Non-standard Contractual Structures in the Operation of Digital Energy Trading Platforms

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Abstract. The article is devoted to the analysis of economic and legal issues related to the revolutionary processes taking place in the world economy, including in the field of fuel and energy, and the application of digital technologies in this sphere. The formation of approaches to the definition of non-standard contractual structures is directly dependent on the impact of the energy transition on public relations. In this regard, urgent measures are required to create an effective legal framework for the use of digital technologies for remote energy trading, and to promote the development of distributed energy in general. Of particular importance in this context is the emerging cryptocurrency market, whose legal regulation at the state level has an initial, non-systemic character.

Keywords: Automated agreements · Digital platforms · Distributed energy · Energy sector · Non-standard contractual structures

1 Introduction

The crisis related to COVID-2019, which humanity is experiencing today, has affected almost all spheres of public life. On the one hand, we are witnesses of how the era is being reset, and then the reformatting of the world will begin, the world which has already become familiar for humanity over the past decades – belle époque, which has gone irrevocably. On the other hand, there is an acceleration of processes related to the transition to virtual reality, which today have reached the level of 2030. The forced changes in public relations have shown a significant dependence of humanity on electricity and the need to obtain electricity in the isolation mode. These changes also demonstrated a transition to a new level in the use of contactless technologies for the transfer of goods and services. In this regard, a careful study of prerequisites for the use of digital technologies in the energy sector is required in order to develop solutions that would allow the full use of high-tech advantages for energy consumers in the framework of isolation. As for the use of innovations in the energy sector, it is necessary to emphasize the complexity of such processes due to the regulation of relations within
the framework of digital energy only in combination with the digital economy. In this regard, the task of digital energy is to reduce the cost of transactions for the transfer of energy between consumers using innovative technologies. Accordingly, changes will affect, first of all, not technological processes, but relations between participants in civil turnover.

2 Methodology

Considering the analyzed processes in the aggregate, we should agree with the opinion that if a lawyer is not used to looking at the development of positive law in a broad socio-economic, ethical and cultural context, he is powerless to model economic and other practical consequences that will lead to the adoption of a particular norm. In this regard, the objectives of this study include a comparative analysis of the applicable legal framework and draft legal acts of the considered countries (the USA, UK), as well as the impact of “energy transition” (Energiewende, Energy Transition – the transition from the use of carbon raw materials to renewable energy sources) on the transformation of public relations in these states.

3 Results

In 2019, the Global Commission on the Geopolitics of Energy Transformation compiled a report that noted that the use of digital technologies in the field of energy, such as Smart Grids, Internet of Things (IoT), Big Data and Artificial Intelligence accelerate the use of renewable energy sources in new intelligent energy generation and distribution systems [1]. As recent months have shown, the architecture of centralized energy with a single hierarchical electricity and capacity market and centralized dispatch management implemented in existing power systems has proved to be unable to work in emergency situations in different countries of the world [4].

The use of digital platforms for remote energy trading implies the possibility of entering into contractual relations with several participants of the energy system at the same time, which requires a new approach to solve problems related to the complexity of management. Under various names (Internet of Energy, Transactive Energy, Energy Cloud, FREEDM Systems), this approach is being developed and tested in different countries around the world. In Russia, this paradigm is the basis for the formation of a technological vision within the framework of the “Energynet” direction of the National technology initiative (“roadmap”) and is the basis for the current development of IDEA (Internet of Distributed Energy Architecture).

The importance of using this approach is evidenced by the fact that on 03.04.2020 the Government of the Russian Federation approved the Russian Energy Strategy for the period up to 2035, assigning an important role in building NTI Energinet digital energy in Russia, and emphasizing the creation of an “Energy Internet” in Russia as a priority for the implementation of the NTI Energinet roadmap. Despite the fact that the spread of the coronavirus epidemic “equalizes” countries in taking urgent measures to digitalize processes in the energy sector, it is necessary to consider foreign experience
in the development of distributed energy, which served as a catalyst for changes in this industry. In particular, the transition from a state monopoly of energy supply to a decentralized management system in the UK can be attributed to the adoption of the energy supply act (the 1989 Electricity Act). The specifics of this decentralization were the emergence of many participants in the management of energy supplies and the formation of the capacity market.

A report prepared by the UK Department of Trade and Industry assessed the expected benefits of projects managed and owned by energy communities [2]. The joint participation of community members in controlling the generation of electricity from different sources was highlighted, which, according to the authors of the report, allows them to significantly reduce the cost of purchasing electricity and attract additional investment in this sector. The roadmap for energy development (Energy White Paper) assumed the use of a local method of energy production, indicating as one of the priority directions of energy policy the provision of affordable electricity to each resident of the country [7]. It should be noted that support for distributed energy projects in this country had a number of distinctive features.

First, such approval by public authorities was considered as a foundation for implementation of distributed energy across the kingdom and did not involve the use of existing divisions responsible for the application of innovative technologies in the energy sector. At the same time, executive bodies had the right to participate in state programs and could directly participate in the distributed energy development projects, but their participation did not mean their responsibilities to control financing and implementation of these initiatives in the energy sector, and did not provide the authority to control and coordinate the actions of participants in such projects. All the powers to implement programs with state support were granted to public organizations directly involved in their work, which allowed them to actively use opportunities presented to them for the application of new technologies and the formation of local energy systems. Thus, the trust of state bodies in public organizations has significantly accelerated the transformation of public relations and attracted new participants in projects related to distributed energy. Secondly, there was no unified strategy for implementing distributed energy and elements of the digital economy in the processes related to the production and transfer of energy within local communities. Each of the above-mentioned programs arose, to some extent, independently, on the initiative of various government departments, and agencies created for their implementation carried out only minor coordination between the project participants and local governments bodies. However, the lack of a unified strategy has led to a variety of distributed energy initiatives. Third, the influence of territorial units of public administration and local self-government bodies on energy policy was carried out by agreements and approving new projects involving the application of new developments, including the development of power systems with a capacity of less than 50 MW. The project approval process was carried out by local governments and state authorities, taking into account the distributed energy development programs, related goals and objectives existing within these territorial units of the United Kingdom [3].

The development of decentralized energy with the application of modern technologies was considered only in combination with the use of renewable energy sources, in accordance with the position of the official authorities of the United Kingdom [6].
This position was taken into account when compiling plans for the development of the energy sector at the level of territorial units of the state (regional spatial strategies - RSS) and local governments. It is worth noting that in the 2000s, a large number of programs for the development of decentralized energy and renewable energy sources were approved by the public authorities of the United Kingdom. Only in 2004, researchers counted a total of 509 projects in the field of distributed generation [3]. The increase in the number of projects in the field of renewable energy was due to the fact that the UK authorities considered the development of distributed energy as a priority task to reduce carbon emissions in the framework of obligations under the Kyoto Protocol. However, it is noted that as a result of the adoption of a huge number of programs, there was a situation where many projects were simply duplicated, due to the lack of coordination between the entities responsible for their implementation [3].

The development of distributed energy took a different path in the United States of America, which is considered to be one of the countries that pioneered the development of new technologies in this area. The reason for this interest in decentralized power systems was the oil crisis of the 1970s, as a result of which the authorities paid attention to new technologies in energy production and began to actively develop distributed generation to reduce dependence on hydrocarbon supplies (in the 1970s, the US still had no experience in shale oil and gas production). In addition to distributed generation, the power industry has opened up new opportunities for energy saving and demand management technologies. A classic example is the “demand rationalization program” (demand management), launched in the 1970s in the United States, aimed at saving electricity by encouraging consumers to reduce energy consumption during peak periods of demand or shifting the time of energy consumption to off-peak periods of demand [9]. Today, there are many projects in the United States that involve the use of digital technologies in the energy sector. At the moment, the use of smart systems in the energy sector, such as the “Internet of things”, allows operators of power systems to receive real-time information about processes within the network. At the same time, due to the large number of disasters that have hit the country in recent years, interest in the development of microgrids that can work independently in crisis situations for the central power system has increased [4]. One of the very first examples of energy trading using distributed ledger technology occurred in New York in April 2016. As part of the LO3 Energy project, a deal was made to sell energy using the Ethereum platform.

To obtain energy in an autonomous power system from various sources and create a sustainable energy consumption by the American company Grid Wise, the term “Transactional energy” (TE – transactive energy) was proposed for the purpose of designating methods for managing the generation, consumption or flow of electricity in an electric power system through the use of market structures for the sale of energy within the network between its participants. On the basis of TE systems in near real-time mode, on a digital platform, auctions are provided with the participation of owners of a wide variety of distributed energy facilities, including electric vehicles, solar cells, home storage, as well as with the participation of existing energy supply and sales companies, aggregators, system and network operators. Predicting the needs and marginal prices of each participant, forming supply and demand, pricing and making decisions about transactions in this market are provided with the help of intelligent
systems. As a result of such auctions, reliable distribution of electricity from multiple suppliers to multiple consumers, distribution of loading and unloading capacity, are distinctive features of the platform that distinguishes it from other projects.

4 Discussion

If we consider the development of digital technologies in the energy sector only in the context of reducing carbon emissions, then taking into account the slight reduction in hydrocarbon consumption, we can assume that the UK budget funds are spent inefficiently. Since such a reduction would require a huge number of heat guns and power plants running on biomass, requiring energy, the cost of which would significantly exceed the amount of budget funds allocated for projects for the development of distributed energy. However, it is worth noting that initially promoting distributed energy projects was not considered as a priority of energy policy, but was associated with the economic crisis in agriculture that engulfed the British society in the early 1990s. The development of local communities that use renewable energy sources for energy supply in agriculture has helped to eliminate the crisis that has arisen, not least because of high electricity prices. Therefore, projects that encourage the development of energy generation based on renewable energy sources were considered primarily as a way to provide new sources of income for rural households suffering from a decline in production and economic collapse.

At the moment, the use of local systems in combination with energy storage and the use of digital platforms enables possible savings of 17–40 billion British pounds by 2050 [5]. Thus, support for projects offered by energy communities allowed the UK government authorities to provide funding for technologies in the field of distributed energy, which have so far gone beyond market-based subsidy mechanisms. The key feature of this method of supporting the development of digital technologies was the use of energy communities (although more applicable is the name “energy environment” in view of the multi-functionality of participants within such a system), which defined its “non-commercial” legal status, that allowed to allocate state subsidies directly, rather than bypassing the existing legislation. Since the legal framework of the United Kingdom does not provide energy trading on the basis of smart contracts, in this case, a legislative definition of cryptocurrencies will be required.

From another perspective, at the state level, a regulatory framework is already beginning to take shape that will speed up the development of autonomous power systems, which in the United States are known as “micro grids”. For example, the Governor of California on 19.09.2018 approved the bill on micro grids (Senate Bill No. 1339), which obliges the commission on regulation of tariffs and utilities (Public Utilities Commission) to develop measures aimed at the commercial use of distributed networks by large energy companies [8]. The bill also defines a microgrid as a system for transferring energy and its capacity between consumers, including the use of energy obtained using distributed energy technologies, which include energy storage devices (they use digital applications that allow forecasting and analyzing energy consumption to reduce peak loads in the network). In this regard, there is a certain improvement of the regulatory framework, which previously restricted the use of micro-networks.
Specific features of legal relations regulation within local power systems is that in the United States, at the legislative level, micro-networks are recognized as a means to provide power during disasters and emergency situations, in cases of technical impossibility to obtain energy from the central power system. The development of micro grids is also considered as a way of economic development, as it contributes to the creation of energy markets and the diversification of energy supplies. The combination of these two components will allow the USA to speed up the process of forming a legal framework for energy trade relations using automated agreements within energy systems in the near future.

5 Conclusion

Despite the absence of definitions of non-standard contractual structures in the legislation of most countries of the world, there is a practice of using in the test mode projects on energy trade between participants of power systems using non-standard contractual structures within the framework of “roadmaps” and social movements that are funded by public authorities. Based on the experience reviewed in the United Kingdom and the United States of America, the following conclusions can be drawn. First, approaches to defining non-standard contractual structures necessary for the operation of digital energy trading platforms are not systematic and depend on the specifics of distributed energy development in a particular region of the world. Secondly, the formation of approaches to the definition of non-standard contractual structures depends on the impact of the energy transition on public relations. Third, since the full use of the advantages of contactless energy trading on digital platforms using automated agreements is possible only if the legal status of cryptocurrencies is determined, which is not yet provided by the legislation of most countries, public authorities support projects in the field of digital energy through public organizations. Without studying the world experience of using non-standard contractual structures in the energy sector and the impact of energy transfer on public relations, it will be difficult to implement initiatives that can provide energy consumers with necessary resources in any situation.

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