in transport decarbonisation

T&E Breakfast event
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Why renewable fuels of non-biological origin?

- Electrification not possible in all parts of transport
- Liquid fuels will be needed in long term at least in aviation and shipping
- Other decarbonization options needed besides biofuels
  - ILUC effects of conventional biofuels
  - Biomass potential limited
Renewable fuels of non-biological origin

- Fuels produced via electrolysis of H₂O using renewable power and synthesis
- Large number of different pathways
- Efficiency varies
Competing technologies

- Substitution effects differ between applications
  - PtH most efficient application
  - "Green hydrogen" better than renewable methane or PtL

Fossil Fuel replaced by 1 kWh renewable electricity
GHG effects

- real world GHG emissions depend on the electricity mix used

- fuel production plant directly connected to wind / PV production unit(s)
  - very low GHG emissions
  - but:
    - higher investment costs
    - fluctuating electric power (i.e. fuel production plant is not fully utilized or excess power not utilized)

- fuel production with electricity from grid:
  - GHG emissions substantially higher
  - grid electricity mix (Germany): 605 gCO₂ / kWh = 168 gCO₂ / MJ
  - assuming 50 % conversion efficiency for PtL production results in fuel GHG emissions of >330 gCO₂ / MJ (fossil diesel: 94.1 gCO₂ / MJ)
Costs of the fuel

• According to estimates production costs are higher than for conventional fuels
• Substantial cost saving potential at locations with a good combination of wind and sun hours (e.g. Morocco)
  – High number of full load hours for fuel generation at locations with lots of wind/sun
  – At the same time lower costs for power generation at such locations
• Cost savings also possible with grid electricity
Renewable fuels of non-biological origin under the FQD in Germany

- GHG targets of 4 % since 2017 and 6 % from 2020 onwards
- **Renewable gaseous fuels** \((H_2, CH_4)\) of non-biological origin can be counted toward the FQD GHG targets in Germany since 1 Jan 2018
  - GHG reduction > 90 %
- **Three options** for origin of electricity:
  - Direct connection to Wind / PV generation
  - Electricity that would **otherwise** be curtailed (fuel production plant started and stopped by transmission network operator)
  - Grid electricity only for existing R&D plants
- **Renewable liquid fuels** of non-biological origin need to be added; COM proposal expected
Renewable fuels of non-biological origin under the RED II

- Germany considered provisions on renewable fuels of non-biological origin in the support schemes foreseen in RED II as very important. Key points:
  - Ensure **traceability** of fuels across borders
    - Fuels are trade (often multiple times) between production plant and the location where they are placed on the market
    - Clear and consistent rules have to be established
    - Cannot be chemically distinguished from fossil fuels
  - Limit support to renewable fuels that are **produced exclusively using renewable electricity**; this could include e.g.
    - time coherence (electricity only from a PV/wind generation plant at times when there is no sun/wind)
    - geographical coherence (in case of a congestion in the grid fuel production plant and electricity generation plant should be on the same side of congestion)
Renewable fuels of non-biological origin under the RED II

- **General approach** from 18 December includes several changes relating to renewable fuels of non-biological origin
- Renewable fuels of non-biological origin will be **subject to certification under the EU voluntary schemes**
- Allows **several options** for **origin of electricity** for production of renewable fuels of non-biological origin
  - Use of **grid electricity** for fuel production allows production of **partially renewable fuels** of non-biological origin:
  - **Direct connection** between fuel production and PV / wind plant without importing electricity from the grid
  - Electricity from grid electricity can be **counted as fully renewable** if it can be proven that electricity is **produced exclusively from renewable energy sources**
  - Commission to adopt implementing act by 2021
Conclusions

• key technologies for long-term GHG reduction
• production costs significantly higher than for conventional fuels, even at the best locations
• inclusion in RED II support scheme important
  – clear rules for renewable electricity needed
  – use of grid electricity in principle desirable, but
    • use of fossil electricity has to be avoided
    • otherwise GHG emissions can be significantly higher than for diesel
Thank you!
“[...] In addition, electricity that has been imported from the grid may be counted as fully renewable if the electricity is produced exclusively from renewable energy sources and:

(a) the renewable electricity generation would have been curtailed if not consumed by the plant or

(b) the renewable properties and any other appropriate criteria have been demonstrated, ensuring that the renewable properties of this electricity are claimed only once and only in one end-use sector.

The Commission shall adopt an implementing act in accordance with Article 31 to establish a common European methodology, setting out detailed rules for economic operators to comply with the requirements set out in this sub-paragraph by December 2021.”