Challenge Brief: Blockchain to Transact Carbon Offsets from Aggregated Micro-Solar Pilot

What is the initiative?

Starting in January 2018, a multi-stakeholder working group was established to understand and develop a model to address concerns about fragmentation and lack of transparency in Alberta's electricity system as renewables become more viable and prevalent.

One of the initiatives from that working group was a pilot using blockchain technology to aggregate solar sites, across rural Albertan communities, and using a co-op model to create scale and make emissions reductions credits accessible. The project focused on automating the verification process to reduce the cost of otherwise expensive process.

The major outcome of the working group was to development of a digital solution to achieve a "single source of truth" across generators, verifiers, sellers and buyers of green attributes.

Why is this initiative important?

Today's electricity systems, including Alberta's, are composed of highly fragmented IT solutions and business processes. Fragmentation is costly for all stakeholders involved in the energy system. Fragmentation:

- Limits trust and visibility between stakeholders
- Leads to duplicate and manual processes that increase costs
- Increases regulatory uncertainty and complexity that increases the cost of compliance

New entrants such as renewable generators, electric vehicle owners, storage companies and pro-sumers have a hard time accessing the power market and currently leave significant potential revenue on the table. While, incumbents (utilities, large IPPs, regulators, system operators, retailers) in the current system, absorb the majority of the costs that result from inefficient processes and complicated regulatory environments.

As electricity systems become more distributed, e.g. through more small scale solar and wind producers, getting a true real-time picture of the system-as-a-whole will become more and more important. Using Distributed Ledger Technology (DLT) technology has the potential to enable a more secure, adaptable and accessible electricity system.

Benefits include:

- For utilities, new revenue streams, and more efficient processes
- For regulators, better visibility to the system to design better policies and incentives
- For communities, lower barriers to participate in energy generation
- Overall increase in transparency and trust across a network that enables more reliable transactions and better decision making

What is the ambition for this initiative?

The pilot showcased the potential of the technology. It showed that when different stakeholders can agree on a common architecture to run and manage a set of relationships we can significantly reduce the cost of transactions and create access for transactions that would never in the past.

This enables the larger ambition to create an interconnected, accessible and adaptable energy system. If clean power generation can be aggregated across the province without giving up ownership or rights to that production, it would result in economic benefits for communities.

What are the challenges to achieve this ambition?

Any technology solution is only as powerful as the number of users, using the distributed ledger. Adoption of technology needs to be simple so that large and small entities can join the network securely and with the least amount of disruption. In terms of "% of production reporting to the platform", 80 - 90% of renewable energy production reporting to the platform would be ideal, 60% would be ambitious, and 30% would be great.

The challenge of adoption comes with two things:

1. The overall perception of what blockchain is and is not, i.e. people are weary of blockchain as a term.
2. There is a lot more willingness in the US to take on these types of initiatives, so should the attention be there? In Alberta, there is some support, but it will take time, in particular to build better relationships with regulators, utilities and communities and talking to the right decision maker empowered to make decisions. This speaks to a need to de-risk and create roadmaps for technology adoption, i.e. it still feels scary for people.

What constraints must be respected?

Because people don't understand blockchain, we need to spend a lot of time educating people on the implications of the technology, how it works, how it integrates with other innovations. The sales cycle is long as people grow their knowledge and comfort levels with DLT.

The legal and regulatory processes will also need to evolve as new relationships between stakeholders start to open up. For example, the "distributed energy resource protocol" to

produce offsets from distributed renewable energy sources is under-utilized, in favor of other incentive programs due in part to an expensive verification process. Proving generation and the creation of offsets exist in compliance with the protocol can eat up any potential revenue from participating in the offsets program. It will be important to consider how new technology, like the blockchain strengthens the intent verification standards while also decreasing the procedural burden of 3rd party verification.

Volumes of generation and trading do not currently support operations. Government and fundraising supported most of the development to date. Additionally, communities are cash strapped. Financial support from other jurisdictions, the United States, Europe, mean that we are spending less time supporting Albertan efforts.

What has been tried in the past? Has it worked?

A pilot with small scale solar producers, mentioned above, has been completed. Other projects are being developed in other jurisdictions. Working groups and training around specific use cases seem to be the most successful ways to increase adoption.

The current use cases under-development include:

1) Updating the renewable production tracking system. All renewable generation across a State to be captured by the ReWatt Platform, for use by the regulatory agency responsible for designing and administering a variety of incentive programs to encourage the development of clean energy across the State.
2) Using blockchain technology settle transactions across an electric vehicle network that includes: renewable generation, storage, and load ie electric vehicle charging stations. Transaction include the renewable energy credits and the physical power. Another outcome of this project is real time data to inform how rate structures need to be redesigned.
3) Supporting Energy Independence in Indigenous communities. Mechanisms to support accountability and governance of assets developed in partnership with external stakeholders.