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ENERGYHYWAY

Potential assessment of large-scale storage and use of hydrogen in elemental and chemically bonded form

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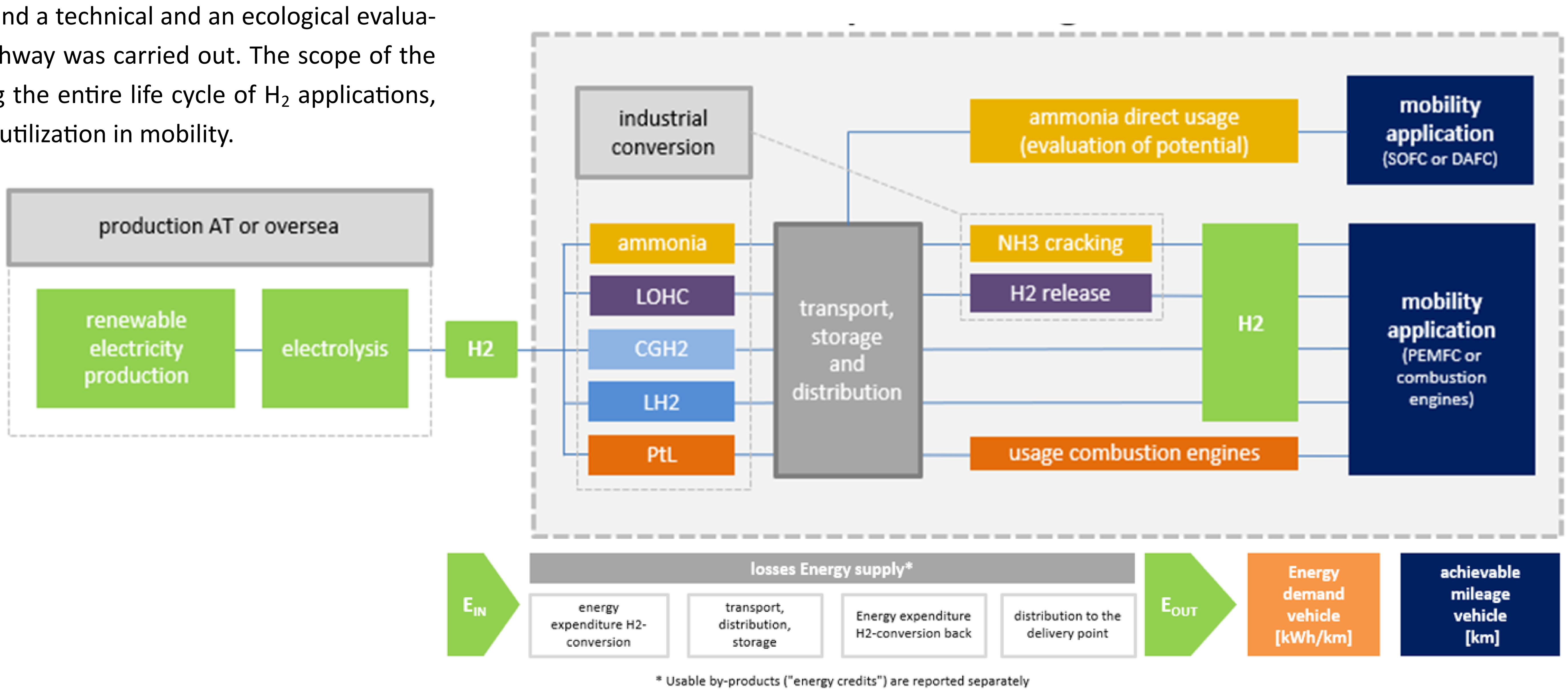
Introduction

With progressive CO_2 reduction in the mobility and industry sectors, H_2 imports will be needed in addition to domestic production [1],[2]. In this context H_2 production should take place at locations that are optimally suited for renewable power generation [2]. The central objective of the project EnergyHyWay was to produce an overall assessment of the most promising hydrogen supply paths for mobility.

Methods

Scenarios were developed, and a technical and an ecological evaluation for different energy pathway was carried out. The scope of the investigation extended along the entire life cycle of H_2 applications, from production to the final utilization in mobility.

Based on the investigated locations in the Middle East and Africa the possible energy pathways were evaluated. This includes potential conversion processes, conditioning processes, storage, transfer operation and the distribution processes.



Results

The result of the compared energy pathways was the achievable mileage of a vehicle driven in Austria. In a favorable scenario, the achievable mileage can be twice as high compared to an unfavorably energy pathway. The most promising energy pathways (highest achievable mileage) were ecological evaluated by a Life Cycle Assessment according to ISO 14040/44. In the analyzed scenarios transporting pure H_2 as a gas, followed by liquefaction, conversion to ammonia, and Fischer Tropsch diesel had the lowest green house gas potential. However, this result is related to the considered pathway and applications within the project and cannot simply be generalized.

Barriers to implementation

- Early phase cooperation of Austria with other countries (e.g. via alliances).
- Market acceptance strongly dependent on H2 price - "blue" vs. "green" H_2 in a transition phase.
- Political acceptance of "blue" H_2 in a transition phase unclear.
- Further technological development of NH_3 cracking needed until industrial scale is implemented.
- Development of H2 transport logistics, further development or roll-out of marine transport, develo-

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