ANNEX

1) Example of CV

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Catalysis for Power-to-X Processes

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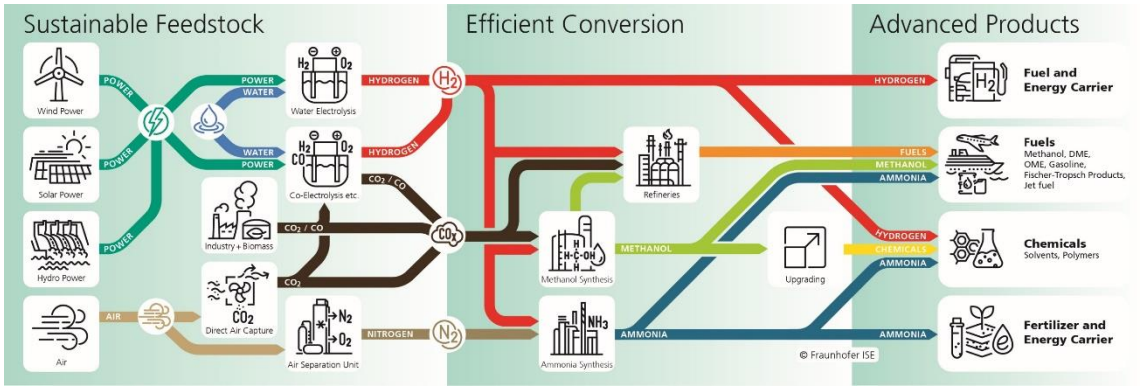
The production of energy carriers based on renewable electricity via the Power-to-X (PtX) approach represents a central element of future defossilized economies based entirely on renewable energy sources [1]. Liquid energy carriers such as methanol, dimethylether (DME) or ammonia are produced by the catalytic conversion of sustainable hydrogen, syngas or nitrogen (Scheme 1). They will be used as platform molecules for the chemical industry, as energy carriers or as clean fuels for combustion engines and turbines in order to reduce both CO_2 and soot/NOx emissions. In addition, PtX systems will need as well as liquid organic hydrogen carriers (LOHC), which will serve as a liquid carrier medium for hydrogen.

To compete with cheap fossil-based carriers, PtX products require low-cost renewable electricity and efficient catalytic processes for their synthesis as well as for their decomposition. Therefore, importing PtX products from countries with high potential for renewable electricity production to countries with high energy demand is a promising option [2, 3]. However, the question in which respect the possible PtX products are suitable for long-distance transport has not yet been clarified.

This talk will offer insights into specific catalytic systems for PtX processes and H_2 storage/transportation technologies with a focus on ammonia and LOHC as well as it will touch our holistic assessment methodology for the evaluation of large-scale PtX-scenarios.



Scheme 1: Power-to-X process chain, where the efficient catalytic systems play a crucial role for conversion processes.

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References

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[2] C. Hank et al. “Energy efficiency and economic assessment of imported energy carriers based on renewable electricity“, Sustainable Energy and Fuels, 2020, 4, 2256
[3] H.-M. Heuser et al. „Techno-economic analysis of a potential energy trading link between Patagonia and Japan based on CO2 free hydrogen“, International journal of hydrogen energy, 2019, 44(25), 12733
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