Union of Concerned Scientists

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Testimony of Julie McNamara, Deputy Policy Director for Climate & Energy
Union of Concerned Scientists

Pennsylvania House Environmental Resources & Energy Committee
Public hearing on *Hydrogen Hubs and Climate Change*

Chairman Vitali, Chairman Causer, and Members of the Committee—

Thank you for the opportunity to provide testimony on the issue of hydrogen hubs and climate change.

My name is Julie McNamara, and I am a senior analyst and deputy policy director for climate and energy at the Union of Concerned Scientists. The Union of Concerned Scientists (UCS) puts rigorous, independent science to work to solve our planet's most pressing problems—including climate change.

UCS believes that hydrogen has a critical role to play in our nation's clean energy transition, but only if that hydrogen is cleanly produced, strategically targeted in its use, and subject to rigorous environmental, health, and safety standards. In the alternate, hydrogen could not just fail to deliver the degree of environmental benefits hoped for—it could outright reverse many of the long fought-for climate and public health gains we've already made. This would be a disastrous outcome, wasting time and money we do not have in the pressing fight to turn the tide on climate. Moreover, it would erode public trust and undermine the ability of the clean energy transition to deliver *truly clean*—not just carbon-free—solutions.

Given the potential for such widely divergent outcomes and the towering costs and consequences of getting it wrong, the single most important policy priority related to hydrogen today is sending strong signals from the outset.

There is an understandable inclination by policymakers to support the fledgling clean hydrogen sector by loosening requirements, believing that boosting production and uptake now will get the industry up and running and then standards and targets can be tightened over time.

But much as we might wish them to be, loopholes are not short-cuts to the future.

Loose production standards and broad-based end-use goals drive investments that are fundamentally misaligned with the methods of clean hydrogen production and destinations for clean hydrogen end use that Pennsylvania's, and our nation's, clean energy transition ultimately needs. That means if today's policies aren't tightly tied to the end goal, subsidies and incentives meant to build out the clean energy economy will instead pour into investments that become stranded assets—and lost jobs—within a decade.

It's critical to get hydrogen policy right *today*. And Pennsylvania, home to two Hydrogen Hubs, has an influential role in setting the forward course.

When it comes to hydrogen production, here's what it means to "get hydrogen policy right": finalizing rigorous clean hydrogen production standards that select for and incentivize production approaches that are really and truly clean. This is relevant for both electrolytically produced hydrogen and fossil-based hydrogen, but plays out differently across the two.

First, electrolytic hydrogen production. Because other testimony today has well-detailed this issue, I will only briefly underscore the key points. Using electricity to split water into hydrogen and oxygen does not by itself render produced hydrogen "clean." The electricity powering that electrolyzer must also be clean, as verified by adherence to the three-pillars framework of incrementality, deliverability, and time-matching.[1] This framework is sometimes misunderstood as a nice-to-have; in reality, it is absolutely critical for guiding development of the right types of electrolyzers, in the right places, at the right ramp-up. Moreover, it defends against an unjust cost-shifting that would otherwise occur in its absence, where deeply subsidized hydrogen producers could shift the economic, climate, and public health costs of their large electricity loads onto captive ratepayers by jumping the line to scoop up existing cheap clean power.[2]

As a result, Pennsylvania policymakers should advocate for rigorous implementation of the 45V Clean Hydrogen Production Tax Credit at the federal level. Regardless of the approach finalized in 45V, however, Pennsylvania policymakers should further commit to independently using this framework within in-state policies and programs, including the Hydrogen Hubs.

Second, fossil-based hydrogen production. Today, the overwhelming majority of hydrogen is produced via steam methane reforming, which uses methane—natural gas—as the feedstock. This is sometimes referred to as "grey" hydrogen. Steam methane reforming is a heavily polluting process, generating high levels of carbon dioxide emissions as well as public health pollution.[3] This hydrogen production pathway is not a climate solution; indeed, it is a climate problem—the very problem policies incentivizing clean hydrogen production are trying to drive the shift away from.

Some members of the fossil fuel industry have promoted alternative fossil-based hydrogen production pathways as "clean," especially by coupling the methane reforming process with carbon capture and sequestration, or CCS. This can sound like an attractive pitch: Turn fossil fuels, the climate problem, into fossil fuels, the climate solution. However, there is yawning gap between what fossil fuel boosters suggest is possible and the far more complicated reality of what would instead be likely to come to pass. This should put policymakers on high alert, as funding investments in pathways that just won't ever be clean will yoke Pennsylvania to the very problems it's currently battling to shift away from.

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[1] See, e.g., "Without sufficient guardrails, the hydrogen tax credit could increase emissions," (April 3, 2023) and pp. 5-11 of comments from the Union of Concerned Scientists to the 45V docket (February 26, 2024), online at https://www.regulations.gov/comment/IRS-2023-0066-29522.

[2] For more on the risks of cost-shifting, see "The Big Hydrogen Cash Grab," (May 9, 2024).

[3] See, e.g., Sun et al. *Criteria air pollutants and greenhouse gas emissions from hydrogen production in U.S. steam methane reforming facilities*. 53 Env. Sci. Tech. 7103-7113 (2019). https://pubs.acs.org/doi/10.1021/acs.est.8b06197

Here are three critical flags with pursuing a fossil-based "clean" hydrogen future.

First, an approach premised on fossil fuels means committing to more of the environmental and health problems those fossil fuels bring. Fossil-based hydrogen does not create a path off fossil fuels; instead, it would force *more* of Pennsylvania's economy to be linked to all their associated risks, harms, and volatility.

Second, despite what boosters argue, fossil-based hydrogen will only qualify as "clean" if multiple pollution loopholes are allowed. That's because a low-carbon version of fossil-based hydrogen is contingent on multiple technological and process interventions that are at risk of poor performance. Each of these has the potential to independently render the final produced hydrogen dirty; together they combine to present a high likelihood of fossil-based hydrogen missing the low-carbon emissions target. Hence the frantic lobbying to secure pollution loopholes. This includes:

- **Carbon capture and sequestration (CCS):** Methane reforming requires carbon capture to reduce facility carbon dioxide emissions, with capture rates of greater than 90 percent to even be in the running for a lower-carbon designation. To date, however, capture performance has trended far lower.[4] A CCS-based approach also requires a high level of performance of carbon dioxide transport and sequestration—plus the buildout of pipelines and associated infrastructure, and all the concerns such projects bring.
- **Upstream methane emissions:** Even with high rates of carbon capture, upstream methane emissions—included in the lifecycle emissions assessment of produced hydrogen—can dwarf facility emissions; an SMR facility with a high rate of capture could still fail to qualify for even the lowest tier of the 45V tax credit with limited methane leakage, for example.[5] Accurately setting methane emission rates—without possibility of gaming—is essential for reflecting the full emissions profile of fossil-based hydrogen production.
- **Carbon offsetting via fugitive methane or biomethane:** Because of the high likelihood that fossil-based hydrogen will not, on its own, be sufficiently low carbon to serve as a viable tool for decarbonization, fossil-based producers are working to secure pollution offset mechanisms to label their resulting hydrogen as "clean," especially as a means of qualifying for the very generous top tier of the 45V tax credit.[6] As subsequent testimony will detail, this is an exercise in pollution shifting, *not* pollution reduction. Moreover, it undermines the capacity of policies to drive innovation for truly low-carbon hydrogen production solutions.

[4] See, e.g., Institute for Energy Economics and Financial Analysis. *Blue hydrogen: Not clean, not low carbon, not a solution.* September 2023. Online at https://ieefa.org/resources/blue-hydrogen-not-clean-not-low-carbon-not-solution.

[5] See, e.g., S. McNaul, C. White, R. Wallace, T. Warner, H. S. Matthews, J. Ma, M. Ramezan, E. Lewis. *Hydrogen Shot Technology Assessment: Thermal Conversion Approaches*. National Energy Technology Laboratory, Pittsburgh, December 5, 2023. Online at https://netl.doe.gov/projects/files/HydrogenShotTechnologyAssessmentThermalConversionApproaches_120523.pdf.

[6] For more, see, e.g., "The serious risks around treatment of biomethane in 45V" and "Biomethane threatens to upend the clean hydrogen tax credit"; additionally, see pp. 14-21 of comments from the Union of Concerned Scientists to the 45V docket (February 26, 2024), online at https://www.regulations.gov/comment/IRS-2023-0066-29522.

Critically, even if these carbon accounting loopholes are allowed today, they do not change the fact that the underlying pollution is real and, for entities using hydrogen as a decarbonization solution—green steel, green ammonia, clean fuels—that pollution still counts. Which means that loophole-dependent fossil-based hydrogen will be avoided by off-takers because it will be inadequate for serving the ultimate goal of end use decarbonization.

And finally third, *even if* fossil-based hydrogen could be sufficiently low-carbon, renewably-powered electrolytic hydrogen production is projected to be cheaper than fossil-based alternatives within a decade.[7]

As a result, between cost pressures, carbon emission pressures, and broader environmental and public health concerns, it's unequivocally clear that for the investment of time, resources, and priorities to prove durable over the long-term, policymakers must set hydrogen policies that are climate-aligned from the outset. Including, when it comes to hydrogen production, prioritizing truly clean electrolytic hydrogen production, not fossil-based alternatives.

Thank you for the opportunity to testify.

[7] See, e.g., BNEF's 2023 Levelized Cost of Hydrogen (summary online at https://about.bnef.com/blog/2023-hydrogen-levelized-cost-update-green-beats-gray/).