University of Groningen

Smart Electricity Systems

Diestelmeier, Lea; Kuiken, Dirk

Published in:
European Competition and Regulatory Law Review

DOI:
[10.21552/core/2017/1/7](https://doi.org/10.21552/core/2017/1/7)

IMPORTANT NOTE: You are advised to consult the publisher's version (publisher's PDF) if you wish to cite from it. Please check the document version below.

Document Version
Publisher's PDF, also known as Version of record

Publication date:
2017

[Link to publication in University of Groningen/UMCG research database](#)

Citation for published version (APA):
Diestelmeier, L., & Kuiken, D. (2017). Smart Electricity Systems: Access Conditions for Household Customers Under EU Law. *European Competition and Regulatory Law Review*, 1(1), 36-46.
<https://doi.org/10.21552/core/2017/1/7>

Copyright

Other than for strictly personal use, it is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license (like Creative Commons).

The publication may also be distributed here under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license. More information can be found on the University of Groningen website: <https://www.rug.nl/library/open-access/self-archiving-pure/taverne-amendment>.

Take-down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Downloaded from the University of Groningen/UMCG research database (Pure): <http://www.rug.nl/research/portal>. For technical reasons the number of authors shown on this cover page is limited to 10 maximum.

HEINONLINE

Citation:

Lea Diestelmeier; Dirk Kuiken, Smart Electricity Systems, 1 Eur. Competition & Reg. L. Rev. 36 (2017)

Content downloaded/printed from [HeinOnline](https://heinonline.org)

Wed Apr 3 06:19:50 2019

-- Your use of this HeinOnline PDF indicates your acceptance of HeinOnline's Terms and Conditions of the license agreement available at <https://heinonline.org/HOL/License>

-- The search text of this PDF is generated from uncorrected OCR text.

-- To obtain permission to use this article beyond the scope of your HeinOnline license, please use:

[Copyright Information](#)

Use QR Code reader to send PDF to your smartphone or tablet device

Smart Electricity Systems:

Access Conditions for Household Customers under EU Law

Lea Diestelmeier and Dirk Kuiken*

Achieving the EU policy goals of a secure, affordable, and sustainable electricity system available to all household customers requires the deployment of smart electricity systems (SES). In SES, all actors (eg consumer, producers, system operators) in the system are enabled to interact with each other by means of information and communication technology (ICT). From an infrastructural perspective SES can therefore also be described as electricity systems that are enhanced with communication systems. Both the electricity- and communication systems are subject to specific access conditions for household customers imposed by EU legislation. Whereas household customers have a clear right to access the electricity system, their right to access communication systems is limited. This article hypothesises that without the legal guarantees to ensure access for household customers to SES communication systems, the level playing field for household customers to participate in SES might be distorted. Therefore, this article addresses the following research question: what are the legal conditions for household customers to access SES communication services and what are their guarantees for accessing SES communication services? The article identifies four different options for household customers to access communication systems for SES under current EU legislation. Furthermore, it concludes that ensuring a level playing field for household customers to participate in SES requires EU and national policy makers to guarantee comparable conditions for household customers to access SES communication services.

I. Introduction

Electricity systems are in transition. One of the EU policy goals guiding this transition is to facilitate the change towards *smart electricity systems* (SES), which enable increased interaction of various actors in the electricity sector through information and

communication technology (ICT) infrastructure.¹ The goal of this increased level of interaction between all system users in the electricity systems is to improve energy efficiency, the efficient integration of renewable energy sources (RES), competition and consumer involvement.² While those are widely accepted policy goals, the question remains how access

* Lea Diestelmeier, LL.M. and Dirk Kuiken, LL.M. are both PhD candidates at the Groningen Centre of Energy Law, University of Groningen. For correspondence: <l.diestelmeier@rug.nl> and <d.kuiken@rug.nl>. The authors wish to express their gratitude to Prof Dr Martha Roggenkamp and Prof Dr Hans Vedder for their valuable support writing this article and to the Netherlands Organisation for Scientific Research (NWO) for enabling this research under the project 'Uncertainty Reduction in Smart Energy Systems'. A concept of this article has been presented as a conference paper at the Florence School of Regulation's 5th Conference on Regulation of Infrastructures (*The Challenges of Digitalisation and the Use of Data*) on 24 June 2016, Florence, Italy. The authors would also like to thank the Florence School of Regulation for this opportunity and the participants of this conference for the valuable comments. A short version of this article has been published in *Network Industries Quarterly*, Autumn 2016

issue.
DOI: 10.21552/core/2017/1/7

- 1 The policy goal to facilitate the shift towards smart energy systems is mentioned in the 'Energy Roadmap 2050'. See European Commission, 'Energy Roadmap 2050' COM (2011) 885 final, 10. See for background on the role of ICT in smart grids and background on smart grid communication architecture, for example Yakubu Tsado, David Lund and Kelum Gamage, 'Resilient communication for smart grid ubiquitous sensor network: State of the art and prospects for next generation' (2015) 71 *Computer Communications*, 34.
- 2 See European Commission, 'Delivering a New Deal for Energy Consumers' COM (2015) 339 final, 4. The objective is also reflected in the definition of smart grids in Regulation 2013/347, which defined smart grids as '[...] economically efficient and

and thus participation for system users in SES is facilitated by the regulatory framework. This article focuses on one particular group of system users, namely household customers.³ Participating in SES necessitates not only access to the electricity system but also access to communication systems. This article hypothesises that without the legal guarantees to ensure access for household customers to SES communication systems, the level playing field for household customers to participate in SES might be distorted.

The main benefit for household customers to participate in SES is to actively adjust consumption of electricity on the basis of eg varying prices and grid congestion. Ideally, a financial stimulus should lead to more efficient system usage and therefore to economic and energy efficiency gains.⁴ The essential precondition to participate in SES and to reap the related benefits is not only to access the electricity system, but also to access the communication system which ‘smartens’ the electricity system. Only then have household customers the option to adjust their consumption on basis of the information shared through the communication system and reap the potential financial gain. However, the EU regulatory access regimes for household customers to the electricity system and to communication systems are quite different. While for the electricity system EU law establishes that Member States have to oblige the electricity distribution system operator (DSO) to connect customers to the grid and thereby provide access to the system, the EU access regime for communication systems is less absolute. This article poses that maintaining a level playing field for household customers to access SES requires that all household customers

have ensured access to communication systems for the purpose of SES. Otherwise, some household customers might be better off by being able to react to eg varying electricity prices or grid congestions, while others are stuck in the conventional electricity system. This article therefore analyses the problem of unclear access conditions for household customers to SES and poses the research question: *What are the legal conditions for household customers to access SES communication services and what are their guarantees for accessing SES communication services?*

The article is structured as follows. After this introduction, section 2 outlines the SES: firstly, by defining the policy objectives that the SES should realise, secondly, by describing the minimum technical requirements for achieving these policy objectives, and thirdly, by describing the potential impact of SES for household customers. Section 3 defines access to electricity and communication systems, identifies and compares the relevant access conditions for both systems, and points out the consequences of the differences for household customers. Section 4 analyses the household customers’ options for accessing SES communication systems under current EU legislation and the consequences of the access conditions applicable to these options for the household customers’ guarantees for accessing the SES. Section 5 concludes that household customers’ access should be guaranteed in SES, what access to SES should imply and recommends how such access can be ensured by EU law.

II. Smart Electricity Systems

Prior to analysing the access conditions to SES, we need to define the system to which access has to be provided. This will also explain the chosen terminology of the article, which consciously applies ‘smart electricity system’ instead of the widely used term ‘smart grid’. Whereas the term ‘smart grid’ suggests that the grid infrastructure is central in the system transformation, the term ‘smart electricity system’ captures the sophistication of the existing grid infrastructure with ICT infrastructure and thus the creation of a new system. Defining this ‘new system’ is less straight forward, as no exhaustive definition of SES exists. Even more severe, often the ‘term is increasingly accused of being a rather vague label for a variety of innovations’.⁵ For the purpose of this ar-

sustainable power system with low losses and high levels of quality, security of supply and safety’. See European Parliament and Council Regulation (EU) 2013/347 on guidelines for trans-European energy infrastructure (TEN-E Regulation) [2013] OJ L115/39, art 2(7).

3 European Parliament and Council Directive 2009/72/EC concerning common rules for the internal market in electricity (Electricity Directive) [2009] OJ L211/55, art 2(10) defines household customers as follows: “household customer” means a customer purchasing electricity for his own household consumption, excluding commercial or professional activities’.

4 Geert Verbong, Sjouke Beemsterboer and Frans Sengers, ‘Smart grids or smart users? Involving users in developing a low carbon electricity economy’ (2013) 52 Energy Policy, 120.

5 Anne Beaulieu, ‘What are smart Grids? Epistemology, Interdisciplinarity and getting things done’ in Anne Beaulieu, Jaap de Wilde and Jacquelin Scherpen (eds), *Smart Grids from a Global Perspective* (Springer Science 2016), 63.

ticle, that is analysing the access conditions for household customers to SES, we decided to define SES in three steps. Firstly, this section identifies the main objectives that are to be achieved with SES and further specify those for household customers. Secondly, from those objectives this section derives technical requirements which are a prerequisite for household customers to actually achieve those objectives. Thirdly, based on the policy objectives and technical requirements, this section describes the potential impact of the defined SES for household customers.

1. Policy Objectives

SES are often mentioned in the context of integrating increasing amounts of intermittent RES, and, more specifically, as measure to achieve the *efficient* integration of RES.⁶ This entails that grid capacities are used efficiently by matching generation and consumption. Matching requires precise monitoring of electricity flows which in turn needs ICT infrastructure. The International Energy Agency summarises that:

a smart grid [SES] is an electricity network that uses digital and other advanced technologies to monitor and manage the transport of electricity from all generation sources to meet the varying electricity demands of end-users.⁷

Also EU legislation includes a definition on smart grids:

‘smart grid’ means an electricity network that can integrate in a cost efficient manner the behaviour and actions of all users connected to it, including generators, consumers and those that both generate and consume, in order to ensure an economically efficient and sustainable power system with low losses and high levels of quality, security of supply and safety.⁸

The underlying idea is to include the demand-side in electricity flow management in order to increase flexibility, which enables efficient grid operation. Based on the above, this section concludes that the objectives SES ought to fulfil are integrating RES, improving energy efficiency, maintaining grid resilience, and involving system users. Those objectives are to a large extent intertwined and cannot be seen in isolation. The dependency becomes most clear in the

objective to involve system users, as this potentially releases flexibilities which are a necessary requirement for achieving the other objectives. In SES, system users can react to eg varying electricity prices or grid congestions, and thereby offer flexibility to, inter alia, system operators.⁹ For households, this entails that they can actively participate in the electricity market. This is also acknowledged in the European Commission Communication on the involvement of energy consumers, which stresses the importance of involving consumers and ascribes an ‘active role’ to them. The aim is to enhance flexibility, which is becoming increasingly important for the integration of intermittent RES:

The growth of variable renewable energy makes demand response ever more important. Energy efficiency and demand response are often better options for balancing supply and demand than building or keeping in operation more power plants or network lines.

Flexible consumption (and certainly also production) should be rewarded ‘to reap the opportunities available on the energy market by taking control of [...] energy consumption (and possible self-production).’ Accomplishing the involvement of system users (including household customers) and enabling their interaction requires system users to be connected and provided with information. Moreover, system users need to act upon the information, which is triggered by eg varying electricity prices and grid congestions. All of this requires a constant information exchange between all connected system users in order to act and react to supply and demand.

2. Technical Requirements

Realising the SES objectives by interconnecting system users in SES requires the transmission and processing of data, which in turn requires communica-

6 Rahmatallah Poudineh and Tooraj Jamasb, ‘Distributed Generation, Storage, Demand Response and Energy Efficiency as Alternative to Grid Capacity Enhancement’ (2014) 67 Energy Policy, 223.

7 International Energy Agency, *Technology Roadmap: Smart Grids* (2011), 6.

8 TEN-E Regulation, art 2(7). Although the definition intends to define smart grids in the scope of ‘projects of common interest’, it can also be used to define smart grids in a broader perspective.

9 Verbong, Beemsterboer and Sengers (n 4) 120.

tion infrastructure. In fact, in a SES the current electricity system is not changing to a large extent. Instead, the current electricity system is enhanced with communication systems for monitoring and controlling the current electricity system which allows operating the electricity system according to the above identified objectives.¹⁰

Communication systems are defined as:
[...] transmission systems [...] which permit the conveyance of signals by wire, radio, optical or other electromagnetic means [...] irrespective of the type of information conveyed.¹¹

This definition is to a great extent technology neutral, so that a variety of technologies fall in its scope.¹² Hence, many technologies could be used for the deployment of a SES communication system. Also the above mentioned definition on smart grids provided by EU legislation leaves large ambiguities in stating: '[...] a network that can integrate in a cost efficient manner the behaviour and actions of all users connected to it [...]'. However, the definition of 'it' in this definition is unclear. Certain is that the system ('it') includes the existing connection to the electricity grid, and that the definition requires access to a system which enables the cost-efficient integration of the behaviour and actions of all users. The broad character of this definition inevitably also leads to ambiguity with regard to the communication systems used in the SES. Especially taking into consideration that a complex web of interconnected communication systems with varying technical specifications

can be deployed in SES.¹³ For example, the different activities in the electricity supply chain (from production to customer premises),¹⁴ each allow for different technologies that can be deployed.¹⁵ In addition, many communication systems that are already in place might be suitable for fulfilling some functions in the SES.

Following the above, many options and possibilities for types of communication systems can be identified.¹⁶ Nevertheless, when focussing on the consumer premises, and more specifically the household premises, the potential types of communication systems to be used can be narrowed down to three categories: 1) the home area networks (HANs), most likely including a communication service that is used for accessing the Internet,¹⁷ 2) communication systems exclusively dedicated to smart meter¹⁸ communications,¹⁹ and 3) other communication systems used by DSOs and transmission system operators (TSOs) for electricity system operations (eg system monitoring), to which household customers could be connected.²⁰ Although, presumably, more types could be suitable, these are the most important communication systems, based on the work by the European standardisation organisations (CEN, CENELEC and ETSI).

Achieving the objectives ascribed to SES requires the integration of communication systems in the electricity system. As such, SES involve two systems: the electricity system and communication systems. For the latter, it is important to emphasise that different types of communication systems can facilitate

10 This is also reflected in the context of the development of smart grid as described by CEN-CENELEC-ETSI Smart Grid Coordination Group: "It is reasonable to view [the Smart Grid] as an evolution of the current grid to take into account new requirements, to develop new applications and to integrate new state-of-the-art technologies, in particular ICT. Integration of ICT into smart grids will provide extended applications management capabilities over an integrated secure, reliable and high-performance network." See CEN-CENELEC-ETSI, *Smart Grid Coordination Group, Smart Grid Reference Architecture* (SG-CG/M490/C_Smart Grid Reference Architecture, 2012), 14.

11 European Parliament and Council Directive 2002/21/EC on a common regulatory framework for electronic communications networks and services (Framework Directive) [2002] OJ L108/33, art 2(a). See for example Paul Nihoul and Peter Rodford, *EU electronic communications law: Competition and regulation in the European telecommunications market* (2nd edn, Oxford University Press 2011), 2–3.

12 See for example Eleni Kosta, *Consent In European Data Protection Law* (Martinus Nijhoff Publishers 2013), 264.

13 Takuro Sato, Daniel Kammen and Bin Duan, *Smart grid standards: Specifications, requirements, and technologies* (John Wiley & Sons 2015), 247–250.

14 Production, transmission, distribution, decentral energy resources, customer premises.

15 CEN-CENELEC-ETSI, *Smart Grid Coordination Group* (n 10) 124, figure 2: Mapping of Communication Networks on SGAM Communication Layer.

16 *ibid* 122–124 (Annex F, Communication Infrastructure, 15–17).

17 *ibid* 15, (A).

18 In order to facilitate system users acquiring this information, EU Member States are required to deploy smart meters, which are able of providing system users with 'information on actual time of use' and '[that] meters can account for electricity put into the grid from the final customer's premises'. See Electricity Directive, Annex I(2) and see European Parliament and Council Directive 2012/27/EU on energy efficiency (Energy Efficiency Directive) [2012] OJ L315/1, art 9(2)(a) and (c).

19 *ibid* and CEN-CENELEC-ETSI, *Smart Grid Coordination Group* (n 10) 15, (B), also, more specifically, CEN-CENELEC-ETSI, *Functional Reference Architecture for Communications in Smart Metering Systems* (Technical Report, CEN/CLC/ETSI/TR 50572, 2011), 18–19.

20 *ibid* 15–16(C)–(M).

the access to SES. This also means that household customers could have different options for accessing SES. Dependent on the options they have for accessing SES, and the conditions upon which they can use these options (communication systems), the SES might not be equally accessible for all household customers. The remainder of this article argues that this difference might have considerable implications for the access conditions that apply for household customers seeking access to the SES.

3. Implications for Household Customers

In the SES, household customers are expected to become ‘active’. This means that they transform into ‘active’ consumers, or prosumers, which are not just consuming electricity, but are also producing, storing and active in demand response (offering flexibility).²¹ Active consumers are an important source for the envisaged flexibility in the SES.²² In order to harness this potential flexibility, consumers should be rewarded for their flexibility. However, rewarding active consumers also implies that inactive consumers are not rewarded. Consequently, active consumers can lower the total costs of their electricity needs, whilst inactive consumers cannot. This contrast becomes even bigger considering that commonly the total system costs are shared amongst all system users. These system users are usually divided into classes, and all users in one class are considered to be to a large extent comparable. All users in a single class usually also have to pay an equal, or at least comparable, share of the total system costs. Household customers usually form one class. As such, household customers have to pay an equal (albeit variations based on connection size or consumption size usually exist) share of the total system costs.²³ If some users in this class are able to be rewarded, this implies a redistribution of costs and benefits in the system users’ class of household customers. De facto, active household customers are able to lower their system costs, whilst inactive consumers are unable to do so, and potentially also have to compensate the rewards of active system users.

In order to become an active consumer, consumers have to participate in the information exchanges in the SES. This also implies access to the appropriate communication systems required for such information exchanges. As such, also the system services of-

fered to household customers should take this implication into account. Nevertheless, household customers do not necessarily have to become active consumers. Multiple reasons can cause household customers to remain ‘inactive’. Firstly, a lack of technical abilities (eg inability to install production capacity, or unfavourable network position for offering flexibility to system operators) can prevent household customers from becoming active. Secondly, a lack of economical abilities (eg inability to make the required investments in production capacity or flexibility appliances) could also prevent household customers from becoming active. Lack of technical or economical abilities can also lead to a lack of the appropriate SES communication services, or at least unfavourable conditions, rendering the costs of accessing the SES higher (and potentially discriminatory) compared to other household customers. Thirdly, household customers may simply choose to remain inactive. Leaving aside whether the above described redistribution of household customers’ system costs is fair, at least a level playing field for all household customers should exist to become active. This begins with access to the appropriate communication systems, under the same conditions as other household customers. In the remainder of this article we assess whether such a right to SES communication systems exists, and if not, how such a right can be guaranteed under the current regulatory framework.

III. Current SES Access Framework

The electricity sector and the telecommunications sector are network industries with different access regimes. The aim of both access regimes is to provide rules that establish a level playing field, so that despite the dependence on access to the system, third parties (users, including consumers, other than system operators) seeking access have equal conditions to participate in the market. Ultimately, this facilitates a competitive market setting.

21 Lea Schick and Christopher Gad, ‘Flexible and inflexible energy engagement-A study of the Danish Smart Grid Strategy’ [2015] 9 Energy Research & Social Science, 51–54.

22 European Commission, Smart Grids Task Force, ‘Mission and Work Programme’ (2012), 5.

23 Ignacio Pérez-Arriaga (ed), *Regulation of the Power Sector* (Springer 2013), 211, 310–311, 412–413, 418–424.

In order to protect consumers in this competitive market setting eg against information asymmetry and potential abuse of market power by service providers and system operators, the access regime is not only about creating a competitive market, but also about creating a level playing field in which consumers are protected against for example unfair pricing or service conditions. Therefore, both access regimes for the electricity system and communication systems include specific access conditions for consumers, especially household customers.

This section first analyses the access conditions for both the electricity and communication systems that apply to household customers. Thereafter, the article compares the access regimes of electricity and communication systems, and identifies the relevant differences between these regimes for further analysing the access conditions for SES.

1. Access to the Electricity ‘System’

The Electricity Directive imposes the obligation for Member States to establish a system of third-party

access (TPA) for the electricity system. TPA is a right for system users (consumers and producers) and has to be ‘applied objectively and without discrimination between system users’.²⁴ Understanding what this entails firstly requires to identify what exactly *access* means. TPA (further on referred to as ‘access’) to the electricity system aims to establish the internal competitive electricity market. This is facilitated by the freedom of choice for all customers to choose their supplier and by the freedom of suppliers to deliver to their customers.²⁵ To this end, ‘access to the system’ is ‘rather [...] a right to demand a particular service from the energy system operator’.²⁶ The service offered by the system operator is to provide access to the system as established by the Electricity Directive.²⁷ This is reiterated by the Court of Justice of the EU (CJEU), stating that ‘the term ‘access’ is linked to the supply of electricity, including inter alia the quality, regularity and cost of the service.’²⁸ In contrast to the Gas Directive,²⁹ the Electricity Directive does not define the term ‘system.’ The CJEU clarified the range of the system by the purpose of its operation, which is the ‘transport of electricity [...] with a view to its delivery to customers [or to distributors] but does not include supply’.³⁰ Essentially, the clarification of the term ‘system’ follows a functional approach by emphasising the purpose of the system, that is the transportation of electricity with a view to delivery. So in sum, the term ‘access’ in relation to the electricity system implies access to the system that is used for supplying electricity to consumers.

The right to access also entails specific conditions upon which access should be provided to household customers. Article 3(3) of the Electricity Directive requires Member States to ensure that all household customers in the EU enjoy:

[...] universal service, that is the right to be supplied with electricity of a specified quality within their territory at reasonable, easily and clearly comparable, transparent and non-discriminatory prices.³¹

The underlying idea of the concept of universal service is to ensure the basic needs of consumers for services, which have prior to liberalisation efforts, been offered by state monopolies. Universal service provisions aim at preventing that consumers are being cut off the market and consequently suffer social exclusion. In other words, ‘it is intended to guarantee the

24 Electricity Directive, art 32(1).

25 Electricity Directive, recital 3–4 and Case C-439-06 *Citiworks* [2008] ECR I – 3913, para 43.

26 Case C-239-07 *Julius Sabatauskas and Others* [2008] ECR I – 7523, para 42 and Alexander Kotlowski, ‘Access Rights to European Energy Networks – A Construction Site Revisited’ in Bram Delvaux, Michaël Hunt and Kim Talus (eds), *EU Energy Law and Policy Issues II – ELRF Collection* (Intersentia 2009), 8.

27 Electricity Directive, arts 12(g) – (h), 25(3) and 25(6).

28 Case C-239-07 *Julius Sabatauskas and Others* [2008] ECR I – 7523, para 40.

29 In the Gas Directive “‘system’ means any transmission networks, distribution networks, LNG facilities and/or storage facilities owned and/or operated by a natural gas undertaking, including linepack and its facilities supplying ancillary services and those of related undertakings necessary for providing access to transmission, distribution and LNG”, see European Parliament and Council Directive 2009/73/EC concerning common rules for the internal market in natural gas (Gas Directive) [2009] OJ L211/94, art 2(13).

30 Electricity Directive, arts 2(3), 2(5) and Case C-439-06 *Citiworks* [2008] ECR I – 3913, para 51.

31 Note that the universal service provision in the Electricity Directive causes ambiguities regarding the term ‘reasonable prices’. Whereas on the one hand ‘a high supply price could be economically efficient and may be defined as reasonable insofar as it is the outcome of sufficient competition’, on the other hand, and from a universal service perspective, the interpretation in the light of economic efficiency ‘would not be necessarily synonymous with affordable for households’. See Simone Pront-van Bommel, ‘A Reasonable Price for Electricity’ (2016) 39 *Journal of Consumer Policy*, 150.

supply of these services to those who lack the resources to buy them at the market price'.³²

The CJEU assessed the provision on universal service in relation to the right to access the electricity system.³³ The CJEU first established a difference between the terms 'access' and 'connection'. According to the CJEU, access is 'linked to the supply of electricity', and includes 'the right to use the electricity systems'. The term 'connection' indicates the physical connection a system users has with the electricity system. With regard to the relation between the right to access, universal services, and system connection, based on Article 3(3) of the Electricity Directive, the CJEU reiterated the provision that:

Member States shall impose on distribution system companies an obligation to connect customers to their networks under terms, conditions and tariffs [fixed or approved by the (national) regulatory authority].³⁴

In any case, it seems clear that connection is a necessary condition for ensuring access to the electricity system, and that such connection should be guaranteed by DSOs.³⁵

Nevertheless, the obligation to provide access does not imply that all household customers should be treated exactly the same way. The obligation for system operators to organise access to the system is to do so in a non-discriminatory manner.³⁶ The word-

ing of the Electricity Directive acknowledges that not all system users are equal by obliging the system operator to ensure 'non-discrimination as between system users or classes of system users, particularly in favour of its related undertakings'.³⁷ The addition 'classes of system users' entails that different categories of system users exist.³⁸

Objective reasons to treat system users differently are exclusively established by the Electricity Directive and include a lack of network capacity,³⁹ or positive discrimination to the advantage of the integration of RES.⁴⁰ Apart from those objective reasons, the assessment whether system operators can differentiate between system users requires establishing if system users are in comparable situations. Arguably, system users can be categorised with regard to the following characteristics: 'the way they use the system, their company (risk) profile, the quality and origin of the energy, and the point of time, type and amount of their system service request'.⁴¹ Household customers are generally considered to be one class of consumers.⁴² This is likely to change under a SES scenario when household customers have the option to adjust their consumption. In practise, this would result in 'active' and 'passive' consumers.⁴³ However, by law no such distinction exists. Under the current Electricity Directive, both 'active' and 'passive' (household) consumers would still be defined as household customers (purchasing electricity for own household consumption).⁴⁴

32 Hans Micklitz 'Universal Services: Nucleus for a Social European Private Law' in Marise Cremona (ed), *Market Integration and Public Services in the European Union* (Oxford University Press 2011), 64.

33 In Case C-239-07 *Julius Sabatauskas and Others* [2008] ECR I – 7523, the issue at hand concerned the question whether third parties may choose at their discretion the type of system (transmission or distribution system) – to which they wish to connect. This option would be of interest for larger customers who would preferably connect to the transmission system and thereby avoid distribution tariffs. However, arguably this would also lead to an increase in network costs for the remaining smaller customers connected to the distribution grid (see paras 21 and 48).

34 *ibid*, also note para 7 and see Electricity Directive, art 3(3). However, note the difference in wording. Whilst the CJEU uses the word 'may', art 3(3) uses the word 'shall'.

35 Case C-239-07 *Julius Sabatauskas and Others* [2008] ECR I – 7523, paras 40, 41, 42 and 48.

36 Electricity Directive, recital 32 and arts 12(f) and 25(2). For potential reasons for system operators to treat system users differently see Hannah Kruimer, *The Non-Discrimination Obligation of Energy Network Operators – European Rules and Regulatory Practice* (Intersentia 2013), s 2.4 'The Incentives of Network Operators to Treat Network Users Differently'.

37 Electricity Directive, recital 32 and art 12(f).

38 See for an extensive analysis for example Hannah Kruimer, 'Non-Discriminatory Energy System Operation: What Does It Mean?' (2011) 12(3) CRNI, 260–286.

39 Electricity Directive, art 32(2).

40 European Parliament and Council Directive 2009/28/EC on the promotion of the use of energy from renewable sources (Renewables Directive) [2009] OJ L140/16, art 16(2b). Those objective reasons are 'not an exception to the duty 'to not discriminate between system users' but [...] an exemption to the obligation to offer/provide access (service) all times' see Kruimer, 'Non-Discriminatory Energy System Operation' (n 38) 277.

41 Kruimer, 'Non-Discriminatory Energy System Operation' (n 38) 285.

42 See the wording of the Electricity Directive, art 3(3): 'Nothing in this Directive shall prevent Member States from preventing the market position of the household, small and medium-sized consumers by promoting the possibilities [...] for that class of consumers.'

43 See II.3 Implications for Household Customers.

44 Electricity Directive, art 2(10).

2. Access to Communication ‘Systems’

Contrary to the electricity sector, in the telecommunication sector a system operator is not offering the services related to access, it only provides a network.⁴⁵

It is the service provider that offers the end-user services, such as Internet or telephony. Although it is not uncommon that the service provider is also the operator of the network it uses for providing it services, from a legal perspective, it is the service provider that is in a contractual relation with the end-consumers. Whereas the Electricity Directive refers to system users when indicating those seeking access to the electricity system, in EU telecommunication legislation, those seeking access to communication services are simply called users,⁴⁶ being either natural or legal persons requesting electronic communication services.⁴⁷ These ‘electronic communication services’ are usually transmitted via ‘public communication networks’ and are services offered for remuneration.⁴⁸ In EU law, two different types of services can be identified.⁴⁹

The first type of services are electronic communication services, to which general EU telecom consumer protection provisions apply. Examples of such provisions are required minimum contract terms, transparency provisions, quality of service (information) requirements, to be determined by National Regulatory Authorities, provisions on the duration terms of contracts, and switching provisions.⁵⁰ The second type of services are universal services, for which the provider of such a service has to ensure affordable services at a specified quality levels for all users, regardless of their geographical position.⁵¹ One example of such a service is the provision of a

communication service that allows for data communication ‘[...] at data rates that are sufficient to permit functional Internet access [...]’.⁵²

3. Comparison and Consequences

Comparing the access conditions for household customers to electricity and communication systems reveals that they are much more absolute for the former than for the latter. The main reason for this can be ascribed to the greater variety of technologies that can be used for the transmission of electronic communication services. Whereas the electricity system consists of only one grid to which access has to be provided, the variety of technologies in communication systems allows for the existence of parallel systems (different technology based networks) to which access can be provided. This difference is also reflected in the regulatory access regimes. Electricity regulation imposes the provision on Member States to oblige DSOs to connect customers to the grid, and thereby provide access to the system.⁵³ Regulation on access to communication systems is quite different. Here the idea is that consumers only have to receive minimum guarantees, as the potential competition (parallel systems, different technologies) would be higher in the telecommunication sector. Consequently, the multitude of communication systems that could be used for SES purposes leads to several options that could offer household customers access to SES communication services. The following section assesses these potential options and the extent to which such options can be guaranteed by EU law.

45 European Parliament and Council Directive 2002/19/EC on access to, and interconnection of, electronic communications networks and associated facilities (Access Directive) [2002] OJ L108/7, art 2(c) and Framework Directive, art 2(a) and (c).

46 In fact, those seeking access to the electricity system are de facto seeking access to system services, as they are either interested in supplying or being supplied by electricity.

47 Framework Directive, art 2(h)–(i), (n). Note that there is a difference between non-commercial users (consumers) and commercial users (users or end-users).

48 Framework Directive, art 2(c)–(d), (h).

49 Arguably, a third type of services could be services of general economic interest (SGEI) on which on Member State level special rights and duties have been assigned to certain undertakings to provide specific services of general interest. Note that in general granting exclusive (special) rights to undertakings is prohibited, but also note Consolidated Version of the Treaty on the Functioning of the European Union (TFEU) [2012] (OJ C 326/47), art 106(2) and Access Directive, arts 9–13. See further Paul Nihoul

and Peter Rodford, *EU electronic communications law: Competition and regulation in the European telecommunications market* (2nd edn, Oxford University Press 2011), 306 and 364. SGEIs are not considered in this article as an option because the focus of this article is on EU wide access options, whilst SGEIs are only offering access options on Member State level.

50 European Parliament and Council Directive 2002/22/EC on universal service and users' rights relating to electronic communications networks and services (Universal Service Directive) [2002] OJ L108/51, arts 20–22 and 30. See further Ian Walden (ed), *Telecommunications law and regulation* (4th edn, Oxford University Press 2012), 456–462.

51 Framework Directive, arts 2(j) and 3(1), Universal Service Directive, art 3 and Paul Nihoul and Peter Rodford, *EU electronic communications law: Competition and regulation in the European telecommunications market* (2nd edn, Oxford University Press 2011), 306–307.

52 Universal Service Directive, art 4(2).

53 See III.1 Access to the Electricity ‘System’.

IV. Access to SES: Four Options

The current electricity system is defined by the purpose of its operation, which is the ‘transport of electricity [...] with a view to its delivery to customers’.⁵⁴ This definition is enhanced in the SES, including the purpose of electricity transmission with a view to delivery *and* realising efficiency gains on basis of real-time information on production, consumption and network capacity. For realising the efficiency gains in the SES, it is crucial that household customers receive the necessary information at specified time intervals. Moreover, household customers should have access to communication services of sufficient quality standards, which are able to provide them with the necessary information at a reasonable price. The question is whether a minimum guarantee to such communication services for SES exists. This section analyses four options, based on the different access conditions for communication services, that could be applied in the SES.

1. Commercial Communication Services

Market parties might offer communication services meeting the SES quality requirements. Such services might well be affordable for *most* household customers. Yet, such communication services are not subject to the requirement of providing *all* consumers (regardless of their geographical location) with a service under comparable conditions. Therefore, an affordable price for these services cannot be guaranteed for *all* consumers in the market realm. This might be problematic for creating a level playing field for household customers accessing the SES.⁵⁵

2. HAN: Data Connection Under Universal Service Conditions

In most HANs, a data connection intended to provide internet access is included. Household customers can use this HAN to connect for example an energy management system, a smart meter, and their data connection to ensure access to the SES. Nevertheless, the effectiveness of such access depends on the quality of the household customers’ data connection.⁵⁶ Under the Universal Services Directive, Mem-

ber States have to ensure that ‘functional Internet access’ is ensured at the following conditions: availability to all users, geographically independent and at an affordable price.⁵⁷ However, functional Internet access does not mean sufficient Internet access for SES purposes. This leaves much room for interpretation, and only offers for a minimum guarantee of having ‘some’ access. Member States could interpret ‘functional Internet access’ as to require for an Internet connection that is of sufficient standards (eg ADSL standards) to provide effective access to SES communication services.⁵⁸ If this would be the case, SES access can be considered to be guaranteed throughout an entire Member State. Yet, EU law cannot guarantee such standards for data connections, which is also emphasised by the European Commission acknowledging that the current universal service conditions for data connections are not up to modern standards anymore.⁵⁹

3. Smart Meter Communication Infrastructure

Member States have to ensure that if the implementation of smart meters is economically viable, at least 80% of the consumers should be provided with smart meters.⁶⁰ However, this does not guarantee that all

54 Electricity Directive, arts 2(3), 2(5) and Case C-439-06 *Citiworks* [2008] ECR I – 3913, para 51.

55 Alternatively, if the market is unable to provide the required communication services to all consumers at comparable conditions, such as price and quality conditions, and no other parties have an obligation to do so (based on options 2–4), Member States could consider designating one or multiple parties to provide for the required services and at the required quality and price conditions. Such services would classify as services of general economic interest, which should in principle only be established if market parties are unable to provide for the services at commercial conditions. See TFEU, art 106 and (n 49).

56 Arguably, also the smart meter communication infrastructure could be used to communicate for SES purposes, see IV.3 Smart Meter Communication Infrastructure.

57 Universal Service Directive, arts 3 and 4(2).

58 Sato, Kammen and Duan (n 13) 267.

59 European Commission, ‘A Digital Agenda for Europe’ COM (2010) 245 final and Olga Batura, *Universal service in WTO and EU law* (Springer 2016), 239.

60 Electricity Directive, annex I(2). Note that the 80% implementation rate rule should be interpreted as requiring a minimum of 80% implementation in the cases assessed positively, see European Commission, Interpretative Note on Directive 2009/72/EC Concerning Common Rules for the Internal Market in Electricity and Directive 2009/73/EC Concerning Common Rules for the Internal Market in Natural Gas (Retail Markets) 22 January 2010, 8–9.

household customers receive a smart meter. Moreover, even assuming that all household customers receive a smart meter, this does not mean that the communication systems used for smart metering are also suitable for SES purposes. The smart meter needs to be read at minimum intervals and data standards.⁶¹ Yet, these minimum standards are unlikely to satisfy SES needs.⁶² Although the minimum standards required by EU law might not be satisfactory, Member States could require higher standards for smart meters in order to ensure their suitability for SES purposes. In such a scenario, household customers' access to the SES communication infrastructure could be guaranteed. However, EU law itself does not provide for such a guarantee, nor does EU law guarantee the availability of smart meters for all household customers.

4. DSO Communication Services

Currently, system operators (DSOs in the case of household customers) have to ensure that access to the electricity system is provided. In order to provide access, DSOs have to ensure that their distribution systems are fit for the purpose and that they provide household customers in their area with a physical connection to their networks.⁶³ Nevertheless, it is unclear whether the system to which access has to be provided also includes communication systems.

Whereas the electricity system is defined as the system used for transporting electricity for the purpose of supply, the communication systems to which access should be provided are not necessarily used for the transportation of electricity for supply purposes.⁶⁴ Instead, in SES the communication system is used for efficiency gains by virtue of flexibility services offered by (amongst others) household customers.⁶⁵

It is also unclear whether SES communication systems should be developed to ensure 'a secure, reliable and efficient electricity distribution system in its area with due regard for the environment and energy efficiency'.⁶⁶ Surely, the SES would increase the efficiency of the distribution system. However, the efficiency is not necessarily increased if the DSO itself would be developing and maintaining a communication system for household customers. Considering that the development and maintenance of communication systems is costly, it would be more efficient to use (potentially) existing communication systems. However, this implies that it is not the DSO who provides the communication service. If the DSO would be using third party services, also the obligation to connect customers to their networks does not guarantee access to communication services, as the obligation to connect only applies to the (physical) networks of the DSO, and cannot be provided to services.⁶⁷

V. Conclusion and Recommendations

SES are crucial for maintaining a secure, affordable and sustainable electricity system. Inherent to SES are communication systems, which enable the required interaction between all system users. This article focuses on one particular group of system users, namely household customers. The main proposition of this article is that all household customers should have access to communication services to participate in SES under non-discriminatory conditions to be able to reap the benefits of SES and lower their electricity system and supply costs. To analyse the current conditions for household customers to access SES, the article posed the following research question: *what are the legal conditions for household customers to access SES communication services and what are their guarantees for accessing SES communication services?*

61 Electricity Directive, annex I(1)(h)–(i) and Energy Efficiency Directive, art 10(2).

62 The minimum readings a smart meter should be able to produce are based on a daily level, and provided monthly to the end-user, see Energy Efficiency Directive, arts 9 and 10(2), Electricity Directive, annex I(2), and European Commission, 'A Digital Agenda for Europe' (n 59) 8–9. Although different timeframes could be used for realising the SES policy goals, demand response at least implies more detailed information than the minimum daily information, and certainly provided more often than on a monthly basis. Generally, quarterly, up to real-time information is required, provided in equally framed time-frames, see for example CEN-CENELEC-ETSI, *Smart Grid Coordination Group* (n 10) Annex F, Communication Infrastructure, 66–67. Note that Member States have a large discretion in setting smart meter requirements, see Roland Hierzinger et al, 'European Smart Metering Landscape Report 2012' (Smart Regions, 2012).

63 Electricity Directive, arts 25(1), 32 and 3(3).

64 See (n 30).

65 See II Smart Electricity Systems.

66 Electricity Directive, art 25(1).

67 Assuming that the wording of art 3(3) of the Electricity Directive can be interpreted as also including networks other than electricity networks.

This article identifies four potential options under EU law that might provide for access to household customers under non-discriminatory conditions that would ensure a level playing field for *most* household customers in the SES. However, none of the options currently provides guarantees for *all* household customers. Arguably, ensuring a level playing field for *all* household customers depends on how Member States implement the various options that exist for household customers to access SES communication systems. Nevertheless, EU law does not provide for a clear guarantee for all household customers to access SES at non-discriminatory conditions.

Based on the above, this article recommends that the EU policy makers explicitly address household consumers' access conditions for SES. As the EU envisages large-scale implementation of SES, suitable communication services should be provided. However, EU law does not guarantee (or explicitly require) that SES communication services be available. Al-

though, preferably, the relevant communication services should be provided in the market realm, a safety net should be provided for situations in which such services are not offered to *all* household customers. One option for creating such a guarantee would be adjusting the universal service conditions for communication services, eg by the provision of universal service of data connection at updated standards. This would also service a broader policy objective enshrined in the Digital Agenda for Europe: ensuring (high quality) Internet access throughout the EU.⁶⁸ Another option would be adjusting the minimum standards for smart meters, or integrating an obligation to provide SES communication services in the access conditions for the electricity system. Either way, a safety net should be guaranteed for household customers to access SES at non-discriminatory conditions.

68 European Commission, 'A Digital Agenda for Europe' (n 59).