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GUEST EDITORIAL

Beyond Bitcoin—Will Blockchain and Smart Contracts Self-Execute Their Way Into the Utility Industry?

This month's editorial was written by Allen R. O'Neil, Partner, McCarter & English, LLP.

Blockchain is being touted as a game changing development—a disrupter or innovator (depending on your view) that will transform how industries conduct business. One thing is clear, what started as the foundation for Bitcoin has evolved well beyond cryptocurrency into a process that has the potential to impact many companies—including electric cooperatives. What does this really mean for the utility sector? Are there beneficial uses, and if so, what are the legal implications or impediments to making blockchain an everyday reality? Will blockchain be the downfall of the industry, or will it help to reduce costs and streamline processes? Can and should it be embraced by cooperatives?

Blockchain and Smart Contracts

Blockchain and smart contracts are built upon a construct whereby information is organized in blocks which are then distributed to a public network of computers (each a "Node"). Information can then be verified by comparing the data held by each Node to ensure the block's accuracy and to prevent tampering.[1] If a discrepancy is detected, the new block will be rejected. If the transaction is verified, a new block will be linked to previous blocks, creating a chain of transactions permanently tied together and thus immutable.[2] What began as the public ledger for Bitcoin transactions is now a tool that can be used to verify and ensure accuracy of any data residing in the blockchain.

A smart contract consists of a computer code that takes the basic principles of blockchain and uses them to create "if then" self-executing actions that are stored on a blockchain platform. The smart contract is distributed to the Nodes for verification and inclusion in the blockchain—allowing the agreement to take advantage of the security and immutability that blockchain offers.[3] For example, Ethereum, one of the leading platforms for smart contracts, is designed to be programed to take a specific action once certain conditions have been met. Thus, the smart contract could be coded that: If Party A sends a payment to Manufacturer, then upon confirmation by the block that the payment was sent, the code will automatically deliver instructions to ship out the product.

Applications to the Utility Industry

So, how are blockchain technology and smart contracts being implemented in the electric utility sector? Let's consider the following three examples: (1) sales of and payment for energy; (2) tracking and trading Renewable Energy Credits (REC); and (3) controlling various generation assets to maximize value.

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Sales and Payments. The use of blockchain could have huge implications when it comes to the sale and purchase of energy. In 2016, experiments selling energy using Ethereum smart contracts began in Brooklyn, New York. Through the use of the smart contract, a homeowner in Brooklyn sold energy from his solar panel to his neighbor. The sale occurred over a micro grid managed by Lo3 Energy.[4] Some believe this should terrify utilities. As one author puts it, "If utilities think rooftop solar panels and batteries are bad for business, blockchain should scare the bejeezus out of them."[5]

While blockchain technology could be utilized to ultimately bypass utilities, it is more likely that utilities will use blockchain to their advantage,[6] and those that adapt the technology for their own benefit will continue to be successful.[7] Tokyo Electric Power Company (TEPCo) has developed a program that uses a solar and storage package and enables peer-to-peer power sales in an effort to reverse a significant decline in TEPCo's customer base.[8]

While there is a lot of discussion about how to address the potential peer-to-peer electric sales, there are many possible applications of the technology which could benefit cooperatives. Perhaps one of the most logical steps is to replace EEI Confirmations (Confirm) directing the purchase of power under an EEI Master Agreement with the use of smart contracts. This could have benefits to the cooperative from both a business and legal perspective. First, smart contracts could be used to self-execute purchases when pricing hits a certain hardwired price point. There would be no need for a call to, or from, the supplier to confirm the purchase and it would eliminate any questions as to whether there was a "bad actor" in the deal or a misunderstanding of the pricing. It would also eliminate the need to find an employee authorized to approve the purchase when the desired pricing is offered.

Furthermore, since smart contracts reside in the blockchain, it would be extremely difficult for a supplier to tie additional contract provisions to the code. Typically, the terms of a Confirm control in the event of a discrepancy between the Confirm and the EEI Master Agreement. Unfortunately, this often necessitates a legal review of the Confirm prior to execution to ensure there are no terms which would be harmful to the cooperative. Frankly, it is not unusual to find out that a cooperative has executed Confirms without this additional legal review due to: (1) a desire to secure the pricing; or (2) misunderstanding that all Confirms are standard, do not alter the Master Agreement, and are, thus, safe to execute without legal review. The use of smart contracts would make the purchase instantaneous and eliminate the need for legal review. Cooperatives would simply develop a strategic plan for their block purchases, code that plan into the smart contract, and the purchase would occur when the target price is reached.

Tracking and Trading REC Allocations and Emissions Allowances. Another potential blockchain use is the creation, and tracking the providence, of REC or other emissions credits. State REC programs can vary greatly, and thus all RECs are not created equal. For example, in Colorado, RECs must meet certain requirements to comply with the state's renewable energy standards, and, depending on the source, the owner of the RECs could receive a multiplier when counting the output towards compliance.[9] Blockchain can be used to track the generation, purchase, and sale of RECs (or any other emission or allowance credit), allowing a purchaser to see exactly where their RECs were generated and to assess whether the RECs being sourced comply with their state's renewable energy portfolio standard. A blockchain project in Santa Clara,

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California is currently being used to track and trade carbon offsets.[10]

In addition to providing a secure source of trackable RECs, blockchain can also reduce the cost of procuring those RECs. REC brokers charge fees in connection with the sale of RECs. There are also costs associated with verifying and providing certificates of origin. These costs, along with other problems with tracking RECs, such as the potential for double counting, represent an estimated one billion dollars in annual spending that could be saved through the implementation of blockchain.[11]

Asset Management/Direction. Finally, blockchain and smart contracts can also be used to assist in asset management and deployment. This could be particularly helpful as the number of distributed energy resources and demand response programs continue to grow. Smart contracts could be used to program in conditions under which certain resources should be dispatched or demand response actions be initiated. This would eliminate the potential for delays and human error when making dispatch decisions.[12]

For example, the City of Burlington, Vermont is working to implement this technology in an effort to manage supply and demand in real time.[13] Burlington plans to utilize the technology to direct batteries to charge from wind resources when pricing is low and to draw from the same batteries when pricing is high.

Legal Issues

While there are clearly benefits that blockchain and smart contracts can provide to the electric industry, certain legal hurdles must be addressed before they can be fully embraced. The following are several of the legal issues that will need to be addressed should a cooperative decide to use blockchain and smart contracts.

Confidentiality. One of the legal issues standing in the way of smart contracts is confidentiality.[14] The basic principle of blockchain is security through transparency. Thus, information sent to the block has essentially become public. There is nothing to stop the individuals maintaining and verifying the information in the block from looking at the data stored on their systems. Once information is loaded into the block it becomes extremely difficult, if not impossible, to remove, and additional records will be created each time the information is altered. For example, if a cooperative and a member decide to use a smart contract for purposes of billing, the contract could be coded to provide that the member's payment will self-execute at the end of each month based on the member's energy usage. Assuming the cooperative and the member are using a traditional form of funds transfer (i.e., not digital currency), it may be necessary to include information in the block that typically would not be public. Cooperatives looking to adopt blockchain technology would need to carefully review their data protection requirements to ensure they do not inadvertently breach those data privacy requirements.

The reason the system works for crypto currencies is that there is no information that could be used if viewed by someone in the Node. If a Node were to "peek behind the curtain," all they would see are account numbers and transactions amounts. There is no personal information to view and abuse. The further you move to expand the use of blockchain into other industries, the more likely confidentiality will become a problem.

Dispute Resolution. Another problem with smart contracts is dealing with disputes. Smart contracts may work well for very simple direct transactions, but the more complex the transaction the greater risk that a dispute could arise. Since smart contracts are a coded process, they may not include provisions as to how a dispute will be resolved. In addition, often smart contracts will need to rely on information received from sources outside of the blockchain itself (e.g., market price of power or fuel). This can create problems in the event either the price is not "pushed" to a large enough number of Nodes, resulting in the rejection of the transaction, or the supplier of the "off-chain" information provides inaccurate data.[15] Smart contract parties will need to carefully discuss how these situations will be handled and code the contract accordingly.

Also, the Nodes may be located all over the world which raises questions regarding jurisdiction in the event a dispute arises. If the smart contract lacks governing law and venue provisions, a plaintiff could have almost unfettered choice of venue and law to apply to the contract.[16] Smart contracts will need to be coded to address governing law, venue, and whether the parties wish to waive a trial by jury or if the parties will need to execute a traditional text-based companion agreement to cover these issues.

Problems with the Rigid Nature of Smart Contracts

There is typically no such thing as substantial or partial performance in the world of smart contracts. It is an all or nothing transaction. A smart contract self-executes upon completion of a specific set of instructions. If

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Party A substantially performs under the agreement, but falls short of full performance, the smart contract will not be triggered to move on to the next action as the current step has yet to be completed. The smart contract has not failed. It has functioned exactly as it was coded, however, the result may not be what was intended by the parties or contemplated by law.

A traditional written contract allows for some flexibility in performance even when the terms of the agreement do not exactly match up with the real world situation. Parties may wish to see the transaction completed even if not all the conditions for completion have occurred. Parties can agree to proceed with a transaction by waiving conditions, amending the document, or choosing to rely on flexibility built into the agreement, in order to ensure the outcome occurs as the parties intended.

It is difficult, if not impossible, to code this level of flexibility into smart contracts. In addition, the cost to account for and code all these scenarios would likely far outweigh the legal costs of preparing a traditional agreement. As such, smart contracts may, for now, need to be limited to very specific and clear cut transactions or paired with a traditional written contract until greater flexibility can be coded into the process (e.g., EEI Masters with smart contract confirmations).

Smart contracts by design are intended to be difficult to modify or alter which can cause complications in the event a party desires to amend an agreement or terminate it early.[17] Although this provides a level of security to the agreements, the inability to modify agreements to keep up with changes in law will need to be addressed.[18] Traditional contracts, for example, have change in law provisions to address what happens in the event a provision becomes illegal after execution. Smart contracts will need to be coded in a way to ensure that there is a process in place to deal with issues such as changes in law, bankruptcy protections, events of default beyond performance (i.e., breach of reps and warranties), etc. Coding smart contracts to account for many of these issues is not impossible,[19] but early adaptors may find the process time consuming and costly compared to drafting a traditional contract.

While these legal issues provide some significant hurdles to overcome, in all likelihood blockchain and smart contracts will find a place in the electric utility sector. The legal issues discussed here can be addressed through either detailed coding of smart contracts or a traditional text-based companion agreement. While smart contracts may remain a novelty in the short term, cooperatives should nevertheless begin to monitor the potential impact these contracts may have on their business, and assess how smart contracts could be utilized to increase efficiencies and lower costs for their members.

If you have any questions or comments about the issues discussed in this editorial, please feel free to contact me at aoneil@mccarter.com or at (202) 753-3431.

1 *See* Reed Karaim, *Blockchain Explained: What does cryptocurrency technology mean for Co-ops?*, Rural Electric Magazine (July 7, 2018), https://www.cooperative.com/remagazine/articles/Pages/blockchain-explained-co-ops-and-cryptocurrency.aspx.

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7 *See* Jackson, *supra* note 4.

8 Martin, *supra* note 5.

9 *See* 4 Colo. Code Regs. 723-3, §3654 (2018).

10 Marija Maisch, *Singapore Launches Blockchain-Based Renewable Energy Marketplace*, PV Magazine International (Nov. 12, 2018), https://www.pv-magazine.com/2018/11/12/singapore-launches-blockchain-based-renewable-energy-marketplace.

11 *See* Claire Henly, *et. al.*, *Energizing the Future with Blockchain*, 39 Energy L.J. 197, 210 (2018).

12 *Id.* at 212.

13 Martin, *supra* note 5.

14 *See* Gideon Greenspan, *Why Many Smart Contract Use Cases are Simply Impossible*, Coindesk (Apr. 17, 2016, updated Apr. 18, 2016), https://www.coindesk.com/three-smart-contract-misconceptions.

15 *See* Levi & Lipton, *supra* note 3.

16 *See id.*

17 *See id.*

18 Max Raskin, *The Law and Legality of Smart Contracts*, 1 Geo. L. Tech. Rev 305, 326-27 (2017).

19 *Id.* at 327-28.

The comments and opinions in this editorial are the author's, and may or may not be consistent with NRECA's.