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# 24. On the implementation of smart meters in the European Union: Legal considerations regarding privacy and personal data protection in times of the Twin Transitions

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## 1. INTRODUCTION

Seven years have passed since the first version of this Research Handbook. Seven years have also provided the European Union (EU) legislator with the opportunity to further engage in regulating the use of so-called smart meters, to use their potential as well as to limit their risks. Taking a helicopter view on the issue, it seems as if the latter was rather not in the legislator's focus. Already from the Third Energy Package smart meters were introduced as a key tool for the electricity market in the EU, with the aim of promoting energy efficiency and the active participation of consumers in the electricity market.<sup>2</sup> Under the Fourth Energy Package (the so-called “Clean Energy Package”), smart meters are no less important, as they have become a key enabler of digitalization in the electricity sector, as well as a valuable source of data for the data economy. This observation is best reflected by the notion of ‘Twin Transitions’,

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<sup>1</sup> This chapter is based on the chapter Max Baumgart, ‘A (Legal) Challenge to Privacy: On the Implementation of Smart Meters in the EU and the US’ in Rafael Leal-Arcas and Jan Wouters (eds), *Research Handbook on EU Energy Law and Policy* (Edward Elgar Publishing 2017) <https://www.elgaronline.com/edcollchap/edcoll/9781786431042/9781786431042.00029.xml> accessed 24 June 2024. For this second edition of the Research Handbook, the chapter has been substantially revised and re-written by the two co-authors jointly. The authors' names are listed in alphabetical order. With this chapter, Max Baumgart contributes to his Starter Grant project “Transformation processes in European and national economic law: Energy law as law of socio-technical change”, for which he was awarded funds by Tilburg University. Brenda Espinosa's contribution to this chapter is a deliverable of the research program “MegaMind – Measuring, Gathering, Mining and Integrating Data for Self-management in the Edge of the Electricity System”, (partly) financed by the Dutch Research Council (NWO) through the Perspectief program under number P19–25.

<sup>2</sup> Max Baumgart, ‘A (Legal) Challenge to Privacy: On the Implementation of Smart Meters in the EU and the US’ in Rafael Leal-Arcas and Jan Wouters (eds), *Research Handbook on EU Energy Law and Policy* (Edward Elgar Publishing 2017), <https://www.elgaronline.com/edcollchap/edcoll/9781786431042/9781786431042.00029.xml> accessed 24 June 2024.

used in EU policy<sup>3</sup> and research<sup>4</sup> documents to refer to both the Green and Digital Transition, which are taking place in parallel and have the potential to strengthen each other. The Green Transition “aims to achieve sustainability, and combat climate change and environmental degradation”, and the Digital Transition “aims to harness digital technologies for sustainability and prosperity, and to empower citizens and business”.<sup>5</sup>

In this context, smart meters are still seen as a key technology to solve the issues that the generation and supply of renewable energies from wind and solar power pose for every country that decides to increase the share of renewable energy in its energy mix. The increasing feed-in of volatile renewable energy use jeopardizes the safety of the electricity grid if unexpected energy levels lead to an overload of electricity in the grid.<sup>6</sup> Due to their ability to communicate directly with the meter operator, smart meters enable almost real-time capture of power consumption and power production data.<sup>7</sup> They help network operators to regulate the flow of electricity<sup>8</sup> and thus become a significant element for an intelligent power grid.<sup>9</sup> Smart meters

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<sup>3</sup> See European Commission, ‘Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions “Digitalising the Energy System - EU Action Plan”’ (European Commission 2022) COM(2022) 552 final, <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52022DC0552> accessed 24 June 2024; and European Commission, ‘Commission Staff Working Document “on Common European Data Spaces”’ (European Commission 2024) SWD(2024) 21 final, <https://digital-strategy.ec.europa.eu/en/library/second-staff-working-document-data-spaces> accessed 24 June 2024.

<sup>4</sup> Stefan Muench and others, ‘Towards a Green & Digital Future’ (Publications Office of the European Union 2022), <https://publications.jrc.ec.europa.eu/repository/handle/JRC129319> accessed 24 June 2024.

<sup>5</sup> Stefan Muench and others, ‘Towards a Green & Digital Future’ (Publications Office of the European Union 2022), <https://publications.jrc.ec.europa.eu/repository/handle/JRC129319> accessed 24 June 2024, iv.

<sup>6</sup> See Sabine Schulte-Beckhausen/Carmen Schneider/Thorsten Kirch, ‘Unionsrechtliche Aspekte eines “EEG 2.0”’ (2014) *Recht der Energiewirtschaft (RdE)*, 101, 104.

<sup>7</sup> Jan Dinter, ‘Das Gesetz zur Digitalisierung der Energiewende – Startschuss für Smart Meter? Ein Überblick über den Referentenentwurf’ (2015) *EnergieRecht Zeitschrift für die gesamte Energierechtspraxis (ER)*, 229, 229; see also Luisa Albrecht, *Intelligente Stromzähler als Herausforderung für den Datenschutz – Tatsächliche und rechtliche Betrachtung* (Heymanns 2015), 14, with reference to Bundesnetzagentur, ““Smart Grid” und “Smart Market”. Eckpunktepapier der Bundesnetzagentur zu den Aspekten des sich verändernden Energieversorgungssystems”, (2011), [https://www.bundesnetzagentur.de/SharedDocs/Downloads/DE/Sachgebiete/Energie/Unternehmen\\_Institutionen/NetzentwicklungUndSmartGrid/SmartGrid/SmartGridPapierpdf.pdf?\\_\\_blob=publicationFile&v=2](https://www.bundesnetzagentur.de/SharedDocs/Downloads/DE/Sachgebiete/Energie/Unternehmen_Institutionen/NetzentwicklungUndSmartGrid/SmartGrid/SmartGridPapierpdf.pdf?__blob=publicationFile&v=2) accessed 24 June 2024, 11.

<sup>8</sup> See Jan Dinter, ‘Das Gesetz zur Digitalisierung der Energiewende – Startschuss für Smart Meter? Ein Überblick über den Referentenentwurf’ (2015) *EnergieRecht Zeitschrift für die gesamte Energierechtspraxis (ER)*, 229, 229.

<sup>9</sup> See Luisa Albrecht, *Intelligente Stromzähler als Herausforderung für den Datenschutz – Tatsächliche und rechtliche Betrachtung* (Heymanns 2015), 1; see on the role of smart meters in a so-called smart grid also Claudia Eckert/Christoph Krauß, ‘Sicherheit im Smart Grid. Herausforderungen und Handlungsempfehlungen’ [2011] *Datenschutz und Datensicherheit (DuD)*, 535, 535ff; on the purpose of a smart grid, see Nicole Angenendt/Katharina Vera Boesche/Oliver

also allow suppliers to offer load-dependent or daytime-dependent tariffs,<sup>10</sup> which favours grid regulation through economic incentives.<sup>11</sup> Hence, smart meters and the data they collect are seen as a key tool to deal with the challenges that come along with the energy transition, such as increasing decentralized generation and supply of variable renewable energies.<sup>12</sup> Besides, smart meters are also seen as an element in the creation of smart cities.<sup>13</sup> At the same time, smart meters create challenges themselves, particularly with regard to the fundamental rights to privacy and personal data protection.<sup>14</sup> These challenges emerge because residential smart meters are installed at the homes of consumers and allow for frequent collection of data relating to them, which can provide detailed insight into the private and family life of consumers.<sup>15</sup>

The chapter published in the first edition of this Research Handbook provided an in-depth-analysis of the applicable law to introduce smart meters vis-à-vis the fundamental

Helge Franz, 'Der energierechtliche Rahmen einer Implementierung von Smart Grids' (2011) *Recht der Energiewirtschaft (RdE)*, 117, 118.

<sup>10</sup> Eoghan McKenna/Ian Richardson/Murray Thomson, 'Smart meter data: Balancing consumer privacy concerns with legitimate applications' (2012) Vol. 41, *Energy Policy*, 807, 811; Jan Dinter, 'Das Gesetz zur Digitalisierung der Energiewende – Startschuss für Smart Meter? Ein Überblick über den Referentenentwurf' [2015] *EnergieRecht Zeitschrift für die gesamte Energierechtspraxis (ER)*, 229, 230; Joel B. Eisen and others, *Energy, Economics and the Environment* (4th edn, Foundation Press 2015), 904 and 907.

<sup>11</sup> Luisa Albrecht, *Intelligente Stromzähler als Herausforderung für den Datenschutz – Tatsächliche und rechtliche Betrachtung* (Heymanns 2015), 106ff, and references therein; Joel B. Eisen and others, *Energy, Economics and the Environment* (4th edn, Foundation Press 2015), 903.

<sup>12</sup> Vitiello S and others, 'Smart Metering Roll-Out in Europe: Where Do We Stand? Cost Benefit Analyses in the Clean Energy Package and Research Trends in the Green Deal' (2022) 15 *Energies* 2340. There are also sceptical voices, cf. Bundesnetzagentur, "Smart Grid" and "Smart Market". Summary of the BNetzA Position Paper (2011), [https://www.bundesnetzagentur.de/SharedDocs/Downloads/DE/Sachgebiete/Energie/Unternehmen\\_Institutionen/NetzentwicklungUndSmartGrid/SmartGrid/SmartGridPapier\\_EN.pdf?\\_\\_blob=publicationFile&v=4](https://www.bundesnetzagentur.de/SharedDocs/Downloads/DE/Sachgebiete/Energie/Unternehmen_Institutionen/NetzentwicklungUndSmartGrid/SmartGrid/SmartGridPapier_EN.pdf?__blob=publicationFile&v=4) accessed 24 June 2024, 3.

<sup>13</sup> Thomas Schuster, Juliane Unbereit and Antonia Maguhn, 'Wege zur Smart City. Strategien, Handlungsfelder, rechtliche Herausforderungen und funktionsfähige Governance' (2023) *Recht Digital*, 432, 436.

<sup>14</sup> See also Luisa Albrecht, *Intelligente Stromzähler als Herausforderung für den Datenschutz – Tatsächliche und rechtliche Betrachtung* (Heymanns 2015), 1ff; Christian Beckel/Leyna Sadamori/Thorsten Staake/Silvia Santini, 'Revealing household characteristics from smart meter data' [2014] Vol. 78, *Energy*, 397, 409; and Eoghan McKenna/Ian Richardson/Murray Thomson, 'Smart meter data: Balancing consumer privacy concerns with legitimate applications' (2012) Vol. 41, *Energy Policy*, 807, 807ff.

<sup>15</sup> Max Baumgart, 'A (Legal) Challenge to Privacy: On the Implementation of Smart Meters in the EU and the US' in Rafael Leal-Arcas and Jan Wouters (eds), *Research Handbook on EU Energy Law and Policy* (Edward Elgar Publishing 2017), <https://www.elgaronline.com/edcollchap/edcoll/9781786431042/9781786431042.00029.xml> accessed 24 June 2024; Luisa Albrecht, *Intelligente Stromzähler als Herausforderung für den Datenschutz – Tatsächliche und rechtliche Betrachtung* (Heymanns 2015), 299, and references therein. See also Nancy J. King/Pernille W. Jessen, 'For privacy's sake: Consumer "opt outs" for smart meters' (2014) *Computer Law & Security Review*, 530, 532.

right to privacy,<sup>16</sup> enshrined in Article 7 of the Charter of Fundamental Rights of the European Union (CFR).<sup>17</sup> The aim of this fully revised chapter in the second edition of this Research Handbook is to delve into the role of smart meters under the ongoing Twin Transitions, as well as their (at times complicated) relationship with the rights to privacy, but also personal data protection. This chapter provides an overview of the latest legal developments and academic contributions on the topic of the implementation of smart meters, and identifies current debates and paths for future research. The investigation is limited to the study of smart electricity meters for household consumers, as there the challenges regarding privacy and data protection are most apparent.

The chapter is structured as follows. Section 2 presents the technical characteristics and functions of smart meters and reflects on their importance in the context of the Twin Transitions and the European Commission's ambition to create a common European energy data space. Section 3 provides an overview of the current regulatory framework for smart meters under EU law. Section 4 identifies key challenges of smart metering technologies vis-à-vis the rights to privacy and personal data protection, as examined by legal scholarship on these topics. Section 5 presents the main conclusions of this chapter, and Section 6 ends with identifying paths for further research.

## 2. TECHNICAL CHARACTERISTICS AND FUNCTIONS OF SMART METERS, THE TWIN TRANSITIONS, AND A COMMON EUROPEAN ENERGY DATA SPACE

Smart meters link two sets of information: the amount of power consumption and the time of consumption.<sup>18</sup> The term 'smart meter' may refer to a meter with and without the functionality of bidirectional communication.<sup>19</sup> Smart meters fulfil a variety of functions. Consumers can utilize smart meters to track their energy consumption in detail and thus identify potential savings.<sup>20</sup> Moreover, the electrical current can be read more easily, since it is not necessary for the meter operator to send a person to read the meter and the consumer does not have to

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<sup>16</sup> Max Baumgart, 'A (Legal) Challenge to Privacy: On the Implementation of Smart Meters in the EU and the US' in Rafael Leal-Arcas and Jan Wouters (eds), *Research Handbook on EU Energy Law and Policy* (Edward Elgar Publishing 2017), <https://www.elgaronline.com/edcollchap/edcoll/9781786431042/9781786431042.00029.xml> accessed 24 June 2024.

<sup>17</sup> Charter of Fundamental Rights of the European Union, OJ C 364, December 18th 2000, p. 1–22.

<sup>18</sup> See also Katrina Fischer Kuh, 'Personal environmental information: The promise and perils of the emerging capacity to identify individual environmental harms' (2012) *Vanderbilt Law Review*, 1565, 1566.

<sup>19</sup> See also Luisa Albrecht, *Intelligente Stromzähler als Herausforderung für den Datenschutz – Tatsächliche und rechtliche Betrachtung* (Heymanns 2015), 5ff.

<sup>20</sup> Ulrich Greveler/Peter Glösekötter/Benjamin Justus/Dennis Löhr, 'Multimedia Content Identification Through Smart Meter Power Usage Profiles', <https://www.nds.rub.de/media/nds/veroeffentlichungen/2012/07/24/ike2012.pdf> accessed 24 June 2024, 1; Eoghan McKenna/Ian Richardson/Murray Thomson, 'Smart meter data: Balancing consumer privacy concerns with legitimate applications' (2012) Vol. 41, *Energy Policy*, 807, 810; see also Nancy J. King/Pernille W. Jessen, 'For privacy's sake: Consumer "opt outs" for smart meters' (2014) *Computer Law &*

convey the meter reading to the supplier in case the consumer chooses remote reading.<sup>21</sup> For network operators, smart meters enable better and safer network management, as the supply and withdrawal of electricity can be regulated more precisely by almost real-time recording of consumption and generation.<sup>22</sup> In practice, this is particularly valuable for recording power generation in smaller electricity facilities, since the power generation of large plants can already be precisely determined.<sup>23</sup> In addition to offering tariffs that are dependent on the load or time of use, smart meters can in some cases switch electrical devices on and off, depending on the price level of the electricity.<sup>24</sup> If an intelligent meter is also equipped with a remote control function, it offers the advantage that power generation and consumption can be directly reduced or increased for the purpose of network control.<sup>25</sup>

Smart meters are one of the key technologies embodying the ongoing digitalization in the electricity sector, i.e., the application of Information Communication Technologies (ICT) to the physical infrastructures used in the electricity sector.<sup>26</sup> As noted by the European Commission in its Communication on ‘Digitalising the Energy System – EU Action Plan’, the digitalization of the energy system (including electricity) is one of the policy priorities of the

Security Review, 530, 531; and Joel B. Eisen and others, *Energy, Economics and the Environment* (4th edn, Foundation Press 2015), 900ff.

<sup>21</sup> See also Jan Dinter, ‘Das Gesetz zur Digitalisierung der Energiewende – Startschuss für Smart Meter? Ein Überblick über den Referentenentwurf’ (2015) *EnergieRecht Zeitschrift für die gesamte Energierechtspraxis* (ER), 229, 229.

<sup>22</sup> Eoghan McKenna/Ian Richardson/Murray Thomson, ‘Smart meter data: Balancing consumer privacy concerns with legitimate applications’ (2012) Vol. 41, *Energy Policy*, 807 (810); Jan Dinter, ‘Das Gesetz zur Digitalisierung der Energiewende – Startschuss für Smart Meter? Ein Überblick über den Referentenentwurf’ [2015] *EnergieRecht Zeitschrift für die gesamte Energierechtspraxis* (ER), 229, 229; Joel B. Eisen and others, *Energy, Economics and the Environment* (4th edn, Foundation Press 2015), 903; see also Nancy J. King/Pernille W. Jessen, ‘For privacy’s sake: Consumer “opt outs” for smart meters’ [2014] *Computer Law & Security Review*, 530, 531.

<sup>23</sup> Jan Dinter, ‘Das Gesetz zur Digitalisierung der Energiewende – Startschuss für Smart Meter? Ein Überblick über den Referentenentwurf’ (2015) *EnergieRecht Zeitschrift für die gesamte Energierechtspraxis* (ER), 229, 229; Ulrich Greveler/Peter Glösekötter/Benjamin Justus/Dennis Löhr, ‘Multimedia Content Identification Through Smart Meter Power Usage Profiles’, <https://www.nds.rub.de/media/nds/veroeffentlichungen/2012/07/24/ike2012.pdf> accessed 24 June 2024, 1.

<sup>24</sup> Jan Dinter, ‘Das Gesetz zur Digitalisierung der Energiewende – Startschuss für Smart Meter? Ein Überblick über den Referentenentwurf’ (2015) *EnergieRecht Zeitschrift für die gesamte Energierechtspraxis* (ER), 229, 230.

<sup>25</sup> *Ibid.*, 229ff. See also Joel B. Eisen and others, *Energy, Economics and the Environment* (4th edn, Foundation Press 2015), 921.

<sup>26</sup> Brenda Espinosa Apráez, ‘Dealing with Data: A Study on the Regulatory Challenges of Data-Driven Innovation and Data Sharing in the Digitalized Utilities and How to Deal with Them’ (Doctoral Dissertation, Tilburg University 2022), [https://research.tilburguniversity.edu/files/67002845/Espinosa\\_Apraez\\_Dealing\\_21\\_12\\_2022.pdf](https://research.tilburguniversity.edu/files/67002845/Espinosa_Apraez_Dealing_21_12_2022.pdf), 17; Nicolò Rosetto and Valerie Reif, ‘Digitalization of the Electricity Infrastructure: A Key Enabler for the Decarbonization and Decentralization of the Power Sector’, *A Modern Guide to the Digitalization of Infrastructure* (Edward Elgar Publishing 2021), <https://doi.org/10.4337/9781839106057.00015> accessed 24 June 2024, 217.

EU, “and one where the European Green Deal and the Digital Decade Policy Programme 2030 for Europe go hand-in-hand as a twin transition”.<sup>27</sup>

As noted by a study of the European Commission’s Joint Research Centre, “[d]ata and data analysis will be the backbone of the green and digital transitions.”<sup>28</sup> Smart meters are a valuable source of data for the Twin Transitions. Besides empowering consumers to be more in control of their energy use and facilitating the monitoring of the electricity grid, smart meter data can also be the raw material for other data-based innovations within the energy sector and beyond, including the development and training of Artificial Intelligence (AI).<sup>29</sup> That is why in 2020 the European Commission’s Data Strategy<sup>30</sup> proposed the creation of a common European energy data space (alongside with data spaces in other crucial sectors) which aims at promoting “stronger availability and cross-sector sharing of data, in a customer-centric, secure and trustworthy manner, as this would facilitate innovative solutions and support the decarbonisation of the energy system”.<sup>31</sup> A recent document on the common European data spaces published by the European Commission sets out three main priorities in order to “respond to the energy-related objectives of the European Green Deal and the Digital Decade: (i) flexibility services in energy systems; (ii) smart and bidirectional charging of electric vehicles; and (iii) data services to support building renovations that improve energy efficiency.”<sup>32</sup> Smart meters provide an important source of data to enable those developments.

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<sup>27</sup> European Commission, ‘Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions “Digitalising the Energy System - EU Action Plan”’ (European Commission 2022) COM(2022) 552 final, <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52022DC0552> accessed 24 June 2024, 1.

<sup>28</sup> *Ibid.*, v.

<sup>29</sup> European Commission, ‘Commission Staff Working Document “on Common European Data Spaces”’ (European Commission 2024) SWD(2024) 21 final, <https://digital-strategy.ec.europa.eu/en/library/second-staff-working-document-data-spaces> accessed 24 June 2024, 3.

<sup>30</sup> European Commission, ‘Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions “A European Strategy for Data”’ (European Commission 2020) COM/2020/66 final, <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52020DC0066> accessed 24 June 2024.

<sup>31</sup> *Ibid.*, 22. For an overview see also Fanny Knoll, ‘Die Digitalisierung der Energiewende als juristische Mammutaufgabe’ (2023) *Klimarecht*, 7, pp. 9–10.

<sup>32</sup> European Commission, ‘Commission Staff Working Document “on Common European Data Spaces”’ (European Commission 2024) SWD(2024) 21 final, <https://digital-strategy.ec.europa.eu/en/library/second-staff-working-document-data-spaces> accessed 24 June 2024 on, ‘Commission Staff Working Document “on Common European Data Spaces”’ (European Commission 2024) SWD(2024) 21 final, <https://digital-strategy.ec.europa.eu/en/library/second-staff-working-document-data-spaces> accessed 24 June 2024, 22. For further reading on the common European energy data space, see Volker Berkhout and others, ‘Common European Energy Data Space’ (Publications Office of the European Union 2023), <https://data.europa.eu/doi/10.2833/354447> accessed 24 June 2024.

### 3. SMART ELECTRICITY METERS IN EU LAW

The first steps towards the adoption of smart metering in the EU were visible already in 2006 with Article 13(1) Directive 2006/32/EC on energy end-use efficiency and energy services,<sup>33</sup> which required Member States to ensure that consumers of electricity were provided with “individual meters that accurately reflect the final customer’s actual energy consumption and that provide information on actual time of use”. After this, two legal instruments regulated the implementation of smart meters: Directive 2009/72/EC on common rules for the internal market in electricity and the Directive 2012/27/EU on energy efficiency,<sup>34</sup> which were in force at the time of the publication of the previous edition of this Research Handbook, but were later modified or replaced by Directive (EU) 2019/944 currently in force.

Directive 2009/72/EC,<sup>35</sup> adopted under the Third Energy Package, referred for the first time to “intelligent metering systems” or “smart meters”, and obliged Member States or national regulatory authorities to “strongly recommend that electricity undertakings optimise the use of electricity, for example by [...] introducing intelligent metering systems” (Article 3, para. 11). Annex I (2) Directive 2009/72/EC went further than a recommendation and stated in sentence 1 that “Member States shall ensure the implementation of intelligent metering systems that shall assist the active participation of consumers in the electricity supply market.” Sentence 2 allowed the Member States to make the implementation of those metering systems subject to an economic assessment. Due to this, in practice, the obligation did not have much effect. For example, the German economic assessment was negative.<sup>36</sup> Directive 2009/72/EC did not provide a definition of smart metering systems nor the minimum functionalities of smart meters. In March 2012, the European Commission issued Recommendation 2012/148/EU ‘on preparations for the roll-out of smart metering systems’<sup>37</sup> in which a definition is introduced for these technologies, namely, “an electronic system that can measure energy consumption, adding more information than a conventional meter, and can transmit and receive data using a form of electronic communication” (Section 3(b)). The Commission Recommendation also introduced a set of recommended minimum functionalities for smart meters, as can be seen in Table 24.1.

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<sup>33</sup> 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, OJ L 114, April 27, 2006, pp. 64–85.

<sup>34</sup> 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, November 14 2012, pp. 1–56.

<sup>35</sup> 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 (Text with EEA relevance), OJ L 211, August 14 2009, pp. 55–93.

<sup>36</sup> Felix Dembski and Sebastian Schnurre, *Das Gesetz zum Neustart der Digitalisierung der Energiewende* (2023) *EnWZ – Zeitschrift für das gesamte Recht der Energiewirtschaft*, 339, 339 with references therein.

<sup>37</sup> Commission Recommendation of 9 March 2012 on preparations for the roll-out of smart metering systems (2012/148/EU), OJ L 73, 13 March 2012, pp. 9–22, [https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=celex%3A32012H0148#ntr10-L\\_2012073EN.01000901-E0010](https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=celex%3A32012H0148#ntr10-L_2012073EN.01000901-E0010).

Table 24.1 Common minimum functional requirements in Commission Recommendation 2012/148/EU

<b>For the customer</b>	Provide readings directly to the customer and any third party designated by the consumer, and ensure that final customers using smart metering systems are equipped with a standardised interface which provides visualised individual consumption data to the consumer.	Section 42 (a)
	Update the meter readings frequently enough to allow the information to be used to achieve energy savings (at least every 15 minutes).	Section 42 (b)
<b>For the metering operator</b>	Allow remote reading of meters by the operator	Section 42 I
	Provide two-way communication between the smart metering system and external networks for maintenance and control of the metering system.	Section 42 (d)
	Allow readings to be taken frequently enough for the information to be used for network planning.	Section 42 I
<b>For commercial aspects of energy supply</b>	Smart metering systems should include advance tariff structures, time-of-use registers and remote tariff control. This should help consumers and network operators to achieve energy efficiencies and save costs by reducing the peaks in energy demand.	Section 42 (f)
	Allow remote on/off control of the supply and/or flow or power limitation.	Section 42 (g)
<b>For security and data protection</b>	Provide secure data communications	Section 42 (h)
	Digitalising the Energy System - EU Action Plan	Section 42 (i)
<b>For distributed generation</b>	Provide import/export and reactive metering.	Section 42 (j)

Commission Recommendation 2012/148/EU has not been repealed, thus it is still in force, although some of its provisions are now tacitly derogated.<sup>38</sup> It is relevant to note, however, that Commission Recommendations are not legally binding (Article 288(5) of the Treaty on the Functioning of the European Union – TFEU<sup>39</sup>), hence, it is up to the Member States to decide to which extent they implement the minimum functionalities laid down in Commission Recommendation 2012/148/EU. While the Commission Recommendation suggests a metering interval of at least every 15 minutes (see Table 24.1), literature suggests that the 15 minutes metering interval is too long from a technical perspective, limiting its suitability to increase the electrical grid’s maximum transport potential.<sup>40</sup>

<sup>38</sup> In particular, those in the Section I. Data Protection and Security Considerations, which refer to Directive 95/46/EC, the Data Protection Directive which has been replaced by the General Data Protection Regulation, Regulation (EU) 2016/679.

<sup>39</sup> Consolidated version of the Treaty on the Functioning of the European Union 2016 OJ C202, pp. 1–366.

<sup>40</sup> Peter Birkner and Hans-Peter Schwintowski, *Flexibilitäten im Kontext der Energiewende – Eine technische und juristische Einschätzung* (2023) EWeRK – Zeitschrift des Institutes für Energie- und Wettbewerbsrecht in der kommunalen Wirtschaft e.V., 50, 60.



Directive 2012/27/EU on energy efficiency<sup>41</sup> introduced a set of functional requirements for smart metering systems in its Article 9, which were not as comprehensive as those listed in Commission Recommendation 2012/148/EU, and were later moved to Directive (EU) 2019/944, in what concerns smart electricity meters.<sup>42</sup> The latter Directive, adopted under the so-called “Clean Energy Package”, replaced Directive 2009/72/EC and amended Directive 2012/27/EU. As a result, the main provisions applicable to electricity smart meters in the EU (including their mandatory functional requirements) that used to be laid down in these two Directives separately,<sup>43</sup> are now enshrined in the Directive 2019/944 currently in force.<sup>44</sup> Directive 2019/944 is itself based on Article 194(2) TFEU, which allows the EU to establish the measures necessary to achieve the objectives in Article 194(1) TFEU. One of these objectives, enshrined in Article 194(1)(c) TFEU, is to promote energy efficiency and energy saving.

### 3.1 Main Characteristics and Requirements of Smart Meters under Directive 2019/944

According to Article 2(23) of Directive 2019/944, smart metering systems have the following characteristics: a) they are capable of measuring electricity consumed and fed into the grid, b) they provide more information than a conventional meter,<sup>45</sup> and c) they are capable of receiving and transmitting data “for information, monitoring and control purposes, using a form of electronic communication”.<sup>46</sup> This definition echoes to a certain extent the definition introduced in the Commission Recommendation 2012/148/EU, but it is now enshrined in a legally binding EU instrument.

Under Article 19 of Directive 2019/944, smart meters are seen as an instrument to promote energy efficiency<sup>47</sup> and to empower consumers. According to Recital 52 of Directive 2019/944, smart meters empower consumers by allowing them “to receive accurate and near real-time feedback on their energy consumption or generation, and to manage their consumption better, to participate in and reap benefits from demand response programmes and other

<sup>41</sup> 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, November 14 2012, pp. 1–56.

<sup>42</sup> 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, OJ L 158, pp. 125–199.

<sup>43</sup> See Max Baumgart, ‘A (Legal) Challenge to Privacy: On the Implementation of Smart Meters in the EU and the US’ in Rafael Leal-Arcas and Jan Wouters (eds), *Research Handbook on EU Energy Law and Policy* (Edward Elgar Publishing 2017), <https://www.elgaronline.com/edcollchap/edcoll/9781786431042/9781786431042.00029.xml> accessed 24 June 2024.

<sup>44</sup> For a more detailed overview of the evolution of the legal instruments regarding smart meters in the EU, see Clément Alaton and Frédéric Tounquet, ‘Benchmarking Smart Metering Deployment in the EU-28: Final Report’ (Publications Office of the European Union 2020), <https://data.europa.eu/doi/10.2833/492070> accessed 24 June 2024, pp. 27–29.

<sup>45</sup> A conventional meter is “an analogue or electronic meter with no capability to both transmit and receive data”, Article 2(22) Directive (EU) 2019/944.

<sup>46</sup> Article 2(23) Directive (EU) 2019/944.

<sup>47</sup> ‘Energy Efficiency’ is defined as “the ratio of output of performance, service, goods or energy, to input of energy”, Article 2(30) Directive (EU) 2019/944.

services, and to lower their electricity bills.”<sup>48</sup> The goal to empower consumers thus takes further the goal of implementing smart meters to assist the active participation of consumers in the electricity supply market initially enshrined in Annex I(2) Directive 2009/72/EC. Besides the main goals of promoting energy efficiency and empowering consumers, Recital 52 of Directive 2019/944 acknowledges that smart metering systems can also help distribution system operators (DSOs) to have “better visibility of their networks, and as a consequence, to reduce their operation and maintenance costs and to pass those savings on to the consumers in the form of lower distribution tariffs.”<sup>49</sup>

Article 19(2) Directive 2019/944 mandates Member States to “ensure the deployment in their territories of smart metering systems that assist the active participation of customers in the electricity market”.<sup>50</sup> According to Directive 2019/944, the deployment or roll out of smart metering systems in Member States may be subject to a cost-benefit assessment, following principles laid down in Annex II to the Directive.<sup>51</sup> This approach follows the path already laid down by Directive 2009/72/EC. In Member States where the cost-benefit assessment is positive, the target of at least 80% of consumers equipped with smart meters must be reached within seven years from that assessment, or by 2024 for Member States that have already started deploying smart meters systematically before July 2019.<sup>52</sup> A report published by the European Union Agency for the Cooperation of Energy Regulators (ACER) and the Council of European Energy Regulators (CEER), shows that by the end of 2022, only thirteen Member States had successfully achieved the target of at least 80% consumers equipped with smart meters.<sup>53</sup>

Furthermore, Directive 2019/944 requires Member States in which the assessment to deploy smart meters has been negative, to revise such assessment (and notify the outcome to the European Commission) at least every four years, or before that, if there have been significant changes in the assumptions underlying the assessment or important technological and market developments.<sup>54</sup> In addition, following Article 21 Directive 2019/944, in Member States where there is no positive cost-benefit assessment and hence no systematic roll out of smart meters, consumers are entitled to request a smart meter if they bear the associated costs. This shows that there is a clear intention in Directive 2019/944 of promoting the adoption of smart meters in the EU.

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<sup>48</sup> Recital 52 Directive (EU) 2019/944.

<sup>49</sup> Recital 52 Directive (EU) 2019/944.

<sup>50</sup> Article 19, para. 2 Directive (EU) 2019/944.

<sup>51</sup> Which, among other aspects entails: “an economic assessment of all of the long-term costs and benefits to the market and the individual consumer”, as well as taking into consideration the minimum functionalities laid down in Commission Recommendation 2012/148/EU of 9 March 2012 on preparations for the roll-out of smart metering systems (OJ L 73, March 13, 2012, pp. 9–22), and “the best available techniques for ensuring the highest level of cybersecurity and data protection”. Annex II, section 2, Directive (EU) 2019/944.

<sup>52</sup> Annex II, section 3, Directive (EU) 2019/944.

<sup>53</sup> European Union Agency for the Cooperation of Energy Regulators and Council of European Energy Regulators, ‘Energy Retail and Consumer Protection - 2023 Market Monitoring Report’ (2023), [https://acer.europa.eu/sites/default/files/documents/Publications/2023\\_MMR\\_Energy\\_Retail\\_Consumer\\_Protection.pdf](https://acer.europa.eu/sites/default/files/documents/Publications/2023_MMR_Energy_Retail_Consumer_Protection.pdf) accessed 24 June 2024.

<sup>54</sup> Article 19, para. 5, Directive (EU) 2019/944.

*Table 24.2 Requirements of Smart Metering Systems (Art. 20, Directive 2019/944)*

Measure accurately actual electricity consumption and be capable of providing to final customers information on actual time of use.	Article 20 (a)
Consumers should be able to access and visualise validated historical consumption data, on request and at no additional cost.	
Consumers should be able to access non-validated near real time consumption data at no additional cost, to support automated energy efficiency programmes, demand response and other services.	
Smart metering systems and data communication must comply with EU (cyber) security rules.	Article 20 (b)
Smart metering systems must comply with EU data protection and privacy rules.	Article 20 (c)
Smart meters must be able to account for electricity fed into the grid by active consumers (also known as prosumers).	Article 20 (d)
The consumer should be able (on request) to have access or to give access to a third party acting on their behalf, to their consumption and feed in data, at no additional cost.	Article 20 (e) and last paragraph. See also Article 23, para. 5.
Consumers should receive advice and information concerning the management of meters' readings and the monitoring of energy consumption, as well as the processing of personal data.	Article 20 (f)
Smart metering systems should allow consumers "to be metered and settled at the same time resolution as the imbalance settlement period in the national market".	Article 20 (g)

Besides the formally non-binding EU Recommendation on the functionalities of smart meters, the main functional requirements of smart meters in the EU are also provided for by Annex II and Article 20 Directive 2019/944.<sup>55</sup> Table 24.2 summarizes the main (functional) requirements listed in this Directive.

It is noteworthy that Article 20 Directive 2019/944 does not replicate all the functional requirements from the abovementioned Commission Recommendation 2012/148/EU. In fact, the Recommendation is only mentioned once in Directive 2019/944, more precisely in Annex II, section 2, as one of the factors to take into consideration when performing the cost-benefit assessment that Member States may perform before starting a systematic rollout of smart metering systems. Hence, any functional requirements that go beyond the ones set forth mandatorily in Article 20 of Directive 2019/944 are in principle to be decided by the Member States.

One of the novelties of Directive 2019/944 is that it obliges Member States to specify rules for access to consumer data, including (smart) metering and consumption data, by eligible parties in its Article 23. Article 23 also introduces a number of requirements that Member States must comply with when regulating the management and access to consumer data.<sup>56</sup> These requirements include ensuring efficient, secure and non-discriminatory data access, and ensuring data security and data protection. Regarding the latter, there is an explicit reference

<sup>55</sup> The requirements in Article 20 Directive 2019/944 replicate to a large extent the requirements laid down in Article 9 Directive 2012/27/EU.

<sup>56</sup> For a more detailed explanation of the provisions concerning data management and access under the Directive 2019/944, see Brenda Espinosa Apráez, 'The Challenges of Sharing Data at the Intersection of EU Data Protection and Electricity Market Legislation: Lessons from the Netherlands' (2023) 41 *Journal of Energy & Natural Resources Law* 403.

to the applicability of the General Data Protection Regulation (GDPR)<sup>57</sup> whenever personal data is processed in the management and/or exchange of data following the provisions of the Directive 2019/944 (Article 23, para. 5).

Article 24 of the same Directive gives powers to the European Commission to adopt implementing acts to lay down interoperability requirements and non-discriminatory and transparent procedures for access to consumers' data. The first of such implementing acts, Implementing Regulation (EU) 2023/1162,<sup>58</sup> was adopted in June 2023 and regulates access to metering and consumption data.<sup>59</sup>

### **3.2 Implementing Regulation (EU) 2023/1162**

Article 1(2) of Implementing Regulation (EU)2023/1162 introduces a reference model “that sets out the rules and procedures that Member States shall apply to enable interoperability” in the access to data, and lists “the electricity market participants that are concerned by this act and the roles and responsibilities they perform individually or jointly”.<sup>60</sup> The reference model thus consists of a set of reference procedures for data access,<sup>61</sup> as well as the necessary information exchanges between the roles performed by the electricity market parties.<sup>62</sup> For example, Regulation (EU) 2023/1162 lays down obligations for ‘metered data administrators’, which are parties (typically DSOs) “responsible for storing validated historical metering and consumption data and distributing these data to [consumers] and/or eligible parties”.<sup>63</sup> Eligible parties are defined in the Implementing Regulation as entities “offering energy-related services to final customers”, which includes (among other entities) DSOs, suppliers, energy

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<sup>57</sup> 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, OJ L 119, May 4 2016, pp. 1–88.

<sup>58</sup> 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, June 15 2023, pp. 10–40.

<sup>59</sup> ‘Metering and consumption data’ means “meter readings of electricity consumption from the grid, or electricity fed into the grid, or consumption from on-site generation facilities which are connected to the grid, and includes validated historical data and non-validated near-real time data”, Article 2(2) Commission Implementing Regulation (EU) 2023/1162. ‘Validated historical metering and consumption data’ means “historical metering and consumption data collected from a meter, a conventional meter or a smart meter, or a smart metering system, or completed with substitute values that are determined otherwise in case of meter unavailability”, Article 2(3) Commission Implementing Regulation (EU) 2023/1162. ‘Near real-time metering and consumption data’ means “metering and consumption data provided continuously by a smart meter or a smart metering system in a short time period, usually down to seconds or up to the imbalance settlement period in the national market, which is non-validated and made available through a standardised interface or through remote access in line with Article 20(a) of the Electricity Directive (EU) 2019/944”, Article 2(5) Commission Implementing Regulation (EU) 2023/1162.

<sup>60</sup> Article 1, para. 2, Commission Implementing Regulation (EU) 2023/1162.

<sup>61</sup> For the list of procedures, see Implementing Regulation (EU) 2023/1162, Annex, Table III and following.

<sup>62</sup> See Article 2(1) and the Annex of Commission Implementing Regulation (EU) 2023/1162.

<sup>63</sup> Article 2(7) Commission Implementing Regulation (EU) 2023/1162.

services companies, aggregators and energy communities.<sup>64</sup> These ‘eligible parties’ can access consumer data provided that there is a ‘permission’ granted by the consumer, i.e., an authorization given to an eligible party on the basis of a contractual agreement, to have access to their data for the provision of a specific service.<sup>65</sup> Recital 16 Implementing Regulation explicitly acknowledges that the processing of personal data following its rules, needs to comply with the GDPR and also with the so-called E-Privacy Directive (Directive 2002/58/EC).<sup>66</sup> The latter applies because smart meters qualify as terminal equipment, as defined in that legal instrument.

#### 4. SMART METERS AND THE RIGHTS TO PRIVACY AND PERSONAL DATA PROTECTION

This contribution has referred to the opportunities offered by smart meters in the context of the Twin Transitions. However, smart meters also come along with concerns, in particular regarding their impact on the rights to privacy and personal data protection of electricity consumers. Although sometimes used interchangeably, in the EU legal system, these are two different rights. Article 7 CFR,<sup>67</sup> protects the private and family life, the homes and communications of natural persons.<sup>68</sup> Private life is the area that concerns only oneself.<sup>69</sup> ‘Home’ means the geographic area that therefore affects only oneself because it is removed from the general access,<sup>70</sup> including basements.<sup>71</sup>

In turn, Article 8 CFR provides for the protection of personal data. It protects any information relating to a natural person.<sup>72</sup> However, the protections granted by Article 8 CFR only

<sup>64</sup> Article 2(6) Commission Implementing Regulation (EU) 2023/1162.

<sup>65</sup> Article 2(8) Commission Implementing Regulation (EU) 2023/1162.

<sup>66</sup> Directive 2002/58/EC of the European Parliament and of the Council of 12 July 2002 concerning the processing of personal data and the protection of privacy in the electronic communications sector (Directive on privacy and electronic communications), OJ L 201, July 31st 2002, pp. 37–47.

<sup>67</sup> Article 7 CFR states: ‘Respect for private and family life. Everyone has the right to respect for his or her private and family life, home and communications’, Charter of Fundamental Rights of the European Union, OJ C 364, December 18th 2000, pp. 1–22, 10.

<sup>68</sup> Ino Augsberg, in Hans von der Groeben/Jürgen Schwarze/Armin Hatje (eds), *Europäisches Unionsrecht* (7th edn, Nomos 2015), Art. 7 GRC marginal reference number 10.

<sup>69</sup> See Norbert Bernsdorff, in Jürgen Meyer (ed), *Charta der Grundrechte der Europäischen Union* (5th edn, Nomos 2019), Art. 7 marginal reference number 15; Ino Augsberg, in Hans von der Groeben/Jürgen Schwarze/Armin Hatje (eds), *Europäisches Unionsrecht* (7th edn, Nomos 2015), Art. 7 GRC marginal reference number 5.

<sup>70</sup> Thorsten Kingreen, in Christian Calliess/Matthias Ruffert (eds), *EUV/AEUV. Das Verfassungsrecht der Europäischen Union mit Europäischer Grundrechtecharta. Kommentar* (6th edn, CH Beck 2022), Art. 7 GRCh marginal reference number 9.

<sup>71</sup> Hans D. Jarass, *Charta der Grundrechte der Europäischen Union. Kommentar* (4th edn, CH Beck 2021), Art. 7 marginal reference number 22.

<sup>72</sup> Norbert Bernsdorff, in Jürgen Meyer (ed), *Charta der Grundrechte der Europäischen Union* (5th edn, Nomos 2019), Art. 8 marginal reference number 20; Ino Augsberg, in Hans von der

apply in the context of data processing operations.<sup>73</sup> The content of the right to data protection is less clear than that of the right to privacy, and there is no consensus regarding what exactly this right protects.<sup>74</sup> From a textual analysis of Article 8 CFR, however, three elements emerge: i) a set of data processing principles to be respected; ii) rights that are granted to the person to which the data relate (e.g. access and rectification); and iii) an obligation for Member States to ensure independent monitoring.<sup>75</sup>

Even if there is a broad consensus that privacy and personal data protection are two different rights, drawing a clear cut distinction between them is difficult, as they are strongly connected,<sup>76</sup> and are usually applied jointly.<sup>77</sup> However, the literature has attempted to explain the difference between these two rights, saying that while privacy has a more substantive nature (it protects specific interests, i.e., private and family life, home and communications), personal data protection has a “more formal, procedural nature”, dictating a set of rules and procedures that apply to personal data processing to protect various underlying rights.<sup>78</sup>

In the case of smart metering systems, both privacy and personal data protection are at stake. The right to privacy is concerned, because smart meters are installed at the homes of consumers, and they are able to collect and transmit information about electricity consumption or feed in, which can give insight into the behaviour, habits and other circumstances of consumers in their private and family life.<sup>79</sup> The right to personal data protection is also concerned, because

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Groeben/Jürgen Schwarze/Armin Hatje (eds), *Europäisches Unionsrecht* (7th edn, Nomos 2015), Art. 8 GRC marginal reference number 7.

<sup>73</sup> Kirsten Bock/Malte Engeler, ‘Die verfassungsrechtliche Wesengehaltsgarantie als absolute Schranke im Datenschutzrecht’ [2016] *Deutsches Verwaltungsblatt* (DVBl), 593, 595; Ino Augsberg, in Hans von der Groeben/Jürgen Schwarze/Armin Hatje (eds), *Europäisches Unionsrecht* (7th edn, Nomos 2015), Art. 8 GRC marginal reference number 11; Norbert Bernsdorff, in Jürgen Meyer (ed), *Charta der Grundrechte der Europäischen Union* (5th edn, Nomos 2019), Art. 8 marginal reference number 22.

<sup>74</sup> See Gloria González Fuster, ‘Study on the Essence of the Fundamental Rights to Privacy and to Protection of Personal Data’ (European Data Protection Supervisor 2022) EDPS 2021/0932, [https://edps.europa.eu/system/files/2023-11/edps-vub-study\\_on\\_the\\_essence\\_of\\_fundamental\\_rights\\_to\\_privacy\\_and\\_to\\_protection\\_of\\_personal\\_data\\_en.pdf](https://edps.europa.eu/system/files/2023-11/edps-vub-study_on_the_essence_of_fundamental_rights_to_privacy_and_to_protection_of_personal_data_en.pdf) accessed 24 June 2024, 17.

<sup>75</sup> *Ibid.*

<sup>76</sup> See Jeanne P. Misfud Bonnici, ‘Exploring the non-absolute nature of the right to data protection’ (2014) Vol. 28, *International Review of Law, Computers & Technology*, 131, 137, and Gloria González Fuster/Raphaël Gellert, ‘The fundamental right of data protection in the European Union: In search of an uncharted right’ (2012) Vol. 26, *International Review of Law, Computers & Technology*, 73, 77, with reference to ECJ, Decision of 09 November 2010, Joined Cases C-92/09 and C-93/09, ECLI:EU:C:2010:662, paragraph 47.

<sup>77</sup> See Gloria González Fuster, ‘Study on the Essence of the Fundamental Rights to Privacy and to Protection of Personal Data’ (European Data Protection Supervisor 2022) EDPS 2021/0932, [https://edps.europa.eu/system/files/2023-11/edps-vub-study\\_on\\_the\\_essence\\_of\\_fundamental\\_rights\\_to\\_privacy\\_and\\_to\\_protection\\_of\\_personal\\_data\\_en.pdf](https://edps.europa.eu/system/files/2023-11/edps-vub-study_on_the_essence_of_fundamental_rights_to_privacy_and_to_protection_of_personal_data_en.pdf) accessed 24 June 2024, 24.

<sup>78</sup> Lorenzo Dalla Corte, ‘The European Right to Data Protection in Relation to Open Data’ in Bastiaan van Loenen, Glenn Vancauwenberghe and Joep Cromptvoets (eds), *Open Data Exposed* (TMC Asser Press 2018), [https://doi.org/10.1007/978-94-6265-261-3\\_7](https://doi.org/10.1007/978-94-6265-261-3_7) accessed 24 June 2024, 136. See also, Orla Lynskey, ‘Deconstructing data protection: The “added-value” of a right to data protection in the EU legal order’ (2014) *International and Comparative Law Quarterly*, 569, 569ff.

<sup>79</sup> See Section 4.1 below.

smart meters are tools that enable the processing<sup>80</sup> of personal data, i.e., “any information relating to an identified or identifiable natural person (‘data subject’)”.<sup>81</sup> Smart meter data can be qualified as personal data because it can be associated with a unique identifier (e.g. the meter identification number), which is in turn linked to at least one identified individual, the consumer responsible for the electricity contract.<sup>82</sup> In addition, the data is used to make decisions that directly affect the consumer (e.g. invoicing the electricity consumed).<sup>83</sup>

The next sections will provide an overview of key challenges that smart electricity meters pose vis-à-vis the rights to privacy and personal data protection in the EU, following from a review of legal scholarship, as well as other sources, such as Opinions by the European Data Protection Supervisor (EDPS) and the Article 29 Data Protection Working Party (replaced by the European Data Protection Board – EDPB). Even though for readability purposes there are separate sections for privacy and data protection, it is important to note that some of the identified challenges are compounded by concerns relating to both rights, which, as noted before, are strongly interconnected.

#### 4.1 Challenges of Smart Meters vis-à-vis the Right to Privacy

It is noteworthy that most of the legal literature on smart meters and the fundamental right to privacy in the EU was published in the years following the adoption of Directive 2009/72/EC. The concerns that smart metering systems arise vis-à-vis privacy stem from the fact that by collecting detailed data on electricity usage, smart meters might also allow to “track what members of a household do within the privacy of their own homes, whether they are away on holiday or at work, if someone uses a specific medical device or a baby-monitor, how they like to spend their free time.”<sup>84</sup> Literature suggests that, given the fact that home appliances have characteristic load profiles, it is possible to identify exactly what appliance is being used at

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<sup>80</sup> ‘Processing’ means “any operation or set of operations which is performed on personal data or on sets of personal data, whether or not by automated means, such as collection, recording, organisation, structuring, storage, adaptation or alteration, retrieval, consultation, use, disclosure by transmission, dissemination or otherwise making available, alignment or combination, restriction, erasure or destruction”, Article 4(2) GDPR.

<sup>81</sup> Article 4(1) GDPR.

<sup>82</sup> Article 29 Data Protection Working Party, ‘Opinion 12/2011 on Smart Metering’ (2011) 00671/11/EN WP 183, [https://ec.europa.eu/justice/article-29/documentation/opinion-recommendation/files/2011/wp183\\_en.pdf](https://ec.europa.eu/justice/article-29/documentation/opinion-recommendation/files/2011/wp183_en.pdf), 8. See also Maximilian Wimmer, ‘Smart Meter, Plattform und Blockchain, Datenschutzrechtliche Herausforderungen neuer Digitalisierungskonzepte der Energiewende’ (2020) *EnWZ – Zeitschrift für das gesamte Recht der Energiewirtschaft*, 387, 389; Sebastian Bretthauer ‘Smart Meter im Spannungsfeld zwischen Europäischer Datenschutzgrundverordnung und Messstellenbetriebsgesetz’ (2017) *EnWZ – Zeitschrift für das gesamte Recht der Energiewirtschaft*, 56, 57–58. For further discussion see Lutz Martin Keppeler, ‘Personenbezug und Transparenz im Smart Meter-Datenschutz zwischen europäischem und nationalem Recht’ (2016) *EnWZ – Zeitschrift für das gesamte Recht der Energiewirtschaft*, 99.

<sup>83</sup> Article 29 Data Protection Working Party, ‘Opinion 12/2011 on Smart Metering’ (2011) 00671/11/EN WP 183, [https://ec.europa.eu/justice/article-29/documentation/opinion-recommendation/files/2011/wp183\\_en.pdf](https://ec.europa.eu/justice/article-29/documentation/opinion-recommendation/files/2011/wp183_en.pdf), 8.

<sup>84</sup> European Data Protection Supervisor, ‘Press Release - Smart Meters: Consumer Profiling Will Track Much More than Energy Consumption If Not Properly Safeguarded, Says the EDPS’

a given time, to the point that it might be even possible to pinpoint which TV program is being watched in a household.<sup>85</sup>

Two main topics stand out in the legal literature concerning smart meters and the right to privacy. First, the compatibility of the EU and national laws that introduce these technologies with the fundamental right to privacy, Second, on the other hand, concerns regarding the uses that can be given to smart meter data beyond the original intended aims of smart metering systems.

#### 4.1.1 The compatibility of legislation introducing smart meters with the right to privacy

The compatibility of legislation introducing smart meters with the right to privacy has been studied from the EU law as well as from the national law perspective, and both based on the codification of the right to privacy under Article 8 of the European Convention on Human Rights (ECHR)<sup>86</sup> and Article 7 CFR.<sup>87</sup>

The chapter by *Baumgart* in the previous edition of this Research Handbook,<sup>88</sup> for example, examined the compatibility of the two EU legal instruments introducing smart meters with Article 7 CFR in 2017. After establishing that the introduction of smart meters in the EU following Directive 2009/72/EC and Directive 2012/27/EU constitutes an impairment of the right to privacy as enshrined in Article 7 CFR, it was explored whether there are any grounds to justify the limitation of the right to privacy, following the criteria laid down in Article 52 CFR. Article 52 CFR states that any limitations to the rights and freedoms enshrined in the Charter “must be provided for by law and respect the essence of those rights and freedoms”, and that such limitations “may be made only if they are necessary and genuinely meet objectives of general interest recognised by the Union or the need to protect the rights and freedoms of others”, subject to the principle of proportionality. The chapter by *Baumgart* concluded that even though the introduction of smart meters interferes with the right to privacy, this is “based on a legally binding EU act and the directives’ purpose and scope is recognizable”,

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(2012) EDPS/10/12, [https://www.edps.europa.eu/sites/default/files/edpsweb\\_press\\_releases/edps-2012-10\\_smartmetering\\_en.pdf](https://www.edps.europa.eu/sites/default/files/edpsweb_press_releases/edps-2012-10_smartmetering_en.pdf) accessed 24 June 2024.

<sup>85</sup> Ulrich Greveler, Peter Glösekötter, Benjamin Justus and Dennis Löhr, ‘Multimedia content identification through smart meter power usage profiles’, <https://www.nds.rub.de/media/nds/veroeffentlichungen/2012/07/24/ike2012.pdf> accessed 24 June 2024, 7. If the measurement is carried out in two-second intervals, it is in principle possible to conclude the TV programme or other audio-visual content, see Greveler et al., *ibid.* See also Ulrich Greveler, Benjamin Justus and Dennis Lohr, ‘Identifikation von Videoinhalten über granulare Stromverbrauchsdaten’, <https://subs.emis.de/LNI/Proceedings/Proceedings195/35.pdf> accessed 24 June 2024.

<sup>86</sup> European Convention on Human Rights of 4 November 1950, as amended by Protocols Nos. 11, 14 and 15, supplemented by Protocols Nos. 1, 4, 6, 7, 12, 13 and 16, [https://www.echr.coe.int/documents/d/echr/convention\\_ENG](https://www.echr.coe.int/documents/d/echr/convention_ENG) accessed 24 June 2024.

<sup>87</sup> Article 7 CFR states: ‘Respect for private and family life. Everyone has the right to respect for his or her private and family life, home and communications’, Charter of Fundamental Rights of the European Union, OJ C 364, December 18 2000, pp. 1–22.

<sup>88</sup> Max Baumgart, ‘A (Legal) Challenge to Privacy: On the Implementation of Smart Meters in the EU and the US’ in Rafael Leal-Arcas and Jan Wouters (eds), *Research Handbook on EU Energy Law and Policy* (Edward Elgar Publishing 2017), <https://www.elgaronline.com/edcollchap/edcoll/9781786431042/9781786431042.00029.xml> accessed 24 June 2024.



and moreover, there is no impairment of the essence of this right.<sup>89</sup> However, according to *Baumgart*, the obligation under Directive 2009/72/EC does not comply with the requirements of proportionality and necessity laid down in Article 52 CFR, in particular because it does not introduce provisions to limit the measuring intervals to the strictly necessary, to “exclude systematic monitoring from the outset”.<sup>90</sup>

Similar assessments were also conducted in parallel on the national level.<sup>91</sup> In the case of Germany, it was highlighted that the possibility of accessing information associated with the mandatory installation of smart metering systems, which can depict residential behaviour to a significant extent, leads to a permanent interference with the right to withdraw into a private space protected by Article 13 of the German Basic Law, unless such conclusions can be excluded by the law.<sup>92</sup> Further, a salient case studied by *Cuijpers* and *Koops* also sheds light on the (heated) debates around privacy that emerged when the legislation to introduce smart meters in the Netherlands was being proposed.<sup>93</sup> In a nutshell, the Dutch Senate (*Eerste Kamer*) rejected the initial legislative proposal submitted by the government to regulate the roll out of smart meters, due to serious concerns vis-à-vis the right to privacy raised by public opinion, and in particular, by a report commissioned by a Dutch consumer association (*Consumentenbond*) and prepared by *Cuijpers* and *Koops*.<sup>94</sup> In that study, the authors assessed whether the legislative proposal would stand a strict privacy-compliance test, following Article 8 ECHR.<sup>95</sup> They found that three characteristics of the proposed smart metering system did not meet the test’s requirement of being necessary in a democratic society: “the generation and passing on of quarter-hourly/hourly readings to grid managers; the daily readings to grid managers and suppliers; and the compulsory roll-out of smart meters to all households.”<sup>96</sup> *Cuijpers* and *Koops* also found that “the government had provided too little evidence to assess the necessity of building in a switching function that would enable capacity to be switched

<sup>89</sup> *Ibid.*, 364.

<sup>90</sup> *Ibid.*

<sup>91</sup> Max Baumgart and Arnulf Mallmann, *Die Duldungspflicht nach § 36 Abs. 3 MsbG – eine grundrechtliche Anmerkung* (2017) *Zeitschrift für neues Energierecht*, 95.

<sup>92</sup> *Ibid.*, 101.

<sup>93</sup> Colette Cuijpers and Bert-Jaap Koops, ‘Smart Metering and Privacy in Europe: Lessons from the Dutch Case’ in Serge Gutwirth and others (eds), *European Data Protection: Coming of Age* (Springer Netherlands 2013), [https://doi.org/10.1007/978-94-007-5170-5\\_12](https://doi.org/10.1007/978-94-007-5170-5_12) accessed 24 June 2024.

<sup>94</sup> Colette Cuijpers and Bert-Jaap Koops, ‘Het wetsvoorstel “slimme meters”: een privacytoets op basis van art. 8 EVRM [The “smart meters” bill: a privacy test based on article 8 ECHR], Study commissioned by the Dutch Consumers’ Association’ (TILT – Centrum voor Recht, Technologie en Samenleving 2008).

<sup>95</sup> Such test is derived from Art. 8(2) ECHR which states: “There shall be no interference by a public authority with the exercise of this right except such as is in accordance with the law and is necessary in a democratic society in the interests of national security, public safety or the economic well-being of the country, for the prevention of disorder or crime, for the protection of health or morals, or for the protection of the rights and freedoms of others.”

<sup>96</sup> Colette Cuijpers and Bert-Jaap Koops, ‘Smart Metering and Privacy in Europe: Lessons from the Dutch Case’ in Serge Gutwirth and others (eds), *European Data Protection: Coming of Age* (Springer Netherlands 2013), [https://doi.org/10.1007/978-94-007-5170-5\\_12](https://doi.org/10.1007/978-94-007-5170-5_12) accessed 24 June 2024, 280.

on and off remotely”.<sup>97</sup> These critical points ultimately led to an adjustment of the legislative proposal to make it more protective of the right to privacy, by making the roll out of smart meters voluntary instead of mandatory, and by giving more options for consumers to decide how often they wanted their smart meters to be read out.<sup>98</sup> One of the authors’ key conclusions is that “[t]he smarter a meter is, i.e., the more detailed its readings are – up to quarter-hourly or even less – and the more functionalities it has, the more likely is it to be privacy-invasive”.<sup>99</sup> And the more privacy invasive the smart metering system, the bigger the burden on the legislator to demonstrate its necessity in a democratic society.<sup>100</sup>

#### 4.1.2 Privacy concerns regarding secondary uses of smart meter data

Another prominent topic in legal literature on smart meters and privacy relates to the risks associated to the use of smart meter data for aims that go beyond the purposes of smart metering systems, which, as noted earlier, are mainly energy efficiency and consumer empowerment, and secondly, improving network visibility for DSOs to reduce operation and maintenance costs. *King and Jessen* make a distinction between primary and secondary purposes for acquiring and using the information collected with smart meters.<sup>101</sup> According to the authors, a primary purpose for smart meter data is enabling “the energy supplier (and/or the network operator) to provide energy to the customer and engage in energy management activities associated with the smart grid”, which includes e.g., measuring and invoicing electricity use or offering dynamic electricity prices.<sup>102</sup> Secondary purposes are those that “are not directly related to providing energy to customers or managing the energy supply”, such as targeted and personalized advertising.<sup>103</sup> Besides the potential use for marketing purposes, the EDPS warns about the interest that other parties (such as law enforcement and tax authorities, insurance companies, landlords or employers) might have in obtaining consumers’ energy usage information.<sup>104</sup> The main concern here is that the frequent and continuous measurement of electricity use allowed by smart meters results in energy use profiles which reveal detailed information about the lifestyle and behaviour of the occupants of the home, which might be problematic if this information is not properly handled or used for purposes other than the primary purposes for which smart meters have been introduced in the EU.<sup>105</sup>

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<sup>97</sup> Ibid.

<sup>98</sup> Ibid., section 12.3.5.

<sup>99</sup> Ibid., 291.

<sup>100</sup> Ibid.

<sup>101</sup> Nancy J King and Pernille W Jessen, ‘Smart Metering Systems and Data Sharing: Why Getting a Smart Meter Should Also Mean Getting Strong Information Privacy Controls to Manage Data Sharing’ (2014) 22 *International Journal of Law and Information Technology* 215.

<sup>102</sup> Ibid., 231.

<sup>103</sup> Ibid., 232.

<sup>104</sup> European Data Protection Supervisor, ‘Opinion of the European Data Protection Supervisor on the Commission Recommendation on Preparations for the Roll-out of Smart Metering Systems’ (European Data Protection Supervisor 2012), [https://www.edps.europa.eu/sites/default/files/publication/12-06-08\\_smart\\_metering\\_en.pdf](https://www.edps.europa.eu/sites/default/files/publication/12-06-08_smart_metering_en.pdf) accessed 24 June 2024, 6.

<sup>105</sup> Cf. Nancy J King and Pernille W Jessen, ‘Smart Metering Systems and Data Sharing: Why Getting a Smart Meter Should Also Mean Getting Strong Information Privacy Controls to Manage Data Sharing’ (2014) 22 *International Journal of Law and Information Technology* 215, 250.

In this context, one crucial point of concern is the use of smart meter data by law enforcement agencies. *Milaj* and *Misfud Bonnici*, for example, warn that smart meters might end up being “non-purpose built surveillance tools” used by law enforcement authorities.<sup>106</sup> “Non-purpose built surveillance tools” are “devices that are not originally built for the purpose of surveillance [but] are used for this purpose”, such as smart phones, TVs, or GPS navigation systems.<sup>107</sup> According to the cited authors, smart meter data is attractive for law enforcement agencies, because it can “give the possibility for detecting illegal activities, for collecting evidence, for verifying defendants’ claims [...], suspects’ claims and even for creating and verifying profiles of certain criminals”.<sup>108</sup> For example, smart meter data can reveal if electricity is used to cultivate narcotic plants or unauthorized commercial activities, as well as whether a suspect is at home or not.<sup>109</sup>

Since smart meters allow to transmit information about electricity use in short intervals and they are installed at the homes of consumers and active all the time, they might enable direct surveillance of the individuals in the household.<sup>110</sup> As noted by *Milaj* and *Misfud Bonnici* “[t]hat is tantamount to 24 h surveillance of activities that take place in the privacy of one’s home and it is also the reason why the need for a warrant similar with [*sic*] the one needed for searching a home has been advised, when smart meter data is asked for”.<sup>111</sup> The authors examine the effects of surveillance via smart meters on the right to privacy (and data protection) in cases of individual and mass surveillance. Individual surveillance refers to the surveillance of targeted individuals by law enforcement authorities.<sup>112</sup> *Milaj* and *Misfud Bonnici* identify three problematic aspects regarding individual surveillance.<sup>113</sup> Firstly, the lack of protection of the privacy of individuals that are subject to incidental surveillance (i.e., people who are not the target of surveillance but whose data is also accidentally collected), e.g., the other residents of a household where a suspect resides.<sup>114</sup> Secondly, the possibility of having inaccurate data for the profiling of individuals, if, for example “one member of the household engages in an activity that is normally attributed to another member”.<sup>115</sup> Thirdly, the possibility of past surveillance, i.e., the possibility that law enforcement agencies have access to historical smart meter data and thereby have “the possibility to scrutinize past activities, belonging to a time that the individual was not under suspicion and no mandate for his surveillance was issued”.<sup>116</sup> Regarding mass surveillance, i.e., the surveillance of certain groups of individuals (under so-called mass surveillance programmes), *Milaj* and *Misfud Bonnici* observe that under EU law, the possibility of a “routine control by the law enforcement authorities of smart meter

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<sup>106</sup> Jonida Milaj and Jeanne Pia Mifsud Bonnici, ‘Smart Meters as Non-Purpose Built Surveillance Tools’ in Stefan Schiffner and others (eds), *Privacy Technologies and Policy* (Springer International Publishing 2016).

<sup>107</sup> *Ibid.*, 83.

<sup>108</sup> *Ibid.*, 85.

<sup>109</sup> *Ibid.*, 86.

<sup>110</sup> *Ibid.*, 88.

<sup>111</sup> *Ibid.*

<sup>112</sup> *Ibid.*

<sup>113</sup> *Ibid.*, section 4.1.

<sup>114</sup> *Ibid.*, 89.

<sup>115</sup> *Ibid.*, 90.

<sup>116</sup> *Ibid.*

data for detecting special crimes is [...] not to be excluded”.<sup>117</sup> Moreover, the authors note that such a routine control of smart meter data “is tantamount to a routine control inside a house and this goes against the right to inviolability of the home”.<sup>118</sup> Therefore, they advise against the use of smart meter data for surveillance purposes without a specific mandate and highlight the importance of taking into account the proportionality of the interference with the private life of people if mass surveillance programmes with smart meter data are to be implemented.<sup>119</sup>

#### 4.2 Challenges of Smart Meters vis-à-vis Personal Data Protection

In the case of personal data protection, the focus will be on scholarship published after the adoption of the GDPR and Directive 2019/944. Where relevant, reference will also be made to opinions from the EDPS and the Article 29 Data Protection Working Party (replaced by the EDPB) both from before and after the adoption of Directive 2019/944.

Before diving into the challenges of smart meters vis-à-vis personal data protection, it is relevant to provide a brief summary of the GDPR. The GDPR is an EU Regulation based on Article 16 TFEU,<sup>120</sup> which has the dual objective of safeguarding the right to personal data protection and facilitating the free movement of personal data.<sup>121</sup> It is the most comprehensive legal framework concerning personal data protection in the EU, and it applies to the processing of personal data<sup>122</sup> in all sectors and domains that are not expressly excluded from its scope.<sup>123</sup> The GDPR lays down several obligations and principles that must be complied with by the actors that process personal data, namely, data controllers<sup>124</sup> and data processors,<sup>125</sup> and it also grants several rights to data subjects in respect of their personal data (such as the rights to information, access, rectification and erasure and the right to data portability).<sup>126</sup> As noted in Section 4 of this chapter, smart meter data from households qualifies as personal data and

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<sup>117</sup> Ibid., 91.

<sup>118</sup> Ibid.

<sup>119</sup> Ibid.

<sup>120</sup> Consolidated version of the Treaty on the Functioning of the European Union 2016 OJ C202, pp. 1–366.

<sup>121</sup> See Hielke Hijmans, ‘Article 1 Subject-Matter and Objectives’ in Christopher Kuner and others (eds), *The EU General Data Protection Regulation (GDPR): A Commentary* (Oxford University Press 2020), <https://doi.org/10.1093/oso/9780198826491.003.0003> accessed 24 June 2024.

<sup>122</sup> See Section 4 of this Chapter for the definition of personal data and data processing activities.

<sup>123</sup> For example, the processing of personal data in the context of law enforcement activities. For more details on the material scope of the GDPR, see its Article 2.

<sup>124</sup> Article 4(7) GDPR: “‘controller’ means the natural or legal person, public authority, agency or other body which, alone or jointly with others, determines the purposes and means of the processing of personal data; where the purposes and means of such processing are determined by Union or Member State law, the controller or the specific criteria for its nomination may be provided for by Union or Member State law”.

<sup>125</sup> Article 4(8) GDPR: “‘processor’ means a natural or legal person, public authority, agency or other body which processes personal data on behalf of the controller”.

<sup>126</sup> For a detailed commentary of the GDPR, see Christopher Kuner and others (eds), *The EU General Data Protection Regulation (GDPR): A Commentary* (Oxford University Press 2020), <https://doi.org/10.1093/oso/9780198826491.001.0001> accessed 24 June 2024.

hence, their processing (including collection, use and disclosure to other parties) is subject to the GDPR, the provisions regarding the management and access to smart meter data laid down in the Directive 2019/944, and the Implementing Regulation (EU) 2023/1162. The parallel application of the GDPR and the electricity specific legislation “entails an entwining of the roles, rights and obligations arising from both legal regimes.”<sup>127</sup> From a review of legal scholarship on smart meters and the protection of personal data under the GDPR, the following challenges stand out: difficulties to identify the electricity market parties fulfilling the GDPR roles, including the data subject; difficulties to identify the appropriate legal grounds to process smart meter data; legal uncertainty arising from parallel legal regimes for access to smart meter data; and issues concerning the overlapping competences of different supervisory authorities.

#### **4.2.1 Difficulties to identify the electricity market parties fulfilling the GDPR’s roles**

The GDPR lays down obligations and rights for three main roles, namely, the data controllers, data processors and data subjects. Identifying which actors fulfil these roles is vital to enforce the obligations that rest upon data controllers and processors and to ensure the effective exercise of the rights granted to the data subjects.<sup>128</sup> However, it is not always easy to pinpoint exactly which actors in the electricity market fulfil the three roles described in the GDPR.<sup>129</sup>

Regarding controllers and processors, from an examination of Implementing Regulation (EU) 2023/1162 (which as noted earlier, regulates procedures for access to metering data), it is not entirely clear which of the roles therein described (‘metered data administrator’, ‘metering point administrator’, ‘data access provider’, ‘identity service provider’ and ‘eligible party’) corresponds to the GDPR roles of controllers and processors in respect of personal smart meter data.<sup>130</sup> This issue was raised by the EDPS in its formal comments on the draft of the aforementioned Implementing Regulation, following a request from the European Commission.<sup>131</sup> The EDPS was of the opinion that “the roles and responsibilities of the various actors involved

<sup>127</sup> Brenda Espinosa Apréaz, ‘The Challenges of Sharing Data at the Intersection of EU Data Protection and Electricity Market Legislation: Lessons from the Netherlands’ (2023) 41 *Journal of Energy & Natural Resources Law* 403, 413.

<sup>128</sup> European Data Protection Supervisor, ‘EDPS Formal Comments on the Draft Commission Implementing Regulation on Interoperability Requirements and Non-Discriminatory and Transparent Procedures for Access to Metering and Consumption Data’ (European Data Protection Supervisor 2022), [https://www.edps.europa.eu/system/files/2022-09/22-08-24\\_access-metering-and-consumption-data\\_en.pdf](https://www.edps.europa.eu/system/files/2022-09/22-08-24_access-metering-and-consumption-data_en.pdf) accessed 24 June 2024, 6.

<sup>129</sup> See in this regard, Domenico Orlando and Wim Vandevelde, ‘Smart Meters’ Roll out, Solutions in Favour of a Trust Enhancing Law in the EU’ (2021) 2 *Journal of Law, Technology and Trust*, <https://www.northumbriajournals.co.uk/index.php/jlft/article/view/1071> accessed 24 June 2024, 11; Nancy J King and Pernille W Jessen, ‘Smart Metering Systems and Data Sharing: Why Getting a Smart Meter Should Also Mean Getting Strong Information Privacy Controls to Manage Data Sharing’ (2014) 22 *International Journal of Law and Information Technology* 215, section 6.1.

<sup>130</sup> European Data Protection Supervisor, ‘EDPS Formal Comments on the Draft Commission Implementing Regulation on Interoperability Requirements and Non-Discriminatory and Transparent Procedures for Access to Metering and Consumption Data’ (European Data Protection Supervisor 2022), [https://www.edps.europa.eu/system/files/2022-09/22-08-24\\_access-metering-and-consumption-data\\_en.pdf](https://www.edps.europa.eu/system/files/2022-09/22-08-24_access-metering-and-consumption-data_en.pdf) accessed 24 June 2024.

<sup>131</sup> *Ibid.*

as controller, joint controller or processor should be clearly assigned” in the Implementing Regulation, “to ensure that the data subjects can fully exercise their rights under the GDPR”.<sup>132</sup> However, the final text Implementing Regulation (EU) 2023/1162 does not include such clarification and, therefore, consumers might encounter difficulties finding out who to approach in order to exercise the rights they have under the GDPR as data subjects.

It is also difficult to clearly identify who is the data subject in respect of smart meter data, both for GDPR purposes and for the purposes of granting the ‘permission’ required for eligible parties to have access to smart meter data under Implementing Regulation (EU) 2023/1162 (see Section 3.2. of this chapter). This is the case, because smart meters are installed at homes that can host more than one individual. Although in principle there might be one identified individual, i.e., the person that is responsible for the energy contract in the household, the collection and analysis of smart meter data can result in the identifiability of other individuals,<sup>133</sup> as noted earlier in this chapter. This raises the question: who can be seen as a data subject and as the person entitled to give the permission for access to smart meter data by eligible parties in a household with multiple individuals? The literature sketches different possible answers to this question: only the consumer that appears in the energy contract, all individual members of the household (including or not temporary guests), or the home inhabitants as a whole.<sup>134</sup> In this regard, *King* and *Jessen* advocate for “a more inclusive definition of data subject that includes a group of natural persons living together”,<sup>135</sup> however, such an approach is not compatible with the GDPR, which is designed for the protection of personal data of individuals rather than groups.<sup>136</sup> In any case, from a GDPR perspective, any identified or identifiable individual shall be considered a data subject, therefore, any household member who is aware of the processing of their personal data via smart meters can in principle exercise their rights as a data subject under the GDPR.

More complex is the question of who is entitled to grant the ‘permission’ required by Implementing Regulation (EU) 2023/1162 to share smart meter data with eligible parties, in cases of multiple inhabitants in a household. The Implementing Regulation refers to the ‘final customer’ (the consumer), which might point at the person who subscribed the energy contract. However, as noted by *King* and *Jessen* there might be cases in which multiple persons own and reside in the home and only one of them would like to give access to the smart meter data

<sup>132</sup> *Ibid.*, 7.

<sup>133</sup> The GDPR does not require full identification of the data subject for it to be applicable; it applies also to the processing of personal data of individuals who are identifiable on the basis of location data, or factors such as their economic, cultural or social identity, Article 4(1) GDPR.

<sup>134</sup> See in this regard, Domenico Orlando and Wim Vandevelde, ‘Smart Meters’ Roll out, Solutions in Favour of a Trust Enhancing Law in the EU’ (2021) 2 *Journal of Law, Technology and Trust*, <https://www.northumbriajournals.co.uk/index.php/jlft/article/view/1071> accessed 24 June 2024, 11; Nancy J King and Pernille W Jessen, ‘Smart Metering Systems and Data Sharing: Why Getting a Smart Meter Should Also Mean Getting Strong Information Privacy Controls to Manage Data Sharing’ (2014) 22 *International Journal of Law and Information Technology* 215, section 6.1.

<sup>135</sup> Nancy J King and Pernille W Jessen, ‘Smart Metering Systems and Data Sharing: Why Getting a Smart Meter Should Also Mean Getting Strong Information Privacy Controls to Manage Data Sharing’ (2014) 22 *International Journal of Law and Information Technology* 215, 234.

<sup>136</sup> In this regard, see e.g., Alessandro Mantelero, ‘Personal Data for Decisional Purposes in the Age of Analytics: From an Individual to a Collective Dimension of Data Protection’ (2016) 32 *Computer Law & Security Review* 238.

and the others do not want to.<sup>137</sup> Can the subscriber alone provide this permission, or should it be also provided by all the members of the household? This issue is not clearly resolved in the current EU legislation on smart meters.

#### 4.2.2 Challenges to identify the appropriate legal grounds to process smart meter data

Another topic that has been explored by legal scholarship on smart meters and personal data protection relates to the legal grounds that can be relied upon to process personal smart meter data under the GDPR.<sup>138</sup> Article 6(1) GDPR requires that in order to make the processing of personal lawful, one or more of the following grounds shall be invoked by the data controller/processor: a) consent of the data subject; the processing is necessary: b) to perform a contract or to take steps prior to entering into a contract, c) to comply with a legal obligation vested upon the data controller, d) to protect the vital interests of the data subject or another person, e) to perform a task in the public interest or to exercise official authority by the controller, and f) for legitimate interests pursued by the controller or a third party.<sup>139</sup>

It is relevant to note that smart meter data can be processed by different parties for different purposes. For example, smart meter data can be used by DSOs to perform their legal tasks as grid operators, by energy suppliers to invoice the electricity consumed by a household, or by providers of energy services to offer e.g. home energy management systems.<sup>140</sup> A different ground may be more appropriate depending on the specific purpose of the processing of smart meter data and the data controller in question, and each processing ground has its own requirements, benefits and drawbacks.<sup>141</sup>

It goes beyond of the scope of this chapter to provide a detailed analysis of the different processing grounds applicable to smart meter data, but it is pertinent to draw attention to the

<sup>137</sup> Nancy J King and Pernille W Jessen, 'Smart Metering Systems and Data Sharing: Why Getting a Smart Meter Should Also Mean Getting Strong Information Privacy Controls to Manage Data Sharing' (2014) 22 *International Journal of Law and Information Technology* 215, 235.

<sup>138</sup> See e.g., Kaisa Huhta, 'Smartening up While Keeping Safe? Advances in Smart Metering and Data Protection under EU Law' (2020) 38 *Journal of Energy & Natural Resources Law* 5; Domenico Orlando and Wim Vandeveldel, 'Smart Meters' Roll out, Solutions in Favour of a Trust Enhancing Law in the EU' (2021) 2 *Journal of Law, Technology and Trust*, <https://www.northumbriajournals.co.uk/index.php/jltt/article/view/1071> accessed 24 June 2024.

<sup>139</sup> Article 6(1) GDPR.

<sup>140</sup> See Brenda Espinosa Apráez (2023) The challenges of sharing data at the intersection of EU data protection and electricity market legislation: lessons from the Netherlands, *Journal of Energy & Natural Resources Law*, 41:4, 403-429, DOI: 10.1080/02646811.2022.2143673, section 2.1.; and Zardiashvili, L.; Dechesne, F. Consumer Control of Energy Data: The Need for the Consent Management Mechanism in the Energy Sector of the Netherlands and Roadblocks Related to its Implementation. Report on Consumer Control of Energy Data. 2019. Available online: <https://www.universiteitileiden.nl/binaries/content/assets/rechtsgeleerdheid/instituut-voor-metajuridica/scales/roadblocks-to-implementing-consent-management-mechanism-in-dutch-energy-sector.pdf>.

<sup>141</sup> See e.g., Kaisa Huhta, 'Smartening up While Keeping Safe? Advances in Smart Metering and Data Protection under EU Law' (2020) 38 *Journal of Energy & Natural Resources Law* 5; Domenico Orlando and Wim Vandeveldel, 'Smart Meters' Roll out, Solutions in Favour of a Trust Enhancing Law in the EU' (2021) 2 *Journal of Law, Technology and Trust*, <https://www.northumbriajournals.co.uk/index.php/jltt/article/view/1071> accessed 24 June 2024.

following question that warrants further examination: should the appropriate ground for the processing of personal smart meter data be chosen by the data controller, or are there cases in which the legislator should specify certain processing grounds (e.g., consent or a legal obligation) for certain purposes? The GDPR offers room for the latter, as noted by *Espinosa Apráez*,<sup>142</sup> because Recital 10 GDPR allows Member State law to “[set] out the circumstances for specific processing situations, including determining more precisely the conditions under which the processing of personal data is lawful”.<sup>143</sup>

#### 4.2.3 Legal uncertainty arising from parallel legal regimes for access to consumer data

Consumers whose personal data are processed in the context of smart metering systems are entitled to the rights granted by both the Directive 2019/944 and the GDPR.<sup>144</sup> Under Article 20 (literal (e) and last paragraph) of Directive 2019/944, consumers have the right to have access to their smart meter data or to give access to this data to an eligible party “at no additional cost and in accordance with their right to data portability under Union data protection rules”.<sup>145</sup> This provision makes direct reference to the right to data portability enshrined in Article 20 of the GDPR, which entitles a data subject to “receive the personal data concerning him or her, which he or she has provided to a controller, in a structured, commonly used and machine-readable format and have the right to transmit those data to another controller”.<sup>146</sup>

Although seemingly alike, there are important differences between the rights laid down in Article 20 Directive 2019/944 and Article 20 GDPR.<sup>147</sup> For example, under Directive 2019/944 (Article 20 last paragraph and Article 23(5)), consumers will never be charged for a request to access or share their smart meter data, while under Article 12(5)(a) GDPR, data subjects might be charged a reasonable fee in cases of excessive or repetitive requests.<sup>148</sup> Another difference is that Directive 2019/944 and Implementing Regulation (EU) 2023/1162 seem to limit the access to smart meter data to ‘eligible parties’ within the energy sector, while the GDPR “does not introduce any limitations concerning the new controller to which the data will be ported, allowing portability to occur within the same sector or across sectors”.<sup>149</sup>

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<sup>142</sup> See Brenda Espinosa Apráez, ‘The Challenges of Sharing Data at the Intersection of EU Data Protection and Electricity Market Legislation: Lessons from the Netherlands’ (2023) 41 *Journal of Energy & Natural Resources Law* 403, 424.

<sup>143</sup> Recital 10 GDPR.

<sup>144</sup> Saskia Lavrijssen, Brenda Espinosa Apráez and Thijs ten Caten, ‘The Legal Complexities of Processing and Protecting Personal Data in the Electricity Sector’ (2022) 15 *Energies* 1088, section 3.4.2.

<sup>145</sup> Article 20 last paragraph, GDPR.

<sup>146</sup> Article 20 GDPR.

<sup>147</sup> Saskia Lavrijssen, Brenda Espinosa Apráez and Thijs ten Caten, ‘The Legal Complexities of Processing and Protecting Personal Data in the Electricity Sector’ (2022) 15 *Energies* 1088, section 3.4.2.

<sup>148</sup> *Ibid.* See also Inge Graef, Martin Husovec and Jasper van den Boom, ‘Spill-Over in Data Governance: Uncovering the Uneasy Relationship Between the GDPR’s Right to Data Portability and EU Sector-Specific Data Access Regimes’ [2020] *Journal of European Consumer and Market Law* 3.

<sup>149</sup> Saskia Lavrijssen, Brenda Espinosa Apráez and Thijs ten Caten, ‘The Legal Complexities of Processing and Protecting Personal Data in the Electricity Sector’ (2022) 15 *Energies* 1088, 17.



These differences raise the question of which rules should prevail when a consumer requests or gives access to personal smart meter data. The guidelines on the right to data portability issued by the extinct Article 29 Working Party (and endorsed by the EDPB) offer some guidance in this respect.<sup>150</sup> Following these guidelines, it all depends on the data subject's intention, namely, if it is clear that the data subject wishes "to exercise rights under sectorial legislation only, then the GDPR's data portability provisions will not apply to this request", but if the data subject's intention is to exercise the right to data portability under the GDPR, "it must be assessed, on a case by case basis, how, if at all, such specific legislation may affect the right to data portability".<sup>151</sup> The problem with this interpretation, as noted by *Graef, Husovec and van den Boom*, is that "individual consumers will unlikely be aware of the consequences of basing their request either on the GDPR's [right to data portability] or a sector-specific data access tool".<sup>152</sup> Another issue is that these guidelines are not legally binding and data protection authorities and courts might have a different interpretation.<sup>153</sup> Hence, there is still legal uncertainty regarding the interaction between the rights laid down in Article 20 Directive 2019/944 and Article 20 GDPR.

#### 4.2.4 Issues concerning the overlapping competences of different supervisory authorities

Besides looking into the interaction between the GDPR and Directive 2019/944 from a substantive legal perspective, there are a few academic publications that explore the institutional aspects of this interaction. In this regard the work of *Lavrijssen, Espinosa Apráez and Ten Caten (2022)*<sup>154</sup> and *Espinosa Apráez (2023)*<sup>155</sup> examine the possibility of overlapping competences between two kinds of national supervisory authorities: the national regulatory authorities (NRAs) or energy regulators that must be appointed following Articles 57 ff. Directive 2019/944, and the data protection authorities (DPAs) that must be appointed following Articles 51 ff. GDPR. The competences of an NRA and a DPA in a given Member State might overlap because they are tasked with the supervision of access to consumer's data, each from their respective regulatory domain.<sup>156</sup> The overlap in competences might be

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<sup>150</sup> Article 29 Data Protection Working Party, 'Guidelines on the Right to Data Portability – Adopted on 13 December 2016 As Last Revised and Adopted on 5 April 2017' (Article 29 Data Protection Working Party 2017) 16/EN WP 242 rev.01, <https://ec.europa.eu/newsroom/article29/items/611233> accessed 24 June 2024.

<sup>151</sup> *Ibid.*, pp. 7–8.

<sup>152</sup> Inge Graef, Martin Husovec and Jasper van den Boom, 'Spill-Over in Data Governance: Uncovering the Uneasy Relationship Between the GDPR's Right to Data Portability and EU Sector-Specific Data Access Regimes' [2020] *Journal of European Consumer and Market Law* 3, 15.

<sup>153</sup> *Ibid.*, 14.

<sup>154</sup> Saskia Lavrijssen, Brenda Espinosa Apráez and Thijs ten Caten, 'The Legal Complexities of Processing and Protecting Personal Data in the Electricity Sector' (2022) 15 *Energies* 1088.

<sup>155</sup> Brenda Espinosa Apráez, 'The Challenges of Sharing Data at the Intersection of EU Data Protection and Electricity Market Legislation: Lessons from the Netherlands' (2023) 41 *Journal of Energy & Natural Resources Law* 403.

<sup>156</sup> See *ibid.*; Saskia Lavrijssen, Brenda Espinosa Apráez and Thijs ten Caten, 'The Legal Complexities of Processing and Protecting Personal Data in the Electricity Sector' (2022) 15 *Energies* 1088.

problematic because it can lead to situations in which “neither authority intervenes or that each authority interprets the rules differently, considering the different focus and expertise of both authorities”.<sup>157</sup> Regarding the latter, *Espinosa Apráez* examines a case from the Netherlands, in which the Dutch NRA (the Authority for Consumers and Markets – ACM) and the Dutch DPA (*Autoriteitpersoonsgegevens*) had a different interpretation regarding the most appropriate ground for the processing of consumers’ personal data, and who should ultimately decide about this.<sup>158</sup>

*Lavrijssen, Espinosa Apráez and Ten Caten (2022)*<sup>159</sup> and *Espinosa Apráez (2023)*<sup>160</sup> highlight the importance of having appropriate cooperation mechanisms between NRAs and DPAs but miss in the GDPR and the Directive 2019/944 a clear legal basis for this. The authors also refer to EU and national initiatives that can serve as a blueprint for more cooperation between these two kinds of supervisory authorities, for example, by means of formal cooperation protocols or agreements between these authorities or the less formal alternative of networks of supervisory authorities, following the example of the EU Digital Clearing House or the Dutch Digital Regulation Cooperation Platform.

## 5. CONCLUSION AND SUMMARY

Smart meters offer a way to address the challenges posed by the increasing use of renewable energy technologies such as wind and solar. Whereas earlier, there were two legal bases under EU law for the implementation of smart meters in the electricity sector, this is now consolidated under Directive 2019/944. Smart meters, according to the EU legislator, shall promote energy efficiency and empower final consumers, thus aiming at the active participation of consumers in the electricity supply market. Besides contributing to these objectives, smart meters are also increasingly seen as a valuable source of data for innovative products and services within and beyond the energy sector. The data provided by these digital technologies is therefore crucial for the ongoing Twin Green and Digital Transitions.

Nonetheless, the introduction of smart meters also comes with challenges for privacy and personal data protection. Regarding privacy, legal literature raises questions about the compatibility of EU and Member State legislation introducing smart meters with the right that protects the private and family life and the inviolability of the home of consumers. The contributions reviewed in this chapter highlight the importance of a proper assessment of the proportionality and necessity of the intrusion in the private sphere of the individuals that is inherent to the installation of smart meters in households. This is now more important than ever, because under the Directive 2019/944 by default smart meters allow for bi-directional communication

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<sup>157</sup> *Ibid.*, 20.

<sup>158</sup> Brenda Espinosa Apráez, ‘The Challenges of Sharing Data at the Intersection of EU Data Protection and Electricity Market Legislation: Lessons from the Netherlands’ (2023) 41 *Journal of Energy & Natural Resources Law* 403.

<sup>159</sup> Saskia Lavrijssen, Brenda Espinosa Apráez and Thijs ten Caten, ‘The Legal Complexities of Processing and Protecting Personal Data in the Electricity Sector’ (2022) 15 *Energies* 1088.

<sup>160</sup> Brenda Espinosa Apráez, ‘The Challenges of Sharing Data at the Intersection of EU Data Protection and Electricity Market Legislation: Lessons from the Netherlands’ (2023) 41 *Journal of Energy & Natural Resources Law* 403.

and the meter readings are not just for the information of the consumer, but can also be used by other parties for different purposes. There are also significant privacy concerns regarding secondary uses of smart meter data, in particular by law enforcement authorities. Regarding personal data protection, four issues were outlined. Firstly, it is difficult to identify the electricity market parties fulfilling the legal roles under the GDPR. There are also challenges to identify the appropriate legal grounds to process smart meter data. Moreover, the simultaneous application of the GDPR and the Directive 2019/944 create legal uncertainty regarding two parallel legal regimes for the access to consumer data, as well as issues regarding the overlapping competences of the two relevant supervisory authorities (NRAs and DPAs).

Since the publication of the previous version of this chapter in the first edition of this Research Handbook, a lot of work has been done by legal scholars to identify privacy and data protection challenges around the implementation of smart meters. Nonetheless, it seems that the EU legislator has not yet addressed these issues specifically, deferring them to the Member States, at the risk of having different levels of protection of the privacy and personal data of electricity consumers, and at the risk of market fragmentation due to dissimilar requirements to use smart meter data across the different Member States. Against this background, in times of the Twin Transitions, there is still a lot of work to do for researchers to offer guidance for the handling of smart meters, as the legal complexity and parallel competences arising from energy and data legislation are only increasing.

## 6. KNOWLEDGE GAPS AND FURTHER RESEARCH

While the policy choice of implementing smart meters seems to have been made and further steps are taken on the road to their wide-spread use within the EU, there is still plenty of room for further research on how to safeguard privacy and data protection in the Twin Transitions. One fundamental aspect to investigate is whether these protective measures should be put in place by the EU legislator or whether it is on the Member States to come up with the right solutions. As several overlapping data law regimes are introduced in the EU – and expected to be introduced further – a comprehensive study of the applicable legal frameworks to safeguard the privacy and data protection of consumers in the electricity sector must be made. In this light, it is also encouraged to engage in another detailed legal analysis in light of fundamental rights, this time based on the Directive 2019/944, as it was done in the previous version of this chapter in the first edition of this Research Handbook. Some critical aspects to explore could be: What should be the frequency of smart meters readings and who is entitled to decide this? Do consumers have a right to refuse a smart meter? Thus, is there a “right to not be digitalized”? Is and should the switch off of electricity supply via smart meters be allowed to deal with issues of net congestion?

Another question that warrants further exploration is whether the existing general frameworks that protect privacy and personal data are sufficient to protect consumers in the digitalized electricity sector, or if sector specific legislation might be required. A complete analysis would also require to look beyond smart meters, since digital technologies that enable the collection and analysis of data from different sources in the electricity sector (e.g., solar panels, electric vehicles, smart appliances) are constantly emerging.