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Opinion of the European Economic and Social Committee

Energy digitalisation: balancing opportunities and risks for European consumers

(own-initiative opinion)

(C/2024/6020)

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1. Conclusions and recommendations

1.1. Digital tools present tremendous opportunities, particularly for facilitating production, demand-side flexibility (DSF), and the decarbonisation of the energy sector. However, they run the risk of making already highly complex energy markets even more complex to operate and understand for small energy consumers, such as households and micro- and small businesses. Energy should remain affordable, adjustable and easy to use. Consumers should still be able to choose prices, contracts, and customer services in a 'pre-digital' way.

1.2. User data cybersecurity must be a priority. Digitalisation amplifies the need to create dynamic consumer protection regulations adapted to the novel contexts and participants in the sector – who may not necessarily be the 'conventional' players in the energy sector or maintain direct contact with consumers.

1.3. The digitalisation of energy systems must not be achieved at the expense of the most fragile elements in our societies, particularly those already suffering from energy poverty or the digital divide. On the contrary, it is critical to ensure accountability safeguards among the various stakeholders and to level the playing field. Local players and authorities play a key role in bridging the digital divide.

1.4. While artificial intelligence (AI) and distributed ledger technologies tools can support the work of regulators, alternative dispute resolution (ADR) bodies and consumer organisations by identifying patterns and shortcomings in consumer rights implementation and enforcement, these tools are not foolproof. Consumers should always be entitled to human oversight, to check and monitor the practices of energy and digital players.

1.5. For consumers to truly benefit from demand-side management, they need to install communicating equipment and infrastructure such as smart meters and connected household appliances, which need to be affordable to buy and use, sustainable, and designed with the users' interests at the core. The EESC recommends taking a balanced approach focused on inclusive and accessible design, and supplementing the provision of more advanced and apparently more expensive digital tools with measures to improve households' 'fluency' in energy efficiency.

1.6. Training should be provided for workers, including through Net-Zero Academies, which should become operational as soon as possible and be promoted to all interested parties, with an emphasis on energy efficiency skills.

1.7. As the representative of the EU's organised civil society, the EESC should be invited to join working groups and roundtables on the governance of the aforementioned smart energy systems. In particular, the EESC urges the Commission to step up efforts in launching the EU Smart Energy Expert Group.

2. **Background**

2.1. In a communication published in 2022 ([1]), the European Commission outlined the existing situation in the energy sector and proposed ways of putting household consumers 'front and centre' in energy system digitalisation. The Committee issued the corresponding opinion in 2023 ([2]).

2.2. The communication provided some clues regarding what direction should be taken to protect the rights of consumers at the nexus of energy and digital. General EU consumer protection regulation plays a key role here; however, a digitalised energy sector raises additional issues: adding a digital dimension means adding complexity, and the tools developed for 'analogue' times may not be for fit for purpose ([3]) in digital times. The EU legal framework protects the rights of consumers, but 'implementation is slow', according to the communication.

2.3. Regarding consumer protection, the European Commission has taken some steps in the right direction, for example adopting an implementing act to improve access to metering and consumption data in 2023 ([4]). It remains to be seen how successful such EU-level initiatives are and how deeply entrenched the inertia of the 'traditional' energy sector will prove to be. New business opportunities are arising, but to cope with the necessary pace of change, the development of skills is key: Europe first needs a skilled workforce to roll out digital devices. It is also vital to provide comprehensive information and to educate consumers at household and small business level on how to make the best use of all the opportunities digitalisation offers. It is important to acknowledge that energy is a highly complex sector that can be difficult to understand even for consumers with a certain level of specialist knowledge.

2.4. Multiple studies and policy papers have been published providing insights on how to protect and empower consumers with the aid of digitalisation. The concepts proposed and keywords used in such studies have referred to data protection and empowerment of consumers, smart grids and meters, energy sharing and peer-to-peer trading, demand response, smart cities and smart buildings, smart charging etc. It is widely accepted that the opportunities outweigh the risks.

2.5. The EESC aims to contribute to the ongoing debate by focusing on how societal actions in digital and energy systems could produce a more inclusive future, where everyone feels secure, and where households reap the benefits of novel technologies. Digitalisation on the consumer (demand) side is becoming ever more important in light of the green transition, as it enables consumers to better understand their impact on the energy transition, and to actively participate in it: they can benefit from the dynamics of energy markets, improve energy efficiency, use renewable energy, and implement energy sufficiency practices.

3. **Turning strengths into opportunities**

3.1. In the rapidly evolving landscape of the European energy sector, digitalisation is emerging as a double-edged sword. On the one hand, it promises unprecedented efficiency, consumer empowerment, and a pathway to a sustainable energy future. Advanced smart grids, real-time energy consumption data (leading to wider adoption of DSF at household level), and AI-driven energy management systems can dramatically transform consumer interactions with modern energy systems, forecast their energy needs, and finetune energy usage. At the moment, their roll out is stalling in many Member States, preventing adequate responses to energy poverty and a smooth integration of prosumers and energy communities in the grid.

([1]) COM(2022) 552 final.

([2]) Opinion of the European Economic and Social Committee on the Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on Digitalising the energy system — EU Action Plan (OJ C 184, 25.5.2023, p. 93).

([3]) Digital fairness – fitness check on EU consumer law.

([4]) Commission adopts new implementing act to improve access to metering and consumption data.

3.2. These innovations have the potential to democratise energy access, reduce costs, and contribute significantly to the European Green Deal's objectives. EU citizens and businesses are well placed to explore and adopt new technologies that are already available; in the global context, our continent is relatively advanced in terms of digital connectivity, access to grids and general level of household awareness.

3.3. Also on the benefit side, digitalisation may not only improve the penetration of renewable energy sources and grid resilience, but also lead to economic gains for consumers, increase social cohesion and reduce energy poverty. Overall, digitalisation enhances integration and interaction among various stakeholders, which allows consumers to gain greater access to and benefits from local and renewable energy resources.

3.4. Smart grids and digitalisation play a crucial role in decarbonising energy. They enable more efficient management of energy resources, facilitate the integration of renewable energy, and optimise consumption, in particular through real-time data analytics and automation. Smart grids can enhance grid stability and reliability by automatically responding to system changes. They represent a tremendous tool for beefing up infrastructure to overcome a number of challenges linked to energy access, energy poverty and climate change ([5]). Over time, digital tools can reduce operational and energy costs by improving system efficiency and reducing peak demand pressures.

3.5. Digitalisation, particularly through AI automation, the Internet of Things (IoT, including Collaborative IoT) and data analysis, makes it possible to monitor energy production and consumption in real time, which is essential for balancing supply and demand without resorting to energy sources with a high carbon footprint. Digital tools can improve the resilience of energy systems against physical and cyber disruptions by enabling rapid response capabilities. While digital transformation is behind innovative business models and services in the energy sector, such as aggregators, one should not forget that energy is an essential service and access to it must remain a public right.

3.6. Digital tools can provide consumers with detailed energy usage data, empowering them to make informed decisions about their consumption patterns. Digitalisation also plays a role in the relationship between consumers and utilities (distribution system operators (DSOs), suppliers, and aggregators), for instance in the signing of contracts and the provision of customer services.

3.7. Digital tools can also support decision-making in drafting more user-centered policies, especially energy poverty action plans. Communication and data sharing protocols on energy consumption between DSOs/ suppliers and authorities must be set up to support the identification of vulnerable consumers, and therefore targeted energy support, especially for those in hidden energy poverty.

3.8. Through digital tools and smart technologies, DSF could reduce EU households' electricity consumption by more than EUR 71 billion per year by 2030 ([6]). By designing inclusive DSF measures we can unlock multiple direct benefits for vulnerable populations. These measures should be easy and stress-free to participate in, should maintain comfort and well-being, and should be integrated with price protection and social support measures. The key to successful DSF implementation lies in its ability to empower consumers, reduce energy costs, and contribute to the overall efficiency and sustainability of the energy system.

3.9. Some sophisticated digital devices, instead of boosting consumer engagement, may 'scare off' consumers as they may contain too many options that are not essential. The proliferation of such tools, and the high costs of buying and using such devices, may lead to mistrust. The EESC recommends taking a balanced approach focused on inclusive and accessible design, and supplementing the provision of more advanced and apparently more expensive digital tools with measures to improve households' 'fluency' in energy efficiency. The Committee also suggests installing a procedure of audit checks to ensure the above principle is respected.

3.10. The European Parliament's resolution on distributed ledger technologies and blockchains (P8_TA(2018)0373) highlights their potential to empower citizens by promoting data control, reducing transaction costs, and enhancing transparency ([7]). Replacing fragile centralised databases with distributed ledger technology (DLT) could give consumers more trust that the data will not be altered. This applies to any type of data we consider important that reflects consumer behaviour and contractual or extra-contractual obligations, such as data on energy production, consumption, related services etc.

([5]) https://www2.deloitte.com/xe/en/pages/energy-and-resources/articles/distribution-grid-investment-to-power-energy-transition.html.
([6]) https://smarten.eu/wp-content/uploads/2022/09/SmartEN-DSF-benefits-2030-Report_DIGITAL.pdf.
([7]) https://www.europarl.europa.eu/doceo/document/TA-8-2018-0373_EN.pdf.

3.11. DLT looks particularly promising in the context of energy sharing and energy communities, and its usefulness for peer-to-peer trading is obvious. Best practices in governance transparency and the efficient use of DLT in energy should be promoted among academia, technology providers and consumer groups, using knowledge exchange platforms and expert groups.

4. **Fixing systemic weaknesses and managing threats**

4.1. On the other hand, digitalisation also presents palpable risks. Data ownership, sovereignty, governance and privacy concerns, safety, security and potential cyber-attacks on energy infrastructure, loopholes, lack of enforcement, and the digital divide that might leave vulnerable populations behind, are all issues that have to be mitigated.

4.2. Digitalisation is complex and expensive. Implementing digital technologies often requires significant upfront investment in infrastructure and training. Digital systems add complexity to energy management, potentially leading to new points of failure.

4.3. Energy infrastructure is considered high risk under the AI Act, as explicitly detailed in Annex III to the Act. Over-reliance on digital technologies can make energy systems vulnerable to failures in digital infrastructure. Digital infrastructure itself consumes energy, which could offset some of the efficiency gains.

4.4. Challenges presented by the advent of quantum computing puts energy system integrity at even higher risk ([8]). We continue to trust that grid operators and large energy producers are aware of what that means for them, and that they possess top-notch skills that will enable them to tackle the 'quantum challenge'. However, the use of this new powerful technology by malicious actors could also expose consumers at an individual consumption unit level.

4.5. Digital tools remain widely inaccessible to many, despite being among the core features of recent EU energy policies. This raises an important question: does it make sense to digitalise when you do not have enough affordable energy to start with? Energy-poor households tend to have more limited access to modern energy technologies, including advanced digital solutions, due to lack of knowledge and/or skills, limited investment capacity, and low business interest in providing specific solutions for such households. Energy policies should focus on making these technologies available to and accepted by energy poor households, as they hold the premises for lowering the energy bill.

4.6. To mitigate the digital divide, industry-led action is required: it is in the interests of providers to make sure that consumers can adapt seamlessly to changing internal processes and new services; however, this is only possible if consumers understand the benefits of digitalised interaction. The best way forward is to make it simple and easy: further overcomplicating services will backfire, as consumers will become more risk averse in adopting any novel technologies.

4.7. Therefore, the EESC stresses the need to ensure fairness and inclusivity by design. In light of the digital divide, the EESC calls for action to make digital energy solutions and platforms accessible and inclusive for all consumers, including vulnerable populations. This entails developing user-friendly digital tools that accommodate diverse needs and promote equal access to digital energy services. In 2022, only one in ten individuals in the EU used internet-connected thermostats, utility meters, lights or plug-ins or other internet-connected solutions for energy management in their home ([9]). The gap among EU countries was huge: from two-thirds in the Netherlands, to an almost complete absence of any use of internet-connected home energy management solutions in Romania and Bulgaria.

4.8. While beneficial in general for the functioning of energy markets, DSF is a risky product in itself, as application of flexibility services at household level involves consumers signing up for a market-related floating tariff, which might lead to price volatility being transferred to the household. As the consumer has little or no negotiating power in such circumstances, this makes them vulnerable to price shocks and other adverse market conditions. The EESC notes that it is necessary to have fallback mechanisms in place, in case a 'once in a lifetime' shock happens with disastrous effects on consumers' bills.

([8]) https://www.smart-energy.com/industry-sectors/cybersecurity/preparing-the-power-grid-for-future-quantum-cyberattacks/.
([9]) Eurostat, https://doi.org/10.2908/ISOC_IIOT_USE.

4.9. The EESC maintains a view that direct grants and subsidies have a role in supporting the adoption of digital technologies and digital infrastructure, at least in the early adoption phase. The countries on the furthest end of the digital adoption chart should receive targeted support to speed up adoption of internet-connected solutions for energy management and the necessary infrastructure, while market players in these countries should be scrutinised more in order to ensure they comply with EU and national digitalisation obligations.

4.10. It is well known that introducing new technologies and digital solutions may help achieve significant energy savings and provide scope for energy efficiency; however, initial savings can also lead to a rebound in consumption ([10]). The EESC maintains the view that such effects can be minimised with measures aimed at developing consumers' 'fluency' in energy matters as well as smart gamification, with an emphasis on energy sufficiency.

4.11. The energy sector should lead by example and implement strict data privacy regulations to protect consumer information and build public trust. Making technology available for diverse groups and the most marginalised should be a priority. Regulatory sandboxes could be (re)designed to direct the actions of actors using them, making a 'vulnerability test' a must in order to maximise the benefits of the relaxed regulatory regime. For example, when developing a 'smart' home appliance or device, the first concern is whether it is able to withstand a malicious cyberattack in a 'crash test'. However, in parallel, such devices must have user-intuitive interfaces and designs to ensure that, in the worst case, even the least knowledgeable users are still in a position to take necessary action and avoid the worst outcomes.

4.12. To address potential ethical concerns arising from the use of AI and big data in the energy sector, the EESC calls for the implementation of stringent sector-specific frameworks. These should emphasise the ethical governance of AI and big data, ensuring these technologies are utilised in ways that respect fundamental human values and consumer rights – as planned in the AI Act.

4.13. DLT is still on its way to achieving its broader potential in everyday practical implementations. Recognising the importance of DLT to securing energy data and transactions, and thus fostering transparency and trust, the EESC cautiously supports its increased use in digital energy transaction applications. Strong regulatory oversight and safeguards are needed.

4.14. Digital and energy divides are often preceded by entrenched intergenerational poverty and inequality of opportunity. In deploying financial tools to mitigate this challenge, just transition principles should be adhered to. At the heart of the just digital transition is the need to provide support for those sectors and workers negatively affected by disruptions due to digitalisation. Such support, in the form of retraining programmes and financial assistance, needs to target the most vulnerable first; it should not create new imbalances. Net-Zero Academies ([11]) are expected to train 100 000 learners each within three years of establishment; energy sector digitalisation, with its clear benefits for energy efficiency, is one of the areas these yet-to-materialise academies must focus on.

4.15. The impact of this 'energy digitalisation divide' might be even broader than would naturally be expected. Consumers left on the margins of energy digitalisation may not be able to take advantage of the new opportunities and participate effectively in the energy transition process. The emerging divide between 'advanced consumers'/prosumers and 'traditional consumers' may mean that vulnerable consumers will bear a relatively higher share of the costs of the energy system. In this case, the energy transition would be unjust and regressive in nature. A wide range of measures is needed to ensure appropriate consumer inclusion, such as inclusive design and affordability measures, because digitalisation is not an end in itself.

4.16. While AI tools can support the work of regulators, ADR bodies and consumer organisations by identifying patterns and shortcomings in consumer rights implementation and enforcement, these tools are not foolproof. Consumers should always be entitled to human oversight, to check and monitor the practices of energy and digital players.

4.17. The EESC also calls for the EU to take a leadership role in the development of international digital energy consumer standards. Turning threats into opportunities on a global scale means taking a close look at other regions for best practices and adapting them locally, while also promoting them further internationally. EU-led efforts to achieve the highest consumer protection standards should focus on fostering global collaboration to create a unified approach to digital consumer rights and obligations.

([10]) https://www.sciencedirect.com/science/article/pii/S2214629620302334.
([11]) The Net-Zero Industry Act: Accelerating the transition to climate neutrality.

4.18. To achieve this goal, it is crucial to collaborate with key global partners such as the International Energy Agency (IEA), the International Electrotechnical Commission (IEC), and the Global Smart Energy Federation (GSEF). These organisations can provide valuable insights and support, ensuring that the standards are comprehensive and inclusive, and effectively address the needs of digital energy consumers worldwide. Through such cooperation, the EU can spearhead efforts to harmonise regulations, enhance consumer protection, and promote sustainable energy practices on a global scale.

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