ULTRA SAFE NUCLEAR

Secretary of Energy
US Department of Energy - Office of Clean Energy Demonstrations
1000 Independence Ave SW
Washington, D.C.
20585
United States of America

2022/11/14

ULTRA SAFE NUCLEAR RESPONSE TO CLEAN HYDROGEN PRODUCTION STANDARD DRAFT GUIDANCE

Dear Secretary Granholm:

Ultra Safe Nuclear Corporation, a U.S. corporation headquartered in Seattle, (Ultra Safe Nuclear) is a leading technology developer with a vertically integrated supply chain to design and develop advanced nuclear fuel, reactor, and space applications. Ultra Safe Nuclear' s flagship product is the Micro Modular Reactor (MMR), a micro-scale High Temperature Gas Reactor (HTGR) for commercial applications. The MMR utilizes our proprietary Fully Ceramic Micro Encapsulated (FCM) fuel technology to provide additional inherent safety and defense-in-depth beyond conventional TRISO fuel. The strengths of the design are fully intrinsic safety, load following capabilities, and modularity.

The extreme flexibility of the power output level makes the MMR an ideal candidate for operating as a grid peaker while producing low carbon hydrogen in moments of low demand. The MMR also offers a state-of-the-art molten salt storage system operated at the highest allowable temperature for commercial solar salt. The availability of heat of greater than 550 Celsius enables nuclear-generated energy for many chemical processes including hydrogen production through high temperature steam electrolysis. Ultra Safe Nuclear is driving the most advanced commercial micro-scale Gen-IV program in the world and is demonstrating MMR Energy Systems at the Canadian Nuclear Laboratories with Ontario Power Generation and at the University of Illinois Urbana-Champaign, with new deployment projects underway in the United States, Canada, and Europe.

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Ultra Safe Nuclear is pleased to provide the attached responses to specific questions offered in the Stakeholder Feedback portion of the U.S. Department of Energy Clean Hydrogen Production Standard (CHPS) Draft Guidance, issued 9/22/2022.

Yours sincerely,

Steven J. Cuevas
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Attachment:
Ultra Safe Nuclear Response to US DOE Clean Hydrogen Production Standard (CHPS) Draft Guidance

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Responses to Specific RFI Questions

Question 2(c) and 2(d) Methodology

How should GHG emissions be allocated to co-products from the hydrogen production process? For example, if a hydrogen producer valorizes steam, electricity, elemental carbon, or oxygen co-produced alongside hydrogen, how should emissions be allocated to the co-products (e.g., system expansion, energy-based approach, mass-based approach), and what is the basis for your recommendation?

Ultra Safe Nuclear response:

GHG emissions for co-products should be allocated based on the gross margin received from each product. This methodology proportionally assigns the emissions to the most valuable products and, thus, the fundamental reason the producer has decided to generate them. This also prevents producers from allocating GHG emissions to products that may have a higher weighting by other methodologies to reduce the GHG emission allocated to the hydrogen, even if there is no inherent value in producing the other by-products other than artificially lowering the GHG emissions assigned to the hydrogen.

How should GHG emissions be allocated to hydrogen that is a by-product, such as in chlor-alkali production, petrochemical cracking, or other industrial processes? How is by-product hydrogen from these processes typically handled (e.g., venting, flaring, burning onsite for heat and power)?

Ultra Safe Nuclear response:

GHG emissions should only be allocated to hydrogen that is a by-product if it is monetized and sold to an external party. If it is monetized, the GHG emission should be allocated based on the gross margin received for each product. If the hydrogen is used in another process and is not an end product in and of itself, the GHG emissions should be assigned to the eventual end product of the process.

Queston 3(c) Implementation

Should renewable energy credits, power purchase agreements, or other market structures be allowable in characterizing the intensity of electricity emissions for

hydrogen production? Should any requirements be placed on these instruments if they are allowed to be accounted for as a source of clean electricity (e.g., restrictions on time of generation, time of use, or regional considerations)? What are the pros and cons of allowing different schemes? How should these instruments be structured (e.g., time of generation, time of use, or regional considerations) if they are allowed for use?

Ultra Safe Nuclear response:

Renewable energy credits, virtual power purchase agreements (VPPAs), or other market structures which involve a lack of physical connection between the electricity production and the hydrogen production should not be allowable in characterizing the intensity of electricity emissions for hydrogen production. A direct, physical tie should be established between the electricity source and the hydrogen production.

The pros of this scheme are that it expedites the transition to a low carbon grid. However, if this scheme is not employed and a credit or VPPA scheme is allowed, fossil fuel based peaker plants will continue to operate to meet the grid demand while the renewable generation being relied upon for the credit or VPPA is removed from supplying green electricity to the grid. Conversely, disallowing time transfer of carbon free electricity generation through a credit or VPPA scheme reduces the opportunity for long lasting present for fossil fuel based peaking plants, thereby speeding the decarbonization of the grid. Additionally, completing the transition to low carbon electricity generation sources now will allow projects to take advantage of the tax credits created under the Inflation Reduction Act and thus reduce the overall cost of the energy transition.

If a credit or VPPA scheme is instituted to allow a non-physical connection between electricity generation and hydrogen production, a temporal correlation should be used to ensure the electrolysis process is truly tied to low carbon power. The European Union's temporal correlation of quarterly matching would be a loose starting point, while tighter constraints (e.g., monthly or daily) would be preferrable. The pro of this scheme, specifically when considering tighter constraints, is that it ensures that higher emission grid power is not used to generate hydrogen at emission levels exceeding the standard. In addition to delaying transition to a low carbon grid as noted above, the con of this scheme is that aligning the power generation timing with the hydrogen production timing may be technically and administratively burdensome. Thus, a direct, physical connection is preferred.

Question 4(a) Additional Information

Please provide any other information that DOE should consider related to this BIL provision if not already covered above.

Ultra Safe Nuclear response:

Existing low carbon power sources should not be used to produce low carbon hydrogen. These power sources are needed to maintain and support overall emissions reductions of the existing grid. New low carbon sources should be required to be built to provide power to hydrogen generation systems. This will support current grid decarbonization plans while ensuring electrolytic hydrogen is produced using low carbon resources.