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**U.S. Department of the Treasury, Internal Revenue Service, Notice 2022-58: Request for Comments on Credits for Clean Hydrogen and Clean Fuel Production**

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Internal Revenue Service
CC:PA:LPD:PR (Notice 2022-58)
Via Electronic Filing Submission

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Onward Energy (Onward) appreciates the opportunity to submit comments to the Department of the Treasury (Treasury Department) and the Internal Revenue Service (IRS) in response to Notice 2022-58. Onward's comments focus on the definition of the term "qualified clean hydrogen" as used in § 45V of the Inflation Reduction Act (IRA) and other associated issues. Onward submitted related comments in response to Notice 2022-49 (Comment Tracking Number: la2-u684-yi8u) and in response to the Department of Energy's (DOE) draft guidance for a Clean Hydrogen Production Standard (CHPS).

**Background on Onward**

Onward brings unique experience and expertise for the Treasury Department and the IRS's consideration. As one of North America's premier independent power producers, Onward is committed to rapidly decarbonizing the grid while providing safe, reliable, and clean electricity. Onward has a fleet of 56 electrical generating facilities, including wind, solar, and natural gas, totaling over six gigawatts (GW) and spanning 22 states. Onward is ideally situated to address the energy market's transition to lower carbon emissions while maintaining reliability and affordability. In pursuit of that vision, Onward is actively pursuing opportunities to develop projects that will enhance grid reliability in a sustainable manner, including through batteries and hydrogen generation, storage, and use.

Of particular relevance to these comments, Onward owns and operates the Arapahoe natural gas-fired power plant in Denver, Colorado. Arapahoe has a total capacity of 125 megawatts (MW) and consists of two 40 MW General Electric (GE) LM6000 natural gas aeroderivative combustion turbines, two heat

recovery steam generators with supplemental firing, one steam turbine, and selective catalytic reduction emissions controls. Arapahoe is highly effective in integrating increased penetration of wind, solar, and other renewable energy in Colorado's largest load pocket.

Onward is evaluating a hydrogen electrolyzer and storage facility to be co-located with the Arapahoe generating unit. It is Onward's intention to bid this project into the current Electric Resource Plan (ERP) of Public Service Company of Colorado (PSCo) (an Xcel Energy Company). Subject to selection by PSCo and approval by the Colorado Public Utilities Commission, the project would be among the first of its kind in the world.

Under the plan, the electrolyzer would be powered by the electric grid operated by PSCo, but only during periods of excess renewable energy generation, when zero-carbon renewable generators would otherwise be curtailed. The electrolzyer would produce hydrogen that would then be blended with natural gas. When the Arapahoe facility is called upon, primarily to provide renewable integration and reliability services to the local grid, it would use the hydrogen-natural gas blend to the greatest extent possible, thereby reducing the greenhouse gas (GHG) emissions profile of the resulting electricity.

**Response to Specific Requests for Comments**

Onward is responding specifically to requests 3.01(1) ("What, if any, guidance is needed to clarify the definition of qualified clean hydrogen?"); 3.01(2) ("For purposes of the § 45V credit, what should be the definition or specific boundaries of the well-to-gate analysis?"); and 3.01(5)(c) ("What existing industry standards, if any, should the Treasury Department and the IRS consider for the verification of production and sale or use of clean hydrogen for the § 45V credit, § 45 credit, and § 48 credit?").

*Defining Qualified Clean Hydrogen*

Onward urges the Treasury Department and the IRS to look at grid systems holistically when defining "qualified clean hydrogen" for purposes of calculating a § 45V credit. In some circumstances, hydrogen can be produced with no net system-wide GHG emissions, even when it receives power from the grid rather than from a co-located renewable facility. Forthcoming guidance should confirm that hydrogen produced as fuel in power generation should qualify as clean hydrogen under the IRA if (among other scenarios): (i) it is generated using grid electricity from net-zero-carbon electrons produced during

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periods of excess renewable generation on the grid that would otherwise be curtailed, and (ii) the hydrogen is burned as a fuel at times when it is not displacing generation from renewable resources.

If a grid operator—whether an Independent System Operator, a Balancing Authority, or other entity—cannot increase beneficial load (such as energy storage) during periods of excess renewable generation on a system, then it typically must curtail renewable generation.[1] Relatedly, if a grid-powered hydrogen facility is operated such that electrolysis occurs only during periods of excess intermittent renewable generation, then it would increase the load on the system and reduce the amount of renewable generation that would otherwise be curtailed. The facility would put the excess renewable energy to a productive use, transforming it into hydrogen that could then be used to provide dispatchable energy and lower future emissions. Hydrogen produced under such circumstances should have no GHG emissions allocated to its production because the excess renewable generation and associated losses can be measured and tracked by the grid operator, providing what could be the first material source of dispatchable zero-carbon generation with rotating mass in the United States.

Some commenters may advocate that any hydrogen produced using grid electricity should be assigned the GHG emissions of the grid-average electricity at the time of production for purposes of determining the appropriate tax credit level. Such an approach would be overly simplistic and highly short-sighted.

Moreover, this approach would fail to properly incentivize hydrogen generation and storage facilities that have great potential to advance decarbonization objectives. Generating hydrogen during times of system renewable curtailments or otherwise using "surplus" renewable energy has been increasingly recognized as key strategy in decarbonizing the broader grid.[2] Although electrolysis results in necessary

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[1] *See, e.g.,* Bethany Frew et al., *The Curtailment Paradox in the Transition to High Solar Power Systems*, 5 JOULE 1143 (2021) (describing basics of curtailment and analyzing effect of various grid flexibility options on amounts of renewable curtailment), *available at* https://doi.org/10.1016/j.joule.2021.03.021.

[2] *See, e.g.,* Tyler H. Ruggles et al., *Opportunities for Flexible Electricity Loads such as Hydrogen Production from Curtailed Generation*, 3 ADVANCES IN APPLIED ENERGY 1, 8 (2021) (finding that unused and curtailed generation capacity can be cost-effectively exploited with flexible loads such as hydrogen electrolysis), *available at* https://doi.org/10.1016/j.adapen.2021.100051; *see also* SASAN SAADAT & SARA GERSEN, RECLAIMING HYDROGEN FOR A RENEWABLE FUTURE: DISTINGUISHING OIL & GAS INDUSTRY SPIN FROM ZERO-EMISSION SOLUTIONS 13 (Earthjustice 2021) ("To deliver meaningful environmental benefits, green hydrogen production must be paired with the build-out of new renewable resources *and/or use surplus renewable energy*.") (emphasis added), *available at* https://earthjustice.org/sites/default/files/files/hydrogen_earthjustice_2021.pdf.

power costs,[3] it will play a critical role in grid decarbonization. For example, hydrogen that is produced and used strategically for grid capacity, reliability, and stability purposes can facilitate overall decarbonization, so long as the hydrogen displaces natural gas or other fossil fuels and does not displace renewable fuels in significant amounts.

Grid systems in the United States are not yet prepared to run both cost-effectively and reliably with zero- or near-zero GHG emissions. It simply is not yet affordable for grid operators to acquire enough firm dispatchable zero-carbon generation and storage in sufficient quantities and of sufficient duration to fully replace all thermal resources, especially during extreme weather events.[4] Accordingly, if hydrogen fuel—generated using either co-located renewable power or grid power during periods of excess renewable generation—can displace some fossil fuels in thermal resources, there will be a net GHG emissions benefit, so long as those thermal resources are not being dispatched *in lieu of* renewable or other lower-emissions generation. When a thermal unit is instead being dispatched either because all available lower-emissions generation is operating at peak capacity, or to provide grid balancing or reliability services that cannot be provided by other renewable resources, blending in hydrogen fuel will only serve to reduce system-wide GHG emissions, while retaining dispatchability and rotating mass benefits provided by traditional generation resources.

Requiring that hydrogen production be collocated with renewable energy production to qualify as clean hydrogen would severely limit the effectiveness of this strategy. Forthcoming guidance should therefore recognize the power to run a hydrogen electrolzyer should count as zero-carbon—and not be assigned the grid-average carbon emissions—if the hydrogen facility operator can demonstrate that electrolysis occurs at a time when excess renewable energy in the same balancing area would otherwise be curtailed.

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[3] *See, e.g.,* Chao Zheng, *Hydrogen Round Trip Efficiency*, 2 FRONTIERS OF MECHATRONICAL ENG'G 79, 80 (describing the inefficiency of electrolysis generally), *available at* http://dx.doi.org/10.18282/fme.v2i3.1272.

[4] For example, during an early September 2022 heat wave, the California Independent System Operator (CAISO) used natural gas for as much as 60%—and never less than 30%—of the generation mix to meet electricity demand, despite the state's deep investment in renewable generation and energy storage. *See California Fuel Mix Changes in Response to September Heat Wave*, U.S. ENERGY INFO. ADMIN. (Sept. 21, 2022), *available at* https://www.eia.gov/todayinenergy/detail.php?id=53939.

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*Alignment with the Clean Hydrogen Production Standard*

DOE's CHPS draft guidance establishes a target lifecycle GHG emissions rate for clean hydrogen of no greater than 4.0 kgCO2e/kgH2, which is the same lifecycle GHG emissions limit required by § 45V.

The draft guidance also states that DOE's understanding of lifecycle emissions is informed by a working paper published by the International Partnership for Hydrogen in the Economy's Hydrogen Production Analysis Task Force. Draft Guidance at 7. The working paper, in turn, states that "GHG emissions associated with electrolysis are subject to the nature of electricity supply for electrolysis as electricity can be sourced from the grid (noting that this may be impacted by contracting of renewable electricity supply and associated instruments)."[5] This helps explain why DOE believes "electrolysis systems that primarily use clean energy . . . are all generally expected to be capable of achieving 4.0 kgCO2e/kgH2 on a lifecycle basis using technologies that are commercially deployable today." Draft Guidance at 3.

Notice 2022-58 seeks alignment with the CHPS, and in that spirit, Onward encourages the Treasury Department and the IRS to define or set well-to-gate analysis boundaries in a way that appropriately considers grid-powered production. Forthcoming guidance should share DOE's acknowledgement that GHG emissions associated with electrolysis reflect the source of electricity powering the electrolysis. More specifically, the Treasury Department and the IRS should calculate the lifecycle GHG emissions limit of hydrogen produced at a time when excess renewable energy in the same balancing area would otherwise be curtailed and deployed in lieu of fossil fuels to be zero-carbon.

*Industry Standards for Verifying Production and Sale or Use of Clean Hydrogen*

Onward is not aware of any established industry standards that the Treasury Department and the IRS should consider in establishing guidelines for third-party verification of qualified clean hydrogen. However, Onward encourages the Treasury Department and the IRS to consider the broader grid when establishing such guidelines, and to acknowledge that in certain circumstances, grid-powered hydrogen production does not result in system-wide GHG emissions.

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[5] IPHE HYDROGEN PRODUCTION ANALYSIS TASK FORCE, METHODOLOGY FOR DETERMINING THE GREENHOUSE GAS EMISSIONS ASSOCIATED WITH THE PRODUCTION OF HYDROGEN 40 (Int'l P'ship for Hydrogen and Fuel Cells in the Econ. 2021), *available at* https://www.iphe.net/iphe-working-papermethodology-doc-oct-2021.

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**Conclusion**

Onward appreciates the opportunity to submit comments to the Treasury Department and the IRS. As discussed above, Onward requests that the IRA guidance confirm that hydrogen production for use as a fuel in power generation should be certified to meet the IRA's clean hydrogen verification requirements if: (i) it is generated using grid electricity from zero-carbon electrons produced during periods of excess renewable generation on the grid that would otherwise be curtailed, and (ii) the hydrogen is burned as a fuel at times when it is not displacing generation from renewable resources.

Sincerely,

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