February 26, 2024

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Internal Revenue Service
CC:PA:LPD:PR
Room 5203
P.O. Box 7604
Ben Franklin Station
Washington, DC 20044

Re: Comments and Request to Testify
Notice of Proposed Rulemaking – Section 45V
REG–117631–23

To Whom It May Concern:

Fortescue is a $55 billion global integrated green energy, technology, and minerals company. We are recognized for our culture, innovation, and industry-leading development of infrastructure, mining assets, and green energy initiatives. Fortescue is leading the green industrial revolution, developing technology solutions for hard-to-decarbonize industries, and building a global portfolio of renewable green hydrogen and green ammonia projects.

As such, Fortescue is keenly invested in the implementation of the Inflation Reduction Act's (IRA) tax incentives as they related to hydrogen, as relevant here, the Hydrogen Production Tax Credit found at Section 45V of the Internal Revenue Code. Since the passage of the IRA, Fortescue announced major investments in the U.S. in electrolytic (green) hydrogen production and manufacturing. Our U.S. Advanced Manufacturing Center, located in the heart of Detroit, Michigan, intends to manufacture heavy industry batteries, fast chargers, and electrolyzers. The $35 million initial investment to buy the facility, with additional investment to retrofit for manufacturing, will create up to 600 jobs by 2030, with the potential for significant expansion. In November 2022, Fortescue made a final investment decision on a $550 million capital expenditure for a green hydrogen production facility in Buckeye, Arizona to service the mobility market beginning in 2026. These two projects, in addition to our announced green hydrogen production facility in Washington State, part of the Pacific Northwest's Hydrogen Hub, demonstrate Fortescue's commitment to bring critical investment to the U.S. to provide for global energy needs while fighting the climate crisis.

As a result of the IRA, Department of Energy's Hydrogen Hub Program, and other Biden Administration efforts to decarbonize, U.S. demand for hydrogen is expected to increase by about

40 percent by 2040, with some predicting that global hydrogen consumption will increase five-fold by 2050. Of course, these predictions assume favorable conditions for producing hydrogen to ensure the price of hydrogen is low enough to enable widespread adoption from hard-to-abate industries. The opportunity for the U.S. to meet this demand is significant.

Section 45V was intended to be a catalyst for clean hydrogen production in the U.S., however the notice of proposed rulemaking (NPRM) will have the opposite effect on the burgeoning hydrogen industry if finalized as proposed. Specifically, the NPRM as drafted limits project opportunity, creates investment risk and uncertainty, and significantly increases costs for green hydrogen production. The requirements under the NPRM will make it difficult to produce hydrogen at the volume and price necessary to meet anticipated demand, in contradiction with the purpose of the IRA and the Biden Administration's goal of 1-1-1 – one kilogram of hydrogen for $1 in one decade.

To be clear, Fortescue is unequivocally devoted to efforts that reduce emissions, however, Section 45V rules that are too strict will make the U.S. industry uncompetitive and uneconomic even before it starts. If we are serious about combating climate change, we must work to build the green hydrogen industry in parallel to the development of cheaper, more available renewable resources, not after those renewable resources have already been developed. For these reasons and the reasons outlined below, Fortescue urges Treasury to remove these overly burdensome eligibility requirements or risk losing the development of a critical industry at a time when the globe hurtles past 1.5 degrees Celsius. This will be a missed opportunity and result in lower adoption rates of green hydrogen and continued or increased use of fossil fuels. For these reasons, and in an effort ensure the right policy environment for the U.S. green hydrogen production industry, we offer the following comments and recommendations.

COMMENT OVERVIEW

Hydrogen production facilities require significant planning and capital. Fortescue joins other stakeholders in urging that the rules under Section 45V be finalized as quickly as possible – longer delays in promulgating the final rulemaking will delay investment decisions and construction dates. Fortescue and the greater hydrogen industry, as well as financiers, need final rules to evaluate the feasibility of planned projects, which includes an analysis of Section 45V credit availability and value. Further delays in publishing a final rule puts the U.S. at a competitive disadvantage in the race across the world for hydrogen development. In addition, final rules must provide stability and certainty, for example it is difficult to proceed with planned projects when the credit value could fluctuate over the 10-year credit period due to changes in the rules or updates to the 45VH2-GREET model.

Decisions made on the final rules will greatly impact the calculus for Fortescue; the NPRM has made it difficult for Fortescue to have confidence in the feasibility of its plans to produce green hydrogen in U.S. competitively. We believe that the approach taken by the NPRM as it relates to

the Three Pillars – incrementality, temporal matching, and deliverability – is legally without support in the statute, inconsistent with congressional intent and diverges from the stated goals of the Biden Administration. Specifically, many of Fortescue's concerns over the NPRM relate to two requirements (two of the Three Pillars) that energy attribute certificates (EACs) must satisfy to be considered qualifying – incrementality and temporal matching.

For reasons detailed below, the NPRM greatly limits the number of EACs that would be considered qualifying, and Fortescue predicts that for its planned projects this will result in a significant increase in green hydrogen production costs, to the point where it could become uneconomic to produce in the U.S.

Ultimately, the requirements outlined in the NPRM at it relates to the Three Pillars will suppress the growth of the U.S. green hydrogen industry. Without the early execution of large green hydrogen projects, the related supply chains--most importantly electrolyzer manufacturing--will not scale, impeding the cost declines envisioned in the U.S. National Clean Hydrogen Strategy. Leveraging economies of scale to generate cost declines is critical to achieving a hydrogen price supportive of widespread adoption by hard-to-abate industries. As such, the NPRM not only threatens the feasibility of green hydrogen production facilities, but also the larger U.S. emissions reduction targets.

Fortescue implores the U.S. Department of Treasury and the Internal Revenue Service to rethink the principles of the NPRM as they relate to the Three Pillars for qualifying EACs, or at the very least the timing of such an approach, to nurture and encourage the growth of the green hydrogen industry and its ecosystem. Further to our comments below, Fortescue notes that the most effective way to bring green hydrogen projects online is to grandfather projects, not by delaying the implementation effective date. For example, a transition rule that requires annual temporal matching and moves to hourly temporal matching does not provide any benefit to a project, as the hydrogen production facility must be designed and built to meet the strictest Section 45V eligibility criteria that will apply during the facility's 10-year credit period. A transition period of any length, therefore, does not provide relief. Ultimately, we recommend Treasury should remove the Three Pillars entirely, allowing the industry to develop in a meaningful way. Our comments will outline how, if the Three Pillars are adopted, grandfathering, and grandfathering alone, is the only way to ensure green hydrogen projects progress in the U.S. in a way that makes its production and use economic.

We have presented our detailed comments below in order of the proposed rules. However, we highlight our critical recommendations in order of importance as follows:

CRITICAL RECOMMENDATIONS

1) **Temporal Matching.**

Grandfather facilities that begin construction prior to December 31, 2029, into annual temporal matching, such that they are deemed to satisfy the temporal matching pillar during the 10-year credit period.

2) **Incrementality.**

Grandfather facilities that begin construction prior to December 31, 2029, such that they are deemed to satisfy the incrementality pillar during the 10-year credit period.

3) **45V H2-GREET model.**

Allow taxpayers to utilize the version of the 45VH2-GREET model available at the time the facility begins construction for the 10-year credit period. In addition, taxpayers should also be able to elect to use the 45VH2-GREET model that is available on the first day of the taxable year in which the hydrogen is produced.

DETAILED COMMENTS AND RECOMMENDATIONS

Proposed § 1.45V–1. Credit for production of qualified clean hydrogen.

Fortescue appreciates the efforts to release a GREET model specific to Section 45V. While updates to the 45VH2-GREET model to improve accuracy and flexibility will be welcome, the NPRM requires taxpayers to use the 45VH2-GREET model that is publicly available on the first day of the taxable year during which the qualified hydrogen is produced. Under this rule, after a facility is placed in service, the facility's ability to qualify for tax credits, and the value of such tax credits, could change from year to year as the 45VH2-GREET model changes. Tying eligibility and credit value to a moving 45VH2-GREET target over the 10-year credit period creates significant risk that a facility will not qualify for the life of the tax credit. That risk will make project development difficult and investment and financing improbable.

Critical Recommendation: Allow taxpayers to utilize the version of the 45VH2-GREET model available at the time the facility begins construction for 10-year credit period or the 45VH2-GREET model available on the first day of the taxable year in which the clean hydrogen is produced.

In addition, we request additional flexibility be built into the 45VH2-GREET model such that taxpayer can input "actual" background data when available, rather than rely on values and assumptions built into the background data of a model. The 45VH2-GREET model should also be as transparent possible, with the source of data points made clear and all assumptions or

calculations made available for evaluation. Such flexibility and transparency is important for taxpayers as this will allow them the information and incentive to undertake all steps to reduce the Greenhouse Gas Emissions (GHG) of their hydrogen.

Recommendation: Future iterations of the 45VH2-GREET model should provide greater flexibility and transparency.

Proposed § 1.45V–4. Procedures for determining lifecycle greenhouse gas emission rates.

Incrementality. The NPRM provides only two narrow ways to meet the incrementality requirements – renewable resources that began production of energy no more than 36 months prior to the date the hydrogen facility was placed in service or a facility that had an uprate within that same period. While we agree that one of the most effective ways to minimize the impacts and effects of climate change is to place more renewable resources in service, and quickly, requiring all facilities meet these criteria immediately will halt growth of the green hydrogen industry.

Blanket application of the incrementality proposal, even with a 36-month lookback, also disadvantages important zero-carbon electricity sources, like nuclear and hydropower, and regions which have made the most progress towards a zero-carbon grid. For example, Fortescue's 300MW green hydrogen production facility in Washington State plans to use a mix of hydropower and other renewables. If incrementality is applied as proposed in the NPRM, coupled with the challenge in procuring hourly EACs as further described in the section below, Fortescue would need to seek additional new renewable energy resources from the region for this facility, costing an additional $14/MWh in transmission costs alone, assuming it is even achievable within the same time frame as the project. The average time in the U.S. for new renewable (wind and solar) capacity to come online is about five years from start to finish, while projects that require new transmission lines take longer. In addition, DOE's proposed National Environmental Policy Act (NEPA) process for Hydrogen Hubs will delay the start of construction, impacting the ability of those projects to adhere to incrementality requirements in the NPRM. Considering these factors, and in light of the requirements for development schedules mandated by DOE, incrementality makes our facility at the center of the Pacific Northwest Hydrogen Hub unfeasible and uneconomic.

The increase in cost from the NPRM's incrementality requirements will also result in a significant negative downstream impact on emission reductions. If green hydrogen projects do not move forward, or if they move forward with a prohibitively more expensive product, the decarbonization benefits from green hydrogen in fertilizers, feedstocks, and the transportation market are lost completely.

Other power users, including but limited to electric vehicles and data centers, do not have such stringent requirements on power purchase and use; the result of the NPRM as proposed creates a significant competitive disadvantage for green hydrogen production and use.

Critical Recommendation: Grandfather facilities that begin construction prior to December 31, 2029, such that they are deemed to satisfy incrementality during the 10-year credit period.

Recommendation: If a broader grandfather provision on incrementality is not amendable, allow facilities that begin construction prior to December 31, 2029, to use the formulaic approach as discussed in the NPRM to address incrementality from existing clean generators. This should be done by deeming ten percent (an increase from the suggested five) of the hourly generation from minimal-emitting electricity generators placed in service before January 1, 2023, as satisfying the incrementality requirement.

This is particularly important for hydropower where new facilities are not likely to come online quickly in response to the increasing demand. Hydropower is complementary to wind and solar and should be incentivized to continue investing in reliability and maintenance and part of the future of a zero-carbon grid.

Recommendation: Finally, Fortescue recommends that if incrementality is required, the final rules provide additional pathways to meet the incrementality requirement, for example where the taxpayer can demonstrate that an electric generating facility would have been retired or its generation curtailed.

Temporal matching. Temporal matching on an hourly basis is the biggest challenge to the feasibility of any single green hydrogen facility and if the NPRM is finalized as proposed, the future of the U.S. green hydrogen industry is uncertain. The implementation of this stringent requirement will result in an extremely expensive product which will severely limit demand. To meet the hourly requirement, facilities must either 1) run according to the intermittent profile of the (new) renewable plant where there is limited operating history, 2) oversize its renewable capacity, and/or 3) add batteries. All of these, even if feasible, add significant costs to each kilogram of green hydrogen produced.

Intermittent Profile: Start and stop operations to match the cycle of renewable electricity increases unit costs and creates operating risks. Running the electrolyzers intermittently would reduce the overall utilization factor of the facility and would also create wear and tear on the facility, which is not designed for cyclical startup/shut down. Hourly matching, and the inherent intermittency of renewable electricity, requires an optimization of the facility to reduce the required ratio of contracted power to electrolyzer demand. In some regions, industrial users that typically require power 24/7 may be unable to contract for the intermittent supply under an operational optimization, hourly matching scenario. The consequence is a reduced utilization rate of the equipment, reducing the production volumes and increasing the levelized cost of hydrogen (LCOH).

Oversizing renewable capacity: Purchasing more renewable power than is needed, if available, creates stress on the system and increases risk management challenges. To manage the intermittent nature of renewable power, and to meet hourly matching, a green hydrogen production facility will

require significantly more power than the capacity of the electrolyzer. This significantly oversized renewable capacity, to enable hourly matching, creates additional risk inherent in managing such quantities of excess capacity, and will likely result in a power trading scheme to buy and sell excess capacity. Like running an intermittent profile, it also significantly increases the cost of the hydrogen.

For example, in ERCOT, producing 177,000 tpa of green hydrogen (to produce about 1 mtpa of green ammonia) will require approximately 1.3 GW of electrolyzer capacity. Under hourly matching, the ratio of contracted power to electrolyzer capacity can range up to 7:1 under baseload operations, or over 7 GW of contracted power for a project at that scale. In 2023, ERCOT's average daily load was approximately 50.7GW. (Weather normalized daily average load in ERCOT in 2023 was between 42GW - 47GW.) The potential amount of excess power on any given day or hour represents approximately 10 percent of ERCOT's daily demand. Selling this excess power into the market may cause volatility in the grid. Whether grid operators limit how much excess capacity can be supported, this risk represents further material impact on LCOH on a project basis, but more broadly, will likely limit the number of green hydrogen facilities that can be implemented as grid operators will be resistant to adding this type of burden to the system. Alternatively, the impacts of hourly matching could result in significantly smaller projects, leading to higher costs and more expensive green hydrogen.

Onsite battery storage: Finally, storage also significantly increases the cost of production. Because every system has an average number of hours per year during which neither wind nor solar power are produced, hourly matching will further impose the requirement to add energy storage to the facility to utilize during the production hours without the corresponding electricity. This energy storage requirement materially and adversely impacts the overall cost of the project. Fortescue estimates that adding onsite battery storage could increase in the cost at our Buckeye, Arizona green hydrogen production facility of over 140% when the facility is operating at baseload capacity. In the ERCOT scenario described above, the battery to support baseload operations with hourly matching will result in a cost increase of over 200%.

Even if a facility can procure the right amount of power during the correct hours, the technology for hourly matching is not readily available, nor is there certainty around when this technology can be implemented. The Arizona facility uses additional solar power, contracted through Arizona Public Service (APS). APS, located in a solar-dominant region, is not set up to measure, track, and retire EACs on an hourly basis, and they have indicated that they will need several years to have this capacity. This uncertainty creates significant issues with the design, construction, and financing of the Arizona facility. However, even if feasible someday, the greater issue is that there is a lack of capacity to hourly match. This would then require Fortescue to source power outside of the APS system and add storage, resulting in increased costs to the project and LCOH.

Other regions in which Fortescue is looking to execute projects have similar concerns with the ability to comply with hourly matching and uncertainty around how long it will take to bring those capabilities to customers.

Furthermore, Fortescue struggles to see the development and deployment of an EAC market on an hourly basis. Since there is no such EAC market today and it is hard to estimate when it will develop, we expect financiers of green hydrogen facilities will require developers to secure EACs via bilateral contracts for security of supply in advance of providing the financing. This will not be possible as renewable power generators cannot currently commit to specific hourly profiles. Even if it is possible, this introduces risks that the project will not be able to operate at the utilization rate forecasted (due to lack of availability of qualifying EACs) or the facility will be forced to use grid power, risking the availability of Section 45V.

Fortescue appreciates the NPRM's attempt to provide a period of transition to meet temporal compliance, however the transition from annual to hourly matching requires vastly different equipment and power procurement configuration. Thus a transition period until 2028, or even 2030, is of little benefit to the taxpayer. Buildout of a green hydrogen production facility takes years to complete. As noted, hourly matching requires significant additional costs in the form of onsite energy storage and long-term contracts for oversized power capacity. If a facility must comply with hourly matching requirements at any point during the 10-year credit period, the facility needs to be built to meet hourly specifications, even with transition relief; there is not a drop-in replacement to convert from annual to hourly matching scenarios. Therefore, a transition period from annual matching into hourly imposes the same costly uncertainties as if the NPRM were to require hourly matching from day one.

Finally, Fortescue recommends a more cautious approach to implementing hourly matching because of the uncertainty with estimating any induced, indirect grid emissions resulting from green hydrogen production. Academic studies addressing this question, such as those from MIT and Princeton, acknowledge the large number of assumptions required to isolate the impact of green hydrogen production on overall grid emissions, particularly given the number of dynamic factors driving generation and load growth. In addition, these studies have sometimes reached conflicting conclusions about the conditions under which hourly matching would result in less emissions than under annual matching.

Critical Recommendation: Fortescue recognizes the importance of achieving necessary emission reductions to combat global climate change. To balance both the need for a nascent industry's regulatory environment to allow the buildout the green hydrogen ecosystem and put in place rules that will achieve emissions reduction, Fortescue recommends that final regulations provide additional flexibility, under which all facilities that begin construction prior to December 31, 2029, are grandfathered into annual temporal matching, such that they are deemed to satisfy the temporal matching pillar during the 10-year credit period. Alternatively, the requirement for hourly

matching should be eliminated until further information is available in later years that would better inform the feasibility of such a requirement.

Recommendation: The NPRM seeks public comment on the treatment of onsite energy storage. Fortescue recommends that if a facility uses renewable electricity to charge onsite energy storage that is then used to produce hydrogen, the discharge of this onsite energy storage should then be deemed consistent with temporal matching requirements.

Recommendation: Final rules should make clear that taxpayers can claim Section 45V for kilograms of qualified green hydrogen produced with qualifying EACs, even if other kilograms produced at that facility during the same taxable year are not credit eligible. Due to the nature of renewables, there will be hours when there are no available qualifying EACs for during particular timeslots in a region. For those hours that do not have qualifying EACs, Fortescue intends to acquire and retire non-fully qualifying EACs (e.g. not hourly matched or not incremental) to mitigate emissions. We recommend others claiming credit under Section 45V do the same and believe such practices should be incentivized.

Fugitive Sources of Methane and Renewable Natural Gas (RNG). We appreciate the inclusion of fugitive methane emissions in the 45VH2-GREET model but encourage the Biden Administration to consider upstream methane emissions from the wellhead in the life-cycle analysis for fossil fuel hydrogen in order to create parity with emissions calculations for green hydrogen. Fortescue also appreciates the suggestion that future rules will make clear that RNG must meet the "first productive use." A "first productive use" rule is logically consistent with incrementality requirements imposed for EACs to be considered qualifying. As suggested in the NPRM, requirements must be put in place such that there is parity between the requirements for RNG-derived hydrogen and the EAC requirements for green hydrogen. For example, if book-and-claim is allowed, there should also be a rule that the relevant RNG and natural gas sources be connected to the same local distribution network, as the logical parallel to the deliverability requirement for EACs. Safeguards should also be put in place to ensure that RNG does not provide a backdoor for unabated fossil fuels to produce hydrogen receiving the Section 45V tax credit, such as by blending a small share of negative CI RNG with conventional methane that is then jointly combusted in an unabated steam methane reformer. Finally, RNG claiming Renewable Identification Credits (RINs) for transportation fuels should not be considered eligible for Section 45V, as that would represent a double counting of the environmental benefit.

Finally, Fortescue recommends a careful evaluation of how the NPRM disproportionately favors hydrogen produced from fossil fuels. Application of the Three Pillars to only green hydrogen, and other hydrogen produced from truly zero carbon energy sources, adds significant barriers to growth of an industry that the Biden Administration supports for its climate benefits. That is especially true noting that 13 projects representing over 55% of global carbon capture, utilization, and sequestration (CCUS) capacity have failed or underperformed.[1] CCUS is a significant power

[1] Ahmed Abdulla *et al* 2021 *Environ. Res. Lett.* **16** 014036

consumer – power costs alone can increase project costs by up to 80%. If CCUS is eligible for the Section 45V credit, Fortescue recommends similar requirements under the Three Pillars to apply to hydrogen produced using CCUS. The massive power needs diverted to CCUS can have a substantial impact on grid cleanliness, and we urge consideration as to whether it is a good use of taxpayer resources to support projects that are not aligned with the Biden Administration's climate targets.

We appreciate the opportunity to respond to the NPRM and look forward to providing further testimony at the hearing on March 25, 2024.

Sincerely,

Andrew M. Vesey
President and CEO, North America
Fortescue