

IPIECA

Hydrogen as an enabler of the energy transition and the pathways to net-zero emissions

Scope of Work/Terms of Reference under the Low Emissions Pathways Task Force

BACKGROUND

Following discussions at the Climate Change Group meetings, members have requested the IPIECA Low Emissions Pathways taskforce to develop a document, either an awareness brief or a factsheet, focusing in more detail on one particular element of the *Exploring low emission pathways; Advancing the Paris Puzzle* awareness brief; specifically, on the role of hydrogen as an enabler.

This document will build upon and broaden the dialogue from the prior IPIECA documents in this series: *Making the case for CCS* factsheet and *Exploring low emission pathways for transport* awareness brief.

OBJECTIVES

- To continue IPIECA's role in demonstrating to key external stakeholders the industry commitment to sustainable development, to helping society meet the dual challenge of access to affordable, reliable, modern and clean energy while meeting the goals of the Paris Agreement.
- To ensure that stakeholders have a better understanding of the role of oil and gas in the energy transition and pathways to a net-zero-emissions future.
- To communicate more specifically the essential current and future role of the oil and gas industry in providing low-emission solutions across all aspects of the global energy system: electricity generation; transport; heavy industry; and residential and business space heating and cooling.
- To highlight that natural gas coupled with CCS is an affordable and scalable option for the provision of hydrogen as an energy carrier that will complement hydrogen manufactured via electrolysis from renewable electricity sources during the energy transition.

SCOPE

The work will consist of either a factsheet (2-3 pages) or awareness brief (~8-10 pages), built around the following outline narrative:

- A. Hydrogen is a flexible energy carrier that can provide a low GHG emission option across a range of energy-intensive sectors: electricity generation; transport; heat and cooling for industrial, business and private residential use. It can also be used as an energy storage medium to balance inter-seasonal demand (similar to underground storage of natural gas).
- B. Natural gas coupled with CCS is an affordable and scalable option for the provision of hydrogen as a global energy carrier.
- C. Each of these potential areas in A will be developed in appropriate detail. For instance, for transport this could encompass the following aspects: hydrogen for fuel cells, differing potential and challenges for hydrogen usage in the sub-segments of aviation, shipping (as H₂, compressed gaseous or liquefied, or NH₃), road transport, both heavy and light duty.
- D. There are a number of routes to generating hydrogen. Electrolysis, Steam Methane Reforming (SMR) and other technologies will be described in appropriate detail. For natural gas as a source

Commented [KHS1]: Suggest the title of the publication be revised as part of drafting the report outline and in the context of the other publications in this workstream

Commented [FA2]: I'm partial to a factsheet too – there are a lot of comprehensive reports on H2 out, some quite recent. Maybe the factsheet can reference them. But the factsheet should cover all sectors

Commented [KHS3]: Do we have a preference...I would expect a factsheet would be 2-4 pages and a brief would be longer.

My default tendency would be towards a factsheet.

Commented [KHS4]: Maintain an emphasis on pathways...not only a future endpoint (netzero)

Commented [FA5]: A net zero future does not mean much without a date. It's quite different if it is 2050 or 2100, for example

Commented [KHS6]: Do we want to explore those parts of H business models where O&G adds value?...eg along the supply chain?

Commented [FA7]: I'm not a fan of the colors for H, but the emphasis on gas+CCS is key, especially in Europe where there are already signs that only H from renewables may be allowed. This should be a major point of any document.

Commented [KHS8]: May not want to vector off into assigning fractions of different color H...preferably it will evolve with the merits of each.

Commented [FA9]: Think the narrative below is fairly well aligned with our views (and the H2 WP from Bryan C et al) with a possible partial exception of the last one – policy – for which we are still evolving views.

Commented [KHS10]: Have we converged on a narrative?

Commented [KHS11]: This may be an opportunity to reference good assessments on these options?

Commented [KHS12]: Is H stored underground?

Commented [FA13]: As said before, many reports exist. Could be just referenced.

Commented [KHS14]: This could become very long?

Draft ToR v1 13mar20

of hydrogen as in B then it must be coupled with CCS to be deemed “low-carbon”. Existing IPIECA material on CCS will be used.

- E. Once you have hydrogen, you can use it as is, or carry out additional processing to generate hydrogen carriers such as ammonia or liquids (e-fuels concept). Maybe explain the different shades of hydrogen: green; blue; brown and black.
- F. There is the possibility for repurposing of existing infrastructure, e.g. blending low levels of hydrogen into natural gas in pipelines assuming safety and other operational considerations are satisfied. There is also a link with biomethane.
- G. In addition to the reduction in GHG emissions, this enabler of the energy transition could also address aspects associated with air quality and public health. Hydrogen for electricity generation or in fuel cells for transport emits no stack or tailpipe emissions (other than water vapour).
- H. The oil & gas industry has the knowledge and expertise to contribute to the “hydrogen economy”. Bring in some case studies from member companies as illustration.
- I. The emerging regulatory environment stemming from the implementation of revised country Nationally Determined Contributions (NDCs) and mid-century strategies at COP26, particularly aiming toward net zero emissions by 2050 will also be an important factor.

The secretariat will prepare a communications plan for this initiative taking into account opportunities for engagement in and around COP26.

Note: the factsheet / awareness brief could consider two-time periods consistent with the architecture of the Paris Agreement:

- Through to 2030 - consistent with Nationally Determined Contributions (NDCs)
- Through to 2050 – consistent with Mid-century strategies (MCSs)
- (And / Or to 2040 consistent with energy outlooks and some scenarios from IEA)

The range of potential technical opportunities and pace of deployment for hydrogen may differ significantly across the sectors, transport, industry, electricity generation, etc. And across different regions and geographies.

Data sources / inputs for the work to include: Company sourced experience, academic input and other sources such as the IEA, IEA-GHG, FuelsEurope / CONCAWE, IMO, ICAO, Hydrogen Council, OGCI, UK Committee on Climate Change, Japan government hydrogen strategy, etc. This is a new piece of work and not an IPIECA review of its existing material.

The taskforce will be supported by an external expert copy editor (as for the Exploring low emissions pathway for transport activity) up to a budget of £10k, as agreed in the 2020 Business Plan.

DELIVERABLE / TIMELINE

- Draft document by end-September 2020
- Document finalized before November 2020, in time for sharing / highlighting at COP26.

Commented [KHS15]: Watch how this term is defined in the LEP documents

Commented [KHS16]: How much do we want to stress colors...my expectation is less rather than what others might opt for?

Commented [FA17]: The key is low-carbon, not if from gas, coal or renewables

Commented [KHS18]: How big an issue should this be for the report? Do we have a view on use of existing infrastructure?

Commented [FA19]: Upstream has some interest in this. Or at least they watch it and are not dismissing it. To me this is a facilitator but not the main story

Commented [KHS20]: Is this a link or a tangent?

Commented [FA21]: Fair but would not make this a big deal. Useful in the short term but too little supply to matter

Commented [KHS22]: Does H emit NOx?

Commented [KHS23]: Do we have a case studies...suggestions for those from others?

Commented [FA24]: We have announced CFC in Rotterdam. Shell, BP and Total and Equinor should have quite a few

Commented [KHS25]: Is there much on either of these? Suggested pubs?

Commented [KHS26]: What is the preferred source on H from IEA?

Commented [FA27]: Lots of sources: IEA 2019 H2 report, IHS, McKinsey, IRENA...also upcoming IEA TEP report detailing the size of H2 in a 2 DC scenario to 2070 “consistent” with paris

Commented [KHS28]: Suggestions for preferred sources?

Commented [FA29]: Think all should be looked at but 2019 IEA is recent and pretty comprehensive

Commented [KHS30]: I guess this means referencing others not IPIECA

Commented [KHS31]: I expect that this is Betty Flowers who had worked with Shell on their climate docs (air scenario etc) and other LEP pubs

Commented [KHS32]: I would be surprised if this keeps to schedule

Commented [KHS33]: COP 26 has been delayed to 2021