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RE: Docket UE-210183 Rulemaking to consider adoption of Markets and Compliance Requirements for the Clean Energy Transformation Act

Washington Department of Commerce May 3 Notice of Opportunity to Comment on Energy Storage Accounting Issues

The Renewable Hydrogen Alliance (RHA) submits these comments to the Utilities and Transportation Commission ("Commission") and the Department of Commerce ("Commerce") responding to the Request for Comments on Energy Storage Accounting Issues.

RHA is a trade association with more than 70 members whose mission is to promote the use of renewable electricity to produce hydrogen and other climate neutral electrofuels. Its membership includes electrolyzer, fuel cell and automobile manufacturers, electric and natural gas utilities, fueling station manufacturers, independent power producers, hydrogen project developers and other members with an interest in the renewable and electrolytic hydrogen (hydrogen produced using electrolysis) sector.

Storage

Grid storage can be thought of as a process, molecule, facility, or resource that is "charged" through the input of electricity, then "discharged" when that stored energy is needed for grid operations. Examples include pumped storage, battery storage, compressed air storage and electrolytic hydrogen. That charging and discharging cycling comes at a net loss of energy in the conversion to dispatchability. The current statutes do not account for, let alone value these losses, but it should, and in a manner that provides value to that conversion, and evaluates storage's cost effectiveness when comparing against thermal or other capacity resources.

Electricity can be stored in a hydrogen molecule through a process called electrolysis. The storage resource for electrolytic hydrogen should be considered as a complete "charge to discharge" unit, i.e. the electrolyzer charging the hydrogen molecule, the charged hydrogen transported in its energy carrier, the storage facility (tanks, salt domes, etc), and the ultimate redispatch unit, either a fuel cell or simple or combined cycle turbine (e.g., technologies currently available to generate electricity from hydrogen, though others can be expected on the market in the future).

RHA's comments are focused on the unique attributes of electrolytic and renewable hydrogen as a storage resource.

The following statutory definitions will help clarify the uniqueness of renewable hydrogen charging/production, and our comments also highlight the need for further clarification on how hydrogen should be considered as a storage resource.

In RCW 19.405, renewable hydrogen is defined as:

> *"Renewable hydrogen" means hydrogen produced using* ***renewable resources*** *both as the source for the hydrogen and the source for the energy input into the production process.*[1]

Further, renewable resources are defined as (note inclusion of "renewable hydrogen"):

> *"Renewable resource" means: (a) Water; (b) wind; (c) solar energy; (d) geothermal energy; (e) renewable natural gas****; (f) renewable hydrogen****; (g) wave, ocean, or tidal power; (h) biodiesel fuel that is not derived from crops raised on land cleared from old growth or first growth forests; or (i) biomass energy.*[2]
>
> *"Biomass energy" includes: (i) Organic by-products of pulping and the wood manufacturing process; (ii) animal manure; (iii) solid organic fuels from wood; (iv) forest or field residues; (v) untreated wooden demolition or construction debris; (vi) food waste and food processing residuals; (vii) liquors derived from algae; (viii) dedicated energy crops; and (ix) yard waste.*[3]
>
> *"Renewable natural gas" means a gas consisting largely of methane and other hydrocarbons derived from the decomposition of organic material in landfills, wastewater treatment facilities, and anaerobic digesters.*[4]

Description

Electrolytic hydrogen can be "charged" or produced by sending electricity through water and splitting the water molecule into oxygen and charged hydrogen. The hydrogen can then be

[1] RCW 19.405.020
[2] RCW 19.405.020
[3] RCW 19.405.020
[4] RCW 19.405.020

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used in: (i) a fuel cell or combustion turbine to produce grid electricity; (ii) fuel for transportation; (iii) energy that can be used to displace fossil natural gas in all of its uses; and (iv) incorporated into various energy carrier molecules or end use products such as formic acid or ammonia that can then be redispatched as energy or utilized as an end use product.

Hydrogen pathways to energy storage and end uses:

1. Electrolytic hydrogen, whether charged with 100% renewable electricity (renewable hydrogen) or grid electricity, then redispatched as electricity through a fuel cell or combustion turbine meets the conventional use as a grid based storage resource both seasonal (the only storage resource that we are aware of that can be stored and redispatched over an extended time period without losing it charge) and bulk power storage;

2. Electrolytic hydrogen can be blended into an energy carrier such as formic acid, ammonia, or synthetic natural gas using captured CO_2; and then redispatched as electricity (conventional grid storage); used as a transportation fuel (cross sector storage); used to displace fossil natural gas for end use (cross sector storage); or as an end use such as fertilizer.

3. Renewable hydrogen produced from renewable natural gas through steam methane reformation or from biomass produced through pyrolysis or other process and subsequently used to generate electricity should be considered a renewable resource, pursuant to inclusion in the definition of renewable resources under CETA, and thus a renewable energy credit (REC) for CETA compliance purposes should also be generated as the electricity is generated.

Given the variety of categorizations of renewable and electrolytic hydrogen, answers to the questions posed in this opportunity for comment will be specific to the category of grid storage.

Electrolytic hydrogen's value as a grid storage resource includes the unique properties that it not only can redispatch electricity at a different time, similar to other grid storage vehicles, but it also does not lose its charge over time, unlike lithium and other batteries. It can be stored in high capacity geologic formations and retrieved when needed to power co-located baseload thermal generation facilities such as a combined cycle combustion turbine[5]. Thus hydrogen is the only practical seasonal storage available for grid operations.

Hydrogen can also redispatch electricity at a different location than where it was produced. Hydrogen and its derivatives are easily transportable in a liquid or gaseous form in vehicles or through pipelines and stored until needed at that location.

[5] https://power.mhi.com/regions/amer/news/200310.html

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RESPONSES TO QUESTIONS

1. **What information regarding the use of storage in meeting its CETA requirements should be included in the utility's CETA compliance report?**

   No comments provided.

2. **How should the energy used and provided by energy storage resources be accounted for to ensure that nonpower attributes of renewable generation are not double counted? What compliance and reporting requirements would assure verification and prevent double counting?**

First, clearly define electrolytic hydrogen that is redispatched into the grid as storage and not, when dispatched, as generation. The renewable electricity inputs and outputs should be treated in the same manner as the renewable electricity inputs and outputs are treated for other storage resources such as lithium batteries. Concerns about double counting can be avoided by not defining the redispatch of electricity as generation. Therefore, no additional compliance or reporting requirement is necessary.

3. Should compliance and reporting rules related to energy storage be differentiated based on any of the following:

Each storage resource will provide different and potentially distinct values to grid operations. Thus, if the Commission or Commerce adopts reporting protocols for energy storage resources, we would suggest type, location, charging and discharging characteristics, and ancillary and other services that may be provided by that resource.

a. The storage technology, such as battery storage or pumped hydro storage?

Storage of electricity in hydrogen and the redispatch of that electricity does provide unique characteristics that other storage resources do not bring to grid operation. As stated earlier, hydrogen can provide location and timing flexibility, including seasonal storage, that other storage resources cannot. This additional flexibility does come at an additional round trip efficiency loss, a trade off that provides that additional value.

b. The location of the storage resource within the grid, such as collocated with a generating resource, interconnected in the transmission or distribution system, or at a retail customer's premise?

Electrolytic hydrogen is unique in that the location of the charging and charging facility may very well be different from the location of the discharging and discharging facility, but they may also be collocated with the generating resource. Location of the storage resource would seem to be a necessary data set for reporting and subsequent grid analysis.

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c. The ownership of the storage resource, such as a utility subject to CETA, a non-utility operator, or a retail end use customer.

Ownership should be reported, as the ownership may determine how the electricity is treated under CETA.

4. For a storage resource that is interconnected in the power grid, one possible approach to compliance is to treat it like a generating resource. The storage resource would be registered in the Western Renewable Energy Generation Information System (WREGIS). It would retire RECs for the renewable electricity used to charge the storage device and report verified data on discharge of electricity into the grid. WREGIS would create renewable energy credits (RECs) for the electricity discharged into the grid. If it used a combination of renewable and fossil sources for charging, a multi-fuel calculation would be applied to ensure that RECs are created only for the renewable portion of electricity generated into the grid. Please comment on the advantages, disadvantages, and necessary elements of this approach.

Renewable hydrogen is included in the definition of a renewable resource in CETA, but as the proponent of that amendment in the 2019 session, we would point out that the definition included hydrogen produced from renewable natural gas or biomass. In those cases, the energy in the hydrogen is not from electricity, but from the energy contained in the RNG or biomass itself which is converted to hydrogen for dispatch. When that energy is dispatched from the hydrogen, it is an original source of energy equivalent to burning RNG or biomass to generate electricity and should generate a REC, but that is not the subject of this inquiry.

Conversely, hydrogen produced from 100% renewable electricity, while meeting the pure definition of renewable hydrogen should still be treated as electricity storage when charged and discharged, not as original generation, with the RECs treated similarly to REC treatment in the cycling of other storage resources.

5. For a storage resource that is collocated with a renewable generating facility:

a. Should the storage accounting rules specify that RECs are created based on the amount of electricity generated or on the amount of electricity delivered into the grid?

To maintain consistency, a REC should be counted as generated, prior to roundtripping through an electrolytic hydrogen storage resource. Any round trip through the storage resource should be reported separately, and thus able to be measurable and transparent as to the capacity and other values that hydrogen storage provides, in addition to not diminishing the value of the REC prior to injection into the grid.

b. How should power from the grid used to charge the storage resource be accounted for?

For electrolytic hydrogen that is redispatched into the grid, for fuel mix and other reporting needs, generation should be accounted for prior to cycling through a storage resource, and

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capacity and other services provided by storage should be valued and accounted for separately. For electrolytic hydrogen where the energy is redispatched into another sector such as for a transportation fuel, to displace fossil natural gas, or for end use as a manufacturing input (i.e., fertilizer production or food processing), the electricity used to charge the hydrogen should be treated as load if delivered by a utility to a third party electrolyzer and should be accounted for as such.

6. For a storage resource located at a retail customer's premise, should the electricity used to charge the resource be included in the load of the utility for purposes of CETA? If the storage resource returns electricity to the grid, should this electricity be subtracted from the load of the utility for purposes of CETA?

No comment provided.

7. Use of a storage resource will result in electricity being delivered to load at a different time than the electricity was generated. WREGIS creates RECs with a vintage specified as month and year. Is month and year vintage information sufficient to ensure that renewable energy claims are accurate and that double counting of renewable generation does not occur? If not, what vintage detail should be required and why?

Yes – based on our responses to the other questions, we do believe the current vintage reporting is sufficient. A temporal change in the redispatch of electricity from storage is the value of storage, i.e., conversion of variable energy to dispatchable capacity and ancillary services. If any vintage detail is required on the discharge cycle, it should be for determining and providing for the value of that temporal difference between generation and redispatch.

8. If a storage facility operator charges an energy storage facility with a combination of renewable and non-renewable electricity, what verification, documentation, or calculation requirements would ensure that the output of the storage resource is accurately accounted for as renewable or non-renewable?

CETA does not require verification or documentation for storage resources other than planning requirements in the IRP process. However, for other statutes and studies such as the newly passed Clean Fuels Program and Climate Commitment Act, and reliability and resource adequacy analyses, we assume that this data will be necessary and collected. The fuel mix of electricity delivered to load under Washington law is reported each year and will be used for the other statutes. It seems appropriate to assign the discharging of electricity the same level of reporting required for the charging of electricity, diminished proportionally by the round trip efficiency drop on a reporting level currently required under Washington law.

9. Are there any energy storage accounting requirements used by other jurisdictions or by voluntary programs or protocols that the Commission should consider, either as guidance in adopting rules for CETA or to avoid potential conflicts in approaches?

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No comment provided.

CONCLUSION

RHA appreciates the opportunity to provide these comments to the Commission and Commerce. The questions raised are timely and complex, and to some extent still incomplete and evolving, particularly around the production (charging) and end use (discharging or other) of electrolytic hydrogen. Ultimately, we would request that the state agencies bring parties together once COVID restrictions have been fully lifted to analyze, discuss and further refine the answers to these complex questions. We believe hydrogen storage is a vital and necessary component of the transition to clean energy in multiple sectors and strongly urge the rules adopted encourage the procurement, deployment, and appropriate valuation of this and other storage resources.

Sincerely,

Michelle Detwiler
Executive Director