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Protecting consumers in digitized and multi-source energy systems

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ABSTRACT

This paper investigates if the consumer risks of digitized and multi-source energy systems are capable of being addressed under existing energy consumer protection frameworks. Two challenges are identified. First, under existing frameworks the decision about which entities are subject to consumer protection obligations is often binary and may not easily accommodate new energy products, business models, or supply arrangements. Second, the highly prescriptive and detailed nature of current frameworks are ill-suited to the changes occurring in energy markets that require policy-makers to develop rules to mitigate consumer risks arising from a rapidly expanding group of products, sources and technologies. To address these challenges, we propose that frameworks adapt to be based around baseline rights for all consumers irrespective of how they source, manage, or consume energy. We also argue for greater reliance on co-regulation to develop, monitor, and enforce a series of codes to protect consumers from the risks of new energy products and services.

KEYWORDS

Local energy solutions;
community energy systems;
digitalization; regulation

1. Introduction

Increasing numbers of consumers now have a choice about when and how they source energy including the option to access energy from sources such as standalone or community networks, behind the meter generation, or battery storage. Digitalization is also allowing more consumers to effectively control their purchase, and manage their consumption, of energy including through the automatic control of appliances and automated engagement with suppliers in real time. In aggregate these changes have substantial potential to “empower” energy consumers by allowing them to buy, manage, share, and sell energy in different ways (Brown, Woodhouse, and Sioshansi 2019; Cseres 2018; Lowitzsch 2019). However, the changes also give rise to new risks for some consumers that raise important questions about whether consumer protections originally developed for traditional energy products and services need to adapt to reflect this changed context. Among these risks are that consumers do not get the information they need to fully assess the suitability of the new unfamiliar products; agree to adverse contractual terms; or become locked-in to new long-term supply arrangements limiting future choice.

A large and expanding body of literature examines the changes occurring in energy markets. Much of this research focusses on technological aspects (Sioshansi 2016), the impact of distributed energy resources on consumers and energy systems (Helman 2019) or the implications of the changes for the wider regulatory framework (Bashir et al. 2019; Koirala et al. 2019). While some research has identified new risks to consumers, such as the those associated with smart technologies (Catapult 2018; Godden and Kallies 2018; Lavrijssen 2017), questions about whether and how consumer protection frameworks need to change have only been raised in a small number of studies (BEUC 2019; Council of European Energy Regulators 2021; Orton et al. 2017). Studies that do consider consumer protection

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typically focus on specific issues such as energy poverty (Doukas and Marinakis 2020), empowering vulnerable consumers to participate in energy communities (Hanke and Lowitzsch 2020) or the rules needed to protect consumers for specific products such as ‘Heat as a Service’ (Britton et al. 2021).

The research question motivating this paper is to investigate whether existing consumer protection frameworks are fit for purpose in digitized and multi-source energy systems, in so far as they are likely to strike an appropriate balance between the consumer benefits and risks of new energy products and services. The analysis proceeds in three stages. First, it identifies the broad types of risks that consumers might face in digitized and multi-source energy systems. Second, it assesses whether existing consumer protection frameworks can adequately address these risks. The conclusion drawn is that while some risks might be addressed under existing frameworks there are other risks – such as those which arise for community energy systems or where a particular provider is not “designated” as an energy supplier – where consumers may not be adequately protected. Based on this assessment, the final part of the paper proposes a way to adapt consumer protection frameworks to mitigate the risks to consumers associated with changing energy markets while at the same time not unduly stifling the development of such products by applying a one-size-fits-all set of rules. Unlike existing work on this topic, the focus of this paper is purposively broad and does not limit itself to any specific product, technology, or source. This reflects the reality facing policy makers, which is that any consumer protection framework needs to be capable of dealing with the consumer risks of a diverse range of new energy sources, products, and technologies (from autoswitching sites, energy sharing platforms, home management systems to car batteries and community energy sources).

2. How are energy systems changing for the consumer?

Alongside the traditional supply arrangement, which is based around a centralized, unidirectional shared public supply network, consumers in many countries now have the ability to source energy in different ways and access a range of “new” energy products, services, and technologies (Gui and MacGill 2019). Table 1 presents a non-exhaustive list of some new energy sources, products, and services.

As the breadth and type of new energy products and services offered to consumers has expanded, the types of *providers* offering these products has also changed. Examples of new types of providers include municipal bodies; third party for-profit financing companies; battery and solar panel service providers; electric car manufacturers; smart home and energy management service providers; auto-switching providers and operators of peer-to-peer sharing platforms. Large technology companies are also active in the energy sector.

A particularly important change is the development of energy sharing arrangements that defy the classical supplier–customer relationship. These include community energy systems; virtual sharing over the grid; or sharing of local production through community grids (Council of European Energy Regulators 2019; Khan et al. 2007; Seyfang, Park, and Smith 2013). Community energy systems can take various organizational forms ranging from cooperatives to co-ownership schemes and community-based arrangements (Tricarico 2018, Tricarico 2021; Lowitzsch, Hoicka, and Van Tulder 2020; Sokołowski 2020). As discussed below, how such communities are organized and structured has implications for consumer requirements to fund investments in assets, such as community energy storage (Koirala et al. 2019), and for how consumers become involved in the management, operation, and governance of the system (Moroni and Tricarico 2018).

3. Risks to consumers of new energy products and services

Recognizing that energy consumers differ significantly in terms of their exposure to risks, it is nevertheless possible to identify some general risks posed by new products, services, and technologies for some consumers. While this section focusses on identifying the risks, later sections consider the extent to which existing consumer protections might address these risks, and how regulations in Europe, the USA and Britain are adapting. Seven types of risks to consumers from new energy products are considered below.

Table 1. Examples of new energy sources, products and services.

Broad product category	Examples of specific products and services
New ways of sourcing energy	<ul style="list-style-type: none"> • Energy sourced from small-scale onsite distributed generation facilities (e.g.: solar PV facilities and small-scale wind turbines). • Energy sourced from microgrids or community owned generation facilities. • Energy sourced or shared through peer-to-peer platforms (such as where households share surplus energy with one another under a peer-to-peer arrangement).
New ways of storing energy	<ul style="list-style-type: none"> • Small scale batteries. • Electric vehicles.
Products that allow consumers to use energy more efficiently, manage consumption and respond to market signals	<ul style="list-style-type: none"> • Insulation or energy efficient appliances. • Manual systems that allow appliances to be adjusted through apps on mobile phones. • Automated appliances and smart devices which automatically switch on and off in response to market signals (e.g. smart pool pumps or air conditioners). • Automated home management systems and smart thermostats.
Products where consumers interact with third parties or intermediaries	<ul style="list-style-type: none"> • Personalized and customized products to manage energy use • “White label” products which involves grid sourced energy being provided through a third-party, who has a direct relationship with consumers. • Community sharing arrangements. • Joint product offerings where a customer is offered a specific retail market offer contingent on them also being contracted with a storage provider.
Products that allow consumers to better assess, and make choices, about different products and suppliers	<ul style="list-style-type: none"> • Price comparison websites, energy brokers and other intermediaries. • Suppliers of energy efficiency advice or bill forecasting or checking services. • Switching products including the automated switching of accounts among different suppliers (“auto-switchers”).
Information and data products	<ul style="list-style-type: none"> • Products which provide breakdowns of specific timing and amounts of energy consumption and the associated estimated costs. • Products which allow customers to monitor and record data on their consumption over time.

A first risk arises where consumers adopt a new way to source energy and as a result disconnect themselves, or de-energize their connection to grid sourced energy. For example, a consumer may sign a long-term power purchase agreement with a solar provider, or become a member of a community energy scheme and as a result decide to no longer maintain a connection to the grid.¹ While this can bring the consumer benefits in terms of the ability to source energy in a different way, a risk could arise if at a later point the consumer decides it wants to reconnect to the grid for some or all of its supplies. In particular, if there is no appointed default or backstop provider, then there is a risk that the consumer is effectively locked-in to this new supply arrangement indefinitely.

A second risk arises for consumers who cannot, or do not, effectively exercise choice because they are unfamiliar with new energy sources or providers of new products and services. Some consumers may not get the information they need to fully assess the suitability of the new unfamiliar products. In the United States, the sales practices for solar power agreements has given rise to concerns, particularly in relation to warranty terms, maintenance complications and property transference issues and the use of “teaser rates” (Citizens Alliance for Responsible Energy 2015; Congress of the United States House of Representatives 2014). The risk that consumers may enter into contracts that have complex conditions attached or which consumers do not fully understand, including bundled offers, has also been identified in Europe (Council of European Energy Regulators 2021).

¹For example, some companies in Europe require that tenants in an apartment block who wish to benefit from the supply of energy from the building’s solar panels can no longer be supplied from an alternative traditional supplier (see Council of European Energy Regulators 2021).

A third risk is that because some new product and services involve long-term contractual commitments, some consumers may be contractually locked-in to that arrangement or face high exit charges that limit their ability to exercise choice and switch. Again, issues of this kind have arisen for long-term solar power purchase agreements in some US states (Arizona Corporation Commission 2014; Congress of the United States House of Representatives 2014). Similar concerns about consumer captivity have been raised in Europe (Council of European Energy Regulators 2021). Consumers who participate in community energy scheme may also need to make substantial up-front investments, such as contribute to a community energy asset or storage facilities, which can act as a practical “lock-in” and reduce the incentives for consumers to exercise choice.

A fourth risk is that consumers agree to adverse contract terms and conditions because they do not fully understand the terms and conditions of the new and unfamiliar supply arrangement. For example, a supply contract might require a consumer to sign up to a long-term lease (e.g. for assets such as solar panels) or commit to fund the purchase of joint asset.² Contract terms might also entail a consumer facing more variable (and potentially volatile) charges than they are familiar with which could, in principle, generate the same need for protections as might be considered usual for financial products with variable outcomes.³

Fifth, consumers who participate in community energy schemes might face new and specific risks. For instance, members may be required to jointly fund capital equipment (e.g. a battery) and contribute to its ongoing maintenance. There may also be challenges around determining what the energy “price” is in such community arrangements that could give rise to a need for consumers to fully understand the contracts concluded particularly regarding each participant’s share of energy consumption.

Sixth, consumers of new products and services might no longer have access to low cost and accessible avenues for resolving disputes (BEUC 2019). In other words, they may have to litigate any claims against providers (or other members of an energy community) through lengthy and costly court proceedings and under different legal provisions than apply to consumers of traditional energy services (e.g.: use contract law or fraud provisions rather than consumer law).

Finally, vulnerable consumers or those facing financial hardship might face new risks when purchasing new products and services if suppliers are not required to assess the characteristics of consumers, or the particular consumer, before offering them a product (as they are sometimes required to do under traditional supply arrangements), or if they seek to purposively exploit known vulnerabilities by shrouding aspects of the prices or making it difficult for the consumer to understand the terms of the supply arrangement (Decker 2020).

4. Do existing energy consumer protections address these risks?

Protections for energy consumers in many jurisdictions are contained in a combination of generally applicable (horizontal) consumer protection laws and (vertical) energy-specific regulations.⁴ Whether the existing consumer protections apply to consumers of new products and services depends critically on how the new services, and the suppliers of such services, are classified. In many jurisdictions, energy-specific protections only apply to consumers of a “designated” or “licensed” energy supplier,

²Council of European Energy Regulators (2021) discuss the risk that consumers agree upfront investments in products/assets that can only be used in combination with a service contract with a specific provider (e.g.: a compatible solar panel system). This potentially restricts the future use of the product/asset with other service providers.

³This issue might arise in particular where a consumer participates in peer-to-peer or other energy trading platforms. Council of European Energy Regulators (2021) refers to blockchain based energy trading platforms where energy buyers engage in Contracts for Difference. This requires consumers to have a basic knowledge of financial concepts and derivatives and blockchain skills.

⁴In Europe horizontal consumer protection laws include the: Consumer Rights directive (93/13/EEC), Unfair Commercial Practices Directive (2011/83/EU) and the Distance selling and door-to-door sales Directive (85/577/EEC). Vertical or energy specific consumer protections are contained in the Electricity Directives of 1996, 2003, 2009 and 2019 (respectively Directives 96/92/EC; 2003/54/EC; 2009/72/EC and 2019/944). In the USA, important horizontal consumer protections are contained in the Federal Trade Commission Act (1914), while energy sector specific consumer protections are determined at the state level. While some consumer protection obligations are placed on the retail suppliers, others are provided for under state law and apply directly to the consumer or are contained in a Consumer Bill of Rights, such as in New York and Texas.

which raises complex legal questions about which types of new providers are considered to be engaged in the “supply of energy.” While it is beyond the scope of this paper to consider these questions of designation in detail, [Table 2](#) below assesses the extent to which the seven types of risks identified in [section 3](#) might be addressed under existing consumer protection frameworks. It highlights a potential “gap” in the protection of consumers of new products and services where they are provided by non-traditional or non-designated suppliers.

As noted above, community energy systems raises specific and novel consumer protection issues as they typically involve consumers isolating themselves from traditional regulated energy systems. First, there are questions about governance and decision-making: how does a consumer participate in such a system and under what conditions?⁵ Second, there are a range of questions about the price and non-price terms on which electricity is shared among a community: what charges are levied and how are they calculated? what up-front and ongoing financial commitments must consumers make? and what happens when service is interrupted, who is responsible? Third, there are questions about the information provided to consumers/members about system usage, operation and costs. Finally, there are issues about the ability of consumers to exercise choice, switch suppliers and “exit” a community energy system.

The extent of protection for consumers that participate in community energy schemes under existing protection frameworks currently depends critically on how such schemes are classified. In Europe, if a citizen energy community is granted the status of a distribution system operator then it is automatically subject to the same consumer protection obligations as traditional distribution system operators (Council of European Energy Regulators 2019; European Union 2019a).⁶ Similarly, many US states have rules that classify microgrids as a utility, which means that they are subject to the same rules about billing, rates, and quality of services as traditional suppliers (Hyams 2010; Oueid 2019). However, as community energy systems evolve and expand this type of binary approach may no longer be appropriate, and may act to disincentivise the development of such systems.

5. How are consumer protection frameworks adapting to the risks of new energy products and services?

The risks to consumers associated with new energy sources and products and services have not gone unnoticed by policymakers in different parts of the world. This section provides a brief overview of how policy in the EU, USA and Britain are currently responding to these risks.

5.1. European Union (EU)

The 2019 “Clean Energy Package” (CEP) recognizes that the ways in which consumers can access and be supplied with electricity is changing as a result of self-generation, storage or through aggregators, intermediaries or community energy communities (Anchustegui and Formosa 2020; European Union 2019a; Lowitzsch 2019; Nouicer and Meeus 2019).⁷ Critically, while recognizing the importance of these changes, the CEP does not seek to prescribe the consumer protections that should attach to different new products and services. Rather, the CEP distinguishes between different types of electricity “customer” and the protections tend to be tailored to each customer type ([Table 3](#)). The

⁵For example, do all tenants renting a property within a building with a PV plant shared among different flat owners have the right to choose if they want to participate in community scheme or not.

⁶The rights and obligations of citizen energy communities apply in accordance with the roles that they undertake, such as the roles of final customers, producers, suppliers or distribution system operators. Accordingly, once a citizen energy community is granted the status of a distribution system operator, it should be treated as, and be subject to the same obligations as, a distribution system operator.

⁷The Clean Energy Package comprises four Directives (European Union 2018a, European Union 2018b; European Union 2018c; European Union 2019a) and four Regulations (European Union 2018d, European Union 2019b; European Union 2019c; European Union 2019d). The most relevant of which is Electricity Directive (European Union 2019a) which considers consumer empowerment and protection issues.

Table 2. Coverage of risks of new energy products and services under existing energy-specific consumer protections.

Risk	Current protections for consumers of traditional suppliers	Potential gap for consumers of non-traditional suppliers
<p>Consumers could disconnect themselves, or de-energize their connection to grid sourced energy, and cannot access at least one energy source/supplier at a later date</p>	<ul style="list-style-type: none"> Designated suppliers can be obliged to provide connection services and be under a general obligation to maintain a customer connection, limit interruptions and to undertake various steps before disconnections.¹⁸ Also additional protections for customers on life support equipment.¹⁹ Designated suppliers subject to specific disclosure and information requirements, which includes: historical billing data; bill review; end of fixed term contract notice.²⁰ 	<ul style="list-style-type: none"> No requirement on non-traditional suppliers to offer/ provide or maintain a customer connection, or in terms of the process for disconnection. For example, there is no requirement on providers of long-term solar agreement to offer consumers a connection, nor are they obliged to follow rules for disconnection in the event of nonpayment. There is often no standardized rules on disclosure and information requirements for new products and services (e.g.: solar panels or batteries) provided by non-traditional suppliers over and above those provided in general consumer law relating to fraud and deception.
<p>Consumers cannot, or do not, effectively exercise choice among competing new sources/suppliers because they are unfamiliar with products.</p>	<ul style="list-style-type: none"> Designated suppliers are often subject to pre-contractual information and marketing rules, such as requirements to disclose certain information prior to a contract being struck and certain restriction on marketing, canvassing and advertising.²¹ 	<ul style="list-style-type: none"> No specific requirements to provide pre-contractual information or marketing material applies for non-traditional providers beyond those contained in general consumer protection law.
<p>Consumers do not fully understand the terms and conditions for the products and services they are purchasing and risk agreeing to adverse contract terms and conditions.</p> <p>Consumers might agree to long-term contractual lock-ins or high exit/termination charges which limit the ability of a consumer to switch at a later date</p>	<ul style="list-style-type: none"> Designated suppliers typically cannot lock-in consumers to supply arrangements or impose fees ability consumer ability to switch to another supplier.²² 	<ul style="list-style-type: none"> Contractual terms are negotiated between a consumer and a non-traditional supplier. Contracts can be long term (up to 20 years) in nature, or might involve a consumer committing to fund an asset which they will be required to honor even if they choose to switch to an alternative energy source. Contractual terms are negotiated between a consumer and a non-traditional supplier and no minimum contractual terms exist.
<p>Consumers agree to adverse contract terms and conditions because they do not fully understand or are unfamiliar with the new terms and conditions</p> <p>Consumers cannot access low cost and accessible avenues for resolving disputes</p>	<ul style="list-style-type: none"> Designated suppliers can face established minimum contract terms: relating to billing; payment obligations; pricing.²³ Designated suppliers often required to have established processes for customer complaints and dispute resolution. Small customer complaints are sometimes handled by a jurisdictional energy ombudsman²⁴ 	<ul style="list-style-type: none"> Contractual terms are negotiated between a consumer and a non-traditional supplier and no minimum contractual terms exist. Consumers of non-traditional suppliers may not have accessible rights of redress to make their rights meaningful and enforceable. This means they will have to pursue matters through the courts.
<p>Vulnerable customers or customers experiencing financial hardship are not protected having regard to their particular circumstances</p>	<ul style="list-style-type: none"> Designated suppliers often required to provide support and assistance to those experiencing financial difficulty or who are otherwise vulnerable.²⁵ 	<ul style="list-style-type: none"> Vulnerable consumers, or those experiencing financial hardship, of non-traditional suppliers do not automatically have additional or specific protections.

Table 3. Types of “customer” under the Electricity Directive.

Type of customer	Meaning
Customer	A wholesale or final customer of electricity
Final customer	A customer who purchases electricity for own use
Household customer	A customer who purchases electricity for the customer’s own household consumption, excluding commercial or professional activities.
Active customer	A final customer, or a group of jointly acting final customers, who consumes or stores electricity generated within its premises located within confined boundaries or, where permitted by a Member State, within other premises, or who sells self-generated electricity or participates in flexibility or energy efficiency schemes, provided that those activities do not constitute its primary commercial or professional activity.
Vulnerable customer	Each Member State can define the concept of vulnerable customers that may include criteria such as income levels, age or other criteria.

Source: European Union 2019a.

Directive also discusses electricity supply to final customers via so-called “Citizen Energy Communities” (Jasiak 2018; Lowitzsch, Hoicka, and Van Tulder 2020).⁸ Under the CEP Directive, customers being supplied through such communities must retain their rights as household customers and rights to be “active consumers.” Household customers should be allowed to participate voluntarily in community energy initiatives as well as to leave them, without losing access to the network operated by the community energy initiative or losing their rights as consumers. In addition, access to a citizen energy community’s network should be granted on fair and cost-reflective terms.

The CEP Directive does not specify the types of consumer protections that should apply for particular electricity products or services. Rather, consumer protections are applied whenever a provider engages in “supply”; which is defined as the sale, including resale of electricity to customers.⁹ Those who *supply* (sell or resell) electricity are expected to follow the consumer protection rules that attach to the different types of “customer” as set out in Table 3. Accordingly, specific rules apply where electricity is purchased by customers for their own use (final customers), while additional protections apply for household customers (purchasers of electricity for their own household consumption) and further protections for vulnerable customers.

While certain fundamental consumer protections and rights are set out in the Directive, EU Member States have discretion in determining how the protections contained are reflected in national laws. In an attempt to achieve consistency, the Council of European Energy Regulators (CEER), has identified a set of principles it considers should be reflected in consumer protection frameworks across EU Member States (Council of European Energy Regulators 2019). While some of these principles are similar to those already in place, others address new issues or provide further clarification about how an existing principle might apply to a different form of supply arrangement. In relation to community energy systems, for example, the CEER proposes the following principles: consumer rights need to be safeguarded even if customers engage in sharing; consumers cannot be forced into a sharing scheme or community, and cannot be prevented from joining one as long as they fulfil the technical criteria; consumers need to be adequately informed of the conditions of their supply, regardless of its source; and consumers need to be able to choose their supplier freely, and to change their supplier without undue barriers (Council of European Energy Regulators 2019).

5.2. USA

A number of US states are considering if consumer protection frameworks need to adapt to take account of the increasing number of consumers that are obtaining energy under solar power agreements and from batteries, mini-grids or standalone networks. In California, concerns have arisen

⁸An entity controlled by members (individuals, small enterprises or local authorities) that generates, distributes, supply consumes, or stores electricity, or provides charging services for electric vehicles or other energy services to its members where such activity is primarily to benefit its members or its local area rather than for financial profit.

⁹European Union (2019a: Art. 2 (12)).

about false and misleading acts in the marketing and sale of new products, and the state Public Utility Commission (PUC) has acknowledged that consumer protections will “grow weaker” as new technologies, financial vehicles and business models emerge (CPUC, California Public Utilities Commission 2018). In other states, particular consumer protection concerns have arisen about installed residential solar power agreements (so-called “solar leases”) where a third party installs the system at the residential customer’s property, often with no upfront costs, and is responsible for maintenance (Campaign for Accountability 2017; Citizens Alliance for Responsible Energy 2015; Congress of the United States House of Representatives 2014; NREL, National Renewable Energy Laboratory 2020). To address these concerns, some states have introduced mandatory rooftop and community solar disclosure rules (NREL, National Renewable Energy Laboratory 2020), while other states require that customers be provided with a Solar Consumer Protection Guide which needs to be initialed and signed by prior to purchase (CPUC, California Public Utilities Commission 2019).

The ability of consumers that have access to solar and/or battery facilities to be “active” customers is also being debated in some states. A 2018 Colorado law gave consumers the right to install, interconnect and use energy storage systems on their property without unnecessary restrictions or regulations and without unfair or discriminatory rates or fees (General Assembly of State of Colorado 2018). In contrast, under the Californian Public Utilities Code only utilities are allowed to distribute electricity generated at one property to more than two neighboring properties or to non-adjacent properties.¹⁰

As in Europe questions are also being asked about the frameworks that should apply to consumers that participate in community systems and microgrids.¹¹ In some states, community microgrids (above specific supply levels) could, in some circumstances, be classified as utilities, which would mean that they would face rate regulation and their customers would be subject to the same protections as consumers of traditional products (Hirsch, Parag, and Guerrero 2018; Hyams 2010). However, classifying microgrids as utilities is seen by some as a potential barrier to their development, and may limit the ability of consumers to share locally generated power. Community Choice Aggregators (CCAs) are a particular form of community energy scheme that procures electricity for residents, businesses, and municipal facilities in a local area. CCAs are government entities and involve all customers in an area automatically being enrolled but with an ability to opt-out to continue to be served by the IOU. PUCs generally do not have oversight of the CCA on consumer protection matters.

5.3. Britain

In Britain, energy sector-specific consumer protections are contained in supplier licenses, and as such the consumer protection obligations placed on new providers depends critically on whether they are classified as a “supplier” or not. For example, the regulator recently considered whether selling electricity from electric vehicle charging points might be classified as a supply activity.¹²

Alongside protections contained in licenses, for some new products and services consumer protection codes have been introduced to protect customers in areas that may not be covered by existing rules. This includes the Renewable Energy Consumer Code (RECC) which sets out consumer protections in marketing, pre-contractual information, quotations, deposits, contracts, guarantees and after-sales service for domestic consumers (Renewable Energy Consumer Code 2016)). A 2019 audit of

¹⁰Section 218 (b2) of California Code, Public Utilities Code – PUC § 218.

¹¹While there is no universal distinction between microgrids and energy communities, some argue that microgrids are defined by the technical ability to connect to the grid and be operated in both grid-connected or Island-mode. Energy communities do not necessarily focus on the technical capability to connect to the grid (although many community energy systems can be configured as microgrids) but rather focus more on who develops, owns and operates the project. See Warneryd, Håkansson, and Karltorp (2020) and Reijnders, van der Laan, and Dijkstra (2020).

¹²Ofgem (2020) concluded that “supplying electricity to EV charging points would be supply, but selling electricity to EVs from those charging points won’t necessarily be supply”

the Code concluded that there is a high number of applications for membership and that monitoring of compliance was risk-based, comprehensive and focussed on those areas where potential risk of consumer detriment and/or noncompliance is greatest (Chartered Trading Standards Institute 2019). In addition to the RECC, various other voluntary codes apply to traditional suppliers including: a Code of Practice for accurate bills; energy switch guarantee; and safety net for vulnerable consumers.

6. A consumer protection framework for new energy sources, products and services

While the previous discussion highlighted that some jurisdictions recognize the risks of new energy sources, products and services and are introducing changes to address them, there remain many issues which are unaddressed or ambiguous, and where there does not appear to be a clear policy consensus on how to adapt consumer protection regulatory frameworks. With this point in mind, this section sets out a proposal for how energy consumer protection frameworks could evolve to accommodate the varied risks posed by new energy sources, products and services. The proposal comprises two elements: generally applicable (baseline) rights applicable to all consumers of energy services (including consumers of traditional and non-traditional energy products) coupled with a greater reliance on co-regulation and the use of codes to develop, monitor and enforce the rules.

6.1. Baseline consumer rights for all energy consumers

Existing energy consumer protections are typically highly prescriptive and based around detailed rules. While such an approach is suitable for the largely homogenous setting of traditional energy supply, it is less appropriate as the sector undergoes rapid and fundamental structural change. To take one example, current rules in Britain, Europe and Australia require that designated energy suppliers provide customers with detailed periodic bills comprising certain key information.¹³ This rule is not easily transferable to many new supply settings such as where consumers source energy through a community system, under a long-term lease arrangement or through peer-to-peer trading.¹⁴

Given the significant range and diversity in the types of new products and services emerging there may be a number of benefits in developing a framework based around a small number of core consumer “rights” that apply to all energy consumers. Each of these rights might be accompanied by indicative guidance providing examples of how they might apply to different products and services. For example, there might be specific guidance about billing arrangements for traditional suppliers, and different guidance for battery providers or solar lease providers. While the rights will remain in place, the guidance could evolve in accordance with product and service developments and new risks identified in the market. Although the specific rights will need to reflect local conditions in specific jurisdictions, Table 4 sets out five examples of core consumer rights that could apply to all energy consumers.¹⁵ As described in Table 2, many of these rights already apply to consumers of traditional grid supplied energy in some jurisdictions. However, what is less clear is whether such rights also apply to non-traditional suppliers and energy sources such as where consumer sources energy from a battery and solar panel service provider, peer-to-peer sharing platform or as part of a community energy system (such as an apartment block).

¹³For example, EU Directives require that all energy bills issued by licensed supplier should – unless the national authorities determine it inappropriate – set out clearly: the current actual prices and how much energy used; a comparison with how much was used by the consumer in the same period during the previous year; details of who the consumer may contact to find out how to save energy, for example consumer organizations, energy agencies or similar bodies, including website addresses and, wherever possible and useful, comparisons with similar types of customers.

¹⁴Some of these detailed billing requirements would clearly be difficult, and disproportionate, for small community systems to implement. For example, the project to put 120 kW of solar on 60 houses on two streets in Easton, Bristol UK which will operate as community owned microgrid to share solar energy (CEER 2019), or the GridFlex Heeten project in the Netherlands where 47 households will operate as an energy community (Reijnders, van der Laan, and Dijkstra 2020). Moreover, some requirements could also be redundant or inconsistent with the nature of the supply arrangements, such as where consumer commit to a long-term solar purchase agreement or where households share surplus energy with one another under a peer-to-peer arrangement.

¹⁵Table 4 builds on and expands the analysis contained in Decker (2020).

One advantage of introducing such generally applicable consumer rights is that they can accommodate new and innovative business models, are technologically neutral, and do not discriminate between traditional and non-traditional suppliers and energy sources. They are also non-prescriptive in terms of how providers can ensure that a particular right is satisfied, meaning that a right can be satisfied in different ways. As such, the rights should not act as a barrier to innovation or alternative business models, and can allow providers to adopt protection measures that they consider to be proportionate to the risks involved. In addition, because the rights are linked to the overarching goal of protecting consumers, they can be applied universally across all types of provider and allow for consumer protections to be adapted to the different relationships between providers and consumers (e.g.: the special circumstances of community energy systems), and as such should not over-regulate.

Critically, the introduction of baseline consumer rights does not entail the complete abandonment of a more prescriptive approach in some high-risk areas or for some products. Rather it raises the possibility for a hybrid approach that combines the core rights with prescriptive rules in specific areas. For example, the rights identified in [Table 4](#) above could be accompanied with more prescriptive rules for products and contracts involving long-term commitments or high exit fees. Such a hybrid regulatory approach is seen in other regulated sectors that are fast moving and innovative, where significant market change is occurring, or where it would be too difficult to apply a prescriptive approach given the many and diverse risks that need to be regulated (Decker 2018). To some extent a hybrid-based approach is already being used for (traditional) electricity suppliers in Britain where in addition to prescriptive rules all customers of licensed suppliers have a right to be treated fairly. However, as described above, it is unclear whether and how this approach extends to providers of new products and services.¹⁶

One implication of the first baseline right is that it may require that a default universal service energy supplier be appointed, which raises questions about how the costs incurred by the default should be funded. Among the possibilities here is that the prices paid to default supplier(s) increase to take account of their customer base (and the insurance aspect of it), or the structure of charges change to be based more on capacity charges rather than volume-based charges. Another possibility, which has been considered the post and telecommunications sectors, is that all energy providers (both traditional and new) be required to contribute to a universal service fund, which is then used to subsidize the activities of the default supplier.

6.2. Greater reliance on a co-regulatory approach based around codes

Existing consumer protection frameworks for traditional energy products are typically mandated in law and enforced by regulatory agencies. An alternative approach that may be more suited to the dynamic changes occurring in energy markets is to rely on consumer protection frameworks that are shaped by statute, but given substantive content by industry through a code. A co-regulatory approach can be particularly effective in sectors that are changing rapidly and where supplier understanding of developments is likely to be better than that of regulators (Decker 2020). Starting with a code in the first instance, and only mandating rules in formal legislation if and when specific harmful risks arise, may also be a more proportionate approach to the changing circumstances. It also ensures that while policymakers establish the desirable goals the means of achieving these goals are left to the market to determine (Sunstein 1991). This avoids the risks of a regulator needing to specify in advance what risks might arise (which given the changing context could be too diverse to identify), and the challenges of defining precise and succinct rules for many different possibilities (Kaplow 1992; Sunstein 1995).

A range of co-regulatory arrangements can be observed in practice, each of which involves varying degrees of involvement for industry and regulators. Under some arrangements industry develops a code but must obtain regulatory approval. In contrast, other arrangements involve the industry designing and managing the code with the regulator only intervening on receipt of a complaint from a participant or consumer.

¹⁶The regulator has suggested that the standards might also apply to price comparison websites and potentially to auto switching sites (Ofgem 2019).

Table 4. Consumers rights of all energy products and services.

Principle	Rationale
All consumers can access at least one reliable energy supply source	<ul style="list-style-type: none"> • Will ensure that no consumer is left “stranded” without access to any energy source/supply, including consumers that have previously chosen to use a new product and service as their main supply source. • Practically, this could require that consumers can always access a “default supplier” in a specific region/area (meaning that a default supplier would need to be adequately funded for providing this insurance function). • In addition to the traditional sale or resale of energy, access might involve “self-supply” or “collective sharing” of energy among groups of consumers involving no financial exchange.
All consumers can choose to switch to another supplier/ energy source without undue impediments	<ul style="list-style-type: none"> • Should ensure consumers are not unduly “locked-in” to poor deals over the long term. In practical terms, this principle will again likely require that consumers can switch to and access a “default supplier” if requested. • For some new products and services that involve individual or shared investments, consumers may still have to pay their share of any investments they had committed to funding prior to exiting that supply arrangement (i.e. undue impediments is a relative concept).
All consumers have access to sufficient, accurate and timely information about the product or service	<ul style="list-style-type: none"> • Should ensure consumers are able to make timely and informed decisions about the suitability of new products and services. • Such an understanding is likely to be particularly important where it involves a new and unfamiliar product or complex and long-term financing arrangements which consumers may not be familiar with. • Where specific disclosure and information requirements are contained in voluntary codes or guides, suppliers could be mandatorily required to bring that to the attention of consumers, and specify whether they participate in that voluntary code or not.
Vulnerable and financial hardship consumer circumstances are adequately considered	<ul style="list-style-type: none"> • As is currently the case with traditional suppliers in some jurisdictions, new energy products and service providers may be required to take account of specific consumer circumstances in proposing their products/services to vulnerable customers or those experiencing financial hardship and in contracting with them. • This is to ensure that the consumer protections related to vulnerability (e.g. critical dependence on electricity for health reasons, financial vulnerability, age etc) apply irrespective of how a vulnerable consumer sources energy. • This requirement to take account of consumer circumstances is likely to be particularly important where new energy products or services involve substantial up-front investments, will lead to increased practical impediments to changing supplier; potentially reduce reliability of supply or increase price volatility.
All consumers should have access to low cost and accessible dispute resolution mechanisms	<ul style="list-style-type: none"> • As new products, providers and business models emerge this could give rise to misunderstanding and disputes about supply arrangements. Accordingly, the ability of consumers to access low-cost and accessible dispute resolution (such as ombudsmen schemes) is likely to be as important for new products and services as it is for traditional energy products.

Source: Own analysis which draws on Decker (2020)

There are a number of potential benefits of adopting such a co-regulatory strategy for new energy sources, products and services. First, it can be more flexible and adaptable than standard unidirectional mandated regulation which often requires changes to legislation. This means that codes can be updated to reflect consumer protection issues as and when they arise. Second, the governance and management of the code can establish an interaction and dialogue between regulators, suppliers of new products and services and consumers. Involving multiple stakeholders promotes a perception of shared “ownership” can give greater legitimacy to the code. Third, co-regulation can be more cost-effective than statutory regulation if it reduces the transactions costs associated with negotiating and introducing new regulations and involves lower administrative and enforcement costs than statutory

regulation (i.e.: if the industry is effective in “policing” itself). Finally, co-regulatory frameworks can allow for greater differentiation and experimentation: allowing the regulator and providers to work together to test and develop protections for specific consumer risks.

While a co-regulatory approach has many potential benefits, in practice, the effectiveness of co-regulation based around codes depends critically on two factors: the scope of participation; and how it is implemented, monitored and enforced. If the code is voluntary there is a risk of under-representation of providers that choose to participate which obviously weakens its effectiveness. A second risk is that co-regulation will operate without adequate state monitoring and enforcement which can lead to consumer harm. For instance, if there is insufficient state involvement in the design and monitoring of a code then new providers may have too much control over which consumer protection measures are introduced and how actively they follow the rules (i.e.: in effect, they will capture the process and the rules).

While these risks are very real, there is a body of experience on the use of co-regulation and codes in other sectors that can be drawn upon to mitigate these risks (OECD 2002; Ofcom 2008; Office of Fair Trading 2009;; Australian Treasury 2017; McEntaggart, Etienne, and Uddin 2019). Among other things, this work highlights how providers can be encouraged to participate in co-regulation, including that: it provides them with an ability to input and shape the rules that apply to them; that they can apply their own specialist knowledge to the problem; and that it can enhance the collective reputation of the activity (e.g.: all solar panel providers will benefit from maintaining high standards in a code). This work also sets out design and implementation factors that have associated with better (or worse performance) of a co-regulatory arrangement. Among the key factors are: the need to tailor the codes to different sectors/products/services and business models: encouraging widespread participation in the code, which in some cases may require that the codes be mandatory (legally binding on all industry participants); establishing clear processes for quickly and effectively adapting to change where safeguards no longer meet community expectations; and, perhaps most critically, that breaches of the code are identified and enforcement action is sufficient to deter noncompliance. This may involve the use of legally enforceable code provisions which allow consumers to directly challenge any suspected breach through the courts or with a regulator or ombudsman.

As described in section 5, a co-regulatory approach for consumer protection is already adopted in Britain for some new products and services to some degree and the experience to date has generally been positive.¹⁷ In Australia, signatories to a New Energy Tech Consumer Code (covering solar generation systems, energy storage systems, electrical vehicle charging and other emerging energy products and services) have committed to establishing minimum standards of consumer protection. More generally, a regulatory approach of relying on co-regulation and codes of conduct is currently being considered in the context of the future regulation of digital platforms which raises similar issues in terms of the diversity of business models and potential risks to consumers (Centre on Regulation in Europe (CERRE) 2021; OECD 2019).

7. Conclusion

This paper directly addresses a question confronting policymakers around the world: how can we reap the benefits to consumers of multisource and digitized energy systems while at the same time ensuring that they are adequately protected? We identify two general problems with existing consumer protection frameworks. First, under existing frameworks the choice as to which providers are subject to consumer protection obligations is generally a binary one: if you are designated as an “energy supplier” then you are subject to all of the consumer protection rules, if you are not designated then you are only subject to generic (horizontal) consumer protection laws that apply across the economy. This raises a risk of *under*-protecting consumers if new providers raise some consumer risks but are

¹⁷Further back in time, in 2007 the European Commission suggested that a co-regulatory strategy may be the best starting point for developing standard terms for the then liberalizing energy markets (European Commission 2007).

not designated or, alternatively, *over*-protecting consumers if new providers who pose a low level of risk are treated the same as traditional providers. A second problem with current frameworks is that they require policymakers to develop rules in advance to protect consumers from a potentially diverse set of risks associated with a rapidly changing group of products, sources and technologies. Given the limited information available to policymakers about these products, here too there is a high risk of developing rules that either over- or under-protect consumers, and may potentially impede the development of the new products and services.

Taking into account these points, we propose that energy consumer protection frameworks adapt in two ways. First, the framework could be based around a small number of baseline rights that apply to all consumers irrespective of how they source, manage, or consume energy. These rights should be based around fundamental principles (e.g.: right to access energy) and be cast at a general level to cover a wide range of risks and potential supply arrangements (such as community energy systems). A major benefit of such an approach is that it avoids the need to make binary decisions about which providers are “in or out” of a consumer protection framework, while at the same time ensuring that all consumers have a baseline degree of protection. Second, the framework could place greater reliance on co-regulation to develop, monitor and enforce a series of codes that apply to new products and services. This avoids the need for policymakers to predict what risks might or might not occur in advance, and at the same time allows regulators to enlist industry knowledge and expertise to understand which types of risks could arise and how harmful they might be. Such an approach also has the benefit of being able to adapt quickly to new circumstances, which means that rules for problem areas can be added as needed, while rules that are ineffective or disproportionate can be swiftly removed. Of course, to be effective any co-regulatory approach will need adequate regulatory oversight and strong and active enforcement. However, as discussed, there is ample experience from other sectors that can be drawn on here. Alongside these two structural changes there are a range of specific tools and strategies not discussed in this paper that policymakers could adopt including the use of regulatory sandboxes, exemption regimes or impact assessments. These tools and strategies can assist regulators in striking the right balance between ensuring an adequate degree of consumer protection while not impeding innovation and the development of new products and services.

The aim of this paper has been to assist policymakers in adapting consumer protection frameworks to accommodate new energy products, sources and technologies. However, three limitations of analysis should be noted. First, while the general nature of the analysis should make it relevant to a wide range of settings and products, it is recognized that the specific features of energy consumer protection frameworks differ across jurisdictions. As such some of the risks and gaps identified in [sections 3 and 4](#) above may not arise in all jurisdictions, and similarly some of the policy proposals described in [sections 5 and 6](#) may not be suitable given the specific legal and political context. A second limitation is technological and reflects the fact that while energy systems are changing in many countries, there are likely to be differences in the pace and extent to which new energy products and services are offered in a market. This means that the need to adapt consumer protection frameworks may not be as pressing in some jurisdictions as in others. A final limitation relates to the proposal to apply a co-regulatory structure. Experience suggests for such arrangements to be effective there needs to be a degree of trust between a regulator, industry and consumers. In settings where this trust does not exist, more traditional forms of prescriptive state regulation may be required to protect consumers.

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References

- Anchustegui, I. H., and A. Formosa. 2020. Regulation of electricity markets in Europe in light of the Clean Energy Package: Prosumers and demand response. In *Routledge Handbook of Energy Law*. Hunter, Tina Soliman, Ignacio Herrera Anchustegui, Penelope Crossley, and Gloria M. Alvarez, eds London and New York: Routledge. 90–106.
- Arizona Corporation Commission. 2014. 'In the Matter of the Commission's Inquiry into Solar Distributed Generation Business Models and Practices and Their Impacts on Public Service Corporations and Their Ratepayers'. 22 December 2014.
- Australian Treasury. 2017. 'Industry Codes of Conduct – Policy Framework.' November 2017.
- Bashir, S., A. Smits, and T. Nelson, et al. 2019. Service innovation and disruption in the Australian contestable retail market. In *Consumer, prosumer, prosumer: How service innovations will disrupt the utility business model*, ed. F. Sioshansi. Academic Press. 2019.
- BEUC. 2019. 'The Future of Energy Consumers: Bright or Burdensome?' 4 October 2019.
- Britton, J., A. M. Minas, A. C. Marques, and Z. Pourmirza, et al. 2021. Exploring the potential of heat as a service in decarbonization: evidence needs and research gaps. *Energy Sources, Part B: Economics, Planning, and Policy* 1–17. doi:10.1080/15567249.2021.1873460.
- Brown, M., S. Woodhouse, and F. Sioshansi, et al. 2019. Digitalization of energy. In *Consumer, prosumer, prosumer: How service innovations will disrupt the utility business model*, ed. F. Sioshansi. London: Academic Press. 3–25.
- Campaign for Accountability. 2017. Re: Violations of the Federal Trade Commission Act' 'Letter to Consumer Protection Federal Trade Commission. 19 July 2017.
- Catapult. 2018. 'Potential risks for consumers in a smart energy future: closing report.' 10 December 2018.
- Centre on Regulation in Europe (CERRE). 2021. The European Proposal for a Digital Markets Act: A First Assessment. January 2021.
- Chartered Trading Standards Institute. 2019. 'Consumer Code of Practice Renewable Energy Consumer Code' July 2019.
- Citizens Alliance for Responsible Energy. 2015. 'Solar Power in the US: Lessons Learned and Guidance for Policymakers.' March 2015.
- Congress of the United States House of Representatives. 2014. Joint Letter to US Federal Trade Commission. 12 December 2014.
- Council of European Energy Regulators. 2019. 'Regulatory Aspects of Self Consumption and Energy Communities' CEER Report Ref: C18-CRM9_DS7-05-03. 25 June 2019.
- Council of European Energy Regulators. 2021. 'CEER Report on Innovative Business Models and Consumer Protection Challenges' CEER Report Ref: C20-CRM-DS-03-03. 20 September 2021.
- CPUC, California Public Utilities Commission. 2018. 'California Customer Choice Project: Choice Action Plan and Gap Analysis.' December 2018.
- CPUC, California Public Utilities Commission. 2019. 'Solar Consumer Guide (September 2019 - version 2).'
- Cseres, K. J. 2018. The active energy consumer in EU law. *European Journal of Risk Regulation* 9 (2). doi:10.1017/err.2018.7.
- Decker, C. 2018. Goals-based and rules-based approaches to regulation. Department of Business, Energy & Industrial Strategy, BEIS Research Paper Number 8. May 2018.
- Decker, C. 2020. 'Consumer Protection Frameworks for New energy Products and Services and The Traditional Sale of Energy in Australia' Report for the Australian Energy Market Commission.
- Doukas, H., and V. Marinakis 2020. Energy poverty alleviation: effective policies, best practices and innovative schemes.
- European Commission. 2007. 'Energy regulation and consumers' interests. D(2007)210013. July 2007.
- European Union. 2018a. 'Directive (EU) 2018/844 of the European Parliament and of the Council of 30 May 2018 amending Directive 2010/31/EU on the energy performance of buildings and Directive 2012/27/EU on energy efficiency.' 30 May 2018.
- European Union. 2018b. Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources'. 11 December 2018.
- European Union. 2018c. Directive (EU) 2018/2002 of the European Parliament and of the Council of 11 December 2018 amending Directive 2012/27/EU on energy efficiency'. 11 December 2018.
- European Union. 2018d. Regulation (EU) 2018/1999 of the European Parliament and of the Council of 11 December 2018 on the Governance of the Energy Union and Climate Action, amending Regulations (EC) No 663/2009 and (EC) No 715/2009 of the European Parliament and of the Council, Directives 94/22/EC, 98/70/EC, 2009/31/EC, 2009/73/EC, 2010/31/EU, 2012/27/EU and 2013/30/EU of the European Parliament and of the Council, Council Directives 2009/119/EC and (EU) 2015/652 and repealing Regulation (EU) No 525/2013 of the European Parliament and of the Council'. 11 December 2018.
- European Union. 2019a. '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.' 5 June 2019.
- European Union. 2019b. 'Regulation (EU) 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity.' 5 June 2019.

- European Union. 2019c. 'Regulation (EU) 2019/942 of the European Parliament and of the Council of 5 June 2019 establishing a European Union Agency for the Cooperation of Energy Regulators. 5 June 2019.
- European Union. 2019d. 'Regulation (EU) 2019/941 of the European Parliament and of the Council of 5 June 2019 on risk-preparedness in the electricity sector and repealing Directive 2005/89/EC. 5 June 2019.
- General Assembly of State of Colorado. 2018. 'Concerning the right of consumers of electricity to interconnect energy storage systems for use on their property.' Senate Bill 18-009 November 2018.
- Godden, L., and A. Kallies. 2018. Smart infrastructure: Innovative energy technology, climate mitigation, and consumer protection in Australia and Germany. In *Innovation in Energy Law and Technology*. Zillman, Donald, Lee Godden, LeRoy Paddock, and Martha Roggenkamp, eds. Oxford: Oxford University Press. 391–411.
- Gui, E. M., and I. MacGill. 2019. Consumer-centric service innovations in an era of self-selecting customers. In *Consumer, prosumer, prosumager: How service innovations will disrupt the utility business model*, ed. F. Sioshansi. London: Academic Press. 127–151.
- Hanke, F., and J. Lowitzsch. 2020. Empowering vulnerable consumers to join renewable energy communities—Towards an inclusive design of the clean energy package. *Energies* 13 (7): 1615. doi:10.3390/en13071615.
- Helman, U. 2019. Distributed Energy Resources in the US Wholesale Markets: Recent Trends, New Models, and Forecasts. In *Consumer, prosumer, prosumager: How service innovations will disrupt the utility business model*, ed. F. Sioshansi. London: Academic Press. 431–469. 2019.
- Hirsch, A., Y. Parag, and J. Guerrero, et al. 2018. Microgrids: A review of technologies, key drivers, and outstanding issues. *Renewable and Sustainable Energy Reviews* 90: 402–11. doi:10.1016/j.rser.2018.03.040.
- Hyams, M. A. 2010. 'Microgrids: An Assessment of the Value, Opportunities and Barriers to Deployment in New York State.' Report Prepared for New York State Energy Research and Development Authority. September 2010.
- Jasiak, M. 2018. Energy communities in the clean energy package. *EEJ*. 8: 29.
- Kaplow, L. 1992. Rules versus standards: an economic analysis. *Duke Law Journal* 42 (3): 557–624. doi:10.2307/1372840.
- Khan, M. I., A. B. Chhetri, and M. R. Islam, et al. 2007. Community-based energy model: A novel approach to developing sustainable energy. *Energy Sources, Part B* 2 (4). doi:10.1080/15567240600629534.
- Koirala, B. P., R. A. Hakvoort, E. C. van Oost, and H. J. van der Windt, et al. 2019. Community energy storage: Governance and business models. In *Consumer, prosumer, prosumager: How service innovations will disrupt the utility business model*, ed. F. Sioshansi. London: Academic Press. 209–234 2019.
- Lavrijssen, S. A. 2017. Power to the energy consumers. *European Energy and Environmental Law Review*. 26 (6): 172–187. .
- Lowitzsch, J., C. E. Hoicka, and F. J. Van Tulder, et al. 2020. Renewable energy communities under the 2019 European clean energy package—Governance model for the energy clusters of the future? *Renewable and Sustainable Energy Reviews* 122. doi: 10.1016/j.rser.2019.109489.
- Lowitzsch, J. 2019. Investing in a renewable future—renewable energy communities, consumer (Co-) ownership and energy sharing in the clean energy package. *Renewable Energy Law and Policy Review* 9 (2): 14–36.
- McEntaggart, K., J. Etienne, and J. Uddin , et al. 2019. Designing self- and co-regulation initiatives: evidence on best practices: a literature review. (London: BEIS Research Paper Number 2019/025).
- Moroni, S., and L. Tricarico. 2018. Distributed energy production in a polycentric scenario: Policy reforms and community management. *Journal of Environmental Planning and Management* 61 (11): 1973–93. doi:10.1080/09640568.2017.1379957.
- Nouicer, A., and L. Meeus. 2019. 'The EU Clean Energy Package.' Technical Report. Florence School of Regulation. October 2019.
- NREL, National Renewable Energy Laboratory. 2020. 'Solar Consumer Protection.'
- OECD. 2002. *Regulatory Policies in OECD Countries: From Interventionism to Regulatory Governance*. Paris: OECD Publishing.
- OECD. 2019. *An Introduction to Online Platforms and Their Role in the Digital Transformation*. Paris: OECD Publishing.
- Ofcom. 2008. 'Identifying appropriate regulatory solutions: principles for analysing self- and co-regulation' Statement. 10 December 2008.
- Office of Fair Trading . 2009 .The economics of self regulation in solving consumer quality issues. OFT 1059.
- Ofgem. 2019. 'Supply licence guide: Introduction to the supply licences.' 21 February 2019.
- Ofgem. 2020. 'Selling electricity to consumers: What are your options?' Guidance. 27 February 2020.
- Orton, F., T. Nelson, M. Pierce, and T. Chappel, et al. 2017. Access Rights and Consumer Protections in a Distributed Energy System. In *Innovation and Disruption at the Grid's Edge*. ed. Sioshansi, Fereidoon P. London: Academic Press. 261–285 .
- Oueid, R. K. 2019. Microgrid finance, revenue, and regulation considerations. *The Electricity Journal* 32 (5). doi:10.1016/j.tej.2019.05.006.
- Reijnders, V. M., M. D. van der Laan, and R. Dijkstra, et al. 2020. Energy communities: A Dutch case study. In *Behind and Beyond the Meter*. ed. Sioshansi, Fereidoon. London: Academic Press. 137–155.
- Renewable Energy Consumer Code. 2016. 'Renewable Energy Consumer Code: For supplying small-scale renewable and low carbon heat or power generating systems to domestic consumers.' October 2016.

- Seyfang, G., J. J. Park, and A. Smith, et al. 2013. A thousand flowers blooming? an examination of community energy in the UK. *Energy Policy* 61: 977–89. doi:10.1016/j.enpol.2013.06.030.
- Sioshansi, F., ed. 2016. *Future of utilities-utilities of the future: How technological innovations in distributed energy resources will reshape the electric power sector*. London: Academic Press.
- Sokołowski, M. 2020. Renewable and citizen energy communities in the European Union: How (not) to regulate community energy in national laws and policies. *Journal of Energy & Natural Resources Law* 38 (3): 289–304. doi:10.1080/02646811.2020.1759247.
- Sunstein, C. R. 1991. Administrative substance. *Duke Law Journal* (3): 607–44. doi:10.2307/1372706.
- Sunstein, C. R. 1995. Problems with rules. *California Law Review* 83 (4): 956. doi:10.2307/3480896.
- Tricarico, L. 2018. Community energy enterprises in the distributed energy geography. *International Journal of Sustainable Energy Planning and Management* 18: 81–94.
- Tricarico, L. 2021. Is community earning enough? reflections on engagement processes and drivers in two Italian energy communities. *Energy Research & Social Science* 72: 101899. doi:10.1016/j.erss.2020.101899.
- Warneryd, M., M. Håkansson, and K. Karltorp, et al. 2020. Unpacking the complexity of community microgrids: A review of institutions' roles for development of microgrids. *Renewable and Sustainable Energy Reviews* 121: 109690. doi:10.1016/j.rser.2019.109690.