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# Electricity Quality: Proposals to Improve the Electric Power Industry Laws of the Russian Federation

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## Аннотация

The issues of regulating the requirements to electricity quality and electricity quality assurance are among the fundamental issues for the electric power industry. The current system of regulating the requirements to electricity quality is based on national standards that can be applied voluntarily. At the same time, regulatory control over these requirements is essential both for achieving such goals of state regulation of reliability and safety in the electric power industry as ensuring its stable, reliable, and safe operation, preventing emergencies associated with the operation of electric power industry facilities and power receivers of electricity consumers and for the long-term development of the electric power industry. In this article, the author studies the problems identified in the laws of the Russian Federation on the electric power industry in terms of regulation of the requirements to electricity quality and quality assurance and ways of solving these problems and contradictions.

**Ключевые слова:** energy law; legal regime of energy resources; electricity quality; national standards

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1        The content of the legal regime of energy resources is fundamental for energy law. Many elements of the content of the legal regime of energy resources are of interest to scientific research. Special attention is paid to registering the number of energy resources supplied. [1] At the same time, such element of the content of the legal regime as the quality of energy resources also requires clear legal coverage to exclude legal uncertainty and minimize the risks of disagreement between the subjects of energy law.

2        As the Energy Strategy of the Russian Federation until 2035 stipulates, high quality power supply is a task set for the electric power industry as a branch of the fuel and energy complex. The implementation of this task requires creating a mechanism controlling electricity quality and improving the reliability of servicing electricity consumers. [2]

3        The laws of the Russian Federation on the electric power industry are based on the Civil Code of the Russian Federation and special regulations governing relations in the electric power industry.

4        As per Article 542 of the Civil Code of the Russian Federation, energy quality shall meet the requirements established under the laws of the Russian Federation, including mandatory rules, or stipulated by the energy supply agreement. This requirement is general in relation to those established by regulations governing legal relations in the electric power industry. Let us review the current state of regulations in the electric power industry in terms of regulating the requirements to electricity quality and electricity quality assurance.

5        As per Federal Law No. 35-Φ3 on the Electric Power Industry dd. March 26, 2003, (as amended by Federal Law No. 174-Φ3 dd. June 11, 2022) (hereinafter referred to as the Electric Power Industry Law or Federal Law No. 174-Φ3, respectively): [3] [4]

6        - the conceptual framework of the Electric Power Industry Law includes the concept of “electricity quality”, which means the extent of compliance of electricity characteristics at a certain grid point with a combination of controlled parameters;

7        - the controlled parameters to be met by electricity characteristics are set by regulations of federal executive authorities authorized by the Government of the Russian Federation;

8        - electric power industry entities and electricity consumers should comply with the requirements of regulations in the electric power industry, which establish the requirements to electricity quality and electricity quality assurance;

9        - electric power industry entities that supply electricity to electricity consumers are also responsible to consumers for the quality of electricity supplied;

10       - electric power industry entities and electricity consumers should make sure that technical specifications and operating parameters of their electric power facilities and power receivers meet the requirements set by the regulations, which determine electricity quality;

11       - the adoption of regulations establishing requirements to electricity quality assurance is included in the scope of measures of state regulation of reliability and safety in the electric power industry. [5]

<sup>12</sup> Thus, the Electric Power Industry Law (as amended by Federal Law No. 174-Φ3) established the basic principles, the regulation of the requirements to electricity quality and electricity quality assurance should be based on.

<sup>13</sup> It should be noted that currently some regulations of the Government of the Russian Federation and the Ministry of Energy of Russia impose obligations on electric power industry entities and electricity consumers related to compliance with the requirements to electricity quality and electricity quality assurance.

<sup>14</sup> For example, under clauses 14 and 15 of the Rules for Non-Discriminatory Access to and Provision of Electricity Transmission Services, the service receiver shall maintain at the boundary point the values of quality parameters based on the operation of its power receivers, and the grid operator should transmit electricity, the quality and parameters of which meet the mandatory requirements set by the regulations. [6]

<sup>15</sup> As per clause 80 of the Rules of Technological Operation of Electric Power Systems (hereinafter referred to as the RTO), each grid operator shall develop voltage curves in 35-110 kV grids based on the need to ensure the controlled parameters of electricity quality. Also, as per clause 135 of the RTO, the operation of consumers' electrical installations shall not violate the mandatory requirements to electricity quality at the grid connection point. [7]

<sup>16</sup> The obligations imposed on electric power industry entities and consumers to ensure electricity quality are also finalized in regulations governing economic relations in the electric power industry. An example is the Basic Rules of Operation of the Retail Electricity Markets (hereinafter referred to as the Basic Rules), which state that electric power industry entities, which supply electricity to consumers, shall take joint actions to ensure electricity quality in the retail markets. [8] At the same time, it should be noted that the requirements to the quality of electricity supplied are an essential condition of the electricity (capacity) sale and purchase agreement and the energy supply agreement.

<sup>17</sup> Acts of the Ministry of Energy of Russia also establish obligations for electric power industry entities and electricity consumers in terms of compliance with the requirements to electricity quality and electricity quality assurance.

<sup>18</sup> As per clause 5 of the Regulations for the Operation of Consumer Electrical Installations, the operation of consumer electrical installations shall comply with the requirements to electricity quality assurance of regulations. [9]

<sup>19</sup> Attention should also be paid to the Rules for the Development and Approval of Power Distribution Schemes of Electric Power Generation Facility and External Power Supply Schemes for Power Receivers of Electricity Consumers (hereinafter referred to as the Rules for PDS and EPSS Development). In particular, technical power distribution solutions for an electric power generation facility shall preserve electricity quality for electricity consumers whose installations are already connected to the power grid as well as ensure non-deterioration of operation of other electric power facilities previously connected to power grid facilities. A similar requirement is set for technical solutions for power grid construction and/or reconstruction implemented for the technological connection of power receivers of the electricity consumer to the power grid (technical solutions for external electricity supply). [10]

20 Given the above, we can make the following conclusions:

21 - proper regulation of issues related to electricity quality and electricity quality assurance is a fundamental problem that concerns all electric power industry entities and electricity consumers;

22 - the adoption of Federal Law No. 174-Φ3 established the basis for drafting currently needed subordinate regulations governing electricity quality. Federal executive authorities authorized by the Government of the Russian Federation have gained the right to establish requirements to electricity quality and electricity quality assurance, which allows comprehensive regulation of the above issues at the level of subordinate regulations;

23 - drafting and adoption of regulations governing the requirements to electricity quality contribute to the development of state regulation of reliability and safety in the electric power industry;

24 - obligations of electric power industry entities and electricity consumers stipulated by the regulations of the Government of the Russian Federation and the Ministry of Energy of Russia in terms of compliance with the requirements to electricity quality and electricity quality assurance cannot be discharged unless the requirements are established at the regulatory level. The above examples show the “selectivity” of regulation of these issues, but they do not address the issue of comprehensive regulation of electricity quality.

25 We should mention international experience in the regulation of issues related to electricity quality. For example, European countries use Standard EN 50160-2010, Voltage Characteristics of Electricity Supplied by Public Distribution Networks, which regulates electricity quality parameters. Such parameters include voltage drift, voltage dips, unbalance, voltage transients, short voltage interruptions, surge overvoltages, unsinusoidality, long voltage interruptions, and frequency deviation. Standard EN 50160-2010 is applied in Austria, Belgium, Bulgaria, the Czech Republic, Denmark, Estonia, Finland, France, Germany, the UK, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Slovenia, Spain, and Sweden. The United States has internal standards for grid companies in place. Some of the main standards used to ensure electricity quality include IEEE 1159-1995, Recommended Practice for Monitoring Electric Power Quality, and IEEE 519-1992, Recommended Practices and Requirements to Harmonic Control in Electrical Power Systems. The U.S. also applies NFPA 70-1999, National Electrical Code, which recommends how to protect electrical distribution facilities from overloads.

26 The existing system of national regulation of electricity quality requirements is based on technical regulation and requires a revision in view of the adopted regulations and standard technical documents applied in the UES of Russia.

27 GOST 32144-2013 is a key standard establishing electricity quality requirements. [11] This national standard specifies such parameters of electricity quality as “frequency deviation” and “voltage deviation”, but the same parameters are power system parameters by virtue of the RTO requirements, while GOST 32144-2013

requirements to current frequency and voltage differ from the requirements established by the RTO.

<sup>28</sup> Besides, by virtue of clause 1 of Article 26 of Federal Law No. 162-Φ3 on Standardization in the Russian Federation dd. June 29, 2015, electric power industry entities and electricity consumers may apply GOST requirements voluntarily. The Electric Power Industry Law currently contains no provisions establishing the mandatory application of national standards. Previously, the Electric Power Industry Law included a reference to technical regulations, but the current technical regulations existing in the regulatory framework have never governed issues related to electricity quality and electricity quality assurance parameters.

<sup>29</sup> The regulation of electricity quality requirements at the level of GOST only and the existence of different requirements to the same parameters result in contradictory law enforcement practices, numerous disagreements and court disputes with electricity market players as well as emergence of dual liability, which contradicts the principles of Russian law.

<sup>30</sup> A similar problem is typical of electricity quality assurance issues.

<sup>31</sup> Article 28 of the Electric Power Industry Law sets the general requirement for electric power industry entities supplying electricity to consumers (including energy sales organizations, guaranteed suppliers, grid companies, other operators of power grid facilities as well as owners and other operators of electricity (capacity) generation facilities, and operational dispatch management entities) to ensure electricity quality within the scope of their duties to comply with the mandatory requirements established by the regulations as well as the requirements of specifications for technological connection to power grids and obligations under the contracts they concluded to perform their activities. Article 28 of the Electric Power Industry Law also establishes the obligation of electricity consumers to ensure compliance with electricity quality parameters in view of the operation of electric power facilities and power receivers they own.

<sup>32</sup> Thus, it is necessary to develop regulations that govern:

<sup>33</sup> - electricity quality requirements;

<sup>34</sup> - electricity quality assurance requirements, requirements to the segregation of electricity quality assurance duties, and liability for the performance thereof between electric power industry entities and electricity consumers.

<sup>35</sup> In addition, it is necessary to adopt regulations governing the mechanism of control over compliance with the requirements to electricity quality and electricity quality assurance. Besides, the issue of interaction between power sales organizations, guarantee suppliers, grid companies, and electricity consumers in case of claims involving unsatisfactory quality of electricity supplied (transmitted) at electricity supply points has not been addressed at the regulatory level.

<sup>36</sup> As per Articles 21 and 28 of the Electric Power Industry Law (as amended by Federal Law No. 196-Φ3 dd. June 23, 2016, on Amendments to the Federal Law on the Electric Power Industry to Improve the Requirements to Ensuring the Reliability and

Safety of Power Grids and Electric Power Facilities) and Decree of the Government of the Russian Federation No. 244 dd. March 2, 2017, on Improving the Requirements to Ensuring the Reliability and Safety of Power Grids and Electric Power Facilities and Amending Certain Acts of the Government of the Russian Federation, the electric power industry has created and successfully applies a mechanism for drafting and adopting regulations on the reliability of power grids, the reliability and safety of electric power facilities and power receivers. Therefore, it is advisable to regulate the requirements to electricity quality within the framework of the above mechanism.

37 In this respect, it is proposed to develop:

38 (1) a draft order of the Ministry of Energy of Russia on Approval of Electricity Quality Requirements;

39 (2) a draft order of the Ministry of Energy of Russia on Approval of Electricity Quality Assurance Requirements.

40 Conceptually, the draft order of the Ministry of Energy of Russia on Approval of Electricity Quality Requirements can be summarized as follows.

41 Electricity quality requirements shall specify the characteristics (parameters) of electricity quality in the power grid; requirements to values of parameters that describe electricity quality (standardization that is derived from the definition of “electricity quality”) as well as requirements to quality parameter measurements to determine compliance of the specified parameters with standards.

42 Given the fundamental importance of compliance with the electricity quality requirements as well as the requirements of acts of the Government of the Russian Federation and acts of the Ministry of Energy of Russia, it is advisable to define the scope of this order so that the requirements it establishes are met at the stage of design of electric power facilities.

43 In this respect, it seems logical to stipulate in the draft order that the requirements it establishes should be met during (1) the development of technical solutions for the construction, reconstruction, modernization, and technical re-equipping of electric power facilities; (2) the development of project documentation; (3) the development of technical solutions for the technological connection of electric power facilities and power receivers of consumers to the power grid as well as the development and approval of specifications for the technological connection of electric power facilities to the power grid; (4) the development of PDSs/EPSSs; (5) the operation of electric power facilities and power receivers of electricity consumers; (6) the supply of electricity to consumers under the contracts concluded with them.

44 The requirements set by the said draft order shall be mandatory for electric power industry entities and electricity consumers owning or possessing electric power generation facilities on other grounds, power grid facilities, electricity consumers owning power receivers; operational dispatch management entities; design organizations that develop project documentation, PDSs of electric power generation facilities, EPSSs of power receivers of consumers.

<sup>45</sup> The adoption of the draft order will eliminate existing gaps in regulation, establish the electricity quality requirements at the regulatory level, and exclude the voluntary application of the electricity quality requirements and related problems in law enforcement practice.

<sup>46</sup> The draft order of the Ministry of Energy of Russia on Approval of Electricity Quality Assurance Requirements should conceptually stipulate a procedure for the implementation of the electricity quality requirements by electric power industry entities and electricity consumers.

<sup>47</sup> For example, electricity quality is ensured at the points of electricity supply to electricity consumers upon provision of electricity transmission services by grid operators; frequency is maintained within the permissible values by the operational dispatch management entity, etc.

<sup>48</sup> A number of electricity quality parameters can be ensured by joint actions of grid operators and electric power industry entities owning electric power generation facilities when they perform their activities by way of meeting the requirements established by the regulations and standard technical documents (in particular, by way of complying with the RTO requirements, the Rules of Non-Discriminatory Access to Transmission Services, acts of the Ministry of Energy of Russia adopted in furtherance of the RTO, requirements of specifications for the technological connection to power grids, obligations under contracts concluded on the wholesale and retail markets).

<sup>49</sup> The draft order offered for development should also stipulate a procedure for ensuring quality parameters by electricity consumers by way of complying with the RTO requirements, the Basic Rules, the Regulations for the Operation of Consumer Electrical Installations, and the Rules for Non-Discriminatory Access to and Provision of Electricity Transmission Services. There is no regulatory framework for grid operators or related consumers, whose facilities are connected to the respective power grid, to demand that consumers, whose electrical installations distort electricity quality, take technical measures to compensate for the negative impact of their equipment on electricity quality (at the common connection point), and these issues need to be governed at the regulatory level.

<sup>50</sup> Compliance with the mandatory requirements established by the above orders of the Ministry of Energy of Russia can be assessed as part of antimonopoly control and mechanisms of contractual liability.

<sup>51</sup> Thus, electricity quality is a fundamental issue for the electric power industry. However, prior to the adoption of Federal Law No. 174-ФЗ dd. June 11, 2022, there was no statutory regulation of electricity quality issues, and the electricity quality requirements were limited by references to technical regulations that contained no such requirements, despite the provision pre-existing at the level of the Federal Law on the Electric Power Industry, which defines the electricity quality liability to consumers of electric power industry entities that supply electricity to electricity consumers. As a result, so far the only document defining any electricity quality requirements has been GOST 32144-2013, which is a document of voluntary application requiring a revision in view of the changes in the statutory and technical regulation of operation processes of power grids of Russia since 2013.

<sup>52</sup> The draft orders to be developed are meant to eliminate gaps in the statutory regulation of issues related to establishing electricity quality requirements and electricity quality assurance.

<sup>53</sup> The statutory regulation of the requirements to electricity quality and electricity quality assurance is essential both for achieving such goals of state regulation of reliability and safety in the electric power industry as ensuring its sustainable, reliable, and safe operation, prevention of emergencies associated with the operation of electric power facilities and power receivers of electricity consumers, and for the long-term development of the electric power industry.

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## Abstract

The issues of regulating the requirements to electricity quality and electricity quality assurance are among the fundamental issues for the electric power industry. The current system of regulating the requirements to electricity quality is based on national standards that can be applied voluntarily. At the same time, regulatory control over these requirements is essential both for achieving such goals of state regulation of reliability and safety in the electric power industry as ensuring its stable, reliable, and safe operation, preventing emergencies associated with the operation of electric power industry facilities and power receivers of electricity consumers and for the long-term development of the electric power industry. In this article, the author studies the problems identified in the laws of the Russian Federation on the electric power industry in terms of regulation of the requirements to electricity quality and quality assurance and ways of solving these problems and contradictions.

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