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February 12, 2024

To whom it may concern,

Thank you for your diligent effort to consider the views of all stakeholders while simultaneously working to set power procurement standards and LCA methodologies that ensure the 45V production tax credit does not significantly increase U.S. carbon emissions. This is an incredibly technical and complex task, and the Verse team applauds Treasury's careful analysis.

One area that Verse believes could be further defined to allow for high levels of hourly matching of clean power is the role for energy storage. Our team has substantial expertise in structuring corporate clean power portfolios of hourly matched renewables, as well as decades of experience developing and optimizing utility-scale energy storage resources. Further details of our team's capabilities can be viewed on our corporate website.

Energy Storage Reduces the Cost of Hourly Matching

Energy storage technologies play a critical role in achieving high levels of hourly matching of carbon-free energy. Constructing an hourly matched portfolio without energy storage often requires dramatically overbuilding non-dispatchable renewable energy sources like wind and solar. Analysis by McKinsey has shown that including a portfolio of energy storage technologies alongside renewable energy resources can reduce the cost of achieving 100% hourly matching by more than half (see Exhibit 2 in this article).

In key hydrogen markets like ERCOT (Texas), Verse expects to see >10GW of energy storage assets operating by the end of the decade. In a grid with a peak load of 85GW, these assets represent a powerful tool for lowering the cost of achieving high levels of hourly matching.

We believe it would also be useful for Treasury to clarify how compliance with the three pillars (incrementality, temporal matching, and deliverability), can be met and substantiated. At present it is unclear whether and how energy storage will contribute to compliance with the hourly matching requirement, since the stored electricity will have been generated at a time before it is ultimately used to power the hydrogen production. If energy storage can contribute to hourly matching, Treasury would need to clarify what documentation it will require to substantiate the claims.

We understand that charging an energy storage asset using electricity derived from fossil-fuel generation is contradictory to the goals of the IRA and would not be considered carbon-free energy. The examples below illustrate how energy storage assets can be charged with renewable energy resources, with the support of established operational software solutions.

Configuration #1: No Storage

Consider the example of a single day of operations for a 100MW electrolyzer facility that operates as a "flat load" (i.e., the electrolyzer has no ability to curtail its operations). The facility sources its clean power

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from one offsite wind and one offsite solar facility, as shown in Figures 1 and 2.

Figure 1: A green hydrogen facility, its power meter, and offsite wind and solar

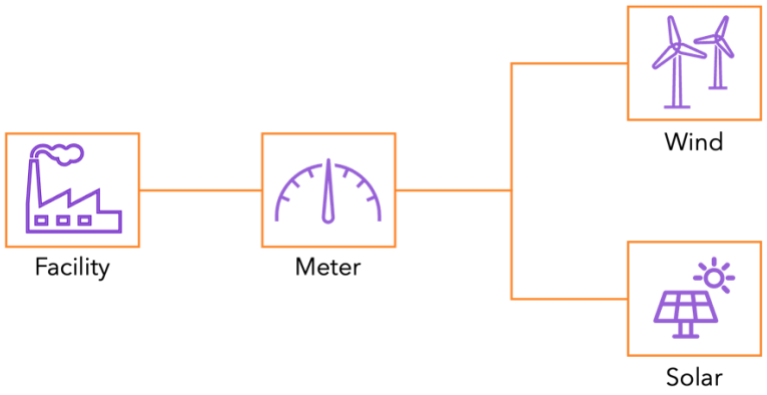
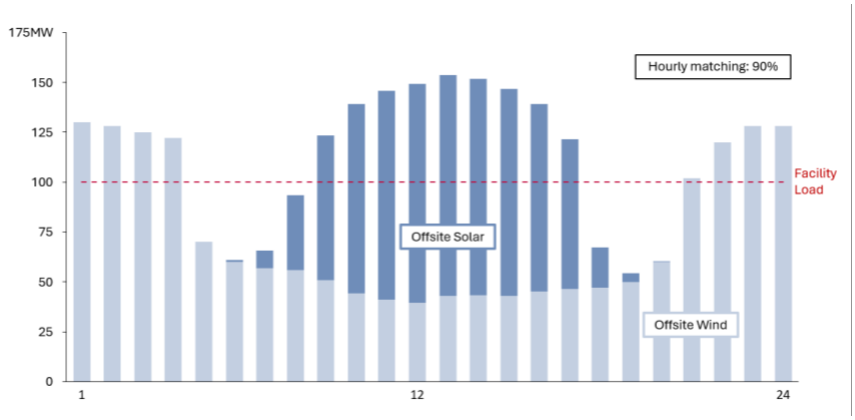


Figure 2: A green hydrogen facility's 24-hour flat load (red dashed line), overlaid onto illustrative generation profiles for offsite solar and wind.



In this case, the percentage of the facility's electricity consumption (aka facility load) served by carbon-free energy (CFE) on this day is 90%. This is also referred to as a 90% "CFE score." The remaining 10% of the facility electricity consumption is then sourced from grid power.

Configuration #2: Behind-The-Meter (BTM) Energy Storage

Behind-the-meter (BTM) refers to anything that happens onsite, on the energy user's side of the power meter. Consider an example in which the electrolyzer facility is equipped with a BTM energy storage asset capable of modifying the facility's electricity usage to match the availability of variable renewable energy supply – in this case, offsite wind and solar generation. The facility operator has control over this storage resource and chooses to optimize it to maximize hourly matching of renewable supply.

Figure 3: A green hydrogen facility, behind-the-meter energy storage asset, the facility's power meter, and offsite wind and solar

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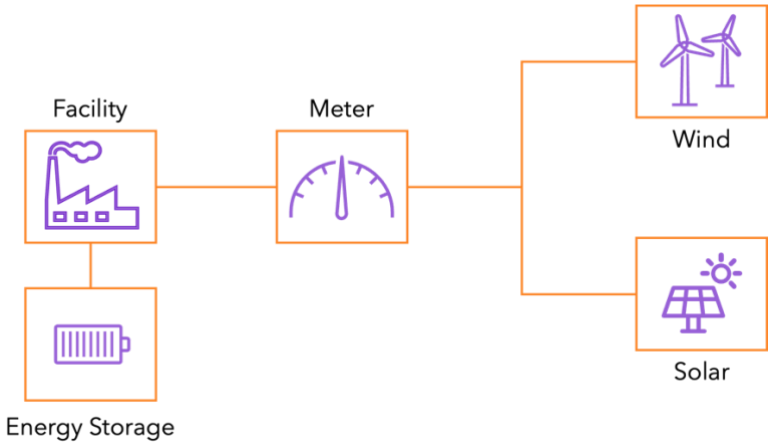
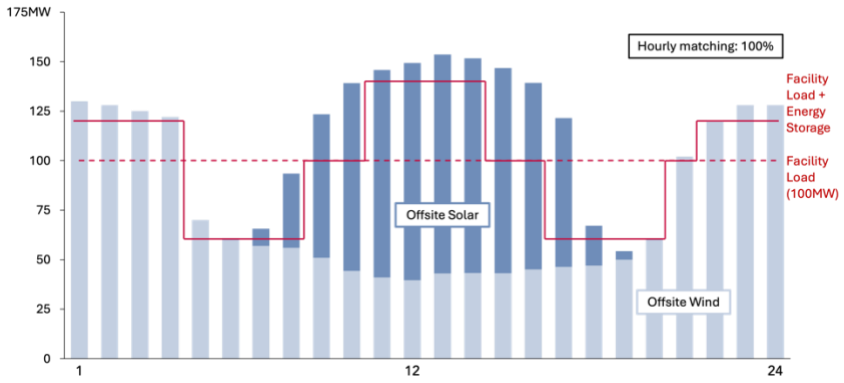


Figure 4: A green hydrogen facility's 24-hour combined meter reading, which is the summation of the electrolyzer facility load and the BTM energy storage asset (solid red line).



In this case, the BTM storage asset discharges during periods when the variable renewable resources are unavailable to match the facility's load. The storage asset brings the CFE score up to 100%.

Verse's interpretation of the current draft guidelines is that the facility operator (i.e., the taxpayer) would receive credit for 100% hourly matching if they used their BTM energy storage asset in this way.

Configuration #3: Front-Of-The-Meter (FOM) Energy Storage

Front-of-the-meter (FOM) refers to anything that is offsite from the hydrogen electrolyzer facility, namely on the "grid side" of the facility power meter. Consider a final example, in which we move the energy storage asset from behind the meter to a nearby FOM location in the same "region", as defined by the 45V geographic matching requirements.

Figure 5: A green hydrogen facility, front-of-the-meter energy storage asset, the facility's power meter, and offsite wind and solar

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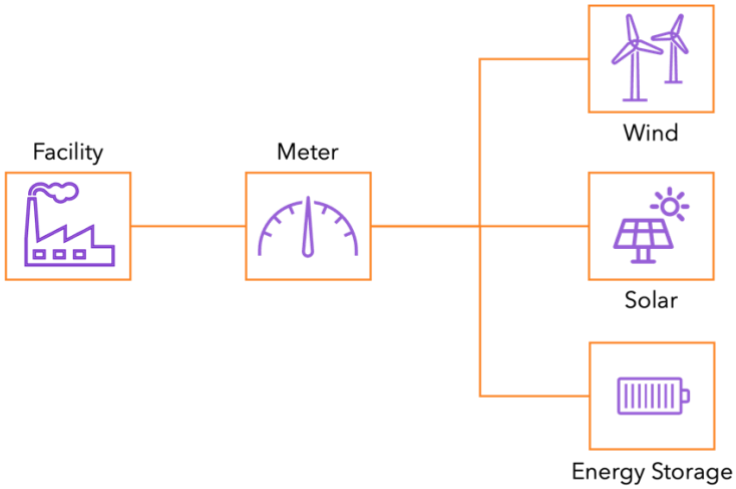

Assume the facility operator still has control over the dispatch behavior of this offsite energy storage asset in the same way they did under Configuration #2 and chooses to optimize the storage asset in the same way as in Configuration #2 - again resulting in a CFE score of 100%.

In this case, shouldn't the taxpayer receive credit for the same level of hourly matching as in Configuration #2? If it accomplishes the same goal of supplying 100% of the facility's load with carbon-free energy, the storage asset's location – whether BTM or FOM – should not matter, as long as it is within the geographic region. Verse's interpretation of the current guidelines is that the taxpayer will not receive credit for 100% hourly matching under Configuration #3, which creates an opportunity for clarification of the guidelines.

Proposed Language to Clarify the Role of Energy Storage: A "Portfolio Approach"

A "portfolio approach" refers to a portfolio of clean energy assets. Verse proposes that the following language be included in the final guidelines to ensure that energy storage can be used by green hydrogen producers to dramatically reduce the cost of hourly matching:

- Behind-The-Meter (BTM) energy storage will be considered as a load modification to the electrolyzer facility, where the taxpayer is able to use such storage resource to modify their load in service of higher rates of hourly matched clean energy.

- Similarly, Front-Of-The-Meter (FOM) energy storage will be considered as part of the "portfolio" of clean energy resources that a taxpayer can use to achieve high levels of hourly clean energy matching. In the same way that a taxpayer can use a BTM energy storage resource to better match their facility load to their intermittent renewable energy supply, a taxpayer who has contracted for control over the energy dispatch of an offsite energy storage resource will receive the same "load modification" treatment as would be used for a BTM battery, for the purposes of calculating levels of hourly matching.

Risks and Mitigations of the Proposed Approach

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Opponents to this proposed structure might raise the following concerns, which Verse seeks to preemptively address below:

- **Time Matched EACs:** There are alternate ways to deal with the situation outlined above, including with time-stamped energy attributes certificates (EACs) or renewable energy credits (RECs). While the technology is progressing, these certificates have not yet been widely adopted and the nuances of how to track EACs over time as they are "stored" in energy storage assets is complicated by issues like grid carbon-free energy content and round-trip efficiency losses. For these reasons, Verse advocates for the "portfolio approach" outlined above as the simplest way to track hourly matching for large energy users like green hydrogen facilities.

- **Revenue Stacking and Ancillary Services:** Opponents to the "portfolio approach" may also argue that the above structure overlooks the nuances of energy storage operations, including the importance of ancillary services[1], which are the primary revenue streams for utility-scale energy storage assets in restructured markets like ERCOT. As experts in wholesale market optimization of utility-scale storage, the Verse team would respond by pointing to novel structures that simultaneously co-optimize "carbon aware" energy dispatch with ancillary services (link). The revenue stacking "problem" can be readily solved through careful structuring of the energy storage offtake agreement by the taxpayer, and the application of well-established operational optimization software solutions.

Conclusion

The Verse team would again like to thank the Department of Treasury for its efforts to operationalize section 45V of the IRA and for the opportunity to provide comments.

Inclusion and clarification of the use of energy storage assets in the final 45V guidelines can reduce the cost of achieving high levels of hourly matching, supporting the Biden Administration's emissions reduction goals and accelerating the energy transition.

We hope that our comments can aid Treasury in shaping rules that create the pathway to an ascendant domestic green hydrogen industry without adding to power sector emissions.

Verse experts are available to clarify or discuss any of the above points, should this be of value to the teams drafting the final guidance.

Sincerely,

[1] "Ancillary services are services that ensure reliability and support the transmission of electricity from generation sites to customer loads. Such services may include load regulation, spinning reserve, non-spinning reserve, replacement reserve, and voltage support." U.S. Energy Information Agency; Link.

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