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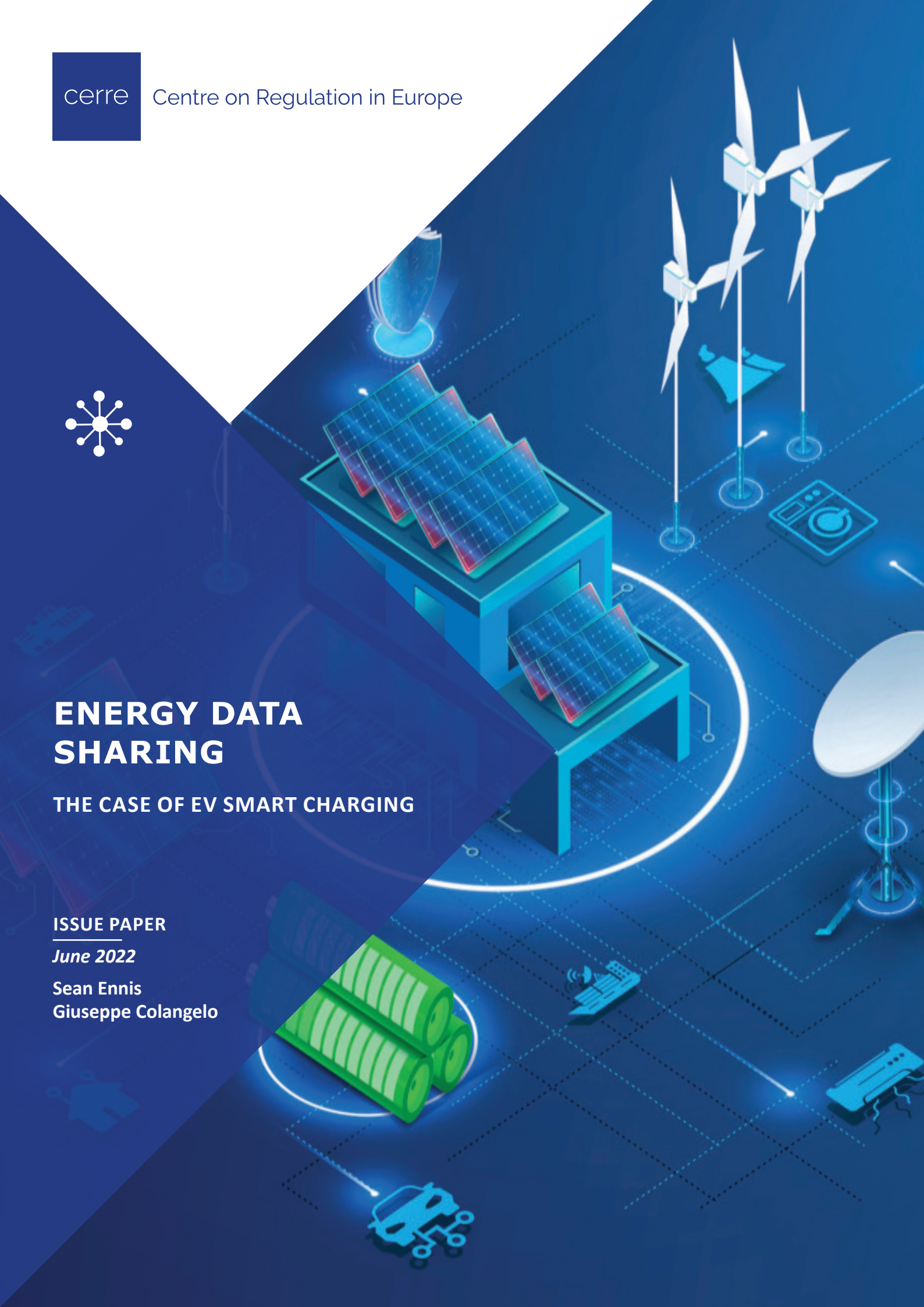

ENERGY DATA SHARING

THE CASE OF EV SMART CHARGING

ISSUE PAPER

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ABOUT CERRE

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1. INTRODUCTION

The green and digital transitions are concomitantly underway. There is potential for them to yield synergies with each other, as Europe moves towards a smart, integrated and cleaner energy system. Such a revised system could be based on variable and more distributed generation and greater electrification. Digital technology can provide system optimisation and substantial operational/network infrastructure efficiency, support energy system integration, and help optimising the use of the existing grid capacity.

Electricity networks already include substantial dynamic updating and data movement for the purpose of engaging in transactional decisions over energy production, supply and, sometimes, usage. But the small customer retail interface has remained relatively passive, as has the retail customer usage responsiveness to price, even with the introduction of small-scale "distributed" generation (such as home-based photovoltaic (PV) cells) and "smart" meters that, in many implementations, have actually been relatively dumb[1].

In its upcoming Action Plan on Digitalisation of Energy, the European Commission aims to outline how EU policies and funding instruments can exploit the benefits of digital solutions in the energy sector while minimising their risks and environmental footprint[2]. It will focus on five areas:

- Developing a European data-sharing infrastructure and a common European energy data space (compatible with other data spaces) to foster the development of an interoperability framework. This is to create a competitive market for energy services that supports planning and monitoring of energy infrastructure as well as demand-side flexibility;
- Empowering European citizens with tools for participation in energy markets as well as data-driven services and re/upskilling initiatives. It will seek to learn and promote best practices from research and innovation projects that developed new tools that make it easy for citizens to grant access to their data and become active players in the transition;
- Driving the general uptake of digital tech in energy by fostering research, innovation and supporting the scaling up of successful pilots (including for energy communities);
- Improving the cybersecurity of the sector with a mix of legacy tech with smart tech, in alignment with the overarching cybersecurity framework, specifically the revised Directive on Security of Network and Information Systems (NIS2) and the planned Network Code on cybersecurity of crossborder electricity flows (NCCS);
- Supporting the development and uptake of climate-neutral solutions for ICT. This is to complement the European Digital Strategy[3] and promote cooperation between the energy and digital sectors.

1 The UK's SMETS1 rollout could be cited as an example.
2 European Commission, 'Roadmap to the Action Plan on the Digitalisation of the Energy Sector', 2021. https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/13141-Digitalising-the-energy-sector-EU-action-plan_en
3 European Commission, 'European Commission Digital Strategy' C(2018) 7118 final, 21 November, 2018.

2. ENERGY DATA SHARING: THE CASE OF EV SMART CHARGING

The European Commission aims to develop a digital-driven "European energy data space" to allow for and support data sharing and system integration between the energy sector and other sectors, e.g. mobility. The sharing of such data, along with the general uptake of digital tools, will be critical in empowering EU citizens and giving them a more active role in the energy transition and system.

The Commission has recently unveiled the **EU Data Act**[4], which contains some high-level principles on data sharing across sectors, supplementing the Data Governance Regulation[5]. At the same time, stakeholders such as consumer organisation BEUC[6], have been calling the Commission to go further and propose sector-specific rules for access to in-vehicle data. and the Commission is reportedly planning to propose such sector-specific legislation in Q4 2022.

With respect to data and energy, other EU legislative proposals will also have relevance, including the **Network and Information Security Directive** (NIS2)[7] and elements of the **Fit for 55** package[8] such as the **Alternative Fuels Infrastructure Regulation** (AFIR, repealing a previous Directive)[9], and the revised **Energy Performance of Buildings Directive** (EPBD)[10] and **Renewable Energy Directive** (REDII)[11].

In this context, it is critical to identify the business case to encourage industry players and customers to share their data, as well as the key governance principles for the sharing of such data. Following a bottom-up approach, industry players and national regulators have a key role to play in laying out the bases of this framework.

CERRE is beginning its work at the intersection of data and energy with a mapping focused on smart charging points, whose successful rollout is critical for the EU's energy transition. They will not only help with the electrification of mobility but also with providing flexibility on when electricity is demanded for charging, and based on vehicle batteries' potential to store energy at times of particularly high production and contribute back to the network at times of scarcity.

4 European Commission, 'Proposal for a Regulation on harmonised rules on fair access to and use of data (Data Act)', COM (2022) 68 final.
5 Regulation (EU) 2022/868 on European data governance (Data Governance Act) [2022] OJ L 152/1.
6 The acronym stands for Bureau Européen des Unions de Consommateurs.
7 Proposal for a Directive on measures for a high common level of cybersecurity across the Union, repealing Directive (EU) 2016/1148, COM(2020) 823 final. In May 2022, the Council and the European Parliament reached an agreement on the final version of the Directive (https://www.consilium.europa.eu/en/press/press-releases/2022/05/13/renforcer-la-cybersecurite-et-la-resilience-a-l-echelle-de-l-ue-accord-provisoire-du-conseil-et-du-parlement-europeen/?utm_source=dsms-auto&utm_medium=email&utm_campaign=Strengthening+EU-wide+cybersecurity+and+resilience+%u2013+provisional+agreement+by+the+Council+and+the+European+Parliament).
8 European Commission, 'European Green Deal: Commission proposes transformation of EU economy and society to meet climate ambitions', (2021) https://ec.europa.eu/commission/presscorner/detail/en/IP_21_3541
9 Proposal for a Regulation on the deployment of alternative fuels infrastructure, and repealing Directive 2014/94/EU, COM(2021) 559 final.
10 Proposal for a Directive on the energy performance of buildings (recast), COM(2021) 802 final.
11 Proposal for a Directive 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, COM(2021) 557 final.

The European Commission is currently suggesting a number of regulatory options to support the rollout of charging points, but the data sharing aspect of the issue remains largely unaddressed and unexplored.

In this context, CERRE has started a research initiative which will present guiding principles and recommendations to the European Commission and other relevant stakeholders related to energy data sharing and smart charging. CERRE's contribution aims to feed into the discussions linked to the Action Plan on Digitalisation of Energy and sectoral initiatives following on from the Data Governance Regulation and the Data Act.

Key research questions to be addressed are:

- What property rights are included within the smart charging data?
- What is the business case for industry players and customers to share their data?
- What should be the overarching principles governing a European energy data space?
- What government interventions or data standards are required to make specific use cases successful for achieving green transition goals?

By the end of the project, considering existing literature, interactions with stakeholders and cross-sectoral input, an assessment will be made and policy recommendations will be drawn and shared in a CERRE report.

3. SMART CHARGING AND ITS DATA NEEDS

As the rollout of charging infrastructure for battery-powered vehicles expands, with an expected rapid increase in this rollout in the years ahead to meet the ambitious transport energy rebalancing promised by 2035 in Europe, the possibility arises of adding unidirectional and bidirectional smart charging[12]. These expansion possibilities are not simply theoretical, as, in 2021, 17% of car sales were electric vehicles (EVs). A number of demonstration projects have been undertaken. In **unidirectional smart charging**, the EV extracts electricity from the network at rates and times that are coordinated via the use of digital planning in "communication" between the battery charger and energy providers. This data-governed transaction would include information on the battery (including state of charge, power setpoint and capacity), the user needs (including priority of charging compared to ability to wait, pricing for different times of download and potentially dynamic battery charging depending on exact network balancing needs and prices as they evolve over time), charging location and cost structure of the charging point. If 50 million EVs are on the road within a decade, that could represent 3,500 GWh of storage capacity[13]. This is between 2 to 3 times the size of all the hydraulic storage capacities in Europe[14].

Given that typical vehicles are parked 95% of the time, **bidirectional smart charging** would add an important further element to the system, by allowing the battery to feed energy into the system as a distributed producer. That is, a battery can be treated as a source of energy to the system, even if much lower in output than an electricity plant. Regulators are increasingly recognising the value of bidirectional charging for energy systems, with the French transmission system operator RTE having certified bidirectional charging as a mature technology that can be used on the grid[15]. Specifically, EV batteries can play into the electricity network as devices that are able to charge at times of high supply capacity and low-cost production, including when renewable energy sources (RES) would otherwise be curtailed due to lack of demand, and then cease their charging to meet system balancing needs and ultimately also to contribute energy to the network at times of production scarcity and high price production. EV batteries can perform arbitrage, and yield their owners, operators or intermediaries an arbitrage profit that could help to lower the effective cost of car batteries[16].

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[12] See European Commission, 'Best practices and assessment of regulatory measures for cost-efficient integration of electric vehicles into the electricity grid', (2022) https://op.europa.eu/en/publication-detail/-/publication/d877544f-8a23-11ec-8c40-01aa75ed71a1/language-en

[13] See Jean-Philippe Laurent, 'Towards the mass adoption of smart and bidirectional charging, the key contribution of the "Fit for 55" package', (2022) Euractiv, https://www.euractiv.com/section/transport/opinion/towards-the-mass-adoption-of-smart-and-bidirectional-charging-the-key-contribution-of-the-fit-for-55-package/

14 Hydraulic storage is currently the only competitive way to "store" electricity and, like batteries, can be turned on instantly, whether for storage or generation (see Laurent, supra note 13).

15 https://assets.rte-france.com/prod/public/2022-02/CP_vehicules%20electriques_RTE_Dreev_V2G.pdf

[16] See Stephan Meisel and Tanja Merfeld, 'Economic incentives for the adoption of electric vehicles: A classification and review of e-vehicle services', 65 Transportation Research Part D 264 (2018), for characterisation of different economic uses of demand supply from EV batteries which can also serve as one of the considerations in lowering the cost of vehicles and increasing their rollout.

The introduction of unidirectional and bidirectional smart charging can deliver more efficiency. It may also require infrastructure system upgrades at the point of charging as well as, potentially, beyond the charging station to handle increased local variability in demand and supply, though this may vary by country[17]. These costs are not taken directly into account in the costs of charging stations but will need to be borne and shared out across system users[18]. Part of the communication cost of bidirectional smart charging may be borne outside the direct relationship between the electricity supplier, electricity buyer and battery "manager". The willingness to enter into contracts and manage the relationship will influence the types of contracts that are possible[19].

Transactions involving either unidirectional or bi-directional smart charging can potentially result in different "sellers" of electricity operating over the same infrastructure, along with different "buyers" while such a distributed development would create system management challenges when total volumes become large relative to the local load. With respect to charging EVs, the buyers can be both car batteries or aggregators who buy from car batteries (or who reduce their consumption on demand of system operators). At different times of day, the buyers could become sellers. One can imagine that apps over smartphones or car-based wireless would generate the orders to the system for smart bidirectional charging, depending on system conditions and prices for various aspects of the system, including the charging station. This requires secure communications to cars from distant controllers, and secure connections between charging stations and vehicles for the movement and monitoring of electricity "download" and "upload".

The parties involved in transactions can potentially include electricity distributors, electricity retailers, car users, car owners (in case of rental cars), car manufacturers, battery manufacturers, battery charging station owners from both the private and public sphere, telecom networks, data networks on top of wireless or wireline networks, app owners and others. This list illustrates the variety of potential market participants. The types of contracts that will eventually evolve in the market will likely depend on who is best placed to supply electricity, buy electricity and arbitrage electricity. The extent of data sharing and interoperability of data networks with each other is likely to impact the ultimate efficiency of the system[20].

The economic use case for batteries could depend further on the number of **optimum charging cycles** for batteries, which typically have a limited number of cycles of recharging before they must be

[17] While some infrastructure improvement is required under the Energy Performance of Buildings Directive, it contains no smart charging requirement. See Andrea Mangipinto, Francesco Lombardi, Francesco Davide Sanvito, Matija Pavičević, Sylvain Quoilin, and Emanuela Colombo, 'Impact of mass-scale deployment of electric vehicles and benefits of smart charging across all European countries', 312 Applied Energy 118676 (2022). The French RTE, the NSO, and Enedys, the DSO, for example, have determined that France's network will remain stable even with large scale smart charging.

[18] ENTSOE, 'Electric Vehicle Integration into Power Grid' (2021) https://www.entsoe.eu/2021/04/02/electric-vehicle-integration-into-power-grids

[19] See Bing Haung, Aart Gerard Meijssen, Jan Anne Annema, and Zofia Lukszo, 'Are electric vehicle drivers willing to participate in vehicle-to-grid contracts? A context-dependent stated choice experiment', 156 Energy Policy 112410 (2021).

[20] For a discussion of initial points on how smart charging factors may integrate with data concerns, see EV Energy Taskforce, 'Data Accessibility and Privacy', (2021) https://evenergytaskforce.com/reports/phase-two-working-group-4/; Id., 'Engaging EV Users in Smart Charging and Energy Services', (2021) https://evenergytaskforce.com/reports/phase-two-working-group-2/; Id., 'Cyber Security and Smart Charging', (2021) https://evenergytaskforce.com/reports/phase-two-working-group-3/; and Id., 'Accessible Data for Decision Making', (2020) https://evenergytaskforce.com/reports/work-package-four/.

replaced. With current battery installations, the battery life will typically be longer than the transport use case for the batteries, so that many cycles can be given over to smart charging without sacrificing the core transport value of the battery. If the number of charging cycles designed into batteries falls substantially in the future, given the large cost of new batteries, increasing the number of cycles used for delivering energy into the network would require that the margin from charging at low-cost moments and providing energy to the network at high-cost moments must, for the battery operator, exceed any efficiency loss from storage and any reduced effective battery lifetime from each cycle of charging and emptying of a battery. This point is more related to future designs than current ones that, with a lifetime of 1000 cycles, are unlikely to decrease their transport effective life as a result of the use of bi-directional smart charging.

Yet **lack of interoperability**, from differing standards, limits user choice about where to charge and how to pay and prevents users from benefitting from the diversity of smart charging services available in the market. If car charging stations are, like petrol stations, the unique deciders of the charging that happens over their infrastructure, this will create a limited regime for charging while ensuring high incentives for construction and may create localised market power that results in less return on the EV investment. On the other hand, if car charging stations are organised more like ATMs, with multiple suppliers and user combinations able to access the infrastructure, potentially at a price, the profits from constructing the charging stations might be lower, so investment incentives would be lower, but opportunities for arbitrage by battery owners might be increased, and give them more incentives to invest in EV. A widescale charging network in Europe will have chargers at homes, on-street parking, at workplaces and along roads.

Given the complex and varied interests of involved parties, the models that govern the system will likely differ from one country to another and evolve over time in varied responses to reflect differing incentives of different players. Flexibility in ultimate modes of operation is thus crucial to build into the system during its early growth. Criteria for successful use of information will include ensuring that:

- Information provided in one format can be read by all other users eligible to access the data;
- Energy sources that are viable are given an incentive to produce as long as storage is expected to be profitable;
- Profitable storage is incentivised to occur including for batteries to be purchased;
- Battery charging stations earn a sufficient return to also be incentivised to build out in line with expected future demand; and
- Energy from a battery can potentially be used at home, used in a building or used in the grid.

The opportunity of rolling out smart charging is high. Grid stability seems high in many countries and resistant to large-scale battery charging, with the time variable part of smart charging being quite

important to guarantee this result across countries[21]. To provide the right incentives for rollout, innovation at the grid level, charging station level, battery level and customer level must all interact to complement each other and align interests, otherwise, socially desirable innovations will not be made[22]. Nonetheless, conflicts of interest will remain with different types of entity seeking to maintain suitable return on investment along with access to the new profit streams.

21 One study suggests that uncontrolled charging by a fleet of EV cars that is of substantial size (e.g., 50% of the fleet) could lead to grid instability and voltage variation. See H. Li and X. Bai, 'Impacts of electric vehicle charging on the electricity grid', (2011) https://www.researchgate.net/publication/297055070_Impacts_of_electric_vehicles_charging_on_distribution_grid

22 See Ernst & Young and Eurelectric, 'Power sector accelerating e-mobility: Can utilities turn EVs into a grid asset?', (2021) https://www.eurelectric.org/media/5704/power_sector_accelerating_e-mobility-2022_eyeurelectric_report-2022-030-0059-01-e.pdf; and David Deller, Thanh Doan, and Franco Mariuzzo with Sean Ennis, Amelia Fletcher and Peter Ormosi, 'Competition and innovation in digital markets', BEIS Working Paper No. 40 (2021), https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1003985/uae-ccp-report__1_.pdf

4. EUROPEAN DATA SHARING REGIMES

In the last years, on the premise that the value of data lies in its use and re-use, access to data and related data sharing practices have gained prominent attention among policy makers as a crucial factor in unlocking competition and enabling innovation to flourish. The European Union has been a forerunner in promoting the free flows of data with a broad array of heterogeneous legislative initiatives, many of them designed to empower digital consumers and making them conscious decision-makers in digital markets[23].

Notably, the **General Data Protection Regulation** (GDPR) enshrined a general data portability right for individuals[24]; the **Second Payment Service Directive** (PSD2) introduced a rule on sector-specific access to account data[25]; the **Regulation on the free-flow of non-personal data** encouraged the development of self-regulatory codes of conduct to facilitate data sharing practices in business-to-business relationships[26]; the **Open Data Directive** aimed at promoting business-to-government data sharing collaboration supporting the wide availability and re-use of public sector information for private or commercial purposes[27]; and the **Data Governance Act** pointed to increase trust in sharing data, lower transaction costs linked to business-to-business and consumer-to-business data sharing, and harmonise conditions for the use of certain public sector data[28]. Moreover, the strategic role played by large platform-based digital ecosystems and the growing relevance of the Internet of Things (IoT) prompted the European institutions to introduce interoperability obligations in the recently adopted **Digital Markets Act** (DMA)[29] and in the proposal for a **Data Act**[30].

These data-related legislative initiatives significantly differ among themselves in terms of scope and approach. Some interventions are horizontal (i.e., cross-sector), others are sector-specific; some mandate data sharing, others envisage measures to facilitate voluntary sharing; some introduce general data rights, and others allow asymmetric data access rights. However, they share one essential

[23] Giuseppe Colangelo and Mariateresa Maggiolino, 'From fragile to smart consumers: shifting paradigm for the digital era', 35 Computer Law & Security Review 173 (2019). For an overview of the European initiatives, see European Commission, Commission Staff Working Document on 'Common European Data Spaces', SWD(2022) 45 final.

[24] 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 [2016] OJ L 119/1, Article 20.

[25] Directive (EU) 2015/2366 of the European Parliament and of the Council of 25 November 2015 on payment services in the internal market, amending Directives 2002/65/EC, 2009/110/EC and 2013/36/EU and Regulation (EU) No 1093/2010, and repealing Directive 2007/64/EC, [2015] OJ L 337/35, Article 67.

[26] Regulation (EU) 2018/1807 of the European Parliament and of the Council of 14 November 2018 on a framework for the free flow of non-personal data in the European Union, [2018] OJ L 303/59.

[27] Directive (EU) 2019/1024 of the European Parliament and of the Council of 20 June 2019 on open data and the re-use of public sector information, [2019] OJ L 172/56.

[28] Data Governance Act, supra note 5.

[29] Regulation (EU) on contestable and fair markets in the digital sector (Digital Markets Act). The text approved by the Permanent Representatives Committee (Coreper) is available at https://www.consilium.europa.eu/media/56086/st08722-xx22.pdf

[30] Data Act, supra note 4. See Oscar Borgogno and Giuseppe Colangelo, 'Shaping interoperability for the IoT: the case for ecosystem-tailored standardisation', (2022) Deep-In Working Paper, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4106894

technical feature, namely the strong reliance on **Application Programming Interfaces (APIs) as a key enabler** to ensure a sound and effective data-sharing ecosystem[31].

Moreover, with regard to the sharing regime, we are witnessing a progressive shift towards interoperability. In the European data strategy, to overcome legal and technical barriers to data sharing, the Commission indeed announced the establishment of EU-wide common, **interoperable data spaces** in strategic sectors (including mobility and energy), which should foster an ecosystem of companies, civil society, and individuals creating new products and services based on more accessible data[32]. In particular, the Commission has identified the lack of interoperability as a crucial element for the exploitation of data value, especially in the context of artificial intelligence deployment. In this context, the European Data Innovation Board, proposed by the Data Governance Act, will support the Commission in identifying the relevant standards and interoperability requirements for cross-sector data sharing.

The key role of interoperability has been confirmed in the recent launch of the proposal for a **European Health Data Space** (EHDS), the first common data space in a specific area to emerge from the EU strategy for data[33]. Given that a substantial amount of electronic data to be accessed in the EHDS is personal health data, the proposal supports the implementation of the portability right enshrined in the GDPR as applied to electronic health data, while, with regards to the secondary use of electronic health data, it builds upon and complements the Data Governance Act and the proposed Data Act. Accordingly, while natural persons will have additional possibilities to digitally access and transmit their electronic health data building upon provisions of the GDPR, market operators will be obliged to share electronic health data with user-selected third parties from the health sector.

In general, the emergence of interoperability as the needed solution to ensure effective data sharing and promote technological innovation reflects the economic features of digital markets. Digital ecosystems have surfaced as infrastructures within which a huge number of IoT interactions take place and a few players enjoy a gatekeeping position, which allows them to restrain other firms' ability to benefit from network effects and obtain unchallenged access to data. The ability to gather and access different data sources is, instead, crucial for IoT innovation to thrive, as the rapid adoption of IoT is possible as long as all sorts of devices can be interconnected and can exchange data in real-time.

Against this background, the pro-competition goal underpinning the right to data portability enshrined within the GDPR probably led to misguided expectations since, due to the presence of strong network effects, mitigating switching costs through mere data portability has proven to be insufficient in promoting multi-homing and easing data-induced lock-in effects. Rather, concerns have been raised about the unintended effects of the provision in terms of competition and innovation as it may have entrenched the market power of incumbents and negatively affected firms seeking data to develop

[31] Oscar Borgogno and Giuseppe Colangelo, 'Data sharing and interoperability: Fostering innovation and competition through APIs', 35 Computer Law & Security Review 105314 (2019).

[32] European Commission, 'A European strategy for data', COM(2020) 66 final, 16.

[33] European Commission, 'Proposal for a Regulation on the European Health Data Space', COM(2022) 197 final.

new products[34]. Further, in markets featuring strong network effects, even when data portability allows users to multi-home, the dominant position of must-have services may remain unchallenged and the elimination of switching costs may even cause the market to tip into a monopoly situation[35].

On these premises, it has been proposed to rely on an ***in situ* data right** for both individuals and firms, which implies that, rather than moving data from the platform, users are allowed to use their data in the location where they reside and to determine when and under what conditions third parties can access their *in situ* data[36]. In the European scenario, the access to account rule enshrined in the PSD2 represents an early case of *in situ* data right[37]. By the same token, pursuant to the proposals for a Data Act and EHDS, at the user's request, data holders are duty-bound to share the relevant data with third parties.

Finally, it cannot be overlooked that building trust, avoiding data breaches, and ensuring cybersecurity are essential elements in facilitating data sharing. A secure and privacy-preserving infrastructure to pool, access, share, process and use data represents a key feature of a common European data space[38]. Therefore, the common technical infrastructure must integrate the cybersecurity-by-design principle and respect the data protection by design and by default obligations enshrined in the GDPR[39]. As we will see in the next section, privacy and cybersecurity issues play an even more relevant role in the energy sector.

[34] See, e.g., Chinchih Chen, Carl Benedikt Frey, and Giorgio Presidente, 'Privacy Regulation and Firm Performance: Estimating the GDPR Effect Globally', Oxford Martin School Working Paper No. 1 (2022), https://www.oxfordmartin.ox.ac.uk/downloads/Privacy-Regulation-and-Firm-Performance-Giorgio-WP-Upload-2022-1.pdf; Rebecca Janßen, Reinhold Kesler, Michael E. Kummer, and Joel Waldfogel, 'GDPR and the Lost Generation of Innovative Apps', NBER Working Paper No. 30028 (2022), https://www.nber.org/papers/w30028; Garrett Johnson, Scott Shriver, and Samuel Goldberg, 'Privacy & Market Concentration: Intended & Unintended Consequences of the GDPR', (2022) https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3477686; Christian Peukert, Stefan Bechtold, Michail Batikas, and Tobias Kretschemer, 'Regulatory Spillovers and Data Governance: Evidence from the GDPR', (forthcoming) Marketing Science; Michal Gal and Oshrit Aviv, 'The Unintended Competitive Effects of the GDPR', 16 Journal of Competition Law and Economics 349 (2020); Wing M.W. Lam and Xingyi Liu, 'Does Data Portability Facilitate Entry?', 69 International Journal of Industrial Organization 102564 (2020).

[35] Jan Krämer, Pierre Senellart, and Alexandre de Streel, 'Making data Portability More Effective for The Digital Economy', (2020) CERRE Report https://cerre.eu/publications/report-making-data-portability-more-effective-digital-economy/

[36] Bertin Martens, Geoffrey Parker, Georgios Petropoulos, and Marshall van Alstyne, 'Towards Efficient Information Sharing in Network Markets', Bruegel Working Paper No. 12 (2021), https://www.bruegel.org/2021/11/towards-efficient-information-sharing-in-network-markets/

[37] Oscar Borgogno and Giuseppe Colangelo, 'Data, Innovation and Competition in Finance: The Case of the Access to Account Rule', 31 European Business Law Review 573 (2020).

[38] European Commission, supra note 23, 2.

[39] Ibid., 4.

4.1 Energy-specific data sharing regimes

Data access and sharing obligations have been also envisaged to address specific issues in the electricity sector. In particular, while **Regulation 2017/1485** has introduced data-sharing obligations for electricity network operators to ensure system security[40], the **Electricity Directive** has requested Member States to ensure the deployment of smart metering systems which should be interoperable, in particular with consumer energy management systems and with smart grids[41]. To assist consumers' active participation, smart metering systems that are deployed should be equipped with fit-for-purpose functionalities that allow consumers to i) have near real-time access to their consumption data; ii) modulate their energy consumption; iii) offer their flexibility to the network and electricity undertakings, and iv) be rewarded for it.

Moreover, the proposed revision of **RED II** introduces measures addressing the need for real-time access to basic battery information (such as state of health, state of charge, capacity and power set point) for facilitating the integration-related operations of domestic batteries and electric vehicles[42]. Notably, Member States are required to ensure that manufacturers of domestic and industrial batteries enable real-time access to basic battery management system information for battery owners and users as well as for third parties acting on their behalf, under non-discriminatory terms and at no cost. Further, Member States shall ensure that vehicle manufacturers make available, in real-time, in-vehicle data related to the battery state of health, battery state of charge, battery power setpoint, battery capacity, as well as the location of electric vehicles to electric vehicle owners and users, as well as to third parties acting on their behalf (such as electricity market participants and electromobility service providers), under non-discriminatory terms and at no cost. In addition, Member States shall ensure that non–publicly accessible normal power recharging points installed in their territory can support smart charging functionalities and, where appropriate, bidirectional charging functionalities.

The revision of REDII would complement the provisions on access to battery data related to facilitating the repurposing of batteries in the proposed Regulation concerning batteries and waste batteries, which assigns to the Commission the task of setting up an electronic exchange system that should contain sortable and searchable information and data on rechargeable industrial batteries and electric vehicle batteries, respecting open standards for third party use[43].

Finally, to facilitate the development of new services related to buildings, the proposed revised **EPBD** establishes that Member States shall ensure that the building owners, tenants and managers can have direct access to their building systems' data and, at their request, the access or data shall be made available to third parties[44]. Building systems data shall include at least all data related to the energy

[40] Regulation (EU) 2017/1485 establishing a guideline on electricity transmission system operation, [2017] OJ L 220/1, Articles 40-53.

[41] Directive (EU) 2019/944 on common rules for the internal market for electricity and amending Directive 2012/27/EU, [2019] OJ L 158/125, Article 19.

[42] Renewable Energy Directive, supra note 11, Article 20.

[43] Proposal for a Regulation concerning batteries and waste batteries, repealing Directive 2006/66/EC and amending Regulation (EU) No 2019/1020, COM(2020) 798 final, Article 64.

44 Energy Performance of Buildings Directive, supra note 10, Article 14.

performance of building elements, the energy performance of building services, building automation and control systems, meters and charging points for e-mobility.

The proposed revisions of REDII and EPBD are particularly relevant for the smart charging of electric vehicles and represent further examples of *in situ* data right already envisaged in the PSD2 and the Data Act. Indeed, smart charging makes more sense in locations where users reside or work. Further, interoperability and standardisation are crucial for the rollout of smart charging since a chargepoint should be able to communicate with another third party. Moreover, a policy intervention on electric vehicles smart charging may share with the Data Act the goal to avoid *de facto* exclusive control over data enjoyed by manufacturers of devices (so-called **vendor lock-in**).

5. REGULATORY CHALLENGES

Against this backdrop, the main regulatory challenges seem represented by the policy choices related to interoperability and standardisation, in particular, the option for a mandated rather than a facilitated APIs adoption, and the concerns about privacy and cybersecurity.

5.1 APIs, Standardisation, and Interoperability

As already mentioned, APIs have been usually identified as a key enabler of interoperability. By allowing a firm to easily access the data gathered by another company, APIs are set to strengthen interoperability among different players and facilitate the exchange of data streams or datasets between data holders. However, data sharing via APIs requires a complex implementation process and sound standardisation initiatives are crucial for its success. Although there is now an overall consensus on the fact that a systematic adoption of open and standardised APIs is essential, European policy makers have not taken a clear stance towards **standardisation** so far, in particular on **who should define the APIs**.

Notably, Article 20 of the GDPR does not provide detailed guidance on how to ensure data portability among undertakings, but it merely states a general requirement for the format of transmitted data, which needs to be structured, commonly used, and machine-readable. Any attempt to mandate the adoption of interoperable standards is excluded as Recital 68 does not go beyond a simple encouragement.

In a similar vein, concerning the access to account rule under the PSD2, the EU has refrained from publicly mandating API standardisation and has left banks free to come up with their own data-sharing interfaces or to take part in privately-led standardisation initiatives. The underpinning rationale was hinged on the concern that a common API standard could jeopardise innovation and dynamic competition between standards. However, launching the Digital Finance and the Retail Payments Strategies in 2020, the European Commission recognised that the lack of APIs interoperability hindered newcomers, and committed to establish an Open Finance framework by the end of 2024, as well as to review the PSD2[45]. Further, the European Payment Council has recently established a work block, consisting of experts and representatives of interested European standardisation initiatives, to develop minimum requirements that ensure pan-European harmonisation and interoperability as well as the integrity of the scheme[46].

[45] European Commission, 'Digital Finance Strategy for the EU', COM (2020) 591 final; Id., 'Retail Payments Strategy for the EU', COM (2020) 592 final.

[46] European Payment Council, 'Call for European standardisation initiatives in the field of PSD2 API's to participate in the API Work Block of the SEPA Payment Account Access Multi-Stakeholder Group', (2022) https://www.europeanpaymentscouncil.eu/news-insights/news/call-european-standardisation-initiatives-field-psd2-apis-participate-api-work. Similar efforts have been previously undertaken by the European Banking Authority (https://www.eba.europa.eu/regulation-and-policy/payment-services-and-electronic-money/eba-working-group-on-apis-under-psd2) and the Euro Retail Payments Board

The DMA and the Data Act confirm the recognition of the key role played by interoperability and standardisation. In particular, the Commission has acknowledged that the absence of an obligation to create technical interfaces for automated and continuous data flows in the context of IoT "can make it hard to offer certain services that require real-time data flows, leading to lock-in situations for data subjects and hampering the development of innovative services based on access to such data"[47]. In a similar vein, in the EHDS the Commission pointed to the absence of binding or compulsory standards across the EU and consequently limited interoperability[48]: "due to different standards and limited interoperability, industry faces barriers and additional costs both nationally and when entering the markets of other Member States"[49]. Notably, given the fragmentation of standards and specifications for storing and sharing data, the digital health industry faces problems when placing new products and services on the market, and this often forces healthcare providers to adopt new standards that erect barriers to new entrants[50].

However, both the DMA and the Data Act rule out the possibility of mandating the adoption of technical standards or interfaces, but opt for providing the Commission with the power to delegate the adoption of European harmonised standards[51]. Nonetheless, in the Data Act the Commission pledges to adopt common specifications by way of implementing acts in case harmonised standards do not exist or relevant harmonised standards are considered insufficient[52]. A similar approach has been put forth in the EHDS[53] and in some of the recent energy-specific legislative initiatives (i.e., the Electricity Directive[54] and the proposed revised Energy Performance of Buildings Directive[55]).

Against this background, it is worth noting the different approach endorsed by the UK policy maker which stands out as one of the most advanced cases of mandated interoperability in the digital economy. Following a review of retail banking, the Competition and Markets Authority (CMA) made full use of its market investigation powers to ease the functioning of the access to account rule enshrined in the PSD2 requiring the nine major banks in Britain and Northern Ireland to agree on common and open API standards, data formats and security protocols that would allow new entrants to calibrate their applications according to a single set of specifications[56].

(https://www.ecb.europa.eu/paym/groups/erpb/shared/pdf/11th-ERPB-meeting/Report_from_the_ERPB_WG_on_a_SEPA_API_Access_Scheme.pdf).

[47] European Commission, 'Data Act (including the review of the Directive 96/9/EC on the legal protection of databases) – Inception Impact Assessment', (2021) https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/13045-Data-Act-&-amended-rules-on-the-legal-protection-of-databases_en

[48] EHDS, supra note 33, Explanatory memorandum, 9-10.

[49] European Commission, 'A European Health Data Space: harnessing the power of health data for people, patients and innovation', COM(2022) 196 final, 5.

[50] Ibid., 6.

[51] DMA, supra note 29, Article 48; and Data Act, supra note 4, Article 28.

[52] Data Act, supra note 4, Article 28(5).

[53] EHDS, supra note 33, Article 23.

[54] Electricity Directive, supra note 41, Article 24.

[55] Energy Performance of Buildings Directive, supra note 10, Article 14.

[56] UK Competition and Markets Authority, 'The Retail Banking Market Investigation Order 2017', https://www.gov.uk/government/publications/retail-banking-market-investigation-order-2017. See Oscar Borgogno and Giuseppe

The global attention gained by the **Open Banking experience** convinced the UK Financial Conduct Authority and the Government to expand third-party data access and API standardisation to a broader range of financial services and products, bringing Open Finance into discussion[57]. This initiative is part of the broader Smart Data strategy under which the UK Government is looking to expand data access tools in all regulated markets, including the energy sector[58]. In a recent market study on electric vehicle smart charging, the CMA explicitly referred to the UK Open Banking as a blueprint to fully maximise the benefits of smart charging, hence recommending the Government to set open data and software standards[59]. Open standards would reduce charging costs and provide flexibility to the electricity system, while helping to generate more competition and innovation by ensuring that users are not locked into the chargepoint operator's interface, but have a choice of alternatives to manage the chargepoint from third-parties.

Since interoperability is context-dependent, regulatory strategies require an in-depth understanding of market features and dynamics. Therefore, it is worth investigating whether data sharing regimes and solutions experienced in other scenarios may be effectively adapted to the electricity sector and to the case of smart charging. In particular, it is necessary to assess the promises and perils of mandating, rather than merely facilitating, the adoption of APIs and whether it is appropriate to envisage an asymmetric access to data and information at issue.

Indeed, when it comes to the implications in terms of competition, data-sharing initiatives involve relevant trade-offs. With specific regard to Open Banking and the effectiveness of the PSD2 data-sharing rule in fostering competition, concerns similar to those already illustrated in the case of GDPR have been expressed. Notably, some studies warn against the entry of Big Tech platforms into retail banking maintaining that large technology companies may disrupt retail banking markets by harnessing the massive quantities of data generated by their networks[60]. Others instead argue that, since empirical evidence suggest that FinTech start-ups are set to cooperate (rather than compete) with incumbent banking players, *ex-ante* regulatory measures imposed on BigTechs could end up shielding banks from any competitive pressure, thereby frustrating the very aim of the PSD2[61].

Yet, the UK's experience in the implementation of Open Banking provides a useful example of the challenges related to interoperability requirements. As the market investigation remedy is entering

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Colangelo, 'Consumer inertia and competition-sensitive data governance: the case of Open Banking', 9 Journal of European Consumer and Market Law 143 (2020).

[57] UK Financial Conduct Authority, 'Open finance – Feedback Statement', (2021) https://www.fca.org.uk/publication/feedback/fs21-7.pdf. By taking stock of the UK experience, Australia introduced an ambitious economy-wide data-sharing framework, the Consumer Data Right, which gives consumers the right to share their data between any kinds of service providers of their choosing. In 2019, this regime was initially implemented within the banking sector, with the Australian Competition and Consumer Commission requiring the four major banks to share product reference data with accredited data recipients, mandating the adoption of a single set of API standards for data sharing.

[58] UK Government, Department for Business, Energy and Industrial Strategy, 'Smart Data Working Group', (2021) https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/993365/smart-data-working-group-report-2021.pdf.

[59] UK Competition and Markets Authority, 'Electric Vehicle Charging market study', (2021) https://www.gov.uk/cma-cases/electric-vehicle-charging-market-study.

60 Xavier Vives, 'Digital Disruption in Financial Markets', 11 Annual Review of Financial Economics 243 (2019); de la Mano Miguel and Jorge Padilla (2018), 'Big Tech Banking', 14 Journal of Competition Law and Economics 494 (2018).

61 Oscar Borgogno and Giuseppe Colangelo, 'The data sharing paradox: BigTechs in finance', 16 European Competition Journal 492 (2020).

the final stage of implementation, the CMA has launched a consultation on the future governance of Open Banking[62]. Since the current proposal would allow the nine largest banks to withdraw from membership (and funding duties) after three years, several fintech players complain that this option would easily turn into unfair leverage to influence the new supervisor's behaviour, especially when it comes to standard setting and monitoring of interoperability requirements.

5.2 Data Protection and Cybersecurity

Digitalisation brings challenges on privacy and cybersecurity matters which significantly affect data sharing practices and the adoption of standards. These issues are particularly relevant to the energy sector. As digitalisation increasingly exposes the energy system to cyberattacks and incidents that may jeopardize the security of energy supply, policy measures are needed to ensure that new markets based on energy data are not only open and competitive but also compliant with data protection and cybersecurity[63].

The interface between the GDPR and the recent and ongoing European data-sharing initiatives is the subject of a lively debate.

Notably, although the proposal for a Data Act aligns with the GDPR, supporting the principles of **data minimisation** and data protection by design and by default[64], as noted by the European Data Protection Board and the European Data Protection Supervisor, the provisions introducing the new data access and sharing right do not prescribe that the products should be designed in a way that data subjects are allowed to use them anonymously (or in the least privacy-intrusive way) nor that data holders should anonymise data as much as possible[65]. In contrast, it is worth noting that, in the business-to-government data sharing Chapter, the Data Act states that the data holder should take reasonable efforts to anonymise the data or, where such anonymisation proves impossible, should apply technological means such as pseudonymisation and aggregation, prior to making the data available[66].

On a different note, applying the GDPR's data minimization principle, the EHDS states that, in addition to the tasks necessary to ensure effective secondary use of health data, the health data access bodies should apply tested techniques that ensure electronic health data is processed in a manner that preserves the privacy of the information contained in the data for which secondary use is allowed, including techniques for pseudonymisation, anonymisation, generalisation, suppression and

62 UK Competition and Markets Authority, 'The future oversight of the CMA's open banking Remedies', (2021) https://www.gov.uk/government/consultations/future-oversight-of-the-cmas-open-banking-remedies/the-future-oversight-of-the-cmas-open-banking-remedies

63 European Commission, supra note 2, 2.

64 Data Act, supra note 4, Recital 8.

65 European Data Protection Board and European Data Protection Supervisor (2022), 'Joint Opinion 2/2022 on the Proposal of the European Parliament and of the Council on harmonised rules on fair access to and use of data (Data Act)', https://edpb.europa.eu/our-work-tools/our-documents/edpbedps-joint-opinion/edpb-edps-joint-opinion-22022-proposal-european_en

66 Data Act, supra note 4, Recital 64 and Article 20(2).

randomisation of personal data[67]. Notably, the use of anonymised electronic health data which is devoid of any personal data should be made available when possible and if the data user asks it[68]; where the purpose of the data user's processing cannot be achieved with anonymised data, taking into account the information provided by the data user, the health data access bodies shall provide access to electronic health data in pseudonymised format. Moreover, given the sensitivity of electronic health data, all secondary user access to the requested electronic health data should be done through a **secure processing environment** and the processing of personal data in such a secure environment should comply with the GDPR[69]. By means of implementing acts, the Commission will assist the Member States in developing common security standards providing for the technical, information security and interoperability requirements for the secure processing environments[70].

With specific regard to the electricity sector, the Regulation on the internal market for electricity assigns specific responsibilities regarding data protection and cybersecurity to Transmission System Operators (TSOs) and Distribution System Operators (DSOs)[71]. Their respective European associations (ENTSO-E) and the European entity for DSOs (EU DSO Entity) are required to promote cybersecurity and data protection in cooperation with relevant authorities and regulated entities. Further, the Commission is empowered to adopt delegated acts on sector-specific rules for cybersecurity aspects of cross-border electricity flows, including rules on common minimum requirements, planning, monitoring, reporting and crisis management[72]. Moreover, the Electricity Directive specifically states that the security of the smart metering systems and data communication shall comply with relevant Union security rules, having due regard of the best available techniques for ensuring the highest level of cybersecurity protection[73].

Finally, in order to support the creation of a European energy data space, the forthcoming Commission's Communication "Action plan on the digitalisation of the energy sector" will also propose actions to create a cyber-secure data exchange infrastructure in the energy system, which has been identified as one of the key area of intervention in the Action Plan[74]. Notably, the Action plan will be aligned with the general framework for cybersecurity, in particular the proposed NIS-2 Directive[75], the proposal for a Cyber Resilience Act[76], and the planned **Network Code on Cybersecurity** (NCCS) of cross-border electricity flows, to be adopted in accordance with the Regulation on the internal market for electricity[77]. Regarding the latter, in January 2022 ENTSO-E and the EU DSO Entity submitted their joint proposal for the NCCS to the Agency for the Cooperation of Energy Regulators (ACER)[78].

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67 EHDS, supra note 33, Recitals 43 and 49.
68 Ibid., Article 44(2) and (3).
69 Ibid., Article 50 and Recital 54.
70 Ibid..
71 Regulation (EU) 2019/943 on the internal market for electricity [2019] OJ L 158/54, Articles 30 and 55.
72 Ibid., Article 59(2)(e).
73 Electricity Directive, supra note 41, Art. 20.
74 European Commission, supra note 2, 3.
75 Supra note 7.
76 European Commission, 'Call for evidence for an impact assessment on a Cyber Resilience Act', (2022) https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/13410-Cyber-resilience-act-new-cybersecurity-rules-for-digital-products-and-ancillary-services_en
77 Regulation (EU) 2019/943, supra note 71, Article 59(9).
78 Available at https://www.entsoe.eu/network_codes/nccs/

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