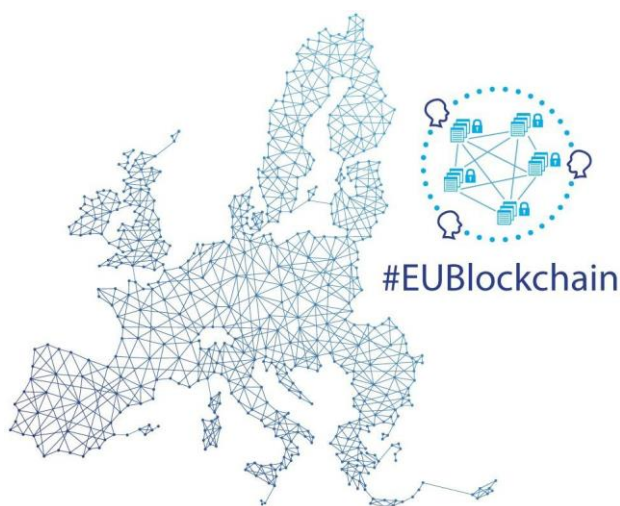


EU BLOCKCHAIN OBSERVATORY & FORUM

Blockchain Applications in the Energy Sector –
Online workshop, June 29, 2022



By the European Commission, Directorate-General of Communications Networks, Content & Technology.

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WELCOME

Ioannis Vlachos, from Energy Web, welcomed everyone to the workshop organised by the EU Blockchain Observatory and Forum. In his opening remarks, Mr Vlachos introduced EUBOF and covered basic housekeeping including how to use the Q&A function, that the workshop is recorded, and both the recording and workshop report will be published on the EUBOF website. After the introduction of the panellists, Mr Vlachos handed over to the first speaker, Mr Lukas Repa, Senior Policy Officer at DGCNECT for his opening speech.

Mr. Lukas Repa thanked everyone for their presence and invitation. He stated that Europe is facing very turbulent times not only in its eastern borders but in the blockchain and crypto assets industry as well. He stressed the importance of reminding ourselves that blockchain is more than only a technology to support crypto assets, it is a transversal technology that can support a multitude of applications. He mentioned that the topic under discussion is a topic that has been at the forefront of discussions since 2014, with the first potential use cases emerging for peer to peer trading of energy, and the more lately use cases as we will hear today, in the area of using Blockchain for authenticating and proofing the origin of renewable energy and the state of electricity. As such, DG CNECT is working closely with DG ENER on exploring the potential of blockchain for sustainability. He wished everyone a fruitful discussion.

Mr. Vlachos thanked Mr. Lukas Repa and proceeded with presenting the “Blockchain Applications in the Energy Sector” Report, which was published by the EUBOF team. This specific report focuses upon applications of blockchain technology and DLT in general in the energy sector. For this report to be produced, the team worked together with a large number of DSOs and TSOs, industry experts, academia and research experts. In addition, the team interviewed a number of C level executives from big corporations DSOs and TSOs across Europe. Of course, EUBOF panel experts supported this report as well. Using the input from individual groups of people, the team consolidated the findings inside the report. The first chapter of the report focuses on standardisation activities of blockchain. The report presents an overview of the standardization activities and groups at the crossroads of benefit blockchain and specifically the team has been in contact with both IEEE from the United States as well as with SENELECT from EU to discuss and present their views on standardization of specifically blockchain in the energy sector. The second chapter of the report focuses on specific use cases of blockchain technology for the energy sector, and more specifically, it examines three main categories of use cases that have a lot of attention right now in the market. The three use cases are:

- flexibility services,
- energy attributes certificate trading, and
- identities for energy assets.

Under the topic of flexibility, services, the team explored applications of blockchain technology, especially for providing flexibility services to transmission distribution system operators across Europe. These applications not only allow medium or large scale assets, but also small scale DERs to participate in wholesale, ancillary services and/or rebalancing markets. The second group of use cases focuses upon the trading of the energy attribute certificate in Europe and focuses on how blockchain is used for corporate renewal procurement, certifying 100% renewable powered electric vehicle charging, low carbon fuel sourcing and similar use cases. The last application of blockchain technologies focuses on the assignment of identities to energy assets in order for his assets to participate in a trusted and verifiable way. The team has conducted a very thorough review which is the only the first and only systematic review of the status of R&D innovation in Europe when it comes to R&D activities and funding mainly under the Horizon 2020 and The Horizon Europe framework programs, especially on projects that consolidate in a way blockchain technologies and the energy sector. In

the fourth chapter of the report, the team included very specific cases studies from reputable companies from the blockchain sector, and asked them to present the most notable flagship use cases and projects that have been developed over the past years. The fifth chapter of the report gathers insights from the industry through interviews with executives from the big players of the energy markets in in the health sector in Europe, that have also a huge impact on blockchain space. To conclude with a set of policy recommendations, the team has gathered and grouped these recommendations in three distinct groups, namely:

- Promotion of standardization at a European level,
- Energy – related use cases to be considered by the European Commission for evaluation
- Systematic exploitation of the results of relevant projects.

On the member state level, it is also recommended that the national regulatory authorities should start thinking of allowing small scale flexibility assets to participate directly or indirectly, in relative markets. Thus, there is a need for the regulatory framework to be adapted to allow the visibility of energy assets connected to the distribution grid to the DSOs as well. This can be facilitated by using digital and self-sovereign identities. Also NRAs shall provide Regulatory Sandboxes so that larger scale projects that are moving out of the POC stage and moving into an MVP, to be easily deployed and tested in a real world environment. This is expected to radically accelerate the adoption of new technologies by both DSOs and TSOs. Across Europe, also immobility and increased rate of penetration of electric vehicles should be taken into account and therefore policies should consider the way that regulated entities like the associate VSOs or car manufacturers and charging point operators to liberate the benefit of the EVS flexibilities. To conclude, Mr. Vlachos reiterated public blockchain should be used in order to promote collaboration between the parties and market participants. He thanked everyone and moved forward to introducing the keynote speech, Mrs. Elena Boškov Kovačs, Chair of the ETIP SNET WG4 to talk about "Energy Digitalisation and Customer Engagement".

Mrs. Kovačs started her remarks by mentioning the energy sector and that it is very important to talk first about digitalization. Digitalisation is seen as one of the key enablers for the energy transition in Europe. And in addition to this, she mentioned that the key into how to achieve this lies in the customer engagement part. This is because one of the highlights that they try to position always and propose is that there is a need of smart sector integration into a system of systems, into a one stop shop for all of the participants, both old and new in the energy transition story, that constitute building blocks. For the design in the sector integration and the way it would be in the future, they have on published a very interesting paper last year, in terms of most innovative solutions, interesting pilots, interesting design of sandboxes regular recent books. She continued her presentation by mentioning that ICT presents a backbone for the European Union strategy for energy system integration and innovation. Digitalization is absolutely necessary, according to Mrs. **Kovačs** . She has also talked about the development and use of new platforms, through enhanced connectivity of assets in the system, and within the context of evolving markets. At the level of electricity markets, crowd balancing platforms are the tool to standardize processes and protocols to enable distributed flexibility resources and they also promote and European collaboration. She mentioned that we expect to see more development in all aspects as well. In addition to that, the innovation in the energy sector, leveraging such technologies goes hand in hand with the design of new architectures, I would say new concepts and requires strong reliance on local regulatory frameworks. So this is it for my part. To conclude, she highlighted that the smart sector integration and digitalization are the key enablers for the energy transition.

Mr. Vlachos thanked the keynote speaker and proceeded with introducing the first panel that focuses on applications of blockchain technology in the energy sector, from theory to practice.

PANEL 1

The first panel was moderated by Mr. Vlachos and it consisted of the following panellists:

Panellists:

- Etienne GEHAIN, Digital Innovation Officer, Engie
- Rafael San Juan MOYA, Innovation and Digital Platforms, Iberdrola
- Paul BRADLEY, Director of Strategy and Innovation, Kigen
- Kai SCHMIED, Innovation Project Manager, Elia Group

Mr. Vlachos started by posing a question to Etienne Gehaian, specifically on sharing his views on the way NG has been using and plans to utilise blockchain technology in the future.

Mr. Gehain started by highlighting that they have been using Blockchain technologies for four years, years and that they have a number of use cases. The first that they implemented is the certificates of renewable energy production that they provide to their customers that buy green energy. He mentioned that they continue to do more towards the use of distributed identifiers and validation of credential. The certify to whoever makes a KYC using those invoices that if they receive an invoice, they can check that they are genuine. He mentioned that they consider blockchain as a specific way of storing information with the trust attribute and that opens a lot of possibility.

Mr. Vlachos thanked him and proceeded with asking Mr. Paul Bradley in which ways telecom company can benefit from blockchain technology, especially when it comes to the energy sector that heavily relies in telecommunication networks.

Mr. Bradley mentioned that since the dawn of 5G and even before, the mobile telecommunications operators dreamt of expanding from consumer services into new industrial verticals, and that's a promise which until now was unfortunately largely disappointed, and maybe with the exception of the automotive market where regulation has imposed a lot of use of cellular technologies. Given the distributed nature of energy networks, they really heavily rely on mobile and cellular technology for connecting devices on the most part. So, mobile connectivity providers are already somehow serving the energy market in some ways. At Kigen they have championed an open usage model of a GSM standard known as IoT safe which enables mobile network operators to protect and allow the usage of credentials by third parties wishing to use the same as a Root of Trust. That Root of Trust can then be used both to ensure Transport Layer Security. He also mentioned that credentials used to transact on energy networks need to be securely provisioned into the SIMs. He highlighted that when someone combines the accessibility to connectivity, with the low power low footprint of ICM and open IoT safe technology, that it's really a winning combination for telecommunications providers to provide access to secure enhanced Transport Layer Security and blockchain based security features.

Moving on, Mr. Vlachos asked Mr. Kai Schmied to share his views on DSOs in applying blockchain technologies for solving problems in the energy sector.

Mr. Schmied mentioned that they have quite an important role in the energy system. He mentioned that in the past production was following demand and now we move into a system that is full of renewables, where demand has to follow the production. Subsequently, he said, that we move into a more decarbonized system with a lot of renewables that is also more decentralized and thus, we have smaller devices that are part of the energy system, such as electric vehicles, batteries, heat pumps, and they can also help and contribute to do

their job in the grid. He described that they have IoT devices that can connect to the internet that can send and receive data. Their role is, as a DSO, to work on a system that is more flexible, that can also reduce copper to steel, so to build less lines in order to continue to build the system. They are also putting the consumer in the centre because that is the most important thing at the end since they are serving consumer needs. But that requires a lot of coordination efforts between different parties; TSOs and DSOs, everyone that is in the energy sector, but also that is not outside of the energy sector such as mobility, for example, because that is the fastest growing source of decentralized flexibilities. He mentioned that we moved to web 3.0 world where we have slight entities where we are not anonymous anymore, so we can build basically ways or that is actually what we hope to exchange data in a trusted way. They started four years ago with proof of concept for energy trading micro transactions to understand how smart contract works, and really understand that technology. Then they build the DLT lab together with energy Web Foundation, where they investigated different challenges that we have in the company. They also focus on self-sovereign identities, asset verification, defining ownership of assets, defining the assets, specifications, and to help using the technologies to verify the information and spread make the information accessible to other parties within the sector, but also outside of the sectors. To conclude, he highlighted that they use blockchain and are operating flexibility on electric mobility side and they saw that they had the technology, but the processes were actually not there. yet. He mentioned that there is also kind of a very fast evolving blockchain world and then the reality is sometimes not there yet.

Mr. Vlachos addressed his final question to Mr. Rafael San Juan Moya, relevant to the question above, on his views on blockchain applications.

Mr. Moya mentioned that in the area of use cases they have been focusing a lot more on sovereign identity than smart contracts. They started in 2018 with guarantees of origin use cases and had a hydroelectric power plant and two different wind farms and they were providing electricity to a local bank and a local telecommunications company through smart contracts. Although in terms of scalability, they need to be very conscious of the amount of generation that can be provided in terms of the amount of consumption to guarantee 100% of renewable energy being provided. So they did double NAD, they have done proofs of concept in terms of smart contracts and guarantees of origin. However, there have been more use cases in terms of sovereign identity of many different aspects of the value chain in the electricity industry; a project they have done in the UK with Scottish power networks and National Grid. They have also implemented self-sovereign identity, which is in compliance a big use case for them. He also mentioned an additional one that was very recent that that was implemented with their shareholders. Withdrawal has over 600,000 different shareholders and a lot of them were not eager to vote on the shareholders meetings, but they proxied or they delegated the votes. So what they have done is to create an underlying blockchain platform so that anyone who delegates the vote or as a proxy agent, or a holding something like that, can review that whatever the order to vote was actually voted. It was less close to the actual energy utilities sector, but it was something they have implemented and with much success.

Mr. Vlachos gave the floor to Mr. Bradley to comment on cybersecurity and critical infrastructure and the role of blockchain technology in the cybersecurity space as a telecom company.

Mr. Laeven thanked everyone for their participation and proceeded with introducing the second panel, which is consisted of the following speakers:

- David PALMER, Blockchain Lead Vodafone Business IoT, Vodafone Business
- Harry BEHRENS, CTO, bloXmove
- Jens STRÜKER, Professor Information Systems and Digital Energy Management, University of Bayreuth

- Emanuele ROSSI, Product Manager, FlexiDAO

Mr. Laeven introduced Mr. David Palmer and passed him the floor. Mr. Palmer thanked everyone for the invitation and continued. He mentioned that blockchain and distributed ledger technology can help the energy sector to optimize and highlighted that we are starting to see that already with the energy Web Foundation. He briefly described his experience on how he interacted with blockchain in the first place and how this technology could be explored. Then, he continued with describing potential use cases for telecommunications. He described how blockchain would be good at joining an ecosystem for IoT devices, by providing those IoT devices with interoperability, providing them with trust, providing them with the ability to smart contracts for automatic transactions. One of the use cases they are looking at are for those device to device IDs, interoperable IDs, the transactions, or the maybe transactions is an EB charging, electronic vehicle charging.

Following Mr. Palmer's remarks, Mr. Laeven moved to Mr. Behrens to ask him how he got into blockchain, why does he think it plays an important role in energy and what applications is he most proud of.

Mr. Behrens mentioned that in the beginning he was totally impressed by the sheer disruptive potential of Bitcoin and not really seeing any use case of beyond the obvious one. He described that his background is totally in software and he joined a large company in 2015. He continued with highlighting that the energy market is also decentralizing, by the sheer fact of renewable energies, where there is localized small energy, power plants, a wind wheel or a solar panel which cannot be stacked. So there is pointed out by the other fact that charging stations are a factor hundreds to one with regards to how many you need to achieve coverage to fuel your cars, and in general, also the capability to store and forward power, which also needs decentralization. He also mentioned that many sectors will need to make far reaching changes to sectors that play a key role in society and have the leverage needed to do this power and mobility.

Mr. Laeven moved to the next panellist, Mr. Fabian and asked the same three questions, how did he get into blockchain, why does it play an important role in energy and what is the thing he has been working on that he is most proud of.

Mr. Fabian thanked everyone for the invitation and proceeded. He became aware of blockchain when he started his way as a researcher and information systems back into 2016. And then he found out that at their institute there was a form of a blockchain lab, and there were first possible applications in the industry. Then two to three years ago they started projects that used blockchain solutions in the energy sector. He highlighted that it is now a matter of accelerating sustainable growth while at the same time keeping energy supply secure and economical and end to end digitalization in the energy sector. He significantly said that blockchain technology processes are indeed a very decisive component. In achieving this goal, in the end, the use cases or the cases the applications they are looking at in the energy space is offering are strongly aimed towards the decarbonisation or in the energy industry specifically. Thus, they are trying to track CO2 emissions across different sectors, across different companies and also across national borders, of course, and above all, to make these CO2 emissions or the CO2 data verifiable so that every company involved in a supply chain and supply network can really understand and can verify how much CO2 is actually in the products that someone has actually bought. What they are doing right now is building GDPR compliant CO2 guarantees of origin for electricity for hydrogen.

Mr. Laeven moved to welcoming Mr. Rossi in the panel and proceeded with the same questions on how he got into blockchain, why does it play an important role in the energy sector and what is he most proud of.

Mr. Rossi thanked everyone and proceeded with his remarks. He was involved with blockchain five years ago, since he had the opportunity to attend the smart city expo in Barcelona. And there was a panel given by Bettina Warburg about the blockchain technology in general. He was really impressed about the technology, even though he did not actually understand much. He, then, decided to pursue a career that combined his background, which is energy and this new technology blockchain. And five years ago, there was just a handful of companies or small startups, working on blockchain, at least publicly. For the past years he has been working with Blockchain in developing solutions for energy buyers and energy suppliers. He highlighted that we have seen the potential of blockchain across the entire energy sector as they started with a peer to peer energy trading software with digital and decentralized identities, digital twins of assets. This was the very beginning of their journey. In addition, he mentioned that we can see the importance of blockchain in many other use cases. But mainly the main idea is that the electricity sector went and is going through a very big change from a very simple system to consumption apps. To conclude, he mentioned that they are founding members of energy tags, which is an association that has an objective to create a General Certificate of an add on to the current energetic certificate system. Their aim is to create a granular and hourly certificate so not bound to one megawatt hour of amount of electricity but bound to the timestamp of the production and consumption and right now, we are tracking consumption production from more than 30,000 assets across these 12 countries and around a bit more than two terawatt hours of electricity consumption per year.

Mr. Laeven gave the floor to Mr. Behrens to explain how he convinced the management board of Ghana to go into blockchain. Mr. Behrens started his remarks by saying he started to try to convince them by pitching in 2017. The main concern was that is blockchain is not only the Bitcoin. It took quite a while to do the necessary gluing of people so they can have at least a discussion. In the end they said that they had the basic concern from the sides of those who basically did the EAA. They took a leap of faith in a way flanked of course by the sheer recognition that beyond the hype in the crypto market, and the speculation aspect, which is also part of crypto. He mentioned that if you give yourself the luxury to think things from scratch and build your system, decentralized from the core, decentralized first, then he had a certain amount of time and he proved it worked. However, they are still working more.

Mr. Laeven immediately switched to Mr. Palmer to ask him about the journey of Vodafone and emerging technologies.

Mr. Palmer mentioned that from the Vodafone point of view is that most connectivity service providers like Vodafone are on a journey to become the digital service providers. What we see with Vodafone is the hiring of thousands of data scientists building a massive sort of technology hub or technology hubs around the world and trying to use this sort of base technology capability with 5G form new solutions. Now, in terms of blockchain, is to try and promote some understanding of the technology. He mentioned that the industry failed, because it spoke a lot about the protocol. This technology has the potential to revolutionize a lot of industries but the business model is different because a decentralized ecosystem driven technology like blockchain is not about the control point. It is about trying to find a way to monetize your presence in that ecosystem. In Vodafone they have a very strong proximity in automotive, he said, and they have an automotive division and for energy, which is another very big area for them. They work with a lot of the big energy companies in Europe. He concluded that people are listening to Harry and himself, who are coming up with solutions to support them in that transition. So it is one of the areas where blockchain plays a key role because it does provide the trust it also provides smart contracting it provides cryptography provides a lot of the tools that the industry needs to develop these new business models and power, the transformation to see and auditable energy.

Mr. Laeven continued with addressing AI and IoT and the experience that Vodafone shares with its users, especially with roaming. Mr. Palmer mentioned that more importantly, they are bringing cellular to blockchain. So in their solution, they use the SIM as the Root of Trust.

Mr. Laeven turned to Mr. Fabian for tracking CO2 emissions. Mr. Fabian mentioned that we do see in many projects, one specific problem or challenge and this also relates to what David and Harry already mentioned, that is the lack of a simple search and user interface or end user connection. And they do have a project for a crowd balancing platform in energy markets, where they also analyzing how to integrate mobility or how to integrate vehicles for crop LNC. Concerning the regulators, there is a role and a very, very important role for the regulator. In his opinion the so called sandboxing approaches are very necessary, especially in the energy sector to find solutions, to test solutions, as sandboxing allows for testing concepts, testing solutions under real world conditions that are currently only partially in line with existing, existing, existing legal and regulatory frameworks.

Mr. Laeven switched to Mr. Rossi about blockchain ad the energy sector ongoing proceedings. Mr. Rossi replied that most of all, there is this sort of feeling with crypto that everything needs to boom, very quick. We have a lot of projects especially in other sectors that they just incredibly boom in the first month completely. Concerning the energy sector, he does not think that is a very hot sector. So, usually people tend to focus on something else. Now we have DeFi, we have NFTs that are definitely more interesting for a general audience. But within the sector, he does not think that we have moved so slow. So in the end, everything related to energy and thinking that it could be completely deregulated is absurd. He mentioned that we will still need regulators and regulators will drive the way for future use cases that will benefit a lot by using Blockchain. And this is something also that happens not only in the energy sector, but in some other factors.

Mr. Laeven turned to Mr. Rossi again to ask if he had to choose one thing, what is he most excited about what is on the horizon for blockchain and energy or blockchain in general?

Mr. Rossi came back to answer that where he is focusing mainly is these parts of 24/7 hourly or even more than hourly electricity matching. He thinks that this is where the electricity matching and procurement should go. A lot of investments in the past have been made, just to cover annual values, annual consumptions and that is not feasible. It's not a really good investment going forward. He said that we need to go deep to the hour and even more in order to have a system that is perfectly balanced or as balanced as it can be that can also incorporate many other technologies like batteries storage, like electric vehicles, and something that goes in line with that is everything that relates to sustainability reporting, that drive now is basically entirely based on certification.

Mr. Laeven asked Mr. Fabian on what he it is on the horizon. Mr. Fabian answered that as practice oriented researchers, the question is on how to combine or integrate blockchain solutions with other technologies, such as SSI, decentralized IDs, zero knowledge proofs, etc. So that they could find solutions and ways for being in line with GDPR requirements while also ensuring some kind of transparency and when we are able to do so, to do this and this is why he is curious about this. Then his goal is to create an end to end connection from energy supply to energy, things are energy consumers to exchange.

Mr. Laeven asked Mr. Palmer of what he is more excited about. Mr. Palmer answered that he is very excited about digital asset broker, very excited about the power of decentralized blockchain technologies, digital identities, verifiable credentials trust, to bring about new efficiencies and business models in energy. He said that what we are starting to see is some of that in sort of backs up to migrate optimization.

Mr. Laeven then asked Mr. Behrens to conclude. Mr. Behrens mentioned that he is really excited about the fact that by converging, what NFTs give, and what the ID based verified credentials give, we call it NF ticket, which is the protocol that we're building. There is basically proof verification and accounting as well as access and for access management and ticketing based on essentially verified credentials, which are very close to

the way businesses conducted, but because of verified credential and then we have a protocol for that can be converted one to one into one another.

Mr. Laeven thanked everyone and gave the floor to the moderator of the third panel, Mr. Olivier Genest, Chair Data Management Working Group – BRDIGE.

Panel 2

Mr. Bradley mentioned that the challenge that the blockchain technology often faces is that it is misunderstood, which is sometimes used also out of context. So, from the usage of blockchain in the energy sector, he thinks we need to be very explicit in communicating the context and the context as any other is to make sure that the integrity of the data is super solid and irrefutable. By using blockchain technology, data becomes verifiable and its sources proven. He mentioned that we can obviously protect against privacy breaches through strong identity protection. He also mentioned that blockchain offers prevention against demand manipulation. So that could lead to overproduction or a massive denial of service attack, causing blackouts, because the distributed nature of the network prevents the single point of failure, which we saw with DNS server attacks and other different attacks that happened in the IoT space. And the insights that are driven from the data lead to a benefit, which is the security of the energy supply, as well as the management of it. And data is often claimed to be the new oil. However, he always believes that it is that the raw data itself is fairly useless, unless the insights that are derived from it lead to the predictability of supply and that is kind of one of the benefits. He described that in the telecoms environment, they have the GSM as security accreditation scheme. Then he described that beyond blockchain, using a secure connection, based upon things like TLS or DTLS at all times when communicating is extremely important.

Mr. Vlachos gave the floor to Mr. Schmied to comment on how the current regulatory framework is associated, and what according to their views are the steps needs to be taken in which direction to promote and foster the use of decentralized technologies.

Mr. Schmied highlighted that we have to be careful to blame regulatory frameworks for adoption of blockchain. There are new rules and embedded, for example, the crypto travel rule where you must know the sender and the recipient of crypto transactions if they exceed a certain amount. When we talk about tokenization of assets, it is quite important if we talk about security tokens, if we talk about monetary goods, because they fall on the banking regulation or not. We have a different situation in the energy sector. That is his opinion. In the energy sector, he mentions, we have an established system that is one of the most crucial and most important infrastructures we have in the world. And it is also a very settled system, but with distinct players that have their distinct rules. He highlighted that Blockchain is secure. But he mentioned that if we set up a system where we have potential where we provide a portal to attack millions of devices, we still do not know if blockchain is then the solution. What he thinks needs to happen on the regulatory side is that we have to have a lot of education.

Mr. Vlachos proceeded with asking Mr. Moya on his views regarding challenges in big companies towards adopting blockchain technology as one of the tools for creating new business and revenue models.

Mr. Moya Yeah, agreed that one of the main challenges is understanding of the potential and the capabilities of blockchain. He mentioned that there are other things that complicate the situation. When they were doing initial pilots on blockchain, it was usually quite small scale, and usually blockchain has huge potential in large scale automations and cutting out middlemen in very large processes. So, proving worth in smaller projects has been challenging because at the end of the project, you evaluate and seems like the gains are not what you expected, simply because you have not done it on a large enough scale. For Mr. Moya the scale of the attempt has been relatively small and not easy to envision what the large scale implications of it are or its

benefits. And the other one would have to do with the operational side of businesses and the IP side of business and how it is very complex to have a person or a team that can fully understand the security implications of an IT network. He mentioned that as time comes, these things will be more standardized and easy to understand. People in the business are aware of the capabilities of Blockchain implementations rather than having people from IT or tech companies. He concluded that one of their challenges is to make sure that innovation comes from inside for people who understand the business, which at the moment, is kind of been a drag, rather than a pull, sort of mechanism.

Mr. Vlachos continued with addressing Mr. Gehaian with regards to the recently established solar platform to harness the potential of DeFi and asked for an explanation of the process.

Mr. Gehaian mentioned a subsidiary called NG energy access that provides small PV and battery equipment to rural clients in Sub Saharan Africa. They serve about 6 million people there in nine countries, such as Rwanda, Zambia, Uganda and they provide equipment that is repaid over a period of two or three years by micropayment need, possibly every day with their mobile phone. Recently, about 1000 billion dollars were invested in various coins, so they opened the crowdfunding platform for the energy Web Token holders in order to allow them to stake those tokens and provide the means to energy access to do its business with a promise to reimburse in tokens with of course a some interest. He mentioned that there are next steps to be envisaged, because for the moment it is purely funding. What is next, according to Mr. Gehaian, is in fact to provide the equipment that they installed on the field with their own wallet. In addition, he mentioned that they have been cutting quite a lot of intermediaries and providing a more direct link between cryptocurrencies and real world activity.

Later, Mr. Vlachos proceeded with concluding remarks. Mr. Moya concluded that in terms of the use cases they have been focusing on a lot of self-sovereign identity of blockchain where there is a trusted register of either assets, IoT devices, information sets, that are to trade with different partners or different companies in the whole energy value chain regulators, DSOs etc., and making that trusted and decentralized. Mr. Bradley also added that most renewable deployments across this group, smart grid and electric electrification of vehicle infrastructure, today are considered IoT assets. Thus, data traceability, authenticity, security, these are all critical enablers for setting energy tariffs, trading carbon credits and fulfilling demand where it's needed. Last, Mr. Gehaian mentioned that distributed identifier will be key to the next step of many use of blockchain, not necessarily only to implement new business cases but for decentralization of energy production, but also in existing processes.

Mr. Vlachos gave the floor to the moderator of the second panel on Blockchain applications for energy, Mr. Arno Laeven, Co – founder of WBNoDE.

Panel 3

Mr. Genest introduced the third panel on the Status of R&D and Innovation in Europe, consisting of the following panellists:

- Álvaro NOFUENTES, Project Manager, ETRA I+D
- Massimo BERTONCINI, Senior R&D Programs & Innovation Manager, Engineering SpA
- Iordanis PAPOUSOGLU, Associated Researcher, Center for Research and Technology Hellas

- Oscar Lage SERRANO, Head of Cybersecurity and Blockchain, Tecnalia

Mr. Geneste started with Mr. Nofuentes, to explain what they are developing.

Mr. Nofuentes thanked everyone for the invitation and proceeded with his remarks. They are creating a framework in order to issue with this region in a more fast and reliable manner. And they are using Blockchain as a backbone of this of this framework. So, he just explain in a couple of minutes in which concepts their proposal is. They have a swing body platform that serves as an interface for the publishing body to take the current status of issue requests and cancellation requests of warranties of origin. Also, they have a platform that the rest of producers or the different market participants in this framework can automatically request a new one does have origins to the issuing body according to the production that they are they are generating. So, somebody is able to validate this. And also it can be done automatically if it is the case.

Mr. Genest turned into Mr. Serrano to explain the use case that they have in their project.

Mr. Serrano thanked everyone. He stated that they have two main use cases with peer to peer markets. First of all is their cell consortium communities that are in some member states like Spain, in this case the implementation of energy communities that are regulated. These communities are compulsive by prosumers or on installation for either in renewable energy generation or consumption. They have made this a blockchain platform and they are the pilot team that calculates the orderly energy produced by the generators and assign them to each consumers. They have developed with manufacturer a blockchain radius multimeter that pass the custody of the printed hardware using the hardware custody and signs the transaction on the blockchain transactions that are sent propagated by the blockchain network. They have created a cloud blockchain platform that forms a settlement validating the fulfilment. He mentioned that there are challenges to make automated fifth grade CO2 for the optimal buy price, based on the duration and consumption forecast, for example. And there are tools to support the consumer in the process of engaging the community the blockchain and setting up units their systems and quick connect to the to the blockchain that is something that for the regular consumer is not quite easy.

Mr. Genest turned to Mr. Papoutsoglou for the RENAISSANCE project and asked for more details. Mr. Papoutsoglou mentioned that RENAISSANCE is based on working on a private permission blockchain with using hyper ledger there. The main component for blockchain is to create an auction platform to have to drive local energy communities. Essentially, the smart contracts there are involved for the auction and a mechanism also on top of that will allow for local communities to have some kind of governance they would select either to be centralized or decentralized by the by choosing how they're going to have to execute some code and second project is parity. There the idea is a bit similar, but the execution differs. The execution is based on the cosmos SDK and the tantrums since they believe it can be robust. There are projects built on that and are available. It can be flexible and interoperable, since it is built on top of course, was blockchain and it is a sidechain of that universe. And it can be scaled. The projects follows layer solution in the architecture as he said, in the layered zero is basically the cosmos. The sidechain is used on top of that and on another part, there is the deployed nodes on mainly on the IoT gateways that will process the smart, the smart contracts and the transactions and then you there is an Oracle on top of that. So there can be an exchanging information with the outside world. You will need the information from Ethernet or existing systems legacy systems that might be helpful for your system. Also, another thing that we needs to point out, he said, is about the data anonymization basically, where pseudo anonymization is used. That is the main ideas of the project. Both the differences about the tools that are used to build but the idea is the same as parity is to address the structural inequity of is distributed.

Mr. Genest thanked Mr. Papoutsoglou and continued with Mr. Bertoncini on the role that blockchain plays in their project and its use cases.

Mr. Bertocini thanked everyone and continued. He mentioned that he works at an ICT company headquartered at Roma that historically has been and is currently very active on deploying boxship blockchain based application along the overarching energy value chain in many R&D projects, at least 12 or 13 R&D projects covering a number of use cases in the last five years. But at the same time, he is experienced some deployment sandbox with an Italian regulatory agencies and Italy will provide some use case based blockchain application delivery deployed to some Italian energy facilities. He said that there has been last year one pulling or addressing this energy that does space implementation. And in that respect, Blockchain is playing a relevant role at a two different level. First level if just utilizing blockchain and smart contracts in order to you tamper proof multiparty energy data sharing any labels. The second level of application of the blockchain is on the on the marketplace. If we look at these two different levels for us, he said, are not considered completely different application. But we are progressing along, he mentioned.

Mr. Genest wanted to discuss about the challenges faced by blockchain in the energy sector.

Mr. Nofuentes mentioned that since they are in R&D projects that try to reduce the carbon footprint of the European energy mix he thinks that it is mandatory or almost mandatory not to use the proof of work concept. But, of course that we still have possibilities to use blockchain for energy efficiency purposes.

Mr. Serrano continued by mentioning that not all information is obtained. We can have sensitive information off chain, of course, even we can use a blockchain we have used in a health sector for example, like decentralized identity and access management for the community in order to access to prove it a storages that has information about the health sector about a person in this case is going to be about a smart meter.

Mr. Bertocini mentioned that he would like to distinguish just interoperability and then we will be concluding with standardization with respect to interoperability. One of the major issue is that if you are going to bidding for energy or similar, like energy data space project, if you would like to integrate normally, Blockchain application operating at different levels that will be a big problem for how much interoperable there are or how I can benefit from potential integration. So, for one that is the state of the art is for emerging of new framework like tender mind or similar or like cosmos in order to create modular application and even to standardize API's, basically, the only way to blockchain. This is, as far as he understands an interesting approach towards this creating interoperability in our recently completed project H2020.

Mr. Genest raised the issue of digitalization to Mr. Papoutsoglou, who replied that it should be step by step. He asked what are the features? For instance, Blockchain brings data mutability, and more security to the table. For instance, the decentralization the digitalization of processes. So, these can be translated for instance in the smart grid by answering some of the challenges there. For instance from a centralized smart grid, where you have all the data on the processes towards one company, you can see the decentralized this this can be done with smart contracts that is executed by its node and potentially avoid single points of failures and also enhance your systems. Availability then, you can have new models, for instance, you start having the opportunity with the identities and the ledger to start relying on and building systems where even smaller entities they can produce small amounts can be entered their IoT devices. Again since they have an identity they can start to be part of the network. In the new models also come towards the end of the spectrum where you have billing systems. When you know someone you could start billing them when you have the data in transactions. You can start having automated daily because when you produce or when you consume energy, for instance, or whatever you want, that's the biggest thing. It will be distributed ledger it will be available to America and also the identity scum that I may not know you by the name, but I know your address. I know what you have done. And consider also the security in smart grids we're talking about the big surface we will start to have IoT devices we will start having more people coming and producing. So you need to consider the security aspect. digital identities are great and will lead to the authorization. So you will have devices or people doing what they should be doing. And it was great for Mascar that referred to data. Data can be outside of blockchain and have blockchain as I said, settlement has the cost of your data of storage. And on top of

that, it's about auditing. You can audit the transactions for instance, you cannot eat who did what and at what time. So this create this creates a mechanism where you can start auditing because having a permission means that if you're allowed to do something, and up to some time, you're not allowed to do different things. You're not allowed to exceed the timeframe. So it's a great mechanism.

Mr. Genest thanked everyone for their participation and the organizing team and wrapped up the session.



Appendix



Videos from this and all other workshops can be found on the [EU Blockchain Observatory and Forum website](#) under the section [Reports](#)




Official Agenda

11:00-11:05	Opening of the session & house rules , <i>Ioannis Vlachos, EUBOF</i>
11:05-11:10	Welcome , <i>Lukas REPA, DG CNECT, Senior Policy Officer</i>
11:10-11:20	Presentation of the thematic report on “Blockchain Applications in the Energy Sector” , <i>Ioannis VLACHOS, EUBOF</i>
11:20-11:30	Energy Digitalization and Customer Engagement , <i>Elena Boškov Kovačs, Chair ETIP</i> <i>SNET WG4 "Energy Digitalization and Customer Engagement"</i>
11:30-12:20	Panel 1 – From Theory to Practice: Tales from the Industry , <i>moderated by Ioannis VLACHOS, Commercial Director EMEA, Energy Web</i> <ul style="list-style-type: none"> • Etienne GEHAIAN, Digital Innovation Officer, Engie • Rafael San Juan MOYA, Innovation and Digital Platforms, Iberdrola • Paul BRADLEY, Director of Strategy and Innovation, Kigen • Kai SCHMIED, Innovation Project Manager, Elia Group
12:20-13:10	Panel 2 – Blockchain Applications for Energy , <i>moderated by Arno LAEVEN, Co-founder, WBNoDE</i> <ul style="list-style-type: none"> • David PALMER, Blockchain Lead Vodafone Business IoT, Vodafone Business • Harry BEHRENS, CTO, bloXmove • Jens STRÜKER, Professor Information Systems and Digital Energy Management, University of Bayreuth • Emanuele ROSSI, Product Manager, FlexiDAO
13:10-14:00	Panel 3 – Status of R&D and Innovation in Europe , <i>moderated by Olivier GENEST, Chair Data Management Working Group – BRDIGE</i> <ul style="list-style-type: none"> • Álvaro NOFUENTES, Project Manager, ETRA I+D • Massimo BERTONCINI, Senior R&D Programs & Innovation Manager, Engineering SpA • Iordanis PAPOUTSOGLOU, Associated Researcher, Center for Research and Technology Hellas • Oscar Lage SERRANO, Head of Cybersecurity and Blockchain, Tecnalia
	End of event



Speakers Biographies



	<p>Dr. Ioannis Vlachos - Energy Web He is a highly seasoned professional with more than 15 years of experience working with large corporations and educational institutes worldwide in the area of smart grids as a scientific expert, project manager, commissioning expert, and consultant. He has also worked closely with both academia and industry in more than 30 countries worldwide in projects that merge the worlds of energy and ICT. Vlachos has also advised ministries, national regulatory authorities, and utilities in the context of projects financed by international institutions. He has co-authored more than 40 scientific publications in international journals and conferences with more than 1,000 cross-references. He has been awarded with the “Ericsson Award of Excellence in Telecommunications” and in 2019 received the “Researcher of the Year” award in the area of blockchain technology for the energy sector. He holds a Bachelor and a PhD in electrical and computer engineering. He is a member of the ETIP-SNET, the CEN-CENELEC Focus Group on Blockchain and Distributed Ledger Technology, and the IEEE P2418.5 Standard for Blockchain in Energy Working Group.</p>
	<p>After working at the University of California at Berkeley (UCB) as fellow at the Institute for European Studies (2018-19) he recently joined the Directorate General CONNECT of the EU Commission to work on innovation, startup funding and blockchain. He is a lawyer by training with 19 years of professional experience in law firms and at the European Commission in Belgium, Brussels. He has a strong sectorial expertise in financial and energy markets and in competition policy. In the European Commission, his assignments involve managing teams of experts for conducting market analyses and investigations as well as policy initiatives.</p>

	<p>Elena Boskov Kovacs – Blueprint Energy Solutions</p> <p>Twenty years of expertise in the energy advisory and consultancy sector worldwide. Responsible for developing energy transition roadmaps and business practice to further advance digital transformation and sustainability in the energy sector and deliver solutions that enhance the entire value chain of energy companies.</p> <p>Chairwoman of group of experts working under EC founded European Technology Innovation Platform = Smart Networks for Energy Transition (Digitalization WG),</p> <p>Active in startup community as mentor, speaker and investor.</p> <p>Currently engaged on several projects in Europe in designing framework for design of flexibility markets, renewables uptake, digital strategy, smart networks and cyber security of critical infrastructure.</p>
	<p>Etienne Gehain – ENGIE</p> <p>Etienne Gehain obtained a PhD in Electrochemistry at Middlesex University (London) in 1993. He spent more than 10 years in R&D at Gaz de France, studying the use of natural gas in Fuels Cells and coordinating a European FP6 collaborative project on the insertion of Distributed Energy Resources in electricity grids (EU-DEEP). After 4 years as Head of a support Department in the Key Account Sales Division of GDF SUEZ, he returned to R&D, and was, for 6 years, in charge of the Digital and Energy Storage Corporate R&D Programs. Since 2017, he joined Engie Fab where he contributes to the development of disruptive offers, in particular in the field of Energy Communities.</p>
	<p>Paul Bradley – Director of Strategy and Innovation Kigen</p> <p>Specialties: Strategy, Strategic Marketing, Partnerships, Technical Management, 5G, Internet of Things, IoT, IoT Security.</p>

	<p>Kai Schmied - Elia Group, Innovation Project Manager</p> <p>Distributed Ledger Technology Set up a blockchain lab to test and validate the technology in the power sector. Focus on digital identity management for distributed energy resources (e.g. electric vehicles) for authentication and authorization processes (e.g. for balancing power, smart charging and other use cases).</p>
	<p>Arno Laeven - Founder WBNoDE</p> <p>Working towards a more resilient, secure, privacy-centric and democratic digital society.</p> <p>Things I do:</p> <ul style="list-style-type: none"> > Senior Advisor to multinationals, consortia, investment firms, start-ups and scale-ups > Interim digital leadership roles > Mentor to startups / founders > Pioneer in blockchain and enterprise since 2015 > Trailblazer for new initiatives in enterprises: from strategy to operation > Industries: healthcare, energy, mobility, oil & gas, government services > Functional areas: supply chain, identity, Mobility-as-a-Service, energy transition
	<p>David Palmer - Vodafone Business, Blockchain Lead Vodafone Business IoT</p> <p>“David Palmer is a digital visionary and global platform innovator. He is the Vodafone Business lead for Blockchain technology, and he has been key to exploring the application of blockchain to telecoms and wider business.</p> <p>David is an expert on the convergence of digital technologies and new business models, and he is currently exploring the opportunities associated with Decentralized Digital Identity, IoT, Blockchain, DeFi and Metaverse.”</p>

	<p>Harry Behrens - Founder, Chairman and CTO at bloXmove</p> <p>As the first Head of the Daimler Mobility Blockchain Factory I lead an interdisciplinary and cross-regional team whose mission is to leverage Blockchain Technology to accelerate and stimulate our Transformation to a fully digitized, integrated and efficient financial and mobility services Provider.</p> <p>The Blockchain Factory applies Digital Identity Management (DID), Blockchain Distributed Ledger Technology (DLT) as well as IoT technology to hyperautomate asset finance and mobility.</p> <p>The Mobility Blockchain Platform (MBP) is our core software platform for the Future of Mobility. The MBP is implemented through smart contracts for the Ethereum EVM and leverages Decentralized identifiers (DID) for identity verification, verification of claims, KYC and consent agreements. The Distributed Ledger (DLT) Financial Engine is realized in Corda.</p> <p>With a view to the future we will apply tokenization to seamless, digital finance and funding.</p>
	<p>Jens Strüker - Professor of Information Systems and Digital Energy Management at the University of Bayreuth Deputy director of the Project Group Business & Information Systems Engineering of the Fraunhofer Institute for Applied Information Technology FIT</p> <p>Director of the Fraunhofer Blockchain Lab</p>
	<p>Emanuele Rossi - Product and Innovation Manager at FlexiDAO</p> <ul style="list-style-type: none"> ● Responsible for the entire product line of the company (+300k€ revenues) ● Product owner of "RESpring" white-label software awarded "energy innovation breakthrough of the decade" by the World Economic Forum. ● Plan and coordinate company's product strategy ● Assess user feedback and lead consumer interviews to garner feedback and improvements to grow overall user satisfaction ● Lead teams of designers and developers in reaching product objectives. ● Internal project manager for H2020 ERA-net project "Beyond: Blockchain based ElectricitY trading for the integration Of National and Decentralized local markets" (Total budget: 2m€)

	<p>Álvaro Nofuentes Prieto - Project Manager en ETRA Project Coordinator of TRINITY TRINITY is a H2020 project in which 19 European companies are involved. TRINITY is developing a set of solutions to enhance cooperation among the Transmission System Operators of SEE region in order to support the integration of their electricity markets whilst promoting higher penetration of clean energies. trinityh2020.eu</p> <p>Project Coordinator of WiseGRID WiseGRID was a Horizon 2020 project in which 21 European companies were involved. WiseGRID's provided a set of technologies for a new, open, green and consumer-centric European energy grid. https://www.wisegrid.eu/</p> <p>Former chair of the Customer Engagement Group at the BRIDGE initiative https://www.h2020-bridge.eu/working-groups/customer-engagement/</p>
	<p>Massimo Bertoncini- R&D Opportunities Senior Manager More than 16 years of experience in management of research and technology based innovation. He acquired consolidated know how in managing research and innovation and in its implementation at company level, with a special emphasis on the smart energy/smart grids enabling technologies. He managed large international teams by conducting large European R&D and Innovation projects.</p> <p>Main ICT competences includes Artificial Intelligence, Intelligent Sensing and real Time processing, Real Time Control for Smart Energy Systems, Multi-criteria decision making, Multimedia, Human Computer Interaction, and Knowledge Based Systems. In the last years he focused on Digital Media and Convergence scenario, including different fields as</p> <p>Major Specialties are Sustainability and Business Plan for R&D Smart Energy/Smart Grid Initiatives, Experienced in Innovation & Technology Transfer, Project Management and Opportunities Scouting. Also Interested in "Supported" Finance, Strategy Analysis & Exploitation and Business Plans with special emphasis on Smart Energy Systems (Smart Grids, Multi-carrier Energy Storage) R&D Long and Medium Term Vision Analysis, Scouting and creating European credible consortia, Strong relationships with European Commission Personnel,</p>

	<p>Iordanis PAPOUTSOGLU, Associated Researcher, Center for Research and Technology Hellas</p> <p>Mr. Iordanis Papoutsoglou is an Associate Researcher in the research centre based in Greece, Centre for Research & Technology Hellas (CERTH). His educational background includes a master degree in economics and another master in data science. Since joining CERTH in 2020, he has worked for ASSIST-IoT and SHOW projects and actively supports European Blockchain Observatory & Forum activities. His research interests are relevant to the blockchain, data analysis, distributed ledgers, and Internet Of Things.</p>
	<p>Oscar Lage SERRANO, Head of Cybersecurity and Blockchain, Tecnia</p> <p>Head of Cybersecurity & Blockchain at Tecnia, member of the board of directors of Aurea Pay&Pass Solution and leader of the first industrial blockchain laboratory in Europe.</p> <p>Oscar has years of experience in Project management, publications at several international congresses, member of Organization Committee of scientific congresses, co-author of several books including "Blockchain: la revolución industrial de internet" & " Self-Sovereign Identity: Decentralized Digital Identity and Verifiable Credentials", and regular contributor to the general media (TV, radio, press).</p> <p>Oscar regularly contributes to opinion, certification and advisory groups (UNE/ISO), member of the two main global blockchain alliances (Hyperledger & EEA), coordinator of the industrial node of the Spanish multi-sectorial Blockchain Network (Alastria), as well as of the main international cybersecurity forums such as the European Cyber Security Organization (ECSO) or the Industrial Cybersecurity Centre (CCI), among others.</p>