



ALL-PARTY
Parliamentary
Group on
Blockchain

ENVIRONMENT & ENERGY

Blockchain applications - regulation, policy & strategy

 **LOCKCHAIN**



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1. APPG Blockchain Evidence Meeting on Environment & Energy

1.1. Purpose

The purpose of the All-Party Parliamentary Group on Blockchain (APPG Blockchain) is to ensure that industry and society benefit from the full potential of blockchain and other distributed ledger technologies (DLT) making the UK a leader in innovation and implementation of the technology.

The eighth evidence meeting focused on the potential uses of Blockchain in the Environment & Energy sector. This report provides a summary of the takeaways and evidence from the meeting.

The video recording of the session is available on our websites APPG Blockchain www.appg-blockchain.org/ and Big Innovation Centre www.biginnovationcentre.com/

1.2. Details of the Meeting

- Date, 12th March 2019
- Time, 17:30 – 19:00pm GMT
- Location, Portcullis House, House of Commons
- Participants, 67 attendees



APPG Blockchain evidence meeting on Energy and Environment

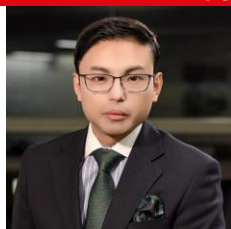
1.3. Panellists: Evidence Givers, Chair & Secretariat

The evidence meeting was chaired by APPG Blockchain Chair Damien Moore MP and Vice-chair Lord Truscott.

Big Innovation Centre acted as the Secretariat for the APPG on Blockchain, led by CEO, Professor Birgitte Andersen and Fernando Santiago-Cajaraville as the Project Manager and Rapporteur.

Building a robust Blockchain ecosystem is part of the mission of the APPG on Blockchain. This APPG meeting on Environment & Energy had representatives from different energy and climate organisations in order to bring the latest developments in the application of Blockchain technology.

Evidence Givers



Alastair Marke,
Director-General,
Blockchain Climate
Institute



Marzia Zafar,
Director, Issues
Monitor &
Innovation, World
Energy Council

Chair



Damien Moore
MP
House of Commons,
UK Parliament

Vice-Chair



Lord Truscott
House of Lords,
UK Parliament

Secretariat



**Professor
Birgitte Andersen**
CEO
Big Innovation Centre



**Fernando
Santiago-Cajaraville**
Project Manager &
Rapporteur
Big Innovation Centre

2. Background

The eighth APPG on Blockchain evidence meeting on Environment & Energy aimed to explore the current uses of Blockchain and most successful use-case within the sector.

The APPG on Blockchain presented the following questions to the Evidence givers,

Environment & Energy

- Bitcoin and other crypto-currency mining are very energy-intensive. Is the environmental cost of digital currency becoming too high?
- What blockchain usage can we envision for the future of the energy sector?
- How can blockchain help tackle environmental challenges?



Attendees at the APPG Blockchain evidence meeting, Portcullis House, House of Commons

3. Meeting Takeaways



Speakers: Marzia Zafar and Alastair Marke

Blockchain is not Bitcoin

Although Bitcoin is an application of Blockchain technology, Blockchain underlying protocol has been different to different applications, and Bitcoin is one such application. . Bitcoin is hugely energy-intensive due to consensus algorithm, "proof-of-work" (POW).

However, alternative mechanisms as Proof of Stake largely address these concerns with energy-efficient blockchains for corporate use (permissioned networks).

Moving from a centralised to a distributed energy system

Blockchain brings the possibility to break up a vertically integrated and centralise system making the system more distributed and more democratised. Enabling direct peer to peer electricity transactions across the value chain, means more inclusions for including the smallest of electricity users and generators. Smaller generators and individuals behind the meter can be seen by the system operator and thus participate in the market.

Blockchain can allow distributed energy resources to play a bigger role in the electricity market. (M. Zafar, World Energy Council)

A blockchain-based system can create a virtual marketplace by matching energy demand and supply (A. Marke, Climate Blockchain Institute)

Regulations need to be updated

A fully scaled Peer to Peer market is dependent on residential customers becoming prosumers. Currently, it is against the law, for the UK consumers to trade with one another like in many other countries.

"The current regulation is defined for vertically integrated utilities" (M. Zafar, World Energy Council)

To allow this, the Community Energy Strategy documents, released in 2014, must be updated with the Blockchain element by the government or BAES (add full form of BAES)

Large scale customer engagement is need

The implementation of Blockchain in the energy sector will be dependant on customer engagement. However, customer engagement relies on reframing of regulation and large-scale customer engagement.

With the emergence of distributed energy resources, including domestic solar batteries?, small-scale generators, battery storage, and a significant demand from electric vehicles; new solutions will soon be required. Customers need to become prosumers.

Blockchain is a useful tool against Climate Change

Currently, there are Blockchain solutions available in the market to support the fight against climate change. From Green Finance where distributed technology can empowering investors with the information to redirect their capital to support the circular economy, with the prevention of plastic waste. The potential to transform regenerative product-service systems and accelerate the shift towards the circular economy.

"Blockchain technology offers unprecedented opportunities for the circular economy" (A. Marke, Climate Blockchain Institute)

An area of particular interest is the use of Blockchain to enable the tokenisation of carbon credits in an Emissions Trading Scheme. The scheme that must be set up after Brexit.

4. Evidence Giving Transcripts

4.1. Marzia Zafar, Director, Issues Monitor & Innovation, World Energy Council.



Marzia Zafar, World Energy Forum

The World Energy Council, with its headquartered in London, is a not-for-profit membership organisation with 92 member countries around the world and over 20 corporate partners.

Blockchain in the Energy Sector

Distributed ledger technology provides a platform for the management of transactional data. Blockchain benefits are transparency, traceability, and the ability to facilitate a push toward the decentralised electricity system.

In 2018 the council's local survey of energy leaders identified Blockchain as a critical uncertainty. They knew that there was something big about and they needed more information about what Blockchain is.

Consequently, the counsel with our partner PwC interviewed 39 companies and regulators from all over the world, and related organisations to understand the maturity of blockchain technology in energy and also to understand its potential and its possible problems.

In October 2018, the council published the following findings,

- Technological feasibility and scalability are hurdles to full deployment. However, those interviewed for this study, are confident that with time, testing and refining of the technology these will be crossed.
- Blockchain in energy is in its infancy. 85% of those interviewed who have piloted projects said they were in the early stages and the pilots are not mature yet
- Blockchain is very much dependent on a reframing of regulation and large-scale customer engagement. The transformative nature of blockchain, which is P2P is dependent on regulation and customer engagement. However, there are existing blockchain applications that can bring immediate optimisation for the existing system.

Blockchain is an enabler, it is not the change itself, but rather it enables the change.

Blockchain and energy consumption

Blockchain is not Bitcoin. Bitcoin was created in 2009; it is a cryptocurrency application of Blockchain. Blockchain technology at the underlying protocol has been to different applications. Bitcoin is hugely energy-intensive because of the way they are using blockchain; however, other blockchain applications use far less energy and need far less computing power.

Energy sector Use-Cases

As part of our exploration in the Blockchain area, we studied two use-cases,

- Electron, a UK-based start-up that has been working towards the creation of a new digitised energy marketplace, able to include smaller distributed energy resources. Smaller generators behind the meter can be seen by the system operator and thus participate in the market. Electron is currently at proof of concept stage and estimate that would be deployed in the UK within the next 12 months

Blockchain can allow distributed energy resources to play a bigger role in the electricity market.

- Peer to peer trading. This is the prospect of blockchain technology that would allow transactive energy to happen. With the right business model and the right part regulatory framework, Blockchain ability to make transactions faster, simpler, and cheaper can allow for wider participation into the energy market down to individual households. We live in a world where we have centralised vertically integrated energy companies. Blockchain brings the possibility to break that up and make the system more distributed and more democratised. London based start-up, Verb, is currently hosting a live P2P Blockchain trial in an East London estate where solar panels have been installed on the roofs of the flats.

Barriers. Regulations & Customer Engagement

Regulation and customer engagement are key factors in how far blockchain can transform the electric grid.

Regulators will need to update rules and regulations to allow for a more distributed grid and more customer engagement. Although customer engagement may not be a requirement for all use cases and business models arising from the use of blockchain technology in the energy space, it is very much a necessity for a P2P market. A fully scaled P2P market is dependent on residential customers becoming prosumers. Currently, it is against the law for UK consumers to trade with one another; this is the case for many countries

What we learned from these interviews with regulators, innovators, and incumbents is that at the very least, there are needs revised definitions of critical terms.

- The consumer, prosumer and other relevant terms need to be defined by the regulators in the energy sector context. All the energy sector stakeholders, including regulators, should aim to talk on the same platform. It will be complex to go ahead if businesses and regulators have different understandings.
- Regulators must clearly state their philosophy and long-term vision: The current regulation is defined for vertically integrated utilities. Regulators need to redefine policies that are suitable for all and do not constrain new business models enabling transactive energy systems. Defining a transition policy is a critical first step to be taken.

Do regulators support centralised vertically integrated energy companies or they push towards distributed energy resources?

In a decentralised market will be a need for cybersecurity oversight. Regulators and companies need to start building the talent internally to have to be able to do adequate oversight of cybersecurity.

Conclusion

The future outlook for energy blockchain is highly promising and also highly uncertain.

Promising because it is fuelling a re-thinking of the energy value chain and uncertain because we do not know how future customers will engage. In 2017, a study showed if customer changes their tariff or supplier-customer can save up to 300 pounds a year; however, sixty per cent of customers have decided no-take those savings. That is a concern for the P2P blockchain, but certainly, many other pilots can bring efficiency into the existing system.

4.2. **Alastair Marke, Director-General, Blockchain Climate Institute / Chair, Committee on Energy, Climate Change & Green Finance, British Blockchain Association.**



Alastair Marke, Blockchain Climate Institute

Energy consumption of cryptocurrencies

Specifically, it is the proof-of-work (POW) algorithm which high energy consumption. However, alternative mechanisms including Proof of Stake and Practical Byzantine Fault Tolerant largely address these concerns with energy-efficient blockchains.

In the near future, Blockchain mining would no longer be necessary

Blockchain for the energy sector

We can envision an extensive use of Blockchain in the energy sector. Blockchain technology enables direct transactions of electricity between entities across the value chain, including the smallest of electricity users and generators.

Distributed energy generation or community energy is possible. This innovative approach differs from the current centralised energy system, which nets generation from demand through a licensed supplier. For example, peer-to-peer energy transactions on community-level allow households to sell the excess energy from one's roof-top solar panels to a neighbour.

With the emergence of distributed energy resources (including domestic solar, small-scale

generators and battery storage) and significant new demand from electric vehicles, new solutions will soon be required for managing a more complicated, less centralised, and dynamic electricity grid.

A blockchain-based system can create a virtual marketplace by matching energy demand and supply

Blockchain will facilitate transactions between two parties with smart contracts, meaning that this can be done automatically rather than manually.

This innovation approach differs from the current centralised energy system, where the electricity comes from licensed suppliers only. To allow this, the community energy strategy documents, released by the former Department for energy and climate change department in 2014, have to update it with the Blockchain element, by the government or BAES.

Blockchain to help tackle environmental challenges

Green Finance

The Green Finance Taskforce noted that 'compared to alternatives such as company reporting, digital technology solutions can be significantly lower cost routes to amass such data at scale across the financial sector' also observing 'digital technology can enable the democratisation of green finance, empowering the investing public with the information to redirect their own capital'.

Blockchain technology can support the creation and development of asset-level databases and information sharing between the public and private sectors.

The Science-based Target Initiative identified that technologies such as data analytics, smart sensors, and blockchain could help companies manage their scope three impacts by offering powerful insight into complex, global value chains and help to reduce emissions in new ways.

Carbon trading

Blockchain technology enables the tokenisation of carbon credits

Especially in a post-Brexit era, Blockchain technology enables the tokenisation of carbon credits in an Emissions Trading Scheme, ensuring complete transparency, entire transaction visibility, ownership tracking. These combined components improve liquidity which is a direct result of increased co-ordination and trading across jurisdictions.

Circular Economy

Prevention of plastic waste. Today, there are digital platforms where consumers can make their assets and even their skills available to the market (e.g. eBay, Airbnb and TaskRabbit). But these business models are third-party centralised marketplace systems that control the flow of information and currency between the parts involved.

Current circular economy business models are still primarily focused on the firm, relegating the end consumer to roles such as use or share and the subsequent separation of products or waste for reuse or refuse collection.

Blockchain technology offers unprecedented opportunities for the circular economy

The advent of the blockchain technology offers unprecedented opportunities for circular economy business models geared by peer to peer (P2P) networks. The opportunities that can be created with the support of the blockchain technology are limitless, including the socio-environmental value one can attach to the currency, or coin, used in blockchain marketplaces.

Blockchain can co-opt the consumer's capabilities, and skills have the potential to transform regenerative product-service systems and accelerate the shift towards the circular economy.

APPENDIX – Speakers' Bios

Marzia Zafar, Director, Issues Monitor & Innovation, World Energy Council

Marzia Zafar is a 20-year veteran of the Energy Industry. Marzia is an international energy policy leader with a unique profile blending public service, policy creation and regulatory innovation with deep experience in the private sector managing multi-million-dollar business initiatives. Marzia is currently working in London with the World Energy Council as Director of Innovation and Issues Monitor.

She co-authored the Council's blockchain work and is currently working on creating educational opportunities for regulators on how blockchain use cases could optimise the existing electric grid

Alastair Marke, Director-General, Blockchain Climate Institute / Chair, Committee on Energy, Climate Change & Green Finance, British Blockchain Association

Alastair Marke is the Chair of the Energy, Climate Change & Green Finance Committee of the British Blockchain Association; and the Director-General of the Blockchain Climate Institute. Mr Marke is a recognised thought leader in the use of blockchain to address climate change issues, including renewable energy development, climate finance, carbon trading and regulatory enforcement

He has published the world's first book combining blockchain and green investment issues. Mr Marke is a co-drafter of the ISO 14097 climate finance standard; and a UK representative on the ISO TC307 blockchain use case and governance working groups. He is our ad hoc Expert Advisor on this APPG.

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