# THE PECULIARITIES OF ENERGY TRADE ON DIGITAL PLATFORMS USING UNCONVENTIONAL CONTRACT STRUCTURES

DOI 10.18572/2410-4396-2020-3-78-84

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*Digitalization shall spur the development of market mechanisms and competition, especially in retail electricity markets, by making information available to all stakeholders, including regulators and consumers. It will be difficult to implement initiatives to make sure consumer demands are met at all times without studying global practices of using unconventional contract structures in the energy sector and the impact of the energy transition on public relations. At the same time, the absence of an effective regulatory framework that would allow us to take full advantage of unconventional contract structures for their further application in the energy sector can result in technological inferiority in key areas of the smart energy sector in terms of both technology and standardization. As the Russian regulatory framework for the regulation of public relations using unconventional contract structures is still in its infancy, it makes sense to turn our attention to other countries' distributed generation development regulation practices that gave impetus to change the industry and use digital platforms.*

***Keywords:*** *energy law, Russia's Energy Strategy until 2035, digital revolution, unconventional contract structures in the energy sector, digital platforms.*

The use of digital platforms as a means of energy trade with multiple participants implies the establishment of contractual relations within autonomous energy systems based on previously unknown structures for which law enforcement practice is still lacking in most countries. This necessitates an analysis of causes for the occurrence of such structures as a result of changes in the public environment and the evaluation of the impact of the *energy transition* (*Energiewende, a transition from carbons to renewable energy sources*) on the use of innovative technologies in contract-based energy trading relations.

A transition of Russia's energy industry to a digital platform is required by both general economy targets established by decrees of the Russian President and in specific orders. In the energy sector, the key focus of digital development, as established by the President, is implementation of intelligent power grid management systems based on digital technology. This task is included in Russia's Energy Strategy until 2035 and the concept of the Russian Intelligent Energy System national project that aims to transform the Russian energy system according to the global trends of blurring divisions between producers and consumers due to advances in the accumulation, distributed generation and smart grid technologies.

Back in 2003, A. Bard and J. Söderqvist pointed out the need to identify the role of the reigning information technologies in the historical process and internal dynamics of digital networks for the understanding of the key aspects of the ongoing information revolution. Indeed, society development stages related to invention of writing, printing, electricity, advent of the microprocessor technology and personal computers revolutionized the society, the culture, the mode of life. Naturally, industrial revolutions were preceded by changes in the ways we store and process information. In this regard, when examining the peculiarities of emerging regulation of digital energy supply using unconventional contract structures, we shall dwell on the transformations of public relations caused by radical changes in information processing, because these transformations have reshaped the society completely. Therefore, as the Fourth Industrial Revolution elements (the Internet of Things (IoT), Big Data) continue to penetrate the energy sector, energy deliveries are becoming inseparably linked to exchange of data on the delivery process.

Speaking of the use of innovations in the energy sector, it should be emphasized that such processes are complex as they are predetermined by the regulation of relations in the digital energy sector only in combination with the digital economy. Thus, the objective of the digital energy sector is to reduce the cost of energy transfer transactions between the consumers using innovative technologies. Therefore, transformations will affect above all the relations between civil commerce stakeholders, and not technological processes. As correctly pointed out by V.V. Romanova, "the goals of the National Technological Initiative, the national goals, and the strategic tasks of the development of the Russian Federation for the period up to 2024 are closely linked to energy security conditions, while clearly suggesting an innovation component in relation to the use of digital technology in the energy industry". V.V. Romanova noted that "poor innovation performance, inferiority in terms of the development and implementation of new and promising technologies (including those of the digital economy) are the key economic security challenges and threats as stated by the Economic Security Strategy of the Russian Federation until 2030".

In 2019, the International Renewable Energy Agency published a report stating that application of digital technologies, such as smart grids, the Internet of Things (IoT), big data, and artificial intelligence, in the energy industry accelerate the use of renewable energy sources in the new smart generation and distribution systems.

The use of digital platforms to buy and sell energy remotely makes it possible for multiple energy system stakeholders to enter in contractual relations simultaneously. This requires a new approach to deal with management difficulties. Such an approach is being developed and tested around the globe under different names (Internet of Energy, Transactive Energy, Energy Cloud, FREEDM Systems). In Russia, this paradigm is the backbone of formation of a technological vision under the Energynet National Technological Initiative (Roadmap) and underlies the ongoing IDEA (Internet of Distributed Energy Architecture) development.

V.V. Romanova analyzed the provisions of the Energynet National Technological Initiative and concluded that "a legal framework needs to be developed to regulate the use of digital technologies for metering of extracted, produced, supplied, delivered, transported, stored energy resources, operation of power systems and facilities, activities and interaction of energy market players in contractual regulation and settlement of disputes".

It should be noted that Russia's Energy Strategy until 2035 approved by the Government of the Russian Federation places a high value on the Energynet NTI for building a digital energy industry in the country. The Energynet Roadmap of the NTI prioritizes creation of the *Internet of Energy* in Russia.

Amendments to the civil laws and the introduction of *digital rights*, a concept never-before-seen in the national doctrine, to the Civil Code of the Russian Federation (Federal Law No. 34-ФЗ "On Amendments to Parts 1, 2 and Article 1124 of Part 3 of the Civil Code of the Russian Federation" dated March 18, 2019) became a step forward for the use of automated contracts in civil commerce, including energy trading. However, these amendments provide only framework regulation based on the principle of technological neutrality. This provides an opportunity to create basic conditions for adoption of laws regulating emission and circulation of digital rights as well as simplifies electronic transactions. This is why automated contracts can only be used to the full extent after a Law "On Digital Financial Assets" is adopted establishing the peculiarities of transactions involving digital rights. Therefore, until *smart contracts* become commonplace in civil commerce, this structure should be considered unconventional.

It should be noted that the use of automated contracts to buy and sell energy on digital platforms makes the existing energy sale contract structures much more complicated as electricity trade is accompanied by exchange of information on the transactions consummated between the system participants, furthermore, the users can play different, ever-changing role in the energy system using their energy cells, providing various services for each other, such as electricity sale (supply), participation in mode management (including frequency and voltage level maintenance), energy equipment lease or assignment for temporary use remotely, ensuring loading and unloading capacity margins, and any other services created in the electric power industry.

As the Russian regulatory framework for the regulation of public relations using unconventional contract structures is still in its infancy, it makes sense to turn our attention to other countries' distributed generation development regulation practices that gave impetus to change the industry and use digital platforms.

For instance, the peculiarities of the British energy laws and regulations have shaped the development of a decentralized energy process management system and innovative regulation of energy supply in the energy systems of the United Kingdom. The 1989 Electricity Act revolutionized the British electricity industry by initiating a process of energy sector privatization and marked a shift from energy supply monopolized by the government to a decentralized energy supply management system. As a result of such decentralization, many new actors appeared in energy supply management and a capacity market was created. On March 31, 1990, England and Wales implemented a competitive energy trading system better known as the Electricity Pool. Distinctive features of this system included creation of a competitive generation market, implementation of the electricity pool for wholesale electricity trading, as well as energy producers and suppliers' freedom to choose who to do business with in the system on a contract basis.

In 2000, the Royal Commission on Environmental Pollution recommended to intensify the use of renewable energy sources when supplying local communities with electricity. In addition, several government-funded programs were created in order to support, assist, and subsidize the development of projects involving the use of renewables for local communities.

The first of these projects was CAFE (Community Action for Energy), an energy generation initiative funded by the Department of Environment, Food and Rural Affairs (DEFRA). The aim of this project was to find solutions to meet the electricity demand in local communities, including by using advanced technologies.

It was followed by the Community Renewables Initiative (CRI) created by the Countryside Agency in 2002 which also coordinated the project, having secured financial support from the British Department of Trade and Industry. The main goal of the CRI was to demonstrate possibilities of using renewable energy sources, support and finance distributed energy projects, as well as help electricity consumers use decentralized energy systems by funding various projects. The CRI was also charged with finding opportunities for the use of distributed energy technologies, support of pilot projects for integration of renewable energy sources into local energy systems, and shared its experience of creating local energy systems via local support teams operating in 10 territorial entities of England.

It should be noted that energy system decentralization and decentralization in the UK are only considered in combination with digital technologies. The use of local systems in combination with energy accumulators and application of digital platforms are expected to help save £ 17 to £ 40 billion by 2050.

By using a local approach, implementing projects in energy communities allowed the UK government authorities to secure financing and support of the market, especially for renewable energy technologies which until then had been beyond the scope of market subsidy mechanisms. The key aspect of this method of supporting digital technology development was the characteristics of the energy communities (although *energy environment* would be more appropriate due to multiple functions of interacting parties in such a system) that defined its *non-profit* legal status, which made it possible to grant government subsidies directly rather than bypassing the effective law. The British regulatory framework does not recognize energy trading under smart contracts as it would require cryptocurrencies to be defined by law.

The American experience of implementation and use if advanced technologies in the energy sector is also worthy of attention. There are many projects using digital technologies in the US energy sector today. At the moment, the use of smart systems in the energy sector of digital technologies, such as the Internet of Things, allow energy system operators to obtain real-time information on processes in the system. As the same time, numerous cataclysms the country has experienced recently stimulated the interest in the development of microgrids that can operate autonomously when the central energy system is facing a crisis. One of the very first examples of energy trade using the distributed ledger technology took place in New York in April 2016. An energy sale was made using the Ethereum platform under the LO3 Energy project.

In order to ensure autonomous energy supply from different sources and stable energy consumption, an American company called Grid Wise proposed the term *transactive energy* (TE) for energy generation, consumption, and capacity management in an energy system using unconventional contract structures to trade energy within the grid between its stakeholders. TE systems allow for near-real time trading on a digital platform involving owners of any and all distributed energy facilities, including electric cars, solar cells, home energy storage systems, along with energy supply and distribution companies, aggregators, system and grid operators. Smart systems are used to predict demand and limit (marginal) prices for each stakeholder, to generate demand and supply, to set prices, and to make decisions on transactions in this market. Such trading results in reliable energy distribution from multiple suppliers to multiple consumers, capacity loading and unloading distribution, which is a distinguishing feature of the platform setting it apart from the other projects. By creating this market, the USA will use the benefits of distributed energy to the fullest extent for optimal operation and the development of stand-alone energy systems.

An example of smart system usage for energy supply is the Port of Long Beach, California, also known as the second busiest container port in the USA. Due to the need to maintain the port operational in case of power failures, a project was initiated to build a more self-sustaining ecosystem that could support cargo operations and supply energy to vital municipal facilities and public utilities during blackouts. Automation of its largest terminal gave the port personnel the ability to operate cranes, monitor the weighing of cargo, perform other actions as necessary to keep operations going using a digital platform.

Despite the abundance of digital platform projects diversifying energy sources, stakeholders of the US autonomous energy system market want the government to create standards for its advancement and formulate federal regulations as well as regulations at the level of local authorities that support the development of microgrids.

On the other hand, a state-level regulatory framework is already emerging which will accelerate the development of autonomous energy systems known as *microgrids* in the USA. Notably, a bill on microgrids (Senate Bill No. 1339) was approved by the Governor of California on September 19, 2018. It states that the Public Utilities Commission shall take action to facilitate the commercialization of distributed grids by large energy companies.

The bill calls for the creation of procedures for the connection of consumers to microgrids and the development of separate electrical tariffs within such energy systems. The document formulates questions related to the operation of microgrids: what role microgrids play in achieving energy policy goals; how microgrids support transfer of energy produced by microgeneration to the electrical grid; what place microgrids occupy in the California regulatory framework. The bill also defines a microgrid as a system for the distribution of energy and capacity among consumers, including energy produced using distributed energy technologies, energy storage devices, demand monitoring application software, or other management applications using software capable of energy consumption forecasting and analysis for peak load reduction in the grid. The system can operate independently when power supply from the central energy system is discontinued and/or run in parallel with the central energy system. This bill, when passed, will help develop a strategy for further advancement of autonomous energy system projects in the American energy market. Thus, the regulatory framework that used to restrict the use of microgrids has been improved noticeably.

The specific nature of the regulation of legal relations within local energy systems stems from the fact that the USA legislatively recognizes microgrids as a means to maintain energy supply during cataclysms and emergencies, when it is not technically possible to access energy from the central energy system. The development of microgrids is also viewed as a way to spur economic growth as it promotes creation of energy markets and diversification of energy resources. By combining these two components, the USA will soon be able to accelerate the development of the legal framework establishing relations involving energy trade using automated agreements within energy systems.

While the energy sector as such, as it was noted, does not tend to make decisions hastily, or take interest in participation in the legal regulation of its activities, a certain model has emerged for piloting projects on energy trading between energy system stakeholders using unconventional contract structures within Roadmaps and public initiatives funded by government authorities in the absence of established compliance practices of applying unconventional contract structures. The following conclusions can be made in view of the experience of the United Kingdom and the United States of America described above.

First, approaches to defining unconventional contract structures necessary for the operation of energy trade digital platforms are random and depend on the specific nature of distributed energy development in a particular region.

Second, the development of approaches to defining unconventional contract structures depends on the impact of the energy transition on public relations.

Third, since the benefits of contact-free energy trade on digital platforms using automated agreements can only be used to the full, when the legal status of cryptocurrencies has been established. The current law of most countries does not contain such provisions, state authorities support digital energy projects via public organizations.

As digitalization shall spur the development of market mechanisms and competition, especially in retail electricity markets, by making information available to all stakeholders, including regulators and consumers, it will be difficult to implement initiatives to make sure consumer demands are met at all times without studying global practices of using unconventional contract structures in the energy sector and the impact of the energy transition on public relations. At the same time, the absence of an effective regulatory framework that would allow us to take full advantage of unconventional contract structures for their further application in the energy sector can result in technological inferiority in key areas of the smart energy sector in terms of both technology and standardization. Therefore, as V.V. Romanova aptly noted, “the energy law science is facing very serious challenges in terms of the development of a fundamental legal framework for using digital technology in the energy industry”. ■

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