

BLOCKCHAIN: THE ENERGY STORM IS COMING

FOOT ANSTEY



NEW KID ON THE BLOCK

Most people have probably heard of bitcoin, the intangible currency that has revolutionised financial transactions around the world, and is, surprisingly, nearly a decade old. Cryptocurrencies such as bitcoin are, however, just one application of 'blockchain' or distributed ledger technology; similar to the way in which email is just one way in which the internet can be used. The potential for other applications built on blockchain development platforms (such as leading light, Ethereum) is astounding. The term "game-changer" is overused, but we make no apologies here. This is more than the goalposts moving; it's rewriting the entire rulebook.

Who or what is this "New Kid"?

Blockchain is an interconnected, decentralised, transactional ledger which enables participants to have simultaneous, real-time access to all the information stored on it. Unlike the internet, where data is stored on centrally-controlled servers, the data is held across a much larger number of computerised 'nodes' and information is accessible to all participants simultaneously.

One helpful analogy is that of a spreadsheet; rather than parties sending amendments back and forth and taking turns with the document, in the world of blockchain, all verified parties can access and update the document, and once concluded, this information is stored as a permanent, incorruptible "block" of data, held simultaneously across a wide network of computers.

There are of course a multitude of benefits from creating, storing and accessing data in this way, including :

- (a) It is secure and much harder to corrupt– data is not stored in a single centralised server so it is substantially more difficult to intercept;
- (b) It is fast – transactions taking place on blockchain are concluded quickly through a mechanism of authentication and authorisation, reducing the need for complex and time consuming KYC;
- (c) It addresses the problem of double-charging (particularly relevant for the energy industry) as the transparency of blockchain ensures that each transaction is concluded only once;
- (d) Compared to other forms of electronic transacting, it provides an extra level of protection against identity theft and fraud – each participant is provided with a "private key", which reduces the need for information sharing over the web.

Does it have a place in the Energy Industry?

We strongly believe that it does have a place; and we are not alone. Many emerging companies are looking at ways to harness the power of this technology and apply it to practical issues arising from the way in which we generate, buy and sell power. For instance, *Grid Singularity* in Austria is a start-up using blockchain technology to develop a 'decentralised energy data exchange platform' to enable smart grid management, energy trade validation and trading of green certificates amongst other potential applications. *Grid Singularity* is also the technical partner of the Energy Web Fund, which is looking specifically at blockchain applications in the energy sector, and has already been backed by major players such as Centrica, Shell, Engie and Statoil to the tune of several million dollars. Clearly, it is already being taken very seriously.

Some of the most promising applications of blockchain emerging from our discussions with the industry are set out below, but make no mistake, there are many many more:

- **Smart Contracts:** the partnership between TenneT (grid operator in Germany) and Sonnen (solar battery maker) is a prime example of how blockchain will allow the almost instantaneous conclusion of transactions between the owner of the battery and the grid once certain

conditions are met. The idea is that battery storage systems installed in various locations are grouped together so that, on provision of services to the grid, a payment will be automatically made to the supplier of this service, for example the homeowner. Lawyers need to be talking nicely to coding partners it would seem!

- **Peer to peer sales and micro-grids:** in the context of this article we are looking at "peer to peer" selling between individuals (e.g. between two neighbours) as well as organisations (e.g. a corporate entity with embedded generation selling surplus electricity to another corporate entity close by). Micro-grids are defined as a number of individual energy suppliers who collectively supply energy to the National Grid or the DNOs. Again blockchain makes this possible by streamlining these transactions and removing the need for aggregators and intermediaries; although our view is that a third party is still likely to be involved to determine the algorithm powering the chain. Some pioneering work has been done in Boston by LO3, looking at peer to peer energy transactions in a single neighbourhood. A world where the tenants in a housing development or block of flats could sell each other their surplus or "spill", before any remainder is pumped out to grid is an intoxicating one.
- **Electricity Market trading:** A number of utilities in Europe (including Enel SpA, RWE and Vattenfall) have joined a project to test how blockchain can be used in the trade of wholesale power and natural gas. Trading is expected to start in August, but again, taking the smart contract application and applying to a set of buy/sell parameters, it is easy to see how the markets can be streamlined, reducing third party cost and de-risked by virtue of the incorruptible and permanent nature of the ledger.
- **Selling and buying REGOs or environmental credits:** a number of organisations (a recent example includes the Whitbread Group) use REGOs to offset up to 100% of their carbon footprint. Blockchain has the ability to move the buying and selling of REGOs onto the virtual space, providing participants with more confidence in their purchases, and ultimate transparency. Carbon offsetting has been undermined by the difficulty in tracing one's contribution to the impact it may have, and by the problems arising from double counting. Blockchain can solve this.
- **Certifying "provenance":** Many issues currently arise when attempting to 'trace' the transfer of electricity from a renewable energy plant (e.g. a wind turbine) to a battery and/or the grid. In situations in the UK where storage is co-located with renewable generation, there are potential issues that blockchain applications can address: firstly, there are issues with accrediting ROCs for electricity discharged by a battery, as this electricity could have come from the grid, and not the renewable energy project adjacent to it. Secondly, there is the risk of double-charging a co-located storage facility as it is currently considered by regulation to be both a 'generator' and a 'consumer', so the battery will be charged for both the use of network and balancing services. Blockchain has the potential to allocate a unique code to each kWh of electricity generated making it possible to "trace" both the origins and the destination of the same without the need for significant and costly metering requirements, allowing the virtual track of the renewable energy clearly and unambiguously.
(We are grateful to Mark Henderson, Investment Manager at Temporis Capital LLP for his contributions to this section)
- **Automated billing:** For energy suppliers in particular this would be a welcome application as it has the ability to significantly reduce human error and the administrative costs associated with this. Accurate billing and access to full billing history will in turn increase customer confidence and retention of the existing customer base.
- **Improved maintenance of assets:** blockchain provides a mechanism for automatic storage of information about "live" assets creating a log of the history of the asset. This means that in the event of failure of the equipment (e.g. the wind turbine) the operator has the ability to go over the history of the asset and identify what has caused this failure. Most importantly it would create a "one-stop" where information about the performance of the asset would be stored indefinitely allowing any participant to the blockchain to assess the same.

- **Crowdfunding made easier:** the energy industry lends itself to innovative forms of funding and crowdfunding is only one of them. Existing platforms will no doubt benefit by this technology which makes transactions substantially quicker.

Not if, when.

Some of these applications are currently being tested across the globe, but if the energy transition has taught us anything, it is that the speed of change is dizzying. There is therefore little time to grapple with some of the issues being thrown up and iron these out, but it will be fun trying!

- **Lack of standardisation and uniformity:** the premise of blockchain is that it allows transactions to take place virtually and independently from the physical location of the parties. How will cross-border transactions (even within the UK) be facilitated? Parties to such transactions will, in the absence of any top-down regulation or industry-driven standardisation, have to choose their preferred jurisdiction in advance and this will then govern their obligations and rights under their "smart contract" or other contractual arrangements;
- **Legal advice:** blockchain will not fully obviate the need for legal advice (and the cost associated with it). Participants will still need to be advised on their rights and obligations under the relevant smart contract or other arrangement. Legal teams will also be required to work hand in hand with the developers of the blockchain software that will underpin all these applications to ensure that the algorithm "behaves" in line with the parties' agreement. Also, the smart contract is only as good as the code powering it, so there is of course the potential for some ground-breaking litigation if issues arising from human error arise, and no insurance market yet to speak of!
- **Accessibility:** whilst seeking to "democratise" the "internet of value" a question that often arises is how accessible blockchain really is. It appears to us that the market is in need of a new breed of IT engineers with thorough knowledge of this new product. This in itself generates a number of other questions is the requisite skill immediately available in the market, at what cost or could it be found in the so-called "gig economy" and what are the wider ramifications about the procurement of this service?
- **Technical issues:** a certain type of infrastructure is required in order to enable peer-to-peer trading to take place (e.g. in the case of two adjoining houses, where one house is the "supplier" and the other the "off-taker", transmission cables and meters will need to be installed). In the event of damage or fault, where will the risk lie? Again this is something that parties wishing to participate in these types of transactions will need to consider carefully alongside considering all other relevant requirements.
- **Insurance:** one of the biggest advantages of blockchain is that it is (almost) impenetrable. However, this does not mean that it is 100% "hack-proof". Companies wishing to develop and participate in blockchain will no doubt be considering the availability of insurance to cover off this risk. Cyber insurance has seen a considerable uptake in the last few years and it would be interesting to see how this fairly new insurance product adapts to the demands and needs of blockchain.

Blockchain has the ability to transform the energy industry. Questions around accessibility, the role of the state (if any) and security remain but these are issues that are commonplace for new and untested technologies. We at Foot Anstey are keen in getting stuck in and we look forward to hearing from those interested in venturing into this exciting field.

Further Reading

- "What is Ethereum?": <http://www.coindesk.com/information/what-is-ethereum/>
- "Energy Sector Turns to Ethereum to Test Blockchain": <http://www.coindesk.com/energy-sector-giants-turn-to-ethereum-to-test-blockchain-potential/>
- "Pilot project taps batteries & blockchain to iron out renewable power": <https://www.cleanenergywire.org/news/pilot-project-taps-batteries-blockchain-iron-out-renewable-power>
- **Blockchain: the internet of value**: <https://www.rathbones.com/knowledge-and-insight/blockchain-internet-value>

FURTHER INFORMATION



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