BLOCKCHAIN TECHNOLOGY AND PEER-TO-PEER TRADING IN RENEWABLE ENERGY COMMUNITIES: A REGULATORY PERSPECTIVE

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Overview

Blockchain technology provides a number of attractive properties as baseline for implementing smart applications in renewable energy communities (RECs). In RECs, consumers are allowed to self-generate, consume, store, share and sell energy, as recently introduced in the revised Renewable Energy Directive [1], which is part of the EU's "Clean Energy for All Europeans Package" to bring the European Union (EU) and its member states on track for the revised climate targets for 2030. The use of Blockchain technology is increasingly discussed in several areas, including the energy sector. In particular, Blockchain is one of the ways to enable innovative approaches, such as peer-to-peer (P2P) energy trade within a community. It provides a trustworthy solution for almost-immediate transaction settlement, transparent accounting as well as dynamic management of grid usage. This makes it relevant for consumers, network operators and the system as a whole.

These new applications raise a lot of questions from the point of view of how Blockchain-based solutions for a renewable energy community and beyond should be regulated. In this paper, we present the approach to the use of Blockchain for P2P trade in an energy community implemented in the Austrian research project "Blockchain Grid" and analyse it with regard to the most crucial aspects and challenges.

Methods

In order to guide the envisaged Blockchain application for peer-to-peer trading, a comprehensive analysis of the relevant regulatory framework is conducted. It includes EU regulations, directives and network codes as well as national regulation and existing best practices from Europe and beyond. Blockchain as a distributed ledger technology is not regulated on either EU or national level, yet multiple aspects related to its applications were considered, in particular the division of roles and responsibilities among stakeholders involved, the supplier status of an energy community that engages in electricity sale, and the requirements for smart contracts.

Results

When it comes to Blockchain-based applications, the roles and responsibilities of the involved stakeholders in the electricity sector are not yet defined, although some conclusions can be derived from the general principles of electricity sector unbundling and market liberalization. For instance, the authors show that the intermediary cannot be fully taken out of the process if Blockchain is used: a legal entity responsible for Blockchain operation is required for dispute settlement and accountability.

First results from project Blockchain Grid further show that the use of Blockchain raises particular concerns with regard to data protection and privacy, as metering data of electricity consumption is treated as personal data [2]. High-granular readouts of this data will be required for a reasonable operation of energy communities. At the same time, fundamental consumer rights granted by the recast Electricity Directive and the General Data Protection Regulation (GDPR) are not trivial to reconcile with the inherent properties of Blockchain [3]. The "party connected to the grid" as defined in the "Harmonized Electricity Market Role Model" [5] is – due to processing its personal data – the data subject of GDPR. Consumer rights, as stated in the GDPR – for example, the right to be forgotten – need to be addressed by a "controller", who might be identical to the "metered data responsible" of the role model.

Finally, as peer-to-peer trade has only recently been addressed, albeit to a very limited extent, in the recast Renewable Energy Directive [1], more questions arise as to the way it can be operationalized. Blockchain technology facilitates P2P trading through so-called smart contracts but in order to effectively implement them, it must be considered how Blockchain-based P2P fits into the regulatory context and whether smart contracts should at all be treated on par with traditional contracts [4]. Arising privacy issues in using smart contracts have not yet significantly be addressed in literature.

Conclusions

Current European energy policy is centered around integrating variable renewables and new technologies into the energy systems and markets, making the consumer the cornerstone on both local and global levels. The attainment of these objectives is expected to facilitate green energy transition as well as local value creation. Renewable energy communities, among others, can ensure active participation of consumers in covering their demand more efficiently and locally, generate saving and value for themselves and the community, as well as support local power networks through flexible consumption and generation.

Such communities and their broad spectrum of activities allow implementation of new innovative solutions, such as Blockchain technology, that is likely to create value for all involved stakeholders. Yet, there is no direct consideration of Blockchain related to the aspects mentioned above in the current European regulatory framework. It will be shown that the treatment of Blockchain depends on its type and the specific application as it is not Blockchain *per se* that needs to be regulated but the *specific applications that this technology enables*. Therefore, Blockchain as a distributed ledger and the uses it is proposed for should be clearly distinguished. The authors discuss how it could be possible to "square the circle" between the inherent features of Blockchain such as lack of an operator and immutability, and the requirements related to data protection, contractual agreements and accountability.

This study includes the overview of the relevant EU and Austrian national regulation, identifies main areas of action and provides recommendations for adjustment, especially since national implementation acts are due by mid-2021. It provides useful insights into the current and future issues related to the use of Blockchain in renewable energy communities and suggests the ways in which they could be tackled.

References

[1] Directive 2018/2001/EU, "Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources (recast). OJ L 328, 21.12.2018, p. 82–209." 2019.

[2] S. Cejka, F. Knorr, and F. Kintzler, "Privacy issues in Smart Buildings by examples in Smart Metering," presented at the 25th International Conference on Electricity Distribution (CIRED), 2019.

[3] S. Cejka *et al.*, "Datenschutz in Blockchain-basierten Erneuerbaren-Energie-Gemeinschaften," *Jusletter IT*, Sep. 2019.

[4] K. Poplavskaya, M. Stefan, and K. de Bruyn, "Energy communities: Technical solutions versus legal and regulatory requirements," presented at the ComForEn Symposium (Communications for Energy Systems), Vienna, 15-Oct-2019.

[5] ebIX, EFET, and ENTSO-E, Harmonised Electricity Market Role Model 2019-01, 2019.