



How important are hydrogen imports for European carbon neutrality?

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Hydrogen could play a crucial role in Europe's transition to carbon neutrality by 2050. However, the size and scope of the upcoming hydrogen sector is subject to great uncertainty due to unknown future costs, technological developments and competition with other energy carriers. The prospects of hydrogen imports from outside the EU is possibly subject to even greater uncertainty. Are hydrogen imports needed at all? Are they an essential element of the green transition? In the present work we use a multi-horizon energy system optimisation framework to investigate the rationale for EU hydrogen imports. In particular, we analyse when hydrogen imports may alleviate the most critical bottlenecks in achieving net carbon neutrality by 2050. The main bottlenecks of interest are rapid growth in renewable energy and hydrogen production. To ensure robustness of the results, we use near-optimal methods to map out a large variety of transition pathways under a number of different political and technological scenarios. The pathways are evaluated on cost and land-use impact inside Europe as well as potential upstream impacts of imported hydrogen. Using this holistic approach allows us to uncover when hydrogen imports are compelling and when they are dubious.