Highlights from the EU debate on H_2 certification

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Raffaele Piria, Senior Advisor, Co-Lead Energy

Logical chain for H_2 sustainability certification in Germany / EU

Source: NASA

Paris Agreement → Climate neutrality → How to deal with hard-to-abate sectors ?

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H_2 and derivatives are crucial for the last miles → Climate (and other) impacts of H_2 production vary strongly → Market ramp-up requires clear regulatory framework

General questions:

- From what level of emission intensity does H_2 usage make sense in different sectors?
- How to define and measure the (climate) impact of various H2 production chains?
- How to establish widely accepted standards and certification schemes?

Various purposes of H_2 certification in the EU

a) Compliance with the EU Renewable Energy Directive of 2018 (RED II)
b) Compliance with hydrogen support schemes currently in the pipeline
   - e.g. for the CfD in Germany's H2Global Program
   - e.g. for an electrolyser in Germany to be exempted from the RES-E levy
   - e.g. for complying with future quota for aviation fuel
   - e.g. for industrial users or importers to comply with future versions of EU ETS / carbon Border Adjustment
c) Voluntary certification (e.g. for customers asking for clean steel, clean ammonia etc.)

Common denominator: the GHG intensity thresholds maybe initially be relatively unambitious, but they will rapidly develop towards true climate neutrality (= 0.0 gCO_2/MJ or compensation for via e.g. Direct Air Capture)

Blue or green? Excerpts from EU Council conclusions 11 Dec 2020

- " … switching to hydrogen, preferably from renewable sources … "
- " …emphasis should be given to hydrogen from renewable sources in view of its key role for the achievement of the decarbonisation objective …"
- "…especially with regard to unavoidable process emissions and temporarily complementing the renewable hydrogen production (….) CCS and CCUS may play a role for the decarbonisation for the Member States that choose this technology."
- " … promoting the development of guarantees of origin for better traceability of hydrogen from renewable sources, promoting renewable fuels of non-biological origin …"
- " … international value chains (…) as potential for cost-competitive renewable hydrogen "

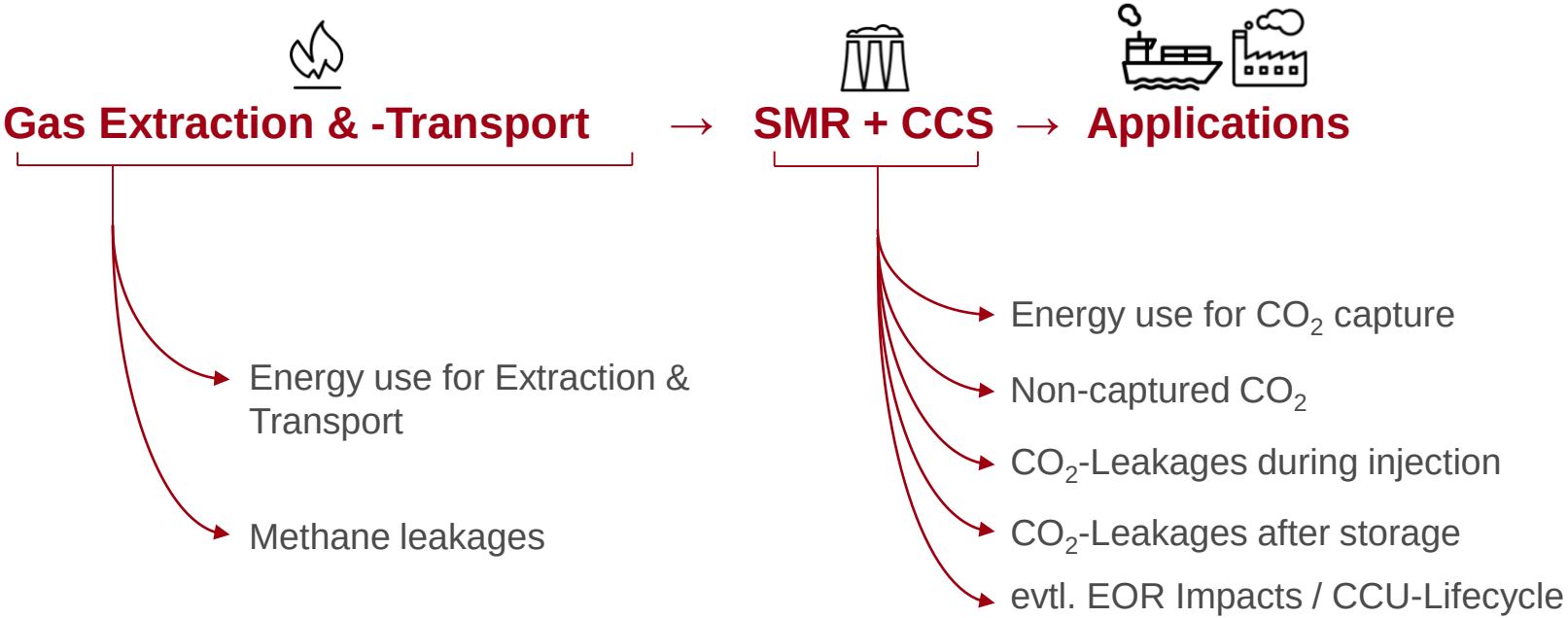
What's the EU Council: the most climate conservative EU institution (Parliament & Commission are usually "greener" than the Council)

Overall message: EU actually wants green H2, but it will temporarily accept blue (if it is <u>really</u> low GHG), during a transition period of uncertain duration

Green H2: sustainability criteria being discussed

- GHG emission intensity of the electricity for electrolysis (dynamic thresholds?)
- Additionality of renewable investments
- Simultaneity of electrolysis with times of high renewable generation
- For imports: general progress of the export country on climate protection / energy transition
- Water usage, biodiversity, social impacts
- Possibly life-cycle approach, including e.g. impacts of the production of wind turbines or solar systems

Blue-H2: Sources of GHG-Emissions



Vector graphics: Ralf Schmitzer, the Noun Project

Measuring GHG intensity of blue H_2

- Remaining CO_2 emissions at capture, injection (!) and after storage
- Methane-leakages from well to SMR facility (including satellite monitoring)
- GHG impact of methane: 100 or 20 years? Acute climate crisis mkes the argument for 20 years
- Emission intensity benchmarks for all alternatives
  - Other sources of H_2 (with dynamic view of power sector decarbionisation)
  - Direct electrification // Energy savings
  - Fossil energy usage without H_2
- Internationally agreed third party certification procedures (third party refers also to upstream methane emissions and injection phase !)

Concluding summary

- Climate mitigation is key driver for H_2 roadmaps and policies
- Regulatory framework still in its infancy, but it will evolve dynamically
- In 1st phase, H_2 GHG emission (and other sustainability) standards must take into account the still high level of power sector emission in EU and elsewhere, and the need to get the clean H2 market up and running
- But in the medium term, GHG emission standards will get closer and closer to true climate neutrality
- I personally would anticipate this and would not make long term investments in “grey-green” or “grey-blue” H2 => It might be accepted today, but not any longer tomorrow.

Thank you for your attention

Raffaele Piria
Senior Advisor, Co-Lead Energy
piria@adelphi.de

adelphi
Alt-Moabit 91
10559 Berlin

T +49 (0)30-89 000 68-0
F +49 (0)30-89 000 68-10

www.adelphi.de
office@adelphi.de