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Ann Pongracz, Commissioner
Public Utilities Commission
1150 E. William Street
Carson City, NV 89701-3109
9075 W. Diablo Dr. Suite 250
Las Vegas, Nevada 89148

Signed copy delivered via courier to Carson City Office.

Dear Ms. Pongracz,

The enclosed written comments are in response to Docket 18-09008, an investigation and rulemaking to examine current regulations governing Nevada's Renewable Portfolio Standard to determine whether providers of electric services should be authorized to utilize alternative solutions, including, but not limited to, blockchain-based solutions, to track and certify Nevada portfolio energy credits.

Thank you for the opportunity to submit these comments.

Sincerely,

A handwritten signature in black ink that reads 'Matt Digesti'.

Matt Digesti
Vice President of Government Affairs and Strategic Initiatives
Blockchains

Comments submitted by Blockchains, April 15, 2019:

Consistent with the March 20, 2019, notice, interested and affected persons may file **comments** at either of the Public Utilities Commission’s offices **on or before April 15, 2019, at 5 p.m.** Comments should address the following questions:

a) What blockchain-based solutions or other available technologies (Alternative Systems) could be utilized by providers of electric services to track and certify Nevada portfolio energy credits (PECs)?

At its core, a public blockchain is an immutable, distributed, publicly verifiable transaction ledger. This makes public blockchain technology ideal for a reliable Alternative System of tracking and certifying Nevada PECs, as such a system would be transparent and could not be controlled by a single stakeholder. As set forth in the responses below, a public blockchain Alternative System would provide benefits to prosumer^[1]-generators, commercial customers, utility providers, and the Public Utilities Commission (PUC).

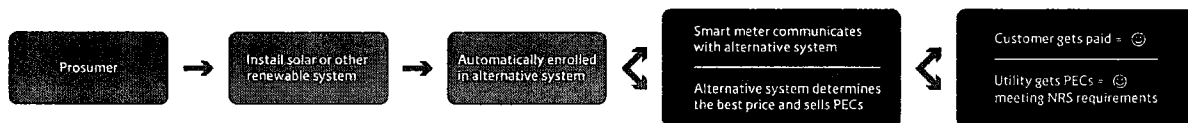
Blockchain technology makes it possible to collect energy production and consumption data, as well as to create certificates for PECs. Applications could be built on a public blockchain, such as Ethereum, to provide a platform for energy users and generators to utilize PEC certificates. The platform could serve as a marketplace where a PEC seller and a PEC buyer could be matched automatically. Once that match occurred, the funds could be transferred automatically to the seller, and the relevant PEC certificates could be automatically transferred to the buyer. This framework would also allow for interoperability, as it could be developed to enable communication between different devices and systems. Many energy utilities, including Exelon Utilities, Duke Energy, and PG&E, are using this type of blockchain framework to build their energy credit registries. The Energy Web Foundation has indicated that it has plans to build a national certificate market based on this framework.

Currently, there are blockchain solutions available that could be adapted and utilized by providers of energy services to track and certify Nevada PECs; however, a ground-up, purpose-built public blockchain solution for tracking Nevada PECs would ensure the needs of all Nevada participants were considered. Ideally, this Alternative System would be built and tested in Nevada. Nevada’s unique regulation of energy requires a Nevada-built Alternative System.

b) What benefits should Nevada realize from utilizing the Alternative System for tracking and certifying PECs? More specifically:

i. How would residential customers generating power through solar panels on their homes utilize the Alternative System?

Proposed residential consumer journey for a prosumer-generator:



^[1] In the energy context, a “prosumer” is a user who both consumes energy and produces energy that can be shared with, or sold to, other users.

The foregoing proposed journey streamlines the prosumer-generator user experience, reduces administration costs, and is much more efficient than the current system. First, prosumer-generators install solar panels, or other renewable energy solutions, and install a smart meter. Once installation is complete, prosumer-generators are automatically enrolled in the Alternative System using a smart meter with internet connection. The customer's smart meter assigns, tracks, and verifies the PECs within the Alternative System. Other customers' smart meters are also able to verify the trustworthiness of the PECs and issue a certification. User settings can be configured to allow the Alternative System to obtain for sellers the best price for their certified PECs in the marketplace. If the prosumer-generator wants to directly sell certified PECs on the Alternative System, the individual can do so through the user-friendly interface proposed below.

Generally, prosumer-generators are currently unable to utilize Nevada Tracks Renewable Energy Credits or contribute PECs into the closest system outside Nevada, California's Western Renewable Energy Generation Information System (WREGIS), unless they can meet a 1-megawatt (MW) minimum. A blockchain-based Alternative System would allow for groups of PECs to be certified, bundled, and sold on the WREGIS platform, as is described in the response to question (c) below.

- ii. How would commercial customers utilize the Alternative System?**
 - i. Would use of the Alternative System for tracking and certifying PECs be particularly useful for commercial customers?**

Commercial customers could also benefit from generating power, as well as tracking and certifying their PECs. Though the customer journey would be like that of the prosumer-generator, commercial customers could also directly (from the Nevada Alternative System) sell their PECs into larger systems, such as WREGIS. This would allow for a more competitive and potentially more lucrative market for PECs.

- iii. Would the Alternative System for tracking and certifying PECs affect development of renewable energy in Nevada? If yes, how?**

The Alternative System for tracking and certifying PECs would positively affect the development of renewable energy in Nevada. As set forth above, current opportunities for prosumer-generators are limited. The Alternative System would allow prosumer-generators to sell PECs in the more competitive and potentially more lucrative PEC market outside Nevada. This would encourage Nevada prosumer-generators to install more renewable energy resources, including biomass, geothermal energy, solar energy, waterpower, and wind. A successful development of an Alternative System could provide an environment such as the Brooklyn Microgrid, a community-powered microgrid where participants engage in a sustainable energy network and choose their preferred energy sources locally.

- iv. Would the Alternative System have the functionality to quantify improvements in efficiency, cost, tracking, and security for PEC transactions compared to current systems? If no, how could this functionality be obtained?**

Without having access to data in the current system, we are unable to provide a quantifiable analysis. Instead, we interviewed a current prosumer-generator who engages in PEC transactions about the customer experience to determine how a blockchain Alternative System could possibly quantify improvements in efficiency, cost, tracking, and security for PEC transactions.

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Through our interview with the prosumer-generator, we learned that each month, a customer must manually enter electricity generation amounts into the online system; these amounts must then be verified by PUC staff before they can be assigned to be sold. This verification process takes anywhere from one week to a month and may require a back-and-forth email exchange. This system relies on the prosumer-generator to be trustworthy and for the PUC to trust the prosumer-generator.

In contrast, the blockchain-based Alternative System set forth in the diagram above is fully automated. The smart meter assigns, tracks, and verifies the PECs within the Alternative System. Other smart meters verify the trustworthiness of the PECs and issue certifications. This process improves efficiency; removes the potential for human error; reduces PUC staff time costs; automates the process for prosumer-generators, commercial customers, and PUC staff; and ensures the security of the PECs for the utilities purchasing these PECs.

Other Nevada Stakeholders

In addition to the stakeholders that are expressly covered in the foregoing questions, the following are additional stakeholders we have identified and the benefits they should realize from the implementation of an Alternative System:

Public Utilities Commission (regulator)

- A streamlined tracking and certification system for PECs would achieve efficiency benefits and cost savings through the reduction of staff time spent certifying, maintaining, and training to use the current system.

Utilities (wholesale and resale providers)

- A streamlined and efficient system for buying and selling PECs would allow utilities to purchase PECs at the best price while also allowing them to stay compliant with relevant Nevada statutes and regulations.

Nonprofits / Government Agencies

- A streamlined and efficient system for tracking, certifying, buying, and selling PECs would allow nonprofits and government agencies to track, certify, and sell PECs at the best price on the Nevada Alternative System and allow them to access other systems, such as the WREGIS platform.

Nevada Residents (general population)

- A streamlined and efficient system for tracking, certifying, buying, and selling PECs would encourage and accelerate development of current and future renewable solutions aimed at protecting and improving a changing planet.
- c) **Could all Nevadans benefit from the opportunity to monetize their PECs in larger markets (e.g., WREGIS)? If yes, what functionality should an Alternative System for tracking and certifying PECs have to ensure Nevada customers were able to interface with other states' PEC systems to market their PECs in those states?**

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Yes, a blockchain-based Alternative System would allow commercial customers with over the 1-MW minimum to directly sell on the WREGIS system and to participate in a more competitive and possibly more lucrative market for PECs.

For prosumer-generators to benefit from the opportunity to monetize their PECs in larger markets, a blockchain-based Alternative System would allow them to bundle their PECs with other prosumer-generators to then sell on the WREGIS system for a more competitive and potentially more lucrative market for PECs. The Alternative System could potentially do this in two ways. First, prosumer-generators could go in to the Alternative System and elect to have their certified PECs included in a bundle. Once enough kilowatt-hours (kWh) were bundled by multiple prosumer-generators, the Alternative System would track and sell them on the WREGIS system. Second, prosumer-generators could be allowed to elect that the most efficient and best price of their PECs be determined by the Alternative System, which would then bundle, certify, and sell the PECs on the Alternative System market or the WREGIS system for the best price.

The Alternative System would track and certify PECs in the same way it would to sell PECs in the Nevada marketplace. The Alternative System could interface with other states' PEC systems through modular features built on the blockchain.

d) What limits should be placed on the functionality of the Alternative System? More specifically:

i. Should there be a minimum MW requirement for participation?

With a blockchain Alternative System, there is no need to have a minimum MW requirement for participation, as the Alternative System can bundle, track, and certify kWh of PECs for all customers. A smart meter would be able to track the electricity at fractional intervals (such as every 15 minutes), and the blockchain Alternative System could store the data on a distributed ledger. This would ensure that at the end of the month, a prosumer-generator or a commercial customer would not waste additional energy to earn extra PECs. Tracking electricity consumption at a micro level would also assist in preventing fraud.

ii. Today, there are many Nevada generators with less than 1 MW of generation. If the answer to (d)(i) is yes, how would PECs be tracked and certified for such generators?

The blockchain Alternative System would allow Nevada prosumer-generators generating less than 1 MW of energy to bundle their certified PECs in kWh. Blockchain technology allows for microtransactions and efficient transaction bundling. This could happen in one of two ways. First, prosumer-generators could go in to the Alternative System and elect to have their PECs certified and included in a bundle. Once enough certified PECs in kWh were bundled by multiple prosumer-generators, the Alternative System would track and sell them on the WREGIS system. Second, prosumer-generators could be allowed to elect that the most efficient and best price of their PECs be determined by the Alternative System, which would then bundle, certify, and sell the PECs on the Alternative System market or the WREGIS system for the best price. In the examples above, the blockchain Alternative System would track and certify the PECs through the prosumer-generator's smart meter.

iii. Should there be user interface requirements? If yes, what would they be?

Prosumer-generators and commercial customers: User interface requirements for a blockchain-based Alternative System should follow best practices for user interface design and allow prosumer-generators

and commercial customers to assign and track their PECs, to set user account settings for automated services (as outlined in the answer to question (d)(ii)), to see market demand, and to sell at the best price. Design should also consider users with lack of computer expertise and general accessibility functions.

Utilities: User interface requirements for a blockchain-based Alternative System should follow best practices for user interface design and allow utilities to see how many credits they bought, for what price the credits were bought, and smart meter information. Design should consider general accessibility functions.

- iv. **If small generators were not able to utilize the Alternative System, e.g., because of a lack of computer expertise or internet access, how would PECs be tracked and certified for such generators?**

Lack of computer expertise: With an internet connection, the blockchain-based Alternative System could be set up to be automated for the prosumer-generator or the commercial customer. This would be accomplished by allowing the smart meter to track, certify, and sell the PECs directly based on the criteria initially decided upon in an annual written contract by either (1) the PUC or (2) the prosumer-generator or the commercial customer.

Lack of internet access: Where the internet is not accessible, a mesh network of smart meters that can communicate with each other using a defined radio frequency could be created. This mesh network would be connected to other smart meters that have access to the internet. In this way, each smart meter communicates with other smart meters using a unique radio frequency to transfer the information related to PECs. This creates a path to find a meter with internet access to transmit the data to the Alternative System.

- v. **Is there an option that would permit customers who are not able to utilize the Alternative System to aggregate their output of energy to qualify under the Alternative System? If yes, what is the aggregation option, and what would it cost?**

Development and implementation of an Alternative System would create a solution that would permit customers to utilize the Alternative System regardless of how much or how little electricity they generated.

- vi. **Should there be limits on the type(s) of currency used for transactions using the Alternative System? For example, what are the potential ramifications for user acceptance of an Alternative System if the form of compensation to generators is not in US dollars?**

To ensure only well-vetted tokens were used as payment methods within the Alternative System, an application programming interface (API) integration from a reputable exchange could be used. A reputable exchange would list assets compliant with local law that have been evaluated against a regularly updated digital asset framework. The exchange's API integration would act as the bridge from cryptocurrency to fiat and vice versa.

A potential ramification for a prosumer-generator or a commercial customer accepting alternative currency is the volatility of that currency's value if the individual does not immediately convert it into US

dollars. This, of course, is the prosumer-generator or the commercial customer's choice and risk, not that of the PUC.

- vii. Would use of a blockchain-based Alternative System necessarily involve the use of cryptocurrency, or could PECs be monetized in US currency as they are today?**

A blockchain-based Alternative System would use executable distributed code (or so-called "smart") contracts, which would require the use of tokens to pay for transactions costs. Tokens could then be exchanged for cryptocurrency, converted into fiat through exchange platforms, or the contract could initiate a payment process through a traditional accounting system, resulting in an ACH bank transfer or a physical check.

- e) If the Commission decided to authorize use of an Alternative System for tracking and certifying PECs, should this be implemented in stages, such as ...**

- i. A pilot program like that of the Energy Web Foundation and PJM Environmental Information Services?**

A pilot program for PECs could be initiated for a blockchain-based Alternative System. The recommended pilot program would be for a small group of prosumer-generators and commercial customers who would elect to participate. An incentive for participation should be designed to ensure committed and engaged participation.

- ii. An initial rollout for commercial customers, followed by an additional rollout for residential customers?**

Recommend a pilot program for those prosumer-generators and commercial customers who elect to participate. Prosumer-generators should be able to participate in an initial pilot program, as it would be important to evaluate the experiences of highly engaged individuals and to place power back into the hands of the individuals.

- f) Regarding transition logistics:**

- i. How long would it take to implement the Alternative System for tracking and certifying PECs in Nevada?**

It is difficult to estimate the length of such an implementation for a full system. However, as a benchmark, an implementation with similar functionality to the existing PJM solution (mentioned above) should take five to six developers roughly one year to develop the Alternative System before initial implementation of the program.

- ii. How would this timeframe be different for partial implementation of the Alternative System for ...**

- i. Commercial customers only?**

Commercial customers usually have supervisory control and data acquisition (SCADA) or similar systems in place, which would be required to connect to the Alternative System, allowing for a simpler and less costly implementation.

- ii. A pilot program?**

A pilot program implementation with both prosumer-generators and commercial customers would require multiple applications of technology to integrate with the blockchain Alternative System.

Although implementation of a pilot program may take longer with prosumer-generators due to the necessity of smart meter integration, it is beneficial because it allows prosumer-generators to be part of the initial experience and places the power back into the hands of the individuals. Generally, commercial customers have systems in place that do not require smart meter integration (such as SCADA systems). If commercial customers did not have systems that could connect with the Alternative System, smart meters or other technology would need to be installed.

- iii. What costs would be associated with the implementation of the Alternative System, including ...**
 - i. Cost to the PUC;**
 - ii. Cost to generators; and**
 - iii. Cost to the system provider?**

It is difficult to provide a cost for implementation, as there are many components that need to be considered.

- iv. How would cost differ for partial implementation of the Alternative System?**

A pilot program, followed by a full implementation in Nevada, would see the most benefit for the PUC, utility providers, commercial customers, nonprofits and government agencies, and other Nevada residents. A partial implementation of the Alternative System would reduce some initial costs, especially related to implementing new technology hardware (such as smart meters).

g) What additional questions should the PUC consider in this proceeding and why?

How long will the Alternative System remain in place before it becomes obsolete? When will utility and transmission technology allow for prosumer-generators to directly sell and transfer excess energy not consumed directly to utility service providers? If the direct sale and transfer of excess energy happens, does it make the PEC system obsolete?

Respectfully submitted April 15th, 2019



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