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Enhancing energy performance of buildings in the EU in the era of digitalisation: Legal challenges and solutions for the national authorities of the EU Member States*

Abstract: According to the Energy Performance of Buildings Directive EU/2024/1275 (EPBD Recast 2024) the buildings are responsible for approximately 40% of final energy consumption and for 36% of energy-related greenhouse gas emissions in the EU. Digitalisation of the energy sector is among the key directions of the EU energy policy. Digitalisation can significantly contribute to increasing the energy performance of buildings. Digital tools will optimise the gathering, analysis, and management of data on energy consumption in buildings. Smart metering will provide energy consumers with more accurate data and, by these means, will encourage them to decrease their energy consumption and to introduce energy efficiency measures in their buildings. The digitalisation-related issues are specifically targeted by the EPBD Recast 2024. This article aims to analyse the legal issues and to elaborate possible solutions concerning the encouragement of digitalisation in the EU buildings sector by public authorities of the EU Member States in the light of the requirements stipulated by the EPBD Recast 2024.

Keywords: digitalisation, energy performance of buildings, smart metering, energy efficiency, climate change

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1. Introduction

We live in the era of digitalisation. Digital solutions optimise many processes in different spheres. In the recent years, digitalisation became a driver of energy transition in the European Union. Thus, two priority directions of the EU policy – digital transition and energy transition – have crossed and led to the digitalisation of the energy sector. According to Energy Performance of Buildings Directive EU/2024/1275 (hereinafter: EPBD 2024 Recast) the buildings are responsible for approximately 40% of final energy consumption and for 36% of energy-related greenhouse gas emissions in the EU. Sustainable built environment is considered as an important element of European Green Deal: a sustainable, climate-neutral, resilient, and competitive EU.[1] One of the largest opportunity areas for digitalisation is in buildings, where it is argued to have the potential to reduce energy use by as much as 10% globally by 2040 if applied throughout buildings value chain and life cycle.[2] Digital tools will optimise the gathering, analysis, and management of data on energy consumption in buildings. Smart metering will provide energy consumers with more accurate data and, by these means, encourage them to decrease their energy consumption and to introduce energy efficiency measures in their buildings. The use of data and digital solutions can help to improve the overall functioning of energy systems by fostering system integration and breaking down barriers between the production, transmission, distribution, and consumption of energy. They can also help to boost energy efficiency and savings in buildings, transport and industry by enabling and enhancing smart management of energy demand.[3] The issues of digitalisation are specifically targeted by the EPBD Recast 2024.

In the recent years, there has been growing interest to the issues of digitalisation of the energy sector in general and in the sphere of energy performance of buildings among representatives of different fields of knowledge (e.g., technical,[4]

[1] S. Dekeyrel, M. Fessler, *Digitalisation: An enabler for the clean energy transition: Discussion paper*, Vodafone Institute for Society and Communications, Sustainable Prosperity for Europe Programme, 31 January 2023, p. 6, https://archive.epc.eu/content/PDF/2023/Vodafone_DP_FINAL.pdf [accessed 6 October 2025].

[2] UNECE: *Improving Efficiency of Buildings through Digitalisation – Policy Recommendations from the Task Force on Digitalisation in Energy*, 2021, https://unece.org/sed/documents/2021/06/working-documents/improving-efficiency-buildings-through-digitalization [accessed 9 October 2025].

[3] S. Dekeyrel, M. Fessler, *Digitalisation*…, p. 6.

[4] Z. Al-Waisi, M. Opoku Agyeman, *On the Challenges and Opportunities of Smart Meters in Smart Homes and Smart Grids*, pp. 1–6, https://scispace.com/pdf/on-the-challenges-and-opportunities-of-smart-meters-in-smart-5bgl8677rk.pdf [accessed 9 October 2025]; R. A. Goswami, G. Jadhav, *Smart metering system using AI techniques*, "International Journal of Scientific

economic,[5] political,[6] etc). Undoubtedly, legal issues of this problem are of high importance, considering that success of digitalisation of the energy system depends on adequate legal regulation and its implementation by respective public authorities. Legal aspects of the digitalisation of the energy sector attract attention of scholars.[7] Considering the recent changes in the EU legal regulation in the energy performance of buildings introduced by the EPBD Recast 2024, the special legal research in this sphere is requested.

This article aims to analyse the legal issues and to elaborate the possible solutions concerning the encouragement of digitalisation in the EU buildings sector by public authorities of the EU Member States in the light of the requirements stipulated by the EPBD Recast 2024.

Several research methods have been used for the purpose of this research. For instance, the system-functional method, methods of analysis and synthesis, and the method of theoretical generalisation were used to generalise current EU legal regulation in the field of digitalisation in the sphere of energy performance of buildings. Although this research is mainly focused on the legal issues of encouragement of digitalisation for the purposes of improvement of energy performance of buildings, the outcomes of the research in other field of studies (e.g., engineering, economic or policy studies) have been used, in particular, to analyse the benefits and risks of use of smart metering systems in the buildings' sector, that should be taken into consideration by public authorities.

The article is structured as follows. The first section thereof is devoted to the analysis of the digitalisation as a driver for improvement of energy performance of buildings, in particular, its benefits and possible risks. The second section presents the key developments in the EU legislation in the sphere of digitalisation related to the energy performance of buildings. The third section is devoted to the key tasks of public administration entities of the EU Member States arisen from the requirements of the EPBD Recast 2024. The main results have been summed up in the conclusions to this article.

Research in Engineering and Management" 2022, vol. 6, no. 10, pp. 1–14, https://scispace.com/pdf/smart-metering-system-using-ai-techniques-3510h66z.pdf [accessed 9 October 2025].

[5] T. Altenburg, D. Staegemann, K. Turowski, *Identifying the Economic Relevance of Smart Meter Reliability in Germany: A Cost-Benefit Analysis*, "Proceedings of the 20th International Conference on Smart Business Technologies (ICSBT)" 2023, pp. 203–208, https://www.scitepress.org/Papers/2023/121249/121249.pdf [accessed 9 October 2025].

[6] F. Heymann, S. Küfeoğlu, M. Galus, *Digitalisation, autonomy and the future of energy policy*, "Energy Research & Social Science" 2025, vol. 127, p. 1, https://doi.org/10.1016/j.erss.2025.104167 [accessed 9 October 2025].

[7] M. Rajavuori, K. Huhta, *Digitalization of security in the energy sector: evolution of EU law and policy*, "The Journal of World Energy Law & Business" 2020, vol. 13, no. 4, pp. 353–367, https://doi.org/10.1093/jwelb/jwaa030 [accessed 9 October 2025].

2. Digitalisation as a driver for improvement of energy performance of buildings

The energy sector is one of strategic sectors of each state. Energy policy is a priority sphere of the EU policy. It should be noted that digitalisation has penetrated the core of the energy sector's security paradigm only recently.[8]

Digitalisation of the energy system can be considered as a catalyst for the improvement of energy performance of buildings, in particular, because it leads to optimisation of the gathering, analysis, and management of data on energy consumption in buildings (smart energy management solutions); encouragement of energy savings and implementation of energy efficiency measures by energy consumers (smart management of energy demand); encouragement the decentralisation of energy systems (transition from fossil fuels to renewable sources of energy, shift from consumers to prosumers); enhancement of informed decision-making by all stakeholders. The key issues of the digitalisation of the EU energy sector are development and deployment of smart energy solutions, cybersecurity, data privacy, and consumers empowerment and protection.

Digitalisation in the buildings' sector can be used at all stages of building's lifecycle: construction, occupancy, and retrofitting. There are different instruments of digitalisation in the buildings' sector, for example, smart metering systems, digital twins, etc. Digital technologies are used for management of final energy consumption, calculation of energy performance of buildings, energy certification of buildings, inspections of buildings' air-conditioning, ventilation and heating systems, etc. For example, the certification procedure in the energy performance of buildings is optimised using software for energy performance of buildings, and certification of experts in energy performance of buildings. Introduction of databases of energy performance certificates can optimise the control system over the certification procedure.

Digital solutions in the buildings' sector have significant benefits. Smart electricity and gas meters installed in the households encourage optimisation and improvement of billing procedure, demand response and regulation, grid management, customer engagement, faster and easier service, integration with smart home technologies, promotion of energy efficiency measures, reduced environmental impact.[9]

However, as experts warn, "digitalisation of the energy sector will not automatically improve the energy system, and associated risks must be addressed from the start. The use of data and digital solutions can also have negative

[8] Ibidem, p. 355.

[9] IBM, *What are smart meters?*, https://www.ibm.com/think/topics/smart-meter [accessed 9 October 2025].

side-effects for the security, sustainability and affordability of the European energy supply. Lastly, while digital technologies can be driver of energy efficiency, they can also be or become significant consumers of electricity."[10]

Digitalisation in the energy sector in general and in the sphere of energy performance of buildings in particular is connected with certain risks that should be mitigated:

- natural hazards (e.g., geomagnetic storms[11]);
- high costs of installation;
- interoperability and standardisation;
- data privacy;
- cyber security attacks;
- lack of digital skills of stakeholders.

In particular, the abovementioned risks can lead to the refusal of the final consumers to actively participate in the market. Experts pay attention that consumer participation, especially that of residential users in the retail energy market is not a given or exogenous factor. Therefore technology, incentives and information are mentioned as the key factors influencing active demand and the level of consumers' participation.[12]

Talking about the importance of digitalisation for energy sector, one should not forget about the importance of electricity for digitalisation: no digitalisation without electricity is possible. Therefore, digitalisation and energy transition are two policy directions that are closely connected and mutually beneficial.

While advancing the development of digitalisation technologies is an important dimension of improving the energy efficiency of building operations, regulatory measures and incentives are required for the widespread adoption and management of these technologies.[13]

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[10] S. Dekeyrel, M. Fessler, *Digitalisation*..., p. 6.

[11] Geomagnetic storm is a major disturbance of Earth's magnetosphere that occurs when there is a very efficient exchange of energy from the solar wind into the space environment surrounding Earth. These storms result from variations in the solar wind that produces major changes in the Earth's magnetosphere (source: https://www.swpc.noaa.gov/phenomena/geomagnetic-storms [accessed 9 October 2025].

[12] M. Llorca, G. Soroush, E. Giovannetti, T. Jamasb, D. Davi-Arderius, *Digitalisation and Economic Regulation in the Energy Sector*, in: *Danish Utility Regulator's Anthology Project Series on Better Regulation in the Energy Sector. Incentives and digitalization for flexibility in the green transition*, (eds.) L. Meeus, T. Jamasb, C. Smidt, Frederiksværk 2024, vol. 2, p. 18, https://forsyningstilsynet.dk/Media/638616385347937203/Danish%20Utility%20Regulator's%20Anthology_vol.2.pdf [accessed 9 October 2025].

[13] K. Otte, T. Stelmach, V. Chandan, A. Delgado, *Digitalisation for the Energy Efficiency of Buildings Operations: Lessons Learned from the EE Hub Digitalisation Working Group*, Pacific Northwest National Laboratory, Richland, Washington 2022, p. 2, https://energyefficiencyhub.org/wp-content/uploads/2022/10/DWGReport.pdf [accessed 9 October 2025].

To use the benefits of digitalisation for the purposes of improvement of energy performance of buildings efficiently and minimise possible risks, the adequate legislation and its correct implementation by designated public authorities is needed.

3. Digitalisation of the EU energy system: A general overview of the EU legal framework

3.1. Digitalisation in the focus of the EU energy directives

3.1.1. Preliminary remarks on digitalisation-related issues in the EU energy directives

Rapid development of the information technologies in general and in the EU energy sector in particular requires the adequate legal regulation. The legal framework on the digitalisation of the energy sector in general and in the sphere of energy performance of buildings have been developed gradually, which can be seen in the example of the EU directives on common rules for internal markets in electricity and gas, on energy efficiency, on promotion of the use of energy from renewable sources, and on energy performance of buildings, which is presented in sections that follow.

3.1.2. Digitalisation according to the Electricity and Gas Directives

The first[14] and the second[15] EU Directives concerning common rules for the internal market in electricity (hereinafter: Electricity Directive) did not include provisions related to the use of digital technologies. Such provisions appeared in the third Electricity Directive,[16] in 2009. Thus, according to para. 27 of the Preamble to this Directive Member States were obliged to encourage the introduction of smart grids for the purposes of decentralised generation and energy

[14] Directive 96/92/EC of the European Parliament and of the Council of 19 December 1996 concerning common rules for the internal market in electricity (OJ L 27, 30 January 1997, p. 20) (no longer in force).

[15] Directive 2003/54/EC of the European Parliament and of the Council of 26 June 2003 concerning common rules for the internal market in electricity and repealing Directive 96/92/EC (OJ L 176, 15 July 2003, p. 0037) (no longer in force).

[16] Directive 2009/72/EC of the European Parliament and of the Council of 13 July 2009 concerning common rules for the internal market in electricity and repealing Directive 2003/54/EC (OJ L 211, 14 August 2009, p. 55) (no longer in force).

efficiency. Also, as referred to in para. 55 of the Preamble to this Directive, the introduction of intelligent metering systems should be done based on an economic assessment. If according to such assessment the introduction of such metering systems was concluded as economically reasonable and cost-effective only for consumers with a certain amount of electricity consumption, Member States should be able to take this into account when implementing intelligent metering systems. According to Article 3(11) of this Directive, the Member States (their designated regulatory authorities) shall promote energy efficiency, in particular, through strong recommendations to electricity undertakings to introduce intelligent metering systems or smart grids, where appropriate. Additionally, in Annex I to this Directive titled "Measures of consumer protection" the consumer-centric principle was introduced that included, in particular, the obligation of the Member States to ensure the implementation of intelligent metering systems to assist the active participation of consumers in the electricity supply market. It was stated that the economic assessment of all the long-term costs and benefits to the market and the individual consumer or which form of intelligent metering is economically reasonable and cost-effective and which timeframe is feasible for their distribution may be conducted prior to the implementation of those metering systems. Where roll-out of smart meters is assessed positively, at least 80% of consumers shall be equipped with intelligent metering systems by 2020. Also, the principle of interoperability of metering systems was stipulated by this Annex. Thus, it was stated that the Member States (competent authority they designate) shall ensure the interoperability of those metering systems to be implemented within their territories and shall have due regard to the use of appropriate standards and best practice and the importance of the development of the internal market in electricity.

The abovementioned provisions concerning the digitalisation of the electricity market found their development in the further Electricity Directive of 2019[17] that is currently in force. This Directive introduces, in particular, such terms related to the digitalisation of the electricity sector as "digitalisation," "smart meter," "smart metering systems," "smart charging," "smart distribution grids," "information technology," "electronic communication," "communication network," "interoperability," "electronic billing," "data protection," "remote reading," "cybersecurity." It should be noted that the Directive uses terms "electronic meter" and "smart meter" that are not synonyms. Thus, according to the definitions presented in point 22 of Article 2 the term "conventional meter" means an analogue or electronic meter with no capability to both transmit and receive data. The term "smart metering system" is defined as an electronic

[17] Directive (EU) 2019/944 of the European Parliament and of the Council of 5 June 2019 on common rules for the internal market for electricity and amending Directive 2012/27/EU (recast) (OJ L 158, 14 June 2019, p. 125).

system that is capable of measuring electricity fed into the grid or electricity consumed from the grid, providing more information than a conventional meter, and that is capable of transmitting and receiving data for information, monitoring, and control purposes, using a form of electronic communication. Thus, smart meter can be defined as an electronic meter with functions to measure electricity fed into the grid or electricity consumed from the grid, and to receive and transmit data for information, monitoring, and control purposes by means of electronic communications. The Directive stipulates the obligations of the EU Member States related to the encouragement of the installation of smart metering systems. As in the previous version of the Electricity Directive, this Directive defines that the consumers shall be active participants of the electricity market. Therefore, Member States (their respective authorities) shall encourage the regular provisions of accurate billing information based on actual electricity consumption by means of smart metering. It will help consumers to regulate their electricity consumption and costs (para. 49 of the Preamble). Also, smart metering systems enable distribution system operators to have better understanding of their grids, to reduce their costs, and to offer consumers lower distributions tariffs due to those savings (para. 52 of the Preamble). As for the previous Electricity Directive, this Directive stipulates the obligation of the respective national authorities to decide concerning the deployment of smart metering systems based on the economic assessment. However, this Directive goes further and stipulates the obligation of national authorities to encourage the review of such assessments on a regular basis (in response to significant changes in the underlying assumptions, or at least every four years), taking into consideration the fast technological development (para. 53 of the Preamble). It should be stressed that this Directive pays special attention to the issues of cybersecurity and stipulates the obligations of the Member States to establish transparent rules under which data can be accessed under non-discriminatory conditions and ensure the highest level of cybersecurity and data protection as well as the impartiality of the entities which process data (para. 57 of the Preamble). The obligations of the respective public authorities of the EU Member States concerning the deployment of smart metering systems are specifically regulated by Articles 19–24 as well as by Annex II of the Directive.

The development of legal framework on digitalisation in the gas sector is analogous to such development in the electricity sector. Like the Electricity Directive, the first[18] and the second[19] Gas Directives did not include provisions

[18] Directive 98/30/EC of the European Parliament and of the Council of 22 June 1998 concerning common rules for the internal market in natural gas (OJ L 204, 21 July 1998, p. 1) (no longer in force).

[19] Directive 2003/55/EC of the European Parliament and of the Council of 26 June 2003 concerning common rules for the internal market in natural gas and repealing Directive 98/30/EC (OJ L 176, 15 July 2003, p. 57) (no longer in force).

related to the digitalisation of the gas market. The third Gas Directive of 2009[20] introduces the intelligent metering systems and stipulates the obligations of the EU Member States on this matter. Thus, according to para. 52 of the Preamble to this Directive, the introduction of intelligent metering systems should be possible based on an economic assessment. If the introduction of such metering systems is concluded as economically reasonable and cost-effective only for consumers with a certain amount of gas consumption, it should be taken into consideration during the implementation of the intelligent metering systems. As referred to in Article 8 (3) of this Directive, Member States (their designated regulatory authorities) shall strongly recommend that the natural gas companies optimise the use of gas, in particular, via introducing intelligent metering systems or smart grids where appropriate. The implementation of intelligent metering systems is considered as measures on consumer protection according to Annex I to this Directive, since such systems encourage the active participation of consumers in the gas supply market. It is stated that the implementation of those metering systems may be subject to an economic assessment of all the long-term costs and benefits to the market and the individual consumer or which form of intelligent metering is economically reasonable and cost-effective and which timeframe is feasible for their distribution. The Member States or any competent authority they designate, shall ensure the interoperability of those metering systems to be implemented within their territories and shall have due regard to the use of appropriate standards and best practice and the importance of the development of the internal market in natural gas.

Fourth Gas Directive that is currently in force[21] follows the approach to digitalisation used in the fourth Electricity Directive, to encourage consistency and predictability in legal regulation in the energy market. Like the fourth Electricity Directive, the fourth Gas Directive demonstrates a significant development in the issues of digitalisation. First, it provides the definitions of such terms as "smart metering systems," "interoperability," "best available techniques" (in relating to smart metering), and uses such terms as "smart meters," "electronic billing," "remote reading," "information technology," "cyber security," and "data protection." The deployment of natural gas smart metering systems is in the focus of the current Gas Directive. According to para. 48 of the Preamble to this Directive the national decisions on the deployment of such systems shall be based on the cost-benefit assessments reviewed regularly (at least every four

[20] Directive 2009/73/EC of the European Parliament and of the Council of 13 July 2009 concerning common rules for the internal market in natural gas and repealing Directive 2003/55/EC (OJ L 211, 14 August 2009, p. 94) (no longer in force).

[21] Directive (EU) 2024/1788 of the European Parliament and of the Council of 13 June 2024 on common rules for the internal markets for renewable gas, natural gas and hydrogen, amending Directive (EU) 2023/1791 and repealing Directive 2009/73/EC (recast) (OJ L 2024/1788, 15 July 2024, p. 1).

years) to consider the rapid technological developments. Principles of such cost-benefit analysis are stipulated in Annex II to this Directive. It should be noted that limited introduction of smart metering systems in the gas sector (e.g., pilot projects or testing phases) is not considered as deployment of such systems within the meaning of the Directive. The principle of active participation of final gas consumers in the gas market shall be encouraged. In particular, it is stated in para. 49 of the Preamble to this Directive that the smart metering systems should not represent a barrier to switching supplier; final customers should be encouraged with the timely access to their consumption data, to regulate their consumption behaviour. In this respect, special attention should be paid to the issues of interoperability of systems. Consumer groups should be advised on how to use smart meters to benefit from them for the purposes of energy efficiency. Even if there are no systematic deployments of gas smart metering system in the Member State, the consumers should be provided with the opportunity to install the smart meters upon their request, under the fair and reasonable conditions, with provision of all necessary information (para. 50 of the Preamble to this Directive). Special requirements on smart metering systems in the natural gas system are stipulated by Article 17 of the Gas Directive, in the hydrogen system – by Article 18 of this Directive. Functionalities of smart metering systems in the natural gas system are regulated by Article 19 of this Directive. Article 20 of the Gas Directive is devoted to entitlement to a smart meter for natural gas. Considering the possible risks to the digital systems in the gas sector, special attention is paid to the mechanisms of cybersecurity and data protection (para. 51 of the Preamble to the Directive).

3.1.3. Digitalisation according to the Energy Efficiency Directive

The Directive 2006/32/EC on energy end-use efficiency and energy services[22] mentioned the importance of use of cost-effective technological innovations such as smart meters (para. 26 of the Preamble) and digital control systems as examples of eligible energy efficiency improvement measures in residential and control systems (Annex III).

In the Directive on energy efficiency[23] that replaced the previous Directive 2006/32/EC the terms “smart meter,” “smart grid,” “smart metering system” / “intelligent metering system,” “electronic billing information” were introduced.

[22] Directive 2006/32/EC of the European Parliament and of the Council of 5 April 2006 on energy end-use efficiency and energy services and repealing Council Directive 93/76/EEC (Text with EEA relevance) (OJ L 114, 27 April 2006, p. 64).

[23] Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC Text with EEA relevance (OJ L 315, 14 November 2012, p. 1) (no longer in force).

In point 28 of Article 2 of this Directive "smart metering system" or "intelligent metering system" was defined as an electronic system that can measure energy consumption, providing more information than a conventional meter, and can transmit and receive data using a form of electronic communication. This Directive stipulated obligations of the EU Member States related to the installation and use of smart meters. It was stated in para. 26 of the Preamble that cost-effective innovations such as smart meters should be taken into consideration. In order to protect consumer rights, it was stipulated that smart meters (where have been installed) should not be used by companies for unjustified back billing.[24] This Directive stipulated the obligation of the Member States to encourage the roll-out of smart meters for electricity[25] and gas,[26] where it was assessed positively (para. 27 of the Preamble).

The Energy Efficiency Directive (EU) 2023/1791 (Directive (EU) 2023/1791 of the European Parliament and of the Council of 13 September 2023 on energy efficiency and amending Regulation (EU) 2023/955 (Recast). OJ L 231, 20 September 2023), that is currently in force, also uses a set of digitalisation-related categories, such as "smart solutions," "smart and sustainable technologies," "smart buildings," "smart metering system," "intelligent metering system," "smart meters," "smart grid," "electronic billing information," "electronic bills," "digital platforms," "digital tools," "digital procurement," "interoperable devices," "remotely readable devices," "remotely readable meters," "remotely readable heat cost allocators," "cybersecurity," etc. In particular, as referred to in para. 69 of the Preamble to this Directive, promotion of smart and sustainable technologies in efficient district heating and cooling system is considered as a tool to achieve the cumulative end-use energy savings. The potential for energy savings using smart technologies and processes across all industrial, residential and commercial water cycles and applications should be fully explored and realised whenever cost-effective, and the energy efficiency first principle should be considered (para. 75 of the Preamble to this Directive). This Directive specifically targets rollouts of smart meters for natural gas (Article 13). It is stressed in the Directive that newly installed heat meters and heat cost allocators should be remotely readable to ensure cost-effective, and frequent provision of, consumption information (para. 97 of the Preamble to this Directive). This obligation is specified in Article 16 of this Directive. Meters and heat cost allocators which are not remotely readable, but which have already been installed, shall be rendered remotely readable or replaced with remotely

[24] Back billing or "catch up" billing means that energy supplier sends to the energy consumer a bill for energy consumed but was not charged in the previous periods.

[25] 80% of electricity consumers should be equipped with the smart metering systems by 2020.

[26] In relation to gas, a timetable for the implementation of intelligent metering systems should be stipulated by the Member States (competent authority they designate).

readable devices by 1 January 2027, save where the Member State in question shows that this is not cost-efficient. It is important to note that remotely readable devices do not require access to individual apartments or units to be read. Special requirements of this Directive are devoted to the exemplary role of the public sector in energy efficiency. For this purpose, the establishment of digital platforms for the aggregated energy consumption data from the public sector is prescribed (para. 35 of the Preamble).

Thus, the Energy Efficiency Directive follows the same approach to rollouts of smart metering systems as previously analysed Electricity and Gas Directives.

3.1.4. Digitalisation in the Directive on the Promotion of the Use of Energy from Renewable Sources

Transition from fossil fuels to renewable energy services is considered among the key energy efficiency measures in buildings. Therefore, digitalisation of such processes is of high importance. The first EU Directive on promotion of energy from renewable energy sources (hereinafter: RED) – EU Directive 2009/28/EC[27] – does not include special provisions relating to the digital technologies. The RED 2018/2001[28] that repealed the previous RED emphasised the obligations of the EU Member States to increase the level of renewable energy sources in buildings via establishment of minimum standards and recognised the importance of development of intelligent networks, storage facilities and interconnections to increase a share of renewable energy in the electricity system (Article 3, 5(c) of this Directive), however, lacked special provisions on digitalisation. Such provisions have been introduced by Directive (EU) 2023/2413 (RED-III).[29] Like abovementioned current Electricity, Gas, and Energy Efficiency Directives, the RED-III introduces, in particular, such terms as "smart metering system" (in the meaning of the Electricity Directive), "smart recharging," "smart management," "smart grids," "intelligent networks," "interoperability," "data access," and "data protection." It is stated in the Directive that the EU Member States shall ensure that manufacturers of domestic and industrial batteries enable real-time access to basic battery management system information, including battery

[27] Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC (OJ L 140, 5 June 2009, p. 16).

[28] 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 December 2018, p. 82).

[29] Directive (EU) 2023/2413 of the European Parliament and of the Council of 18 October 2023 amending Directive (EU) 2018/2001, Regulation (EU) 2018/1999 and Directive 98/70/EC as regards the promotion of energy from renewable sources and repealing Council Directive (EU) 2015/652 (OJ L, 2023/2413, 31 October 2023, p. 1).

capacity, state of health, state of charge and power set point, to battery owners and users, as well as to third parties acting, with explicit consent, on the owners' and users' behalf, such as building energy management undertakings and electricity market participants, under non-discriminatory terms, at no cost and in accordance with the data protection rules (Article 20a (3)). Also, this Directive stipulates the obligations of the EU Member States (designated authorities) to ensure that new and replaced non-publicly accessible normal power recharging points installed in their territory can support smart recharging functionalities and, where appropriate, the interface with smart metering systems deployed by Member States (Article 20a (4)).

3.1.5. Digitalisation according to the Energy Performance of Buildings Directive

The Energy Performance Directive (hereinafter: EPBD) is the special EU legal act that introduces the organisational and legal instruments in the sphere of energy performance of buildings. The first EPBD[30] did not include any provisions relating to digital solutions. The second EPBD[31] introduced the instrument of electronic monitoring and control system for the inspections of heating and air conditioning systems (Arts. 14–15). It was stated that the usage of such instrument may reduce the frequency of such inspections or lighten them.

Digitalisation in the sector of buildings is considered as a central issue in the newly adopted EPBD 2024 (Recast).[32] It is a logical development of the EU energy legislation that follows the approach previously used in the Electricity, Gas, Energy Efficiency and Renewable Energy Directives. It is a timely response to the rapid developments and usage of digital technologies in the buildings sector. This Directive introduces in the field of energy performance of buildings such categories as "digital solutions," "digital technologies," "digitalisation of the energy system," "smart grids," "smart-ready buildings," "smart-ready systems," "high-capacity communication networks," "smart homes," "smart buildings services," "smart-readiness indicator," "information and communication technologies," "building automation," "digital building twin," "smart meters," and "sensors." Digitalisation goes though all key instruments prescribed by the Directive: setting minimum energy performance requirements and energy performance standards, introduction of renewable energy sources in buildings, energy certification and renovation passports, infrastructure for sustainable mobility, financial incentives, inspections of technical systems, independent

[30] Directive 2002/91/EC of The European Parliament and of the Council of 16 December 2002 on the energy performance of buildings (OJ L 1, 4 January 2003, p. 65) (no longer in force).

[31] Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings (recast) (OJ L 153, 18 June 2010, p. 13).

[32] Directive (EU) 2024/1275 of the European Parliament and of the Council of 24 April 2024 on the energy performance of buildings (recast) (OJ L, 2024/1275, 8 May 2024, p. 1).

control system, one-stop shops and support for vulnerable categories of consumers. EPBD 2024 Recast stipulates a set of obligations of the EU Member States (their designated authorities) on encouragement of conditions necessary for efficient, reliable and safe use of digital solutions in all procedures in the sphere of energy performance of buildings. The issues of cyber security and privacy protection are of high importance for public administration entities of the EU Member States.

3.2. Legal framework on digitalisation of the energy system

Considering the aforementioned factors, digitalisation is now in the focus of the key EU Directives related to the energy performance of buildings – EPBD, Electricity Directive, Gas Directive, Energy Efficiency Directive, and RED. All of them include provisions related to the use of digital technologies, in particular, smart grids, smart metering systems, stress their importance for active participation of final consumers in the market, etc. However, the regulation of digitalisation issues in different legal acts is considered by scholars as fragmented. More comprehensive approach to digitalisation of the energy system is currently provided by the *Digitalising the energy system – EU action plan*.[33] It is stated in such EU action plan[34] that a deep digital and sustainable transformation of the EU energy system is needed to end the EU's dependence on Russian fossil fuels, tackle the climate crisis and ensure affordable access to energy for all. The switch to renewable sources in buildings (in particular, installation of solar photovoltaic (PV) panels on roofs of all commercial and public buildings by 2027 and on all new residential buildings by 2029) is considered as an important solution. It is stressed that all consumers should have the smart meters installed in their homes, which is still not the case in some EU Member States. It should be noted that in 2011 the European Commission issued the Communication "Smart Grids: from innovation to deployment"[35] and in 2012 – the Recommendation on preparations for the roll-out of smart metering systems.[36] However, as European Commission pays attention, according to the EU Agency for the Cooperation of Energy Regulators

[33] S. Dekeyrel, M. Fessler, *Digitalisation*…, p. 17.

[34] European Commission, *Digitalising the energy system – EU action plan* (Communication) COM/2022/552 final, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:52022DC0552 [accessed 9 October 2025].

[35] European Commission, *Smart Grids: from innovation to deployment* (Communication) COM/2011/0202 final, https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX-:52011DC0202 [accessed 9 October 2025].

[36] Commission Recommendation 2012/148/EU of 9 March 2012 on preparations for the roll-out of smart metering systems (OJ L 73, 13 March 2012, p. 9).

(ACER) Market Monitoring Report (energy retail and consumer protection volume), 54% of European households had an electricity smart meter at the end of 2021, while in 13 EU countries, the penetration rate was over 80% at the end of 2022.[37] Therefore, the deployment of smart metering systems shall be intensified. The action plan *Digitalising the energy system* includes a set of actions that shall be done by the European Commission according to the above-mentioned directives. In particular, the European Commission approved Commission implementing Regulation (EU) 2023/1162 of 6 June 2023 on interoperability requirements and non-discriminatory and transparent procedures for access to metering and consumption data,[38] that has introduced a reference model, containing a role model, an information model and a set of procedures necessary to support data access and exchange among market participants.[39] Two additional implementing acts (on interoperability requirements, and non-discriminatory and transparent procedures for access to data required for demand response and customer switching) are in the process of preparation. Also, it should be noted that the EU requirements on measuring instruments are stipulated by Directive 2014/32/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of measuring instruments (recast).[40] However, as professionals stress, the essential and instrument-specific requirements established in the late 20th century may not fully address the specific measurement tasks arising in areas such as energy transition, climate change mitigation, and the circular economy.[41] Therefore, the European Commission prepared the draft amendment to the above-mentioned Directive 2014/32/EU – Proposal for a Directive of the European Parliament and of the Council amending Directive 2024/32/EU as regards electric vehicle supply

[37] European Commission, *Smart grids and meters*, https://energy.ec.europa.eu/topics/markets-and-consumers/smart-grids-and-meters_en [accessed 9 October 2025].

[38] Commission implementing Regulation (EU) 2023/1162 of 6 June 2023 on interoperability requirements and non-discriminatory and transparent procedures for access to metering and consumption data (OJ L 154, 15 June 2023, p. 10).

[39] Florence School of Regulation, *Promoting energy consumer data exchange and interoperability: where do we stand? Highlights from the event 'Fostering Interoperability across Borders: The Case of Energy Consumer Data'*, 6 October 2025, https://fsr.eui.eu/promoting-energy-consumer-data-exchange-and-interoperability-where-do-we-stand/ [accessed 9 October 2025].

[40] Directive 2014/32/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of measuring instruments (recast) (OJ L 96, 29 March 2014, p. 149).

[41] P. Klenovský, M. Wouters, *The European single market for measuring instruments*, "OIML Bulletin" 2024, vol. LXV, no. 3, p. 15, https://www.oiml.org/en/publications/oiml-bulletin/online-bulletin-1/2024-07/the-european-single-market-for-measuring-instruments [accessed 9 October 2025].

equipment, compressed gas dispensers, and electricity, gas and thermal energy meter.[42]

Also, it should be emphasised that digitalisation of the energy sector in general and in the sphere of energy performance of buildings in particular shall be in accordance with GDPR[43] (data protection) and NIS2 Directive (cybersecurity).[44] The European Commission in its Recommendation (EU) 2019/553 of 3 April 2019 on cybersecurity in the energy sector aims at helping stakeholders keep in mind the specific requirements of the energy sector when implementing internationally recognised cybersecurity standards. The European Commission suggests the EU Member States to include the recommendations into their national cybersecurity framework via strategies, laws, regulations and other administrative provisions.[45]

Experts stress, that the EU needs a coherent policy and investment framework at the European level to guide and incentivise needed action. The European Green Deal with its vision and objectives provides the strategic direction, and it is now time to ensure that the concrete measures are aligned with the set goals.[46]

As was mentioned above, the digitalisation of the energy sector in general and for the purposes of improving the energy performance of buildings in particular is conducted in frames of two priority directions of the EU policy: energy transition and digital transition. Therefore, the legal framework in this field consists of legal acts of energy legislation and of legislation on digitalisation. In turn, energy legal acts on digitalisation include energy legal acts that regulate digitalisation in the concrete sphere (electricity, gas, energy efficiency, energy performance of buildings, promotion of renewable energy sources) and legal

[42] European Commission, Proposal for a Directive of the European Parliament and of the Council amending Directive 2024/32/EU as regards electric vehicle supply equipment, compressed gas dispensers, and electricity, gas and thermal energy meter. Brussels, 9.11.2024. COM (2024) 561 final. 2024/0311(COD), https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52024PC0561 [accessed 9 October 2025].

[43] Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data and repealing Directive 95/46/EC (General Data Protection Regulation) (OJ L 119, 4 May 2016, p. 1).

[44] Directive (EU) 2022/2555 of the European Parliament and of the Council of 14 December 2022 on measures for a high common level of cybersecurity across the Union, amending Regulation (EU) No 910/2014 and Directive (EU) 2018/1972, and repealing Directive (EU) 2016/1148 (NIS 2 Directive). PE/32/2022/REV/2 (OJ L 333, 27 December 2022, p. 80).

[45] Y. Vashchenko, *Energy Sector Digitalisation: Issues of Cybersecurity in the EU and Ukraine*, in: *Legal Issues of Digitalisation, Robotization and Cyber Security in the Light of EU Law*, (ed.) N. Šišková, Kluwer Law International B.V., Alphen aan den Rijin, the Netherlands, 2024, p. 325.

[46] S. Dekeyrel, M. Fessler, *Digitalisation*..., p. 7.

acts on digitalisation of the energy system (action plan on digitalising the energy system). The EU Electricity, Gas, Renewable Energy, Energy Efficiency, and Energy Performance of Buildings Directives have been developed gradually with the provisions on digitalisation and currently include many new and updated instruments. The recent changes in digitalisation as a tool for improving the energy performance of buildings introduced by the EPBD Recast 2024 shall be correctly transposed and implemented by the national authorities of the EU Member States.

4. Encouragement of digitalisation of the sector of buildings as a task of public authorities

Public authorities of the EU Member States participate in the relations in the sphere of energy performance of buildings in two statuses: as subjects that perform regulatory and administrative functions and as addressees of such decisions (public authorities that own or occupy buildings). Therefore, the key tasks of public authorities in the sphere of digitalisation in energy performance of buildings include:

- transposition of EU legal requirements on digitalisation in the sphere of energy performance of buildings,
- encouragement of the fulfilment of legal requirements on digitalisation in the sphere of energy performance of buildings by all addressees,
- fulfilment of requirements on energy performance of buildings owned or occupied by public authorities,
- optimisation of buildings sector-related decision-making processes via use of digital solutions.

EBPD requirements were transposed into national legislation or by approval of special legal acts (e.g., Law 555/2005 Col. on Energy Efficiency of Buildings of the Slovak Republic[47]) or by amendments to existing construction and/or energy legislation (e.g., in Estonia – via changes to the Building Code[48]), and by respective by-laws. The changes introduced by the EPBD Recast 2024, including related to the digitalisation, shall be transposed by national authorities

[47] Law 555/2005 Col on Energy Efficiency of Buildings of the Slovak Republic, https://www.slov-lex.sk/ezbierky/pravne-predpisy/SK/ZZ/2005/555/ [accessed 9 October 2025].

[48] Building Code of Estonia, https://www.riigiteataja.ee/en/eli/526022021001/consolide [accessed 9 October 2025].

by 29 May 2026 (with certain exceptions) by amendments to existing legal acts or by approval of new ones.

According to EPBD Recast 2024 the national authorities of the EU Member States shall adopt the national building renovation plans. Draft national building renovation plans are to be accessed by the European Commission to encourage the fulfilment of requirements and their comparability. Such plans are closely connected with the National Integrated Energy and Climate Plans introduced by Regulation (EU) 2018/1999[49] and in the future will be part of them. The drafts of the first national building renovation plans are to be submitted to the European Commission by 31 December 2025 and the final plans – by 31 December 2026, following the recommendations provided by the European Commission. As referred to in Annex I to this Directive that stipulates the template of national building renovation plans, such plans shall include, among other things, the targets and actions on the promotion of smart technologies and infrastructure for sustainable mobility in buildings. The European Commission explained that in relation to smart technologies, it is expected that the EU Member States will report the national state of implementation of the Smart Readiness Indicator (SRI).[50] Smart Readiness Indicator – is a new instrument introduced by the EBPD Recast 2024 that should be used to measure the capacity of buildings to use information and communication technologies and electronic systems to adapt the operation of buildings to the needs of the occupants and the grid and to improve the energy efficiency and overall performance of buildings (para. 56 of the Preamble to EPBD Recast 2024).

The EPBD Recast 2024 requirements on digitalisation are related, for example, to the following administrative procedures conducted by the public administration entities of the EU Member States: regulatory procedures, certification and standardisation, control, sanctioning procedures. Regulatory procedures related, for instance, to the establishment of the regulatory framework for the introduction of smart technologies in the buildings' sector. Certification and standardisation are necessary, in particular, for the encouragement of interoperability of smart devices and networks, and cyber security protection. Certification of the experts in energy performance of buildings is another example

[49] Regulation (EU) 2018/1999 of the European Parliament and of the Council of 11 December 2018 on the Governance of the Energy Union and Climate Action, amending Regulations (EC) No 663/2009 and (EC) No 715/2009 of the European Parliament and of the Council, Directives 94/22/EC, 98/70/EC, 2009/31/EC, 2009/73/EC, 2010/31/EU, 2012/27/EU and 2013/30/EU of the European Parliament and of the Council, Council Directives 2009/119/EC and (EU) 2015/652 and repealing Regulation (EU) No 525/2013 of the European Parliament and of the Council (OJ L 328, 21 December 2018, p. 1).

[50] European Commission, *National Building Renovation Plans*, https://energy.ec.europa.eu/topics/energy-efficiency/energy-performance-buildings/national-building-renovation-plans_en [accessed 9 October 2025].

of the certification administrative procedure. The EPBD Recast 2024 stipulates requirements on control over the certification and inspections in the sphere of energy performance of buildings. The fulfilment of the requirements in the sphere of digitalisation of the energy sector shall be enforced via sanctioning procedures.

National authorities on encouragement of digitalisation in the buildings sector under EPBD 2024 Recast shall:

- encourage the use of digital technologies for analysis, simulation and management of buildings, including regarding deep renovations;
- ensure direct access to building systems' data by interested parties;
- facilitate the full interoperability of services and of the data exchange within the Union;
- encourage the use of the smart readiness indicator for large buildings with a high energy demand and consider the possibility of its use for other buildings;
- encourage the consideration of the digital building twin, where available, in particular, for the smart readiness indicator;
- encourage the cyber security issues;
- set up a national database for the energy performance of buildings.

Digital technologies in the buildings' sector facilitate the monitoring of the building stock. Therefore, it was decided to set up national databases for the energy performance of buildings. EPBD Recast 2024 stipulates requirements on national databases for energy performance of buildings (Article 22 of the EPBD). Such databases may be established as an independent platform or as a set of interconnected databases. In some EU Member States, databases of energy performance certificates have been already set up and implemented effectively (e.g., Denmark[51]). So, such integrated national database on energy performance of buildings can consists, for example, of databases of energy performance certificates, certified experts in energy performance of buildings, renovation passports,[52] and of reports of inspections of heating, air-conditioning and ventilation systems (as demonstrated in Figure 1).

[51] Danish databases of energy performance certificates are accessible through: https://sparenergi.dk/energim%C3%A6rke/find-boligens-energimaerke; https://boligejer.dk/find-energimaerkerapporter [accessed 9 October 2025].

[52] As referred to in Article 12 (7) of the EPBD Recast 2024 Member States shall ensure that the renovation passport can be uploaded to the national database for the energy performance of buildings.

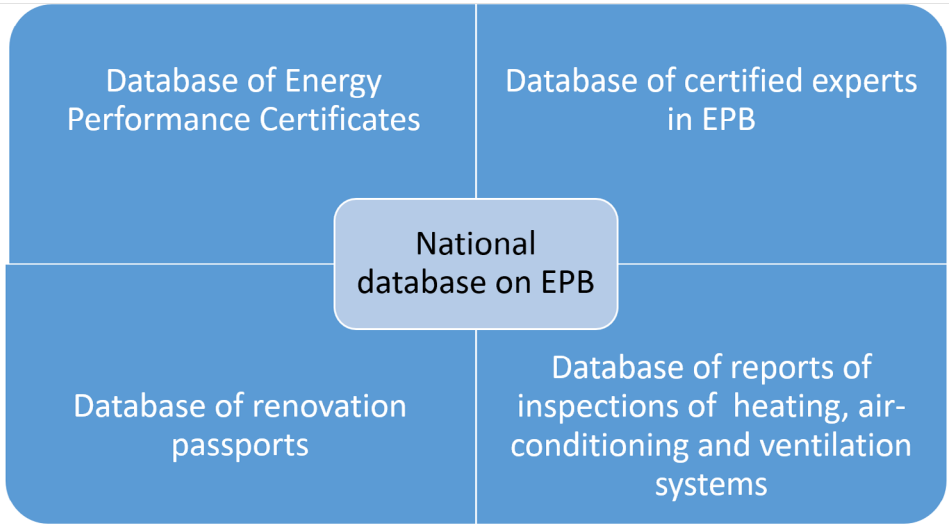

Figure 1. National database on Energy Performance of Buildings (EPB)

Successful implementation of EPBD requirements on digitalisation requires a set of policy actions from public administration entities.

In particular, it is important to encourage a fruitful cooperation of all experts involved in the digitalisation in buildings' sector. When the first EBPD (Directive 2002/91/EC) was approved in 2002, it was necessary to prepare experts in energy performance of buildings – experts with knowledge and skills in both – construction and energy. Digitalisation in the buildings' sector requires active involvement of IT specialists. It is a task of public administration entities to encourage a platform for active cooperation of construction specialists, energy specialists, and IT specialists.

Rapid development of digital technologies requires permanent advanced training of experts in digitalisation in buildings. Therefore, public administration entities shall encourage the high-quality training platforms (e.g., on the base of higher education institutions) for such specialists.

As was mentioned above, EPBD Recast 2024, following the approach of Electricity and Gas Directives, stipulates the principle of active participation of consumers. At the same time, lack of adequate knowledge and skills leads to consumers' refusal to introduce smart technologies (e.g., smart meters). In order to tackle this problem, public authorities shall encourage the improvement of skills of energy consumers in energy efficiency and digitalisation. The key role in this direction shall be played by local authorities, following the principle of deconcentration of public administration.

It should be noted that the officials of public authorities (especially, local authorities) also can lack necessary skills in digitalisation in buildings' sector. Therefore, special platforms should be established to develop necessary skills and to exchange the best practices among public authorities. It will also contribute to the fulfilment of the obligation of public authorities to play an exemplary role.

Affordability is one of the key elements of the right to access to energy services. All energy law instruments mentioned above include special provisions related to the protection of vulnerable categories of energy consumers. In case of digitalisation, initial installation of smart devices (e.g., smart meters) is very costly investment. Therefore, special programmes of support for vulnerable categories of energy consumers shall be in place.

Considering the importance of digitalisation in the buildings' sector for the energy performance of building, energy security, and climate change mitigation, it is important for public administration entities to encourage further research in digitalisation in buildings' sector.

5. Conclusions

Digital transition and energy transition are among the key directions of the EU policy. Digitalisation of the energy sector is a result of their intersection. Digitalisation is considered as a driver of energy transition via establishment of conditions for efficient use of renewable energy sources.

The buildings sector has a high potential to reduce energy consumption and energy-related greenhouse gas emissions, and digital technologies can play a role of a catalyst in these processes.

Considering that digitalisation of the energy system in general and for the purposes of the improving of energy performance of buildings has been started in the recent years, the EU legal framework in this sphere is just in the process of development. The legal regulation of digitalisation in the energy sector started from the fragmentary regulation for the purposes of the special legal acts of the EU energy legislation (e.g., Electricity, Gas, Energy Efficiency, Renewable Energy, and Energy Performance of Buildings Directive) and continues based on intersectoral approach (e.g., action plan on *Digitalising the energy sector*).

Digital tools in the field of energy performance of buildings are in the focus of the EPBD Recast 2024, which follows the approach stipulated by the current EU Electricity, Gas, and Energy Efficiency Directives. The key issues of digitalisation of the energy sector are development and deployment of the smart energy solutions (e.g., smart metering systems), cybersecurity, data privacy,

and consumer empowerment and protection. Consumer-centric approach is one of the key principles of the current EU energy legislation, including EPBD Recast 2024.

Public authorities of the EU Member States participate in the relations in the sphere of energy performance of buildings in two statuses: as subjects that perform regulatory and administrative functions and as addresses of such decisions (public authorities that own or occupy buildings should play an exemplary role as regards energy performance of buildings).

Public authorities shall encourage the use of digital technologies for analysis and management of buildings, including with regard to deep renovations, ensure direct access to building systems' data by interested parties, facilitate the full interoperability of services and of the data exchange within the Union, encourage the use of the smart readiness indicator for large buildings with a high energy demand and consider the possibility of its use for other buildings, encourage the consideration of the digital building twin, where available, in particular for the smart readiness indicator, encourage the cyber security issues and the protection of vulnerable categories of energy consumers, set up a national database for the energy performance of buildings.

Public authorities shall also encourage a fruitful cooperation of all experts involved in the digitalisation in buildings' sector, regular training of experts in digitalisation in buildings, improvement of skills of energy consumers relevant to energy efficiency and digitalisation, development of skills and exchange of the best practices among public authorities (national, regional and local), and further research and development of smart technologies.

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Yuliia Vashchenko

Zwiększanie efektywności energetycznej budynków w UE w erze cyfryzacji: wyzwania prawne i rozwiązania dla organów krajowych państw członkowskich UE

Streszczenie

Zgodnie z dyrektywą Parlamentu Europejskiego i Rady (UE) 2024/1275 w sprawie charakterystyki energetycznej budynków (EPBD Recast 2024) budynki odpowiadają za ok. 40% końcowego zużycia energii oraz za 36% emisji gazów cieplarnianych związanych z energią w Unii Europejskiej. Cyfryzacja sektora energetycznego stanowi jeden z kluczowych kierunków polityki energetycznej UE, gdyż może w istotny sposób przyczynić się do poprawy charakterystyki energetycznej budynków. Narzędzia cyfrowe umożliwią optymalizację gromadzenia danych dotyczących zużycia energii, ich analizy i zarządzania nimi. Inteligentne systemy pomiarowe (*smart metering*) zapewnią odbiorcom energii precyzyjniejsze dane, co z kolei będzie sprzyjać ograniczaniu zużycia energii oraz wdrażaniu środków poprawy efektywności energetycznej w budynkach.

Zagadnienia związane z cyfryzacją zostały wyraźnie uwzględnione w dyrektywie EPBD Recast 2024. Celem niniejszego artykułu jest analiza problemów prawnych oraz opracowanie potencjalnych rozwiązań wspierających cyfryzację w sektorze budynków w Unii Europejskiej przez organy publiczne państw członkowskich w świetle wymogów, jakie wynikają z dyrektywy EPBD Recast 2024.

Słowa kluczowe: cyfryzacja, charakterystyka energetyczna budynków, inteligentne opomiarowanie, efektywność energetyczna, zmiana klimatu

Юлия Ващенко

Повышение энергоэффективности зданий в ЕС в цифровую эпоху: правовые проблемы и решения для национальных органов власти в государствах-членах ЕС

Резюме

Согласно Директиве (ЕС) 2024/1275 Европейского парламента и Совета об энергетической эффективности зданий (EPBD Recast 2024), в Европейском Союзе на здания приходится приблизительно 40% конечного потребления энергии и 36% выбросов парниковых газов, связанных с энергетикой. Цифровизация энергетического сектора – одно из ключевых направлений энергетической политики ЕС, поскольку она может внести значительный вклад в повышение энергетической эффективности зданий. Цифровые инструменты позволяют оптимизировать сбор, анализ и управление данными о потреблении энергии. Системы интеллектуального учета (*smart metering*) предоставят потребителям энергии более точные данные, что, в свою очередь, будет способствовать сокращению потребления энергии и внедрению мер по повышению энергоэффективности зданий.

Вопросы, связанные с цифровизацией, были рассмотрены в Директиве EPBD Recast 2024. Цель данной статьи – проанализировать правовые вопросы и разработать возможные решения для поддержки цифровизации в строительном секторе Европейского союза государственными органами государств-членов в свете требований, вытекающих из пересмотренной Директивы EPBD Recast 2024.

Ключевые слова: цифровизация, энергетическая эффективность зданий, интеллектуальный учет, энергоэффективность, изменение климата

Yuliia Vashchenko

Migliorare l’efficienza energetica degli edifici nell’UE nell’era della digitalizzazione: sfide giuridiche e soluzioni per le autorità nazionali degli Stati membri dell’UE

Sommario

Ai sensi della direttiva (UE) 2024/1275 del Parlamento europeo e del Consiglio relativa alla prestazione energetica degli edifici (EPBD Recast 2024), gli edifici sono responsabili di circa il 40% del consumo finale di energia e del 36% delle emissioni di gas a effetto serra legate all’energia nell’Unione europea. La digitalizzazione del settore energetico rappresenta uno degli assi portanti della politica energetica dell’UE, in quanto può contribuire in modo significativo al miglioramento della prestazione energetica degli edifici. Gli strumenti digitali consentiranno di ottimizzare la raccolta, l’analisi e la gestione dei dati relativi al consumo energetico. I sistemi di misurazione intelligenti (smart metering) forniranno ai consumatori di energia dati più precisi, il che a sua volta favorirà la riduzione del consumo energetico e l’attuazione di misure volte a migliorare l’efficienza energetica negli edifici.

Le questioni relative alla digitalizzazione sono state chiaramente incluse nella direttiva EPBD Recast 2024. Lo scopo del presente articolo è analizzare le questioni giuridiche ed elaborare potenziali soluzioni a sostegno della digitalizzazione nel settore degli edifici nell’Unione Europea da parte delle autorità pubbliche degli Stati membri alla luce dei requisiti derivanti dalla direttiva EPBD Recast 2024.

Parole chiave: digitalizzazione, prestazione energetica degli edifici, misurazione intelligente, efficienza energetica, cambiamento climatico