

Energy & Infrastructure Germany

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## **Update Energy Law: Digitalization**

The fifth and final part of our Client Briefing series shows what is and has to be done to make the digitalization of the energy sector a success story.

"Energy system integration" is one of the key issues when looking at Europe's future, whereby digitalization is one of the key elements. Digitalizing the energy sector aims to bridge the gap between different sources of energy production as well as between production, storage, transport and consumption. "Smart Grids" shall pave the way of the energy transition. Especially the distribution network is facing a change from "one-way" (only in the direction of the final customer) to "two-way" (in the direction of the final customer and from the final customer back to the network). At the same time, "Smart Meter" not only measure the consumption, but start to control the whole network. Another area of use is the digitalization of the transport sector, e.g. with the introduction of app-controlled charging of electric vehicles; real-time traffic management and by autonomous driving.

### 1. European regulatory framework

On an European level, so far, the digitalization of the energy markets was dealt with in a number of legislative acts, but there is no comprehensive set of rules and regulations.

In 2009, the **Directive Concerning Common Rules for the Internal Market in Electricity**<sup>1</sup> aimed to set-up a smart-metering infrastructure: *"Member States shall ensure the implementation of intelligent metering systems that shall assist the active participation of consumers in the electricity supply market.* [...] Where roll-out of *smart meters is assessed positively, at least 80 % of consumers shall be equipped with intelligent metering systems by 2020".* 

An EU Commission **Recommendation on Preparations for the Roll-Out of Smart Metering Systems** was published in March 2012, targeting the EU member states.<sup>2</sup> According to the recommendation, smart grids allow for "greater consumer empowerment, greater integration of renewable energy sources into the grid and higher energy efficiency and make a considerable contribution to reducing greenhouse gas emissions" (Recital No. 1). The recommendation covers topics like (i) data protection and security considerations, (ii) the economic assessment of the long-term costs and benefits for the roll-out of smart metering systems and (iii) common minimumfunctional requirements for smart metering systems for electricity.

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<sup>&</sup>lt;sup>1</sup> Directive 2009/72/EC of 13 July 2009 concerning common rules for the internal market in electricity and repealing Directive 2003/54/EC, Annex I, nr. 2.

<sup>&</sup>lt;sup>2</sup> EU-Commission Recommendation 2012/148/EU of 9 March 2012 on preparations for the roll -out of smart metering systems.

The aforementioned topics play a key role to date and their implementation has proven to be challenging.

Based on the recommendation, the **Digital Single Market Strategy for Europe**<sup>3</sup> aimed to create an appropriate framework and pre-conditions for digitalization in May 2015. Clause 4 reads "*Digitization also offers unprecedented opportunities to other economic sectors, such as transport (e.g. intelligent transport systems) or energy (e.g. smart grids, metering)*". However, the Strategy does not name detailed measures for implementation.

In 2018, the **Directive on the Energy Performance of Buildings**<sup>4</sup> focused on the digitalization of buildings. According to Recital 29 "Targeted incentives should be provided to promote smart-ready systems and digital solutions in the built environment. This offers new opportunities for energy savings, by providing consumers with more accurate information about their consumption patterns, and by enabling the system operator to manage the grid more effectively". But again, the EU Commission refrains from regulating concrete measures.

The **Directive on Common Rules for the Internal Market for Electricity**<sup>5</sup>, published in 2019, names the digitalization of the transmission network as one of the targets of the transmission system operators; however, it does not provide any detailed regulatory framework.<sup>6</sup> Further, it includes the possibility to offer dynamic pricing for energy suppliers and allows customers to demand for such pricing, provided that they are equipped with smart metering technology. The implementation is to be controlled by the national regulatory authorities. In addition, a report and the development of such contracts shall be published on an annual basis.<sup>7</sup>

At the same time, the **Regulation on the Internal Market for Electricity**<sup>8</sup> focused on electricity networks. It determined that digitalization - e.g. by integration of innovative technologies - shall be used to cope with the increasing share of electricity from renewable sources in the network.<sup>9</sup> There is also a call for digitalization of the transmission and the distribution networks; however, the Regulation remains silent with regard to implementation and timing.<sup>10</sup>

So, all in all, the EU Commission's efforts to promote the digitalization of the energy system remained unspecific in recent years.

On a working level, the **BRIDGE-Initiative**<sup>11</sup> (which is part of the EU Commission's Horizon 2020 Program) unites projects in the field of digitalization, e.g. with regard to smart networks and energy storage. An ongoing exchange of knowhow between the projects shall help to develop a structured view on cross-cutting issues that might represent an obstacle to innovation. Amongst others, a working group on "Data Management" is developing a communication infrastructure for data exchange and

<sup>&</sup>lt;sup>3</sup> EU-Commission: A Digital Single Market Strategy for Europe, COM (2015) 192 final.

<sup>&</sup>lt;sup>4</sup> Directive (EU) 2018/844 of 30 May 2018 amending Directive 2010/31/EU on the energy performance of buildings and Directive 2012/27/EU on energy efficiency.

<sup>&</sup>lt;sup>5</sup> Directive (EU) 2019/944 of 5 June 2019 on common rules for the internal market for electricity and amending Directive 2012/27/EU.

<sup>&</sup>lt;sup>6</sup> Directive (EU) 2019/944 of 5 June 2019 on common rules for the internal market for electricity and amending Directive 2012/27/EU, Art. 40 para. 1 (I).

<sup>&</sup>lt;sup>7</sup> Directive (EU) 2019/944 of 5 June 2019 on common rules for the internal market for electricity and amending Directive 2012/27/EU, Art. 59 para. 1 (o) and (i).

<sup>&</sup>lt;sup>8</sup> Regulation (EU) 2019/943 of 5 June 2019 on the internal market for electricity.

<sup>&</sup>lt;sup>9</sup> Regulation (EU) 2019/943 of 5 June 2019 on the internal market for electricity, recital 7.

<sup>&</sup>lt;sup>10</sup> Regulation (EU) 2019/943 of 5 June 2019 on the internal market for electricity, Art. 30 and 55.

<sup>&</sup>lt;sup>11</sup> The BRIDGE initiative and project fact sheets, June 2020.

related requirements, including problems faced by transmission and distribution system operators. In addition, several EU member states are taking part in various smart grid projects.<sup>12</sup>

Digitization of the transport sector is addressed by the Digital Transport and Logistics Forum (DTLF)<sup>13</sup>, which was created as part of the Digital Single Market Strategy<sup>14</sup>. In this forum, member states, public institutions and organizations share knowledge and prepare recommendations in the areas of transport and logistical digitalization for the EU Commission. As a further outcome of the Strategy, the EU Commission supports the introduction and use of connected and automated mobility".15

#### 2. Adaptation of the European regulatory framework

Digitalization is one of the key topics amongst the EU Commission's post-COVID-19 measures. Already in May 2020, the necessity of fully integrated energy systems was outlined in the EU Commission's paper Europe's Moment<sup>16</sup>.

On 8 July 2020, the EU Commission released the communication powering a climate-neutral economy: An EU Strategy for Energy System Integration. Energy system integration is defined as "the coordinated planning and operation of the energy system 'as a whole', across multiple energy carriers, infrastructures, and consumption sectors".<sup>17</sup> It is considered to be the pathway towards an effective, affordable and deep decarbonization of the European economy and shall use, amongst others, potential for energy efficiency and allow a better integration of electricity from renewable sources.<sup>18</sup> An action plan on system integration aims to speed up digitalization. It shall allow dynamic and interconnected flows of energy, linkage of markets and the provision of data required for adjustments of demand and supply on a more diverse level and in real-time.<sup>19</sup> On a technical level, combining latest sensor technology, forward-thinking infrastructure for data exchange and data processing, big data, artificial intelligence, 5G and distributed-ledger-technology to improve forecasts, remote monitoring and management of decentralized productions as well as increased plant optimization shall pave the way to the future.<sup>20</sup> In a nutshell, according to the EU Commission, this leads to four key actions (page 19): (i) Adopt a Digitalization of Energy Action plan to develop a competitive market for digital energy services, (ii) develop a Network Code on cybersecurity in electricity with sector-specific rules, (iii) adopt the implementing acts on interoperability requirements and transparent procedures for access to data within the EU, (iv) publish a new impact-oriented clean energy research and innovation outlook for the EU to ensure research and innovation supports energy system integration. Thus, a

<sup>&</sup>lt;sup>12</sup> https://ec.europa.eu/energy/topics/technology-and-innovation/flexibility-markets\_en

<sup>&</sup>lt;sup>13</sup> https://ec.europa.eu/transport/themes/logistics-and-multimodal-transport/digitalisation-transport-andlogistics-and-digital-transport-and\_en;

https://ec.europa.eu/transport/sites/transport/files/legislation/c20185921-experts-group-dtlf\_en.pdf.

<sup>&</sup>lt;sup>4</sup> EU-Commission, A Digital Single Market Strategy for Europe, COM(2015) 192 final.

<sup>&</sup>lt;sup>15</sup> https://ec.europa.eu/digital-single-market/en/connected-and-automated-mobility-europe.

<sup>&</sup>lt;sup>16</sup> EU-Commission: Europe's moment: Repair and Prepare for the Next Generation, COM(2020) 456 final.

<sup>&</sup>lt;sup>17</sup> EU-Commission: Powering a climate-neutral economy: An EU Strategy for Energy System Integration,

COM(2020) 299 final, p. 1. <sup>18</sup> EU-Commission: Powering a climate-neutral economy: An EU Strategy for Energy System Integration, COM(2020) 299 final, p. 1. and 20.

<sup>&</sup>lt;sup>19</sup> EU-Commission: Powering a climate-neutral economy: An EU Strategy for Energy System Integration, COM(2020) 299 final, p. 19.

<sup>&</sup>lt;sup>20</sup> EU-Commission: Powering a climate-neutral economy: An EU Strategy for Energy System Integration, COM(2020) 299 final, p. 19.

significant development of the digitalization of the energy sector can be expected in future.

## 3. National regulatory framework

Digitalizing of the energy sector is an important topic in Germany as well. It is considered to be a key tool for the energy transition. Rules and regulations to promote the digitalization are included in most of the legal acts that govern the German energy sector (e.g. 3rd part of the Energy Industry Act (Energiewirtschaftsgesetz - EnWG), Article 10a Renewables Energy Act (Erneuerbare-Energien-Gesetz - EEG), Article 14 Heat and Power Act (Kraft-Wärme-Kopplungsgesetz - KWKG)).

### a. Implementation of European requirements

The Directive on Common Rules for the Internal Market for Electricity has introduced dynamic pricing. This concept is already know under Article 40 para 5 EnWG: It obliges energy suppliers to offer a tariff to final customers that gives reason to save energy and control the demand site. Therefore, no additional implementation of the Directive is required.

## b. Further regulations

By introducing the **Digitalization of the Energy Transition Act** (Gesetz zur Digitalisierung der Energiewende - GDEW) in the year 2016, the Federal Government has facilitated the nationwide roll-out of smart meter technologies. The Digitalization of the Energy Transition Act included amendments to most legal acts governing the energy sector EnWG, EEG, KWKG, Regulation on Incentive Regulation (Anreizregulierungsverordnung - ARegV), Regulation on Electricity Network Fees (Stromnetzentgeltverordnung - StromNEV), Regulation on Electricity Network Access (Stromnetzugangsverordnung StromNZV), Regulation on Basic Electricity Supply (Stromgrundversorgungsverordnung StromGVV), Regulation on Low Voltage Connection (Niederspannungsanschlussverordnung - NAV), Regulation on Low Pressure Connection (Niederdruckanschlussverordnung - NDAV) und Regulation on Basic Gas Supply (Gasgrundversorgungsverordnung - GasGVV).

However, the most important act is the **Smart Meters Operation Act** (Messstellenbetriebsgesetz - MsbG), which was newly introduced by the Digitalization of the Energy Transition Act and which has a number of implications on the German electricity market. The deadline to replace analog electricity meters is only in 2032, however, the electricity system shall be used for the needs of the energy transition before. Article 29 of the Smart Meter Operations Act covers installation and operation of smart meter technologies (i) at final customers with an annual consumption above 6,000 kWh or when being equipped with a controllable consumption device in accordance with Article 14a Renewables Energy Act or (ii) at plant operators (meaning operators of power plants under the EEG and KWKG) with an installed capacity of more than 7 kW. Smart Meters consist of a modern consumption device (which tracks electricity consumption and the consumption time) and a smart-meter-gateway which is connected to the communication network. The Smart Meter Operations Act introduces technical standards for smart-meter-gateways, smart metering, smart grid, smart mobility, smart home und smart

services while constantly developing the technical standard. Smart meter operators face a comprehensive regulatory set-up.

The implementation of the Smart Meters Operations Act is monitored by a market analysis.<sup>21</sup> Technical requirements to install smart meter systems to renewable energy plants and power to heat plants could not be fully assed to date, but this shall be done by 31 October 2020.<sup>22</sup> A smart meter roll-out for the **gas sector** has not been scheduled so far. However, new gas metering devices have to be ready for smart metering to enable a smart-meter-gateway connection in future.

Data protection is a very important topic in relation to digitalization. Therefore, the Digitalization of the Energy Transition Act is accompanied by **Technical Guidelines and Protection Profiles**<sup>23</sup> published by the Federal Office for Information Security (Bundesamt für Sicherheit in der Informationstechnik). The Guidelines include data protection and data security standards for the development, production, distribution and operation of smart-meter-gateways and request to certify smart metering systems.

Since 2017 the funding program **Showcase Smart Energy - A Digital Agenda for the Energy Transition** (Schaufenster intelligente Energie – Digitale Agenda für die Energiewende / SINTEG) facilitates to test digital technologies. In five model regions, the tests aim to understand and master technical and economic challenges of the energy transition. This includes the development of procedures that are ready for the mass-market and to explore new and innovative technologies and market mechanisms for flexible and smart networks and markets. The **SINTEG-Directive**<sup>24</sup> enables its participants to try out new technologies, procedures and business cases while receiving financial compensation suffered as a consequence of this pioneer spirit.

The spread of digital hardware and software within the mobility sector brings an intensified coupling to the electricity sector, which is challenging for the energy system.<sup>25</sup> At the same time, a better utilization of the distribution network becomes possible with the means of digital control linked to price signals.<sup>26</sup> In January 2018, the **Funding Program Digitalization of Transport Systems** (Digitalisierung kommunaler Verkehrssysteme) was published. It aims to foster the implementation of projects in the field of digitalization of the transport system.<sup>27</sup> Mid May 2020, the Federal Ministry for Transportation (BMVI) has launched a call for mobility platforms working on "automation, cooperation and linkage" under the umbrella of the funding program.<sup>28</sup> In addition, since 2018, the BMVI offers an **Action Plan Digitalization and Artificial Intelligence in the Field of Mobility**. It was created to develop an

 <sup>&</sup>lt;sup>21</sup> Federal Office for Security and Information Technology: Marktanalyse zur Feststellung der technischen Möglichkeit zum Einbau intelligenter Messsysteme nach § 30 MsbG, 3 February 2020.
<sup>22</sup> Federal Office for Security and Information Technology: Marktanalyse zur Feststellung der technischen Möglichkeit zum Einbau intelligenter Messsysteme nach § 30 MsbG, 3. Februar 2020, p. 32.

<sup>&</sup>lt;sup>23</sup>BSITR-03109, please see:

https://www.bsi.bund.de/DE/Publikationen/TechnischeRichtlinien/tr03109/index\_htm.html.

<sup>&</sup>lt;sup>24</sup> Regulation establising a legal framework for gathering in the support programme: "Schaufenster intelligente Energie – Digitale Agenda für die Energiewende".

<sup>&</sup>lt;sup>25</sup> dena: Elektromobilität in der digitalen Energiewelt, Dezember 2017, p. 18.

<sup>&</sup>lt;sup>26</sup> dena: Elektromobilität in der digitalen Energiewelt, Dezember 2017, p. 19.

<sup>&</sup>lt;sup>27</sup>https://www.bundesregierung.de/breg-de/themen/saubere-luft/foerderrichtlinie-digitalisierungkommunaler-verkehrssysteme-bmvi--319780, Funding Program "Digitalisierung kommunaler Verkehrssysteme", 18.01.2018, BAnz AT 31.01.2018 B3.

<sup>&</sup>lt;sup>28</sup> https://www.bmvi.de/SharedDocs/DE/Artikel/G/digialisierung-kommunaler-verkehrssysteme.html.

efficient, digital infrastructure and to equip the transport infrastructure with the digital technology required for this.<sup>29</sup>

#### 4. Adaption of the national regulatory framework

The programs and measures to promote digitalization of the energy sector have not been increased as part of the COVID-19 stimulus package so far.

#### 5. Conclusions and prospects

The importance of digitalization has been discussed for many years. Nevertheless, the implementation process has been slow.

At the European level, a fully integrated structure is developed under the headline "System Integration" only as a post-COVID-19 measure. In Germany, the expansion has dragged on for years despite the Smart Meters Operations Act was already passed in 2016. An analysis conducted by EY on behalf of the Federal Ministry for Economic Affairs (BMWi) on progress in the fields of market access and certification of technical devices concluded readiness for the installation of smart meters in 2019 for the first time. Renewable energy plants, power-to-heat plants and the gas network have not been in the scope of the German smart meter roll-out so far. This will have to be done in order to obtain a fully integrated energy system in future. In addition, smart grids are relevant for the inclusion of decentralized power generation systems, storages and controllable consumer devices. Finally, digitalization of the transport sector will be a key topic in future, whereas the regulation is still on a basic level. But at least Germany started its smart meter roll-out in early 2020.

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<sup>&</sup>lt;sup>29</sup> https://www.bmvi.de/SharedDocs/DE/Anlage/DG/aktionsplan-ki.pdf?\_\_blob=publicationFile, Federal Ministry of Transport and Digital Infrastructure, Digitalisierung und Künstliche Intelligenz in der Mobilität, Aktionsplan, 2018, p. 11.

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