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Submitted to Cleanh2standard@ee.doe.gov

Re: Draft Guidance on Hydrogen and Fuel Cell Program: Guidance for Clean Hydrogen Production Qualifications

Dr. Richmond,

Thank you for the opportunity to comment on the Draft Guidance on Hydrogen and Fuel Cell Program: Guidance for Clean Hydrogen Production Qualifications. Food & Water Watch ("FWW") respectfully submits these comments to assist the Department of Energy ("DOE") in developing a clean hydrogen guidance that will lead to aggressive and effective climate action and maintains the integrity of future, climate-friendly hydrogen production. DOE's Clean Hydrogen Production Standard ("CHPS") must align with a broad transition away from combustion-based, climate-damaging energy production and focus resources on fostering electrolytic hydrogen production using non-combustion-based sources of electricity. As drafted, the Draft Guidance risks expanding the meaning of "clean hydrogen" to include hydrogen production that cannot reasonably be considered "clean" and could do more climate harm than good. FWW makes the following recommendations, as explained in more detail below:

1) DOE must be cautious when relying on carbon capture use and sequestration ("CCUS") to meet carbon intensity thresholds;

2) DOE must prioritize electrolysis systems that use truly clean and renewable energy such as wind and solar;

3) the CHPS should use a comprehensive system boundary and conservative baselines;

4) DOE must ensure accurate accounting of up and downstream emissions from biogas systems;

5) DOE must ensure the additionality of GHG reductions associated with feedstock or process fuels used to lower hydrogen's carbon intensity; and

6) DOE should not give funding preferences to manure-to-energy projects.

Interests of Commenter

FWW is a national, nonprofit membership organization that mobilizes regular people to build political power to move bold and uncompromised solutions to the most pressing food, water, and climate problems of our time. FWW uses grassroots organizing, media outreach, public education, research, policy analysis, and litigation to protect people's health, communities, and democracy from the growing destructive power of the most powerful economic interests. FWW advocates for a truly green and clean energy transition that prioritizes people and their communities over profits and entrenched industry interests. FWW represents its over 3 million members and supports nationwide.

Recommendations

1. DOE Must Be Cautious When Relying on CCUS

Reliance on CCUS to achieve the 4 $kgCO_2e/kgH_2$ threshold demands that DOE be careful to not overestimate the benefits or underestimate the risks. FWW recognizes that Congress has directed DOE to support hydrogen production from several sources, including hydrogen produced using fossil fuels and CCUS, but the scale and timing of that support is withing DOE's discretion as it navigates a variety of competing priorities in implementing portions of the

Infrastructure Investment and Jobs Act. Despite decades of funding and research, CCUS still poses significant uncertainties regarding overall effectiveness and environmental and public health risks. This includes the risks and impacts from CO_2 pipeline development needed to transport CO_2 from sources to geologic formation storage sites.

FWW recommends that DOE first study and clarify knowledge gaps regarding environmental and public health impacts at carbon dioxide injection sites before proceeding with a full embrace of CCUS. In particular, there is a risk that carbon dioxide injected into saline aquifers could migrate into groundwater or induce seismicity in the surrounding area.[1] Moreover, as carbon dioxide is injected into geologic formations, the increased pressure will necessitate the removal of brine, which may be contaminated with heavy metals, naturally occurring radioactive material, or other contaminants. DOE and the U.S. EPA must give attention to and implement appropriate safeguards regarding the management and disposal of produced brine associated with CCUS.

Uncertainty also persists around Outer Continental Shelf injection sites. The complexity of the offshore environment, and the unknowns specifically in the Gulf of Mexico, make this an especially complicated challenge. Of particular concern are the unknown numbers of abandoned oil and gas wells, which could serve as a route for carbon migration and leakage from purported storage sites. DOE and Bureau of Ocean Energy Management acknowledge these risks, and neither knows how many wells there currently are in the Gulf that may compromise the effectiveness, safety, and durability of CO_2 injection.

[1] National Energy Technology Laboratory, Overview of Potential Failure Models and Effects Associated with CO_2 Injection and Storage Operations in Saline Formations (Dec. 18, 2020), https://www.energy.gov/sites/prod/files/2021/01/f82/DOE-LPO_Carbon_Storage_Report_Final_December_2020.pdf

Finally, the Guidance should clarify that CO_2 injected with accompanying enhanced oil recovery ("EOR") should include a "full-burn assumption"[2] for any oil extraction made possible by EOR. When CO_2 "storage" also leads to more oil extraction, the processing, transport, and combustion of that fuel must be included in the carbon intensity calculations for the hydrogen production using CCUS.

2. DOE Must Prioritize Electrolysis Systems Using Wind, Solar, Geothermal, and Other Truly Clean and Renewable Sources of Energy

DOE must prioritize hydrogen produced via electrolysis systems using wind, solar, geothermal, or other truly clean and renewable sources of energy because they provide the most climate benefit compared with all other methods of hydrogen production and are in line with a clean energy future. Congress has indicated that DOE should prioritize this sector, as illustrated by the establishment of the Clean Hydrogen Electrolysis Program. *See* Infrastructure Investment and Jobs Act § 40314.

Effective climate action must foster a transition away from climate-damaging, combustion-based energy systems. Therefore, hydrogen produced with fossil fuels, natural gas, or other climate damaging inputs or process fuels are counterproductive because they depend on the very systems we must move away from, perversely extending reliance on what we know is a climate dead end. If hydrogen has a meaningful role in long-term climate change mitigation efforts, it must be produced with the kinds of energy that will make up the clean energy systems of the future.

[2] This assumes a 100% utilization rate, which would set a conservative upper-bound estimate of emissions from downstream use. Alternatively, if DOE determines that leakage rates also should be included in downstream emissions from EOR operations, a utilization rate of 100% minus estimated leakage would be appropriate.

Further, producing hydrogen through steam-methane reforming of natural gas is inferior to electrolytic hydrogen production using clean, renewable electricity from a climate and public heath perspective. While we recognize that Congress has directed DOE to "advance and support" clean hydrogen production from diverse energy sources,[3] steam reforming is "an advanced and mature production process" representing "95% of the hydrogen production in the United States" currently.[4] Further support from DOE for this type of hydrogen production is therefore unnecessary and misplaced; instead, DOE must focus resources on advancing and supporting the underdeveloped field of clean electrolytic hydrogen production.

3. DOE's CHPS Should Use a Comprehensive System Boundary and Conservative Baselines

FWW supports the suggestion by the International Partnership for Hydrogen in the Economy's Hydrogen Production Analysis Task Force to use comprehensive system boundaries that capture all up and downstream emissions associated with feedstocks and process fuels as well as downstream usage in the CHPS. Without this comprehensive approach, DOE risks importing major policy failures found in other low carbon fuel programs, where system boundaries are drawn to exclude major sources of GHG emissions associated with feedstock production. This policy failure is most apparent in the LCAs of manure-to-energy projects, where feedstock production (*i.e.*, manure generation) is largely ignored and instead anaerobic manure lagoons that emit large amounts of methane are treated as naturally and spontaneously occurring on the landscape. For example, despite claiming to employ a "well-to-wheels" analysis, California's Low Carbon Fuel Standard ("LCFS") ignores most emissions associated

[3] Infrastructure Investment and Jobs Act § 40313(e)(2).
[4] DOE Office of Energy Efficiency & Renewable Energy, *Hydrogen Production: Natural Gas Reforming*, https://www.energy.gov/eere/fuelcells/hydrogen-production-natural-gas-reforming

with feedstock production at industrial animal confinement facilities. That program's assigned carbon intensities ignore enteric fermentation emissions from the cows that produce the manure used to produce biogas, which can be higher than the "captured" methane emissions from anaerobic lagoons, as well as other increased emissions associated with digestate handling and disposal.[5] This approach severely undermines the integrity of those programs and results in counterproductive market signals that can perversely result in *increased* GHG emissions from expanded operations designed to profit off manure production as a biogas feedstock.

FWW also recommends that DOE employ conservative baselines to inform LCAs. Looking again at manure-to-energy projects and the LCFS, California initially did just this, and assumed that the intentionally vented methane from anaerobic lagoons "would have been captured and destroyed" even without program subsidies.[6] California reversed course in subsequent amendments to the LCFS, and now uses an "avoided methane venting" baseline. This has led to a manure "gold rush" with severe unintended consequences springing from the incentivization of larger and larger herds and manure management practices that maximize methane emissions so they may be "captured" for profit.[7] Manure methane emissions from livestock operations are the result of intentional and avoidable operational decisions (wet manure handling and storage in anaerobic lagoons) that can be largely avoided with more responsible waste management practices. Therefore, DOE must require a conservative baseline that does not

[5] *See* California Air Res. Board, *Renewable Natural Gas from Dairy and Livestock Manure* at 13 (Apr. 13, 2017), https://ww2.arb.ca.gov/sites/default/files/classic//fuels/lcfs/lcfs_meetings/041717discussionpaper_livestock.pdf
[6] *Id.* at 1.
[7] *E.g.*, Phred Dvorak, *California's Green-Energy Subsidies Spur a Gold Rush in Cow Manure*, WALL STREET J. (Feb. 19, 2022), https://www.wsj.com/articles/californias-green-energy-subsidies-spur-a-gold-rush-in-cow-manure-11645279200; Michael McCully, *Energy Revenue Could Be a Game Changer for Dairy Farms*, HOARD'S DAIRYMAN (Sept. 23, 2021), https://hoards.com/article-30925-energy-revenue-could-be-a-game-changer-for-dairy-farms.html; *Manure Becomes More Valuable Than Milk at California Dairies*, SBJ (Oct. 20, 2021), https://sbj.net/stories/manure-becomes-more-valuable-than-milk-at-california-dairies,76541.

credit the "capture" of intentionally generated methane emissions from industrial livestock operations.

4. DOE Must Ensure Accurate Accounting of Fugitive Emissions in Upstream Biogas Systems

As the most recent research indicates, fugitive and other emissions attributable to biogas production are higher than previously understood, threatening the integrity and accuracy of assigned carbon intensities.[8] DOE must ensure that carbon intensities are based on an accurate and comprehensive accounting of these up and downstream emissions. Bakkaloglu et al. (2022) found "data reveals that CH_4 emissions throughout the supply chains have been underestimated." And Holly et al. (2017), focused on biogas production through anaerobic digestion, found that post-digestion handling of digestate resulted in significant increases of ammonia and nitrous oxide emissions compared with the same management of undigested waste.

Finally, Grubert (2020) concluded that renewable natural gas "from intentionally produced methane is always GHG positive unless total system leakage is 0."[9] As explained above, methane produced from intensive livestock operations is intentionally produced and readily avoidable with better waste management, and therefore DOE's guidance should not consider this fuel climate negative, or even climate neutral.

DOE must ensure that this Guidance captures these associated emissions to calculate carbon intensities when biogas is used in hydrogen production.

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[8] *See* Semra Bakkaloglu et al., *Methane Emissions Along Biomethane and Biogas Supply Chains Are Underestimated*, 5 ONE EARTH 724 (2022), https://www.sciencedirect.com/science/article/pii/S2590332222002676; Michael A. Holly et al., *Greenhouse Gas and Ammonia Emissions from Digested and Separated Dairy Manure During Storage and After Land Application*, 239 Agric. Ecosystems & Env't 410 (2017), https://doi.org/10.1016/j.agee.2017.02.007.

[9] Emily Grubert, *At Scale, Renewable Natural Gas Systems Could Be Climate Intensive: The Influence of Methane Feedstock and Leakage Rates*, 15 Enviro. Res. Lett. (2020), https://iopscience.iop.org/article/10.1088/1748-9326/ab9335.

5. DOE Must Ensure Additionality in All LCAs and Carbon Intensities

DOE must ensure the additionality of all GHG reductions associated with a feedstock or process fuel used to comply with the 4 $kgCO_2e/kgH_2$ threshold. To do otherwise will result in double counting that undermines the integrity of climate programs and fails to achieve real-world emissions reductions.

DOE should adopt a comprehensive additionality analysis that ensures only emissions reductions *that would not have occurred otherwise* are used to lower hydrogen's carbon intensity. Specifically, any legally required reductions, any reductions already agreed to through contract or other binding obligation, and reductions that have already been funded by a government program should be deemed non-additional and should not be allowed to lower hydrogen's carbon intensity. Unfortunately, some programs fail to include this additionality analysis, resulting in massive double counting, credit stacking, and illusory GHG reductions. In fact, because California fails to use a comprehensive additionality analysis for the LCFS, many of the supposed reductions claimed under the program are double or triple counted by various programs and agencies.[10] What this means is that the state's claimed methane reductions, especially from industrial livestock sources, diverge from reality because one project can only "capture" a unit of methane once, yet California (and the federal government through the Renewable Fuel Standard and RINs) claims those same reductions multiple times.

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[10] For example, methane capture at certain digester projects at California dairies have been counted and assigned three separate times by California agencies: the Dairy Digester Research and Development Program, the LCFS, and the Aliso Canyon Mitigation Agreement. California Air Res. Board, LCFS TIER 2 PATHWAY APPS. B0019 (DDRDP); B0104 (DDRDP); B0106 (DDRDP); B0172 (DDRDP); B0185 (DDRDP and Alison Canyon Mitigation Agreement); B0198 (DDRDP and Aliso Canyon Mitigation Agreement).

6. DOE Should Not Give Funding Preference to Manure-to-Energy Applicants

The draft guidance states that "DOE may give preference to projects that mitigate upstream fugitive emissions."[11] FWW recommends that DOE clarify that this does not apply to manure-to-energy projects' upstream methane emissions from waste management in anaerobic lagoons. First, these emissions are intentionally produced and therefore should not be encouraged when they can be easily avoided through better waste management practices (the obviously superior option for climate change mitigation). Second, manure methane emissions are not "fugitive" in that they are not unintentional or unanticipated.[12] These emissions are a deliberate choice, knowingly created by factory farm operators as part and parcel of their decision to store and dispose of their waste in the cheapest way possible. Thus, DOE should not prioritize projects on the basis that they mitigate upstream methane emissions from factory farm waste management.

Conclusion

FWW respectfully submits these recommendations so that DOE's CHPS Guidance will foster effective and safe hydrogen production that results in maximum real-world climate change mitigation. DOE must use caution when relying on CCUS to meet its objectives. DOE must prioritize the kind of hydrogen production that aligns with a clean energy future. And other low carbon fuel programs, such as California's LCFS, provide examples of policy failures and unintended consequences springing from how those programs operate; DOE should carefully

[11] Draft Guidance, at 3.
[12] *See Fugitive Emissions,* Science Direct https://www.sciencedirect.com/topics/engineering/fugitive-emission ("Fugitive emission is defined as the unintentional and undesirable emission, leakage, or discharges or gases of vapors…").

avoid making the same mistakes in this Guidance. FWW appreciates the opportunity to comment on these important issues.

Sincerely,

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