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ICE PROJECT DELIVERABLE T5.4.1

**CONSUMER TO PROSUMER
TRANSITION**

NOVEMBER 2021

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ICE DELIVERABLE T5.4.1:

CONSUMER TO PROSUMER TRANSITION



About ICE

Supported by the Interreg VA France (Channel) England programme, the Intelligent Community Energy (ICE) project aims to further develop understanding as well as apply innovative and intelligent energy solutions for isolated areas in the Channel region. The surrounding islands and territories are confronted with specific energy challenges. Many islands are not connected to the European electricity grid and rely on imported fossil fuels, notably fuel-powered heat generators. The energy solutions they use tend to be less reliable, more costly and emit higher levels of greenhouse gases than the European continental grid.

In response to these issues, the ICE project considers the entire energy cycle, from production through to consumption, and integrates mature or new technologies so as to develop innovative energy solutions. These solutions will be trialled and tested on two pilot demonstration sites (the Island of Ushant and the University of East Anglia Campus), to prove their feasibility and to develop a general methodology which can be replicated on other isolated territories elsewhere. To transfer this methodology to other isolated territories, ICE is proposing a low-carbon commercial transition offer. This will include a complete assessment of resources and local energy conditions, a proposed bespoke energy transition model and a body of low-carbon skills and technologies available in a consortium of selected businesses. This ICE-certified consortium will promote the offer to other isolated territories both within and outside of the Channel region (initially 5 territories). The ICE partnership model brings together researchers and bodies providing support to SMEs and will be made up of members from both France and the UK in terms of skills, technological and commercial development.

The involvement of local and European SMEs will further boost competitiveness and transnational cooperation.



Executive Summary for Policy Makers

Consumers in the Energy Transition

As the energy transition unfolds, the interaction between consumers and energy systems is changing. Recent policy developments across Europe are redefining the role of citizens and consumers as efforts ramp up to deliver an increasingly decentralised, decarbonised, digital, and more democratic electricity system. We looked at the evolving policy framework stemming from the **European Union, France, and the United Kingdom** to obtain insights into how the role of consumers is being shaped for a low carbon energy future, identifying specific implications for island regions when available, which are of relevance for the **France-Channel-England region**. We offer up to date insights into these three territories by identifying strengths and weaknesses, and a set of policy recommendations aimed at supporting actions for consumer engagement.

European Union	France	United Kingdom
The Energy Union framework and the Clean Energy for All Europeans policy package are the main pillars shaping the role of consumers. The recent Electricity Directive and Renewable Electricity Directive bring forward new provisions for consumer empowerment and define the scope of “active consumers”, “renewables self-consumer”, “citizen energy community”, and “renewable energy community”.	Consumers have the possibility to shape policy development processes and to participate in the deployment of both large- and small-scale energy infrastructure. France’s key energy policy instruments, the Multi-annual Energy Plan (<i>Programmation pluriannuelle de l’énergie, PPE</i>) and the National Low-Carbon Strategy (<i>Strategie Nationale Bas-Carbone, SNBC</i>) present consumers as important elements of the energy transition going forward.	Progress is observed on regulatory measures and efforts for governing aggregators and community energy. The policy framework recognised the value of “engaged” and “empowered” consumers. Existing policies facilitate consumer participation with specific support for vulnerable consumers.
Switching Rates ^a		
7%	10%	19%
Electricity Prices ^b		
0.217 EUR / kWh	0.177 EUR / kWh	0.212 EUR / kWh
Electricity Mix ^c		
<p>EU-27</p> <p>■ Renewables ■ Combustible fuels ■ Nuclear and other fuels</p>	<p>France</p>	<p>United Kingdom</p>

Sources: **a:** European Commission, Energy Union Indicators, and UK Government, Department of Business, Energy, and Industrial Strategy. Data for 2018; **b:** Source: Eurostat, Electricity prices for medium households. Data for 2019; **c:** Eurostat, Gross electricity production. Data for 2019.

Strengths and Weaknesses

European Union	France	United Kingdom
Strengths		
<ul style="list-style-type: none"> • The legal framework recognises new roles for consumers, acknowledging recent technological developments and the growing importance of collective consumer organising in the energy transition. • New roles for consumers are backed by a legal framework supporting non-discriminatory participation in a market still dominated by large incumbents. • The Clean Energy for All Europeans package aims to improve electricity retail competition to the benefit of consumers, it also establishes the need to protect vulnerable consumers and the energy poor. • The Clean Energy for EU Islands Initiative is a signal of the importance of tailored transitions for isolated island regions. 	<ul style="list-style-type: none"> • Detailed legal framework for citizen participation in energy policy and infrastructure. • Citizens have been consulted to shape the country's main energy policy laws and strategies, including inputs from both mainland France and from non-interconnected islands. • Evolving nature of legal and regulatory framework on collective self-consumption shows willingness to adapt existing rules as new evidence and knowledge is obtained. • Existence of support policies for citizen-led renewable energy projects across regions, which can contribute to the uptake of community and citizen energy engagement and shaping of local energy infrastructure. 	<ul style="list-style-type: none"> • Financial and technological incentives have been implemented to support consumer engagement in the energy transition. • Individual and collective self-consumption are not restricted in existing legislation and have been promoted and supported by the country's energy policy. • The regulator considers the experience and perspective of consumers through structured processes, such as the Consumer First Panel, and the Consumer Challenge Group. • The country is experimenting with approaches that support active participation of citizens on climate policy, seen through the Climate Assembly process.
Weaknesses		
<ul style="list-style-type: none"> - The process of market transformation is gradual and not complete. Retail electricity markets remain concentrated with limited number of suppliers and offers for consumers. - Regulatory development will have to follow the extensive changes introduced regarding the role of consumers to turn the legal framework from the Clean Energy for All Europeans into an operational reality across EU Member States. - New monitoring approaches are needed for an electricity market where consumers can have more active roles, ensuring data availability on the adoption of these new roles. - The Clean Energy for EU Islands initiative is non-binding and does not include dedicated resources, which may have an impact on the delivery of its agenda. 	<ul style="list-style-type: none"> - Existing policies present citizens behavioural change as an important pillar to deliver a low carbon energy transition. It is less clear how these behavioural changes will be delivered at scale and across regions. - Lack of awareness on the available policies and programmes supporting more active consumer roles, which often require complex and lengthy administrative procedures. - Cautious approach on the regulatory framework for collective self-consumption may hinder future development. - Community renewable energy initiatives depend significantly on public support schemes and are vulnerable to policy shifts. 	<ul style="list-style-type: none"> - Policy and regulatory documents state the importance of consumers in the energy transition; however, a legal framework does not exist to provide a foundation for these more engaged consumer roles. - Lack of a legal framework for individual and collective self-consumption can create uncertainty. - Focus on information provision and technologies that provide information, such as smart meters, is proving insufficient to steer consumers towards more engaged roles. - Constant U-turns and changes in support schemes negatively impact their ability to engage consumers in actions that affect their energy usage. The Green Homes Grant is the latest example of a potentially good policy, with significant changes that was ultimately cancelled altogether.

Policy Recommendations

1	<i>Delivering consumers' behavioural change</i>	Consumers are placed as central to delivering a low carbon future. This concept is often connected to significant ambitions for consumers to change their behaviour supported by new technologies and information, such as real-time consumption data provided by smart meters. This role for consumers in the energy transition is seen explicitly in France, as well as in EU level policy. More work is required in terms of how progress on behavioural change is enabled and tracked in the energy transition.
2	<i>Expanding and updating market transformation monitoring and metrics</i>	As the energy transition unfolds, multi-dimensional goals of market liberalisation, low-carbon energy transitions, and consumer empowerment are being pursued in parallel by policies at the EU level, as well as in France and the United Kingdom. This calls for an expansion and update to the market transformation monitoring efforts and metrics used. These should reflect the recent legal developments placing consumers as important players in the energy transition and enable countries and regions to measure and understand their progress. New metrics and a new way to understand success in market transformation can be valuable to obtain a more granular perspective on the dimensions of the energy transition that are advancing, as well as those that need more attention.
3	<i>Reducing policy instability</i>	Reduced policy instability can provide confidence for incumbent and new players in the energy industry to invest in activities that enable new consumer roles. This is an important area of action as policy instability has been seen both in France and the United Kingdom. In France, several changes to the policy framework for collective self-consumption can suggest that commitment for a long-term vision on their role in the energy transition is lacking. In the United Kingdom, constant changes in support schemes negatively impact their ability to engage consumers in actions that affect their energy usage. This degree of policy instability is detrimental to a future in which consumers are more engaged in the energy transition. Long-term commitments introduced as part of whole system energy transition approaches can contribute with effective signals for consumers engagement.
4	<i>Dedicated action for island focused energy transitions</i>	A dedicated legal framework and resources for islands in the FCE region, could support the uptake of innovative technologies and consumer engagement approaches for a low carbon energy transition. At present, islands across the EU must apply to the European Commission to be considered exempt from market liberalisation rules. Recent developments under the Clean Energy for EU islands have moved into the direction of island-focused energy transition work. However, these developments remain voluntary and lack dedicated resources and a compliance obligation. Moving forward, the delivery of energy transitions in island regions can benefit from approaches such as that seen in France. France has a legal framework that requires dedicated energy plans for non-interconnected zones.
5	<i>Rethinking policy approaches for consumers engagement</i>	Emerging policy approaches and support schemes for more engaged consumer roles tend to follow an "opt-in" approach in which consumers must identify, assess, and act on available information regarding new technologies, support schemes, costs and benefits. The need for consumers to act and choose from an array of different options to become more engaged in the energy transition may result on a mismatch between ambitious policy goals related to consumers' behavioural change. As countries adjust their national legal and regulatory framework, it is important to implement processes that minimise administrative burdens to the proliferation of active consumer roles.
6	<i>Better understanding of the regulatory roadmap going forward</i>	Significant regulatory developments will have to follow the extensive changes introduced regarding the role of consumers in the energy transition across countries. At the EU level, the legal framework resulting from the Clean Energy for All European package emphasises an active role for consumers, and protection for those consumers that remain inactive. As regulatory frameworks at the country level are adjusted to reflect these new possibilities it is important to have a better understanding on how implemented regulations support and create a balance for consumers across the different options available to them.
7	<i>Enabling market transformation across countries</i>	There is an energy policy ambition to deliver an integrated internal energy market at the EU level, with consumers placed at the centre of this process. However, across countries, evidence on market developments shows significant heterogeneity in aspects related to retail market functioning, options available for consumers, switching processes, to name a few. As multiple energy policy goals are being pursued across countries, both across the EU and in the United Kingdom, it is essential to dedicate more attention to actions that support progress across countries, with attention for countries with greater gaps in their energy transition process. A focus on enabling market transformation across countries can benefit from best case practice identification and dissemination, providing reference to successful approaches and policies.



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1. Introduction

1.1. Climate Change

The evidence for the anthropogenic nature of climate change has become progressively apparent in each of the IPCC Assessment reports of the last decades. A major impact of climate change is the rise in world average temperature leading to global warming. Emissions from greenhouse gases (GHGs), carbon dioxide (CO₂), nitrous oxide (N₂O) and methane (CH₄) are primarily responsible for the phenomenon of global warming (Dessler, 2021). The latest IPCC report indicates that human activities are responsible for an increase of 1.1°C since 1850-1900 (pre-industrial era) and that will surpass 1.5°C within the next 20 years (IPCC, 2021). The effects of climate change are already visible in every region on earth and the changes will be more noticeable in the foreseeable future. The profound implications of climate change on humanity and its international nature made it a priority in the political agenda.

1.2. Paris Agreement

The Paris Agreement emerged from the Conferences of the Parties 26 (COP26), in 2015, and 191 out of 197 Parties to the UNFCCC are Parties to the Paris Agreement. The Agreement constitutes a landmark point in history and an important tool for combatting climate change and accelerating and intensifying investment required for low carbon energy.

Article 2 encompasses the goals of the Agreement, stating:

‘(a) Holding the increase in the global average temperature to well below 2°C above pre-Industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change;

(b) Increasing the ability to adapt to the adverse impacts of climate change and foster climate resilience and low greenhouse gas emissions development, in a manner that does not threaten food production; and

(c) Making finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development.’

In the Paris COP, states were asked to submit their national plans to reduce GHG on a voluntary basis, and to achieve a goal in their five-year plan, again on a voluntary basis. Part of the national strategy



plans is the developed countries' obligation to assist the developing countries, as provided in Article 3 and 9 of the Agreement. Article 3 maintains that '*as nationally determined contributions to the global response to climate change, all Parties are to undertake and communicate ambitious effort*', and Article 9 states that '*developed country Parties shall provide financial resources to assist developing country Parties with respect to both mitigation and adaptation in continuation of their existing obligations under the Convention*'.

The Paris Agreement achieved nearly universal participation because the key obligations were flexible and unenforceable, at least by traditional legal means. "Naming and shaming" could also trigger international pressure to comply by imposing material and social costs, since international events proved to be quite influential on public awareness and in affecting individual's behavior. The agreement achieved greater accountability and reporting from the participated parties including member states of the EU. In that line, under the EU Emissions Trading System (EU ETS), power stations and energy-intensive industrial installations, such as, refineries and large manufacturing plants, are required to report their emissions. The purpose specifically for the EU is to encourage innovation in low carbon energy systems (Chalvatzis et al., 2019; Pitelis et al., 2020, 2019) and to diversify energy resources to benefit EU energy supply security (Chalvatzis and Ioannidis, 2017; Vafadarnikjoo et al., 2021).

The GHGs emissions are categorized into scopes that indicate where emissions are physically emitted (Greenhouse Gas Protocol, 2004, 2014). Scope 1 emissions –GHG emissions emitted directly by the actors, scope 2 emissions, which result from the actors' electricity consumption and scope 3 emissions referring to supply chain emissions. The GHG Protocol mandates that a company accounts for all its Scope 1 and 2 emissions within its organizational and operational boundaries and provisionally account at its Scope 3 emissions for its own benefit. Energy consumption is the prominent source of manmade greenhouse gas emissions accounting for 76% of the total global emissions (WRI, 2020). Therefore, the role of consumers in a low carbon future, is imperative bearing in mind that households are accountable for a significant part of global carbon emissions (Druckman and Jackson, 2016).

1.3. Transition from consumer to prosumer

The energy sector has been rapidly transitioning in the recent years due to major technological advancements in production and storage of renewable energy sources (Soares et al., 2018). This transition comes with equally new challenges and opportunities to the energy sector and the electricity market particular (Pereira et al., 2018). These changes have also resulted in a growing interest in the options for consumers to shape the energy transition. This is often visible in the changing role of consumers, being transformed from passive consumption into active "prosumerism". Energy users



moved from being traditional consumers, receiving energy from the grid, to being active participants in the energy grid contributing to the digital energy ecosystem (Dai et al., 2020). The role of ICT technologies on pro-environmental behaviour particularly in the energy sector is crucial to this trend (Pothitou et al., 2017, 2016). Prosumers nowadays, can monitor their consumption and participate in demand response programmes, generate, consume, store excess energy for future use and even sell it to nearby customers or to the grid, forming their energy citizenship.

Technological transitions, of the scale of the energy transition, are complex processes, characterized by large uncertainties in their governance and management thus, requiring a combination of technological and social adaptation to be successfully delivered (Pereira et al., 2022). However, the former is often privileged against the latter by policy makers (Mejía-Montero et al., 2020). Whilst civil society has often been seen as a barrier to energy transitions (e.g. NIMBY - opposition to renewables) (Devine-Wright, 2014), there is currently an increasing focus on the important role society can play in delivering ambitious transition targets. Civil society actors are increasingly re-envisioned as: a. using information about their consumption to change behaviour (active consumers); b. influencing policy decision making for regional energy projects (active citizens); and c. producers of energy either at individual or collective level (prosumers). Therefore, the role of civil society and particularly prosumers in accelerating this energy transition is protuberant. At an EU level these developments are fostered through multiple frameworks aiming at large-scale initiatives and institutional change (Apostolopoulos et al., 2021, 2020; Zafirakis et al., 2013).

The role of electricity consumers and citizens has departed from where they have been mainly regarded as a consumption point, at the end of the electricity supply chain, with limited options for interacting and shaping the energy system. Today's consumers can actively participate in the energy transition, and may act as electricity producers – taking on a more engaged role. More active consumers can shape the future of the electricity sector and contribute to accelerating the energy transition. Citizens opting to voice their opinion regarding future policies and projects can shape future priorities and influence the direction of the energy transition, including for instance local perspectives on how to develop sustainable energy systems. Consumers opting to produce electricity from renewables, such as distributed solar PV, can contribute to long-term decarbonisation goals by contributing to the growth of available renewable generation capacity. Whether shaping the electricity system infrastructure directly, as prosumers, or by shaping the policies and regulations governing the energy transition, there is an increasing relevance in considering the role of citizens in the unfolding energy transition.



1.4. Prosumer Definition

The term “prosumer” finds its origins on Toffler (1980) attempt to emphasize the difference between production and consumption (Couture et al., 2014). In general terms the activity of prosumerism focuses on both production and consumption as simultaneous rather than independent acts (Setiffi et al., 2018). It is based on the active participation of consumers as producers, which is at odds with traditional energy systems designed to supply electricity using large powerplants. The energy prosumer participates in the energy system actively through their production and consumption of energy and is becoming an important part in the energy market. Within the energy context Parag & Sovacool (2016), define prosuming as the action where energy customers actively manage their own consumption and production of energy. That can refer to households, businesses, communities, organizations and other agents acting as prosumers.

1.5. Rise of prosumers and technological advancements

The rise of prosumerism goes in line with the technological advancements observed in the sector. The transformation of the energy sector is characterized by digitalization, decentralization and decarbonization. Advancements in the areas of micro-generation, demand reduction and response, data management, and energy storage are embedded in the energy role of prosumers. Examples of such technologies referred to data metering and control, database platforms, Information Communication Technology (ICT) devices and smart energy management systems. The adoption of such technologies relies on four major drivers that can influence the growth of prosumers in a negative or positive direction namely 1) Economic drivers 2) Behavioural drivers 3) Technological drivers, and 4) National conditions (Couture et al., 2014). Therefore, regulatory frameworks and policy makers should rely on a complex mixture of specific conditions to articulate the justification for supporting prosumers.

Technological development and energy transition goals are important to support this shift from an electricity sector where passive consumers are predominant, to one where we see a growing space and relevance for more engaged consumers. Additionally, this depends on a legal and regulatory framework that creates the necessary conditions for new relationships and roles for consumers in the energy sector to emerge and develop.

Building on the market liberalisation reform, the energy transition is unlocking new possibilities for consumer engagement in the energy system and citizen engagement with the energy transition. Recent policy developments allow consumers to simultaneously produce and consume electricity, acting as prosumers, having a direct impact on the energy system and its future development trajectory. Beyond being allowed by existing laws, the participation of consumers on energy markets is also incentivised,



particularly when considering renewable energy technologies, which have benefited from Feed in Tariffs to drive the adoption of distributed electricity generation technologies, with solar photovoltaic receiving considerable support. Moreover, unfolding policy changes – fostered by the EU Clean Energy for All policy package – are now opening the way for collective prosumer action, with a rising interest on the role of energy communities in the energy transition.

The potential impact of having engaged consumers and citizens is significant. At the EU level it has been estimated that up to 83% of households (187 Million households) could become active energy consumers and participate in the energy market through renewable energy production, demand response, and energy storage. About half of EU households could become energy producers (Kampman et al., 2016). Moreover, by 2030 citizen-led energy communities could own 21% of installed solar capacity, and 17% of wind (Grid Singularity, 2020).

At the European Union-level we find a vision that suggests that citizens are at the centre “*Most importantly, our vision is of an Energy Union with citizens at its core, where citizens take ownership of the energy transition [...]*”.

France and the United Kingdom, studied in this volume have been identified as having significant potential for citizens contribution to the energy transition, particularly for electricity production, alongside other countries in the EU (Figure 1.1) (Kampman et al., 2016).



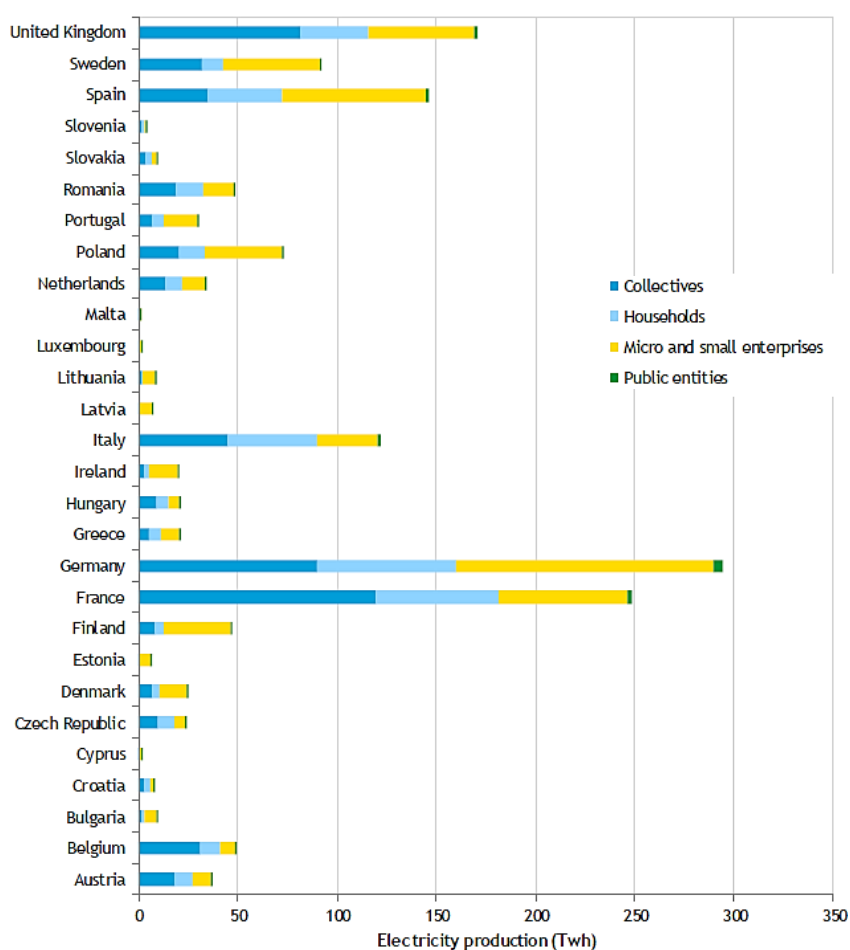


Figure 1.1 Electricity production from citizens, potential by 2050. Source: (Kampman et al., 2016, p. 23).

1.6. Regulatory framework as a barrier

Even though technology advancements provide the opportunity for growing the volume of prosumers it appears that regulatory frameworks aligned with these advancements are lagging. Regulatory frameworks are individually and sporadically supporting the technological advancements, however, failing to enable and incentivise energy prosumerism. The technologies introduced are regulated under existing generic legislations and there is a lack of institutions and authorities dedicated in supporting the transition towards a new market for greater prosumer integration (Chilvers and Kearnes, 2015). At the moment it appears that countries have complicated bureaucratic procedures, vague definitions of key terms in the legislations, and lack of defined timelines, all of which can act as obstacles on the integration of the prosumer into the system (Botelho et al., 2021). A stable regulatory framework providing the right incentives while fairly allocating the cost and benefits can attract consumers. The regulations and policies introduced by national governments should be straight forward, transparent and avoid causing market distortion.

1.7. Document Structure and main contributions

Following the introduction, the report continues with Chapter 2 that focuses on the EU legislative context. We analyse the European Union's electricity sector policy framework for citizens and consumers in the energy transition to understand recent developments as part of the Energy Union and the Clean Energy for All Europeans policy package. In this chapter we review the evolving role of consumers, particularly by focusing on the recent Electricity Directive and Renewable Electricity Directive, which bring forward new provisions for consumer empowerment and define the scope of "active consumers", "renewables self-consumer", "citizen energy community", and "renewable energy community". As a result of these recent developments the EU is now pursuing multiple goals to transform its electricity market for a low carbon future. The implemented policies aim to fill in the gaps related to slow progress on market liberalisation goals, such as retail market concentration and the existence of regulated prices in EU countries, together with ambitions to put the consumer at the centre of the energy transition. The ambitions going forward are contrasted with previous progress to deliver new roles for consumer, where we observe heterogeneity across Member States, which is relevant background in terms of the challenge to deliver policy goals across the EU. Information provision, adoption of innovative technologies, and support for vulnerable consumers are found as focus areas and enablers of new roles. We find that the role for consumers is framed as one in which they assess data, take action, and interact with new technologies. Less evidence is found on the importance of consumers to shape policy processes related to energy transition developments, such as considerations on the legal framework for policies, plans, and proposals to be developed or co-created with citizens participation.

Following that, Chapter 3 focuses on the UK case study with all the specificities of the UK's policies that are relevant to energy prosumers. The United Kingdom's existing energy governance gives way to a more flexible supply-and-demand system, increasingly moulded by the 4D's; decarbonisation, decentralisation, digitalisation, and democratisation. In this chapter, we provide an overview of the UK legal framework by examining the major statutes governing consumers in the energy industry and pertinent international instruments. We examine the UK regulatory measures and efforts for governing aggregators and community energy, we trace the consumer's definitions in fundamental law and present the ideas of "engaged" and "empowered" consumers. We discuss the applicable policies that facilitate consumers' participation and focus on vulnerable consumers as they make up a sizable portion of the UK's energy population. By focusing on three kinds of policies driven by instrumental and normative rationales, we give policy examples that aim to involve and empower energy consumers in their journey to prosumerism. In the UK, individual and collective self-consumption are not restricted in existing legislation and have been promoted and supported by the country's energy policy. The regulator Ofgem considers consumers' experiences and perspectives through organised processes such as the Consumer First Panel and the Consumer Challenge Group. The regulator demonstrates a formalised method for



getting information on issues that affect consumer involvement in the energy market. However, the financial and technological incentives implemented to support consumer engagement in the energy transition are weakening, as the Smart Export Guarantee (SEG) replacing Feed in Tariffs in January 2020 does not equally incentivise small generators. While the importance of consumers in the energy transition is emphasised, there is no legal structure in place, to support these more active consumer activities, which can lead to uncertainty for both consumers and energy sector actors. The capacity to engage consumers in actions that affect their energy usage is harmed by constant U-turns and changes in support packages, such as the Green Homes Grant, a potentially effective policy ultimately scrapped. This level of policy uncertainty is harmful to a future where consumers are increasingly involved in the energy transition.

Chapter 4 focuses on France and identifies the country's regulatory attempts towards prosumerism. The analysis of the role of electricity consumers in France's energy legal framework provides insights into how the country's electricity sector boundaries have evolved towards a greater integration and creation of opportunities for citizen and consumer engagement. In this chapter we review the country's electricity mix and institutional framework, which provides relevant background information for both mainland France where nuclear energy is the main energy source, and for its island regions where fossil fuels are generally dominant. We then review the existing possibilities for consumers to participate in the energy transition. In France, consumers have the possibility to shape policy development processes and to participate in the deployment of both large and small scale energy infrastructure. France's key energy policy instruments, the Multi-annual Energy Plan (Programmation pluriannuelle de l'énergie, PPE) and the National Low-Carbon Strategy (Strategie Nationale Bas-Carbone, SNBC SNBC) present consumers as important elements of the energy transition going forward. However, when looking at implementation approaches being followed, France has been cautious on how it enables the integration of new consumer roles. For instance, this has been recently observed in the regulatory approach for community energy operations, which while still an emerging phenomenon has seen successive changes in its rules of operation. We find that the policy, legal, and regulatory framework in France is contributing to a shift towards a low carbon culture, in which consumers and citizens can play different roles as the country moves forward in delivering its energy transition. The opportunities created in the legal framework to engage citizens and consumers is a signal that these are increasingly becoming substantive stakeholders in the energy transition, moving away from the less engaged role citizens and consumers have had in the past. However, the centralised nature of the electricity system in France and the barriers to the proliferation of prosumer roles at present, individually and collectively, suggest that consumers and citizens ability to shape the energy transition is in the early stages and has significant growth potential



Finally, Chapter 5 draws on the diversity of insights obtained from the aforementioned cases to discuss energy consumer engagement pathways in the energy transition. This discussion aims to identify the building blocks for consumer engagement and how they relate to energy market transformation. It is recognised that the roles presented for consumers may vary depending on the specific region and the characteristics of its local socio-technical reality. However, this high-level discussion is valuable to understand what the possibilities are as we move towards a future where citizens and consumers are expected to be central to the energy transition process. Moreover, in this chapter a series of policy recommendations is presented that build on the case specific insights, and strengths and weaknesses identified for the European Union, France, and the United Kingdom. These recommendations aim to identify action areas and drive policy efforts to support consumer engagement in the energy transition in a way that mitigates existing weaknesses and barriers and capitalizes on best case practices and strengths. Most importantly the above are discussed within specificities of remote territories that need to be taken into consideration when translating policy actions to improve consumer engagement in isolated regions, particularly important for the FCE region.

1.8. Transition Pathways, Remote Territories and Recommendations

With this report we seek to produce a heuristic approach to a transition pathway – i.e. what might be the steps that a consumer takes to become a prosumer. While that is identifiable by means of what is necessary, its application is always more challenging. Of interest to the ICE project is the France Channel England region, which is not typical of either the UK, France or EU as a whole. This report is important because it researches thoroughly the regulatory landscape of the EU, the UK and France to find where energy policy impacts (positively or negatively) on prosumerism. While EU level and national regulatory frameworks are often too large to take into account the specificities of remote territories, this report takes that additional and important step. By providing an understanding of the larger picture it uses opportunities to explain the materiality of regulations for remote regions and islands in the FCE region, especially as they are most vulnerable to energy disruptions and low quality energy (Hills et al., 2018; Ioannidis et al., 2019; Notton et al., 2019). The report also provides a further lens for examining that landscape. Using the main specificities of remote regions (such as geographical remoteness, isolation of energy access, rich low carbon energy resources and the aim to broaden economic growth through active engagement in the energy domain) as a reference point it explores what these mean for the FCE region.

In the above context, the report seeks to answer whether the existing policies are capable of driving the transition to prosumerism. Too often civil society has been portrayed as a barrier to sustainable development and a threat to innovation and progress. When renewable energy technologies (e.g. wind)



are resisted, the public are often labelled as anti-science or ignorant. People's unwillingness to change their behaviours and adopt more sustainable lifestyles get presented as one of the main reasons why numerous environmental issues remain unresolved. The public's assumed lack of understanding and interest in the environment gets blamed as well. Policy makers and scientists are bemused that sound scientific evidence is not enough to change people's minds and behaviours.

But we are currently witnessing a notable shift in energy-related policy, with society being re-envisioned as a key driver of sustainable energy transitions. Multiple recent policies at the EU and national level testify to this. There is still more to do to unleash the potential of civil society. Our recommendations are detailed in the Conclusions chapter and summarized in the Executive Summary for Policy Makers. They span a range of actions from reducing policy instability to build confidence with the public and modernize market and technological monitoring, fitting with current and forthcoming advances. Furthermore, to look into how individual energy users' behaviour can be influenced to encourage deeper engagement with the energy system. Most of all we advocate for policies that do not focus solely on the standard national mainland energy networks. Instead, it is essential to invest in both the most and least connected stakeholders i.e., the multi-country energy collaborations and the remote territories and islands in the FCE region.



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2. Electricity sector policy framework for citizens and consumers in the EU energy transition

Abstract

We analyse the European Union electricity sector policy framework for citizens and consumers in the energy transition to understand recent developments as part of the Energy Union and the Clean Energy for All Europeans policy package. In this chapter we review the evolving role of consumers, particularly by focusing on the recent Electricity Directive and Renewable Electricity Directive, which bring forward new provisions for consumer empowerment and define the scope of “*active consumers*”, “*renewables self-consumer*”, “*citizen energy community*”, and “*renewable energy community*”. As a result of these recent developments the EU is now pursuing multiple goals to transform its electricity market for a low carbon future. The implemented policies aim to fill in the gaps related to slow progress on market liberalisation goals, such as retail market concentration and the existence of regulated prices in EU countries, together with ambitions to put the consumer at the centre of the energy transition. The ambitions going forward are contrasted with previous progress to deliver new roles for consumer, where we observe heterogeneity across Member States, which is relevant background in terms of the challenge to deliver policy goals across the EU. Information provision, adoption of innovative technologies, and support for vulnerable consumers are found as focus areas and enablers of new roles. We find that the role for consumers is framed as one in which they assess data, take action, and interact with new technologies. Less evidence is found on the importance of consumers to shape policy processes related to energy transition developments, such as considerations on the legal framework for policies, plans, and proposals to be developed or co-created with citizens participation.

2.1. Introduction

The European Union electricity market is governed by a complex set of policy instruments, including directives dedicated to the design and functioning of the European internal electricity market, as well as directives setting the framework for improving energy efficiency, and the diffusion and integration of renewable energy. These policy instruments aim to contribute to market transformation to the benefit of European citizens at large and to provide added value for electricity consumers who are expected to benefit from access to affordable, reliable, and clean energy.

Citizen and consumer needs and rights are considered in the policy development efforts as these have an impact on how they interact with the electricity sector. Mainly over the past three decades, since the mid-1990s, successive energy policy developments in the EU have changed the structure of the electricity sector and have resulted in new possible roles for consumers. However, while the legal frameworks have been in place, in practice the electricity sector liberalisation is seen as



underperforming and its benefits lagging (Kolk, 2012). Evidence of an electricity sector that is not aligned with consumers can be found in the EU's consumer markets scoreboard, showing electricity services as a sector with low performance. The 2018 edition of the scoreboard showed that compared to other markets the electricity services market ranked low, at 22nd out of 25th evaluated markets. Positive progress has been seen in terms of consumer choice, which has increased, and difficulties and problems experienced, which has decreased. Interestingly, the performance of the electricity services market matches consumers expectations (European Commission, 2018). Despite some positive progress the low performance observed highlights the need of additional efforts to achieve an electricity sector that works for consumers, which is a central aspect of the EU's Clean Energy for All Europeans package, reviewed in this chapter. The active role of the EU on matters of energy policy is also in line with citizens expectations. A study on Europeans' attitudes on EU energy policy found strong agreement that it should be the EU's responsibility to address energy poverty, ensure that competition leads to affordable prices for consumers, facilitate consumer choice of electricity suppliers, and empower consumers to consume and produce their own energy (Figure 2.1) (European Commission, 2019).

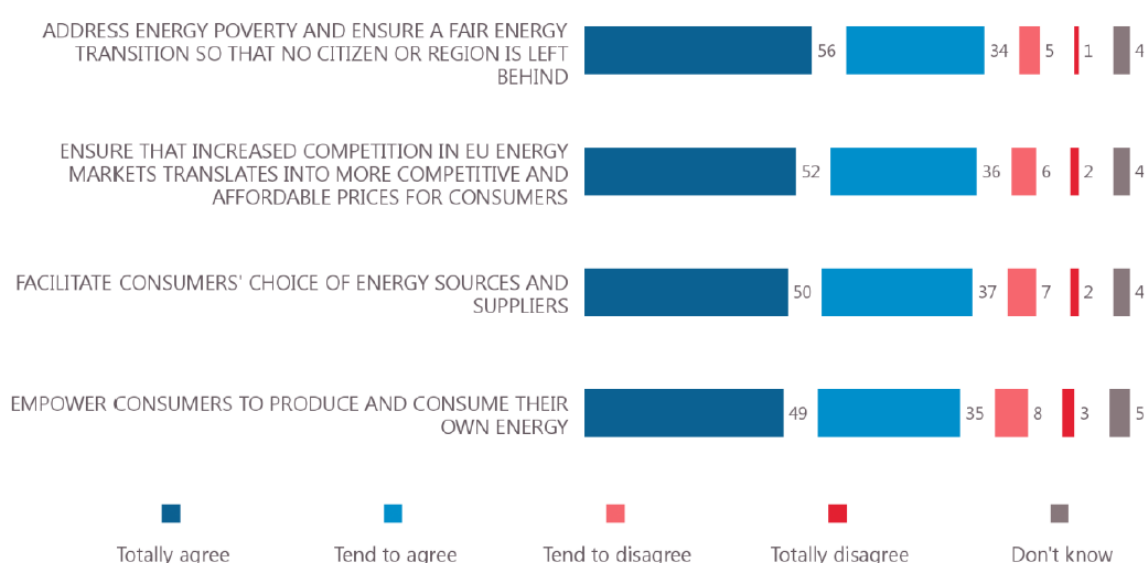


Figure 2.1 Europeans' responses to the questions: To what extent do you agree or disagree with the following? It should be the EU's responsibility to..., results in % of total respondents across the EU (n = 27,438). Source: (European Commission, 2019, p. 33).

In this chapter we aim to provide a more detailed understanding of the role of consumers in the EU electricity sector amid an unfolding energy transition. This can contribute to identify the expected level of engagement of EU citizens in the energy transition. To achieve this, we review EU level policy developments to identify citizens and consumer roles in the energy transition. This analysis focuses on recent policy developments and includes the Clean Energy for All Europeans package.

This chapter is structured as follows. Section 2 reviews how the role of consumers in the energy transition has been shaped by successive phases of EU level market transformation efforts, with greater emphasis on the impact of the Clean Energy for All Europeans package. Section 3 contrasts the forward-looking policy and legal framework discussed in section 2 and provides insights into the existing challenges in transforming electricity markets at the Member State level, where high concentration, low switching rates, and limited offers exist. Section 4 discusses the way forward by identifying focus areas to drive consumer empowerment. It also identifies strengths and weaknesses related to the most recent market transformation efforts and their role in enabling new consumer roles and provides concluding remarks for the chapter.

2.2. Defining the role of consumers

The role of consumers in the EU electricity sector has been mainly shaped by two phases of market transformation that have been implemented in the process of developing the European internal energy market. First, a phase focused on market transformation for electricity sector liberalisation, which started in the 1990s, and implemented the foundations to create competitive electricity generation and retail, and natural monopolies for electricity transmission and distribution networks (Pepermans, 2019). Second, a phase focused on market transformation for a low-carbon electricity sector transition, which has gained momentum more recently driven by the vision for an Energy Union in 2015 and aims to implement the necessary changes to support the uptake of renewable energy and for new actors and technologies to participate in the internal energy market (Pereira et al., 2020; Pereira et al., 2018). The following sections focus on how these different market transformation phases, and the policies associated to them have shaped the role of citizens and consumers in the EU electricity sector.

2.2.1. Market transformation for electricity sector liberalisation

Market transformation for electricity sector liberalisation was pursued by the EU from the mid-1990 and implemented through EU directives that increasingly implemented a framework for market liberalisation as the foundation of an emerging European internal energy market (Pollitt, 2019). Within this process of market transformation, the role of the consumers was defined as an instrument to achieve



market integration (Cseres, 2018). It is particularly the role of consumer that has been gradually gaining prominence within the liberalisation process. Energy consumers were defined as customers with the possibility to choose between suppliers. Consumers were given responsibilities to steer internal market competition and act as agents of liberalisation by having the right to select their electricity supplier (Cseres, 2018). Market liberalisation directives from 1996, 2003, and 2009 used the terms “customer” and “consumer”; and defined final customers as “customers purchasing electricity for their own use” (Table 2.1).

Through the process of developing the directives delivering market transformation for a liberalised electricity market, in particular the process leading up to the 2009 electricity directive, the need for a more comprehensive monitoring of consumer related issues in electricity markets was identified. As a result in 2008 the European Commission established a Citizen Energy Forum (Mengolini & Masera, 2021), as a platform to engage with all the parties that have a role in delivering competitive electricity markets to the benefit of consumers (European Commission, 2010). The forum includes the participation of electricity companies, regulators, dispute resolution organisations, and organisations representing consumers, and aims to increase consumer representation when designing policies. Through the forum the European Commission aimed to combine both the regulatory and consumer perspective, to remove obstacles for well-functioning markets, and to establish the necessary rights benefiting individual consumers, such as the need to protect vulnerable consumers. The initial meetings of the forum, held in the concluding stages of the implementation of the 2009 electricity directive drew attention to issues related to billing, complaint handling, and the need to carefully consider the cost-benefit balance of new innovative energy technologies and how these are shared between consumers and companies (ERGEG and CEER, 2008; European Commission, 2010).

The implementation of the electricity directive in 2009 represents the last major legislative package focusing mainly on market liberalisation in the EU. This process established a new role for consumers in the EU. Prior to market liberalisation, consumers were supplied through their national monopoly electricity companies, without the possibility to choose their electricity supplier (Jamasp & Pollitt, 2005). With the introduction of market liberalisation and of competition for electricity generation and supply, the role of EU customers is reframed and its boundaries expanded enabling them to become decision makers within a new market design, in which there are multiple suppliers providing electricity and of which consumers may select one that best suits their service needs (Jamasp & Pollitt, 2005).



Table 2.1. Definitions of customers in EU directives implemented during the market liberalization phase.

Directive	Definition
Directive 96/92/EC of the European Parliament and of the Council of 19 December 1996 concerning common rules for the internal market in electricity	<i>“final customer” shall mean a customer buying electricity for his own use</i>
Directive 2003/54/EC of the European Parliament and of the Council of 26 June 2003 concerning common rules for the internal market in electricity and repealing directive 96/92/EC	
Directive 2009/72/EC of the European Parliament and of the Council of 13 July 2009 concerning common rules for the internal market in electricity and repealing directive 2003/54/EC	

The process of market liberalisation expanded the scope of possibilities for consumers by giving them the option to choose from alternative electricity supply offers. The resulting competition between suppliers seeking new customers was expected to create pressure for lower prices and improve quality of service, further benefiting consumers (European Commission, 2010). However, while the framework for a competitive electricity market was established, and new possibilities for consumer participation defined, EU electricity markets did not deliver many of the benefits expected from this market transformation efforts.

Emerging issues from an underperforming electricity market included price increases, and difficulties in comparing and switching suppliers, as well as the degree of complexity of the information provided in bills making it difficult to understand consumption, costs, and alternative options (Kolk, 2012). These open issues affecting the delivery of a well-functioning electricity market to the benefit of consumers, in addition to technological and societal developments related to the importance of a low-carbon future, led to an ongoing market transformation effort largely focused on delivering a low-carbon electricity sector (Pereira et al., 2018), with customers at the centre, which is the focus of the following section.

2.2.2. Market transformation for a low-carbon electricity sector transition

Recent policy developments to deliver a low-carbon electricity sector in the EU place consumers as central to energy policies and of the clean energy transition, resulting in strengthened rights and promoting their active participation in the energy market (Mengolini & Masera, 2021).

The implementation of the Energy Union in 2015 by the European Commission invited EU citizens “to take ownership of the energy transition”, thus indicating a shift towards a more participatory and citizen-driven governance of the EU energy transition. Regarding consumers, the vision is for an:



*“[...] **Energy Union with citizens at its core**, where citizens take **ownership** of the energy transition, **benefit** from new **technologies** to reduce their bills, **participate actively** in the market, and where **vulnerable** consumers are **protected**.*

*To reach our goal, we have to move away from an economy driven by fossil fuels, an economy where energy is based on a centralised, supply-side approach and which relies on old technologies and outdated business models. We have to **empower consumers through providing them with information, choice and through creating flexibility to manage demand as well as supply**. We have to move away from a fragmented system characterised by uncoordinated national policies, market barriers and energy-isolated areas.”* (European Commission, 2015a, p. 2).

The Energy Union was motivated in part by a poorly functioning electricity retail market, in which consumers options to switch supplier were limited, as well as one in which a significant share of households faced unaffordable energy bills (European Commission, 2015a). This was leading to a number of barriers, which included (European Commission, 2015b):

- Lack of information and transparency, making it hard to understand the market and existing opportunities.
- Growing share of network charges and taxes on final electricity prices.
- Lack of reward for active participation and difficulties in supplier switching.
- Underdeveloped markets for residential energy services, demand response, self-generation, and self-consumption.

To mitigate these barriers and deliver an Energy Union that provides the expected benefits of competitive energy markets to consumers, the EU defined a strategy focusing on consumer empowerment; smart homes and networks; and data management and protection. It is particularly this 2015 implementation of the Energy Union that describes a new, more active role for the consumer. Consumer empowerment aims to facilitate energy savings enabled by better information provision, provide a broader scope of action for consumers to participate in the energy transition by giving them more switching options, and opportunities to engage in demand-response, and individual or collective self-generation and consumption schemes. Delivering smart homes and networks aims to provide technologies that make consumer’s interaction with electricity markets simpler. Ensuring data management and protection aims to guarantee that the increasing flows of data resulting from a smarter energy system are adequately used and accessed (European Commission, 2015b). Recognising the need for action to deliver these ambitions, the European Commission identified ten steps to facilitate this process (Table 2.2)

Table 2.2. Steps to deliver a new deal for consumers in the Energy Union. Source: (European Commission, 2015b, p. 9-10).

10 Steps to deliver a new deal for consumers	
1.	Providing consumers with frequent access, including in near real-time, to partially standardised, meaningful, accurate and understandable information on consumption and related costs as well as the types of energy sources.
2.	Making switching suppliers quick and simple , enabled by transparent and directly comparable offers from competitive suppliers and not hampered e.g. by switching fees.
3.	Ensuring that consumers remain fully protected in the new energy market , including against unfair commercial practices.
4.	Providing consumers with possibilities to become active energy players and gain from action , for example adjusting and reducing their consumption as prices evolve, helping balance out renewable energy variability by embracing demand response or producing or storing energy.
5.	Keeping consumption/metering data under the consumers' control; where consumers grant other parties (suppliers and intermediaries) access to their data, their privacy, the protection and the security of their data must be guaranteed.
6.	Providing consumers access to competitive and transparent market-based offers , while giving consumers in vulnerable situations and/or facing energy poverty targeted and effective assistance reflecting best practices and contributing to energy efficiency and savings.
7.	Providing consumers the option of participating in the market through reliable intermediaries, collective or community schemes . These intermediaries need to have fair access to the markets and consumption data and be monitored in the same manner as suppliers.
8.	Making sure smart home appliances and components are fully interoperable and easy to use and smart metering systems fit for purpose with the recommended functionalities to maximise their benefit to consumers.
9.	Ensuring cost-effective and stable network operation; ensuring non-discriminatory handling of metering data with potential commercial value by Distribution System operators or any other responsible entity.
10.	Strengthening the link between research, innovation and industry for developing international competitiveness in smart home and smart grid technologies, in cooperation with all market players.

Following the need to further adjust EU electricity market design, many of the action points above were part of the Clean Energy for All European package proposed in 2016 and implemented in 2019, which represents a set of policy and regulatory developments to overhaul the EU's energy policy to deliver the Energy Union and this new role for consumers. The legislative process behind this package included eight legislative pieces covering electricity markets, renewable energy, energy efficiency, to name a few (Table 2.3).

Table 2.3. Clean energy for all Europeans package – legislative process (European Commission, 2021a).

Legal acts	European Commission proposal	EU Inter-institutional negotiations	European Parliament adoption	Council adoption	Official Journal publication
Energy performance in buildings	30/11/2016	Political agreement	17/04/2018	14/05/2018	19/06/2018 – Directive (EU) 2018/844

Renewable energy	30/11/2016	Political agreement	13/11/2018	04/12/2008	21/12/2018 – Directive (EU) 2018/2001
Energy efficiency	30/11/2016	Political agreement	13/11/2018	04/12/2018	21/12/2018 – Directive (EU) 2018/2002
Governance of the energy union	30/11/2016	Political agreement	13/11/2018	04/12/2018	21/12/2018 – Regulation (EU) 2018/1999
Electricity regulation	30/11/2016	Political agreement	26/03/2019	22/05/2019	14/06/2019 – Regulation (EU) 2019/943
Electricity directive	30/11/2016	Political agreement	26/03/2019	22/05/2019	14/06/2019 – Directive (EU) 2019/944
Risk preparedness	30/11/2016	Political agreement	26/03/2019	22/05/2019	14/06/2019 – Regulation (EU) 2019/941
ACER	30/11/2016	Political agreement	26/03/2019	22/05/2019	14/06/2019 – Regulation (EU) 2019/942

Following the Energy Union’s ambition, the Clean Energy for All European reinforces its focus on consumers being at the centre of the energy transition (European Commission, 2016). For instance, the Electricity Directive of 2019, a foundation directive shaping the role of consumers, has a goal to set the necessary conditions for “*creating truly integrated competitive, consumer-centred, flexible, fair and transparent electricity markets in the Union*”. The central role of consumers is further reinforced in this directive by placing consumer protection as its subject matter, along with establishing common rules for the generation, transmission, distribution, energy storage and supply of electricity (European Parliament, 2019).

“Chapter 1, Article 1, Subject Matter:

*This Directive establishes common rules for the generation, transmission, distribution, energy storage and supply of electricity, together with **consumer protection provisions**, with a view to creating truly integrated competitive, **consumer-centred**, flexible, **fair** and transparent electricity markets in the Union.*

*Using the advantages of an integrated market, **this Directive aims to ensure affordable, transparent energy prices and costs for consumers**, a high degree of security of supply and a smooth transition towards a sustainable low-carbon energy system. It lays down key rules relating to the organisation and functioning of the Union electricity sector, in particular **rules on consumer empowerment and protection**, on open access to the integrated market, on third-*

party access to transmission and distribution infrastructure, unbundling requirements, and rules on the independence of regulatory authorities in the Member States.

This Directive also sets out modes for Member States, regulatory authorities and transmission system operators to cooperate towards the creation of a fully interconnected internal market for electricity that increases the integration of electricity from renewable sources, free competition and security of supply.”

Throughout the legislative stages aimed at delivering a low-carbon energy transition, the role of consumers has been expanded. This is reflected on the terms used in the Electricity Directive of 2019 (European Parliament, 2019) and the recast Renewable Energy Directive of 2018 (European Parliament, 2018a). Along with the traditional, passive terms “customer” and “consumer” seen in previous directives, these recent legislative instruments introduce the terms “active customer”, “renewable self-consumer” and “citizen energy communities”, “jointly acting renewables self-consumers”, and “renewable energy communities”. Even though the EU legislation does not use the term “prosumer”, but rather “renewable self-consumers” as consumers that both consume and produce electricity, including selling and storing (Table 2.4).

The instruments of the Clean Energy for all Europeans package which, among others, included the latest Electricity Directive and Renewable Energy Directive increasingly use the term “citizen” to describe the end-users and consumers. They also define certain categories of citizen energy initiatives as “citizen energy communities”, in order to provide them with an enabling framework, fair treatment, a level playing field and a well-defined catalogue of rights and obligations (Table 2.4).

The introduction of communities, seen in both the Electricity Directive and the Renewable Energy Directive, recognizes the role of consumers collectively participating in the energy transition, both for renewable energy (through renewable energy communities) but more broadly too (through citizens energy communities) (Mengolini & Masera, 2021).

Table 2.4. Definitions of customers in EU directives implemented during the low-carbon electricity transition phase.

Directive	Definition
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	<p><i>“final customer”</i> means a customer who purchases electricity for own use.</p> <p><i>“active customer”</i> means 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</p>

Directive	Definition
	<p>or participates in flexibility or energy efficiency schemes, provided that those activities do not constitute its primary commercial or professional activity.</p> <p>“citizen energy community” means a legal entity that:</p> <p>(a) is based on voluntary and open participation and is effectively controlled by members or shareholders that are natural persons, local authorities, including municipalities, or small enterprises;</p> <p>(b) has for its primary purpose to provide environmental, economic or social community benefits to its members or shareholders or to the local areas where it operates rather than to generate financial profits; and</p> <p>(c) may engage in generation, including from renewable sources, distribution, supply, consumption, aggregation, energy storage, energy efficiency services or charging services for electric vehicles or provide other energy services to its members or shareholders.</p>
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	<p>‘renewables self-consumer’ means a final customer operating within its premises located within confined boundaries or, where permitted by a Member State, within other premises, who generates renewable electricity for its own consumption, and who may store or sell self-generated renewable electricity, provided that, for a non-household renewables self-consumer, those activities do not constitute its primary commercial or professional activity.</p> <p>‘jointly acting renewables self-consumers’ means a group of at least two jointly acting renewables self-consumers who are located in the same building or multi-apartment block.</p> <p>‘renewable energy community’ means a legal entity:</p> <p>(a) which, in accordance with the applicable national law, is based on open and voluntary participation, is autonomous, and is effectively controlled by shareholders or members that are located in the proximity of the renewable energy projects that are owned and developed by that legal entity;</p> <p>(b) the shareholders or members of which are natural persons, SMEs or local authorities, including municipalities;</p> <p>(c) the primary purpose of which is to provide environmental, economic or social community benefits for its shareholders or members or for the local areas where it operates, rather than financial profits.</p>

The new definitions related to consumer roles in the energy transition are at the base of the framework for consumer engagement. The Electricity Directive details consumers actions and rights in the energy transition, shaping their role in the electricity market. These details are found as part of the directive’s chapter on “Consumer empowerment and protection” (Chapter III of the Electricity Directive of 2019).

The directive details consumer rights, access to better information for switching such as comparison, tools, and aspects related to billing. These aspects further strengthen the legal framework for market liberalisation, whose delivery has been lagging resulting in a slow delivery of expected benefits. In addition to this the directive sets the framework for new roles for consumers presented as active consumers, and citizens energy communities.

The legal framework (Table 2.5) establishes that active consumers should be able to participate in allowed activities in a non-discriminatory way, and without the burden of disproportionate technical, administrative, or financial requirements. The legal framework also sets the range of activities and how active consumers are able to participate in them. These include self-generation, flexibility and energy efficiency schemes, and electricity storage. Active consumers are also entitled to act individually, or via an aggregator.

Table 2.5 Legal framework for active consumers. Source: (European Parliament, 2019)

EU Electricity Directive legal framework for active consumers
<p>Article 15, Active customers</p> <p><i>1. Member States shall ensure that final customers are entitled to act as active customers without being subject to disproportionate or discriminatory technical requirements, administrative requirements, procedures and charges, and to network charges that are not cost-reflective.</i></p> <p><i>2. Member States shall ensure that active customers are:</i></p> <p><i>(a) entitled to operate either directly or through aggregation;</i></p> <p><i>(b) entitled to sell self-generated electricity, including through power purchase agreements;</i></p> <p><i>(c) entitled to participate in flexibility schemes and energy efficiency schemes;</i></p> <p><i>(d) entitled to delegate to a third party the management of the installations required for their activities, including installation, operation, data handling and maintenance, without that third party being considered to be an active customer;</i></p> <p><i>(e) subject to cost-reflective, transparent and non-discriminatory network charges that account separately for the electricity fed into the grid and the electricity consumed from the grid, in accordance with Article 59(9) of this Directive and Article 18 of Regulation (EU) 2019/943, ensuring that they contribute in an adequate and balanced way to the overall cost sharing of the system;</i></p> <p><i>(f) financially responsible for the imbalances they cause in the electricity system; to that extent they shall be balance responsible parties or shall delegate their balancing responsibility in accordance with Article 5 of Regulation (EU) 2019/943.</i></p> <p><i>3. Member States may have different provisions applicable to individual and jointly-acting active customers in their national law, provided that all rights and obligations under this Article apply to all active customers. Any difference in the treatment of jointly-acting active customers shall be proportionate and duly justified.</i></p> <p><i>4. Member States that have existing schemes that do not account separately for the electricity fed into the grid and the electricity consumed from the grid, shall not grant new rights under such schemes after 31 December 2023. In any event, customers subject to existing schemes shall have the possibility at any time to opt for a new scheme that accounts separately for the electricity fed into the grid and the electricity consumed from the grid as the basis for calculating network charges.</i></p>

5. Member States shall ensure that active customers that own **an energy storage facility**:

- (a) have the right to a grid connection within a reasonable time after the request, provided that all necessary conditions, such as balancing responsibility and adequate metering, are fulfilled;
- (b) are not subject to any double charges, including network charges, for stored electricity remaining within their premises or when providing flexibility services to system operators;
- (c) are not subject to disproportionate licensing requirements or fees;
- (d) are allowed to provide several services simultaneously, if technically feasible.

The legal framework for citizens energy communities (Table 2.6) establishes their main operational aspects, which are open to voluntary participation. Noteworthy, citizens participating in such communities maintain their rights as household consumers, or active consumers in case they conduct activities under the active consumer framework. Member States must ensure communities have access to electricity markets, both directly or indirectly when participating in aggregation. Optional aspects left for Member States to consider include the operation of distribution networks by communities, and cross-border participation.

Table 2.6 Legal framework for citizens energy communities. Source: (European Parliament, 2019)

EU Electricity Directive legal framework for citizens energy communities
<p>Article 16, Citizen energy communities</p> <p>1. Member States shall provide an enabling regulatory framework for citizen energy communities ensuring that:</p> <ul style="list-style-type: none"> (a) participation in a citizen energy community is open and voluntary; (b) members or shareholders of a citizen energy community are entitled to leave the community, in which case Article 12 applies; (c) members or shareholders of a citizen energy community do not lose their rights and obligations as household customers or active customers; (d) subject to fair compensation as assessed by the regulatory authority, relevant distribution system operators cooperate with citizen energy communities to facilitate electricity transfers within citizen energy communities; (e) citizen energy communities are subject to non-discriminatory, fair, proportionate and transparent procedures and charges, including with respect to registration and licensing, and to transparent, non-discriminatory and cost-reflective network charges in accordance with Article 18 of Regulation (EU) 2019/943, ensuring that they contribute in an adequate and balanced way to the overall cost sharing of the system. <p>2. Member States may provide in the enabling regulatory framework that citizen energy communities:</p> <ul style="list-style-type: none"> (a) are open to cross-border participation; (b) are entitled to own, establish, purchase or lease distribution networks and to autonomously manage them subject to conditions set out in paragraph 4 of this Article; (c) are subject to the exemptions provided for in Article 38(2).

EU Electricity Directive legal framework for citizens energy communities
<p>3. Member States shall ensure that citizen energy communities:</p> <p>(a) are able to access all electricity markets, either directly or through aggregation, in a non-discriminatory manner;</p> <p>(b) are treated in a non-discriminatory and proportionate manner with regard to their activities, rights and obligations as final customers, producers, suppliers, distribution system operators or market participants engaged in aggregation;</p> <p>(c) are financially responsible for the imbalances they cause in the electricity system; to that extent they shall be balance responsible parties or shall delegate their balancing responsibility in accordance with Article 5 of Regulation (EU) 2019/943;</p> <p>(d) with regard to consumption of self-generated electricity, citizen energy communities are treated like active customers in accordance with point (e) of Article 15(2);</p> <p>(e) are entitled to arrange within the citizen energy community the sharing of electricity that is produced by the production units owned by the community, subject to other requirements laid down in this Article and subject to the community members retaining their rights and obligations as final customers.</p> <p>For the purposes of point (e) of the first subparagraph, where electricity is shared, this shall be without prejudice to applicable network charges, tariffs and levies, in accordance with a transparent cost-benefit analysis of distributed energy resources developed by the competent national authority.</p> <p>4. Member States may decide to grant citizen energy communities the right to manage distribution networks in their area of operation and establish the relevant procedures, without prejudice to Chapter IV or to other rules and regulations applying to distribution system operators. If such a right is granted, Member States shall ensure that citizen energy communities:</p> <p>(a) are entitled to conclude an agreement on the operation of their network with the relevant distribution system operator or transmission system operator to which their network is connected;</p> <p>(b) are subject to appropriate network charges at the connection points between their network and the distribution network outside the citizen energy community and that such network charges account separately for the electricity fed into the distribution network and the electricity consumed from the distribution network outside the citizen energy community in accordance with Article 59(7);</p> <p>(c) do not discriminate or harm customers who remain connected to the distribution system.</p>

The Renewable Energy Directive further specifies consumer roles related to renewables, particularly for renewables self-consumption and renewable energy communities. The legal framework for renewables self-consumption (Table 2.7) allows for this activity to occur individually or via aggregators. In this role, renewable self-consumers can generate renewable electricity for their own use, and store and sell any excess generation. This sale of excess generation can occur via power purchase agreements, electricity supplier, or in peer-to-peer schemes.

Table 2.7 Legal framework for renewables self-consumption. Source: (European Parliament, 2019)

EU Renewable Energy Directive legal framework for renewables self-consumption
<p><i>Article 21, Renewables self-consumers</i></p> <p>1. Member States shall ensure that consumers are entitled to become renewables self-consumers, subject to this Article.</p>

EU Renewable Energy Directive legal framework for renewables self-consumption

2. Member States shall ensure that renewables self-consumers, individually or through aggregators, are entitled:

(a) to **generate renewable energy, including for their own consumption, store and sell their excess production of renewable electricity, including through renewables power purchase agreements, electricity suppliers and peer-to-peer trading arrangements**, without being subject:

(i) in relation to the electricity that they consume from or feed into the grid, to discriminatory or disproportionate procedures and charges, and to network charges that are not cost-reflective;

(ii) in relation to their self-generated electricity from renewable sources remaining within their premises, to discriminatory or disproportionate procedures, and to any charges or fees;

(b) to install and operate electricity storage systems combined with installations generating renewable electricity for self-consumption without liability for any double charge, including network charges, for stored electricity remaining within their premises;

(c) to maintain their rights and obligations as final consumers;

(d) to receive remuneration, including, where applicable, through support schemes, for the self-generated renewable electricity that they feed into the grid, which reflects the market value of that electricity and which may take into account its long-term value to the grid, the environment and society.

3. Member States may apply non-discriminatory and proportionate charges and fees to renewables self-consumers, in relation to their self-generated renewable electricity remaining within their premises in one or more of the following cases: (a) if the self-generated renewable electricity is effectively supported via support schemes, only to the extent that the economic viability of the project and the incentive effect of such support are not undermined;

(b) from 1 December 2026, if the overall share of self-consumption installations exceeds 8 % of the total installed electricity capacity of a Member State, and if it is demonstrated, by means of a cost-benefit analysis performed by the national regulatory authority of that Member State, which is conducted by way of an open, transparent and participatory process, that the provision laid down in point (a)(ii) of paragraph 2 either results in a significant disproportionate burden on the long-term financial sustainability of the electric system, or creates an incentive exceeding what is objectively needed to achieve cost-effective deployment of renewable energy, and that such burden or incentive cannot be minimised by taking other reasonable actions; or

(c) if the self-generated renewable electricity is produced in installations with a total installed electrical capacity of more than 30 kW.

4. Member States shall ensure that renewables self-consumers located in the same building, including multi-apartment blocks, are entitled to engage jointly in activities referred to in paragraph 2 and that they are permitted to arrange sharing of renewable energy that is produced on their site or sites between themselves, without prejudice to the network charges and other relevant charges, fees, levies and taxes applicable to each renewables self-consumer. Member States may differentiate between individual renewables self-consumers and jointly acting renewables self-consumers. Any such differentiation shall be proportionate and duly justified.

5. The renewables self-consumer's installation may be owned by a third party or managed by a third party for installation, operation, including metering and maintenance, provided that the third party remains subject to the renewables self-consumer's instructions. The third party itself shall not be considered to be a renewables self-consumer.

6. Member States shall put in place an enabling framework to promote and facilitate the development of renewables self-consumption based on an assessment of the existing unjustified

EU Renewable Energy Directive legal framework for renewables self-consumption
<p>barriers to, and of the potential of, renewables self-consumption in their territories and energy networks. That enabling framework shall, inter alia:</p> <p>(a) address accessibility of renewables self-consumption to all final customers, including those in low-income or vulnerable households;</p> <p>(b) address unjustified barriers to the financing of projects in the market and measures to facilitate access to finance;</p> <p>(c) address other unjustified regulatory barriers to renewables self-consumption, including for tenants;</p> <p>(d) address incentives to building owners to create opportunities for renewables self-consumption, including for tenants; (e) grant renewables self-consumers, for self-generated renewable electricity that they feed into the grid, non-discriminatory access to relevant existing support schemes as well as to all electricity market segments;</p> <p>(f) ensure that renewables self-consumers contribute in an adequate and balanced way to the overall cost sharing of the system when electricity is fed into the grid. Member States shall include a summary of the policies and measures under the enabling framework and an assessment of their implementation respectively in their integrated national energy and climate plans and progress reports pursuant to Regulation (EU) 2018/1999.</p>

The legal framework for renewable energy communities (Table 2.8) establishes that participation in renewable communities does not affect customer rights, particularly household consumers. Participation should be enabled in a non-discriminatory way. The main activities for renewable communities include producing, consuming, and selling renewable electricity; sharing of electricity within the community between members; and access to electricity markets both directly and when participating via aggregators.

Table 2.8 Legal framework for renewables energy communities. Source: (European Parliament, 2019)

EU Renewable Energy Directive legal framework for renewable energy communities
<p>Article 22, Renewable energy communities</p> <p>1. Member States shall ensure that final customers, in particular household customers, are entitled to participate in a renewable energy community while maintaining their rights or obligations as final customers, and without being subject to unjustified or discriminatory conditions or procedures that would prevent their participation in a renewable energy community, provided that for private undertakings, their participation does not constitute their primary commercial or professional activity.</p> <p>2. Member States shall ensure that renewable energy communities are entitled to:</p> <p>(a) produce, consume, store and sell renewable energy, including through renewables power purchase agreements;</p> <p>(b) share, within the renewable energy community, renewable energy that is produced by the production units owned by that renewable energy community, subject to the other requirements laid down in this Article and to maintaining the rights and obligations of the renewable energy community members as customers;</p> <p>(c) access all suitable energy markets both directly or through aggregation in a non-discriminatory manner.</p>

EU Renewable Energy Directive legal framework for renewable energy communities

3. Member States shall carry out an assessment of the existing barriers and potential of development of renewable energy communities in their territories.

4. Member States shall provide an enabling framework to promote and facilitate the development of renewable energy communities. That framework shall ensure, inter alia, that:

(a) unjustified regulatory and administrative barriers to renewable energy communities are removed;

(b) renewable energy communities that supply energy or provide aggregation or other commercial energy services are subject to the provisions relevant for such activities;

(c) the relevant distribution system operator cooperates with renewable energy communities to facilitate energy transfers within renewable energy communities;

(d) renewable energy communities are subject to fair, proportionate and transparent procedures, including registration and licensing procedures, and cost-reflective network charges, as well as relevant charges, levies and taxes, ensuring that they contribute, in an adequate, fair and balanced way, to the overall cost sharing of the system in line with a transparent cost-benefit analysis of distributed energy sources developed by the national competent authorities;

(e) renewable energy communities are not subject to discriminatory treatment with regard to their activities, rights and obligations as final customers, producers, suppliers, distribution system operators, or as other market participants;

(f) the participation in the renewable energy communities is accessible to all consumers, including those in low-income or vulnerable households;

(g) tools to facilitate access to finance and information are available;

(h) regulatory and capacity-building support is provided to public authorities in enabling and setting up renewable energy communities, and in helping authorities to participate directly;

(i) rules to secure the equal and non-discriminatory treatment of consumers that participate in the renewable energy community are in place.

5. The main elements of the enabling framework referred to in paragraph 4, and of its implementation, shall be part of the updates of the Member States' integrated national energy and climate plans and progress reports pursuant to Regulation (EU) 2018/1999.

6. Member States may provide for renewable energy communities to be open to cross-border participation.

7. Without prejudice to Articles 107 and 108 TFEU, Member States shall take into account specificities of renewable energy communities when designing support schemes in order to allow them to compete for support on an equal footing with other market participants.

In addition to the legislative actions implemented as part of the Clean Energy for All Europeans, presented above, non-legislative initiatives were also implemented during this period to support an energy transition that is fair across regions. The Clean Energy for EU Islands Initiative was part of this non-legislative action, in parallel with initiatives for coal regions (European Commission, 2021d) and energy poverty (European Commission, 2021f). The EU has more than 2,200 inhabited islands that are home to 16 million people (around 4% of the total EU population) (European Commission, 2021g), which depend on fossil fuels for their energy supply despite access to renewable sources of energy.



This initiative dedicated to islands is expected to support a low carbon and affordable energy transition that contributes to lower costs and higher renewable energy generation; diffusion of demand response and storage technologies; increased energy security and air quality; and economic development by creating new jobs, and business opportunities (European Commission, 2021b). A political declaration signed in 2017 recognises island regions as having a strong sense of community and the potential to be leading territories in implementing innovative approaches to deliver the energy transition (European Commission, 2017). This declaration signed by the European Commission and 14 EU countries with large island populations (Croatia, Cyprus, Denmark, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Malta, Portugal, Spain, and Sweden) further supports the development of tailored clean energy transition across EU islands, also aiming to bring together relevant stakeholders to share best practices that support decision making and action. This declaration was followed by a Memorandum of Understanding signed in 2020 to set a framework for cooperation and to advance the energy transition in islands. The framework has implications for the role of consumers and citizens. As part of its objectives, the framework aims to: promote the participation and engagement of citizens in the energy transition of islands in line with the European Green Deal framework; and facilitate the creation of renewable and citizen energy communities (European Commission, 2020c). To guide the progress towards the set goal, focus areas have been defined, advancing customer role related actions. For instance, work focused on support frameworks and finance aims to facilitate the development of local participation models, such as citizen and renewable energy communities, and collective self-consumption, for which the Electricity Directive and Renewable Energy Directive provide a legal framework. However, the memorandum is non-binding and represents political intent alone (Mauger, 2021), which may result in reduced focus and resources dedicated to achieving its mission and goals.

As part of this initiative on islands the European Parliament and European Commission set up a Clean Energy for EU Islands secretariat in 2018 (European Commission, 2021c), it acts as a platform to facilitate collaboration and exchange of best-case practices. It also provides advisory services and supports capacity building. Interested islands can join the islands community working to advance a clean energy transition by signing a pledge, the “Island Clean Energy Transition Pledge” (European Commission, 2021c). This pledge also frames the role of citizens and consumers as decisive in the energy transition, it states for islands signing the pledge that their “*choices as consumers and behaviour as citizens makes a measurable difference to the climate of our home island communities and beyond.*” (European Commission, 2020b, p. 1). Moreover, the island pledge is structured around three main areas of action for the full decarbonisation of islands energy systems. These areas of action also signal the importance of citizen participation and engagement across stages. This engagement includes: community building efforts to establish a shared understanding of the position, role, and responsibilities of stakeholders in the island’s clean energy transition; a local action plan for decarbonisation that



encompasses the visions of the community; and a focus on locally owned and managed financial solutions to advance the energy transition (Table 2.9).

Table 2.9 Focus areas for an island-wide Clean Energy Transition Agenda. Source: (European Commission, 2020b, p. 2).

Focus areas
<p>Community building and stakeholder involvement to ensure continuity and clear understanding of each stakeholder's position, role and responsibility in the decarbonisation process.</p> <p>A decarbonisation plan bringing together the visions of the island community and the sequencing of concrete actions required for the fulfilment of these; the inclusion of a baseline emission inventory as well as a preliminary estimate of costs is strongly recommended. The progress should be monitored and adjusted according to the collective vision of the island community.</p> <p>A financing concept to ensure feasible financial coverage for implementation of the decarbonisation plan with the use of locally owned and managed financing solutions.</p>

The support and awareness for a dedicated approach for energy transitions in islands in the FCE region provided by the Clean Energy for EU Islands is positive, but its non-legal nature leaves the energy transition of island territories subject to more uncertainty. Island energy systems face very specific challenges compared to mainland regions. For instance, islands often depend more on fossil fuels facing greater energy supply costs, are more vulnerable to the effects of climate change, and often have reduced population and limited system capacity. To overcome the limitations of a missing dedicated legal framework, island regions can focus on the development of energy communities, which are part of the Clean Energy for All European policy package, giving island territories a legal framework through which they can accelerate local energy transition building on collective schemes of participation, contributing to the delivery of an energy transition that is inclusive and brings together citizens in new collaborative formats to share energy resources (Mauger, 2021).

The legal framework for energy transition and market transformation for EU islands, or more broadly for remote territories, is limited. However, both previous Electricity Directives setting the legal framework for market liberalization (Hautecloucq & Ahner, 2012), and the recent Electricity Directive of 2019 included exemptions for small isolated and small connected systems ¹. Islands in the FCE region, may qualify for such exemptions and as a result not have to comply with the general Electricity Directive rules advancing market liberalisation and low carbon energy transitions (Mauger,

¹ A 'small isolated system' means any system that had consumption of less than 3 000 GWh in the year 1996, where less than 5 % of annual consumption is obtained through interconnection with other systems. A 'small connected system' means any system that had consumption of less than 3 000 GWh in the year 1996, where more than 5 % of annual consumption is obtained through interconnection with other systems (European Parliament, 2019, p. 17-18).

2021). Qualifying islands in the FCE region, are exempted from the Electricity Directive requirements related to distribution and transmission system operators, direct lines, and new generation capacity (SMILE, 2019). To be considered exempt, islands in the FCE region have to apply to the European Commission for derogation. The Electricity Directive established that derogations for small isolated and small connected systems are limited in time and granted following an approach that supports competition, market integration, and a low carbon energy transition towards renewables, increased flexibility and demand response, electricity storage, and electric mobility. Derogations granted to outermost regions, as territories located far away from continental Europe, are not limited in time but still granted following an approach that does not undermine the transition to renewable energy (European Parliament, 2019). An example of indefinite derogations for outermost regions is the case of that granted to Madeira islands, and the Azores islands in Portugal, derogations have also been granted to Cyprus, Malta, and Greek islands (European Commission, 2021e).

2.3. Delivering new roles for consumers in the electricity sector

Policy developments at the EU level set the framework for Member States to pursue national level market transformation efforts that align with these policies and contribute to create the necessary conditions for the new roles for consumers to be possible, and associated benefits to be delivered.

Electricity market structures at the country level and their evolution over time have a direct impact on the possibility for new citizens and costumer roles and relationships in the electricity market to emerge across the EU. Retail electricity markets are a key element to deliver a customer centric energy transition in the context of the Clean Energy for All European package. Electricity retailers are often the main or single point of contact between consumers and the electricity sector. Competitive retail markets are presented as a requisite to an affordable energy transition. However, competition across countries is often limited, concentration remains high, and the delivery of benefits for consumers limited despite the enabling EU framework in place.

Market transformation efforts require significant time and resources across levels of governance, from policy proposals and implementation at the EU level, to transposition at the national level, to effective market change once policies and regulations are transformed.

The Council of European Energy Regulators (CEER) ², plays an important role in facilitating the creation of a single, competitive, efficient, and sustainable market for electricity and gas. As part of its

² <https://www.ceer.eu/>

activities, CEER monitors the functioning of electricity markets, which provides valuable insights to understand the progress on market transformation. Recent findings show that at the national level, electricity markets remain concentrated and dominated by a few suppliers (CEER, 2019; Poudineh, 2019). The Herfindahl-Hirschman Index (HHI) is used to measure market concentration, an index over 2,000 represents a highly concentrated market. In 2018, only in 7 out of 21 reporting countries the index was below 2,000 (Figure 2.2). Countries with high concentration included Lithuania, with an index of 10,000, having only one supplier and thus no competitive development (CEER, 2019). However, it is important to note that in smaller countries the number of suppliers will often be relatively lower to that of larger countries as large market size is more attractive to suppliers.

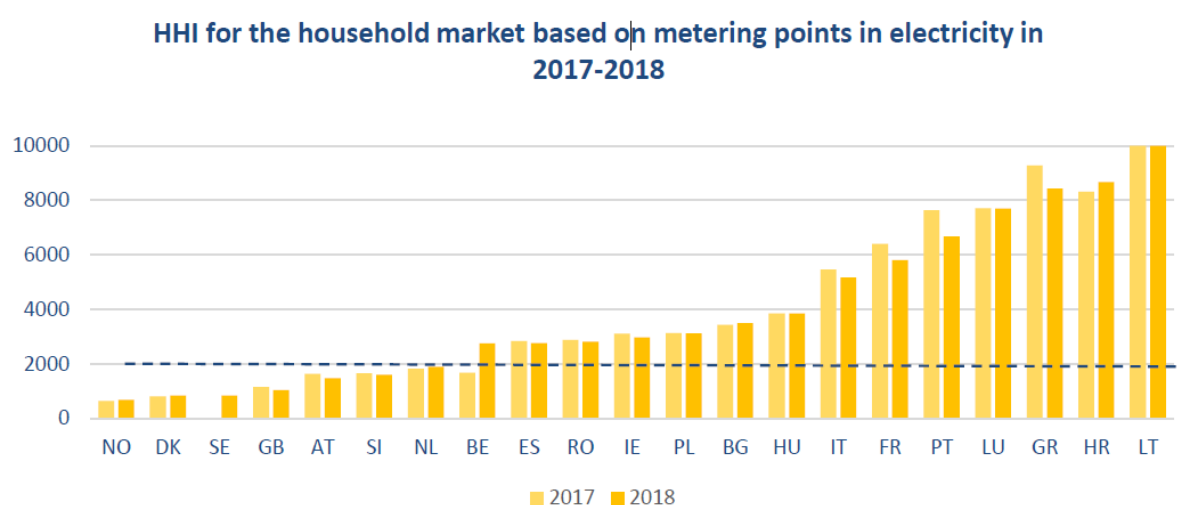


Figure 2.2 Market concentration (HHI) for household electricity consumers, 2017-2018. Source: (CEER, 2019, p. 20).

Entry-Exit activity of suppliers is also used as an indicator of retail market competition and can signal the existence of entry barriers. Great Britain is an example of a country with low barriers to entry on the retail market, in recent years the number of household suppliers increased leading to lower market shares for larger incumbents suppliers, and lower concentration (Figure 2.2) resulting in more choice for consumers (CEER, 2019).

Regional disparities across and within countries also have an impact on consumers access to the benefits of a competitive retail market. Recent findings demonstrate the heterogeneity within countries. For instance, Italy is the country with the largest number of electricity suppliers with 509 active suppliers, however of these only 64 are available nationwide. As a result, consumers in different regions have access to different levels of market development that can impact the retail offers available (Figure 2.3).

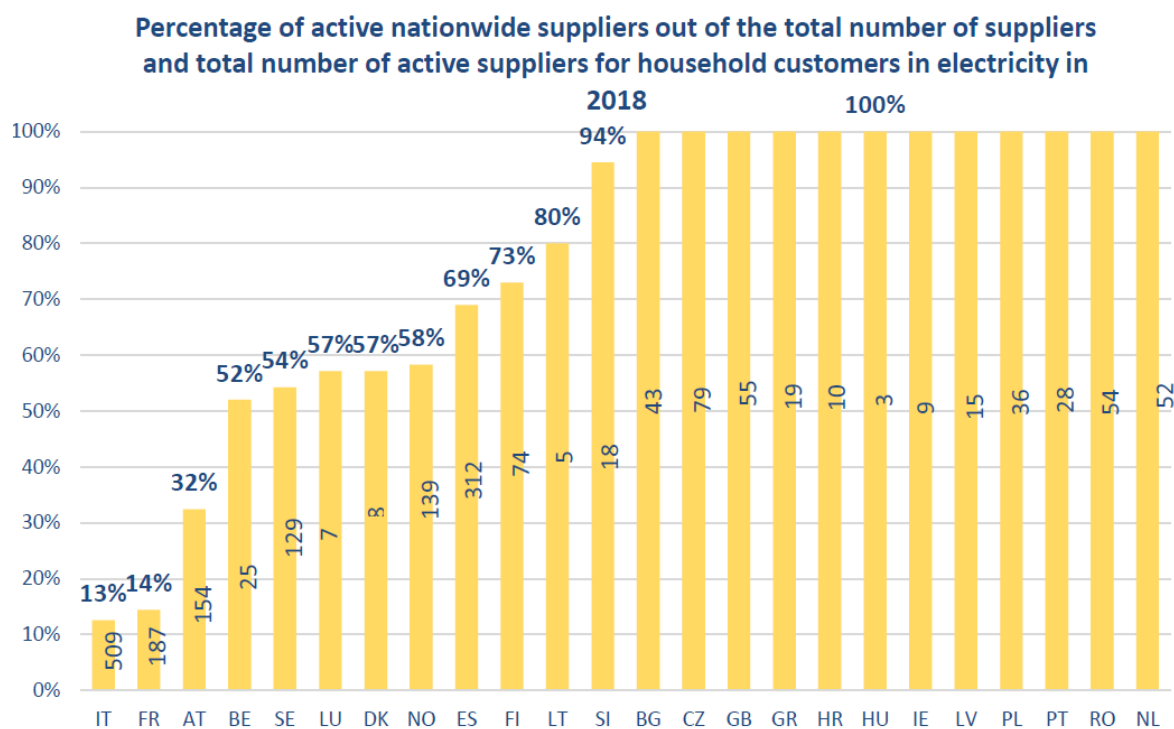


Figure 2.3 Total suppliers and percentage of nationwide suppliers for household's electricity consumers.
Source: (CEER, 2019, p. 16).

Recent developments show an increase of the number of suppliers in 2018, compared to 2017. Market concentration has also decreased over the past six years. However, while some positive evolution is observed, retail markets remain highly concentrated. This can be considered as a reason for reduced innovation, which in turn is a pre-requisite for products and services that will enable prosumerism.

Consumer engagement in the energy market is also a valuable source of information on how much consumers are acting on the opportunities resulting from new market designs. Supplier switching is one of the main observable activities at the moment and central to efforts related to both market liberalisation, and to delivering a low-carbon electricity sector. In most Member States there has been an increase on the switching rate over the past years, with significant progress made in Great Britain and Norway. Switching rates can be analysed as switching when a consumer changes supplier (external switching) and switching to a different contract/offer within the same supplier (internal switching). Both internal and external switching rates are heterogeneous across countries. For 2018 the higher external switching rate was observed in Norway, with 21%. Countries with relatively high external switching of at least 10% include Finland, Germany, Great Britain, and Portugal (Figure 2.4).

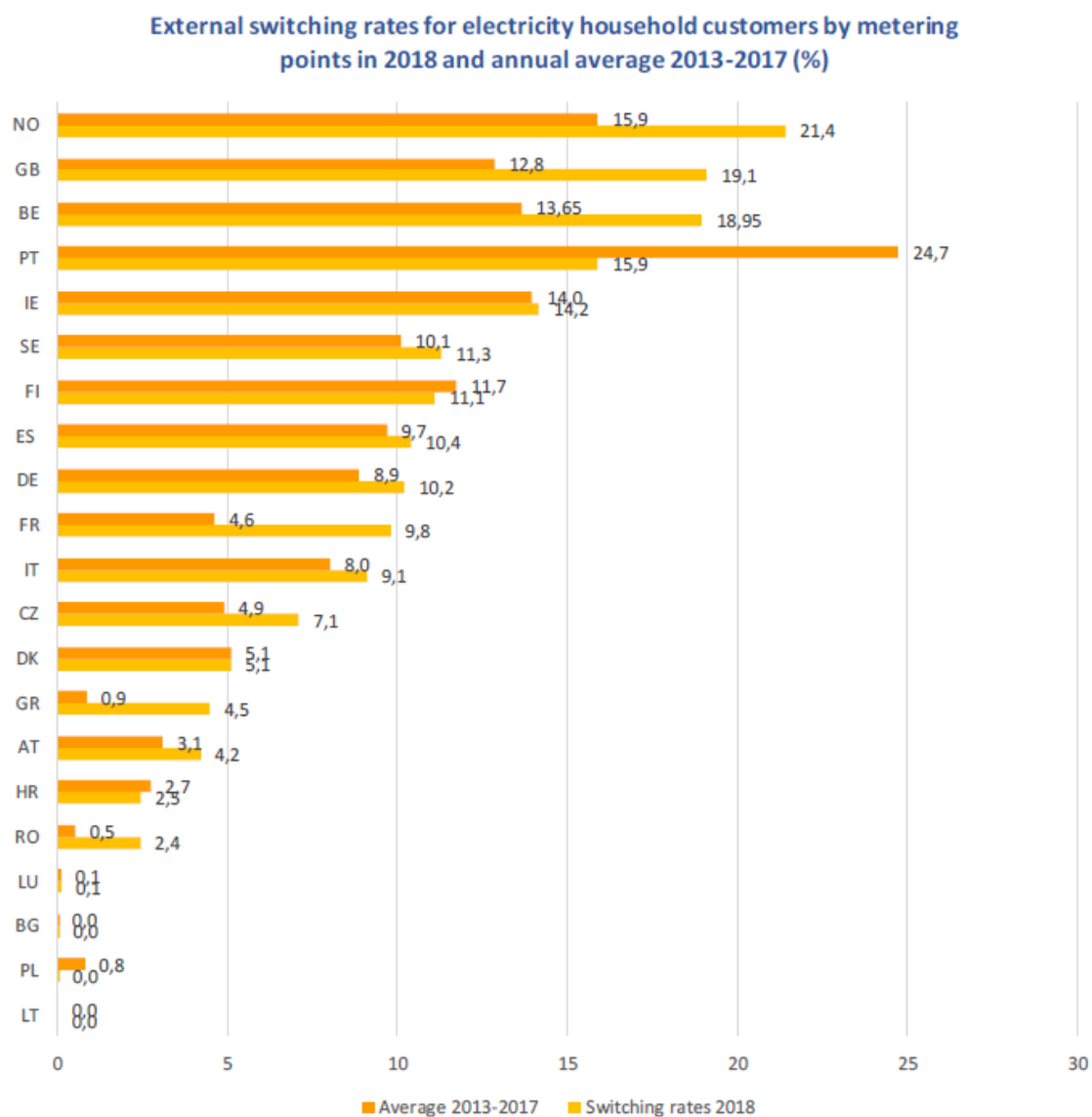
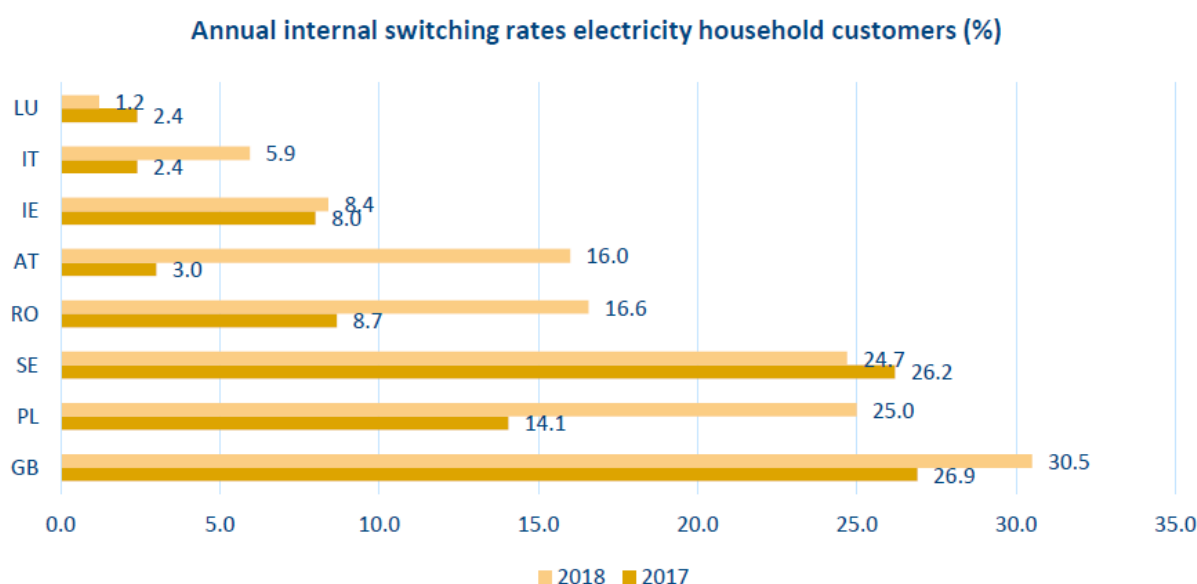


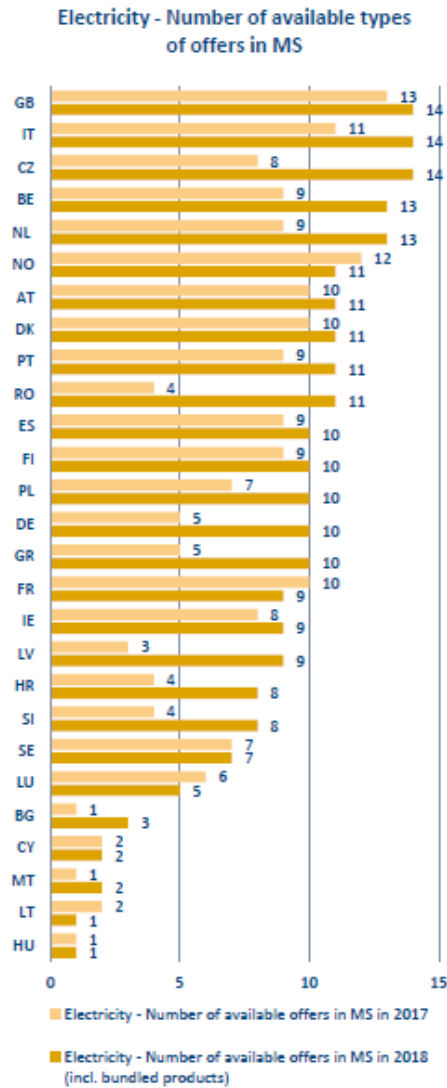
Figure 2.4 External switching rates for household electricity consumers. Source: (CEER, 2019, p. 30).

Internal switching, the change of contract or offer with the same supplier, is only reported by a limited number of countries. Similar to external switching, internal switching is heterogeneous across countries. The higher rates of external switching were observed in Great Britain and Poland (Figure 2.5)

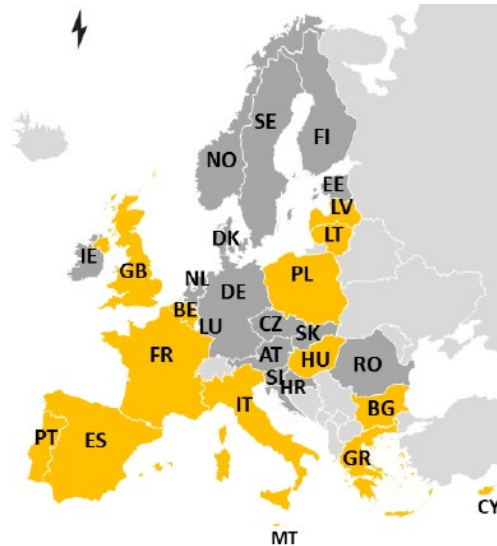


To effectively empower consumers to be active on their choice of energy supplier, switching times should be short. The Electricity Directive of 2019 sets a target for switching to be possible within 24 hours by 2026, as of 2018 that was only possible in Italy. In addition to market concentration and switching, the range of offers available in terms of types of products and services offered to consumers is also a good indicator of the state of development of retail markets. A positive trend has been observed across the EU with 22 out of 27 Member States having five or more different offers for their consumers³ (Figure 2.6).

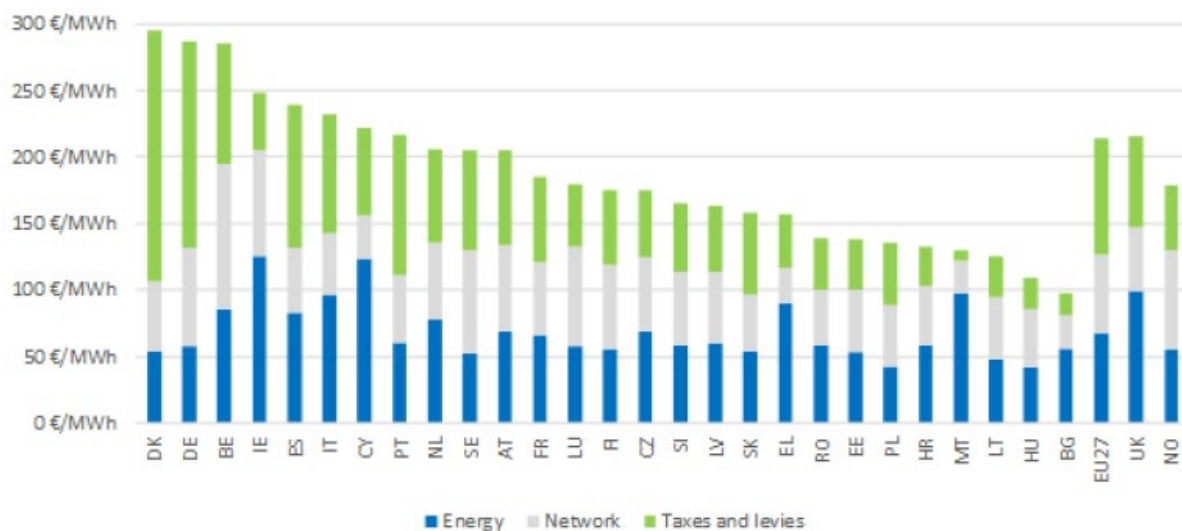
³ These offers included the following type of services: variable, fixed, mixed, variable spot based, variable wholesale based, capped, indexed variable, green, online, social, guaranteed origin, with monetary benefits, with additional services, and bundled products (CEER, 2019, p. 43-44).



Competitive electricity retail markets are presented as a pathway for more affordable electricity for consumers. The existence of government intervention in electricity prices is presented as a barrier for competition in electricity retail under the Clean Energy for All European package. In 2018, 14 out of 27 EU Member States had some form of price intervention, and 9 out of these 14 had end-user price regulation (Figure 2.7). In a smaller number of countries price intervention focuses only on vulnerable consumers, such as in Great Britain and Belgium. The share of consumers under regulated electricity prices provides further insight into the extent to which government intervention on electricity prices may affect competition. In Hungary and Poland over 90% of the households benefit from some form of government price intervention. In Bulgaria, Lithuania, and Malta 100% of the household are subject to price intervention (CEER, 2019).



Looking at prices, since 2016 electricity prices in the EU have been converging but still vary considerably across Member States. For instance, prices for household consumers ranged from EUR 295 MWh in Denmark to EUR 98 MWh in Bulgaria, the EU average being EUR 216 MWh. Noteworthily, a large proportion of the prices of electricity in the EU results from network charges and taxes, set by regulators and national government (Figure 2.8) (Pepermans, 2019).



The range of indicators on market concentration, consumer engagement, and pricing show a diverse landscape of country level realities, often underperforming in comparison to the ambitions set for liberalised electricity retail markets, which is in contrast to the EU-wide policy frameworks aiming to deliver competitive electricity markets to the benefit of consumers, enabling new roles and interactions.

Many of the metrics showing underperformance, such as switching and price intervention, have been goals of market liberalisation (see Section 2.1) and continue to be pursued under more recent efforts to deliver a low-carbon electricity sector (see Section 2.2). These are relevant and provide some perspective on the pace of the progress when delivering new benefits or create new roles for consumers, which may have an impact on the role of consumers in the energy transition and how fast the opportunities can be transformed into action. Pepermans (2019) analysed market competitiveness and suggested that there is also a positive relationship between the number of years since liberalisation was implemented, and the competitiveness of retail markets, suggesting that realizing the goals of liberalisation takes time. This is relevant when looking ahead to the implementation and delivery of the benefits expected under the new customer roles presented in the Clean Energy for All Europeans package.

Nonetheless, the role of EU wide policies has been recognised as supporting a cohesive long-term ambition, without which progress and market transformation across Member States would have been slower (Jamassb & Pollitt, 2005).

Against this backdrop, progress on active consumer roles, including renewable self-consumers (prosumers), and energy communities, is also observed. These active consumer roles are part of the new legislative framework introduced in the Clean Energy for All Europeans package. Solar photovoltaic (PV) generation by households across the EU is a good example of an activity pursued by active consumers, resulting from a combination of support schemes and incentives, and reductions in the cost of technology. However, while active consumers producing electricity from solar PV has become a recognised new role for consumers in the energy transition, only a limited number of EU countries report on its progress. In 2018 it was reported by 13 national regulators (up from 7 in 2017). A possible cause for lack of reporting is the still reduced share of consumers participating in this activity (ACER and CEER, 2019). The Member States with the highest share of households active on solar self-consumption in 2018 were Denmark with 3.3%, Great Britain with 2.8%, and Cyprus with 2.5%. For the other countries reporting on this aspect of active consumers, their share was below 2%, this included Greece, Hungary, Italy, Lithuania, Luxembourg, Malta, Romania, Slovakia, Slovenia and Sweden (ACER and CEER, 2019).

2.4. Moving forward on consumer empowerment

2.4.1. Focus areas on the Clean Energy for All Europeans package

The legal developments implemented as part of the Clean Energy for All Europeans package aim to address existing barriers to consumer engagement and move forward to a low carbon electricity sector



that enables consumer participation. To achieve this, three focus areas are identified in the legal framework, including: information and awareness; adoption of technological innovation; and financial support.

Providing better **information and awareness** can improve citizens and consumers understanding of the options available to have a more engaged role in the electricity sector, including for instance electricity generation options, possibilities to switch suppliers, consumption monitoring and demand-side management, and dispute resolution, to name a few. Recent EU policies emphasize the important role of information provision to enable the active participation of consumers in the energy transition. The Energy Union policy framework of 2015 emphasised the importance of consumers to achieve a fully integrated internal energy market. This package set a vision in which consumers should have access to the necessary information, which should be accessible and understandable, to make decisions about their energy supply from suppliers across the EU.

*“In an Energy Union, **consumers in one Member State should be able to make informed choices and buy their energy freely and simply from a company in another Member State.** This requires the further adaptation of the current national regulatory frameworks since the vast majority of European households remain passive consumers. In some Member States **consumers have a limited choice of suppliers and switching between suppliers is relatively cumbersome.**”*
(European Commission, 2015a, p. 11).

This vision for information being widely available and acting as an enabler to active consumer roles that go beyond country borders to support choices from suppliers across Member States set a highly ambitious target on the functioning of retail electricity markets. This contrasts with the fragmented and heterogenous reality at present, discussed in the previous section (Section 3). To deliver on this ambition, legal provisions on information and awareness to enable consumer engagement in the energy transition are found in specific directives focused on the electricity market, renewable energy, and energy efficiency. For instance, the Electricity Directive of 2019 establishes that consumers must have access to plain and unambiguous information about their rights in the energy sector. This information must be accessible, understandable, and actionable. Important areas where improvements are needed include the comparability of offers from suppliers and the barriers associated with switching suppliers. Independent comparison tools, such as those available online, can be effective for consumers to assess the costs and benefits of the options available to them. These comparison tools are attractive because they reduce the burden on the consumer by aggregating existing offers and presenting them in a comparable format that can contribute to informed decision making. The Electricity Directive places consumers at its centre. However, that does not mean that all consumers will become active in the energy market, and even within the group of active consumers we may see a gradient of engagement



reflecting the different consumer's willingness and ability to engage with the options available. The possibility and importance to create an electricity market where different levels of consumer engagement can co-exist is also defined in this directive by making Member States responsible to ensure that there are no negative penalties for consumers opting to not be active in the energy market. Electricity bills are recognised as important to inform customers of their energy usage and costs. However, bills are often the source of disputes and low level of satisfaction and engagement with the electricity sector. It is important that bills become clearer and more understandable. Regular billing information on actual electricity usage can help consumers manage their consumption and costs, which can also be facilitated by smart meter technology.

Addressing information and awareness aspect related to renewable electricity, the Renewable Energy Directive of 2018 establishes that consumers must be provided with detailed information to support decision making regarding renewable energy, as well as to avoid technology lock-ins. For instance, consumers should have access to information on the energy performance of heating and cooling technologies, as well as on the costs of electric vehicles. The Renewable Energy Directive creates the responsibility for Member States to make information on support measures accessible to all relevant stakeholders, including consumers, such as vulnerable and low-income consumers, renewable self-consumers, as well as for energy communities. Member States must also develop information, awareness, and guidance materials to inform citizens about their rights and benefits of developing and using renewable energy sources, including renewables self-consumption as well as renewable energy communities.

In the domain of energy efficiency, the Energy Efficiency Directive of 2018 (European Parliament, 2018b) sets the consumers right to reliable, clear, and timely information about their energy consumption. Electricity bills and annual statements are recognised as important source of information for consumers to learn about their energy usage and costs. Electricity bills are also often a source of disputes and result in low levels of consumer satisfaction and engagement, as a result bills need to be clear and easy to understand.

Advancing the **adoption of technological innovations** aims to support new consumer roles through a better understanding of and by incorporating technologies that enable more engaged roles, which can be supported by smart meters and other consumption monitoring technologies that can lead to behavioural change, as well as technologies supporting local electricity generation for prosumers and energy communities. The importance of adopting innovative technologies was put forward in the framework of the Energy Union, in which smart technologies are expected to contribute to unlock opportunities related with greater control of energy production and consumption, to the benefit of both consumers and the companies supplying them with energy services.

“Smart technologies will help consumers and energy service companies working for them to reap the opportunities available on the energy market by taking control of their energy consumption (and possible self-production). This will deliver more flexibility in the market and potentially reduce consumer bills.” (European Commission, 2015a, p. 11).

This role of technological innovation to deliver new consumer roles is detailed in more specific legal provisions in the EU directives dedicated to the electricity market, renewable energy, and energy efficiency. The Electricity Directive recognises that new technological developments, related to the efforts to decarbonise the energy system, can result in challenges and opportunities for market participants. However, these also allow for new forms of consumer participation, as well as for cross-border cooperation. Technological advancements in grid management and renewable energy have unlocked opportunities for consumers. However, the lack of real-time information on the energy consumed and its cost prevented consumers from being more active in the energy transition. To ensure all consumers have access to all offers available for electricity supply, consumers subject to regulated electricity tariffs must also be equipped with smart meters and have access to dynamic pricing offers. Delivering shorter supplier switching times can encourage consumers to search for better offers and alternative suppliers. The electricity market directive envisions that by 2026 technological developments will allow for switching to take place within 24 hours. As the energy transition unfolds all consumers should be able to benefit from participating in the energy market, such as by adjusting their consumption in response to market signals that can result in benefits in the form of lower electricity prices or other incentives. The benefits resulting from consumers participation are expected to further increase as more consumers become active, and the opportunities related to participating in electricity markets become more accessible. In this context the role of customers is now significantly expanded, as they should be able to participate in electricity markets by consuming electricity, a role that was granted by market liberalisation, but also to store and sell self-generated electricity, acting as prosumers. Additionally, consumers must be able to participate in markets for flexibility, in which storage technologies, electric vehicles, demand response, and other demand-side management actions are all enablers.

For technological innovations in the realm of renewable energy, the Renewable Energy Directive supports the development of decentralised renewable energy technologies and storage in a non-discriminatory way. This support is driven by the multiple benefits of decentralised energy resources such as tapping into local energy resources, and the possibility to support local community development by adding new income sources and jobs related to deployment, operation, and maintenance of distributed energy technology installations. This support is relevant in the context of new roles for consumers in the energy transition as it signals that there is value added in expanding decentralised



energy resource capacities, in which consumers and local communities can play an active role. Moreover, this emphasizes the role of decentralisation in the energy transition, which contrasts with the historically centralised structure of the electricity sector.

In terms of technological innovation to foster energy efficiency, the Energy Efficiency Directive supports the adoption of technologies that increase feedback on energy consumption, as a key element for demand-side management and for driving behavioural change. As a result, Member States are responsible for ensuring that consumers have access to competitively priced individual meters that reflect their energy consumption on the actual time when it is used. This responsibility should be proportionate with potential energy savings from such technology.

Action on **financial support and energy poverty** aims to support the participation of citizens and consumers in the energy transition. These support measures can contribute to reduce the gap between the cost for consumers to become more engaged in the energy transition, and their financial capacity to meet these costs. Financial support can be particularly effective in support of an inclusive energy transition by providing support to vulnerable consumers. As part of the Energy Union framework the EU has proposed that Member States ensure the protection of vulnerable households when phasing out regulated electricity prices. Vulnerable households affected by energy poverty can see their living conditions and health negatively impacted. Support mechanisms can be implemented through the state social welfare system, or through the energy market via solidarity tariffs of discounted electricity prices. Specific provisions for financial support and action on energy poverty are presented in the recent legal developments. The Electricity Directive 2019 establishes that Member States must implement the necessary social and energy policies to support and protect vulnerable households and energy poor households in the internal energy market. Possible measures can focus on electricity bills, energy efficiency in residential buildings, or on disconnection protection schemes. Moreover, the renewable energy directive of 2018 sets forward a framework in which financial support should be made available for renewable energy communities as it is for larger participants. This highlights the support for electricity system decentralisation and active customer participation, which are commonly found in renewable energy communities. The support for renewable energy communities can also include information, technical, and financial support, as well as reduced administrative requirements. Support for renewable energy communities is important as it can also contribute to opportunities for advancing energy efficiency action by households, and may help reduce supply prices and contribute to reducing energy vulnerability. The directive establishes also that renewables self-consumers must be subject to reasonable costs for the operation of their system that do not result in disproportionate barriers. It is proposed that in general, renewables self-consumers should not be charged for electricity consumed that was produced in the same premise by renewables self-consumers. However, Member States are left with the option to apply charges if these are necessary to support the financial sustainability of the



electricity system. In this regard, financial support schemes can also be adjusted to meet the specific conditions of small islands and isolated regions, to support the generation of energy from renewable energy source. For energy efficiency, the Energy Efficiency Directive of 2018 sets that the EU's energy efficiency policies should be inclusive and accessible to vulnerable consumers affected by energy poverty.

2.4.1. Strengths and weaknesses

The following strengths and weaknesses have been identified from the analysis of recent policy and legal developments shaping the role of consumers in the EU energy transition.

Strengths

- The EU has implemented an upgraded legal framework reflecting a market design that recognises new roles for consumers, acknowledging recent technological developments and the growing importance of collective consumer organising in the energy transition. Technological developments are recognised in provisions for consumer to participate in electricity markets enabled by renewable self-generation, storage, and demand-response technologies. The role of collective consumer organising is included in the provisions for citizens and renewable energy communities.
- New roles for consumers are backed by a legal framework supporting non-discriminatory participation in a market still dominated by large incumbents. This is a welcome effort of the Electricity Directive to level the playing field for more diverse actors in the energy transition, including consumers as part of this.
- The Clean Energy for All Europeans package aims to further improve electricity retail competition to the benefit of consumers, it also establishes the need to protect vulnerable consumers and the energy poor, through social tariffs or other social support programmes.
- The Clean Energy for EU Islands Initiative was part of the non-legislative action resulting from the Clean Energy for All Europeans policy process, in parallel with initiatives for coal regions and energy poverty. This can be seen as a signal of the importance of tailored transitions for isolated islanded regions. This initiative is expected to contribute to: lower costs and higher renewable energy generation; diffusion of demand response and storage technologies; increased energy security and air quality; and economic development by creating new jobs, and business opportunities. A pledge has been created for interested islands to join the initiative, and its main pillars reflect the importance of local community engagement and citizen/consumer participation.



Weaknesses

- The process of market transformation is gradual and not complete. Retail electricity markets remain concentrated with limited number of suppliers and offers for consumers.
- Regulated prices continue to exist, which counters the goals of a liberalised market, with the exception of price regulation for vulnerable consumers. The Electricity Directive requires that Member States present an assessment of the necessity of price regulation for vulnerable and energy poor consumers by 1 January 2022 and a roadmap for the transition to market-based pricing to the Commission by 1 January 2025 (IEA, 2020, p. 149).
- Regulatory development will have to follow the extensive changes introduced regarding the role of consumers to turn the legal framework from the Clean Energy for All Europeans into an operational reality across EU Member States.
- Progress monitoring and reporting on the delivery of market transformation has focused largely on market competition metrics of concentration, offers, price evolution. New monitoring approaches are needed for an electricity market where consumers can have more active roles, ensuring data availability on the adoption of these new roles will be important to understand the effectiveness of the legal framework and how consumers are participating in the electricity sector.
- The Clean Energy for EU Islands initiative is based on a political declaration in 2017 that led to a Memorandum of Understanding in 2020). It is non-binding and does not include dedicated resources, which may have an impact on the delivery of its agenda. It does not establish any new legal commitments and does not replace or modify any existing legal obligations or confers new powers or financial commitments.

2.4.2. Future developments

The policies studied in this chapter emphasise recent developments in the EU related to the scope of activities for consumers to engage in the energy transition, which have been expanded to account for technological developments associated with distributed energy resources, such as behind the meter solar generation for renewable self-consumption, or smart meters enabling more granular data and dynamic tariff designs. Recent policy developments also aim to tackle existing barriers to delivering the benefits of a liberalised electricity market, which in terms of competition, choices for consumers, and information availability and its quality, remains work in progress (Pollitt, 2019).

Important aspects to consider, in the context of the legal framework resulting from the Clean Energy for All European package, is that active consumers and empowered consumers are mainly reflected into roles that require interaction with new technologies or new sources of information and data, with a



focus on empowerment through information (Ioannidou, 2018). However, the process of educating consumers to understand electricity data and the possibilities to take on new roles in the energy transition may present a significant lag in terms of measurable outcomes, similar to the long process we see today for market liberalisation indicators that still present an underperforming market.

In this context, the role for consumers is framed as one in which they assess data, take action, and interact with new technologies. Less emphasis is found for consumers to shape policy processes related to energy transition developments, such as considerations on the legal framework for policies, plans, and proposals to be developed or co-created with citizens participation. This can be considered in future policy development efforts. Including consumers in the governance of the energy transition can contribute to harness a greater number of involved consumers, by broadening the scope of engagement opportunities beyond technologies and data.



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3. The Role of Consumers & Prosumers in UK energy regulations and legislations

Abstract

The United Kingdom's existing energy governance gives way to a more flexible supply-and-demand system, increasingly moulded by the 4D's; decarbonisation, decentralisation, digitalisation, and democratisation. In this chapter, we provide an overview of the UK legal framework by examining the major statutes governing consumers in the energy industry and pertinent international instruments. We examine the UK regulatory measures and efforts for governing aggregators and community energy, we trace the consumer's definitions in fundamental law and present the ideas of "engaged" and "empowered" consumers. We discuss the applicable policies that facilitate consumers' participation and focus on vulnerable consumers as they make up a sizable portion of the UK's energy population. By focusing on three kinds of policies driven by instrumental and normative rationales, we give policy examples that aim to involve and empower energy consumers in their journey to prosumerism. In the UK, Individual and collective self-consumption are not restricted in existing legislation and have been promoted and supported by the country's energy policy. The regulator Ofgem considers consumers' experiences and perspectives through organised processes such as the Consumer First Panel and the Consumer Challenge Group. The regulator demonstrates a formalised method for getting information on issues that affect consumer involvement in the energy market. However, the financial and technological incentives implemented to support consumer engagement in the energy transition are weakening, as the Smart Export Guarantee (SEG) replacing Feed in Tariffs in January 2020 does not equally incentivise small generators. While the importance of consumers in the energy transition is emphasised, there is no legal structure in place, to support these more active consumer activities, which can lead to uncertainty for both consumers and energy sector actors. The capacity to engage consumers in actions that affect their energy usage is harmed by constant U-turns and changes in support packages, such as the Green Homes Grant; of a potentially effective policy ultimately scrapped. This level of policy uncertainty is harmful to a future where consumers are increasingly involved in the energy transition.

3.1. Introduction

The UK's energy governance currently in place gives way to a more flexible supply-and-demand system, which is claimed to be increasingly shaped by decarbonisation, decentralisation, digitalisation, and democratisation (Nolden, 2019). Decarbonisation drives the growing expansion of renewable energy sources in the electricity grid and markets, decentralisation is supported by the push for consumer empowerment and the new opportunities on the demand side, and digitalisation enables new solutions to connect and coordinate system elements and stakeholders across supply, demand, and grid levels (Poplavskeya et al., 2020 p. 105). Democratisation is essential in ensuring meaningful consent, especially when it comes to vulnerable members of society.



This Chapter will firstly provide an overview of the UK’s legal framework by examining the primary legislation regarding the consumer in the energy sector and relevant international instruments. The second section will trace the definitions of the consumer in the primary legislation, whereas the subsequent section will present the concepts of “engaged” and “empowered” consumers. The fourth section will provide policy examples that aim to engage and empower energy consumers in their journey to prosumerism, by focusing on three groups of policies driven by instrumental and normative rationales. The energy governance will firstly be examined through the lenses of supplier switching, smart-meters, and electric vehicles (EV), followed by an inspection of the measures regulating aggregators and community energy and a discussion about policies that facilitate the democratic involvement of consumers. The final section deals with vulnerable consumers, who form a significant proportion of the UK’s energy citizens. As the section will reveal, the legal framework in place for the fuel poor still has to overcome significant barriers to enable an equitable approach to prosumerism.

3.1.1. Electricity mix

The United Kingdom experiences a continuous decline of carbon being part of the electricity mix mainly due to its replacement by natural gas and renewable energy sources. The country’s energy system experiences a rapid transition to low-carbon energy generation, which accounted for over 50% of the electricity mix in 2017 (Figure 3.1). By 2025, the United Kingdom has pledged to phase out all unabated coal-fired power generating. Energy-related CO₂ emissions in the UK have decreased by 35% since 1990, while total GHG emissions have decreased by 40%, hitting some of the lowest levels since 1888 (IEA, 2019). Power and heat, which used to be the leading source of energy-related CO₂ emissions in the UK, have dropped dramatically (to 25% of total) and are now well behind transportation (34 percent).



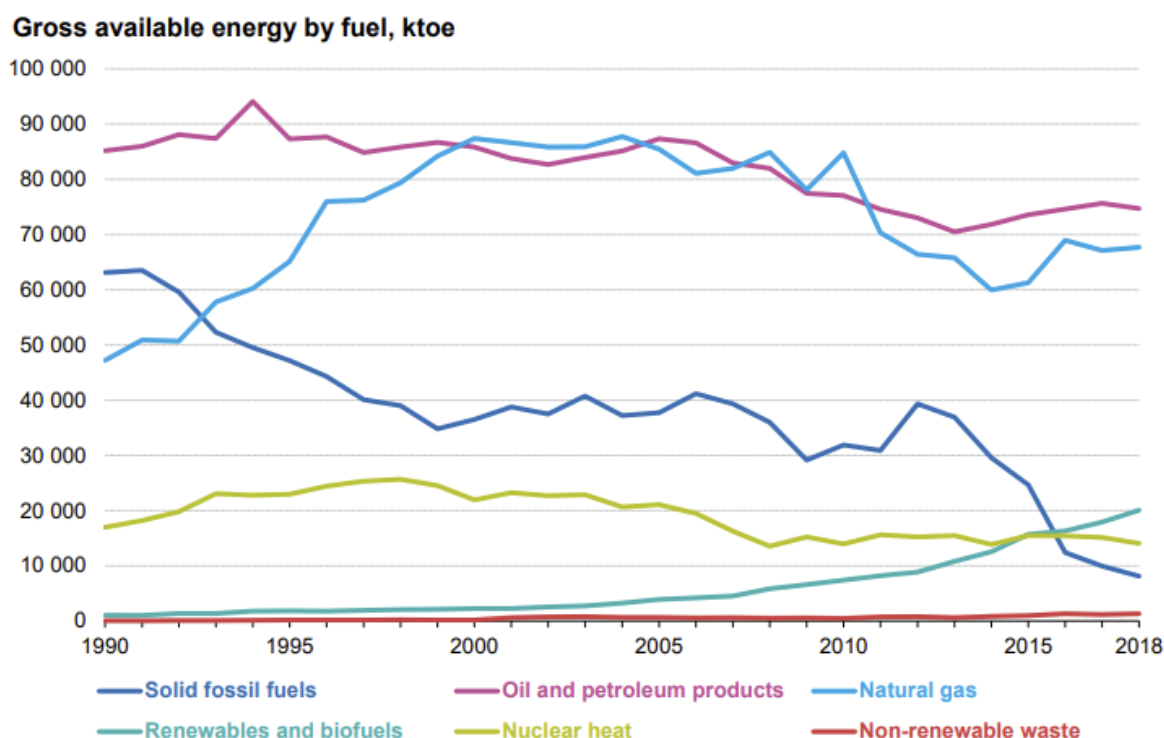


Figure 3.1. Electricity generation GWh by source for the United Kingdom, 1990-2018 (Eurostat, 2020).

Looking into communities located in non-interconnected remote territories, the Ministry of Housing, leads the UK government's National Planning Policy Framework (NPPF). The framework supports local authorities and neighbourhood planning bodies to assist community-led renewable and low-carbon energy initiatives, as well as to make permitting procedures for such projects easier. Furthermore, the NPPF urges governments to look for ways for new projects to get their energy from decentralised, renewable, or low-carbon energy supply systems. The United Kingdom, for example, is pushing the development of wind farms on Scotland's remote islands, which will directly benefit local people.

3.2. UK's Energy Legal Framework: An overview

The energy regulatory framework in GB operates through primary legislation and sources such as regulations, guidance and schemes, as well as licences⁴ and industry codes⁵. In GB, laws are interpreted by the Office of Gas and Electricity Markets (Ofgem), a non-ministerial government department and an independent National Regulatory Authority. In Northern Ireland, energy policies are interpreted differently, as there are separate regulator and electricity markets.

The *Electricity Act 1989*⁶ sets out the central features of the regulation of GB's electricity sector, founds the licencing regime and provides the statutory duties for the Gas and Electricity Markets Authority (GEMA),⁷ which operates through Ofgem and the Secretary of State for Energy and Climate Change (Secretary of State). The Act establishes one of the key authorities for consumers' regulation in the energy market and encourages individual self-consumption through Feed-In-Tariffs (FIT) Regulations⁸, which were reduced during the past few years and finally ended in March 2019⁹, replaced by the Smart Export Guarantee (SEG), a government-backed project, launched on January 1, 2020. Under the SEG, some power suppliers (SEG Licensees) are required to compensate small-scale generators (SEG Generators) for low-carbon electricity that they export back to the National Grid if certain requirements are met. Anyone generating electricity using PV, wind, micro-CHP, Hydro, or Anaerobic Digestion technologies of up to a capacity of 5MW, or up to 50kW for micro-CHP, could profit from the SEG. The rate at which SEG Licensees will pay SEG Generators, as well as the contract period and other terms, are determined by SEG Licensees. Generators considering qualifying for a SEG tariff should shop around to see which tariff is suitable for their specific needs. Tariff rates for SEG are only required

⁴ If a company or an organisation wants to enter the gas or electricity markets it will need to check whether the activity it proposes forms a licensable activity. See, <https://www.ofgem.gov.uk/licences-industry-codes-and-standards/licences>.

⁵ The industry codes support the electricity and gas wholesale and retail markets. Licensees must maintain, become party to, or comply with the industry codes in accordance with the conditions of their licence. See, <https://www.ofgem.gov.uk/licences-industry-codes-and-standards/industry-codes>.

⁶ Electricity Act c.29.

⁷ *Ibid*, s.3A. (Section 3A was substituted for s.3 of the Utilities Act 2000 c.27).

⁸ The Feed-in Tariffs Order 2012, No. 2782.

⁹ See, Ofgem, *Feed-in Tariffs: Essential guide to closure of the scheme* (10 September 2020) <https://www.ofgem.gov.uk/publications-and-updates/feed-tariffs-essential-guide-closure-scheme>.

to be higher than zero. Export meter measurements are used to compute SEG payments. The electricity that SEG Generators export back to the National Grid is paid for by their chosen SEG Licensee.

The Electricity Act has undergone significant amendments with the enactment of the *Utilities Act 2000*¹⁰. Section 1 of the Act establishes GEMA ‘to protect the interests of consumers, wherever appropriate, by promoting effective competition’ and, in performing its functions, ‘to have regard to the interests of low income consumers, the chronically sick, the disabled, pensioners and consumers in rural areas’¹¹. The Gas and Electricity Consumer Council was additionally established by the Act,¹² whose functions are presently carried out by the “Citizens Advice”, the “Citizens Advice Scotland”, and the “General Consumer Council for Northern Ireland”. Notably, the three bodies have been established by *Consumers, Estate Agents and Redress Act 2007*¹³.

Similarly, the *Energy Act 2013*¹⁴ founds a central piece of legislation about the consumers’ role in the energy sector. Part 6 of the Act, titled ‘Consumer Protection and Miscellaneous’, sets a limit on the number of energy tariffs offered to consumers, entails customers’ automatic move from poor value closed tariffs to cheaper deals, and requires the provision of information to consumers by suppliers concerning best alternative deals. Moreover, the statute enables Ofgem to extend its licence regime to third-party intermediaries, like switching websites, to require energy businesses that breach gas or electricity licence conditions to offer redress to consumers who suffer detriment from the breach. As a result, new provisions about consumer redress orders have been inserted into the *Electricity Act*¹⁵ and the *Gas Act 1986*¹⁶. Finally, the Energy Act has amended the *Warm Homes and Energy Conservation Act 2000*¹⁷ to offer a new target for fuel poverty set through secondary legislation.

¹⁰ Utilities Act c.27.

¹¹ Explanatory notes to the Utilities Act 2000, para.5.

¹² Utilities Act 2000 c.27, s.2.

¹³ Consumers, Estate Agents and Redress Act 2007 c.17.

¹⁴ Energy Act 2013 c.32.

¹⁵ Electricity Act ss.27G-27O.

¹⁶ Gas Act, 1986, c.44, ss.30G-30O.

¹⁷ Warm Homes and Energy Conservation Act 2000 c.31

The legal map concerning energy consumers also encompasses *Smart Meters Act 2015*¹⁸, which is consumer-centred legislation. The statute aims to provide consumers with ‘near-real time information on their energy consumption to help them control and manage their energy use and in turn save money and reduce emissions’¹⁹. Nonetheless, the opportunities enabled by smart-metering raise questions regarding data protection and consumers’ right to privacy. The government has implemented a smart metering Data Access and Privacy Framework to address concerns²⁰, which determines the levels of access to energy consumption data that consumers, suppliers, networks, and third parties have and consumers’ choices concerning managing this access.

The UK is also a party to the Aarhus Convention²¹. Article 5(8) of the Convention states that ‘Each Party shall develop mechanisms with a view to ensuring that sufficient product information is made available to the public in a manner which enables consumers to make informed environmental choices’.

As mentioned in the Implementation Guide of the United Nations Economic Commission (UNEC) for Europe, this is a far-reaching provision that governments could further develop when implementing it (UNEC, 2014).

The UK has a sufficient body of consumer law, which extends its effect to the energy sector. Specifically, the *Consumer Rights Act 2015*²² covers the legally binding contracts between energy suppliers and consumers by laying down what consumers may expect from contracts involving the supply of a service such as gas or electricity. The overall consumer protection framework of energy consumers also includes the *Consumer Contracts (Information, Cancellation and Additional Charges)*

¹⁸ Smart Meters Act 2018 c.14.

¹⁹ Explanatory Notes to Smart Meters Act 2018 c.14, para.2.

²⁰ Department for Business, Energy and Industrial Strategy, Smart Metering Implementation Programme: Review of the Data Access and Privacy Framework (November 2018). https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/758281/Smart_Metering_Implementation_Programme_Review_of_the_Data_Access_and_Privacy_Framework.pdf.

²¹ Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters, Aarhus, Denmark, 25 June 1998, (Ratified 23 February 2005), vol. 2161, p. 447.

²² Consumer Rights Act 2015 c.15.

*Regulations 2013*²³. The Regulations bind energy suppliers when contracting to provide consumers with energy off-premises, such as in homes or at a distance and without face-to-face contacts, such as online. Furthermore, the *Consumer Protection from Unfair Trading Regulations 2008*²⁴ offers consumers redress rights if they entered into a contract after being misled by an energy supplier or due to an aggressive commercial practice.

3.3. Definitions of Consumer in Primary Legislation

The Consumer Protection Act defines the consumer as ‘*an individual acting for purposes that are wholly or mainly outside that individual’s trade, business, craft or profession*’²⁵. Additionally, *Consumers, Estate Agents and Redress Act* defines the consumer ‘*a person who purchases, uses or receives, in Great Britain, goods or services which are supplied in the course of a business carried on by the person supplying or seeking to supply them*’²⁶. Moreover, the 2007 Act defines “designated consumers” as ‘*consumers in relation to gas conveyed through pipes or electricity conveyed by distribution systems or transmission systems.*’²⁷

Other than these two rather “thin” definitions of the consumer, the UK’s primary legislation remains silent regarding the empowerment and participation of consumers in the energy sector. The Acts of Parliament mentioned above do not refer to the transformation of consumers to energy citizens or prosumers. As Saintier states, in assessing the role of the consumer in the regulatory governance of the decentralised Renewable Energy Sources (RES) production by citizens, market and government actors fail to empower the “prosumer” (Saintier, 2017). Thus, there is a significant gap in primary legislation, undermining the consumer’s attempts at the heart of the energy sector’s regulatory transformation.

²³ Consumer Contracts (Information, Cancellation and Additional Charges) Regulations, No. 3134.

²⁴ The Consumer Protection from Unfair Trading Regulations 2008, No. 1277.

²⁵ Consumer Rights Act 2015, s.2(3).

²⁶ Consumers, Estate Agents and Redress Act 2007 c.17, s.3(2)(a). Concerning Northern Ireland, the Act maintains that a consumer is ‘*a person who purchases, uses or receives postal services*’ (s. 3(2)(b)).

²⁷ *Ibid*, s 4(1)(a).

3.4. Ofgem’s “Empowered” and “Engaged” Consumers

The adoption of the EU Clean Energy Package has caused the regulatory landscape in Europe to create opportunities for Distributed Energy Resources (DER) and demand to participate in all electricity marketplaces, including ancillary services for the Transmission Systems Operators (National Grid, 2016). In addition, the recast Renewable Energy Directive 2018/2001/EU provides that ‘consumers should be provided with comprehensive information [...] to allow them to make individual consumer choices with regard to renewable energy and avoid technology lock in’²⁸. The Directive also refers to ‘renewables self-consumers’ (an indirect, but clear reference to prosumers) and the need to establish ‘a regulatory framework which would empower renewables self-consumers to generate, consume, store, and sell electricity without facing disproportionate burdens’²⁹.

Implementing the provision of more incentives to consumers, along with an increasing prevalence of decentralised and decarbonised energy generation technologies, is the responsibility of Ofgem. Ofgem recognises that

‘moving from a largely centralised, carbon-intensive model to one which will be increasingly carbon-constrained, smart, flexible and decentralised is creating challenges which can only be addressed by innovation’ (Ofgem, 2016).

Therefore, in light of energy transformation and digital innovation, Ofgem has been collaborating with the UK Department for Business, Energy and Industrial Strategy (BEIS), especially in the context of the security of network and information systems (BEIS/Ofgem, 2017), to set up the rules for smart and flexible energy systems. Nonetheless, Ofgem and the different schemes that aim to promote smart-grid use, enable aggregation, and tackle the fuel poor, provide a narrow framing of the consumer.

The stakeholders in aggregation include all types of consumers, prosumers, and small-scale generators, together with technology providers and IT companies. It has been reported that Renewable Energy Sources (RES)-friendly policies, which encourage consumer-side participation in the energy system, have been shaping the electricity sector. Consumers have been sensitised to the adverse effects of climate change and have become aware of the value of environmentally sustainable solutions including their own role in climate change abatement. Just like the costs of renewables fell substantially in the past decade, so did the energy storage costs. As a result, “green solutions” are gaining impetus within a wide portfolio of low carbon technologies (Poplavskaya et al., 2020).

²⁸ 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 source (Recast) OJ L 328, [28].

²⁹ *Ibid*, [66].

In a position paper titled ‘*Making the electricity system more flexible and delivering the benefits for consumers*’, Ofgem makes reference to “engaged consumers” and “empowered consumers”.

Engaged consumers: ‘*The future electricity system will provide opportunities to increase consumers’ engagement through greater awareness and participation. Consumers could become more engaged by becoming key providers of flexibility, delivered for example through [Demand Side Response] DSR. They could also support system resilience by taking steps to permanently reduce their load and/or by generating electricity – for example from a rooftop solar panel – either consuming it directly themselves (reducing the need to transport it), selling it, or storing it for future use. Whilst greater participation in flexibility opportunities can support greater engagement, consumers who do not wish to become more actively engaged can also use technologies and services to manage energy use on their behalf and make savings.*’ (Ofgem, 2015, para. 1.25)

Empowered consumers: ‘*The new system could empower consumers by giving them access to information and tools to understand their energy consumption and manage their bills. For example, consumers could use the information provided by smart meters to assess their energy consumption and to shop around for the best offer. This could include ToU tariffs (a form of DSR) or other products such as smart thermostats which, with minimal effort, could help them change when they consume energy and save on their energy bills*’ (Ofgem, 2015, 1.26).

As it has been previously mentioned, although BEIS and Ofgem refer to the importance of a flexible and decentralised model that would benefit consumers who, in turn, should have an active role in the transition, their endeavour is undermined by the primary legislation’s silence on the definition and role of the energy consumer. As a result, developments concerning the consumer’s role in the energy transition largely depend on the regulator’s initiatives that remain at the level of soft law; that is, quasi-legal instruments that do not have a legally binding force. As the next section will reveal, the particular policy framework is driven by three different rationales that produce different outcomes vis-à-vis consumers’ participation in the energy transition.

3.5. Policy Examples for Engaging and Empowering Consumers in the Energy Sector

Instrumental and normative rationales influence the policies in the UK’s energy regulatory context which can be divided into three groups. The first group is influenced by the instrumental rationale and includes supplier switching, smart meters, and promoting electric vehicles. Being instrumentally informed, the measures see engagement mechanisms as a means to ratify ‘particular favoured decisions’ and realise specific outcomes such as citizens’ trust, consent, and performance of prescribed actions (Höppner, 2009). The second set of policies contains the legal regulation of energy aggregators and



community energy. Although these measures are also the outcome of an instrumental rationale since they have fixed goals and energy publics, they have a more participatory outlook. The last set of measures is influenced by the normative rationale, which aims to empower citizens to participate in decision-making that affects them as it is their democratic right—this includes initiatives such as citizens’ assemblies and Ofgem’s Consumer First Programme. Practices, research, and policies committed to such normative arguments aim to develop and ensure participatory exercises based on principles such as inclusiveness, equity, and equality (Höppner, 2009).

3.5.1. Supplier Switching and Smart Meters

The UK regulator has encouraged switching as the main route to residential energy consumer engagement and a more comparative market (Ofgem, 2017a, p. 2). According to Ofgem, tariff switching takes on average two to three weeks (Ofgem, 2017a), whereas BEIS has identified slow switching as a barrier to tariff engagement (BEIS, 2018).

BEIS, in its response to the call for evidence for the implementation of midata³⁰, expressed its support to new technologies such as automatic switching services and applications that can make it easier for consumers to find the best deal for themselves (BEIS, 2018). In doing so, the Department mentioned the need to put customers “in control”. It specifically stated that,

‘The Government’s ambition for Midata is to put customers in control of their energy data, enabling them to access key energy data electronically, with the development of Third Party Applications, empowering them to use that data to find the energy deal which is right for them. It should also provide the platform for the development of broader data-driven energy services.’ (BEIS, 2018, p. 5).

In the policy proposal titled ‘Moving to reliable next-day switching,’ Ofgem stated that it intends to introduce accurate next-day switching, which will enable consumers to become “active in the market”:

‘An improved switching process can reduce real or perceived switching costs and increase consumer engagement. This can provide direct benefits to consumers who become active in the market, and further improve outcomes for those who are already “energy shoppers”. This

³⁰ According to Ofgem, Midata will streamline the tariff comparison process by removing the need to manually find and enter the required information. This could be with Price Comparison Websites (PCWs) or competitor suppliers providing a tariff quotation. Midata will enable a more accurate comparison based upon the customer’s actual details (i.e. historical usage) – and customers, if they choose, will be able to provide ongoing consent - to authorise the third party to regularly access their data and routinely provide insight into whether they are on the most suitable deal for them. See, <https://www.ofgem.gov.uk/gas/retail-market/market-review-and-reform/midata-energy-project>.

increased engagement can strengthen competition and lead to innovation, better service and pressure on prices.’ (Ofgem, 2015a, p. 1)

Smart metering will permit these improvements to the switching process. Increasing the number of households with smart meters will grow the potential market for demand response (DR) services and technologies and the digital tools for comparing them (Carmichael et al., 2021). Ofgem has also maintained that the smart meter rollout delivery sets the timeline for introducing a mandatory Market-wide Half-Hourly Settlement (MHHS) regime. MHHS would provide incentives to encourage suppliers to bring forward innovative offerings and stipulate competition in helping consumers to manage and shift their consumption (Ofgem, 2018).

Even though Ofgem and BEIS consider switching as a key route to consumer engagement, evidence suggests that the concept of an empowered and engaged consumer is undercut by a lack of action-oriented focus on addressing barriers to engagement and an absence of realism. As it has been reported, 82 per cent of switchers ‘*would do so to save money*’ (Ofgem, 2017b, p. 46). Additionally, pilots and surveys reviews suggest that financial savings constitute the main incentive for enrolling and remaining in time-of-use services (Chase et al./BEIS, 2017), whereas it has been shown that reducing bills was the most appealing benefit of time-of-use tariffs (Smart Energy GB, 2019).

There is also evidence that consumers are sceptical about the actual tariff differences, discouraging their participation in the energy markets. A response given for not switching tariffs is the new supplier not being cheaper than their previous supplier in a few months (CEPA, 2017). Indeed, to a significant extend, even though switching, is a pre-requisite for competition, the almost exclusive focus on pricing has been a limiting factor in both consumer education and supplier innovation. Therefore, there is need for further information campaigns about the near future options that new technologies will provide and will be become the new competing field of energy suppliers, beyond just pricing.

Consumers’ engagement and empowerment are demonstrated in the finding that the trust in the energy firms is the lowest of all market sectors (Faulk, 2015). As a result, reliance on digital comparison tools, mainly price comparison websites, is an important feature that can encourage switching and demand response uptake. Ofgem has highlighted the importance of offering guidance through online price comparison websites operated by third-party intermediaries, especially after removing the tariff comparison rate from the Clearer Information tools, following the Retail Market Review reform package (Ofgem, 2017a). Furthermore, online comparison tools can reduce the ‘information overload’ of calculating future energy costs from consumption and tariff designs and reduce the ‘choice overload’ of comparing a wide range of suppliers and tariff options (Carmichael et al., 2021).

Moreover, research has shown that only 7 per cent of consumers recognise the benefits for accessing new products or services due to smart meters (Citizens Advice, 2018). As it has been observed, the



Smart Meter Implementation Programme (SMIP) TV campaigns present the idea of smart meters supporting renewable energy but do not specify how this is achieved or what a smart meter will enable households to do (Carmichael et al., 2021). Similarly, it has been alleged that there is a lack of an understanding of the big picture of the smart grid, leading to suspicion about smart meters (Buchanan et al., 2016).

3.5.2. Electric Vehicles

The transport sector (including aviation and shipping), accounts for 7.5 Gt of CO₂ emissions (tank to wheel), about 28 per cent of global final energy demand, 14 per cent of economy-wide global anthropogenic greenhouse gas emissions, and about 23 per cent of emissions due to fuel combustion (IEA, 2016). Additionally, transport sector emissions are rising more quickly than most others because of demographic, behavioural, and economy-driven transformations, leading to significant increases in transport demand, particularly in developing countries (Creutzig et al., 2015). As a result, decarbonising the transport sector to tackle climate change establishes a challenge for policy-makers. Moreover, it provides an enormous opportunity for a sector where emerging technological solutions become increasingly available and gradually more affordable. However, what is most importance about electromobility is its role in enabling prosumerism as it seeks to “bring home” a domain of energy supply (vehicle refuelling) which has historically been linked to fuel forecourts. From the energy prosumer’s point of view an electric vehicle is essentially a large-scale battery on wheels which opens up flexibility options. Among other points, electric vehicles are of great interest to islands in the FCE region, as they often present a limited road network which is not well served by public transport options. An electric vehicle’s often-cited disadvantage of limited range, is not problematic when destined to serve the limited road network of an island.

According to Ofgem, almost one in four (24 per cent) consumers plan to buy an electric or plug-in hybrid vehicle in the next five years (Ofgem, 2021b). The particular statement came a few days before the Regulator’s announcement on the 24th of May 2021 that it will invest 300 million pounds in more than 200 low-carbon infrastructure projects to prepare the country for more electric transport and heat. Britain will ban the sale of new petrol and diesel cars from 2030 as part of its goal of cutting emissions to net-zero by 2050. The investment will be delivered in the next two years and is part of a 40-billion-pound investment plan to ensure Britain can move to low-carbon transport and heating while maintaining secure energy supplies.

As part of its funding package, Ofgem said motorway service areas and trunk road locations across the country would get the cables they need to install 1,800 new ultra-rapid charge points for electric vehicles, which will triple the current network. In addition, 1,750 more charge points will be supported



in towns and cities, which ‘will benefit from increased network capacity to support more ultra-rapid charge points, increased renewable electricity generation and the move to more electric heating for homes and businesses’ (Ofgem, 2021c).

Nonetheless, a barrier to achieving consumers’ usage of electric vehicles is the heterogeneous preferences in their decision about which car to buy. Generally, widespread adoption of electric vehicles implies that consumers actively choose to purchase them over conventional vehicles, whereas like any other consumer technology, such decisions are influenced by upfront capital costs and expectations about future operating and fuel costs (McCollum et al., 2018). As research has shown, although many consumers intend on changing their car to an electric one, over a third (38 per cent) said they were unlikely to get an electric vehicle in the next five years. That is because of perceived barriers like the price being too high (59 per cent), short battery life or short-range (38 per cent), and worries about having nowhere to charge their electric vehicle close to home (36 per cent) (Ofgem, 2021b).

As Jonathan Brearley, Ofgem’s chief executive said:

‘Securing the investment is only half of the answer. Climate change can only be tackled if consumers are engaged in the process. For this to happen the transition to a low carbon economy needs to be fair, inclusive and affordable’ (Ofgem, 2021c).

3.5.3. Aggregation and Community Energy

The trends in the energy transition – decarbonisation, decentralisation, digitalisation, and democratization – foster the emergence of aggregators and position them as key enablers, who can help unlock value from in front of and behind the energy meter, for instance, by combining consumer loads and small-scale generation, or allowing prosumer entry to electricity markets (Poplavskaia et al., 2020, p. 105). Prosumer engagement depends not only on the technological prerequisites, such as appropriate transport infrastructure and the availability of smart meters, but also on the market design and regulatory framework that create opportunities for consumers to participate as aggregators.

Aggregation can be defined as the grouping of different customers within the power system (i.e., consumers, producers, prosumers), to act as a single entity when engaging in electricity markets or when selling services to system operators, such as the electricity system operator (ESO) or the distribution network operators (DNOs) (Burger et al., 2017). Aggregators, in particular, have been defined as third-party intermediaries specialising in coordinating or aggregating demand response from individual consumers to better meet industry parties’ technical requirements for specific routes to market, and who send signals to their consumers to modify their demand to respond to the System Operator requirements or market price signal (PA Consulting & Ofgem, 2016).

Aggregators can participate in the wholesale market if they are registered suppliers for the sites they are aggregating. In GB, aggregators can participate in energy matters by joining the British Electricity Trading and Transmission Arrangement (BETTA). BETTA was introduced in 2005 to integrate the operation of the Scottish transmission system with the English and Welsh systems. The purpose of this has been claimed as achieving more competitive prices and a wider electricity market³¹. However, participating in BETTA requires significant expenses (Inês et al., 2020). Alternatively, consumers can sell their output via a ‘third party,’ a BETTA participant. This is precisely where the aggregator’s role emerges to deliver at scale benefits for the energy system and the prosumers. Automation is paramount here as it is expected that most prosumers have no expertise, available time or even interest to engage with day to day decision making. Therefore, the prosumers’ technological capability (their home-linked technological equipment such as PV panels, battery, electric vehicle etc) is being used in coordination with the grids demands to extract optimal value.

Although there is no specific reference to self-consumption in the law, policy documents have promoted and supported collective forms of self-consumption over the past decades, including the FIT Regulations mentioned above, for small-scale renewable energy production. Policy Support for Community Energy Community action has, for some time, been seen as a central part of government strategy for delivering sustainable development. For example, the UK government in 2005 has stated that

‘Community groups can help tackle climate change, develop community energy and transport projects, help minimise waste, improve the quality of the local environment, and promote fair trade and sustainable consumption and production’ (HM Government, 2005).

Self-consumers and renewable energy communities can be considered as small suppliers for the purposes of participating in the wholesale market. According to the British FIT regulations, persons other than the licensed suppliers, who only supply electricity that they generate themselves, are not allowed to supply more electrical power than 5 MW, of which no more than 2.5 MW is supplied to domestic consumers. In this case, prosumer communities can trade their surplus energy. However, to connect renewable energy generators to the power grid, communities must comply with distribution grid codes and technical specifications to prevent damage to the network (Inês et al., 2020).

As self-consumption is not legally defined, there are no obstacles for renewable energy communities to act as self-consumers jointly. Individuals living in the same multi-apartment building or neighbourhood can create and run a separate energy community, and no precise spatial limits are set (Inês et al., 2020).

³¹ For more, see <https://www.ofgem.gov.uk/ofgem-publications/64116/1105-factsheet070215april.pdf>.

Nonetheless, it should be noted that there is also an absence of a definition of “community energy” that creates confusion, detected in the relevant academic literature, as well as in the disagreement by policy-makers, intermediary organisations, and practitioners (Muller et al., 2011; Hoffman and High-Pippert, 2010; Walker & Devine-Wright 2008).

An effective explanation of community energy is that of Walker & Devine-Wright (2008). The authors present the term as encompassing projects where communities, either of place or interest, show a high degree of ownership and control of the energy project and benefit collectively from the outcomes (either energy-saving or revenue-generation). Therefore, community energy is a field of activity that may include both energy generation and conservation projects, like village hall refurbishments introducing high levels of insulation and energy efficiency, together with micro-generation technologies. It may also encompass collective behaviour change programmes such as Carbon Rationing Action Groups, Transition Streets, or Student Switch-Off; community-owned wind turbines like those on the Scottish Isles of Eigg or Gigha. Finally, it may mean cooperatively-run small-scale energy systems, for example, Ouse Valley Energy Services Company (OVESCO) or Brighton Energy Cooperative (Seyfang et al., 2013). Community energy projects often incorporate local generation, and can be considered ideal for application in remote islands in the FCE region; as these lack interconnection to the mainland grid. Community energy projects do offer an alternative to energy provision, supplied by the main grid, boosting a transition to a low-carbon economy, offering a range of value streams that extend from financial towards social and environmental benefits for the end-users and involved communities.

After the FiT finished, there has been fear that some self-consumers will not be able to profit from their surplus self-generated energy. However, ending the FIT removes the obligation imposed on suppliers to buy the energy that prosumers produce at a fixed price, meaning that even though aggregator tariffs may emerge, peer-to-peer models to sell excess energy may be boosted (Inês et al., 2020).

At the same time, despite the removal of monetary incentives for aggregators, the Grid Code³², which covers all material-technical aspects relating to connections to, and the operation and use of, the national electricity transmission system, and the Balancing and Settlement Code³³, are being modified. These modifications may push for virtual energy communities as a form of Citizen Energy Communities and provide direct access to the wholesale market for self-consumers, increasing prosumers’ potential to secure revenues from diversifying flexibility market (Inês et al., 2020). Similarly, the balancing market

³² For more, see <https://www.ofgem.gov.uk/licences-industry-codes-and-standards/industry-codes/electricity-codes/grid-code>.

³³ For more, see <https://www.ofgem.gov.uk/licences-industry-codes-and-standards/industry-codes/electricity-codes/balancing-and-settlement-code-bsc>.

is opening for independent aggregators, creating, thus, an opportunity for groups of prosumers to pool and benefit from a controllable load (Bray & Woodman, 2019). The combined concepts of self-consuming energy communities and aggregators brings forward island (mode) energy communities. For a non-interconnected (or connected in a limited way) island, energy produced on site will be predominantly used to serve local needs and aggregation can reach high level, even 100%.

3.5.4. The Consumer First Programme

Ofgem has implemented the Consumer First Programme, which aims *‘to protect the interests of current and future consumers, with a further duty relating to the most vulnerable’* (Ofgem, n.d.). A central part of the programme is to take up independent qualitative and quantitative consumer research to shape Ofgem’s policy decisions.

An example is the 2020 Consumer Survey, monitoring consumers’ engagement with the energy market. The survey, which occurs annually since 2014, measures consumer switching and comparison behaviours, consumer confidence to source energy deals, what prompts engagement, perceptions of the switching process and the channels used to switch or compare energy tariffs. In 2020 the content of the survey was refreshed to explore attitudes towards decarbonisation and openness to using technologies that may result in more efficient use of the energy network (Ofgem, 2021b).

Additionally, Ofgem draws insight from a range of places to ensure that the organisation’s staff understand the priorities, views, and experiences of domestic and non-domestic consumers. These include the Consumer First Panel, the Consumer Challenge Group, and the Non-domestic Large User and Small and Medium User groups.

The Consumer First Panel is comprised of eighty everyday domestic customers recruited from four locations across Britain. The Panel has regular meetings to discuss issues affecting their participation in the energy market and other matters connected to energy. A small number of consumer experts make up the Consumer Challenge Group. The Group is not a decision-making body but has an advisory role in helping inform Ofgem’s decision-making processes, and was set up for the latest electricity distribution price control, RIIO-ED1³⁴. Finally, Ofgem’s work on non-domestic customers is informed through the Large User and Small and Medium User Groups. These groups meet two to three times a

³⁴ RIIO model for price controls: Revenue = Incentives + Innovation + Outputs. RIIO-ED1 is the first implementation of RIIO in the electricity distribution sector. The RIIO-ED1 price control period runs from 1 April 2015 and will end on 31 March 2023. For more, see <https://www.ofgem.gov.uk/publications-and-updates/consumer-challenge-group-riio-ed1-update-note-december-2013>.

year, enabling the small and medium enterprise customer representatives to discuss issues with the Authority.

3.5.5. Citizens' Assemblies

In June 2019, six Select Committees of the House of Commons called a citizens' assembly to assess public preferences on how the UK should tackle climate change due to these decisions' significant impact on citizens' lives. The Select Committees examine policy issues, aim to hold the UK government to account, and make proposals for new laws and regulations. The six Committees that were involved were Business Energy and Industrial Strategy; Environmental Audit; Housing, Communities and Local Government; Science and Technology; Transport; and the Treasury.

The Climate Assembly UK brought together people from different strands of society to discuss how the UK can reduce greenhouse gas emissions by 2050. Climate Assembly UK had 108 members selected through a process known as 'sortition' or a 'civic lottery' to be representative of the UK population³⁵. Participants met in central Birmingham from January to March 2020, and then discussions continued online after the UK's outbreak of Covid-19. Their outcomes were presented in a report to the six Select Committees in a Report in September 2020.

Among others, the Report mentions that the participants backed specific measures by at least two-thirds of the votes (1) to support for smaller organisations to offer energy services (94%); (2) simpler consumer protection measures (92%); (3) changes to product standards to make products more energy efficient and 'smart' (91%); (4) local plans for zero carbon homes (89%); (5) a ban on sales of new gas boilers from 2030 or 2035 (86%); (6) changes to energy market rules to allow more companies to compete (86%); (7) changes to VAT on energy efficiency and zero carbon heating products (83%); (8) information and support funded by government (83%), (9) or information and support provided by the government (72%); (10) government help for everyone (69%), or government help for poorer households (68%); (11) enforcing district heating networks (66%) (Climate Assembly UK, 2020, p.19).

Assemblies are most commonly praised for their ability to bring in the wider population in terms of demographics, such as age, gender, ethnicity, social class, and, sometimes, relevant attitudes such as their views on climate change. In fact, citizens' assemblies have been described as "potentially the most radical and democratically robust" type of mini-publics (Escobar & Elstub, 2017, p. 3). In British islands, that democratization of decision-making becomes an integral part of local energy systems.

³⁵ For more about the process of civic lottery, see <https://www.climateassembly.uk/detail/recruitment/index.html>.



Community energy groups and local land-owners are considered as significant parts of the broader partnerships realizing the development, maintenance, and operation of these systems. The smart and local energy system operational in Orkney, Scotland confirms that rationale (van der Waal, 2020; Owaineh *et al.*, 2015), or are an essential part of the future local energy system plans such as planned for Isle of Wight (Isle of Wight Chamber of Commerce, 2020).

3.6. Empowering Vulnerable Consumers

The previous section showed that the UK's regulatory framework includes a combination of instrumentally and normatively driven policies. As Stoll-Kleemann *et al.* claim, with the emerging 'vistas of governance' that aim at empowering citizens in 'sustainable climate futures,' a more participatory form of democracy is evident (Stoll-Kleemann *et al.*, 2003). Even though this might be true, there is a prominence of instrumental understandings of engagement and citizens' role in the UK's climate agenda. That implicates that green attitudes should be "cultivated" in individual consumers or citizens, while, at the same time, questions of democracy and collective action come second.

A large part of the existing energy programs is driven by an instrumental rationale, meaning that economic incentives or monetary costs influence consumer decisions. As a result, many of the UK's "energy citizens" lack any real agency when it comes to engaging with the energy system. It has been reported that 60 per cent of households in the UK pay more than they should, as they have not recently, or ever, made an active choice about their energy tariff (Ofgem, 2017, 5), as well as that 10,000 people died in winter 2013–2014 from cold homes (Khan *et al.*, 2015, p. 98).

This section will examine the regulatory treatment of vulnerable consumers, as their empowerment in the energy transition is critical. Context here is important: Prosumerism, advocates the use of technologies enabling consumer self-production and flexibility for own and grid benefit. A range of products and services become available to support this transition (Fuentes González *et al.*, 2021), but that risks the welfare of vulnerable energy consumers in two ways, linked to their lack of investment means. As a result, firstly, they cannot reap the benefits of these new technologies, such as better energy services and lower prices. Secondly, they risk being penalised in an energy system that transfers benefits to those capable of flexibility.

The importance of the "fuel poor" consumer is highlighted in the primary legislation, unlike the general conception of the energy consumer. Section 1(1) of the Warm Homes and Energy Conservation Act states that '*a person is to be regarded as living "in fuel poverty" if he is a member of a household living on a lower income in a home which cannot be kept warm at reasonable cost*'. Additionally, the Explanatory Notes to the Utilities Act provide that it is '*a requirement for the Authority, in performing*

its functions, to have regard to the interests of low income consumers, the chronically sick, the disabled, pensioners and consumers in rural areas’.

BEIS and Ofgem have, as a result, adopted a number of schemes to enable the fuel poor to become involved in the energy transition. Different grants can be found in England, Scotland, Wales, and Northern Ireland. An example is the Green Homes Grant scheme in England, which has been introduced to support consumers in making their homes more energy-efficient. This scheme, which opened in September 2020 and closed on the 31st of March 2021, provides low-income homeowners in England up to £10,000 each to install energy efficiency and low-carbon heating measures in their homes. It will help cut carbon emissions and see families save up to £600 a year on energy bills. The Green Homes Grant voucher scheme additionally provides other property owners in England with up to £5,000 each, encompassing up to two-thirds of the cost.

Innovative schemes play an imperative role, not only in accelerating energy decarbonisation but also in practically aiming to tackle fuel poverty (Fuentes González et al., 2022). An innovating business model receiving heightened attention in the academic and policy-making landscape is “Heat as a Service” (HaaS), supported by the UK’s Renewable Heat Incentive (RHI)³⁶ that provides financial incentives for consumers to adopt renewable energy-based heating technologies.

The idea behind the model is to offer consumers the opportunity to subscribe to plans charged on a room-by-room, hour-by-hour basis, rather than the number of kilowatt-hours (kWh) consumed. Such projects were evident in the literature, one in Denmark and one in the UK. The second project was the Smart Systems & Heat program (SSH) run by the Energy Systems Catapult (ESC), here in collaboration with Bristol Energy, become the first UK supplier to trial HaaS. HaaS may stimulate carbon emissions reductions from reduced demand and service plans that integrate energy efficiency and smart technologies. Furthermore, there is emerging evidence that HaaS business models may increase consumers’ openness to new technologies with the ESC (Energy Systems Catapult, 2019).

In analysing the usefulness and impact of smart transition for the fuel poor, Shirani et al. (2020) uphold Strengers’ (2016) view that smart home visions have been presented as a fait accompli upheld by policy goals and suggest that the expectations underpinning policy, that smart meters will make consumers better informed about their energy usage and thus promote better choices, need to be further considered. The study found that participants described being very aware of their energy use out of necessity due to limited finances. In some cases, the provision of smart meters was met with scepticism or regarded as offensive, leading to resistance. Shirani et al. (2020) found that there is scope for policy to further engage with these issues if vulnerable consumers feel that their concerns are being heard. Therefore,

³⁶ See, <https://www.gov.uk/domestic-renewable-heat-incentive>.

transition to increasingly smart systems risks worsening divides along the lines of technical confidence and competence, as well as desire and opportunity to engage with innovation. Care must be taken in the implementation to ensure that social exclusion does not happen by default, with older people at particular risk. The UK is taking significant steps for addressing fuel poverty in remote island communities. In Orkney, Scotland, the local energy system, led by Community Energy Scotland involves several partners for controlling the various components, sees the electricity and heating provision positively impacting the societal outlook. In 2017 over 60% of the island population was living under fuel poverty status; the transition to a smart and flexible local energy system will lower energy costs and is expected to lead to less than 20% of the population living in fuel poverty by 2030, or even its eradication (Energy of Orkney, 2017).

Focusing further on English islands, the European Regional Development Fund primarily funds the Smart Energy Islands initiative to develop a smart/local energy system, the first series of interconnected projects delivered by the Smart Islands Partnership (Hitachi Europe, 2018). The £10.8 million project implements electricity generation and storage, smart heating technology, and EV uptake, to develop modern grid infrastructure while financially appealing to the customers transitioning the community towards a low-carbon local economy. The Isles of Scilly Community Venture, a not-for-profit Community Interest Company, will sell power generated by solar panels and use the proceeds to lower electricity rates for all islanders through a specific Isles of Scilly energy tariff (Hitachi Europe Ltd, 2016). By 2025, the Smart Islands Program hopes to reduce electricity bills by 40% (Hitachi Europe Ltd, 2016) and improve the lives of the island's 2,200 residents through their increased available capital.

To conclude, the policy's focus on vulnerable consumers is of particular importance for the overall success of the energy transition. Formerly vulnerable consumers can become active participants in the energy market and are empowered to become self-determining contributing members of society. The Energy Autonomous Community project led by Isle of Wight Council and funded by the UK Research and Innovation (UKRI), explores flexibility for allowing generators to sell power into the local flexibility market, bringing local generation closer to local customers. New commercial models, such as peer-to-peer (P2P) trading have been explored and a platform used to maintain the flexibility system by providing information to over 15,000 households for cheaper local power being available (UKRI, 2019).

3.7. Conclusions

This Chapter has placed the regulatory treatment of the UK consumer at the heart of its attention by looking at the consumer's treatment in the primary legislation and considering the various regulatory mechanisms in place. A set of introduced measures included Ofgem's initiatives to empower consumers



through their engagement with schemes such as Consumer First Programme and Citizens' Assemblies. Although the former comes across as holding a deterministic approach, explained further below, the latter facilitates a future-looking perspective and provides substantial engagement with energy matters and consumer empowerment. According to the advocates of assemblies, one of the main benefits of Citizens' Assemblies is that their recommendations can command high public legitimacy (Elstub & Escobar, 2019). Legitimacy claims usually come from the precision they are selected and the fact that assemblies give the public the time and the opportunity to learn about and discuss a topic. Participants hear from and question specialists, including academics, researchers, people with direct experience of the issue, other stakeholders, and campaigners. It is claimed that they hear balanced evidence through this process before discussing what they have heard and making decisions (Climate Change Assembly UK, 2020, p. 4).

Limitations exist concerning the Citizens' Assemblies setup and effect, which also restrict the concept of the "energy citizen". First, participation is voluntary, meaning that those who receive the invitation can decline it, creating a self-selection bias (Smith & Setälä, 2018). Secondly, as pointed out, the participants' views are not representative of the public opinion, as they can shift during the deliberation (Lafont, 2015). Third, as Parkinson (2004, p. 385) states, assembly participants often make recommendations within narrow boundaries to which they do not have access when discussing citizens' juries. As a result, this undermines the need to ensure proper follow-up and implementation procedures following the recommendations (Devaney et al., 2020; Sandover et al., 2021). Despite these concerns, citizens' assemblies constitute the closest measure to consumers' active involvement in matters that affect them. As it will be held below, such measures are essential for empowering vulnerable consumers in particular.

Focusing on the Consumer First Programme, it requires a different kind of consumer involvement in the energy transition, as it allows for a more active consumer role inspired by democratic principles. Such measures can produce tangible results that can be further developed or change. However, the particular type of involvement is rather structured, guided, and deterministic. In addition, it is not future-looking, as it does not set goals or aims to inspire policy-makers, as the Citizens' Assemblies that will be examined in the following subsection aim.

Financial and technological incentives have been put in place through the Electricity Act of 1989 and the Smart Meters Act of 2015 to encourage consumers to participate in the energy transition. For example, Feed in Tariffs (FiT) rules favour renewable energy technology and smart meter deployment that provides real-time consumption data and allows for demand-side control opportunities.

When the regulatory framework is less entrenched, the pace of change is faster, and new technologies, business models, and ideas are more likely to be tested and applied (Nolden, 2019). However, if



technological developments and relevant policies were all that mattered, the road to tackling climate change would be smoother and more certain. Consumers may become aware of the four Ds, and they may even become engaged, to some extent, with the alternative options available for their energy consumption. However, consumers only slowly adapt and only gradually become comfortable with new technologies. Therefore, although there may be technological and legal solutions to achieve fulfilling the four Ds, the transition largely depends on the consumer's initiative, engagement, and empowerment.

Policy Support for Community Energy Action highlights existing legislation's lack of constraints on individual and collective self-consumption. The country's energy policy encourages and supports self-consumption, whether on its own or as part of a community energy project. Despite the lack of a formal reference to self-consumption in the law, policy documents such as the previously mentioned FiT regulations for small-scale renewable energy generation, have promoted and supported social forms of self-consumption over the years. Nonetheless, it should be noted that the lack of a definition for "community energy" requires clarity. The lack of a definition in policy causes uncertainty, as evidenced by disagreement among policymakers, intermediary organisations, practitioners, and the relevant scholarly literature.

The regulator Ofgem takes consumer experiences and perspectives into account through organised processes, which involve a non-biased approach, such as the Consumer First Panel and the Consumer Challenge Group. Through their advisory role, the regulator now has a formalised method for information acquisition on issues that affect consumer involvement in the energy market.

The UK is experimenting with measures that enable active and wide citizen participation in climate policy through the Climate Assembly process. This democratized process, unaffected by the current pandemic, can potentially signal an indication of increasing consumer willingness and capacity for direct involvement for providing advice, or even effectively guide decision-making, and it could lead to the introduction of similar energy policy processes for further empowering vulnerable consumers.

Although there is the conception that when the regulatory framework is less entrenched, the pace of change is faster, the UK's regulatory framework still has significant gaps that need to be addressed. Having identified the instrumental and normative rationales as the main influences behind the policies analysed, the present report examines supplier switching and smart meters, electric vehicles, and aggregation and community energy. These measures have been identified as instrumentally informed, meaning that they impose a passive role on the consumer instead of pushing for their active involvement. This leaves them as mere change acceptants and largely dependent on monetary incentives in order to facilitate their involvement. Policy and regulatory documents state the importance of consumers in the energy transition; however, a legal framework does not exist to provide a foundation for these more active consumer roles, which can lead to uncertainty for both consumers and energy

sector stakeholders. The lack of a legal framework can also create uncertainty for individual and group self-consumption. If future legislation includes restrictions on their operation, such as location or distance of participants in the collective operation, as observed in the case of France, also studied in this volume, a negative impact on the diffusion of this type of operation can become evident. The aggregation and community-energy policy framework is going through significant changes after the ending of FiTs. As mentioned above, these changes may lead to positive outcomes, yet the tight connection of these policies with personal incentives for consumers renders this somewhat tricky. Therefore, even though aggregation and community energy might seem to impose more responsibilities on British society, reflecting a neoliberal turn towards the “energy citizen,” they are still tied to the instrumental rationale, which implicates a relatively passive role for energy consumers. The tools offered by the UK regulatory framework, including the provision of information, are delivered and grasped in isolation by energy consumers. Consequently, current policies need to regulate services and technology to enable the consumers to understand innovations as a greater ensemble.

Emphasis on information provision and technologies that feed that information, such as smart meters, has proven insufficient to encourage consumers to take more active roles in the energy sector, undermining Ofgem's stated aims of more empowered consumers. The capacity to engage consumers in actions that affect their energy usage is harmed by constant u-turns and changes in support packages. This has been the case with a number of support schemes in the UK's construction industry, with the Green Homes Grant being the most recent example of a potentially effective policy that was ultimately scrapped. This level of policy uncertainty is harmful to a future in which consumers are more actively involved in the energy transition.

The last section of this chapter inspects the legal framework on vulnerable consumers, where it was found that more legal provisions are devoted to their definition and protection. Specific support programmes have been created, focusing on vulnerable consumers as introduced programmes aim to enable their participation in the energy transition. Various grants have become available in the UK. The Green Homes Grant scheme in England, for example, was established to assist consumers in making their homes more energy-efficient. However, there are significant barriers to engaging vulnerable consumers. As it was held, the set of currently more democratically-centred measures needs to be further improved to boost vulnerable consumers' participation in the energy market. Barriers also exist in energy-as-a-service business models concerning consumers' engagement, which, instead of helping in the engagement of vulnerable consumers, render the scheme particularly problematic for them. Regardless, problems such as the contradictory goal of supplier switching and HaaS' long-term contracts, the scheme's service standards are not being guaranteed for unsuitable homes (Britton, 2021) and, as a result, such schemes, instead of boosting participation and engagement of the vulnerable consumers, undermine social equity by denying access to all people.



A truly inclusive framework needs to be established, by removing barriers. In other words, the importance of the fuel poor, evidenced in the legislation's specific reference to the term, invites actions that increase knowledge about vulnerable energy consumers and how it impacts participation in the energy market. Eventually, that may enable the public and policymakers to understand prerequisites, motives, and participation incentives in order to provide those elements and the opportunity to participate.

3.7.1. Strengths and Weaknesses

Strengths

- Financial and technological incentives have been implemented to support consumer engagement in the energy transition. For instance, via Feed in Tariffs has supported renewable energy technologies and via smart meter deployment supporting real time information on consumption and enabling demand-side management opportunities.
- Individual and collective self-consumption are not restricted in existing legislation and have been promoted and supported by the country's energy policy.
- The regulator Ofgem, considers the experience and perspective of consumers through structured processes, such as the Consumer First Panel, and the Consumer Challenge Group. As a result, the regulator has a formalised process to access to insight on issues affecting consumer participation in the energy market.
- The country is experimenting with approaches that support active participation of citizens on climate policy, seen through the Climate Assembly process. This can be a positive sign of a growing willingness and space for consumers, and may result in similar processes dedicated to energy policy.
- Specific support schemes have been implemented, with special attention for vulnerable consumers.

Weaknesses

- Policy and regulatory documents state the importance of consumers in the energy transition; however a legal framework does not exist to provide a foundation for these more engaged consumer roles, which can result in uncertainty for consumers as well as for energy sector players.
- Lack of a legal framework for individual and collective self-consumption can create uncertainty. If future legislation includes restrictions on their operation, such as location or distance of participants in the collective operation, as has been observed in the case of France,

also studied in this volume. This could have a negative impact on the diffusion of this type of operation.

- Focus on information provision and technologies that provide information, such as smart meters, is proving insufficient to steer consumers towards more engaged roles in the electricity sector, which undermines intentions of more empowered consumers communicated by Ofgem.
- Constant u-turns and changes in support schemes negatively impact their ability to engage consumers in actions that affect their energy usage. This has been repeatedly the case for support schemes in the building sector in the UK for which the Green Homes Grant is the latest example of a potentially good policy, with significant changes that was ultimately cancelled altogether. This degree of policy instability is detrimental to a future in which consumers are more engaged in the energy transition.
- The replacement of Feed-in-Tariffs (FiTs) by the Smart Export Guarantee (SEGs), effective from January 2020, comes across as weaker compared to the previous FiT scheme. The sole obligation for suppliers to small generators is that it will only exceed zero.



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4. The role of the electricity consumer in France's energy legal framework

Abstract

The analysis of the role of electricity consumers in France's energy legal framework provides insights into how the country's electricity sector boundaries have evolved towards a greater integration and creation of opportunities for citizen and consumer engagement. In this chapter we review the country's electricity mix and institutional framework, which provides relevant background information for both mainland France where nuclear energy is the main energy source, and for its island regions where fossil fuels are generally dominant. We then review the existing possibilities for consumers to participate in the energy transition. In France, consumers have the possibility to shape policy development processes and to participate in the deployment of both large and small scale energy infrastructure. France's key energy policy instruments, the Multi-annual Energy Plan (Programmation pluriannuelle de l'énergie, PPE) and the National Low-Carbon Strategy (Strategie Nationale Bas-Carbone, SNBC SNBC) present consumers as important elements of the energy transition going forward. However, when looking at implementation approaches being followed, France has been cautious on how it enables the integration of new consumer roles. For instance, this has been recently observed in the regulatory approach for community energy operations, which while still an emerging phenomenon has seen successive changes in its rules of operation. We find that the policy, legal, and regulatory framework in France is contributing to a shift towards a low carbon culture, in which consumers and citizens can play different roles as the country moves forward in delivering its energy transition. The opportunities created in the legal framework to engage citizens and consumers is a signal that these are increasingly becoming substantive stakeholders in the energy transition, moving away from the less engaged role citizens and consumers have had in the past. However, the centralised nature of the electricity system in France and the barriers to the proliferation of prosumer roles at present, individually and collectively, suggest that consumers and citizens ability to shape the energy transition is in the early stages and has significant growth potential.

4.1. Introduction

The role of citizens in the energy transition has gained increased relevance in recent policy developments. In France, the results of the national debate on the energy transition held between 2012 and 2013 indicated that the energy transition must be “*A transition by all and for all [...]*” (Energy Cities, 2017). Moreover, France is a relevant case for analysis on the evolving role of consumers and citizens as its policy, legal, and regulatory framework governing energy policy apply to both mainland France and its large, interconnected electricity system, and to non-interconnected zones in remote island regions.

The role of the consumer in the electricity sector in the context of France's energy legislation has gradually evolved following EU market liberalisation processes since mid-1990s. The role of consumers evolved from that of a passive actor at the end of the electricity supply chain, with no choice over its supplier or possibilities to participate in energy markets, to that of a consumer with options to increasingly engage and be active in the energy transition. Prior to market liberalization, consumers were supplied exclusively by EDF, the country's national monopoly responsible for electricity generation, transmission, distribution, and supply. With liberalisation this has changed, as electricity generation and supply are now open to competition. As a result, electricity consumers can choose a supplier that matches their service needs. Giving consumers a choice over their supplier created the possibility for a greater degree of engagement, as consumers can now evaluate and select from different service offerings for their electricity supply, however even with strongly engaged consumers in liberalised markets their impact in the trajectory of the energy system is still that of a consumer, at the end of an established supply chain.

In this chapter we analyse public policies, laws, and regulations to obtain insights on how they shape the role of consumers and citizens in the energy transition, such as those that govern public consultations on energy policies and projects, and citizen participation in energy projects. Moreover, given the growing number of consumers that are now also producing electricity in France, acting as prosumers, we analyse the recent developments related to individual and collective self-consumption, and to energy communities, which have gained relevance with the decreasing costs of renewable energy technologies.

To provide insight into the role of the consumer in the French energy transition this document is structured as follows. Section 4.2 provides an overview of the French electricity sector and describes the institutional framework shaping the relevant laws and regulations. Section 4.3 analyses the policy and legal framework particularly focusing on the role of consumers and citizens in the energy transition. Section 4.4 analyses the regulatory framework, which sets the guidelines for individual and collective self-consumption operations. Section 4.5 provides an overview of consumer and citizen support policies and incentives. Section 4.6 discusses and concludes.

4.1.1. Electricity mix

France has a low carbon electricity mix mainly due to the large contribution from its nuclear generation assets. However, as part of the country's ambitious energy transition plans, France aims to reduce the share of nuclear from 80% in the electricity mix to 50% by 2035 and decommission all remaining coal plants by 2022 (IEA, 2021). Additional low carbon electricity sources in France include renewables (i.e., hydro, wind, solar, geothermal) and biofuels (Figure 3.1).

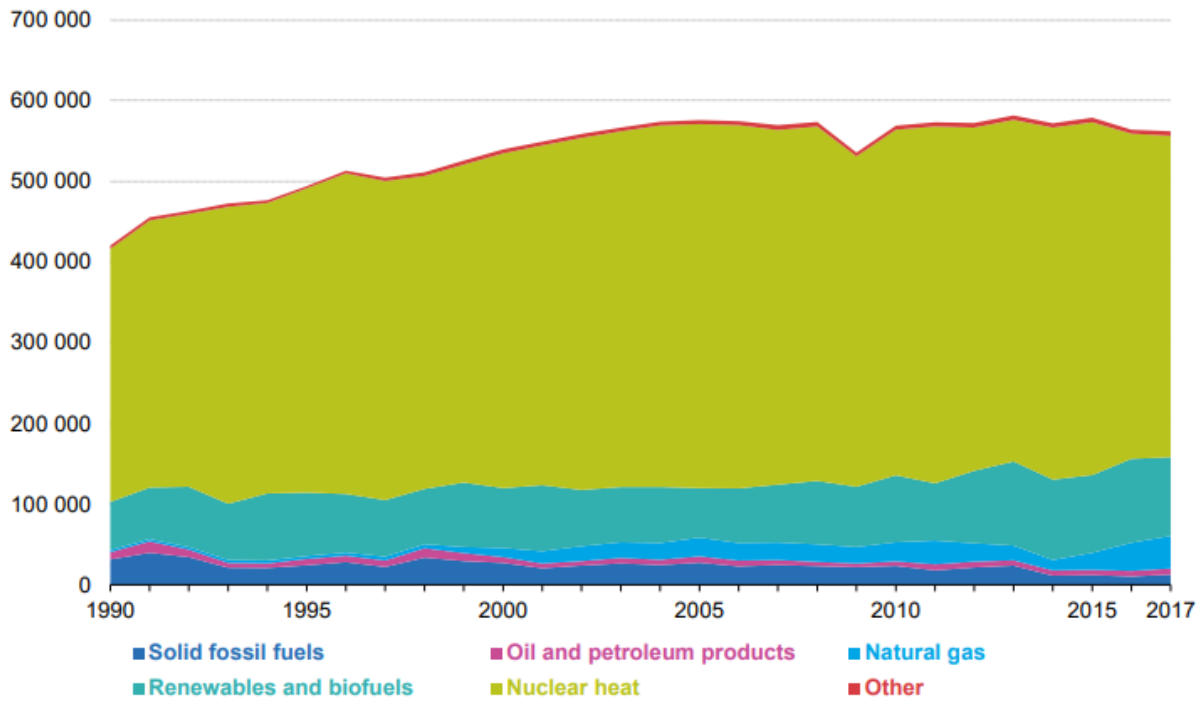


Figure 4.1 Electricity generation GWh by source, 1990-2017. Source: (Eurostat, 2019)

In France's non-interconnected islands, the electricity mix is more carbon-intensive, as these regions rely mainly on locally produced electricity from fossil fuels (Figure 4.2 and Figure 4.3). In 2018, 31% of the electricity mix in these islands was renewables based, resulting from continued growth since the 2000s, however at a pace that is not compatible with the country policy goals (CRE, 2020).

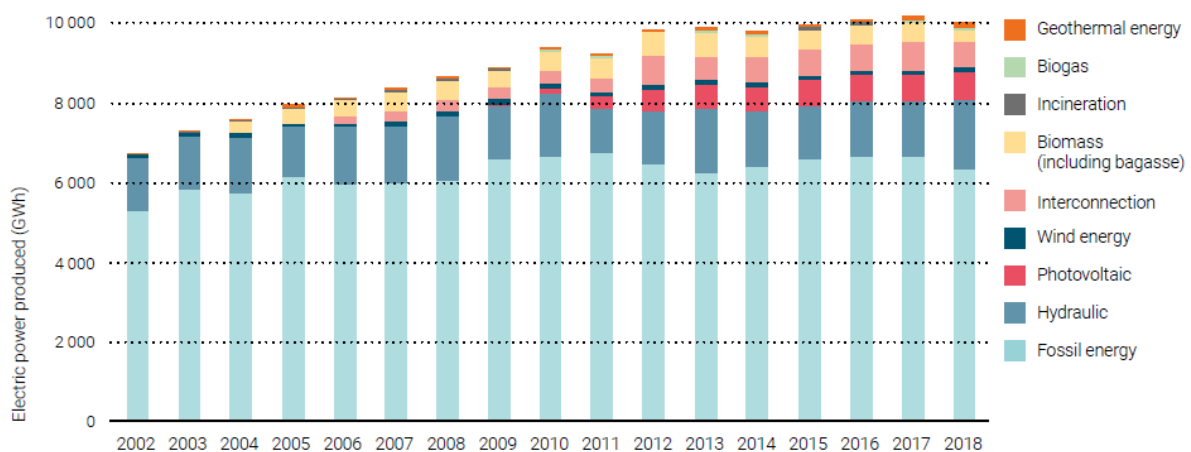


Figure 4.2 Electricity mix in non-interconnected zones, from 2002 to 2018, excluding Saint-Pierre at Miquelon, Breton Islands, and Wallis and Futuna. Source: (CRE, 2020, p. 71).

Each non-interconnected island is also subject to its own specific characteristics resulting in varying electricity mixes across regions. For instance, in 2018, 65% of Guyana's electricity mix was renewables based, mostly due to hydroelectric generation. However, other regions had significantly lower contributions from renewables such as Mayotte and Martinique where renewables represented 5% and 11%, respectively (Figure 4.3) (CRE, 2020).

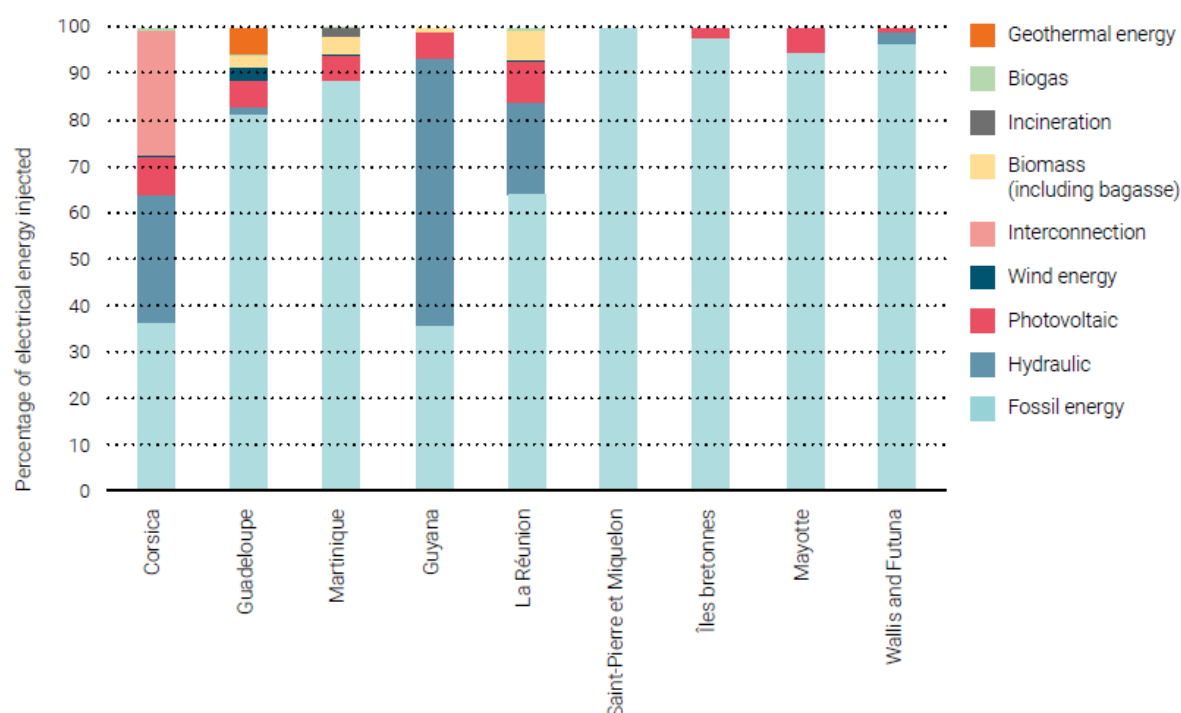


Figure 4.3 Electricity mix in non-interconnected zones in 2018. Source: (CRE, 2020, p. 71).

The electricity sector in France has been gradually liberalized since the 2000, with electricity generation and supply open to competition, and transmission and distribution operating as regulated monopolies. Prior to market liberalization, *Electricite de France* (EDF), was the national monopoly responsible for generation, transmission, distribution, and supply (Fages & Saarinen, 2021; Guénaire et al., 2020). However, despite market liberalization and the introduction of competition, France's electricity sector is one of the most centralised and concentrated in Europe (CEER, 2019). EDF continues to play a significant role on both market (I.e., generation and supply) and non-market (i.e., grids) activities (IEA PVPS, 2020; Sebi & Vernay, 2020). In 2019, EDF accounted for 80% of the electricity produced in France, 96% of electricity distribution via ENEDIS, and 76% of electricity retail (IEA PVPS, 2020).

4.1.2. Institutional framework

The electricity sector in France is steered through an institutional framework that contributes to designing, implementing, and monitoring the implementation of the country's energy policy. At the government level, the **Ministry for the Ecological Transition** (*Ministre de la Transition Écologique*) is responsible for the direction of France's energy policy. The ministry prepares and implements the government's policy concerning sustainable development, the environment, green technologies, energy transition and energy, climate, prevention of natural and technological risks (French Government, 2020b). As part of the Ministry for the Ecological Transition, the **Directorate General for Energy and Climate** (*Direction Générale de l'Énergie et du Climat*, DGEC) develops and implements policy to ensure energy security and the competitiveness of France's energy supply. Its policies aim to enable the adequate functioning of energy markets, including electricity, and oil and gas (French Government, 2021a).

The adequate implementation and monitoring of operation of energy markets is part of the mission of France's national regulatory authority. The **Commission for Energy Regulation** (*Commission Regulation de l'Énergie*, CRE) is responsible for regulating the gas and electricity market. The regulator operates as an independent administrative authority, with independence from the energy industry and government to fulfil its responsibilities (CRE, 2020). CRE responsibilities include:

- Guaranteeing independence for system operators.
- Establishing harmonised rules for the energy networks and markets, to ensure that energy can circulate freely between France and neighbouring countries.
- Ensuring competition between energy suppliers for the benefit of consumers.
- Ensuring that consumers have access to the best service at a fair price.

By fulfilling these objectives, CRE aims to contribute to the development of the European energy market, support the development of renewables, regulate grid monopolies, supply adequate information for consumers, and contribute to the functioning of electricity and gas markets (CRE, 2020).

As a result of their role in shaping and implementing energy policy, these institutions also shape the role of electricity consumers and citizens in the electricity sector. The following sections describe the legal and regulatory framework shaping the role of prosumers in the electricity sector.

4.2. Policy and legal framework

4.2.1. Overview

The legal framework in France is shaped by European Union policy, which set the functioning of the EU internal energy market including action towards liberalization. More recently, EU policy has focused on delivering an affordable and low carbon energy sector, as part of the Clean Energy for all Europeans policy package (Pereira et al., 2020). These EU policies shape national policies in France, through a process of transposition of EU law into the French national law. The following table (Table 4.1) provides an overview of key EU and French laws relating to the functioning of a liberalised and decarbonised energy sector.

Table 4.1 EU and France legal framework

EU policy	French Law
<i>Focus on energy market liberalization</i>	
Directive 96/92/EC on the common rules for the internal market in electricity, which sets the guidelines to open it to competition.	Law No. 2000-108 on modernisation and development of electricity public service setting that: industrials consuming more than 16 GWh per year were no longer compelled to buy electricity from the historical supplier and were allowed to choose a supplier; grids were no longer directly operated by EDF but by the entity in charge of the Electricity Transmission Network (Réseau de Transport d'Électricité) (RTE); and an independent regulator was created
Directive 2003/54/EC on the common rules for the internal market in electricity, which set a two-step calendar for market liberalisation: by 2004 (for non-residential clients) and by 2007 (for other clients), clients had to be able to choose their supplier.	Law No. 2004-803 on electricity and gas public companies transformed <i>Electricité de France</i> into a public limited company and allowed it to diversify its activities. Law No. 2006-1537 on the energy sector set that all end consumers must be able to choose their supplier by 7 July 2007.
Directive 2009/72/EC on the common rules for the internal market in electricity liberalised grid access by imposing a strict separation between grid operators and suppliers and producers.	Law No. 2010-1488 on the new organisation of the electricity market o created the Regulated Access to the Historical Nuclear Electricity (ARENH); and ended regulated tariffs for industrial consumers on 31 December 2015. Ordinance No. 2011-504 created the Energy Code and finalised the transposition of the unbundling regime.
<i>Focus on energy market decarbonisation</i>	

EU policy	French Law
Directive (EU) 2018/844 on the energy performance of buildings.	Law No. 2015-992 on energy transition for green growth.
Directive (EU) 2018/2001 on the promotion of the use of energy from renewable sources.	Law No. 2019-1147 dated 8 November 2019 on energy and climate.
Directive (EU) 2018/2002 on energy efficiency.	Law No. 2019-1428 dated 24 December 2019 on mobility guidelines.
Directive (EU) 2019/944 on common rules for the internal market for electricity.	Decree No. 2020-456 dated 21 April 2020 on the multi-year programme for energy.
Regulation (EU) 2018/1999 on the governance of the energy union and climate action.	
Regulation (EU) 2019/941 on risk-preparedness in the electricity sector.	
Regulation (EU) 2019/942 establishing a European Union Agency for the Co-operation of Energy Regulators (ACER).	
Regulation (EU) 2019/943 on the internal market for electricity.	

The French Energy Code (*Code de l'Énergie*), was implemented in 2011 and is the country's legal energy framework, which sets the goals and functioning mode of the electricity market, as well as for a wider range of energy related aspects (French Government, 2021b). The Energy Code was implemented to:

- Promote a competitive economy and employment, particularly through industries that are supportive of green growth.
- Ensure security of supply and the reduction of the reliance on imports.
- Allow a competitive and attractive price for energy.
- Allow the protection of human health and of the environment.
- Contribute to social and territorial cohesion.
- Participate in the fight against energy insecurity.
- Contribute to the rise of the "European Energy Union".

The delivery of the country's energy policy is supported by the government's multi-annual energy plans (*Programmation pluriannuelle de l'énergie, PPE*). These plans, governed by the Energy Code, set the energy policy priorities for government action for ten years, split in two five-year periods. The current multi-annual energy plan covers two five year periods, 2019-2023 and 2023-2028 (French Government, 2019), and aims to:

- Decrease energy consumption through renovation works to promote energy efficiency.
- Decrease the use of fossil fuels.
- Promote renewable energy sources and reach 50% of renewable sources by 2035.
- Foster the development of accessible clean mobility.

These plans are part of France's National Low-Carbon Strategy (*Strategie Nationale Bas-Carbone, SNBC*), which defines the country's roadmap to achieve net zero emissions by 2050. The current multi-annual energy plan (*PPE*) provides the approach to the first 10 years of the SNBC in terms of government action to decarbonise energy. The Law on Energy Transition for Green Growth (*Loi relative à la transition énergétique pour la croissance verte, LTECV*) of 17 August 2015, sets the principles for both the SNBC and the multi-annual energy plans (French Government, 2017).

In France, the significantly different context in which a low carbon future and the energy transition can be delivered in remote islands in the FCE region, which operate as non-interconnected zones to the mainland energy system, is reflected into the energy policy development process. The Energy Code establishes that a separate multi-annual energy plan is required for Corsica, Guadeloupe, French Guiana, Martinique, Reunion, Saint Pierre and Miquelon and the Wallis and Futuna Islands. However, the energy policy roadmap for Ouessant, Molène, Sein, and Chausey are addressed in an appendix to France's mainland PPE (French Government, 2020e).

Both the **SNBC** and the **PPE** establish a role for citizens in the future. The SNBC provides a wide-ranging role for citizens and consumers as contributors to a low-carbon future, while the PPE details their role particularly in relation to the energy transition.

The SNBC provides its strategy regarding citizens as part of the cross-cutting measures, under the label "*Citizens' education, awareness, and assimilation of issues and solutions*" (French Government, 2020e). The strategy provides an overview of the role of citizens and suggests that a low carbon transition will require people to significantly change their ways of living and consuming in the medium and long term, particularly in terms of travel and consumption of goods and services. To tackle this need for a significant change in behaviour the SNBC presents a strategy that focuses on promoting sustainable consumption habits:

“Strategy: Sobriety has a high potential for reducing emissions. The strategy promotes sobriety in individual and collective behaviour (change in social norms) mainly through informing and educating citizens and raising their awareness. Regulation of the supply chain and clear price signals could also steer consumers towards low carbon consumption.” (French Government, 2020c, p. 65-66).

To support the delivery of this strategy a set of guidelines have been defined that aim to promote a low carbon culture, support citizens in their low carbon transition, and build public acceptance for low carbon policies (Table 4.2). By defining a role for consumers and their relevance to deliver a low carbon future, the SNBC as a policy includes elements to support a socio-technical transition to reduce emissions, one in which both technological and social systems are reconfigured and adapted. In addition, France also aims to build public acceptance for its low carbon policies. It aims to do this by increasing public participation and by delivering a low carbon future that is socially just. To support public acceptance for low carbon policies the SNBC aims to analyse the climate impact of government funded actions and policies, to increase the transparency around the role of public policy and public funds, and thus create a “green budget” approach to government spending.

Table 4.2 Citizens’ education, awareness, and assimilation of issues and solutions. Source: (French Government, 2020c, p. 65-67).

Goal	Guidance and tools
Promote a low carbon culture	<p>Use communication tools to highlight the many services provided by the low carbon transition, including co-benefits such as justice, economy, jobs, health, environment and the risks generated if this transition is not implemented.</p> <p>Reinforce the “leading by example” role of public institutions, by developing management systems for energy, human resources policies and mobility plans.</p> <p>Encourage young people to participate in low carbon activities, such as eco-delegates, elected high school students, civic service, universal national service, youth movements, student associations.</p> <p>Organize national and regional days on the themes of climate and energy, allowing each institution (local authority, company, association, NGO, museum etc.) to take ownership of the theme and organize their own events.</p> <p>Develop regional actions encouraging citizen participation (“positive energy families”, participative workshops, etc.).</p>
Support citizens in their own low carbon transition	<p>Develop and disseminate tools that enable citizens to calculate their impact on the climate, and that propose personalised emissions reduction actions.</p> <p>Provide consumers with a reliable means of choosing more sustainable products and services, by developing information tools and improving the dissemination of existing tools, such as labels for goods and services verified by a trustworthy third party.</p> <p>The carbon pricing policy also contributes to encouraging consumers to prioritize low-carbon options, namely when used in conjunction with grants for the acquisition of property and the installation of high-performance solutions (vehicles, housing) which could be funded by income from carbon pricing.</p>

Goal	Guidance and tools
	<p>Offer educational projects on controlling greenhouse gas emissions linked to consumption (including raising awareness of eco-driving and more general driving skills in the transport domain), as well as on “calculating carbon footprints” in secondary schools, universities and apprentice training centres.</p> <p>Communicate more and better with citizens about their ability to accelerate the implementation of a low carbon economy, through their consumer choices, which condition the production and import of products.</p> <p>Encourage citizens to consume in a more circular way, including by promoting reuse and repair, rather than throwing away to buy again.</p> <p>Increase young people’s awareness of the low-carbon transition during the cohesion phase of universal national service (eco-citizenship, responsible consumption, circular economy,</p>
Build public acceptance for low carbon policy measures	<p>To achieve this, build on sociological studies when setting out the public policies.</p> <p>Increase actions encouraging public participation in implementing public policies, action plans and regional projects supporting a low carbon economy.</p> <p>Consider the impact on households (especially the smallest ones) of measures associated with the low-carbon transition, and favour, as far as possible, socially just and redistributive measures.</p>

As part of the PPE, the role of citizens is presented as essential for all the aspects of the energy transition, including controlling energy demand, diversifying the energy mix and supporting the penetration of renewables, and for network modernisation. Similar to the SNBC, the PPE establishes a role for citizens in the energy transition that is focused on a shift in behaviours and consumption preferences (Table 4.3).

Table 4.3 The role of citizens in the energy transition. Source: (French Government, 2019, p. 225-226).

Role	Guidance and tools
Controlling energy demand	Controlling energy demand primarily implicates the building and transport sectors. Informing citizens and getting them involved as users is essential. They must start taking action to reduce energy use in their home, to adjust the temperature settings in their living spaces and to change their transport habits. Moreover, citizens can also have an impact as trendsetters through their consumption choices by favouring products that consume less energy, by minimising equipment standbys and recycling their products at the end of their lifespan.
Diversification of the mix, and adoption of renewable energy	<p>The public also has a role to play in the penetration of renewable energies. During house construction or boiler renewal, they can choose heating methods which use renewable energies (heat pumps, thermal solar, biomass).</p> <p>Members of the public can also become direct producers of electricity by installing photovoltaic panels on their roof or participate indirectly by helping to fund a renewable energy project. These participative funding initiatives are very important for projects to be accepted locally.</p>
Network modernisation: flexibility, digital	Thanks to the penetration of new technologies in networks, consumers will be able to participate in balancing the electricity network, principally by committing to load shedding contracts: this is about committing to regulating consumption during consumption spikes according to modalities determined with load shedding operators.

France's future targets for the country's energy supply are valuable as a source of insight into the possible evolution and importance of consumers and citizens in the energy transition, particularly by considering targets on technologies that have had significant adoption by consumers in the past.

Solar thermal energy, used to provide domestic hot water and heating, is one of the technologies in which individual consumers play a significant role. In 2016, mainland France had a production of 1.17 TWh/year with an installed area of 2.2 million m², of which 54% of the installed area was on the residential sector. The previous PPE for the 2016-2023 period had set goals for the development of solar thermal, however those had a high level of ambition and France was not on track to deliver (Table 4.4).

Table 4.4 Solar thermal targets in PPE 2016. Source: (French Government, 2019)

2012	2016	PPE Target 2023 (Low)	PPE Target 2023 (High)
1 TWh	1.17 TWh	3.1 TWh	4.6 TWh

Considering this, the new PPE has redefined the targets for solar thermal (Table 4.5).

Table 4.5 Solar thermal targets in PPE 2019. Source: (French Government, 2019)

2016	2023	PPE Target 2028 (Low)	PPE Target 2028 (High)
1.17 TWh	1.75 TWh	1.85 TWh	2.5 TWh

Under the new PPE, for 2023, the target is to install 100,000 m² per year of solar thermal energy in the building sector (half of which will be in private dwellings) and 150,000 m² of facilities in industry (about 50 solar power plants). For 2028, the target is to install between 150,000 m² and 350,000m² per year in the building sector (70% of which will be in private dwellings based on a major development of combined solar systems) and 300,000 m² of facilities in industry (about 100 solar power plants). To deliver the goals related to private dwellings France aims to increase government support for solar thermal systems, and to develop a communication kit for energy advisors on the interest of solar thermal in private dwellings, so that they are better equipped to promote this solution.

Solar PV is also a technology for which consumer participation plays an important role. In 2018 France had 418,000 solar PV facilities with an installed capacity of 8.8 GW, accounting for 2.3% of the French electricity consumption. The new PPE sets the following goals (Table 4.6).

Table 4.6 Solar thermal targets in PPE 2019. Source: (French Government, 2019)

	2016	PPE 2016 Target 2018	PPE 2019 Target 2023	PPE 2019 Target 2028
Panels on the ground (GW)	3.8	5.6	11.6	20.6 to 25
Panels on roofs (GW)	3.2	4.6	9	15 to 19.5
Total target (GW)	7	10.2	20.6	35.6 to 44.5

These objectives correspond in 2028 to between 330 and 400km² of panels on the ground and between 150 and 200km² of panels on roofs (compared to 100km² on ground and 50km² on roof in 2018). France shows preference for developing rooftop and ground mounted solar to deliver their solar PV goals. Roof mounted systems are where most prosumer systems are installed, while ground mounted systems give room to larger systems (e.g., utility scale projects), and can result in more economically viable projects. Some of the measures planned to help deliver these targets include:

- Promoting solar PV ground installations on urbanised or degraded land, to allow the emergence of more economically viable projects;
- Facilitating the development of photovoltaics in car parks (simplification of urban planning measures for parking shades);
- Supporting local communities, particularly through the "Solar Cities" network;
- Facilitating a better articulation between agricultural and solar projects, with the actors concerned;

As part of these targets France aims for between 200,000 solar PV sites to be operating as self-consumption sites by 2023 (French Government, 2020d). In 2018 solar PV represented 2.3% of the country's electricity mix. The projected electricity mix towards 2023 and 2028 also indicates an increasing role for solar, with an expected share of 4.1% of the electricity mix in 2023, and an increase to between 6.9% and 8.4% by 2028 (Table 4.7).

Table 4.7 PPE 2019 electricity mix in 2023 and 2028 in TWh. Source: (French Government, 2019)

Source		2023	%	2028 (Scenario A)	%	2028 (Scenario B)	%
Nuclear		393	67.3	382	61.2	371	59.1
Fossil	Coal	0	-	0	-	0	-
	Oil heating	34	5.8	32	5.1	32	5.1
	Natural gas		-		-		-
Renewable	Hydro	62	10.6	62	9.9	62	9.9
	Wind onshore	53-55	9.1	79	12.7	83	13.2
	Solar PV	24-25	4.1	43	6.9	53	8.4
	Bioenergy	9	1.5	9	1.4	10	1.6
	Wind offshore and marine energy	9	1.5	17	2.7	17	2.7
Total		584		624		628	

The future targets for non-interconnected zones, the remote islands in the FCE region not connected to the mainland energy system, are more specific and consider the local reality of these isolated energy systems. For the islands covered in the appendix to France's mainland PPE, Chausey, Molène, and Sein, are almost vehicle free, thus with a different emissions balance and options for a low-carbon energy transition. Moreover, heating in Ouessant, Molène, Sein, and Chausey is mostly electricity based. In these islands electricity is a pillar of their energy needs (French Government, 2019). Given the geographical constraints in these islands and considering that these are responsible for their own electricity generation, costs are significantly higher than in mainland France. However, these are compensated through the state budget, while consumers pay the regulated electricity price.

Policy actions for these regions consider local constraints and possibilities to meet energy needs while delivering a low-carbon energy transition. For instance, in Ouessant the proposed policy roadmap considers policies for demand management, renewable energy, and intermittency and coordination. Demand management actions include building energy efficiency measures and advancing energy efficiency lighting through a LED distribution campaign. Renewable energy actions aim to further develop and diversify renewables by expanding solar PV in public buildings, which remains largely underused, a goal of 150 kW is planned by 2023. A solar PV plant is also planned with a capacity of between 500 kW and 1.5MW to support agricultural greenhouses power needs. Residential solar PV will be considered as an option, with potential being studied subject to architectural acceptability and constraints. A wind turbine of 900 kW is planned to be commissioned in 2021, subject to permitting and administrative processes. The development of tidal is also on the island's roadmap, with a goal to commission two additional turbines with a capacity between 500 kW and 1 MW each. Biomass is also being considered, which requires a feasibility assessment. In terms of intermittency and coordination actions it is expected that the Linky smart meters will help assess possible flexibility option. As the island aims to move to 100% renewable energy supply, medium-term storage such as hydrogen is being considered. The objectives set for 2023 and 2028 are presented in Table 4.8.

Table 4.8 Ouessant PPE objectives for 2023 and 2028. Source: (French Government, 2019)

Sources	2018	2023 (1)	2028 (1)
Demand side management		-1 GWh	-1.5 GWh
Solar PV	56 kW	0.5 to 1.5 MW (2)	1.5 MW
Wind	0 kW	900 kW	900 Kw
Tidal	250 kW	1 to 2 MW (2)	1 to 2 MW
Biomass	0 kW	0 kW	100 kW
Storage	1MW / 500 kWh	2 MW / 2 MWh (2)	2 MW / 6 MWh
Share of renewable in energy mix	10%	65%	75%
(1) Total installed capacity, (2) Solar PV target will be adjusted considering the tidal capacity achieved, 1.5 MW if 1 MW of tidal, or 0.5 MW if 2 MW of tidal.			

For Molène, Sein, and Chausey the PPE also aims to increase buildings energy efficiency and start the island's transition to renewable energy initially by deploying solar PV, and by further studying the feasibility of wind generation. The objectives set for these islands are presented in Table 4.9.

Table 4.9 Molène, Sein, and Chausey PPE objectives for 2023 and 2028. Source: (French Government, 2019)

Island	Source	2018	2023 (1)	2028 (1)
Molène	Demand side management	-	-0.2 MWh	-0.3 MWh
	Solar PV	0 kW	300 kW	750 kW
	Storage	-	300 kW / 300 kWh	300 kW / 300 kWh (2)
	Share of renewable in energy mix	0%	30%	90.00%
(1) Total installed capacity, (2) To which the hydrogen demonstrator, if any, would be added				
Sein	Demand side management	-	-0.3 MWh	-0.5 MWh
	Solar PV	139 kW	150 kW	250 kW
	Wind	7 kW	250 kW	500 kW
	Storage	200 kW / 180 kWh	200 kW / 500 kWh	200 kW / 1 MWh
	Share of renewable in energy mix	10%	60%	75%
(1) Total installed capacity				
Chausey	Demand side management	-	-0.05 MWh	-0.1 MWh
	Solar PV	0	250 kW	400 kW
	Storage	0	200 kW / 300 kWh (2)	200 kW / 300 kWh (2)
	Share of renewable in energy mix	0%	50%	65%
(1) Total installed capacity, (2) To which the hydrogen demonstrator, if any, would be added				

For the non-interconnected islands not covered in France's mainland PPE, dedicated multi-annual energy plans are prepared for each region, which include Corsica, Guyana, Reunion, Guadeloupe, Mayotte, Martinique, and Wallis and Fortuna. These dedicated plans are co-developed with the local authorities in each island. Energy efficiency measures and expansion of renewable energy are visible across the plans, with a recent study indicating that a 100% renewable energy supply could be possible with sufficient demand-side management and storage capacity (Spaes, 2021).

As part of the energy policy plans, included in the PPE, France considers the impact on households. France recognises that it is important to enable households to participate in the transition as best as possible and contribute to it while protecting their purchasing power. Actions intended to help lower consumption will lead to a reduction of the overall household bills. However, special attention must be paid to vulnerable households in order to ensure the energy transition is socially inclusive.

4.3. The role of consumers and citizens

The role of consumers and citizens set in the energy policy plans in France provide a vision of where the country aims to evolve towards. The legal framework in France set the framework for the different possibilities for consumers and citizens to shape the energy sector as the energy transition unfolds. In this section we review how the legal framework creates possibilities for citizens to shape policies through public participation and engagement, and to shape infrastructure, both larger scale infrastructure through participative financing and crowdfunding, and smaller scale infrastructure through self-consumption and energy communities.

4.3.1. Shaping policies via public participation and citizen engagement

Legal provisions allow citizens in France to participate in shaping the electricity industry and institutions, by shaping the policies governing the energy transition, thus with an impact on how the energy transition is delivered. In France, citizens have the right to information and to participation, outside of elections, in the decision-making processes with the possibility to shape decisions being made. This right covers decisions and decision-making processes impacting the environment and is part of French law. Through this right, citizens can exercise public influence by exchanging views with the decision-makers leading projects or policies with impact on the environment, via a deliberative and transparent process. These rights are part of the French Constitution, Environment Charter, since 2005 (French Government, 2005), and the French Environmental Code (French Government, 2021c). The French Environmental Code creates a framework for the participation of citizens in public policy decisions that aims to go beyond the gathering of opinions on policy proposals. It aims to leverage on public participation to increase the quality of decision-making processes and contribute to improve their democratic legitimacy. As a result, citizens in France can have a substantive role in shaping the energy transition.

As a result of these participatory rights, French citizens have had the opportunity to participate in shaping the country's energy and climate policy. This was the case for France's multi-annual energy plans (*Programmation pluriannuelle de l'énergie*, **PPE**) and for the National Low-Carbon Strategy (*Strategie Nationale Bas-Carbone*, **SNBC**). The draft versions of both the **SNBC** and **PPE** included a wide-ranging consultation process. This included a public debate organised by the National Commission for Public Debate (**CNPD**), collection of formal opinions from six different institutions ³⁷,

³⁷ The Environmental Authority for its Strategic Environmental Evaluation; the National Council for the Ecological Transition (CNTE); the High Council for Energy (CSE); the High Council for Economic Professions' (CSPE)



consultation with neighbouring countries and the European Commission, and organisation of a post-debate dialogue with the public by the CNPD (French Government, 2020c).

For the **PPE** the public debate occurred from 19 March 2018 to 29 June 2018. Citizens' opinions contributed to the assessment of the effectiveness of different policy options for reducing energy consumption; development of the various renewable energy sectors; and security of supply. Throughout this process 86 meetings were organized as part of the public debate which brought together approximately 8,000 participants. The website was viewed 47,572 times and received 561 posts, 140 papers and 193 stakeholder's data logs were published. 2,379 comments on the posts and information available and 666 questions were asked by Internet users. The government followed the contributions of citizens closely throughout the debate and took them into account when writing the PPE (French Government, 2019). Similarly, the dedicated PPEs for remote regions also considered public opinion, through public consultation procedures, seen for Corsica, Guyana, La Reunion, Guadeloupe, Mayotte, Martinique, and Wallis and Fortuna.

Citizen inputs received throughout the public consultation process for the mainland PPE provided the CNPD with evidence that points to a strong consensus on the importance of climate action across citizens. Little scepticism on the need for climate action was observed. This further emphasised the relevance of delivering a low carbon energy transition. However, the analysis of the citizens inputs gathered indicated that contrasting perspectives exist on energy transition options, namely: energy management *versus* energy decarbonisation, cost of renewable energy *versus* cost of nuclear, renewables intermittency *versus* nuclear related risks. French citizens also indicated that they view existing policies and progress as insufficient, and nuclear continues to be a topic that divides the country (CNPD, 2021). The public contributions indicated also the existence of high expectations, for stable, consistent, and continuous policies to deliver the energy transition; an energy transition built on shared governance with local regions, rather than top down action; an energy transition that delivers social justice, citizens expressed the need for an energy transition where the distribution of costs is just (CNPD, 2021).

For the **SNBC**, the reference scenario and the guidelines outlined were developed in cooperation with stakeholders with a view to identify possible challenges. Civil society representatives and the public were asked on several occasions to get involved, to submit their suggestions and to express their opinions. The initial stage of public consultation invited French citizens to share their expectations and proposals through an online questionnaire from 13 November 2017 to 17 December 2017. This

Management Committee; the Committee of the System for Public Distribution of Electricity; and the High Council for Construction and Energy Efficiency (CSCEE).



questionnaire collected opinions from over 13,000 citizens in aspects related to transport, housing, food, and consumption (French Government, 2018). The final public consultation received 275 responses (French Government, 2020f). Citizens shared their support for shaping schools' curricula to provide content supportive of an energy transition, as well as the support for awareness campaigns. The insights on perceived barriers pointed to aspects seen as responsible for slowing progress on the energy transition, such as planned obsolescence for electronics, and lack of supervision on building renovation pricing. In terms of policy and regulations, citizens shared their interest in more proactive policies even if those require a stronger contributions from citizens (CNPd, 2018). The need for education and awareness shared by citizens are found in the final version of the SNBC, indicating alignment with citizens inputs (Table 4.2).

This iterative process ended with an official referral of the strategy to the following bodies prior to its adoption by decree: the Environmental Authority, the High Council for Climate, the Corsican Assembly, the overseas authorities affected by the strategy and the National Council for Standards Assessment. This was followed by a final public consultation conducted from 20 January 2020 to 19 February 2020 (French Government, 2020d).

French citizens also had a role in shaping the law underpinning the PPE and SNBC, the Law on Energy Transition for Green Growth (*Loi relative à la transition énergétique pour la croissance verte*, LTECV) of 17 August 2015 (French Government, 2017). Citizen participation was encouraged through organised events in all the regions and territories, which resulted in a strong participation of citizens, allowing to obtain contributions that reflect the diversity of local realities. More than 1,000 events were organized between November 2012 and July 2013 bringing together over 170,000 participants (French Government, 2013a; Mason et al., 2016). This included also public participation from remote islands with contributions from Guadeloupe, Guyana, Martinique, La Reunion, and Corsica (French Government, 2013b). For instance, the inputs presented by a joint network representing Corsica, Guadeloupe, Martinique, and La Reunion, indicated that the new law should make the most out of the resources available in non-interconnected remote islands, making them pioneers in renewable energy and contributing to reducing the cost of energy supply. Also, these islands indicated that the new law should build on the success of the Regional Climate Air and Energy Plans (*Schéma Régional Climat Air Énergie, SRCAE*), which were also developed in collaboration with local actors (French Government, 2013b).

4.3.2. Shaping larger-scale infrastructure via participative investment and crowdfunding

Electricity consumers can also have a role in the energy sector infrastructure by participating in the investment needed to develop local renewable energy projects. By promoting participatory investment, the government aims to strengthen the territorial anchoring of renewable energy infrastructure and to improve local acceptability of projects. To incentivise participatory investment, tenders launched since 2016 include the possibility to favour projects that implement participatory investment and engage citizens or local authorities. These incentives include bonuses that depend on participatory investment. The government has also created more favourable conditions for crowdfunding renewable energy projects on financing platforms. The participatory bonus gives renewable energy project developers a remuneration bonus when they are able to involve local citizens and communities in their projects (French Government, 2019). The bonus can be accessed in two different options (ENERFIP, 2021; Energie Partagée, 2021b):

- If the project leader opts to offer **participatory investment**, they will be able to benefit from a bonus of € 3 per MWh on the sale price of electricity for the project. For this option, 40% of the equity necessary for developing the project must be brought in by the citizens.
- If the project leader opts to offer **crowdfunding**, they will be able to benefit from a bonus of € 1 per MWh on the sale price of the project's electricity. In this case, 10% of the total amount of the investment of the project must be brought by the citizens.

In terms of uptake, **participatory investment** had occurred in 223 projects by the end of 2020, of which 123 were in operation, where solar and wind technologies are prevalent. Most of the projects focus on electricity generation, with only 2.7% of the installed capacity dedicated to heat generation (Energie Partagée, 2021c). These projects have captured 73 Million Euros in participative investment (Energie Partagée, 2021a). **Crowdfunded** projects received over 100 Million Euros of investment in 2020, with solar energy being the preferred technology in terms of funding received, capacity, and number of projects (Chicheportiche, 2021).

4.3.3. Shaping smaller-scale infrastructure via self-consumption and energy communities

Citizens in France can expand their role as consumer and have a direct impact on the infrastructure by acting as prosumers, engaging in self-consumption, and in energy communities. The legal framework regarding prosumers in France is recent and gained momentum from 2015 onwards as part of the country's implementation Law No. 2015-992 on energy transition for green growth, which included some aspects regarding prosumers, enabling the government to develop the policy framework for self-

consumption (Oriol, 2018). This was followed by specific adjustments to the French Energy Code through Ordinance No. 2016-1019 and Decree No. 2017-676 on self-consumption of electricity.

The role of consumers producing electricity (i.e., prosumers) is established in the Energy Code and it defines what constitutes a self-consumption operation. French law defines both **individual** self-consumption and **collective** self-consumption, as presented in the following table (Table 4.10).

Table 4.10 Legal framework for individual and collective self-consumption

Individual self-consumption	Collective self-consumption
<p>Article L315-1</p> <p><i>An individual self-consumption operation is the act of a producer, called a self-producer, of consuming himself and at the same site all or part of the electricity produced by his installation. The part of the electricity produced that is consumed is consumed either instantaneously or after a period of storage.</i></p> <p><i>The operator of a charging infrastructure open to the public for electric vehicles and plug-in hybrid vehicles which is supplied in whole or in part, for the needs of its activity, from an original renewable electricity production facility that operates located on the same site is considered a self-producer, within the meaning of the first paragraph. The part of the electricity produced that is used for supply is either consumed instantly or after a period of storage.[...]</i></p>	<p>Article L315-2</p> <p><i>The self-consumption operation is collective when the supply of electricity is made between one or more producers and one or more end consumers linked to each other within a legal person and whose withdrawal and injection points are located in the same building, including residential buildings.</i></p> <p><i>A collective self-consumption operation can be qualified as extensive when the supply of electricity is made between one or more producers and one or more end consumers linked to each other within a legal person whose points of withdrawal and injection are located on the low voltage network and comply with the criteria, in particular of geographical proximity, set by order of the Minister in charge of energy,</i></p> <p>[...]</p>

Individual self-consumption is defined to allow for prosumer operations where the electricity produced is consumed either instantaneously, when local generation coincides with local consumption needs, or to be consumed later by using storage technologies. The definition of individual prosumer operations also includes the operators of electric vehicle charging infrastructure. Under French law both individual and collective self-consumption operations are not meant to be the main commercial activity of their participants. In this way the framework introduces new roles for consumers that are linked to advanced low carbon energy technologies.

For collective self-consumption the French legal framework allows for two configurations. A localised configuration, where the generation and consumption of the collective happens within the same building, including residential building. And, an extended configuration, that goes beyond the building unit and in which generation and consumption must be connected to the low voltage electricity distribution network and meet specific distance and capacity requirements (also known as behind and in front of the meter types of installation).

The definition of these requirements occurred in 2019 and 2020 (French Government, 2020g, 2020a). The geographical proximity requirement was defined to include two different distance considerations.

A **maximum of 2 km** between the most distant participants in the collective self-consumption operation, and a **maximum of 20 km** for collective-self consumption operations located in isolated regions with low population density. The capacity requirement was defined to less than 3 MW for systems on the continental metropolitan territory, and 0.5 MW for systems in non-interconnected areas.

Collective self-consumption operators are exempt from electricity supplier responsibilities and are not required to meet the licencing and the technical and financial capacity requirements, they are also not responsible for system balancing or to implement public service obligations. This gives self-consumption operations greater operational flexibility. However, these less stringent operational requirements are counterbalanced by the capacity limits and geographical proximity set for the systems, which can act as a barrier for the proliferation of renewable energy communities (Toporek & Campos, 2019).

While the existing legal boundaries, with geographical and capacity limits, can be argued to limit the operational possibilities for establishing collective self-consumption operations, these are already an expanded version of a previous, more strict, legal definition. Initially, the law limited collective self-consumption to an operation that was part of the same low voltage substation. This received criticism given the limitation it posed on the ability to maximize self-consumption in collective self-consumption operations, and resulted in a change to the law that now allows for the inclusion of participants that are up to 2 km apart, or 20 km apart for isolated regions (Verde & Rossetto, 2020). A previous version of the law on collective self-consumption also limited these operations to a 5-year experimental period, this experimental period requirement was removed from the law in 2020 (Rollet, 2020), which provides a stronger signal for citizens interested in setting up a collective self-consumption operation.

This broader legal boundary can contribute to the proliferation of more encompassing and diverse energy communities. The initial law indicates a cautious approach by French policy makers in terms of an enabling policy framework in which energy communities can proliferate, while the adjustment to a more flexible distance criteria indicates a degree of openness to consider the evolving public debate and perception regarding this energy policy. In practice, this can be seen as an attempt from French policy makers to balance the need to define collective self-consumption operations in a way that allows for diverse and inclusive communities to emerge, while minimising the possible impacts on the operation of the electricity system with particular attention (Verde & Rossetto, 2020).

Electricity distribution system operators are responsible for ensuring non-discriminatory access for the development of self-consumption operations, and for providing all self-consumption participants in individual and collective self-consumption operations with a smart meter. Additionally, for collective self-consumption operations the distribution network operator has to establish a contractual relationship

with the legal entity under which the collective self-consumption participants are operating to identify all the consumers, producers, and storage capacity, as well as the define how the electricity generated is shared across the participants (Oriol, 2018).

The possibility for prosumers to aggregate in collective self-consumption operations opens possibilities for the development of energy communities, which were an important part of the EU's Clean Energy for All policy package. Following this, France has established in its Energy Code both **renewable energy communities** and **citizen energy communities**, as presented in the following table (Table 4.11).

Table 4.11 Legal framework for renewable energy communities and citizen energy communities

Renewable energy communities	Citizen energy communities
<p>Article L291-1 (Creation Ordinance n ° 2021-236 of March 3, 2021 - art. 5)</p> <p><i>A renewable energy community is an autonomous legal person meeting the following cumulative criteria:</i></p> <ol style="list-style-type: none"> 1. <i>It is based on open and voluntary participation;</i> 2. <i>Its shareholders or members are natural persons, small and medium-sized enterprises, local authorities or their groups. When a private company participates in a renewable energy community, this participation cannot constitute its main commercial or professional activity;</i> 3. <i>It is effectively controlled by shareholders or members located near the renewable energy projects to which it has subscribed and which it has developed;</i> 4. <i>Its primary objective is to provide environmental, economic or social benefits to its shareholders or members or to the local territories where it operates, rather than generating financial profits.</i> <p>Article L291-2 (Creation Ordinance n ° 2021-236 of March 3, 2021 - art. 5)</p> <p><i>A renewable energy community can:</i></p> <ol style="list-style-type: none"> 1. <i>Produce, consume, store and sell renewable energy, including through renewable energy purchase contracts;</i> 2. <i>Share within it the renewable energy produced by the production units it owns, subject to the maintenance of the rights and obligations of its members as end customers and, in the case of electricity, the provisions provided for Articles L. 315-1 to L. 315-8;</i> 3. <i>Access all relevant energy markets, either directly or by aggregation, in a non-discriminatory manner.</i> 	<p>Article L292-1 (Creation Ordinance n ° 2021-236 of March 3, 2021 - art. 5)</p> <p><i>A citizen energy community is a legal person meeting the following cumulative criteria:</i></p> <ol style="list-style-type: none"> 1. <i>It is based on voluntary participation open to any type of member or shareholder;</i> 2. <i>It is effectively controlled by members or shareholders who are natural persons, local authorities or their groups, or small companies meeting the definition given in point 11 of article 2 of Directive (EU) 2019 / 944 of the European Parliament and of the Council of 5 June 2019 concerning common rules for the internal market in electricity;</i> 3. <i>Its main objective is to provide environmental, economic or social benefits to its members or shareholders or to the local territories where it operates, rather than to generate financial profits.</i> <p>Article L292-2 Creation Ordinance n ° 2021-236 of March 3, 2021 - art. 5</p> <p><i>A citizen energy community can:</i></p> <ol style="list-style-type: none"> 1. <i>Take part in the production, including from renewable sources, in the supply, consumption, aggregation, storage and sale of electricity;</i> 2. <i>Provide services related to energy efficiency, recharging services for electric vehicles or other energy services to its members or shareholders;</i> 3. <i>Share within it the electricity produced by the production units it owns, subject to upholding the rights and obligations of its members as end customers and the provisions of Articles L. 315-1 to L. 315 -8;</i> 4. <i>Access all electricity markets, either directly or by aggregation, in a non-discriminatory manner.</i> <p>[...]</p>

Similar to the definitions of self-consumption, energy communities are defined with the main goal of providing environmental, economic, and social benefits, rather than as a source of financial profits. Renewable energy communities are set to be led by local stakeholders that are near the renewable energy projects developed and operated by the community. Citizen energy communities have a broader scope of action, as they can act as aggregators, and provide energy efficiency services, as well as electric vehicle charging services. This broader scope carries greater responsibility as the citizen energy community is responsible for electricity system imbalances, acting as a balance responsible party. For both renewable and citizen energy communities, when sharing with their members the electricity produced, they must comply with the legal requirements for self-consumption (see Table 4.10).

From the perspective of the French government, set in the PPE, self-consumption and local energy production represent an opportunity for the energy transition by allowing for consumer participation in shaping and ownership of the transition. As a result, consumers are expected to develop and take a more prominent role in the electricity system transformation, considering that production costs of renewable electricity, particularly photovoltaic electricity installations, are decreasing while electricity prices are rising.

French policy goals also emphasise that the development of self-consumption should not be at the expense of other electricity consumers and should not undermine the principle of national solidarity that governs the pricing of the use of public networks. The pricing applicable to self-consumers should reflect the benefits as well as the costs they can generate on the electricity system. The regulatory framework specific to self-consumption (individual and collective) came into effect in 2017 and is described in the following section.

4.4. Regulatory framework

In France, **CRE** sets the regulatory framework that establishes the operational aspects of individual and collective self-consumption, which further shapes the role of consumers in the electricity sector. Self-consumption has been defined in the French regulatory framework since 2016 (Oriol, 2018), when CRE adapted its tariffs for the use of the public electricity network (*Tarifs d'Utilisation des Réseaux Publics d'Électricité, TURPE*) in relation to individual self-consumption. This resulted in the implementation of a new **management component** for the tariffs to be charged to prosumers with an individual self-consumption operation, to reflect the specific costs of prosumers on the network infrastructure.

The public debate regarding the transition to more active consumers, particularly the development of collective self-consumption as a model for consumer participation in the energy system, has raised technical and economic uncertainties (CRE, 2018, 2021). For instance, collective self-consumption is



recognised given its support to a local community driven energy transition that contributes to long term sustainability goals while creating value for local consumers, reducing their energy costs. However, these added value features are contrasted with concerns that collective self-consumption participants can become free riders on electricity networks, or that self-consumption may lead to the proliferation of closed independent communities, which would impact the ability to maintain critical energy network infrastructure, as a greater number of independent consumers may result in fewer network tariff revenues (Verde & Rossetto, 2020).

As a result, network tariffs and the regulatory regime adopted for collective self-consumption are relevant. Depending on the network tariff design implemented by regulators, additional costs may fall on users that are not participating in collective self-consumption, which may create cross-subsidies and lead to equality concerns.

At CRE collective self-consumption gained more attention from 2017 onwards, when it launched a public consultation to better understand the costs and benefits of self-consumption for the French energy sector (CRE, 2018). At the time, CRE faced uncertainty regarding the costs and benefits of self-consumption for electricity networks. Through the public consultation it gathered insights to create an informed perspective on the possible effects of increasing rates of self-consumption operations connected to the grid. The insights obtained made it clear that self-consumption operations did not reduce the peak related to early evening hours (for winter hours, without sun), unless these were equipped with control or storage technologies. As a result, stand-alone self-consumption operations without control or storage devices do not reduce investments costs in low voltage network infrastructure. Additionally, evidence from the public consultation indicated that while storage devices are less common, control devices, in particular those associated with domestic hot water, are more common. Building on the evidence collected in the public consultation, CRE decided to:

- Maintain its regulatory approach to individual self-consumption, set in 2016, that added a new management component for these prosumers.
- Introduce a new and optional tariff for collective self-consumption operations, with the following characteristics: a lower volumetric charge on self-consumed energy; a higher volumetric charge on energy consumed from the supplier; and a higher fixed charge, that reflects the greater costs for distribution system operators to handle data related with collective self-consumption operations.

These regulatory changes were introduced in the middle of the regulatory period for tariffs under TURPE 5 2016-2021, which allowed for a period of experimentation ahead of the tariffs to be set for the period 2021-2024, the TURPE 6. After implementation of these regulatory changes, the optional



tariff for collective self-consumption saw limited uptake, with few collective self-consumers opting for it (Verde & Rossetto, 2020). This optional scheme also raised concerns related to it being a disincentive for the viability of collective self-consumption operations.

Building on the experience gained since these regulatory changes were implemented and based on new evidence from network operators and stakeholders obtained during 2020, CRE implemented changes to their regulatory approach to self-consumption for the regulatory period 2021-2024, the TURPE 6. For this new regulatory period CRE decided to **maintain the level of the management component for both individual and collective self-consumption**. In term of the **withdrawal component**, CRE drew on the experience gained from its optional tariff for collective self-consumption operation introduced in 2018. This optional tariff was designed to deliver cost reductions for those participating in collective self-consumption operations, particularly those participants who were able to maximize their self-consumption at critical grid times and minimize the need to rely on the grid for electricity supply in general. This optional tariff received negative feedback from stakeholders, as an option that would affect collective self-consumption projects viability. CRE drew on analyses from Enedis, which demonstrated that selecting the new optional tariff would in most cases lead to cost reductions for participants in those collective self-consumption operations. This analysis was conducted on all active collective self-consumption operations with data available for a full year. However, it is important to emphasise that the incentive of this optional tariff depends on a high self-consumption rate of participants, the higher the rate the greater the benefit from this optional tariff. From its public consultation and analysis CRE also found that storage technology is still limited in self-consumption operation, which limits the ability to maximise self-consumption on existing operations.

For the tariffs TURPE 6 in effect for the period 2021-2024, the new optional **withdrawal component** for collective self-consumption has been adjusted and is presented as a less conservative approach. In 2018 CRE implemented a withdrawal component that included a contribution to the costs associated with high-voltage networks for the electricity self-consumed. This was due to despite self-consumption occurring locally, the 30-minute window in which consumption and generation are considered, a fraction of self-consumption could be using the higher voltage networks. This conservative approach was pursued based on lack of evidence on the impact of collective self-consumption operations. However, building on new evidence provided by the network operator Enedis, CRE moved away from this more conservative approach, as it found that the 30-minute window for considering consumption and generation had a very limited impact. Consequently, the new optional **withdrawal component** makes self-consumption more affordable, and may act as an added incentive to maximise self-consumption (CRE, 2021).

4.5. Consumer and citizen support policies and incentives

The legal and regulatory framework creates the necessary conditions for more engaged consumer roles to emerge in the French electricity sector. In parallel, France also has a number of support policies and incentives to drive the adoption of behaviours and technologies that can contribute to the uptake of active consumer roles, such as those providing information and raising awareness for building renovation, programmes supporting citizen-led and participatory renewable energy projects, and those targeting solar PV technologies to promote prosumer roles and self-consumption. The following provide an overview of existing support policies and incentives contributing to more engaged consumers and citizens.

Communication and awareness raising, are important to provide citizens with information that can enable a shift in preferences and behaviours and lead to a positive progress to deliver the energy transition. France has a communication campaign for the general public targeting building energy retrofits for increased energy efficiency – FAIRE (Facilitating, Accompanying and Informing on Energy Renovation). This campaign is relevant as buildings represent 45% of France’s energy consumption, 25% of the country’s emissions, and the country has 6 Million poorly insulated homes. Through this communication campaign the government aims to deliver a public service of information and advice on home building energy renovations that brings all the relevant stakeholders together (Martin, 2021).

Direct public support for citizen-led and participatory renewable energy projects, aims to contribute to the uptake of citizen involvement in renewable energy projects. Assistance for citizen involvement is available across regions in France and supports projects across different development stages. Direct support exists to provide assistance for: emerging projects, for project development, and investment aid for citizen led projects (APPROVE, 2020). For instance, support for emerging projects is provided in the Paris region where a call for citizen-led projects grants access to service providers that can help establish projects and develop the necessary economic, legal, and technical assessments (excluding mandatory assessments). This support can cover up to 80% of the associated costs, capped at 100,000 Euros. The Auvergne-Rhône-Alpes region provides project development support through a call for partnerships for decentralised energy production. This call grants access to support of up to 200,000 Euros to incentivise local governance for renewable energy projects (APPROVE, 2020). The Occitanie region provides investment support through a call for cooperative and citizen energy project. This call grants access to investment aid in the form of a citizen participation bonus, of 1 Euro from the Region for each 1 Euro from the citizens, capped at 100,000 Euros per project leader (CITEGO, 2021).

Feed in Tariffs, as a form of direct support, have played an important role in the development of prosumers adopting solar PV. Feed in Tariffs were initially implemented as a policy compensating all



the electricity produced by the consumer, behind the meter, at its local installation. However, in 2016 France introduced policy changes allowing prosumers to self-consume part of their generation. In this new policy, residential prosumers receive an upfront subsidy for the generation system and are exempt from grid connection charges (Rebenaque, 2020). Systems with a capacity of up to 3 kW benefit from reduced VAT and receive a Feed in Tariff for excess electricity generation fed back to the grid. Alternatively, prosumers with these systems, under 3 kW capacity, can give away excess generation for free, in which case they benefit from lower administrative costs (Rebenaque, 2020).

The Feed in Tariffs available for solar PV are limited to systems installed in buildings and with a capacity of up to 100 kW (Vidalic, 2021). The tariffs are available for a period of 20 years and follow a degressive schedule. For self-consumption operations, any surpluses receive a Feed in Tariff (Oriol, 2018). The surpluses receive 0.1 EUR/kWh for systems with a capacity under 9 kW, and 0.06 EUR/kWh for systems with a capacity between 9 and 100 kW (Hendricks & Mesquita, 2019). A capacity premium is paid (EUR/MW) during the first 5 years of the contracted tariff. This capacity premium is based on different rates: 0.39 EUR/W for an installation \leq or equal to 3kW; 0.29 EUR/W for an installation between 3 and 9 kW; 0.19 EUR/W for an installation between 9 and 36 kW; and 0.09 EUR/W for an installation between 36 and 100 kW (IEA PVPS, 2021).

Tenders for self-consumption have been organised since 2016. The capacity available for tenders is of 150 MW since 2017 and targets projects with a capacity between 100 and 500 kW, which can include small industrial sites, or commercial and office buildings. Through these tenders, support is given as a premium based on EUR/MWh for a 10-year period. The aim is to incentivise high levels of self-consumption, as a result the premium is lowered if self-consumption falls below 50% (Oriol, 2018). In 2019, a dedicated tender was introduced for the construction and operation of electricity production facilities from renewable energies for self-consumption for remote islands in the FCE region (i.e., non-interconnected zones). To apply to this call for tenders, the capacity of the installation must be between 100 kW and 1 MW, and the tender will initially run from 2019 to 2023. The cumulative power targets were set for each remote region, as follows Corsica 1.5 MW, Guadeloupe 3 MW, Guyana 3 MW, Reunion 6 MW, Martinique 6 MW, and Mayotte 1.5 MW (CRE, 2019).

4.6. Discussion and conclusion

4.6.1. State of consumer and citizen engagement

Under the policy, legal, and regulatory framework described in the previous sections we find citizens in France have the possibility to have an impact on the energy transition by shaping policies and infrastructure. In terms of policy shaping impact, granted through public participation rights, France



has seen thousands of inputs from citizens on key policies and law. Considering the role of citizens in shaping energy infrastructure, while the legal framework is in place and evolving, prosumer's interaction with electricity grids remains limited. France is seen as having a technology neutral policy framework for prosumers. However, a strong preference exists for generation technologies that allow to sell electricity back to the grid, particularly for solar PV technologies. Prosumer driven PV capacity growth has been the result of generous policy support provided via Feed in Tariffs. In 2019 France had a total of 5.5 GW of solar rooftop capacity, which in the EU context puts France just behind Germany and Italy (SMARTEN, 2020). In 2020, the distribution network operator Enedis estimated that 86,000 individual self-consumers were connected to the public electricity distribution networks. Moreover, 41 collective self-consumption operations were active by the end of August 2020, aggregating 607 participants (529 consumers, and 78 producers), mostly led by municipalities and social landlords, a further 45 operations were identified as projects (CRE, 2021). Community renewable energy projects are still in an emerging stage, but continued growth has been observed in recent years, with 223 community renewable energy projects at the end of 2020 (Energie Partagée, 2021c).

According to the electricity transmission network operator RTE, by 2035 self-consumption may reach up to 10GW of installed capacity just from solar PV, coming from 3.8 million households. Noteworthy, Enedis forecasts a greater penetration of the self-consumption model for the 2035 horizon, with an estimated installed capacity between 15.5 and 35 GW, which would be coming from between 5.8 and 11.6 million consumers, at the low-voltage level (CRE, 2021). While existing estimates show significant variability, they signal a growing trend of self-consumption and an increasing role for prosumers in the French electricity sector.

4.6.2. Strengths and weaknesses

The following strengths and weaknesses have been identified from the analysis of France's policy, legal, and regulatory framework in relation to the role of engaged consumers and citizens in the energy transition.

Strengths

- National legal framework provides a detailed framework for citizen participation in energy policy and infrastructure.
- Citizens have been consulted to shape the country's main energy policy laws and strategies (i.e., Law on Low Carbon Transition, National Low Carbon Strategy, and Multiannual Energy Plan), including inputs from both mainland France and from non-interconnected islands in the FCE region.

- Evolving nature of legal and regulatory framework on collective self-consumption shows willingness to adapt existing rules as new evidence and knowledge is obtained.
- Existence of support policies for citizen-led of renewable energy projects across regions (APPROVE, 2020; Sebi & Vernay, 2020), which can contribute to the uptake of community and citizen energy engagement and shaping of local energy infrastructure.

Weaknesses

- The low carbon policy roadmap, SNBC, and the multi-annual energy plan, PPE, present citizens behavioural change as an important pillar to deliver the planned goals. However, it is less clear how these behavioural changes leading to more “sobriety” will be delivered at scale and across regions, what their potential contribution is to energy transition policy goals, and the extent to which consumers are willing and able to engage in significant behavioural change. For instance, the French Agency for the Ecological Transition (*Agence de la Transition Ecologique, ADEME*), has analysed public opinion and found that French citizens in principle are interested in adopting new behaviours, however a gap remains between interest and real behavioural change (Bosseboeuf, 2021). A study across French regions has found that some of the challenges that need attention regarding behavioural change include that it can be seen as adding constraints to the communities and citizens, behavioural change can also be seen as not contributing to economic development (ADEME, 2021).
- While France has a range of existing support policies and programmes to support more active consumer roles, there is often a lack of awareness to their availability and they often require complex and lengthy administrative procedures.
- Cautious approach on the regulatory framework for collective self-consumption may hinder future development. Even if adjustments and a willingness to continuously evolve the legal framework exists, it may suggest France is placing greater burdens than needed on emerging self-consumption operations.
- The French energy communities are still limited to low-voltage networks which excludes larger electricity consumers (Rollet, 2020).
- The economic viability of self-consumption can be an issue in the uptake of this type of operation due to low electricity prices in France.
- Community renewable energy initiatives depend significantly on public support schemes and are vulnerable to shifts in policy (Sebi & Vernay, 2020, p. 7).

4.7. Moving forward with citizens in the energy transition

France has been effective in the administrative aspects of reforming its electricity sector (IEA, 2017). European Union policy directives for market liberalisation, and the more recent policies under the Clean Energy for All Europeans package, have been transposed into the country's legal framework. However, the degree to which these have changed the operational dynamics of the traditional electricity system in France is limited. The market remains significantly concentrated around EDF and switching rates for electricity consumers are low, due to significant perceived barriers to switch supplier (European Commission, 2021).

France has created space for citizens to shape its energy policy, with inputs being used on key national energy laws and policies. Enabling citizens to shape policy seems to be a prominent dimension of citizen participation in the energy transition for France. This is emphasised by the country's recent Citizen Climate Assembly (*Convention Citoyenne pour le Climat*) (French Government, 2021d), which gathered 150 citizens to shape the future of France's climate agenda, and was led by the President, Emmanuel Macron. This was presented by the president as a participatory democracy in the aftermath of the "Yellow Vests" protests in 2018 (Phalnikar, 2021). However, the outcome of the assembly in terms of the extent to which it shaped future priorities has been described as limited (Guillot, 2021). Nonetheless, this type of citizen engagement method marks a new approach in democratic processes and is not like a regular citizen consultation (Trian, 2021).

Regarding consumers ability to shape energy infrastructure, the French legal and regulatory framework allows for a more favourable framework for individual self-consumption than for collective self-consumption, which can have a negative impact on the uptake of community energy. This may be a result of the fact that, even though the French electricity market has liberalized and introduced competition, it still has a highly concentrated market with EDF playing a key role in all the segments of the supply chain. This may have led to a missed opportunity for the French electricity sector actors to steer a highly centralised industry into one with more distributed and collective forms of organisation. This may also have led to a missed opportunity to leverage and learn from new organisational models in the electricity sector that could have positioned the country to embrace prosumer driven community projects more readily. Possible evidence for this can be seen on the cautious and conservative approach that the country's policy makers have followed to implement collective self-consumption in France. While in practice it remains a niche market with limited uptake, the law and regulatory framework have been amended multiple times.

The policy, legal, and regulatory framework in France is contributing to a shift towards a low carbon culture, in which consumers and citizens can play different roles as the country moves forward in delivering its energy transition. The opportunities created in the legal framework to engage citizens and



consumers is a signal that these are increasingly becoming substantive stakeholders in the energy transition, moving away from the less engaged role citizens and consumers have had in the past. However, the centralised nature of the electricity system in France and the barriers to the proliferation of prosumer roles at present, individually and collectively, suggest that consumers and citizens ability to shape the energy transition is in the early stages and has significant growth potential



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5. Conclusion

The energy transition is gradually evolving supported by new configurations of socio-technical systems (Pereira et al., 2018). Low carbon technologies are shaping critical energy infrastructure. Renewable energy technologies and smart grids have received significant attention and policy support in the last decade, aiming at updating an energy system that was designed for bulk power generation and transmission. However, the future looks more decentralised, where small scale generation can be a part of the large, interconnected pan-European energy market (Pereira et al., 2022). Policies are also changing, recognising new interactions and relationships for both incumbent and new players. Consumers and their engagement with the energy transition is also becoming a building block of the ongoing energy transition, as these can play an important role in shaping policies and energy infrastructure and contribute to the delivery of a low carbon future.

In this report we focused on understanding the recent developments on the policy and regulatory framework shaping the role of consumers in the energy transition. By focusing on the cases of the European Union, the United Kingdom, and France, we captured policy insights across different levels of governance for energy policy making, and also across regions with distinct energy sector characteristics, for instance the UK has a more competitive electricity retail sector, compared to France and most EU countries. Then, France has a high share of nuclear energy, compared to the UK, and to other EU countries. These cases provide a diverse perspective on the changing role of consumers in the energy transition, and the policies and regulatory developments that are part of this process. Each case depicts a distinct pathway for consumer engagement in the energy transition. For instance, in the European Union, recent policy developments place the consumer at the centre of delivering a low carbon future, with an important role given to technology and information, and new definitions for the scope of “*active consumers*”, “*renewables self-consumer*”, “*citizen energy community*”, and “*renewable energy community*”. In France and the United Kingdom, we find that prosumers and consumer engagement are important aspects of the energy transition. However, in France we observe some hesitancy to embrace energy communities at the regulatory level, although with recent improvements in the scope for system integration. In the UK we identify policy uncertainty in schemes that can contribute to consumer engagement in the energy transition, of which the Green Homes Grant scheme launched as a COVID-19 green recovery measure is a recent example (Geels et al., 2022). Nonetheless, in both France and the United Kingdom we see a willingness to experiment with active engagement of citizens and consumers on policy making processes, in France this was seen through the Citizen Climate Assembly (*Convention Citoyenne pour le Climat*), and in the UK through the Climate Assembly UK, both examples of deliberative policy making processes.



In this section, we draw on the diversity of insights obtained from these cases to discuss **energy consumer engagement pathways** in the energy transition. This discussion aims to identify the building blocks for consumer engagement and how they relate to energy market transformation. We recognise that the roles presented for consumers may overlap, change order of occurrence, or not be possible at all, depending on the specific region and the characteristics of its local socio-technical reality. However, this high-level discussion is valuable to understand what the possibilities are as we move towards a future where citizens and consumers are expected to be central to the energy transition process. We then present a series of **policy recommendations** that build on the case specific insights, and strengths and weaknesses identified for the European Union, France, and the United Kingdom. These recommendations aim to identify action areas and drive policy efforts to support consumer engagement in the energy transition in a way that mitigates existing weaknesses and barriers, and capitalizes on best case practices and strengths. Lastly, we **discuss specificities of remote territories** that need to be taken into consideration when translating policy actions to improve consumer engagement in isolated regions, particularly important for the FCE region.

5.1. Energy consumer engagement pathway

Anyone who uses energy is essentially an energy consumer and it is safe to say that we all belong in this category. While we use energy differently and our engagement with energy use varies, there are certain broad steps that can describe the gradual progression of an energy consumer to an energy prosumer. This report provided a detailed review of the EU, UK and French policy and regulatory environment in relation to energy consumers and the facilitation of their transition to *prosumerism*. Policy and regulation, however, are not a stand-alone vehicle that enables this transition. These should be seen more as the means that help other elements of the energy system to work smoothly and purposefully to achieve a goal; thus, having a role that permeates through all the levels of the transition itself, whether these are based on market operation, technological advancements or collective action.

Recognising that *prosumerism* is not achievable overnight but rather requires a gradual development calls for a closer look at the early stages of energy markets, when an individual would only be described as a **consumer** (and not a prosumer). That is the state where most energy users still are and probably all have been up until approximately 10 years ago. A typical example would be a household that is connected to the energy systems for electricity and gas and enjoy a regularly billed access to these

commodities. The household does not have a choice of multiple energy suppliers, they can only use the services of a regional (or national) company.

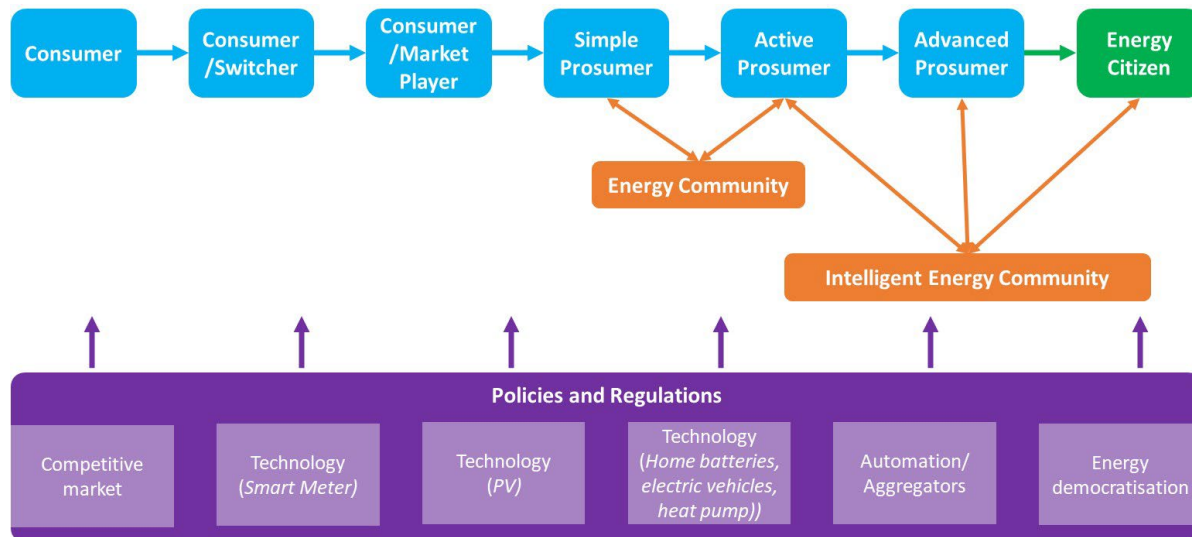


Figure 5.1 Energy consumer engagement pathway

One of the first steps from that point is market liberalisation, which brings competition for energy supply between companies who wish to offer their services to consumers. Typically, for a competitive market to be created there is the need for a number of competitors to enter the market and adequate assurances that they will be allowed to compete in a level playing field. That is normally facilitated by privatisation of several assets of the market in order to enable a greater plurality and reduce market power of any one supplier. From the consumer's point of view a well-functioning market provides options to choose from on the basis of criteria that matter to the consumer. Most often these are price-centred, but they can also be related to more qualitative characteristics of the energy provision such as green credentials and other forms of benefits. A consumer that regularly considers the available market options and switches among them in order to benefit the most from the best possible deal is effectively a **switcher**.

Following this, a possible next step is taking the consumer to a slightly more advanced level of consumerism where they can be a **market player**. This can be achieved even without having invested in any energy assets, other than perhaps a smart meter, the cost of which is often assumed by the energy suppliers. The capability to be a market player without any assets comes with subscription to specific tariffs that change based on the variable pricing of the spot market. Such tariffs are often described as Time of Use (ToU) tariffs and require a smart meter to enable billing based not just on the cumulative energy consumption over a specific period but in addition based on the specific time when that energy was consumed. This is an important step, as it allows consumers to respond to price signals and adjust

their consumptions accordingly to benefit themselves from lower pricing and benefit the energy system by avoiding overloading it. Even at a household level several types of energy consumption are time-flexible. For example, one can choose what time they will use the washing machine, dishwasher or tumble drier and most modern devices have timer settings that enable just that. Moreover, smart electronic devices that help automate heating times and temperature can contribute to this step. Therefore, certain loads can be deferred to times when energy is cheaper, and the system is under less pressure.

Acting as a **market player** exhausts what might be possible without owning any energy assets, the evolution from here is to take the role of a **simple prosumer**, which requires investment in specific types of assets. The simplest entry mode to prosumerism is by solar (PV) panels at the roof of a house. This type of investment has been subsidised by most European countries and enables the consumer to produce electricity which might be adequate or exceed their own energy needs. However, most solar PV installations do not necessarily provide electricity to the household they are installed at but rather to the grid, and then the grid supplies the household. That is because in most cases energy is used in the household at times when solar production might be low therefore grid supplied energy is necessary. Depending on regional regulatory regimes it might be that billing reflects a specific tariff for selling energy to the grid and different tariffs for buying energy from the grid or it might prescribe a single price which is also known and as net-metering. A shift has also been seen towards regulatory approaches that support self-consumption when sizing a PV system, to ensure that the prosumer generation capacity meets their own needs.

The journey to energy prosumerism does not stop here but can go a step further to the **active prosumer** role. Proliferation of technological advancements means that many more options are available to enable a deeper level of prosumerism. One example that could follow up from a solar PV installation is the use of a home battery to store some of the energy the solar panels produce. In most households' energy consumption from the PV panels happens when nobody is at home, during the day. If that energy is stored in a battery, then it can be used in the evening when the consumers are back at home. Such energy storage use has been previously shown in larger industrial facilities but is now available for household applications (Zafirakis et al., 2014). Solar panels, however, are not a prerequisite for a household battery use. In fact, the battery can be charged during times of low energy price and allow energy use at times of high demand/price without having to pay for that high cost.

Household batteries are not the only energy asset relevant to that step. Much is being said today about the electrification of transport and household heating. Starting from transport electrification it is noteworthy that an electric vehicle owner can charge their car at home. Even in relatively, high carbon energy systems electric vehicles deliver emissions savings compared to having an internal combustion



engine (Hofmann et al., 2016). Equally they can use a heat pump for house heating and cooling. The role active prosumers can play in the energy market is significant as they can provide demand side flexibility. That could mean that they choose to increase their consumption when energy price is low (as is usually when there is abundance of low carbon energy production) and because their consumption is not limited to household appliances but extends to vehicle charging and household heating it can be significantly higher. At other times in the day, when energy price is high (as is the case when there is a shortage of low carbon energy sources) they can choose to eliminate their consumption and instead rely on energy they have previously stored. When active prosumers join aggregator schemes with other active prosumers and exploit automations that allow their energy assets to act in a fine-tuned way with energy markets signals then their impact grows even further (**advanced prosumer**).

Within the graph's framework one more step is included; that of the **energy citizen**. This is left for the end not because it has to happen after all the other steps but rather because of its relatively different nature. So far, the consumer to prosumer transition has been focused on technology assets, regulations and the market as they concern the individual and their peers. However, a significant part of the energy system remains and will remain in the future outside of the realm of the individual. For example, an offshore wind farm is not normally an asset that belongs or is managed by an individual consumer or a few consumers. That is where the concept of energy citizenship comes along to encompass a wider range of energy issues, which are often not directly dictated by the energy prosumers or consumers. Within the offshore wind farm example, energy citizenship requires involvement of the public in the decision making for that investment or about the broader direction of a region's energy policy governance. In that context energy citizenship does not necessarily belong at the end of the steps but could as well precede them all to form the basis of any engagement with energy matters.

Adjacent to the transition steps described above, there is also a role for community energy schemes. Essentially, any level of prosumerism can be formed either at individual level or via the means of a simple energy community or an intelligent community energy scheme. The energy assets described above can belong to individual households or be scaled up and belong to a community where every member owns shares. Equally decision making can be either a result of collective decision making based on pre-agreed objectives or a matter for automated service providers to offer. It is often the case for community energy schemes that they can achieve a great sense of ownership and purpose for their members. That is especially the case when they form part of a natural community either as members of an island or a remote geographical region. Community energy and intelligent community energy schemes provide in this way an alternative pathway to prosumerism for their members.

In addition to the alternative prosumerism pathway offered by community energy, it is noteworthy clarifying that the energy assets mentioned above have been in use even in households that do not have



access to ToU tariffs. While the lack of ToU tariffs does not allow for asset performance optimisation, it is not completely detrimental to the performance either. Therefore, depending on the regional regulatory environment it is important to identify the appropriate steps ahead and set priorities. It is not uncommon for regulatory change to happen only after early technology adopters have demonstrated the capabilities of new systems and their combinations.

When it comes to energy assets and their role in prosumerism, certain types of technologies appear to be excluded. This is particularly true for technologies related to heat production and storage. For example, solar heaters have been used for several decades and serve households with hot water most often used directly for showers and in the kitchen. More recent technologies allow for heat storage at home, which can allow flexible heat pump usage to avoid high carbon, high price times. One more category of energy investment that is not featured in prosumerism debates, is that of building fabric energy efficiency. This usually includes improvements in heat insulations such as loft and wall insulation or triple glazing windows. Given that particularly in northern climates, heating forms the majority of household energy consumption, measures that improve heating efficiency, either by means of insulation or by means of direct heat production are a necessity. Moreover, that would mean that the energy produced by the household or the energy community forms a larger share of the total energy demand (which has been reduced due to efficiency improvements); hence reducing the need to import energy from the grid and increasing autonomy and resilience.

The aforementioned pathway analysis provides a heuristic approach to the journey energy consumers take while they navigate the new regulatory and technological landscape. It is not meant as a deterministic route and indeed within the analysis alternative pathways are demonstrated. Research for this report led to the necessity for highlighting the steps and their enabling conditions, either in the market or in technology or in the broader regulatory environment.

5.2. Policy Recommendations

5.2.1. Delivering consumers' behavioural change

Consumers are placed centrally to delivering a low carbon future. This concept is often connected to significant ambitions for consumers to change their behaviour supported by new technologies and information, such as real-time consumption data provided by smart meters. This prominent role for consumers in the energy transition is seen explicitly in France, as well as in EU level policy. In France, the low carbon policy roadmap (SNBC) and the multi-annual energy plan (PPE), present citizens behavioural change as an important pillar to deliver planned goals. However, it is unclear how these behavioural changes leading to more “*sobriety*”, as described in French policy documents, will be



delivered at scale and across regions, their potential contribution to energy transition policy goals, and the extent to which consumers are willing and able to engage in significant behavioural change.

Consequently, more work is required in terms of how progress on behavioural change is enabled and tracked as part of the energy transition. Consumers are increasingly identified as central to an effective energy transition. Much of this central role relates to consumers reacting to new data sources and making decisions on consumption and distributed energy technologies. Such a process of behavioural transformation can take significant time. It is still unclear how progress toward consumers taking on new roles can be monitored in addition to tangible outcomes, such as the number of solar PV units or growth on citizen energy cooperative initiatives.

5.2.2.Expanding and updating market transformation monitoring and metrics

As the energy transition unfolds, multi-dimensional goals of market liberalisation, low-carbon energy transitions, and consumer empowerment are being pursued in parallel by policies at the EU level, as well as in France and the United Kingdom. Electricity markets and the role of consumers are being transformed involving different stakeholders, technologies, and institutional structures. This calls for an expansion and update to the market transformation monitoring efforts and metrics used. These should reflect the recent legal developments placing consumers as important players in the energy transition and enabling countries and regions to measure and understand their progress. For instance, in the EU, traditional metrics and market monitoring indicate gradual but slow progress on market concentration, available consumer choices, and switching rates. Many of these metrics focus on outcomes, which are valuable but limited. New metrics can focus on understanding processes leading to those outcomes, such as increasing interest in engaging with energy topics by consumers, which may later lead to increased engagement. New metrics and a new way to understand success in market transformation can be valuable to obtain a more granular perspective on the dimensions of the energy transition that are advancing, as well as those that need more attention. The expansion of market transformation monitoring can also be further supported by broader and more diverse networks of collaboration that bring together expertise and perspectives across fields of knowledge and societal groups to help inform and shape ongoing market transformation efforts in a way that works for all consumers.

5.2.3.Reducing policy instability

New policies supporting a transition to more engaged consumer roles will benefit from reduced instability. Long-term commitments introduced as part of whole system energy transition approaches can contribute with effective signals for consumers to consider new options to engage with their energy use. Additionally, reduced policy instability can provide confidence for incumbent and new players in



the energy industry to invest in activities that enable new consumer roles and engagement in the energy transition. This is an important area of action as policy instability has been seen both in France and the United Kingdom. In France, several changes to the policy framework for collective self-consumption can suggest that commitment for a long-term vision on their role in the energy transition is lacking. Establishing a long-term vision for collective self-consumption operations can contribute to a policy framework that is more stable over time and result in adequate signals for consumers and industry stakeholders on the existing opportunities. In the United Kingdom, constant changes in support schemes negatively impact their ability to engage consumers in actions that affect their energy usage. For instance, this has been repeatedly the case for support schemes in the building sector in the UK for which the Green Homes Grant is the latest example of a potentially good policy, with significant changes since implementation that was ultimately cancelled altogether. This degree of policy instability is detrimental to a future in which consumers are more engaged in the energy transition.

5.2.4. Dedicated action for island focused energy transitions

A dedicated legal framework and resources for islands in the FCE region, could support the uptake of innovative technologies and consumer engagement approaches for a low carbon energy transition. At present, islands across the EU must apply to the European Commission to be considered exempt from market liberalisation rules. Recent developments under the Clean Energy for EU islands have moved into the direction of island-focused energy transition policy. However, these developments remain voluntary and lack dedicated resources and a compliance obligation. Moving forward, the delivery of energy transitions in island regions can benefit from approaches such as that seen in France. France has a legal framework that requires dedicated energy plans for non-interconnected zones, which provide tailored energy transition policies for island regions. Countries looking to pursue dedicated action for island energy transitions can also consider a broader approach that includes remote regions in the country in addition to island territories. In the UK case of remote island territories, specific cases (e.g. Orkney, Isles of Scilly) demonstrate a successful energy transition to Smart Local Energy Systems realised through partnerships, increasing RES integration, providing adequate energy and security of supply, effectively aiding social development and economic growth for the involved communities. However, the cases come across as afterthoughts in the current policy framework. Relevant policies are not island-specific, while financial viability in standalone projects is often questionable.



5.2.5. Rethinking policy approaches for consumers engagement

Emerging policy approaches and support schemes for more engaged consumer roles tend to follow an “opt-in” approach in which consumers have to identify, assess, and act on available information regarding new technologies, support schemes, costs and benefits. The need for consumers to act and choose from an array of different options to become more engaged in the energy transition may result on a mismatch between ambitious policy goals related to consumers’ behavioural change. For instance, in France, this may occur due to support schemes having lengthy and complex bureaucratic processes, scattered information, or lack of awareness from consumers on the opportunities available. Moreover, as countries adjust their national legal and regulatory framework, it is important to implement processes that minimise administrative burdens to the proliferation of active consumer roles. At the EU level, the Clean Energy for All Europeans package establishes the need for active consumers to have access to opportunities to participate in the energy transition in a non-discriminatory way.

5.2.6. Better understanding of the regulatory roadmap going forward

Significant regulatory developments will have to follow the extensive changes introduced regarding the role of consumers in the energy transition across countries. At the EU level, the legal framework resulting from the Clean Energy for All Europeans package emphasises an active role for consumers, and protection for those consumers that remain inactive. As regulatory frameworks at the country level are adjusted to reflect these new possibilities it is important to have a better understanding on how implemented regulations support and create a balance for consumers across the different options available to them. At the EU level, recent legal developments call for non-discriminatory access to opportunities for consumers to participate in the energy transition, as seen in the recent Electricity Directive. It will be relevant to see the complexity of administrative processes for active consumers, as administrative burdens may detract from the central role of consumers proposed in the recent legal developments. Following Brexit, it will also be important to see how the United Kingdom orients its regulatory framework considering the opportunities for consumer engagement.

5.2.7. Enabling market transformation across countries

There is an energy policy ambition to deliver an integrated internal energy market at the EU level, with consumers placed at the centre of this process. However, across countries, evidence on market developments shows significant heterogeneity in aspects related to retail market functioning, options available for consumers and switching processes, to name a few. As multiple energy policy goals are being pursued across countries, both across the EU and in the United Kingdom, it is essential to dedicate

more attention to actions that support progress across countries, with attention for countries with greater gaps in their energy transition process. For instance, while fully liberalised from a legal perspective, France continues to have EDF, a national company that used to be the national monopoly, playing a pivotal role across the electricity sector value chain. The UK has had a more active electricity wholesale market where however, many major suppliers have not been focused on innovation (Rutter et al., 2018). The UK's retail market has seen an influx of new players that introduced new service offerings for consumers, a trend that has been reversed, from September 2021 onwards, due to the increasing wholesale prices, which put multiple retail suppliers out of the market. A focus on enabling market transformation across countries can benefit from best case practice identification and dissemination, providing references to successful approaches and policies.

5.3. Specificities of Remote Territories in the FCE region

The **energy consumer engagement pathway** and **policy recommendations** presented are applicable and relevant for the FCE region, as well as to other remote and island regions. When considering how these pathways and recommendations apply in remote territories in the FCE region it is important to reflect further on the specificities of such regions and how they present challenges and opportunities for the consumer to prosumer transition. While remote regions are often impacted by low energy security they also host polluting power stations which in the past have been seen as their only option for energy supply (Spyropoulos et al., 2005; Tzanes et al., 2019; Zafirakis and Chalvatzis, 2014).

The first characteristic is geographical remoteness and is part of the very definition of the remote territories. This often comes with a lack of access to large infrastructure and amenities that are normally linked to areas of high population density. For example, access to high quality healthcare, high speed broadband internet, markets for goods and skilled labour are typically lacking in remote areas. More recent investment in internet infrastructure has been seen as a means to resolve some of the issues caused by all the other lacking resources. At the same time remoteness tends to impact perceptions of both the community itself and the outside world about the community. For example, it is common in remote territories to have a great sense of community and a strong regional identity where people feel that they belong to that place and they want to work to improve it. For externals remoteness can often be attractive mainly in terms of tourism, if it is associated with a complete package of benefits, such as quietness, or natural beauty, to name a few. With regards to prosumerism, geographical remoteness and lack of access to mainland infrastructure might act as a motivation for individual households and communities to seek to be more autonomous (Stephanides et al., 2019b, 2019c, 2019a).

Table 5.1 Challenges and opportunities of remote territories

Characteristics	Challenges	Opportunities
Geographical remoteness	Lack of good access to amenities linked to high population density such as healthcare, markets for goods and skilled labour and infrastructure.	<p>Developed sense of community and understanding of strengths in place as a feature of regional identity.</p> <p>Sense of seclusion can be attractive for tourism industry when combined with a strong proposition on other fronts.</p> <p>Makes islands in the FCE region, well-placed for new tech / new engagement experimentation and approaches.</p>
Isolation of energy access	<p>Remoteness often means lack of access, full or partial to energy. It's a view via the lens of grid connectivity where energy is supplied by means of connection to the electricity or gas grid.</p> <p>It is a significant issue for most islands in the FCE region, and many remote regions that often have limited access to import energy and also limited access to export energy if they produce too much.</p>	Lack of energy access usually implies lack of legacy networks. This can be an opportunity since it allows for investment without the restrictions of old systems compatibility. Many legacy networks are over half a century old and pose severe interoperability challenges to modern energy assets.
Rich low carbon energy resources	<p>Low carbon energy resources have often been understood as an opportunity for the central government to exploit, resulting in projects that did not have public consent.</p> <p>Sensitive ecosystems have to be taken into consideration when location of low carbon energy projects is decided.</p>	<p>Remote and island regions often have excellent wind, solar and tidal energy potential.</p> <p>Smaller population density which means that a larger land area hosts fewer people which allows for easier location of low carbon energy projects.</p> <p>It can resolve problems caused by remoteness when energy networks from the mainland are either non-existent or weak.</p>
Unlock economic growth through active engagement in the energy domain	There might be conflicting economic development paradigms. Local businesses in the tourism industry might be concerned about the visual impact of a wind turbine on their island.	<p>Opportunity for local involvement in energy project conception, development and operation provides local economic growth.</p> <p>It can attract investment from outside of the region in terms of equipment costs, technological know-how and services.</p> <p>When designed correctly it can strengthen the touristic appeal of an area which becomes a green region or low carbon island.</p>

Among the infrastructure that is often lacking in remote territories, energy is very prominently placed. This is linked to the view that energy should be supplied by central, large-scale power stations and transferred via the grid to remote territories. Such connections are often missing completely, as in the case of remote islands in the FCE region, or might be weak links as in the case of remote mainland regions. The impact typically is that remote territories receive lower quality energy and often when they invest in significant energy production this cannot be exported to the rest of the mainland. At the same

time, it is important to understand that energy networks are often a very long-term investment. Most grids use infrastructure that has been put in place over 50 years ago and was never designed for today's operating environment. Lack of legacy infrastructure can be considered a liberating factor that enables an easier investment in modern technologies that are compatible with today's and future demands. Clearly restricted access to energy means that prosumerism can be encouraged since it can help improve quality of life. This is relevant to both individual households and to investment in energy communities.

Remote territories are often rich in low carbon energy resources. Depending on the geographical location (and certainly within the FCE region) resources such as onshore and offshore wind energy, solar energy and especially tidal energy are abundant. That abundance has attracted investment without proper population engagement strategies. Therefore, local populations have seen investment in low carbon energy sources as something to be opposed since it was not designed with their needs in mind and has been harmful to their way of life (Kallis et al., 2021). Moreover, such early investment very rarely took into consideration the value of the natural ecosystems which are treasured in remote territories. Obviously, abundance of low carbon energy resources can be handled properly for the benefit of the local communities. As such, adequate energy for regional needs can be produced to enable a degree of autonomy and quality of life. At the same time, with relatively low population density remote territories in the FCE region are ideal for siting low carbon energy infrastructure which can be land intensive. If connections to the mainland allow and if that is consistent with the local economic plan, then abundance of low carbon energy resources can lead to surplus energy that can be exported from the region for profit. Abundance of low carbon energy resources is encouraging for prosumerism. Clearly some resources such as solar panels lend themselves to individual households and some others such as tidal and wind energy are better pursued by community schemes.

Following up from the previous point of economic development, low carbon energy growth presents a significant opportunity. Unlike centralised energy planning, with low carbon energy for remote territories most of the investment takes place within the region and provides the local population with an opportunity to get engaged in the conception, installation and operation of new facilities. In this way, technological know-how is being transferred helping to support regional economies. Appropriate development relies on a combinations of novel business models to accommodate for technological advancements (Li et al., 2019, 2018). Another important element is the potential to attract investment to the region, which can help with local growth in new jobs and demand. Most importantly, economic development through low carbon innovation has to be well-planned. For many remote regions, tourism is the main or among the main industries and it relies on the outstanding natural beauty of these locations. It is understandable that sometimes local communities hesitate with decisions to build a wind farm in an area which is visited for its pristine nature. However, within a well-designed development

plan this is possible and recent experiences show that the touristic value of a destination can grow if the proposition is aligned with a broader package of sustainable tourism (Ioannidis et al., 2021). Prosumerism, either at individual level or through energy collective schemes is a major way to increase regional investment, improve quality of life and encourage further economic development without the risks of failing energy supply systems.



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