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Comments

Dear Madam/Sir,

SkyNRG welcomes DOE's Proposed Clean Hydrogen Production Standard as we are convinced a stable investment framework is crucial to the scale-up of a United States clean hydrogen industry. While we applaud this effort, we are also critical of the sustainability safeguards put in place in the Draft Standard. Being a company of Dutch origin, SkyNRG has a wealth of experience in EU policymaking and some of the issues touching on clean hydrogen production in the US are also being dealt with in the EU, which presents an opportunity to share best practices. Below you will find our summarized feedback:

- **GHG Thresholds:** DOE specifically requests stakeholders to comment on GHG thresholds. The threshold to qualify for the Hydrogen Production Tax Credit is currently defined at 4 kg CO₂e/kg H₂, representing roughly a 60% decrease in emissions compared to conventional hydrogen produced via steam methane reforming. While we appreciate that a lower credit is available for hydrogen with higher GHG emissions, we believe it is important to also consider energy system-wide GHG effects and the US' position on the global hydrogen market.
 - Primarily, DOE should consider that when a hydrogen is produced, it is not yet *used*. Best use cases for clean hydrogen from an energy system efficiency perspective are to replace conventional hydrogen, e.g. in refineries or fertilizer production, or for use in hard-to-abate sectors such as heavy industry, aviation and maritime sectors. This means that hydrogen is either converted into products or a fuel. Due to the fugitive nature of hydrogen it is likely that leakage will occur to some extent or additional energy is needed to convert the hydrogen into a useful end-product, thereby adding to the CI-score of the hydrogen and further reducing its relative GHG performance compared to the counterfactual use. DOE should therefore strive to stay aligned with the 2 kg CO₂e/kg H₂ threshold, which is consistent with the definition of 'Clean Hydrogen' from the Bipartisan Infrastructure Law that defined a Clean Hydrogen Standard.
 - Further, when many hydrogen producers put hydrogen on the market close to the 4 kg CO₂e threshold, either using renewable electricity or abated natural gas, the US removes itself from accessing the export markets. For example,

the EU in its Renewable Energy Directive puts forward a GHG reduction threshold of 70% compared to the baseline. Since further conversions or transport will only add to emissions, this type of hydrogen will not be able to access the largest demand center for hydrogen in the world based on announced policy.

- **Fugitive Emissions:** Upstream non-CO₂ GHG emissions of oil and gas production are a topic of heated debate. Various scientific papers in the past years have pointed out that fugitive emissions have been underestimated and that fugitive emissions in hydrogen production systems based on natural gas can be as high as 95 gCO₂/MJ hydrogen¹. This means that it would be extremely challenging to achieve the 4 kg CO₂e threshold when deploying a natural gas-based production process and using validated data sources to determine fugitive emissions. Another paper recently pointed out via satellite measurements that average US fugitive methane emissions from oil and gas are about 80% higher than estimated by EPA and that the average methane leakage rate in the US today is about 2%.² We therefore recommend putting more emphasis on upstream methane emissions to ensure creating a fair level playing field with green hydrogen projects in the US.
- **Additionality Criteria:** To safeguard the sustainability of hydrogen produced from renewable power, additionality criteria are essential. With expected demand for green hydrogen towards 2030 running in the millions of tonnes, we would not want that associated power demand to be met with gas-fired power generation or we run the risk of increasing energy system-wide GHG emissions. Certification should safeguard that every unit of power used is matched with a unit of renewable power elsewhere in the energy system. Blueprints for this are in development in the European Union, with a 'Delegated Act' on green hydrogen additionality under development in the context of the Renewable Energy Directive. The United States can borrow much of this language for its Clean Hydrogen Production Standard, to further harmonize the criteria for hydrogen products across the United States and Europe.

¹ Source: Howarth & Jacobson, 2021, *How green is blue hydrogen?*, DOI: 10.1002/ese3.956

² Source: Shen et al., 2022, *Satellite quantification of oil and natural gas methane emissions in the US and Canada including contributions from individual basins*, <https://doi.org/10.5194/acp-22-11203-2022>