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Comments on proposed regulations under Section 45V relating to the clean hydrogen production credit established by the Inflation Reduction Act of 2022.

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The Section 45V proposed regulations on clean hydrogen stand contrary to the stated goal of the IRA to incentivize clean hydrogen production because the uncertainty and complexity they introduce make the incentive risky and the cost of producing clean hydrogen far more expensive. Obsidian proposes other strategies that are accurate and more easily implemented to assure that necessary carbon emissions reductions will be realized at a much lower cost.

Obsidian Renewables pioneered developing utility scale solar projects in the Pacific Northwest and has been focused on developing clean hydrogen projects for the past four years. We look forward to helping meet the objectives of the Inflation Reduction Act (IRA) to encourage clean hydrogen production through the development of robust Section 45V rules for the production tax credit.

Like most clean hydrogen developers, we are concerned that the large incentive of Section 45V could become an unintended pathway for poor climate decisions. Thoughtful and effective rules can help prevent that.

As proposed, the rules seem inconsistent with the goals of the IRA, so we suggest a system that will better achieve those goals, specifically:

1) Helping to launch a strong and viable new industry producing clean hydrogen;
2) Ensuring that the carbon intensity of hydrogen production facilities is reasonably and accurately counted for purposes of assigning the amount of credits earned;
3) Constructing a sturdy methodology for calculating a project's carbon intensity that can be easily administered, implemented, and audited; and
4) Constructing a system that encourages and automatically adjusts to the growing reality of grid decarbonization.

Obsidian believes an efficient, bankable methodology that accomplishes these goals can be worked out.

The "Three Pillar Methodology".

Obsidian's primary concern with the Three Pillar Methodology, for reasons laid out in more detail below, is its implementation will prevent projects from being bankable. In other words, uncertainty about hydrogen project company revenue from the production tax credit would raise sufficient uncertainty about total project revenue that the project company would be unable to secure long term debt from a bank. Replacing that debt with private equity would be quite expensive. The Department of Energy's description of the Lifecycle Assessment built on the Three Pillar Methodology states that the three criteria serve "as a reasonable proxy for calculating induced grid emissions[1]" and "as an appropriate approach." This leaves open the possibility of other proxies.

Additionality is Very Important.

We can't have more clean energy unless we build more clean energy, everywhere on the grid. The more the better. Delays getting more clean energy on the grid are not caused by lack of demand or will on the part of developers. Delays are caused by delays in land use approvals, delays in the interconnection queue, and delays in getting approval for transmission capacity.

Additionality mandates and commitments should be encouraged broadly. States that have already adopted aggressive additionality requirements, like Oregon, Washington, and California do not need a federal mandate.

We have three suggestions for additionality.

(1) Strict additionality should be tempered by binding regional commitments to decarbonization. This is well illustrated by the Portland General Electric example set forth below. We suggest utilities or balancing authorities that reach a certain level of decarbonization can use a modest percentage of their renewable legacy generation for qualified EACs. We suggest 10 percent of legacy renewable generation for a 70 percent decarbonized utility and 20 percent for an 80 percent decarbonized utility (or balancing area).
(2) Strict additionality should be tempered to recognize curtailments. We suggest curtailments be recognized on a utility or balancing authority basis and that the approximate percentage of curtailed renewables be allowed to be matched with an equal percentage of legacy renewable generation in determining qualified EACs. We suggest this percentage start at 5 percent with an understanding that it will likely increase to 10 percent or more in high renewable penetration areas.
(3) Strict additionality should be tempered to allow a small percentage of energy consumed by a hydrogen production facility to be qualified with green tags (Renewable Energy Credits) of the same calendar year to address the practical

[1] See *Assessing Lifecycle Greenhouse Gas Emissions Associated with Electricity Use for the Section 45V Clean Hydrogen Production Tax Credit*, December 19, 2023. Clean Hydrogen Production Tax Credit (45V) Resources | Department of Energy

need to have some makeup allowed for station service and for inevitable "foot faults." We suggest this percentage be set at 2-3 percent, and that this exception be allowed for both additionality and hourly matching.

Time (hourly) matching.

Any imputed effect of new loads should be matched with an imputed effect of new renewable generation. The proposed rules express great concern over induced carbon emissions in determining the carbon effects of electrolyzers (as a new load) on the electric grid. Obsidian agrees that the effect of new loads on overall carbon emissions is an important consideration, and the use of an induced emissions theory is one way to think about the impact of new loads. Equally important when applying an induced emissions theory are the induced carbon emission ***reductions*** from additional renewable generating plants, particularly those associated with clean hydrogen manufacturing.

Obsidian agrees that care must be taken to ensure that the carbon cost of a clean hydrogen facility is reasonably estimated in calculating the tax credit amount. The difficulty of ensuring this is underscored by US DOE Lifecycle Assessment document[2] (Lifecycle Assessment) cited by the draft rules. The interconnectedness of a multitude of electrical consuming and generating components, along with the time-variable nature of the system makes a precise assessment of the impacts of any given change extremely difficult to assess, even after the fact. The facts and circumstances that lead to more carbon emissions are different among different utility districts and different areas of the country. And our carbon emissions picture is expected to change over time as decarbonization goals and policies have increased effect.

Obsidian agrees with the DOE's assertion that an implementable solution is possible[3].

Obsidian's main concern with strict hourly matching is that it does not support the important and necessary requirement to overbuild wind and solar if we are ever reach high decarbonization goals. Saying it again: Well-designed wind and solar farms are built to a larger nameplate size than required on a real time basis in order to provide power at times of the day when the wind is not blowing and the sun is not shining.

- Matching is necessary but strict hourly matching is not necessary when the hydrogen facility has new generating resources. Strict hourly matching estimates the system implications of a new load on grid CO2 emissions, but it omits consideration of the opposite: the CO2 implications of an added generator running in excess of the new load. Because a new load in excess of new generation is estimated to turn up a gas plant somewhere, new generation in excess of the new load should be estimated to turn down a gas plant somewhere. The megawatt hours of new excess generation should be banked to the project and allowed to be removed when running the electrolyzer in excess of load. This is well illustrated in Real World Example 3, below.

[2] See *Assessing Lifecycle Greenhouse Gas Emissions Associated with Electricity Use for the Section 45V Clean Hydrogen Production Tax Credit*, p. 12.
[3] Ibid, p. 4.

- Additional hours of renewables for strict hourly matching come only from wind and solar for most of the United States. There are no significant amounts of new domestic hydroelectric, nuclear or geothermal, at least not in the West. That means the best an electrolyzer can run under the proposed rules utilizing both wind and solar, with hourly matching, is about 50 percent of the time. (70 percent in the summer and 25-30 percent in the winter.) Obsidian's projects are configured to use new wind, new solar and legacy hydroelectric power when it is plentiful and inexpensive, raising the load factor of the electrolyzer to 70 percent. That is 40 percent more hydrogen and 40 percent more revenue on the same capital investment compared to 50 percent utilization. These numbers are significant.
- A merchant energy supply for solar and wind does not exist. No utility in the United States has a tariff that satisfies the requirements of qualified EACs. As best Obsidian can determine, no merchant solar projects came on line in the last three years, and few if any new merchant wind projects came on line in the last three years. Unless that changes, hydrogen project companies will need to enter into long-term power purchase agreements for both wind and solar. The complexity of underwriting the hydrogen project company will make it difficult for a hydrogen project company to compete with utilities to acquire power purchase agreements for those assets. It's not just a registry that is required for hourly matching, hourly matching requires an actual energy supply shaped to qualify for three pillar EACs. It is unclear if and when that energy supply will be available and at what cost.
- Verifications will be expensive. Because timely verification is essential to earning the production tax credit, it seems likely that the production tax credits will not be tradeable for cash prior to the verification being available. A pay-as-you-go tax credit regime is not impossible, but it would have far better economics if it can be funded on a quarterly basis rather than an annual basis. Quarterly funding will likely require quarterly verification reports for the project company lenders and tax equity investors.

Obsidian's Proposed Methodology: "Induced Carbon Accounting"

Each NERC Region has and runs the "complex models" referred to in the Lifecycle Assessment document.[4] NERC regions use the models primarily to carry out their system reliability responsibilities. The models are capable of computing estimated average carbon intensity of each NERC region and sub-region. This data can be analyzed. It's not an academic theory. Is carbon intensity increasing or decreasing? Where? Does new load seem to be inducing carbon increases or is new load outpaced with additional renewables? Why? Will carbon reduction mandates make a difference when and where they are enacted? These questions are not hard to address.

Real World Example 1. Portland General Electric supported Oregon legislation that was enacted and dictates an overall carbon emissions reduction against a base amount calculated using historic base emissions. Simply stated, Oregon law requires PGE to

[4] Ibid, p. 12.

serve all new loads without any increase in carbon emissions. Sensibly, the law is to be implemented by PGE with Oregon Public Utility Commission oversight on an overall system basis, not on a customer-by-customer basis. It can't be said that PGE is sending its carbon emissions to other utilities because PGE also agreed to shut down its coal plant (accomplished), to stop buying coal electricity altogether in short order, and to not build any new natural gas plants. These developments were heralded as a huge climate win by several of the groups promoting the induced emissions theory. Oregon's clean climate law is the real deal and should be copied elsewhere.

Real World Example 2. Seattle City Light, a municipal utiity serving Seattle, Washington, has no fossil fuel generation among its major generating assets. Its proud commitment to climate goals is recognized as top tier. SCL's overall load has been flat for several years, and credit goes to its aggressive energy conservation measures. But with recent developments loads are expected to increase. One obvious strategy to maintain zero fossil generators is to build a generator that can run on hydrogen and other low carbon fuels. (Additional transmission from wind and solar rich Eastern Washington is a real problem.) SCL has legacy hydroelectric generation that it owns and uses as best it can. Hydroelectric energy not needed in the hours produced is sold in the market (mostly seasonal and during low load hours). SCL can instead use that energy to produce hydrogen in Seattle, store the hydrogen and use it in a turbine or in fuel cells to displace some of the market power it must buy during very high load hours. Peak load hydrogen is worth more than off peak electrons, so the plan is attractive for ratepayers. SCL would be using its own hydropower to store energy as hydrogen and then using that stored energy to avoid market purchases (which during peak hours tend to be natural gas to some extent).

Obsidian's proposed Induced Carbon Accounting methodology creates a project level carbon bank, where induced carbon savings are stored, and induced carbon emissions are withdrawn. As long as the project's carbon bank balance remains above zero at the end of the year, there is a net carbon savings with respect to systemwide induced carbon emissions and reductions. This methodology offers a simple and easily implemented solution for storage: storing renewable energy is important, necessary for a decarbonized grid and should not be tasked with causing imputed emissions. Unlike the Three Pillars, this Induced Carbon Accounting methodology should be bankable. It allows the electrolyzer operator to operate in real time in such a way to ensure that their project produces hydrogen with the required level of net emissions[5]. The level of net emissions is calculable and still dependent on the performance of the added generating resources. Also, this methodology incorporates storage in a simple, easily verifiable manner.

Finally, the Induced Carbon Accounting methodology gives a greater degree of freedom to allow climate leaders use their own investments in renewable assets in the manner that seems best for their ratepayers.

[5] Note that temporal matching requires an operator to use an estimate of the performance of a renewable resource for an operating hour to set the electrolyzer consumption. If the resource underperforms the estimate, and the electrolyzer runs on grid power, likely resulting in the production tax credit being forfeited. This is simply unworkable.

Proxy Accuracy

Just as the Three Pillars methodology is characterized as a proxy, the Induced Carbon Accounting methodology is also a proxy. Every day is different, and not 100% predictable the day, or even hour, before. There will be days when this method undercounts the net carbon emissions and days when it overcounts them. We believe it is fair and aligns with the core objectives of Section 45V. It promotes a new clean hydrogen industry, does so without increasing carbon emissions, and can be readily implemented and monitored.

More Detailed Comments

State Regulation Obviates the Need for Additionality Rules

As a Northwest company, we are mindful that the Pacific Coast states have adopted carbon emissions caps that decline over time to zero. Our position is that states with strong carbon emission caps should be exempt from additionality requirements, because under state law new loads must be offset. The responsibility for additionality is on the utilities serving those loads, and the additionality requirements under the proposed rules would in our view needlessly shift that requirement to a narrow class of new customers. This is not needed in regions with strong carbon emission caps.

Proposed rule adjustment: Allow green hydrogen facilities to satisfy the three pillars by adopting the comprehensive decarbonization policies of the state in which it is located, and let DOE determine which states or regions have enacted satisfactory decarbonization policies.

Observation: As the US grid moves to deep decarbonization, the need for the Three Pillars will decline and the disadvantages of their strict rules will become more apparent. Why create such a complicated system for a temporary need?

Uncertainty

GREET Model Uncertainty

Expected annual updates to the proposed GREET model create a climate where qualification for the hydrogen PTC incentive can change on an annual basis. Because more than 50 percent of project revenue is expected from the PTC, the uncertainty created by changes to post-construction qualification rules is material. As noted above, uncertainty raises the cost of capital and limits the pool of potential lenders. More expensive financing disadvantages the ability of the clean hydrogen industry to get the jump start it needs to compete financially with traditional fossil fuel derived hydrogen—the very jump start the IRA intended to facilitate.

Proposed rule adjustment: Allow clean hydrogen producers to stick to the version of GREET current at the time of final investment decision, and at their option move to updates when they become available.

Electricity Supply Uncertainty

No tariff and no market yet exists to supply hourly matching renewable energy in actual delivered fact. It's not just a question of having a registry, it's also getting the product.

> *Proposed rule adjustment:* Induced Carbon Accounting methodology greatly mitigates this problem by allowing more flexibility in meeting decarbonization requirements. If hourly matching is required, don't implement it until a somewhat robust market for qualifying energy develops.

Scheduling Uncertainty

In the West (and we expect across the country), energy production from every generator is scheduled in advance for each hour. If solar or wind production is less than scheduled, the balancing authority makes up the shortfall with grid energy. If the solar or wind production is greater than scheduled, then any surplus is purchased by the balancing authority at the spot market price. Under the strict hourly matching rules of the proposed regulations, a qualified hydrogen project loses when solar or wind is overscheduled (grid power is not qualified as low carbon) and loses again when solar or wind is under scheduled (no credits for energy not delivered). This strict rule applied to balancing serves no policy purpose and will require very expensive auditing to trace under and over deliveries for every hour of the year from every designated resource. For Obsidian's projects, over and under scheduling is netted over a day or a month. It should be sufficient to count scheduled energy from a qualified generator and ignore balancing differences. Balancing authorities already have rules in place to avoid misuse of scheduling.

> *Proposed rule adjustment:* The Induced Carbon Accounting methodology eliminates this problem. To the extent hourly matching is enacted, the hydrogen project should be allowed to use the energy scheduled during the hour and delivered by the utility, subject to a monthly netting of the hourly mismatch between actual and schedule. Balancing authorities already provide this service and data.

Qualified Day One

Further hampering the bankability of projects through additional uncertainty is the qualification for the credit itself. Traditional tax credits, such as the low-income housing credit, the investment tax credit for solar and storage, and the production tax credits for wind and solar projects, are earned in an easily verifiable manner. This predictability and certainty means these revenue streams are bankable and can be used to help finance development of the project. For a traditional solar, storage, or wind project, an engineer needs to certify that the project was built with new equipment, works properly, and is connected to the grid. The proposed regulations for clean hydrogen to qualify are far more complicated and as of yet unclear. Annual verification is required, which likely will mean the hydrogen PTC is funded on a "pay as you go" basis. When PTC is tied to operations, and not objective facts of project completion, a significant risk is created for tax credit

realization. Tax equity investors have been historically unwilling to bear much business operations risk.

To promote the objectives of the Act, the regulations should encourage stable, predictable production tax credits for the hydrogen project and its investors. As they currently stand, the proposed regulations introduce risk and thereby deter such investment, creating significant obstacles for clean hydrogen to be chosen over other tax credits in the highly competitive tax credit finance market.

> *Proposed rule adjustment:* The hydrogen project company should be able to use the GREET model in effect at Final Investment Decision and to elect to adopt subsequently updated GREET models.

Foot Faults

When the prevailing wage requirements were adopted for renewable energy tax credits, there was considerable review as to what exactly was required and how banks and other investors could responsibly confirm the new labor requirements were met. Sensibly, the law provides that if it turns out that some work was misclassified and some workers were underpaid, the remedy to cure for tax purposes was well matched to the problem and presented little risk of the extreme result of losing credits altogether. Foot faults occur to well-meaning businesses and a remedy that matches the unintended mistake is expected. The idea of a gentle remedy for a simple problem is missing from the proposed regulations.

There should be a provision allowing grid power for station service (lights, security, heat and air conditioning 24-7, whether or not hydrogen is being produced) without having to carve certain portions of the plant out from the definition of “facility”, a seemingly awkward strategy.

> *Proposed rule adjustment*: The rules should allow purchase of a small amount of renewable energy credits after the fact to true up a small miss in carbon intensity and to account for station service. We suggest RECs in an amount limited to 2 or 3 percent of electricity consumption as a flat rule rather than requiring a factual demonstration. Similarly, the rules should allow a late verification report to be filed with an amended return. We read the proposed rules as allowing this in the first year only.

Legacy Hydroelectric Power in the Pacific Northwest

Several utilities in the Pacific Northwest own substantial amounts of legacy hydroelectric power. The list includes Seattle City Light, Tacoma Power, Puget Sound Energy, Portland General Electric, Pacific Power, Avista, Grant County Public Utility District, Douglas County Public Utility District, Eugene Water and Electric Board and several others. A broad declaration that these utilities cannot use their hydropower to produce qualifying hydrogen to use in their own generating plants to provide clean power for their customers is not mandated in the legislation and is poor public policy. These utilities include some of the least carbon emitting utilities in the country, and they should be encouraged to

continue that commitment. Other of these utilities are committed to moving their natural gas plants to clean fuels and want to use their legacy hydro to help accomplish that in the most cost-effective manner for ratepayers. Taking away the obvious solution of using their own resources to do so will significantly delay and sharply increase the cost of the clean fuels they need.

Also, the Pacific Northwest has enacted legislation and firm policies to reduce carbon emissions quickly and steadily. It is clearly a better policy to allow the stakeholders in the region to find the best paths forward to achieve these goals. The best paths forward to clean hydrogen are simply not the same around the country.

Proposed rule adjustment: Allow 10 percent of the energy output from legacy renewable generation to be used to qualify EAC's, increasing to 20 percent as decarbonization milestones for the region or utility are realized.

NERC, WECC, and Bonneville Power Administration

Bonneville Power Administration, a division of the Federal Department of Energy, supplies a huge amount of legacy hydroelectric power to the region, a region that has for decades been larger than the proposed EAC procurement region. Use of "balancing authority" does not work in the WECC because there are more than a dozen balancing authorities, and PacificCorp itself has two. Bonneville has transmission lines into California, Utah, Montana, and Wyoming in addition to Oregon, Washington and Idaho. This is an existing region, called the WECC. It appears in the regulations that the GREET model uses NERC regions, which includes the WECC, for determining the emissions profile, but EACs appear to be sourced from a different NERC map, which carves up the WECC into different regions, dividing the Bonneville territory in a manner that is not sensible. Power moves around the West and that is good for the grid and ratepayers.

Portland General Electric and Puget Sound Energy have recently announced acquiring new wind generation from Eastern Montana. This common practice is sound policy and should not be discouraged.

Proposed rule adjustment: Allow the EAC procurement region in the West to be the WECC.

Canadian Hydro

A very large and important amount of low carbon energy consumed in the Pacific Northwest and California comes from hydroelectric dams in Canada, and a new large hydroelectric storage facility in Northern British Columbia is under construction, so its energy will be additional. Will the additional hydroelectric energy qualify for EACs? The energy is going to be used in the WECC to help decarbonize its grid. Did the IRA somehow prohibit full use of cross-border clean energy with our important trading partners? Did DOE consider whether the regionality regulations are consistent with our obligations under the North American Free Trade Agreement? Is the restriction on use of Canadian hydropower for clean hydrogen being discussed with Canada as part of the current negotiations over the Columbia River Treaty?

Proposed rule adjustment: Allow additional renewables from Mexico and Canada to qualify for EACs.

Storage in the Hydro System

The Pacific Northwest has vast amounts of hydro storage that could be used to help integrate new renewables for all loads, including electrolyzers. Excess solar and wind can be used to lower hydroelectric draw or offset grid purchases (the exact opposite of increased emissions). When that surplus renewable energy is returned and fed into an electrolyzer, it should retain its character as clean energy. These events do not induce fossil fuel emissions, they just recapture green energy previously put into the system. This flexibility allows for more efficient storage of green energy, and the ability to smooth the intermittent nature of solar and wind.

Real World Example 3. Obsidian has proposed such an arrangement with a Washington Public Utility District that has ample hydroelectric resources. Obsidian proposed pairing a 50 MW electrolyzer with a new 120 MW solar field. On hours when the solar field produces more energy than the electrolyzer could take, the surplus would be stored in the PUD hydro reservoir for a few hours or used to reduce market purchases, and then returned to the electrolyzer later in the evening. This would clearly be a carbon neutral arrangement that is simply not allowed under the proposed rules.

> *Proposed rule adjustment*: The Induced Carbon Accounting methodology eliminates this problem, ensuring carbon neutrality without the added burden of ruling out storage facilities in the process. Far less costly to implement, bankable, achieves the goals of the Act and provides appropriate incentives for acquiring renewable resources and operating electrolyzers for the benefit of system carbon emissions.

Stored Energy Used to Produce Hydrogen

Renewable energy is intermittent and requires effective storage strategies to be used efficiently. It is well understood that building sufficient wind and solar resources for high levels of renewable energy requires overbuilding both wind and solar, which increases the number of hours during which there may be curtailment of renewable energy and increases the benefits of energy storage. California is clearly demonstrating the relationship between high renewables penetration and high levels of storage. It is extremely important to clearly state how energy in storage is to be counted under these regulations as it is drawn and used. Each of the projects Obsidian is developing relies on storage of one type or another. Storage can be much more than lithium-ion batteries.

> *Proposed rule adjustment*: The Induced Carbon Accounting methodology makes the storage question easier. The energy stored keeps the carbon footprint from when it was generated rather than when it is removed from storage. To the extent hourly matching is enacted, energy removed from storage has the time stamp from when it is removed.

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