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Competition Policy and an Internal Energy Market

Study for the ECON Committee



DIRECTORATE GENERAL FOR INTERNAL POLICIES
POLICY DEPARTMENT A: ECONOMIC AND SCIENTIFIC POLICY

Competition Policy and an Internal Energy Market

STUDY

Abstract

This study identifies selected important competition-related issues in the internal energy market. It discusses the role of competition law with respect to the following issues: State aid, congestion management, capacity remuneration mechanisms, balancing markets, effective competition between suppliers, integration of new players in the market, and energy poverty. To tackle these present and possible upcoming issues, the study provides indications regarding the current and future need for applying instruments of competition law as well as other types of instruments.

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LIST OF ABBREVIATIONS

- ACER** Agency for the Cooperation of the Energy Regulators
- BES** Battery Energy Storage
- BRP** Balancing Responsibility Party
- CACM** Capacity Allocation and Congestion Management
- CAES** Compressed Air Energy Storage
- CEER** Council of European Energy Regulators
- CR3** Concentration Ratio (market share of the three largest market players)
- CRM** Capacity Remuneration Mechanism
- DER** Distributed Energy Resources
- DG** Distributed Generation
- DNO** Distribution Network Operator
- DR** Demand Response
- DPIA** Data Protection Impact Assessment
- DSO** Distribution Network Operator
- EB** Electricity Balancing
- EEAG** Guidelines on State Aid for Environmental Protection and Energy 2014-2020
- EDF** Electricité de France (Electricity of France)
- EES** Electrical Energy Storage
- Enel** Ente Nazionale per l'Energia elettrica
(National Entity for Electricity in Italy)
- ENTSO-E** European Network of Transmission System Operators for Electricity
- ENTSO-G** European Network of Transmission System Operators for Gas
- EP** European Parliament
- ETS** Emission Trading System
- EV** Electric vehicle
- FBES** Flow Battery Energy Storage

FCA	Foward capacity allocation
FES	Flywheel Energy Storage
FIPs	Feed-in premiums
FIT	Feed-in-tariffs
GBER	General Block Exemption Regulation 2014-2020
GDP	Gross Domestic Product
GGE	Gross grant equavalent
GW	Gigawatt
ITRE	Committee on Industry, Research and Energy in the EP
kW	Kilowatt
MCO	Market Coupling Operators
MDI	Market Design Initiative
MS	Member State
MSC	Market Surveillance and Conduct
MWh	Megawatt-hours
NCA	National competition authority
NCs	Network Codes
NRA	National (Energy) Regulatory Authority
ONR	Office for Nuclear Regulation
PHS	Pumped Hydroelectric Storage
PV	Photovoltaics
REMIT	Regulation on wholesale Energy Market Integrity and Transparency
RE	Renewable Energy
RES	Renewable Energy Sources
SMES	Superconducting magnetic Energy Storage
TFEU	Treaty on the Funtioning of the European Union
TSO	Transmission System Operators
VPP	Virtual Power Plant

GLOSSARY OF TERMS

ACER	<p>The Agency for the Cooperation of Energy Regulators (ACER), a European Union Agency, was created by the third energy package to further progress the completion of the internal energy market both for electricity and natural gas. It was officially launched in March 2011 and has its seat in Ljubljana, Slovenia. It is an independent body with the aim of fostering cooperation among European energy regulators. It coordinates regional and cross-regional initiatives which enhance integration; it monitors the work of ENTSOs and evaluates their EU-wide network development plans. It also monitors the functioning of the electricity markets in general and that of wholesale energy trading.</p>
Aggregators	<p>Aggregators reach agreements with various types of customers, such as industrial, commercial or residential, to aggregate their capability to adjust their energy demand or energy supply. Aggregators aim at creating a portfolio of flexible energy products and to offer this as a service to markets.</p>
Ancillary services	<p>Ancillary services can be defined as measures to be taken by a transmission system operator (TSO) to provide support to electric power transmission, while assuring a secure power system and a safe supply of electricity to end consumers. The cost of ancillary services is covered by power transmission charges or by balancing energy fees levied by the TSO; electricity customers are ultimately also customers of ancillary services.</p> <p>Ancillary services encompass:</p> <ul style="list-style-type: none"> • Voltage and reactive power control: the goal is to maintain voltage levels within prescribed limits. • Black start of the power plants: enables a production unit to independently initiate generators without external power supply. • Island mode operation: ensures the establishment of individual independent components in the power system in order to reduce electricity supply interruption to end consumers in case of disturbance, major maintenances and reconstructions. • Frequency and active power control: generators need to frequently adjust their outputs to keep the system frequency stable (frequency increases if more power is produced than consumed); this service is implemented by primary (activated within a 30 second time frame), secondary (activated within a 15 minutes time frame) and tertiary power control (activated within a period of several minutes to several hours). • Balancing energy: see below.

	One can hence distinguish between frequency (balancing of the system) and non-frequency (voltage control, black-start and islanding capability) ancillary services.
Balancing	Balancing refers to the situation after markets have closed (gate closure), in which a TSO acts to ensure that the demand for electricity is equal to the supply of electricity in and near real time. Balancing responsible parties (BRP) may be electricity producers, suppliers or traders.
Bidding zone	A bidding zone is the largest geographical area within which market participants are able to exchange energy without capacity allocation. It is hence assumed that there are no major congestions resulting from transactions within bidding zones.
Clean Energy for All Europeans legislative proposals (“Winter Package”)	The Clean Energy for All Europeans legislative proposals of 30 November 2016 cover energy efficiency, renewable energy, the design of the electricity market, security of electricity supply and governance rules for the Energy Union. All proposed legislation is available at http://ec.europa.eu/energy/en/news/commission-proposes-new-rules-consumer-centred-clean-energy-transition .
CR3 value	The concentration ratio is a measure of the total output produced by a specific number of players on the market, which, in the case of CR3, refers to the market share of the three largest suppliers.
Demand response (DR)	This term refers to the changes in electric usage by end-consumers in response to changes in the electricity price over time, or to incentive schemes or payments designed to induce lower electricity use at time of high wholesale market prices or when system reliability is in danger.
Distributed energy resources (DER)	DER encompass distributed generation (DG), i.e., decentralised electricity sources, such as electric storage, electric vehicles (EVs) and demand response tools. Typically, DER systems also encompass renewable energy sources, such as small hydro, biomass, biogas, solar power, wind and geothermal power.
Distributed generation (DG)	Distributed generation is generated or stored by a variety of small devices connected to the grid, at or very near to the point of consumption. These devices are called distributed energy resources (DER). The advantages of generating (and storing) power on-site, rather than centrally, encompass more independence from large electricity suppliers, less interdependencies, lower costs and less inefficiencies associated with transmission and distribution.
Electricity day-ahead (and intraday) markets	The day-ahead market is the main arena for trading power, where contracts are made between seller and buyer for the

	delivery of power the following day, the price is set and the trade is agreed. The intraday market supplements the day-ahead market and helps secure the necessary balance between supply and demand in the power market. In case of incidents which have taken place between the closing of the day-ahead market and delivery the next day, buyers and sellers can trade volumes close to real time to bring the market back in balance in the intraday market.
Emissions Trading System (ETS)	The EU ETS is based on a cap and trade principle. The cap is set on a total amount of greenhouse gases that can be emitted by installations. Companies can trade their emissions allowances, ensuring that emissions will be reduced over time where it is cheapest to do so.
Energy only market	The term ' <i>energy only market</i> ' is used in contrast to ' <i>capacity market</i> ': on the energy only market, the only ' <i>good</i> ' traded, i.e. demanded and supplied and hence remunerated, is energy. In contrast, if the energy only market is enhanced by some capacity remuneration mechanism, not only electricity, but also the capacity to produce it are remunerated.
Feed-in-tariffs (FIT)	A FIT is a price-based energy supply policy offering long-term purchase agreements for the sale of renewable energy (RE) electricity. FITs offer a stable revenue and guarantee for renewable energy projects.
Firm-capacity generation	Firm capacity is the guaranteed amount of energy available for generation at a given time. Firm energy is the energy available sold on the spot market, whereas non-firm energy refers to available energy beyond firm energy, which is often intermittent in nature.
Intermittent generation	Intermittent forms of energy generation are not firm per definition as their energy supply depends on changing and not controllable factors, such as weather. Intermittent generation include wind power, solar power, wave and tidal power.
Market Design Initiative	The new market design initiative is a set of arrangements which govern how market actors generate, trade, supply and consume electricity and use the electricity infrastructure. The European Commission's new electricity market design initiative aims at improving the functioning of the internal electricity market in order to allow electricity to move freely, provide for cross-border competition, while integrating increasing shares of renewable energy.
Micro-grids	Micro-grids are small, low voltage electricity networks with local (often renewable) supply sources and local storage. The total installed capacity often ranges from a few hundred

	kW to some MW. Micro-grids are usually attached to a central grid, but can also function on their own.
Network codes (NCs)	The EU-wide rules which manage gas and electricity flows are known as network codes and govern all cross-border gas and electricity market transitions. NCs provide harmonised rules for cross-border exchanges of electricity and gas.
Prosumer	'Prosumers' are small and medium-sized agents which both consume and produce electricity by using, for instance, solar photovoltaic panels, smart meters, vehicle-to-grid electric automobiles, home batteries and other 'smart' devices.
REMIT	REMIT (Regulation on Wholesale Energy Market Integrity and Transparency) introduced a sector-specific legal framework for the monitoring of wholesale energy markets in 2011 with the objective to detect and deter market manipulation.
Smart meter	A device which allows consumers to monitor energy consumption directly and in real time. It might enable and encourage consumers to use DR.
Virtual power plant divestitures	A behavioural remedy in which a company needs to release part of its production temporarily to competitors.
Watt	Watt is a derived unit of power in the International System of Units (SI) measuring the rate of energy conversion. Watt is defined as one joule per second. A kilowatt (kW) is equal to thousand watts, a megawatt (MW) equal to a million watts, and a gigawatt (GW) is equal to one billion watts. Power on the other hand is the rate at which energy is generated and consumed. Watt per hour therefore refers to the change of power per hour in order to characterise the ramp-up behaviour of power plants.

EXECUTIVE SUMMARY

The EU Energy Market

Both energy and competition policies are important elements of the European Union. EU competition rules have been part of the Treaty since the establishment of the European Union. However, much has changed on the EU Energy Market. In the 1990s most of the national electricity and natural gas markets were publicly owned or controlled. The first legislative package prescribing energy market liberalisation was adopted in 1998. Over time the political attention within the EU gradually shifted from **energy market liberalisation** towards **energy market integration**, although liberalisation efforts are still ongoing in some Member States.

In the following years, these ambitions and actions were confirmed and strengthened by further Directives on the internal **market for electricity and gas** of 2003 (second legislative package) and 2009, when, the third and latest legislative package on the internal energy market was introduced. The goal of this package was to further open up the gas and electricity markets in the European Union, to enhance investments in energy infrastructure and cross-border trade in order to reach the goals of the '*Europe 2020 Strategy*'¹ through a secure, competitive and sustainable supply of energy to the economy and the society. Many steps have been made towards the establishment of the internal energy market, however the Commission has concluded that further efforts are still required.

The 2016 Clean Energy Package is the most recent policy initiative and encompasses measures in various energy market related fields, such as:

- governance of the Energy Union²;
- promotion of the use of renewable energy³;
- internal market for energy⁴.

In addition to the overarching EU regulation on the internal energy market mentioned above, more **specific EU regulations with respect to energy** exist, for example concerning energy infrastructure investment, energy efficiency, renewable energy, emission trading and market- and price transparency.

The basic structure of the electricity system consists of generation, transport and distribution, as well as different energy markets where energy is exchanged between various market participants. In a liberalised market, electricity generation is separated from transmission system operation. The transmission grids are operated by national transmission system operators (TSOs), which are responsible for ensuring that the supply of electricity meets demand at each instant of time⁵. Distribution networks are managed by distribution system operators (DSOs) connecting the consumers to the transmission grid and the energy generators feeding into the transmission grid. Energy from renewable sources is more and more often fed directly into the distribution network.

¹ https://ec.europa.eu/info/strategy/european-semester/framework/europe-2020-strategy_en.

² <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2016:759:REV1>.

³ <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52016PC0767R%2801%29>.

⁴ <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52016PC0861R%2801%29> and <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52016PC0864R%2801%29>.

⁵ TSOs are entities operating independently from other electricity market players (e.g., of electricity generation and distribution companies). Transmission grid companies can have this function, too, but not necessarily. TSOs are often wholly or partly owned by state or national governments.

Instruments of competition policies

Competition policy instruments in this study encompass:

- sector-specific energy market regulation;
- EU competition law instruments; and
- general rules.

Sector-specific energy market regulation can be proposed by the European Commission to shape a legislative framework which is capable of producing the conditions to establish competition in the market. **Competition law instruments** are used by the European Commission and Member States' competition authorities (NCA) to deal with competition cases and enforce European competition law, such as antitrust regulation, merger control, and State aid regulation. **General rules** could also address specific competition problems. A concrete example are rules on consumer protection and consumer contracts. Their main aim is the protection of natural persons, for instance regarding the processing of personal data and their more vulnerable position compared to energy suppliers. In practice, however, these rules could result in increased switching behaviour of consumers, enhancing competition on the energy market.

Competition policy and the internal energy market

Different instruments can be used to solve issues in the internal energy market which are related to competition. In order to decide whether it is best to use sector-specific regulation or competition law, one should analyse whether the competition problem at hand is caused by policies not related to competition, such as energy policies or consumer protection. In that case, a change in these other policy fields is appropriate to address the competition problem. Only if this is not the case or if sector-specific or general policy instruments cannot be amended, should competition law tackle this problem.

Issues to address with competition law instruments

The application of competition law plays an important role regarding the following issues in the internal energy market selected for this study: energy generation and State aid⁶, capacity remuneration mechanisms (CRMs)⁷, and the effectiveness of competition between suppliers⁸. As the issues related to State aid in the renewable energy sector and CRMs are caused predominantly by energy policies, sector-specific regulation is fit to be used alongside of competition law.

The role of competition law is more limited regarding issues such as energy poverty⁹, which is mainly a social policy issue, congestion management¹⁰ and the integration of balancing markets¹¹, both of which are rather technical issues and could be improved upon by increased transparency and coordination between regulators. The integration of new market players in

⁶ In paragraph 4.3 of the study we discuss energy generation and State aid.

⁷ In paragraph 4.5 of the study we discuss CRM.

⁸ In paragraph 4.7 of the study we discuss effective competition between energy suppliers.

⁹ In paragraph 4.9 of the study we discuss energy poverty.

¹⁰ In paragraph 4.4 of the study we discuss congestion management in the transmission grid.

¹¹ In paragraph 4.6 of the study we discuss the integration of balancing markets.

the retail market should be addressed by sector-specific energy market regulation in order to guarantee a level playing field¹².

Contribution of competition law

The Member States' State aid measures to support renewables, nuclear facilities or capacity building fractionalise the internal energy market. State aid rules can provide a certain degree of harmonisation and thereby reduce market disruption.

Highly technical issues, such as congestion management in the transmission grid and balancing markets, are currently predominantly nationally organised. This inhibits competition and stands in contrast to the ambition of an internal energy market. Cross-border integration and the opening up of these markets to new market players require a certain degree of harmonisation across Member States. To this end, sector-specific instruments need to ensure harmonisation, open access to markets and a level playing field for (new) market players. The role of competition law is confined to combating the possible competition issues stemming from vertical integration.

Despite past efforts to liberalise energy markets, entry barriers still exist and are leading to market concentration. The impact of these barriers is especially severe with regard to new market players, such as '*prosumers*' and aggregators. With sector-specific regulation being the reason for some of these barriers, amending the corresponding regulation should be a priority to resolve these issues. Various instruments can be used to tackle barriers, which result for instance from national or language requirements.

Whereas energy poverty is a market failure addressed by different types of (social) policies in the Member States, there is hardly a direct role for competition law. Yet, competition law is crucial to maintain the degree of competition in the retail markets, which indirectly reduces energy poverty.

We conclude that the energy market has been a highly regulated market historically and will remain so in the future. The already significant role of sector-specific regulation will become even more important in the near future, given the ambitious policy objectives outlined in the Energy Union Framework Strategy. While the role of competition law instruments has and will continue to be important to protect and maintain effective competition, their role in achieving the Energy Union Framework Strategy is a supporting one. We expect that State aid control in particular will continue to play a prominent role in the future. The reason is that the energy transition will require large-scale state support to renewable energy technologies which are not yet entirely competitive without public investments¹³.

¹² In paragraph 4.8 of the study we discuss the integration of DER, '*prosumers*' and aggregators.

¹³ A new EU-funded study (Hajos et al., 2017) forecasts the possible evolution of European electricity markets in the period 2020 to 2050 and estimates how far renewable electricity projects will be able to finance themselves in this period without the need for public subsidies. It suggests that after 2020 some mature renewable technologies may no longer need subsidies due to lower costs and reforms of the Emissions Trading System (ETS). Yet, for less mature technologies, such as offshore wind, subsidies might still remain necessary after 2020. The study estimates that around €25 billion a year will be needed for government investment in renewable sources of energy 2020 – 2030. The study is available at https://ec.europa.eu/energy/sites/ener/files/documents/cepa_final_report_ener_c1_2015-394.pdf.

1. INTRODUCTION

1.1. Objective of the study

Not too long ago, electricity and gas markets in the European Union were still national monopolies. In the second half of the nineties, Member States decided to gradually open these markets to competition and work towards an internal energy market. This has resulted in numerous competition issues, for example due to a historically high market concentration and a lack of possibilities for market entry due to long term contracts with customers and network operators¹⁴. Important milestones have been reached to address these issues, such as the unbundling of energy distribution and supply, the introduction of the right to switch energy supplier and improvements in interconnectivity and, therewith, in market integration. Moreover, a lot has also been done to ensure that the energy supply is not only affordable and competitive, but also secure and sustainable. The EU is now on its way to reach its 2020 sustainability targets and has formulated new targets for 2030¹⁵, while the Paris Climate Agreement necessitates further actions up to 2050.

As a result, the energy market of today is in many ways totally different from the market 20 years ago. It is still undergoing major changes under the influence of climate change objectives and the accompanying policies¹⁶. 'Energy' is now a vast field, covering many different types of market participants (e.g. generators, aggregators, network operators), technologies (e.g. coal, wind, nuclear but also batteries and smart grids) and business models (e.g. energy management services, energy advisory services, energy trading services besides e.g. the generation and supply of kilowatt hours). This also means that the complexity of the market has increased significantly. Compared to the historical situations, which often have been characterised by a single dominant state-owned monopolist, competition now comes in many different shapes and forms and manifests itself on markets that were non-existent 20 years ago.

Given the developments in recent years as well as the structural and policy changes that are yet to come, this is a good time to take stock of the currently most important issues in the energy sector related to competition and to think about ways to address them. The European Parliament has commissioned this study to provide an overview of these problems and imminent questions related to competition, and to identify the implications of these issues on the internal energy market. Specific attention is paid to the question how these issues can best be addressed: by instruments of competition law or by other policy instruments.

1.2. Reading guide

The European energy market is characterised by certain specificities distinguishing it from other product markets (e.g. the market for cookies) and geographical markets (e.g. Luxemburg). As many policy issues are related to these specificities, we first introduce the EU energy market and its special features (Chapter 2, development and functioning).

A brief definition of competition policy instruments used in the internal energy market follows in Chapter 3. The focus of the analysis lies in Chapter 4, where our methodology for choosing the adequate policy instruments to solve competition-related issues on the internal energy

¹⁴ These issues were systematically analysed in the 2007 sector enquiry of the European Commission: http://ec.europa.eu/competition/sectors/energy/2005_inquiry/index_en.html and were addressed in new legislation as well as individual competition cases.

¹⁵ For example, a Eurostat press release of March 2017 states that the EU share of energy from renewable sources in gross final consumption of energy was 16.7% in 2015 compared to 8.5% in 2004.

¹⁶ The recent Clean Energy Package of November 2016 is the newest major policy initiative.

market is introduced. Seven salient, competition-relevant issues in the internal energy market are described, followed by an analysis of the involved policy fields (competition, energy, consumer protection etc.) and a discussion regarding the usage of possible policy instruments.

We conclude by indicating the adequate policy instrument (competition law, other policy regulation) which provides a solution for the respective competition-related issues. Based on the practical application of policy instruments to these specific issues, the role of competition law in the development of the internal energy market is discussed on a more abstract level, followed by our conclusions (Chapter 5).

2. THE EU ENERGY MARKET

KEY FINDINGS

- The latest round of EU energy market legislation, known as the third package, was adopted in 2009 and created a regulatory framework to progress towards a single European energy market.
- More recent policy initiatives summarised in the 2016 Clean Energy Package ('*Winter Package*'), which, however, has not been adopted yet, encompass a proposal for the governance of the Energy Union, for the promotion of the use of renewable energy and a proposal on the internal market for electricity.
- The basic structure of the European energy electricity system encompasses electricity generation, the power grid with transmission and distribution networks and energy consumption. Electricity is currently difficult to store at large scale (except e.g. hydro-power), which is an important characteristic of energy as a good.
- The European energy market consists of various wholesale markets, characterised by different time-frames, and retail markets, where renewable energy and decentral generation by, e.g., '*prosumers*', are playing a larger role.

2.1. Development of the EU Energy Market

2.1.1. Historical developments

Both energy and competition policies have been and still are important pillars of the European Union, which has been created based on the experience from the European Coal and Steel Community. It was founded on the motivation to prevent another war by establishing a common market for coal and steel.

Most of the national electricity and natural gas companies were still publicly owned or controlled when the European Union and the Member States decided to gradually open the respective markets to competition in the 1990s¹⁷. The first European Energy Directives prescribing the **liberalisation of energy markets** entered into force in 1996. Between 1996 and the late 2000s several other pieces of energy market legislation were adopted¹⁸, in which the political attention gradually shifted from energy market liberalisation towards **energy market integration**, thereby laying the legislative fundamentals to the Energy Union strategy.

¹⁷ Generation and energy supply have been separated from transmission and network operation and opened to competition in the course of the liberalisation. The non-competitive parts of the industry (transmission and networks) were obliged to allow for third party access to the infrastructure. Restrictions on customers to change their suppliers have been gradually removed and independent regulators have been introduced to monitor the sector.

¹⁸ The first legislative package (Directives 96/92/EC concerning common rules for the internal market in electricity and 98/30/EC on common rules for the internal market in natural gas), see the full text at <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31996L0092:EN:HTML> and http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.1998.204.01.0001.01.ENG&toc=OJ:L:1998:204:TOC.

In 2003 and 2009 the ambitions were confirmed and strengthened by further Directives on the internal **market for electricity and gas**¹⁹, grouped in the second and third legislative packages on the internal energy market. The two Directives and three Regulations²⁰, which introduce a clear separation of supply and production activities from network operation, a more effective regulatory oversight by independent national energy regulators and reinforce consumer protection, together form the **third and latest legislative package on the internal energy market**, which has been adopted in 2009. The goal of this package was to further open up the gas and electricity markets in the European Union, to enhance investments in energy infrastructure and cross-border trade in order to reach the goals of 'Europe 2020 Strategy'²¹ through a secure, competitive and sustainable supply of energy to the industry and the society. The three legislative packages and the corresponding directives are illustrated in Figure 1.

The **third energy package** created a regulatory framework to support a single, European energy market by developing **European-wide network codes** (NCs) which form a legally binding set rules and obligations that govern access to and use of the European energy networks (e.g. cross-border capacity allocation mechanisms, rules on balancing, rules on transmission tariffs structures and rules on operability). To this end cooperation between transmission system operators (TSOs) was established through the European Network of Transmission System Operators for electricity (ENTSO-E), aiming at completing and ensuring the optimal functioning of the internal energy market by collaborating on the development of rules for network operation and preparing 10-year network development plans. An equivalent body was also created for gas (ENTSO-G).

Moreover, the **Agency for the Cooperation of Energy Regulators** (ACER) was created by the third energy package as an independent European agency with the mission to play a central role in the development of EU-wide network and market rules with a view to enhancing competition²². It assists national energy regulatory authorities (NRAs) in performing their duties, coordinates regional and cross-regional initiatives which enhance market integration, monitors the work of ENTSOs and evaluates their network development plans. In this context ACER can issue both non-binding opinions and recommendations to national energy regulators, TSOs and the EU institutions as well as binding decisions in specific cases and on cross border issues²³.

Whereas the 1996/98 (first) and 2003 (second) legislative packages were focussed primarily on liberalisation and market structure (unbundling), the third energy package of 2009 also focusses on the development of **market access, wholesale market integration** and of **effective retail markets**. It introduced an obligation for the Member State to define

¹⁹ The first legislative package was replaced in 2003 by a second legislative package enabling new gas and electricity suppliers to enter the MS's markets, and consumers to choose their own gas and electricity suppliers.

²⁰ Directive 2009/72/EC concerning common rules for the internal market in electricity and repealing Directive 2003/54/EC; Directive 2009/73/EC concerning common rules for the internal market in natural gas and repealing Directive 2003/55/EC; Regulation (EC) No 714/2009 on conditions for access to the network for cross-border exchanges in electricity and repealing Regulation (EC) No 1228/2003; Regulation (EC) No 715/2009 on conditions for access to the natural gas transmission networks and repealing Regulation (EC) No 1775/2005; Regulation (EC) No 713/2009 of the European Parliament and of the Council of 13 July 2009 establishing an Agency for the Cooperation of Energy Regulators.

²¹ Europe 2020 is the EU's growth and jobs strategy for the current decade, aiming to facilitate development towards a smart, sustainable and inclusive future, see https://ec.europa.eu/info/strategy/european-semester/framework/europe-2020-strategy_en.

²² For further information see the glossary, see also webpage: <http://www.acer.europa.eu/en/Pages/default.aspx>.

²³ http://www.acer.europa.eu/en/The_agency/Mission_and_Objectives/Pages/Acts-of-the-agency.aspx.

vulnerable consumers which a Member State wishes to protect (which may refer to the concept of energy poverty). Any national mechanism to protect these vulnerable consumers may however not harm the functioning of the market. The third package also granted energy consumers a number of rights, such as the right to switch energy providers and to receive clear offers, contracts and energy bills²⁴. Furthermore, the third package sets out obligations on suppliers with respect to the contents of supply contracts, the length of time for which supply data must be retained and the time it should take a consumer to switch their supplier (no more than three weeks).

In addition to this overarching EU regulation on the internal energy market, more **specific EU regulations with respect to energy** exist, for example concerning energy infrastructure investment, energy efficiency, renewable energy²⁵, emission trading and market and price transparency. The Regulation on Wholesale Energy Market Integrity and Transparency (REMIT)²⁶ introduced a sector-specific legal framework to identify and penalise insider trading and market manipulation in European wholesale markets²⁷.

On 25 February 2015 the **Energy Union Framework Strategy**, including the Communication '*A Framework Strategy for a Resilient Energy Union with a Forward-Looking Climate Change Policy*²⁸' was published, aiming at bringing about the transition to a low-carbon, secure and competitive economy. This Energy Union strategy is made up by **five** related and mutually reinforcing **pillars**: (1) supply security, (2) a fully-integrated internal energy market, (3) energy efficiency, (4) climate action (reduction of greenhouse gases) and (5) research and innovation in low-carbon technologies. All actions taken in the scope of the Energy Union strategy ultimately aim to ensure that European consumers, both households and businesses, are supplied with secure, affordable, competitive and sustainable energy. An important objective of the European Union with respect to the European electricity market is to complete the single energy market by 2018²⁹.

Significant steps have been made towards the establishment of the internal energy market and the other key objectives included in the Energy Union strategy³⁰. However, the Commission has concluded that further efforts are still required. To support this, the Commission has agreed to take stock of the progress already made towards building the Energy Union each year and to highlight the issues in need of further attention. This so-called

²⁴ Some of these rights have not yet been put into practice, see [http://www.europarl.europa.eu/thinktank/en/document.html?reference=EPRS_BRI\(2017\)603890](http://www.europarl.europa.eu/thinktank/en/document.html?reference=EPRS_BRI(2017)603890), p. 1. The main reason is non-compliance of companies; for further information see the position paper of the European Consumer Organisation BEUC, http://www.beuc.eu/publications/x2013_083_mst_consumer_rights_in_electricity_and_gas_markets.pdf.

²⁵ Renewable energy encompasses, for instance, solar energy and wind, hydro energy, biomass and geothermal power.

²⁶ <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32011R1227&from=EN>.

²⁷ ACER has been assigned this new task under Regulation (EU) No 1227/2011 of the European Parliament and of the Council on wholesale energy market integrity and transparency, published on 8 December 2011.

²⁸ COM/2015/080 final, from 25. February 2015, <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2015%3A80%3AFIN>.

²⁹ The legal basis of the internal energy market is found in Art. 194, TFEU. The completion of the EU's internal energy market requires the removal of numerous obstacles and trade barriers, the approximation of tax and pricing policies, measures in respect of norms and standards, and environmental and safety regulations. The objective is to ensure a functioning market with fair market access and a high level of consumer protection, as well as adequate levels of interconnection and generation capacity.

³⁰ Important milestones have been achieved in, among others, the unbundling of energy distribution and supply, the opportunity to switch energy supplier, the increase in interconnectivity and market integration and therewith in cross-border trade (decrease in wholesale prices), and the decoupling of energy consumption growth and its related greenhouse gas emissions.

State of the Energy Union was for the first time published on 18 November 2015 and brought together a series of Commission reports and initiatives. It also includes a report monitoring the progress towards the Energy Union objectives for each Member State separately. The second report on the State of the Energy Union was published in February 2017, concluding that the EU as a whole has continued to make good progress on delivering the Energy Union objectives, in particular regarding the 2020 energy and climate targets. The EU has already achieved its 2020 final energy consumption and greenhouse gas emissions targets: EU greenhouse gas emissions were 22% below the 1990 level in 2015. Based on 2014 data, the share of renewables reached 16% of the EU's gross final energy consumption. Another important trend is that the EU continues to successfully decouple its economic growth from its greenhouse gas emissions. During the 1990-2015 period, the EU's combined Gross Domestic Product (GDP) grew by 50 %, while total emissions decreased by 22 %.

Box 1: Terminology: 'Single energy market' versus 'internal energy market'

Although often used synonymously, there are some differences in meaning regarding the concepts of the European "common market", "single market" and "internal market". The **common market**, created by the Treaty of Rome in 1958, is a stage in the multinational integration process, which, in the words of a Court of Justice ruling, aims to remove all the barriers to intra-Community trade with a view to the merger of national markets into a **single market** giving rise to conditions as close as possible to a genuine **internal market**.

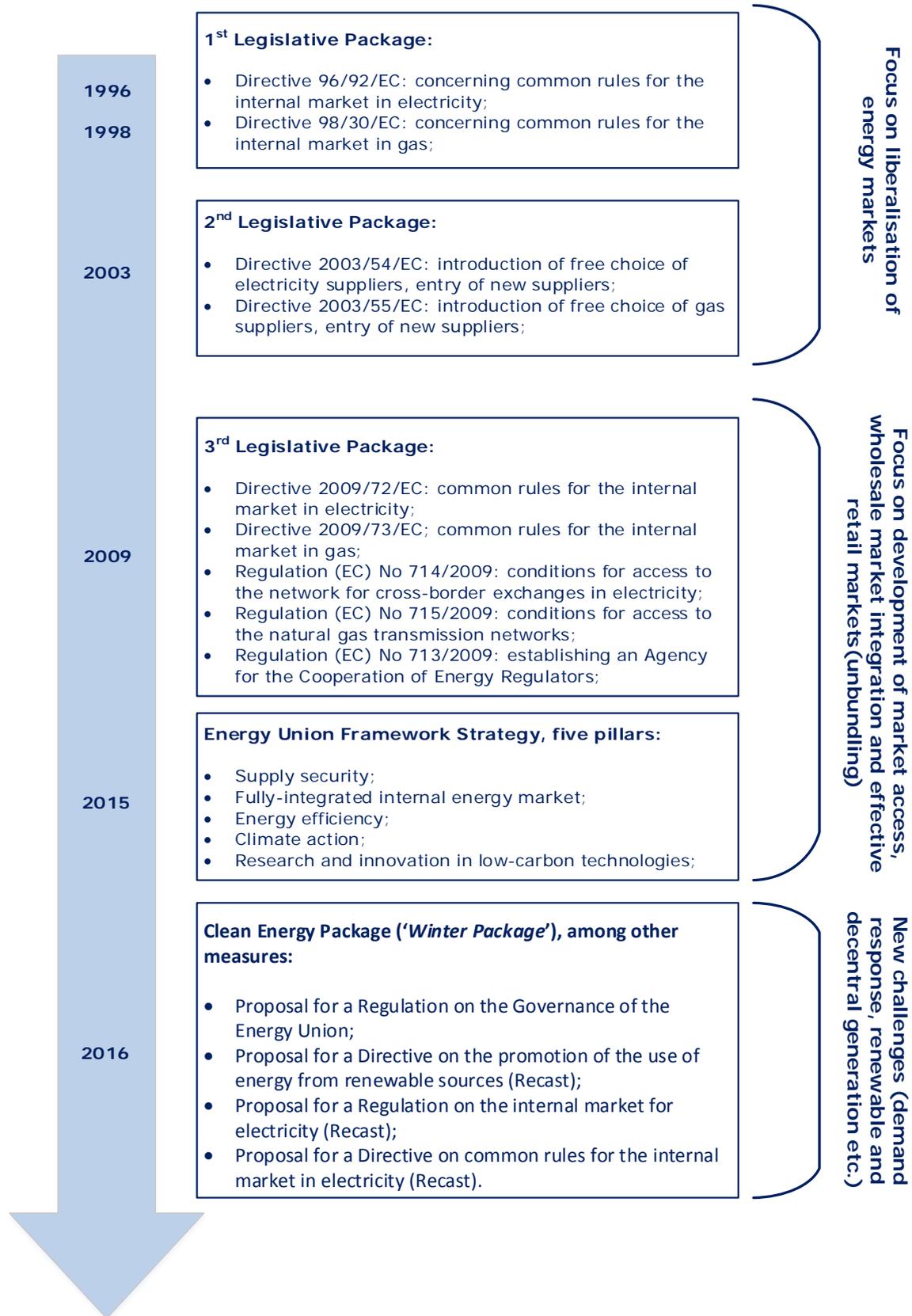
The common and single markets are hence stages of an integration process, of which the internal market is the result.

Applied to the context of the European energy market, a **single energy market** would be a step towards a truly **internal energy market**. In this study, however, we use the terms "internal energy market" and "single energy market" interchangeably.

Source: Based on http://www.europarl.europa.eu/atyourservice/en/displayFtu.html?ftuId=FTU_3.1.1.html.

Figure 1 presents an overview of the timeline of the most important EU energy market legislative measures discussed in this section, together with the most recent policy initiatives discussed in the next section (section 2.1.2).

Figure 1: Timeline of key EU energy market legislation



Source: Ecorys.

2.1.2. Recent policy initiatives

2016 Clean Energy Package ('Winter Package')

Implementing the 2030 energy and climate framework as agreed by the European Council is a priority in follow up to the Paris Climate Agreement (December 2015). Already in 2014 the European Council had agreed on the 2030 climate and energy policy framework for the EU setting a target of reduction of at least 40% of greenhouse gas emissions for 2030. In November 2016, the European Commission proposed a **package of measures** of the remaining key pieces **to fully implement the EU's 2030 climate and energy framework**³¹. This **2016 Clean Energy Package**, also known as the '**Winter Package**', entails measures '*to keep the European Union competitive as the clean energy transition is changing global energy markets*'³² with the aim of leading the energy transition by focussing on three key areas:

- energy efficiency³³;
- achieving global leadership in renewable energies; and
- providing a fair deal for consumers³⁴.

It does so by proposing to amend existing energy market and climate change legislation, such as the regulations from the third package energy market liberalisation measures discussed in section 2.1, and by proposing new measures. The measures are aimed at providing a new market design fitting better to address new challenges, such as the necessity to manage demand-response, through more co-ordination of legislation, planning, guidelines and new institutions³⁵.

Governance of the Energy Union

The reporting requirements necessary to monitor the progress towards the Energy Union in each Member State are addressed by the '*Proposal for a Regulation on the Governance of the Energy Union*'³⁶ that aims to establish a **regulatory framework for the Governance of the Energy Union**: firstly, by streamlining and by integrating the planning, reporting and monitoring requirements in the energy and climate fields, and, secondly, by defining a political process between the Member States and the Commission, also involving other EU institutions, with the aim of achieving the Energy Union objectives.

Promotion of the use of renewable energy

Whereas the new initiative on the Governance of the Energy Union is important to achieve the Energy Union's objectives, more needs to be done, especially regarding the goal of

³¹ For the Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee, the Committee of the Regions and the European Investment Bank on Clean Energy For All Europeans, see http://eur-lex.europa.eu/resource.html?uri=cellar:fa6ea15b-b7b0-11e6-9e3c-01aa75ed71a1.0001.02/DOC_1&format=PDF. Please note that the Clean Energy Package is a package of suggestions by the EC; it has not yet been approved by the EP and the Council.

³² <https://ec.europa.eu/energy/en/news/commission-proposes-new-rules-consumer-centred-clean-energy-transition>.

³³ The EC proposes a binding energy efficiency target for 2030 of 30% instead of the 27% envisaged in 2014.

³⁴ http://europa.eu/rapid/press-release_IP-16-4009_en.htm.

³⁵ An example for a new institution created are Regional Operational Centres (ROCs), which consist of TSOs from a region designated by ACER to enhance a more coordinated regional approach.

³⁶ http://ec.europa.eu/energy/sites/ener/files/documents/1_en_act_part1_v9_759.pdf.

reaching the share of 27% renewable energy consumption³⁷. Therefore, the '*Proposal for a Directive of the European Parliament and the Council on the promotion of the use of energy from renewable sources (recast)*' lays out the principles of an **updated renewable energy framework**³⁸. Furthermore, Art. 5 introduces the gradual, but mandatory opening of national support schemes to renewable energy installations in other Member States.

Internal market for electricity

The '*Proposal for a Regulation of the European Parliament and of the Council on the internal market for electricity*'³⁹ and the '*Proposal for a Directive of the European Parliament and of the Council on common rules for the internal market in electricity*'⁴⁰ are closely linked to the initiatives described above⁴¹. The aim of all those initiatives is to **implement the required measures to achieve the goals and objectives of the Energy Union Strategy**: a competitive, secure and sustainable Energy Union. These recasts are necessary to address fundamental changes and new challenges in European electricity markets, such as the increased share of electricity generated from renewable energy sources (RES-E), integration of local generation, distorted electricity pricing and price regulation.

The '*Proposal for a Regulation of the European Parliament and of the Council on the internal market for electricity*' sets out the key principles for national energy legislation to allow for a functioning internal electricity market and for electricity trading rules within different timeframes (balancing, intraday, day-ahead and forward markets). It also provides for a framework of for more market compatible rules for the dispatch of generation and demand response (DR)⁴².

The '*Proposal for a Directive of the European Parliament and of the Council on common rules for the internal market in electricity*' lays down principles for Member States to ensure that the EU electricity market is competitive, consumer-centred, flexible and non-discriminatory. This is done by highlighting that cross-border electricity flows should not be hampered by national measures. Pre-existing consumer rights are reinforced and new rights are introduced to empower and better protect the consumer, such as clearer billing information and certified comparison tools, the entitlement of consumers to a dynamic price contract, the possibility of consumers to engage in DR, self-generation and self-consumption of electricity, and their entitlement to request a smart meter. Member States are requested to address energy poverty and to define frameworks to ensure full market participation for independent aggregators and for DR.

Role of competition policy

The provisions proposed in the Clean Energy Package acknowledge the surge of new market players, such as aggregators or '*prosumers*', as well as new markets and products, such as

³⁷ In October 2014 the European Council agreed on the 2030 climate and energy framework introducing new EU-wide targets and policy objectives for the period between 2020 and 2030. The concrete targets proposed a 40% greenhouse gas reduction relative to 1990 levels, at least 27% of EU energy consumption from renewable, and an improvement in energy efficiency of 27%.

³⁸ <http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=COM:2016:767:FIN>.

³⁹ Proposal for a Regulation of the European Parliament and of the Council on the internal market for electricity; <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2016:861:FIN>.

⁴⁰ Proposal for a Directive of the European Parliament and of the Council on common rules for the internal market in electricity; <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2016:0864:FIN>.

⁴¹ <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2016:861:FIN>.

⁴² Demand response denotes the possibility to change the power consumption of an electric utility customer to better match the demand for power with the supply, for further explanation see the glossary.

flexibility services. Furthermore, the Clean Energy Package seeks to introduce co-ordination of unilateral Member State interventions on the energy market, as the latter represent a threat to the internal market⁴³. The role of competition policy in maintaining a level playing field for all market players and competition on all energy product markets is discussed throughout the chapters 4 and 5 of this study.

2.2. Functioning of the EU Energy Market

2.2.1. Basic structure of the EU electricity system

Figure 2 illustrates the basic structure of the electricity system consisting of the **physical infrastructure** for electricity generation, transport and distribution, and different energy and electricity markets.

The physical grid consists of energy generators which can be very different in terms of capacity, energy source, modes of operation, etcetera. For example, the energy generators range from very small (5 kW for a residential solar photovoltaic (PV) system) to very large (nuclear power plants or hydroelectric dams with a capacity of several GW), can be privately or publicly owned, and generate electricity from numerous sources, both renewable and conventional⁴⁴.

In a liberalised market, electricity **generation is separated from the transmission** system operation. As presented in Figure 2, there are two types of electricity networks:

- **Transmission** networks which carry electricity over long distances around the country or internationally at high voltages (typically 110 kV and higher); and
- **Distribution** networks which run at lower voltages and supply the end-consumer, i.e., houses and businesses, with the electricity from the transmission grid.

The transmission grids are operated by **national TSOs** which are responsible for balancing the system, i.e., for ensuring that the supply of electricity meets demand at each instant of time. At the moment, balancing rules are not harmonised within the European Union, hindering and limiting the integration of **balancing markets**, which is an important step towards the creation of a single internal electricity market⁴⁵.

Since 2009, 41 TSOs from 34 countries across Europe are organised in the European Network of Transmission System Operators (ENTSO-E) on the European level. Many TSO's cooperate at a regional level in different forms⁴⁶.

Distribution networks are managed by **distribution system operators (DSOs)** connecting consumers, installing electricity meters etc.

Energy from smaller renewable sources, such as wind and solar, is generally fed directly into the distribution network, whereas large offshore wind farms feed into the transmission grid.

Next to the physical distribution part of the electricity system, energy is sold on different markets with different market players. The market participants are the **electricity generators, the TSOs and DSOs, electricity suppliers** buying electricity from generators

⁴³ Hancher, L., Winters, B.M. (2017), p. 6.

⁴⁴ Conventional energy sources encompass, for instance, fossil fuels, coal, oil and gas, and nuclear fuels, such as uranium-235 or plutonium-239, elements capable of nuclear fusion.

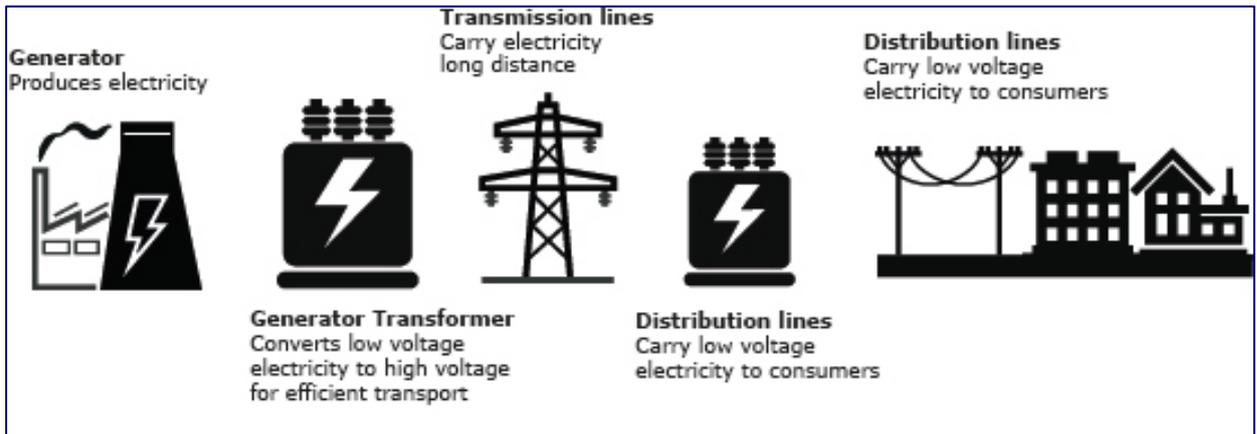
⁴⁵ In section 4.6 we further discuss the issue of balancing markets integration.

⁴⁶ See, e.g., <http://www.coreso.eu>.

and the **consumers** of this electricity. Also **regulators** play an important role in all parts of the value chain. We can distinguish between wholesale markets, where participants are professional and well-informed, and retail markets where energy is supplied to retail consumers. Both markets are discussed in more detail in section 2.2.3.

In contrast to other markets, such as goods markets, **timing** is an important factor in the electricity markets, especially in the wholesale market. This is because electricity cannot (yet) be stored efficiently⁴⁷ – it needs to be produced and delivered the moment it is needed. This has led to the development of different markets within the wholesale market which aim at ensuring that electricity demand is met at all times. This is covered in the next section.

Figure 2: Basic structure of the electricity system



Source: Ecorys.

2.2.2. Generation

Characteristics of electricity generation

There is a plethora of different energy generation technologies, also linked to different energy sources. We can distinguish energy generation along a couple of lines:

- **Generator capacity**⁴⁸, i.e., the maximum power they can produce.
- **Flexibility to provide electrical power when needed:** whereas nuclear power plants are not flexible to adjust their production and usually produce the same amount of energy over long time periods, hydropower and gas plants can be switched on and off or change their production within a few seconds and a few minutes respectively.
- **Firm and variable capacity generation:** one can distinguish between generators which can be switched on and off as needed (firm-capacity), and generators depending on factors which cannot be influenced, such as wind and sun (intermittent capacity).
- **Source of the primary energy used for generation:** renewable (solar energy and wind, hydro energy, biomass and geothermal power) and conventional energy sources

⁴⁷ For more information and the prospects of electricity storage please see Box 5 in section 2.2.3.

⁴⁸ As noted above, energy generation can range from capacities of less than 5 kW for rooftop solar panels to large hydroelectric dams or nuclear power stations with a capacity of several GW. For an explanation of watts, watt-hours, GW and kW please see the glossary.

(e.g. fossil fuels, coal, oil and gas, and nuclear fuels⁴⁹, such as uranium-235 or plutonium-239, elements capable of nuclear fusion).

Table 1 gives an overview over the characteristics of the energy generation technologies mentioned here.

Table 1: Overview over the characteristics of energy generation technologies and corresponding fuel types

Energy generation technology – fuel type	Firm- /Variable- generation	Fuel type	Flexibility	Emissions (kg CO ₂ /kWh)
Coal-fired power plants	Firm	Fossil fuel	Medium	0.95
Natural gas-fired power plants	Firm	Fossil fuel	High	0.55
Nuclear power plant	Firm	Fossil fuel	Low	Zero-emission
Hydro dam	Firm	Renewable	Very high	Zero-emission
Biomass	Firm	Renewable	Medium	Zero-emission (if re-grown)
Solar	Variable	Renewable	Very low	Zero-emission
Wind	Variable	Renewable	Very low	Zero-emission
Geothermal	Firm	Renewable	High	Zero-emission

Source: Understanding Electricity markets, Briefing European Parliament, November 2016, p. 4, [http://www.europarl.europa.eu/RegData/etudes/BRIE/2016/593519/EPRS_BRI\(2016\)593519_EN.pdf](http://www.europarl.europa.eu/RegData/etudes/BRIE/2016/593519/EPRS_BRI(2016)593519_EN.pdf). For data regarding CO₂ emissions of different methods of electricity generation, see <https://www.eia.gov/tools/faqs/faq.php?id=74&t=11>. For more background information regarding the characteristics of different forms of energy generation and the impact of growing shares of variable renewable generation on flexibility requirements of the electricity system, see, for instance, Kosmadakis et al. (2013)⁵⁰ and Eurelectric (2011)⁵¹.

⁴⁹ Although nuclear fuel is not renewable, nuclear energy is considered as a nearly zero-emission energy source.

⁵⁰ Available at https://link.springer.com/chapter/10.1007%2F978-1-4471-5595-9_2.

⁵¹ Available at http://www.eurelectric.org/media/61388/flexibility_report_final-2011-102-0003-01-e.pdf.

Electricity generation in Europe

Energy generation in Europe varies broadly in different Member States: traditionally, it originates mostly from **very large units**, such as nuclear power plants or coal fired plants. A reason for market concentration is that the construction of large power plants is very costly; the construction of a nuclear power plant can cost several billion Euros. Therefore, up to recently, the market was dominated by a couple of large energy companies, such as EDF (France), Enel (Italy), E.ON (Germany), Iberdrola (Spain) and SSE (UK) that generate energy EU-wide and feed into the transmission networks. As a result of the changes in energy and climate policies, some of these large companies have chosen to split themselves into a fossil company and a renewable company, the latter having a brighter future.

Furthermore, the share of **small-scale regional generation** has increased significantly in recent years⁵². This electricity is usually fed into regional distribution networks. Another recent development is the rise of micro-grids, i.e., small low-voltage electricity grids⁵³. There are different types of micro-grids: micro-grids are often owned by private industrial and commercial organisations, operated with the focus to support the owners' business operations with economic and reliable power supply. Military base micro-grids are focused on reliability and safety. Micro-grids in cities and municipalities are seen as drivers for a '*smart city*' vision. Also vertically integrated utilities might use micro-grids to serve customers with special requirements⁵⁴.

Box 2: European Micro-grid Project Examples

Grid4EU

Grid4EU is a project of a consortium spanning 27 partners in 12 EU MS, including utility industry members and six European DOSs. It aims at developing large-scale demonstration projects of smart grid solutions, which are replicable and scalable⁵⁵.

NiceGrid

The NiceGrid micro-grid project is one of the EU's Grid4EU programme's six smart grid projects located in the municipality of Carros in north-eastern France. It aims at studying and testing economic, technical and social issues related to micro-grids of the future⁵⁶.

IssyGrid

IssyGrid is a city micro-grid project in the French city of Issy-Is-Moulineaux near Paris. It entails a cloud-based service to inform users about their carbon efficiency and link them to DR programs⁵⁷.

Reflexe

The project forms a VPP (Virtual Power Plant) integrating renewable generation, storage and DR, with some of the large industrial sites connected to the grid operating as micro-grids⁵⁸.

Source: Schmitt et al. (2013), pp. 63-66.

⁵² The market share of the largest generator in the electricity market differs widely in Europe, from 100% in Cyprus and Malta to about 20% in Poland, see [http://ec.europa.eu/eurostat/statistics-explained/index.php/File:Market_share_of_the_largest_generator_in_the_electricity_market,_2014_\(%C2%B9\)_\(%25_of_total_generation\)_YB16.png](http://ec.europa.eu/eurostat/statistics-explained/index.php/File:Market_share_of_the_largest_generator_in_the_electricity_market,_2014_(%C2%B9)_(%25_of_total_generation)_YB16.png).

⁵³ See the glossary for an explanation.

⁵⁴ Schmitt et al. (2013), p. 61.

⁵⁵ For more information please visit the project's website: <http://www.grid4eu.eu/>.

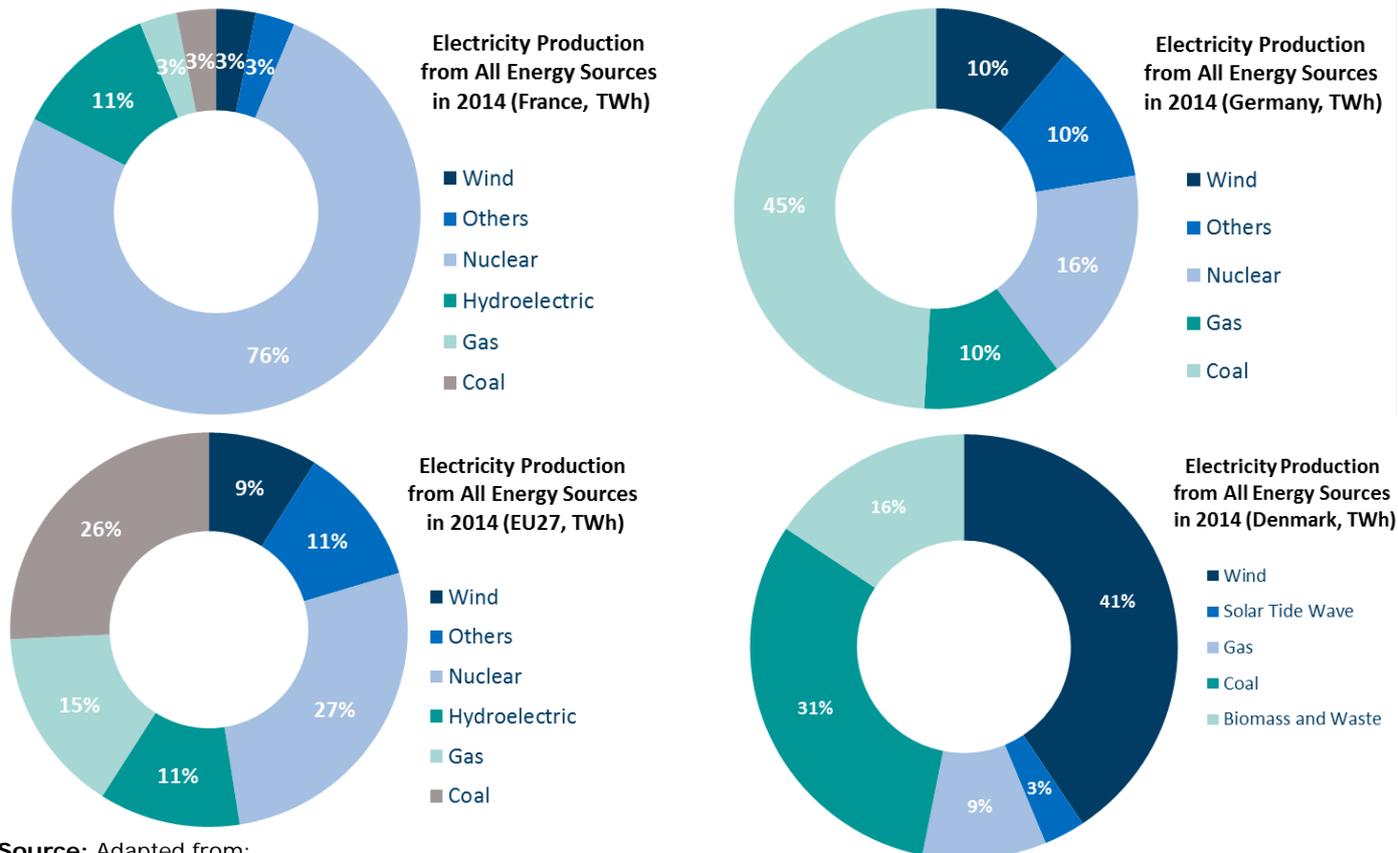
⁵⁶ For more information please visit the project's website: <http://www.grid4eu.eu/project-demonstrators/demonstrators/demo-6.aspx>.

⁵⁷ For more information please visit the project's website: <http://issygrid.com/en/>.

⁵⁸ For more information please visit the project's website: <http://www.reflexproject.co.uk/>.

Also the composition of the **energy mix** (primary energy sources for generation) per Member State differs widely, as can be seen in Figure 3. The reasons are related to geography, the availability of different primary energy sources, such as coal and hydro, former policy choices and path dependency in countries.

Figure 3: Electricity production from all sources in EU 27, DE, DK, FR (2014)



Source: Adapted from: <http://www.tsp-data-portal.org/Breakdown-of-Electricity-Generation-by-Energy-Source>.

Member States use investment aid as an instrument to reach their renewable energy targets and to enable the construction of nuclear power plants, for instance. However, unfair competition could arise when overcompensation takes place⁵⁹.

Electricity generation and ETS

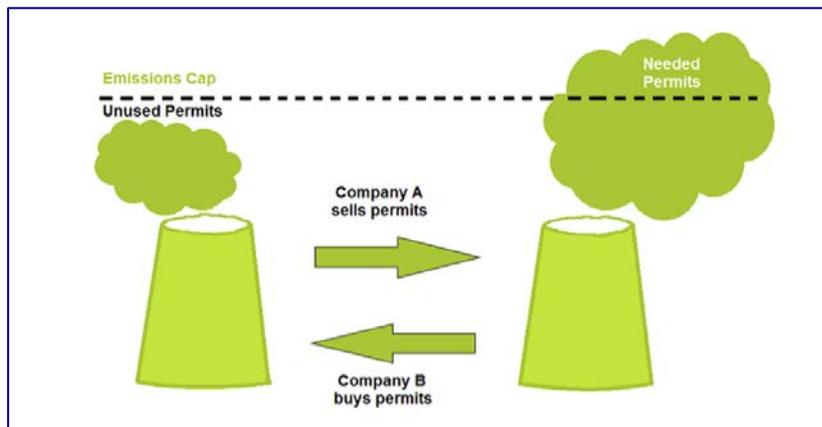
ETS is an important instrument regarding the EU's aim of reducing greenhouse gas emissions. It is a so called '*cap-and-trade*' system, **limiting the total of emissions for power stations and certain industrial plants** in all 28 EU countries, plus Iceland, Lichtenstein and Norway. Around 45% of all greenhouse gas emissions in the EU are covered by the system; the affected sectors encompass power and heat generation, energy-intensive industry sectors, such as oil refineries, the production of steel, aluminium and other metals, the production of lime, glass, ceramics, pulp, paper, cardboard, acids and bulk organic chemicals, and commercial aviation.

As mentioned above, the total allowed emissions in certain sectors are limited, i.e., a '*cap*' is set which is reduced over time. Companies operating under this cap receive or buy emission

⁵⁹ In section 4.3 we further discuss the issue of energy generation and State aid. In section 4.3.2 we discuss auctions as a means to reach more efficient renewables support schemes.

allowances which can be traded amongst the companies. A company needs to have enough emission allowances to cover its actual emissions, otherwise it needs to buy additional allowances or reduce its emissions. This trade is schematically illustrated in Figure 4. Another possibility to fulfil the emissions obligations of a company is to buy international 'offsets' or credits⁶⁰. Emissions savings are incentivised by the possibility to re-sell the emission allowances not used. However, currently the CO₂ prices generated by the ETS-system are generally perceived as too low to provide appropriate incentives to invest in renewable generation capacity and to save energy⁶¹. As a result, some countries have implemented national measures such as a CO₂-tax or a floor on the CO₂-price.

Figure 4: Schematic illustration of the EU ETS permit trade



Source: <http://climatepolicyinfohub.eu/eu-emissions-trading-system-introduction>.

Box 3: Three EU ETS phases

EU ETS phase 1 (2005-2007): In this pilot phase only CO₂ emissions from power generation and some energy-intensive industries were covered by the cap. The allowances were mostly given for free.

EU ETS phase 2 (2008-2012): The experience from the first phase was that the cap has been set too generous. Hence, a lower cap on allowances was set. Allowances were allocated for free in 90% of the cases, the rest was auctioned off. The possibility to buy international credits was introduced. The aviation sector was included into the EU ETS. Also, Iceland, Liechtenstein and Norway joined the system.

EU ETS phase 3 (2013-2020): Significant changes were introduced in the third phase of the system, such as a single, EU-wide cap on emissions, auctioning as the default allocation method for allowances in contrast to giving it away for free. Furthermore, more sectors and greenhouse gases were included. By setting 300 million allowances the New Entrants Reserve was created which aims to fund demonstration projects on renewable energy technologies and carbon capture and storage.

⁶⁰ These international credits are financial instruments representing a tonne of CO₂ removed or reduced from the atmosphere resulting from an emissions reduction project.

⁶¹ Currently: 4,53 EUR/tCO₂ (source: <https://www.eex.com>), whereas a price of 60-100 EUR/tCO₂ would be required for providing the appropriate investment and energy saving incentives.

New challenges in the area of electricity generation

The changes which have been taking place in the electricity sector over the past decades pose challenges for the future. Especially the **growing share of electricity from renewable sources** reduces greenhouse gas emissions from electricity generation, but raises two problems for the current electricity system:

1. As electricity supply must be equal to the demand at all times – otherwise the system is at risk of breaking down, **flexibility** becomes more important with the increased share of intermittent capacity⁶². Therefore, interconnection, DR, storage and sufficient firm generation capacity are needed.
2. A related challenge is to ensure sufficient investment in flexible (low-carbon) electricity generation. It might not be economically beneficial for energy companies to keep power plants in reserve which are only used to supply electricity in times of demand peaks⁶³. The **lack of these reserves**, however, could have a destabilising effect on the entire system in case peak demands cannot be met. To ensure the stability of the electrical system and achieve supply of security for consumers, several Member States have introduced **capacity remuneration mechanisms (CRMs)**. These mechanisms could harm competition as they often provide support to specific generation technologies⁶⁴.

2.2.3. Electricity markets in the EU

Energy markets – demarcation

There are various electricity markets in the EU operating on different levels and differing in their institutional and organisational structures: **wholesale** markets for energy generators and suppliers, for instance, work differently from **retail** markets supplying consumers.

Wide variation exists with respect to the **geographical scope** of these markets: whereas wholesale markets can be transnational, retail markets are national or regional (covering smaller parts of the national market). The **time horizons** for contracts on different markets can be very different: wholesale markets, for instance, entail real-time balancing markets, but also markets where long-term contracts are prevalent.

The **relevant** geographical market for a potential competition case assessment **can vary quite significantly** and it is possible that it entails the entire internal market or just a (cross border) region covering part of one or several Member States. A thorough market definition is thus essential. For wholesale markets, bidding zones are important geographical demarcations⁶⁵. The wholesale electricity price is uniform within a bidding zone. Bidding zones in Europe correspond mostly to regions or whole nation states in Europe for historical reasons. Yet, there are bidding zones which encompass multiple Member States, such as the common Austrian-Germany-Luxemburg bidding zone. Geographic definitions have been used in cases regarding the TSO curtailment of cross-border transmission capacity for electricity,

⁶² While non-flexible generators were traditionally used for supplying the base load, i.e., the normal, predictable level of electricity use, flexible generators supplied additional electricity in times of demand peaks.

⁶³ The reasons for a lack of reserves and investment in new capacities are described in detail in Chapter 4.5.

⁶⁴ In paragraph 4.5 we discuss further on the issue of CRM.

⁶⁵ See the glossary for a further explanation of the term '*bidding zone*'.

for instance⁶⁶. The relevant retail markets, in contrast, might range from local, regional (in Germany, for instance) to national (in the Netherlands)⁶⁷.

Wholesale market

Generators, electricity suppliers and large industrial consumers participate in the wholesale market. Suppliers offer electricity to individual consumers on the retail markets.

Wholesale market transactions reflect the fact that electricity cannot yet be stored and has to be delivered when it is needed: the task is to **match supply and demand** at each point in the future, resulting in different markets **characterised by different time horizons**:

- Long-term contracts market (up to 20 years).
- Forward and future markets (weeks to years in advance).
- Day-ahead market.
- Intra-day market (time period of an hour or fifteen minutes).
- Balancing market (real time balancing of supply and demand); this refers to the situation after markets have closed in which a TSO acts to ensure that demand is equal to supply, in and near real time)⁶⁸.

The relevant product market from a competition perspective may vary depending on supply and demand conditions during certain periods (e.g. peak periods versus off-peak periods or intra-day versus day-ahead or long term). This is due to the ever-changing nature of electricity demand, to which electricity supply (in the absence of demand response measures) must adjust.

Energy trading occurs between two parties or through an energy exchange, where many buyers and sellers are brought together. There, prices are highly volatile due to the changing supply and demand. Peak prices of around EUR 80/MWh (or even more) are possible as well as prices near or below zero at times of excessive supply. If relatively few generators are able to respond to an exceptionally high demand, these generators will be able to charge much higher prices than in the absence of such a potential imbalance. Some countries have introduced price caps to ensure prices cannot rise *'too high'* and are hence aimed at limiting any potential for abuse of a dominant position. This however comes at a cost as incentives to invest in flexible generation capacity are diminished.

Electricity is produced in the merit order, i.e., the generators with the lowest production price are dispatched first until energy demand is satisfied. The dispatching generators receive the price demanded by the *'marginal'* generator, i.e., the generator with the highest production costs which was still called to produce electricity⁶⁹. In recent years, the merit order has changed as a result of higher shares of renewable generation, such as wind and solar, which have nearly zero marginal generation costs and are therefore dispatched first (whenever they are available).

⁶⁶ See, for example, Commission Decision of 14.4.2010 relating to a proceeding under Article 102 of the Treaty on the Functioning of the European Union (TFEU) and Article 54 of the EEA Agreement (Case 39351 – Swedish Interconnectors), section 4.1, for an example for a geographic demarcation of a relevant market. Text available at http://ec.europa.eu/competition/antitrust/cases/dec_docs/39351/39351_1223_2.pdf.

⁶⁷ In section 4.7.1 we explicate the difficulty to demarcate retail markets using the example of Germany.

⁶⁸ Where there is a discrepancy between the amount of electricity produced and that demanded during a certain time period, a TSO may accept a *'bid'* or *'offer'* to either increase or decrease generation (or consumption) on the balancing market.

⁶⁹ For more detail, please see Box 3.

Box 4: The merit order

The available sources of energy (especially of electricity generation) need to be called upon to produce energy depending on the demand for energy. The 'merit order' is a way of ranking available generators in order to organise the dispatch: the sources are ranked based on the ascending order of price reflecting their short-run marginal costs. To minimise the costs of electricity production, the plants with the lowest marginal costs are called to dispatch first. The plants with the highest marginal cost are brought on line last. In case that demand is low, plants with high costs are not asked to provide energy at all. The price paid for the provision of electricity at a certain point in time in theory therefore equals the marginal costs of the last unit which was called to dispatch to meet energy demand. A price higher than this marginal costs would result in inefficiently high energy prices, whereas, if the price was lower than the marginal price, the last plant (and possibly some of the called upon plants before the last plant) would make a loss producing electricity and would hence refuse to provide energy.

The availability of this zero marginal generation costs renewable energy has caused wholesale prices to decline and there have been less peaks in prices. As a result, wholesale prices have been too low to cover the average costs of many conventional generators (especially the older and less efficient ones), resulting in a 'mothballing' and decommissioning of generators. This has reduced the available capacity that can respond quickly to changes in demand or supply, creating concerns about the security of supply in some MS or regions.

Box 5: Market coupling in Europe

Market coupling refers to the integration of two or more electricity markets from different areas through a cross-border allocation mechanism. The cross-border transmission capacities are implicitly available for the market participants in the connected areas⁷⁰, instead of being explicitly auctioned. Electricity is sold together with interconnection capacity, instead of being sold separately. This is an important step to enable free movement of electricity between integrated markets. Examples of market coupling are the Danish-German market coupling, realised in 2009 and extended by the Baltic Cable⁷¹ between Sweden and Germany in 2010. In November 2010 a day-ahead market coupling for an extended region covering Belgium, France, Luxembourg, Germany, the Netherlands, the Nordic region and Estonia was launched and in 2011 extended by the NorNed⁷² cable between Norway and the Netherlands. In February 2014 the Price Coupling in North Western Europe (NWE) went live, covering 15 countries and 75% of the European power market. Since the launch of NWE, two extensions of the coupled area have taken place: In May 2014 Spain and Portugal joined, and in February 2015 Italy coupled with France, Austria and Slovenia, resulting in an area covering 19 countries and representing about 85% of European power consumption. **Due to market coupling, electricity prices across the markets converge if there is enough interconnection capacity.**

⁷⁰ This is facilitated by the European Market Coupling Company, EMCC, which provides congestion management services for cross-border electrical interconnectors.

⁷¹ The Baltic Cable is a power line running beneath the Baltic Sea, interconnecting the electric power grids of Germany and Sweden.

⁷² NorNed is a 580-kilometre long high-voltage direct current submarine power cable between Fedaa in Norway and the seaport of Eemshaven in the Netherlands, interconnecting both countries' electrical grids.

There are transnationally integrated wholesale markets in different regions of Europe (**'market coupling'**). In case there is not enough interconnector capacity and electricity cannot flow from a lower to a higher price area, **'congestion'** occurs resulting in different prices across regions. Congestion in the transmission grid can constrain the ability of remote suppliers to compete, resulting in higher prices for end-consumers⁷³.

Retail market

Retail market participants are suppliers offering different electricity contracts and consumers who can choose their preferred contract and their supplier⁷⁴.

Suppliers charge customers according to their specific contract for the energy delivered, as well as a **fee** for transmission and distribution (network costs), **taxes, surcharges** and possibly **levies** for various other policy objectives (renewable energy sources (RES) support etc.)⁷⁵. The consumer can choose his/her contract with respect to price, conditions (e.g. fixed or variable rates) and/or energy source (**'green'** versus conventional power sources). High levels of concentration and/or high levels of vertical integration between energy suppliers can cause market distortions, limit competition, reduce consumers' choice and result in higher prices⁷⁶.

Prices for electricity on retail markets offered to households often differ from electricity prices for industrial consumers: the latter, energy-intensive industries in particular, might enjoy (partly) exemptions from certain charges (e.g. energy taxes). Moreover, industrial consumers often do not participate in the retail, but in the wholesale market.

Consumption and decentralised generation

Despite the goal of the EU to ensuring affordable energy for households and the industry, the support for renewable energy sources resulted in price increases for households. **Energy poverty**⁷⁷, defined as a situation where individuals or households cannot adequately heat or provide other required energy services in their home at affordable costs, is still a problem in large parts of the EU⁷⁸. The reasons are rising energy prices, taxes and fees, regional and national economic decline, and homes with poor energy efficiency. According to the EU Survey on Income and Living Conditions an estimated 54 million Europeans (around 11% of the European population) were unable to warm their houses adequately in 2012⁷⁹. A similar number of Europeans was late with paying utility bills or lived in poor housing conditions. These indicators are particularly pronounced in Central Eastern European and Southern European Member States⁸⁰.

The development of renewable energy sources increased the need for integration of the electricity market: renewable energy sources are often geographically clustered and cheap renewable energy needs to be transported to regions with little renewable sources. The development of **'smart energy solutions'** offers the possibility of **'prosuming'**: the consumer is no longer a passive recipient but an active producer of energy for his own consumption or

⁷³ In section 4.4 we further elaborate on the issue of congestion management in the transmission grid.

⁷⁴ Retail market consumers encompass households and other small-scale consumers, such as SMEs, schools, hospitals etc. Large industrial consumers often participate in the wholesale market.

⁷⁵ See Section *'Energy prices in Europe'* in http://ec.europa.eu/energy/sites/ener/files/documents/20140122_communication_energy_prices_1.pdf.

⁷⁶ In paragraph 4.7 we further discuss the issue of effective competition between energy suppliers.

⁷⁷ In paragraph 4.9 we further discuss the issue of discuss energy poverty.

⁷⁸ Pye and Dobbins (2015), p. v.

⁷⁹ Pye et al. (2015), p. 1, the data used still seems to be the most recent available.

⁸⁰ Pye and Dobbins (2015), p. v.

for feeding it into the grid. The consumer can play a more active role apart from energy generation: *'smart meters'* offer the possibility to introduce time-variant electricity pricing, i.e., pricing which reflects the scarcity of electricity at each moment of the day. In that case, consumers could choose to have their electricity supply cut when the price reaches a certain cut-off value, whereas they could choose to use electricity (or store it) when the price is low and supply is abundant.

Box 6: Electrical energy storage

The need to reduce greenhouse gas emissions and to introduce renewable, very often intermittent, energy sources results in great challenges for the power network regarding transmission and distribution: demand needs to be met while supply is subject to unpredictable daily and seasonal fluctuations.

Electrical Energy Storage (EES) technologies are being developed to meet these challenges: electrical energy is stored in a certain state, according to the technology used, and is converted to energy when needed⁸¹. There are many different EES technologies, such as Pumped Hydroelectric Storage (PHS), Compressed Air Energy Storage (CAES), Flywheel Energy Storage (FES), Battery Energy Storage (BES), Flow Battery Energy Storage (FBES), capacitor and super capacitor, Superconducting Magnetic Energy Storage (SMES), solar fuels, hydrogen storage and fuel cells, thermal energy storage and different hybrid version of the aforementioned storage possibilities⁸². All these technologies can be used for many different storage applications.

Apart from PHS, most EES technologies are **not yet cost-effective or mature enough** to be implemented on a large scale within current large network operation regulation and energy market frame. Also, there is no suitable commercialised technology for seasonal energy storage, i.e., energy storage in the time frame of months, yet, although PHS, fuel cells and TES have potential in this area. A future widespread deployment of EES will depend on technology advances which are difficult to forecast as well as carbon prices.

These future possibilities relating to a more active role of the consumer, or the *'prosumer'*, require better information and political will to empower the consumer⁸³. Moreover, time dependent pricing is necessary (which is currently absent on retail markets) to provide incentives for consumers to respond when prices are relatively low or relatively high. Currently, consumers are not exposed to daily or hourly price variability, while only some consumers have daytime and night-time electricity. Many *'prosumers'* also receive a fixed rate per kWh of electricity delivered to the grid, either explicitly (through an agreement with an energy supplier) or implicitly (through net metering which reduces offtake).

2.2.4. Short summary of EU energy market characteristics

The energy market has some **specific characteristics** that distinguish it from other goods and raises policy issues. Firstly, energy is a **necessity** for all economic activities and a precondition for economic and social welfare. Having affordable and reliable energy is

⁸¹ Luo et al. (2015), p. 511.

⁸² For a description of these EES technologies see Luo et al. (2015), section 3, starting at p. 513.

⁸³ In paragraph 4.8 we further discuss the role and position of a *'prosumer'* as well as the issue of DER and aggregators integration.

therefore of utmost importance. Secondly, energy is a **non-touchable good**⁸⁴. It can currently only be distributed via a **network** or (transmission and distribution) networks, potentially resulting in competition issues related to questions of network ownership and management. **Timing** is important: due to a **lack of (cost-efficient) storage possibilities**, electricity demand and supply need to match at all times. Electricity prices can potentially be very high during short periods of time due to scarcity.

Thirdly, apart from these special product characteristics of electricity, the EU energy market is a sector which is still **in transition** due to the (not yet) finalised process of liberalisation. The profound changes are influenced by **technological** (e.g. renewable energy technologies and smart technologies) **and policy developments** (such as the Paris Agreement). As a result, the challenge for policy makers is to find the appropriate mix of instruments to manage the transition. In the next chapter we discuss the various available instruments with special attention to instruments of competition policies.

⁸⁴ The non-touchable nature of energy refers to the fact that electricity is non-touchable, non-material and non-storable, having no physical substance. It is, however, a necessity for many economic activities and can also be seen as a service and not only as a good. It has hence an economic value and a price.

3. INSTRUMENTS OF COMPETITION POLICIES

Competition policy instruments in this study encompass sector-specific regulation, competition law and general rules affecting competition⁸⁵. Sector-specific regulation is proposed by the European Commission to shape a legislative framework that is capable of producing the conditions to create and/or maintain competition⁸⁶. Sector-specific regulation and general rules are policy instruments that may include different initiatives to reach a specific goal. **Competition policy** is commonly used to protect competition on all markets. EU Competition law and national competition law instruments can therefore be used to foster competition on the energy market and support at the same time the objectives of the European energy regulations.

Sector-specific regulation

Sector-specific regulation is proposed by the European Commission to create the conditions conducive to maintain competition in a specific sector. The EU energy market has seen much sector-specific regulation during the last 20 years and is likely to see more, as explicated in section 2.1. Therefore, sector-specific regulation is defined as part of competition policy instruments in this study.

Examples of sector-specific regulations are REMIT, Capacity Allocation and Congestion Management (CACM), Forward Capacity Allocation (FCA) and other energy market regulations which also can have an impact on competition⁸⁷. For example, article 3 of the CACM states that the Regulation aims at promoting effective competition in the generation, trading and supply of electricity. It furthermore states: *'the Regulation sets out minimum harmonised rules for the ultimately single day-ahead and intraday coupling, in order to provide a clear legal framework for an efficient and modern capacity allocation and congestion management system, facilitating Union-wide trade in electricity, allowing more efficient use of the network and increasing competition, for the benefit of consumers'*⁸⁸.

Competition law instruments

EU competition law instruments are used by the European Commission and national competition authorities to deal with individual competition cases. The main goal of competition law is to prevent harmful competitive behaviour to the detriment of consumers or undertakings, to strengthen the broader concept of economic efficiency and innovation (dynamic efficiency)⁸⁹ and to achieve effective competition in the market.

⁸⁵ A similar definition has been used in Ellersgaard Nielsen et al. (2013), where it was noted, however, that the general notion of competition policy instruments is mostly constrained to competition law, p. 19.

⁸⁶ Talus (2013), p. 293-294.

⁸⁷ Commission Regulation (EU) 2016/1719 of 26 September 2016 establishing a guideline on forward capacity allocation; <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32015R1222>.

⁸⁸ Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management; <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32015R1222>.

⁸⁹ Lianos (2013) provides a discussion of current approaches in the literature on the question of the goals of EU competition law.

Box 7: Instruments of EU competition law applied in the energy sector

- Antitrust: includes, inter alia, cartel prosecution and measures against the abuse of dominance and the control of essential facilities. The European Commission can determine fines within its powers, illustrated by the cartel prosecution on the sale of gas-insulated switch gear, a component which is used to control energy flow in electricity grids⁹⁰. Antitrust cases also relate to vertical agreements⁹¹ and horizontal agreements⁹². A crucial aspect of assessing anticompetitive behaviour is the market definition, which has a product, geographic and temporal dimensions. For example, when considering abuse of a dominant position it is important to determine whether the behaviour occurs on the whole EU internal energy market or only on the internal electricity market. Geographic limits of the market may be the whole EU, a region consisting of several Member States or just one Member State or even regions (covering parts of different Member States). A specific feature of the electricity market is temporal dimension: the competitive position of a gas fired power plant can be very different from hour to hour (e.g. due to weather changes and the corresponding availability of electricity from renewable intermittent sources).
- Merger control (Regulation (EC) No. 139/2004)⁹³: prohibits mergers which may impede effective competition. Merger control keeps Europe an attractive place for investment and limits horizontal and vertical integration on the energy markets.
- State aid control (Art. 107 TFEU): State aid is used to overcome market failures. State aid control ensures a climate-friendly and resilient energy market without undue competition distortions on the internal energy market. The European Commission often needs to strike a difficult balance in State aid cases, for example on the promotion of renewable energy and the insurance of its stable financing and fair contribution by SMEs and consumers and at the same time protect competitiveness of the European industries⁹⁴.

In practice, the Commission handled 351 merger and anti-trust cases in the gas and electricity markets across Europe in the time period between 1994-2014⁹⁵. The vast majority of these cases concern **mergers**. Moreover, two sector inquiries at European level have taken place, the most recent one being on capacity remuneration mechanisms⁹⁶. Sector inquiries

⁹⁰ C-231/11 P Siemens AG Österreich; <http://curia.europa.eu/juris/liste.jsf?num=C-231/11>.

⁹¹ Vertical agreements apply in a vertical relationship where the product of one party is the input for the other party on different stages of the economic process, so the exercise of market power could harm the upstream supplier or downstream buyer. These agreements have the potential to reduce the intra-brand competition. Competition issues could arise when vertical agreements are concluded on a market with insufficient inter-brand competition, or when the parties have high degrees of market power.

⁹² Horizontal agreements apply in a horizontal relationship where (mostly competitive) parties concluded an agreement at the same level in the supply chain, this could be harmful for competition especially if the objective of the agreement is to fix prices, limit production or share markets.

⁹³ Council Regulation 139/2004 of 20 January 2004 on the control of concentrations between undertakings (EU Merger Regulation); <http://eur-lex.europa.eu/legal-content/en/ALL/?uri=CELEX%3A32004R0139>.

⁹⁴ Illustrated by case SA.33995 Support of renewable electricity and reduced EEG surcharge for energy-intensive users; http://ec.europa.eu/competition/elojade/isef/case_details.cfm?proc_code=3_SA_33995 and as one of the selected topics further discussed in section 4.3.1..

⁹⁵ ICF Consultancy Services, DIW Berlin (2015) p. 86.

⁹⁶ In 2005 the European Commission launched a Sector Inquiry on the functioning of energy markets; http://ec.europa.eu/competition/sectors/energy/2005_inquiry/index_en.html, in 2016 the European

on national levels have also occurred. In Germany, for instance, sector inquiries in district heating (2012), in the fuel sector (2011), in the electricity sector (2011) and in the gas transmission sector (2009) have been conducted⁹⁷.

General rules

General rules, such as consumer protection or data protection rules which are fulfilling specific objectives outside the field of competition could also address specific competition problems and have an impact on the market. Because these general rules address issues at the intersection between the energy sector and other policy fields, such as consumer protection, they are also competition policy instruments as defined in this study. Concrete examples are rules on consumer rights⁹⁸, consumer contracts⁹⁹, the protection of natural persons with regard to the processing of personal data and on the free movement of this data and privacy regulations¹⁰⁰.

Ex ante and ex post instruments

In summary, EU competition law aims at safeguarding effective competition, whereas other competition policy instruments, such as specific sector regulation and general rules, are more prescriptive and provide more detailed guidance and are usually applied ex ante, anticipating potential competition issues, safeguarding and promoting competition. This distinction becomes clear when considering the role of competition law and specific sector regulation regarding capacity mechanisms in Member States. In April 2017 the European Commission has opened an in-depth investigation to assess whether German plans to set up an electricity capacity reserve comply with EU state aid rules. The Commission has concerns that the measure may distort competition and favour power plant operators over DR operators and uses competition law to ensure effective competition. In contrast, the *Proposal for a Regulation of the European Parliament and of the Council on the internal electricity market*, which is part of the 2016 Clean Energy Package, sets out new general principles for addressing resource adequacy concerns by Member States in a coordinated manner:

Commission published the Final Report of the Sector Inquiry on Capacity Mechanisms;
http://ec.europa.eu/energy/sites/ener/files/documents/com2016752_en_.pdf.

- ⁹⁷ The Sector Inquiry into Electricity Generation and Wholesale Markets is found here: http://www.bundeskartellamt.de/SharedDocs/Publikation/EN/Sector%20Inquiries/Sector%20Inquiry%20Electricity%20Generation%20and%20Wholesale%20Markets.pdf?__blob=publicationFile&v=2 (English version), the Final Report Sector Inquiry District Heating can be found here: http://www.bundeskartellamt.de/SharedDocs/Publikation/EN/Sector%20Inquiries/Sector%20Inquiry%20District%20Heating%20-Final%20Report.pdf?__blob=publicationFile&v=2, the Fuel Sector Inquiry can be found here: http://www.bundeskartellamt.de/SharedDocs/Publikation/EN/Sector%20Inquiries/Fuel%20Sector%20Inquiry%20-%20Final%20Report.pdf?__blob=publicationFile&v=14, and the English summary of the Sector Inquiry Gas Transmission can be found here: http://www.bundeskartellamt.de/SharedDocs/Publikation/EN/Sector%20Inquiries/Gas%20Transmission%20Sector%20Inquiry%20-%20Summary%20Report.pdf?__blob=publicationFile&v=6.
- ⁹⁸ Directive 2011/83/EU of the European Parliament and of the Council of 25 October 2011 on consumer rights; <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:C:2010:083:0389:0403:en:PDF/>.
- ⁹⁹ Council Directive 93/13/EEC of 5 April 1993 on unfair terms in consumer contracts; <http://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX:31993L0013>.
- ¹⁰⁰ Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation); http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2016.119.01.0001.01.ENG&toc=OJ:L:2016:119:TOC.

- It sets out principles for the development of a European resource adequacy assessment to arrive at a common European methodology to determine the need for CRM.
- It clarifies the circumstances for the introduction of CRM.
- It clarifies market compatible design principles for CRM.

Thus, whereas competition law is used *ex post* to assess potential competition disturbances caused by the introduction of a CRM scheme, the proposed Regulation aims at minimising negative competition effects of CRM schemes by ensuring that they are designed in a way that safeguards competition.

4. COMPETITION POLICY AND THE INTERNAL ENERGY MARKET

KEY FINDINGS

- For some energy market issues, both sector-specific regulation, competition law and general policy instruments (such as consumer protection law) can be used to address the competition issue at hand.
- In order to decide whether using competition law instruments is the first-best approach, the reason for the competition issue at hand needs to be analysed to determine whether sector-specific regulation or competition law should be used. If the competition issues stems from a flaw in policies, the first-best approach might be to adjust regulation in the corresponding policy field.
- State aid can be used by governments as an instrument to overcome market failures, for example to achieve energy policy objectives which cannot be achieved by the market without State support (e.g. State aid for renewable energy generation or safeguarding energy security by establishing CRMs). Yet, Member States' employment of State aid could fragment the internal energy market, therefore other options (policy instruments) not involving State aid need to be checked for appropriateness first.
- Some energy market issues, such as congestion management and the integration of balancing markets, are currently predominantly nationally organised. The application of competition law cannot solve these problems, as the lack of competition is often caused by a lack of harmonisation of rules, but could be enhanced by the introduction of common market rules.
- There are still many market entry barriers in the retail market, originating from sector-specific regulation. Changes in these regulations should enhance competition.
- Market failures are inter alia addressed by State aid in different Member States; yet, policy measures distorting energy market competition, such as social tariffs, limitations on disconnections due to non-payment and Member State control or capping of retail prices, should be avoided.

4.1. Energy market issues relevant for competition

Based on the description of the energy market in Chapter 2, Table 2 provides an overview of competition-relevant energy issues, which have been selected because of their significance to achieve both effective competition and a genuine internal energy market. The list is by no means exhaustive; yet, the chosen issues offer a key-starting point in a systematic discussion on the achievements and current and future challenges of competition in an internal energy market.

Table 2: Competition-relevant energy market issues

Issue	Short description
1. Energy generation and State aid	Investment aid (= State aid) enables Member States to reach the goals of the energy transition to renewable energy sources, but the accompanying risks include unfair competition, overcompensation and inefficient functioning of the energy market. The guidelines on State aid for environmental protection and energy 2014-2020 ('EEAG') ¹⁰¹ sets guidance on stimulation mechanisms for renewable energy. State aid to the nuclear sector is beyond the scope of the EEAG.
2. Congestion management in the transmission grid	Congestion in the transmission and distribution grid reduces efficiently allocated capacity to transport electricity and creates barriers for competition in the electricity market as it constrains the ability of remote suppliers to compete with each other. The management of congestion (contractual capacity allocation), physical capacity transmission possibilities and (insufficient) information flows determine the effects on competition.
3. Capacity remuneration mechanisms	Member States have introduced capacity remuneration mechanisms to overcome risks of insufficient flexible generation capacity. These national mechanisms could distort cross-border trade and competition as they are often designed to provide support to specific generation technologies or to national generators only.
4. Integration of balancing markets	Further integration of balancing markets, which are the domain of TSOs ensuring that the demand for electricity is equal to its supply, in and near real time ¹⁰² , is one of the key criteria to create a single internal electricity market. Currently the rules are not harmonised and there is a lack of available cross-border capacity for the exchange of balancing services.
5. Effectiveness of competition between energy suppliers	A high level of concentration and high level of vertical integration between energy suppliers create market distortions, limit efficiency, reduce consumer choice and lead to higher prices. When there are barriers to entry to the market, competition will be limited. Currently, new entrants (e.g. aggregators and 'prosumers') encounter barriers regarding their integration in the market.
6. Integration of prosumers and aggregators in the market	The functioning of the energy retail market can be evaluated based on the switching behaviour of consumers between energy suppliers (transparency). Limited transparency and switching costs could hamper switching and therefore can create competition issues, e.g. risks of coordinated behaviour and the abuse of market power. Consumer activation (e.g. flex providers) is one of the focal points of the transition of the energy

¹⁰¹ Guidelines on State aid for environmental protection and energy 2014-2020 (2014/C 200/01); <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52014XC0628%2801%29>.

¹⁰² <https://www.entsoe.eu/about-entso-e/market/balancing-and-ancillary-services-markets/Pages/default.aspx>.

Issue	Short description
	markets to stimulate passive consumers to become active market actors. Limited access to necessary (smart meter) data for DNOs could create competition distortions, but at the same time access to these data needs to be regulated carefully and data produced needs to satisfy performance standards (e.g. timeliness; accuracy; procedures for dispute resolution) that still need to be developed.
7. Energy poverty	Energy poverty remains a problem despite highly developed energy markets. Therefore vulnerable consumers need to be better protected.

4.2. When to use competition law or sector-specific regulation?

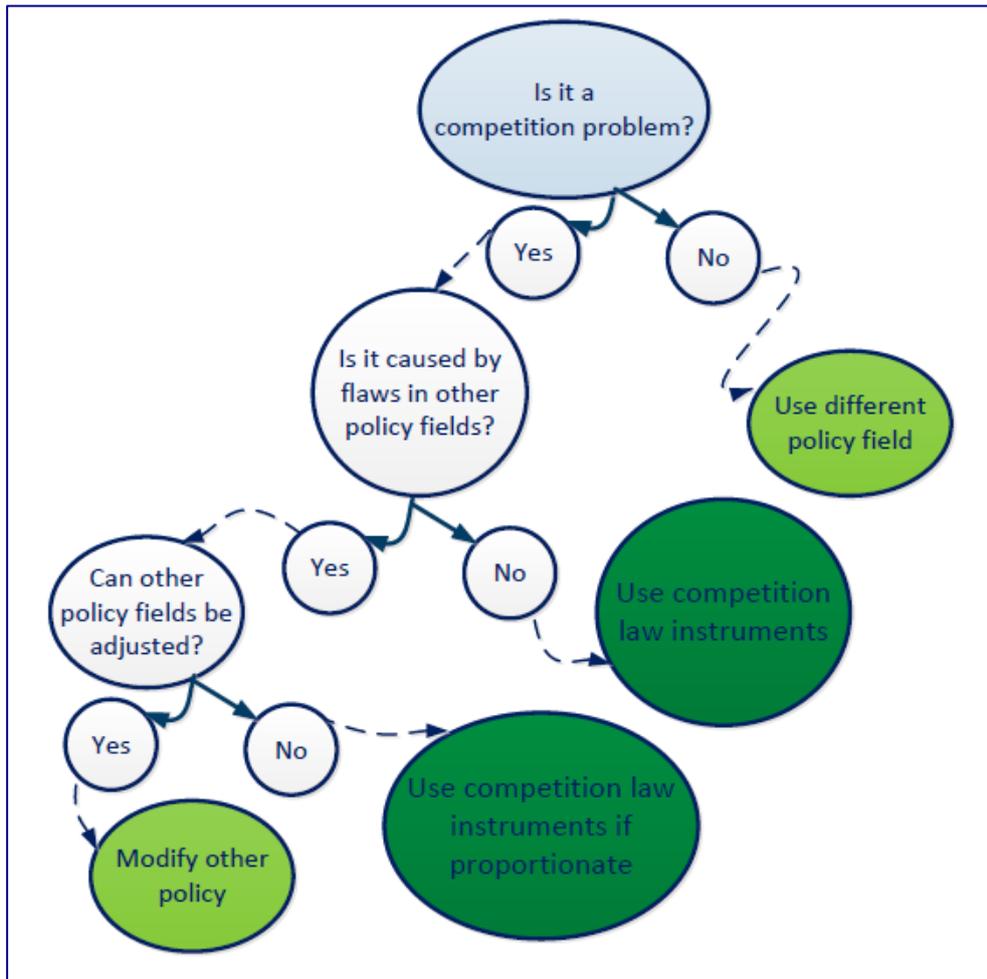
The decision tree presented in Figure 5 below describes an approach to determine when to use specific competition policy tools, and, in particular, when the use of competition law and when the use of sector-specific regulation is appropriate. It should be noted that, although competition law and sector-specific regulation are compatible and based on the same premises, there are differences in the nature and objectives of each instrument¹⁰³. Sector-specific regulation is more intrusive: it does not only aim at preserving competition, but at actively promoting it by changing features of markets which, structurally, tend to be less competitive¹⁰⁴.

The *first* question to answer is whether a problem is directly related to competition, such as cartel behaviour and other forms of collusion, joint selling/cooperative joint ventures, price fixing, market-sharing, abuse of a dominant position and an unequal playing field. If a problem is not directly linked to the state of competition in the market, a different policy instrument is more appropriate to deal with the issue. The *second* question to ask is whether the competition issue is caused by other policies outside the realm of competition law (e.g. energy market policies or cross-sectoral policies such as consumer protection policies). If the latter is not the case, competition law instruments are most suitable to address the issue. If the problem is caused by *'other'* policies, then the first best solution is to adjust these policies (if possible). Only in the case where the specific policy fields cannot be adjusted to successfully address the competition problem or if the competition problem is a direct effect of competition law instruments, should the latter be used to tackle the problem.

¹⁰³ Ibáñez Colomo (2016), p. 2.

¹⁰⁴ Markets which have a tendency towards monopoly or which have been protected by exclusive rights for a long time.

Figure 5: A decision tree to assess whether to use competition policy tools



Given the decision tree, the issues of Table 2 will be discussed according to the following structure:

1. a description of the energy market issue;
2. a short presentation of the competition-relevant problem(s) and the anti-competitive effect;
3. possible instruments to address the competition-relevant problems.

In a *third step* we apply the decision tree in Figure 5 to obtain a conclusion regarding the optimal competition policy instruments. Chapter 5 summarises the possibilities to use different competition policy instruments to the issues at hand and derives key lessons on the appropriate balance or choice between different instruments (competition law, energy market regulations and general rules).

4.3. Energy generation and State aid

4.3.1. State aid for renewable and nuclear energy

Renewable energy

In order to enhance the energy transition mandatory **renewable energy** objectives have been set at the EU level¹⁰⁵. These renewable energy levels are unlikely to be reached within the prescribed timeframe if one relies solely on market forces. Different technologies for renewable energy generation are still insufficiently competitive, i.e., the **market revenues fall short of their levelised costs of installation or technology** and thereby cannot compete with energy generated from fossil fuels. Moreover, the ETS price of carbon emissions is currently too low to drive investment into low-carbon options¹⁰⁶. This is a market failure which makes public intervention by Member States necessary, as also acknowledged by Art. 3 of the Renewable Energy Directive, similarly explicitly allowing for public support measures¹⁰⁷. Yet, the renewables' '*viability gap*' is expected to be transitional as renewable energy generation technologies mature and costs fall¹⁰⁸. A transition away from the necessity to subsidise major renewable technologies might begin in 2020, partly driven by technology cost improvements and a reduction in investor risk perceptions¹⁰⁹. Signs of this transition can be seen already now: in April 2017, for instance, Germany's electricity grid regulator approved bids to build what will be the first offshore wind farms that depend entirely on market prices instead of government support and subsidy¹¹⁰.

There are, however, risks for competition which stem from state financed support mechanisms:

- The State aid schemes may contribute to unfair competition within the renewables sector, for instance by being applicable only to certain technologies, and create an uneven playing field between renewable and conventional technologies possibly resulting in an inefficient functioning of the energy market.
- Large differences between the support schemes of different Member States may cause distortions of the energy market by creating an uneven level playing field between different Member States. An example is the German electricity excess of renewable electricity on sunny and windy days being sold into France and other neighbouring Member States, displacing domestic production in those countries.
- Public aid may lead to overcompensation, for example due to technological progress regarding some technologies, such as solar panels and wind turbines, which are more

¹⁰⁵ The 20-20 targets in 2007 (20% renewable energy by 2020 as compared to 1990 levels), the 2011 '*energy roadmap 2050*' (27% renewable energy by 2030 as compared to 1990 levels and close to 100% renewable by 2050), see https://ec.europa.eu/clima/policies/strategies/2020_en and https://ec.europa.eu/energy/sites/ener/files/documents/2012_energy_roadmap_2050_en_0.pdf.

¹⁰⁶ For more detail, please see Box 2.

¹⁰⁷ See Article 3 (2) in <http://eur-lex.europa.eu/legal-content/en/ALL/?uri=CELEX%3A32009L0028>: Renewable stimulation mechanisms are defined in art. 3(2) of the Renewable Energy Directive, stating '*Member States shall introduce measures effectively designed to ensure that the share of energy from renewable sources equals or exceeds that shown in the indicative trajectory set out in part B of Annex I*'.

¹⁰⁸ Hajos et al. (2017), p. 13, the '*viability gap*' is defined as the difference (typically a shortfall) between the market revenues and the levelised cost of a renewable energy generation installation or technology.

¹⁰⁹ Hajos et al. (2017), p. 16.

¹¹⁰ See, for instance, <https://www.bloomberg.com/news/articles/2017-04-13/germany-gets-bids-for-first-subsidy-free-offshore-wind-farms>.

frequently considered mature¹¹¹. With regard to declining costs per MWh of certain renewable energy technologies, discussions arise for which technologies it is desirable to phase out renewables' subsidy mechanisms and let the market determine the necessary amount of investments¹¹².

- Renewable support schemes could decrease investment incentives in necessary firm generation capacity, as subsidised renewable technologies can produce energy at low marginal costs, therefore reducing the wholesale price also for conventional electricity generation.

A mechanism to increase cost-effectiveness and limit distortion of competition is the efficient implementation of auctions for renewable energy support. AURES (Auctions for Renewable Energy Support) support policy makers in the Member States with the improvement of competitive auctions¹¹³. The focus of the European Commission is to replace all existing renewable support schemes with market-based instruments. Furthermore, the intended opening of national support schemes in Art. 5 of the revised Renewable Energy Directive (Clean Energy Package) aims at reducing the national schemes' negative effects on competition¹¹⁴.

Nuclear power

Nuclear power plants generate around 30% of the electricity produced in the EU¹¹⁵. Nuclear power is seen by many as an important part of a low-carbon future. At the same time the consequences of a nuclear accident would be devastating and problems rise with the storage of nuclear waste within the European Union, making nuclear safety of the utmost importance for the EU¹¹⁶. Therefore, the EU requires the highest quality of regulatory oversight and nuclear safety standards at Member State level. Rules on the use of nuclear energy are put down in the **Euratom Treaty**¹¹⁷.

The construction of new nuclear plants as well as the dismantling of nuclear facilities are capital-intensive, making them difficult endeavours in the absence subsidies¹¹⁸. **Rules on aid to the nuclear industry** are set out by Art. 106a (3) of the Euratom Treaty and in general Art. 107 TFEU. Nuclear power does not fall under the EEAG. It is also not considered to be a renewable form of energy and is therefore not included in the RES Directive. The State aid rules under TFEU may apply to the nuclear sector only if the aid is inconsistent with the Euratom provisions¹¹⁹.

¹¹¹ Discussion Paper European Commission (2014), 'Improving State Aid for Energy and the Environment', quoted page or section? Competition policy brief; http://ec.europa.eu/competition/publications/cpb/2014/016_en.pdf.

¹¹² THEMA Consulting Group, 'Time to phase out support to mature renewables? Approaches and options', THEMA Memo 2016-07; <https://www.energinorge.no/contentassets/4f4676a626cd4db782c4cd7d825ace6d/time-to-phase-out-support-to-mature-renewables.pdf>.

¹¹³ <http://www.aresproject.eu>.

¹¹⁴ See Proposal for a Directive of the European Parliament and of the Council on the promotion of the use of energy from renewable sources (recast), Art. 5, http://eur-lex.europa.eu/resource.html?uri=cellar:3eb9ae57-faa6-11e6-8a35-01aa75ed71a1_0007_02/DOC_1&format=PDF.

¹¹⁵ <https://ec.europa.eu/energy/en/topics/nuclear-energy>.

¹¹⁶ <http://www.ensreg.eu/members-glance/nuclear-eu>.

¹¹⁷ <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:12012A/TXT>.

¹¹⁸ World nuclear industry status report 2016 section 'European Union (EU28) and Switzerland'; <http://www.worldnuclearreport.org/IMG/pdf/20160713MSC-WNISR2016V2-HR.pdf>.

¹¹⁹ So far there have not been any decisions in which the provisions of the Euratom Treaty were contradicting State aid rules. The question remains what the Commission's decision would be if this happened. Would the TFEU overrule the requirements of the Euratom Treaty or the other way around (2011:32 The European

The issue of State aid to the nuclear sector is both a legal and a political issue. State aid to the nuclear sector needs to comply with State aid rules, but the more prominent political question¹²⁰ is the question whether nuclear energy with all its risks fits in the future energy mix¹²¹. Another question, however, is whether State aid measures for nuclear energy sources can contribute to the overall objective of common interest. Discussions on the Hinkley case prove this once more, as shown by Box 7. Besides investing in nuclear facilities, also the dismantling of nuclear facilities (possibly with the use of State aid) could create further competition issues.

Box 8: The Hinkley case

The Hinkley case is one of the prime examples of application of State aid rules to nuclear power. In the Hinkley case the United Kingdom notified a State aid measure to support the new nuclear power station Hinkley Point C¹²². The UK plans were to establish a feed-in tariff which ensures the nuclear plant to receive a stable revenue for 35 years despite the volatility of the wholesale electricity price. The Commission opened an in-depth investigation as doubts arose regarding the notion that the project suffers from a genuine market failure. Therefore, the Commission needed to assess whether the construction and maintenance of business operations¹²³ of a nuclear power station could not be achieved by market forces alone. During the investigation, the UK authorities proved that the State aid addresses a market failure; at the same time, however, the UK agreed to modify the terms of the project finances in order to comply with the EU State aid rules. Modifications to minimise distortive market effects included a raise of the State guarantee fee and a clause to ensure that financial gains of the project will be shared with the UK consumers¹²⁴.

4.3.2. Harmonisation of support schemes and a consistent application of the State aid rules

Generally, State aid is forbidden by competition law. Exceptions are allowed under tough conditions laid down in Article 107(3) TFEU. An example is the decision of the European Commission on the State aid scheme of the UK to support renewable electricity production. Under the scheme, renewable generators received support for the electricity generated. Electricity is widely traded between Member States and therefore the scheme could distort competition on the electricity market and affect trade between Member States. The European Commission assessed the compatibility of the aid, determined the objective of common interest, the need for State aid and the appropriateness of the instrument. It also analysed the incentive effect, proportionality, the distortion of competition and balancing test,

Treaty v. Treaties of the European Union: limits of competence and interaction, available at www.stralsakerhetsmyndighete.se, pp. 88-95)? In case the TFEU prevails, what would this imply for the legal power of the Euratom Treaty?

¹²⁰ And is as such beyond the scope of this report.

¹²¹ <http://energypost.eu/state-aid-for-nuclear-are-you-kidding/>.

¹²² Available at http://ec.europa.eu/competition/elojade/isef/case_details.cfm?proc_code=3_SA_34947.

¹²³ Operational cost line items include: nuclear fuel front end refuelling, insurance, ONR fees, business rates, transmission charges, changes to the costs of Intermediate Level Waste, changes in spent fuel management and decommissioning costs, operation and maintenance costs, refurbishments and cash operating costs.

¹²⁴ http://ec.europa.eu/competition/state_aid/cases/251157/251157_1615983_2292_4.pdf.

transparency and other aspects¹²⁵. Other cases in the past encompass the support to renewable electricity in Portugal¹²⁶, aid for liquefied natural gas infrastructure in Finland¹²⁷, the renewables support scheme in Croatia¹²⁸, the reform of support for cogeneration in Germany¹²⁹, and the support to electricity for renewable sources in Italy¹³⁰.

Box 9 describes the general requirements of State aid under the TFEU, in order to ensure there is no distortive effect on the energy market.

Box 9: Art. 107(3)(c) TFEU

The Commission decides on the compatibility of the State aid for environmental protection and energy objectives in the internal market within the meaning of article 107(3)(c) TFEU¹³¹. Compatibility with the State aid rules implies that:

1. The State aid measure aims to contribute to a well-defined **objective of common interest**.
2. There is a **need for State intervention**, for example, to overcome market failure.
3. The proposed aid measure is an **appropriate policy instrument** to address the objective of common interest.
4. The aid has an **incentive effect** and changes the behaviour or the undertakings.
5. The aid is **proportionate** and limited to the minimum to incentivise additional investment or activities.
6. The **negative effects** on competition and trade between Member States are **limited** in order to have an overall positive balance of the measure.
7. The aid measure is **transparent**, sufficient information needs to be public to judge whether the State aid is needed and not too generous.

In order to minimise the possible risks and distortions, and to be able to anticipate and prevent inconsistencies in the application of State aid rules to renewable energy promotion at Member State level, the EEAG have been adopted. The EEAG prescribes in concrete terms the conditions which national stimulation mechanisms for renewable energy have to fulfil in order to comply with EU rules on State aid.

Member States are free to design support schemes under the requirements set by EEAG but need to notify State aid to the European Commission, when it exceeds the notification

¹²⁵ SA.36196 (2014/N), Contract for Difference for renewables in UK, decision available at http://ec.europa.eu/competition/elojade/isef/case_details.cfm?proc_code=3_SA_36196.

¹²⁶ SA.41694 (2015/N), Support to renewable electricity in Portugal, decision available at http://ec.europa.eu/competition/elojade/isef/case_details.cfm?proc_code=3_SA_41694.

¹²⁷ SA.42889 (2016/N), Individual aid to LNG Infrastructure, decision available at http://ec.europa.eu/competition/elojade/isef/case_details.cfm?proc_code=3_SA_42889.

¹²⁸ SA.38406 (2014/N), Renewables support scheme in Croatia 2014-2015, decision available at http://ec.europa.eu/competition/elojade/isef/case_details.cfm?proc_code=3_SA_38406.

¹²⁹ SA.42393 (2015/N), Reform of support for cogeneration in Germany, decision available at http://ec.europa.eu/competition/elojade/isef/case_details.cfm?proc_code=3_SA_42393.

¹³⁰ SA.43756, Support to electricity for renewable sources in Italy, decision available at http://ec.europa.eu/competition/elojade/isef/case_details.cfm?proc_code=3_SA_43756.

¹³¹ Communication from the Commission, guidelines on State aid for environmental protection and energy 2014-2020 available at <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52014XC0628%2801%29>.

thresholds¹³². Aid measures that are covered by the EEAG include, for example, aid for early adaptation to future Union standards, environmental studies, remediation of contaminated sites, energy from renewable sources, energy efficiency measures, resource efficiency and energy infrastructure.¹³³

The guidelines set out how the European Commission assesses the design of the support schemes; Section 3.3 EEAG (Aid to energy from renewable sources) sets limits of 10 years on the specific aid schemes, Section 3.9 EEAG (Aid for Generation Adequacy) requires proper analysis and quantification of the nature and causes of the generation adequacy problem and the need for State aid to ensure generation adequacy, for example in terms of lack of peak load or seasonal capacity or peak demand in case of failure of the short-term wholesale market to match demand and supply. The State aid guidelines stated that from 2015 onwards Member States need to replace all existing renewable support schemes with market-based instruments¹³⁴. As of 2017 competitive bidding processes will apply to all new renewable electricity capacities, which includes the imposition of a technology-neutral competitive bidding process as the main mechanism to allocate support. Well-designed auctions can improve competition because compared to support mechanisms they will be more cost-effective¹³⁵. At the same time, an inadequate design can result in low effectiveness of renewables deployment. If there are not sufficient bidders, negative effects on competition can arise. In this case, specific requirements could even push suppliers out of the markets, resulting in an even lower number of bidders. The requirements in the EEAG related to the competitive bidding process within generation adequacy measures are summarised by the Capacity Mechanisms Working Group¹³⁶.

It is assumed that national renewable stimulation mechanisms do not create negative competition effects if they are compatible with State aid guidelines and designed to overcome energy market failures. Yet, although the guidelines provide an elaborated and detailed framework to balance various objectives, the compatibility with the EU State aid rules is challenging in practice. Guidelines can only provide guidance up to a certain level of detail, whereas renewable support mechanisms are very specific, adapted to national and political circumstances in the Member States. This resulted in State aid notification cases in which the European Commission opened in-depth investigations, leading to modifications of the support mechanisms necessary to bring them in line with the EU State aid rules¹³⁷. However, no comprehensive and systematic evaluation of the competition effects of the support schemes has been conducted up to date.

State aid to renewable energy and energy efficiency can be exempted under the **General Block Exemption Regulation 2014-2020** (GBER) which simplifies the award of State aid

¹³² The notification thresholds are defined by section 2, Notifiable environmental and energy aid, of the guidelines on State aid for environmental protection and energy 2014-2020.

¹³³ Section 1.2, aid measures covered by the guidelines, of the guidelines on State aid for environmental protection and energy 2014-2020.

¹³⁴ Paragraph 3.3.1 (109), Guidelines on State aid for environmental protection and energy 2014-2020; <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52014XC0628%2801%29>.

¹³⁵ Report D4.2, June 2016, 'Auctions for Renewable Support: Lessons Learnt from International Experiences', presents different auction types under different market conditions to establish best practices across Europe; <http://www.ecofys.com/files/files/aures-wp4-synthesis-report-final.pdf>.

¹³⁶ Capacity Mechanisms Working Group (2015).

¹³⁷ State aid notification cases not happen very often as most cases are cleared before arriving at the General Court; the German EEG (Case T-47/15 Germany v Commission; State aid notification cases not happen very often as most cases are cleared before; the German EEG and capacity market mechanism cases are exceptions) and capacity market mechanism cases are exceptions.

and extends the possibility for Member States to grant certain categories of aid compatible with the internal market without the requirement of prior notification¹³⁸. Such State aid needs to be transparent, in line with the energy and environment 2020 targets and limited to the minimum amount to achieve the environmental goal¹³⁹. If a State aid measure is not covered by the GBER it does not necessarily mean that the measure is incompatible; the consequence is that the measure needs to be notified to the Commission and assessed in full.

A balance needs to be found between the policy goals (renewable energy targets, energy supply security) of Member States and the overall EU policy objectives, such as a proper functioning and non-distorted internal energy market. The EEAG currently seems to strike a good balance between these two objectives. However, an important caveat is that we have not surveyed individual State aid cases. Studies providing a systematic overview of the impact of the application of State aid rules seem to be lacking, e.g. on the effectiveness and efficiency of the procedure, the impact on the market, etcetera. While the guidance provided by the guidelines is useful, in-depth assessments of individual schemes by the European Commission are frequently required, showing that significant legal uncertainty remains with respect to their application. Moreover, a proper application of the State aid rules requires detailed and specific market expertise, which could best be found by enhancing cooperation with Member States' competition authorities during State aid assessment procedures.

Finally, it should be noted that renewable energy support schemes are only necessary as long as sustainable business cases for these technologies are lacking in the market. Hence a first-best solution is to ensure carbon is appropriately priced, either through reforms of the ETS, or a combination of carbon taxes and regulation banning the most polluting types of fossil fuel energy generation. Currently, carbon prices are too low to reach renewable energy targets as they do not provide an effective incentive throughout the EU. Where renewable energy schemes are necessary they should be designed to (1) support investment¹⁴⁰, (2) be technology-neutral (as required by the EEAG since 2017) and (3) accessible to investors from other Member States¹⁴¹. Further harmonisation of renewable energy support schemes between Member States is one of the options to achieve this.

¹³⁸ Commission Regulation (EU) No 651/2014 of 17 June 2014 declaring certain categories of aid compatible with the internal market in application of Articles 107 and 108 of the Treaty; <http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1404295693570&uri=CELEX:32014R0651>.

¹³⁹ Direct grants and interest rate subsidies and loans need to be transparent, which implies that the gross grant equivalent (GGE) can be calculated on the basis of the safe-harbour premiums set out by the European Commission.

¹⁴⁰ Instead of devising investment schemes providing a guaranteed compensation for the production of renewable energy, which might not be sustainable in the long run, energy producers could be obliged to supply a specific percentage of sustainable energy. This would incentivise energy suppliers to look for the cheapest renewable energy production opportunities.

¹⁴¹ Technology neutrality is a requirement under the EEAG since 1 January 2017, see Art. 3.3.2.1. '*Aid for electricity from renewable energy sources*', (126), http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52014XC0628%2801%29#ntc66-C_2014200EN.01000101-E0067. The access of support schemes to investors from MSs is partly already happening in practice and will be required under the revised renewable energy directive of the Clean Energy Package, see Art. 5, Proposal for a Directive of the European Parliament and the Council on the promotion of the use of energy from renewable sources (recast), <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52016PC0767R%2801%29>.

4.4. Congestion management in the transmission grid

4.4.1. Congestion reduces cross-border competition

Due to varying electricity demand and transmission facilities which may sometimes be out of service, some lines on a network can become congested due to an excess of produced energy compared to the capacity, which means that the power flows are constrained and electricity cannot move freely from where it is generated to where it is needed.

The same holds for transmission lines between countries. Network congestion constrains the ability of remote suppliers to compete with each other on the electricity market.

Cross-border congestion impeding cross-border competition can have **different reasons**:

- If transmission capacity is small relative to the size of the local electricity market, especially in regions which are usually importing electricity, local generators can '*withhold*' generation capacity, congesting the transmission line and increasing the value of local generation. The result is an inefficient restriction of imports of cheaper electricity. Hence, network congestion cannot only occur when electricity is unable to flow where it is needed due to **physical** (e.g. not enough capacity) constraints, but also due to **contractual** (all available capacity has been reserved) issues or the **strategic behaviour** of market participant.
- Another problem hindering competition between different nodes of the network is the fact that **cross-border transmission capacity** and **capacity allocation** can be **scheduled long in advance**. This limits the ability of the network to react to short-term changes in supply and demand. Hence it might lead to inefficient large price differences between different regions, especially in the case of high intermittent production (wind and solar) in one region¹⁴².
- An additional source of inefficiencies is the separation between the scheduling of cross-border transmission from transmission within countries. This leads to **incomplete information flows** regarding the condition of the network and the expected demand and supply of electricity resulting in under-utilisation of the network.

Network congestion constrains the ability of remote suppliers to compete with each other on the electricity market. Cheap electricity might not be transported to where it is needed in the presence of congestion, which has **negative competition effects resulting in higher prices for consumers**. This is why transmission capacities need to be allocated as efficiently as possible, as the allocation has implications for the intensity of competition in national generation markets.

4.4.2. Better enforcement of existing guidelines, more transparency and information exchange

It is clear that congestion management is not only a technical necessity, but is also needed for efficient allocation of transmission capacities and hence lower electricity prices. Also the creation of an internal electricity market necessitates the efficient allocation of limited cross-border transmission capacities. The cross-border capacity allocation needs to be done in a way which hinders international trade in electricity as little as possible.

¹⁴² Moreover, intermittent energy generation tends to be geographically concentrated, reinforcing the imbalance.

On European level, the **CACM NC**¹⁴³ lists the methods for capacity allocation in the day-ahead and intra-day timescales. Furthermore, CACM delineates the way to calculate cross-border capacity and to define and review bidding zones. This NC was developed by ENTSO-E and entered into force in August 2015, following the Commission's Regulation establishing a guideline on capacity allocation and congestion management¹⁴⁴. The aim of this Regulation is to harmonise national electricity markets, ultimately leading to a more efficient European market and providing a basis for the implementation of a single energy market in Europe¹⁴⁵.

For timeframes longer than day-ahead, the Regulation establishing a guideline on FCA entered into force on 17 October 2016¹⁴⁶. It establishes a framework for the calculation and allocation of interconnection capacity and cross-border trading in forward markets. The subjects included in the CACM and FCA are very technical and complex, as they provide guidelines for TSOs and market coupling operators (MCOs) regarding TSO collaboration, the use of specific capacity calculation methods and grid models. Furthermore, there has been little operational experience in some of the areas covered, e.g. for the specific methods of capacity calculation outlined in the regulations. It will hence take time for the guidelines to be fully implemented. Furthermore, both regulations require additional work and the methodologies to be developed further¹⁴⁷.

Moreover, operational challenges are related to a lack of appropriate enforcement powers to monitor and ensure compliance with the CACM and FCA and to long regulatory approval processes. The **CACM and FCA can be deemed as starting points** which are required to be implemented to enhance the development of an internal energy market. The consolidated NCs form the basis of the implementation works of the TSOs and ENTSO-E. However, in order to change the markets' governance and transparency, regulations are necessary to support implementation. The focus of ACER in 2017 is to implement the adopted NCs and guidelines¹⁴⁸. ENTSO-E monitors and analyses the implementation of the NCs and guidelines, and their effects on the harmonisation of the rules¹⁴⁹. To this end, efficient data-collection, increased communication and cooperation with ACER regarding information to be submitted for monitoring purposes is necessary¹⁵⁰. The implementation of CACM and FCA is not yet completed; important activities are still scheduled for 2017¹⁵¹.

¹⁴³ See glossary.

¹⁴⁴ Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management.

¹⁴⁵ <https://www.entsoe.eu/major-projects/network-code-development/capacity-allocation-and-congestion-management/Pages/default.aspx>.

¹⁴⁶ Commission Regulation (EU) 2016/1719 of 26 September 2016 establishing a guideline on forward capacity allocation.

¹⁴⁷ <https://www.entsoe.eu/major-projects/network-code-development/capacity-allocation-and-congestion-management/Pages/default.aspx>.

¹⁴⁸ More information on the acts, tasks and deliverables of ACER is available at http://www.acer.europa.eu/Official_documents/Acts_of_the_Agency/Pages/default.aspx.

¹⁴⁹ See the ENTSO-E Work Programme 2016 through December 2017, p. 11-16 on NC implementation, https://www.entsoe.eu/Documents/Publications/ENTSO-Egeneral-publications/AWP_161221_20.pdf.

¹⁵⁰ See the ACER Programming Document 2017 (March 2017), p. 71-79, for their deliverables and work regarding framework guidelines and NCs, http://www.acer.europa.eu/en/The_agency/Mission_and_Objectives/Documents/ACER%20Programming%20Document%202017-Revised-16March2017.pdf.

¹⁵¹ See the ENTSO-E Work Programme 2016 through December 2017, p. 15 for an overview of relevant TSO and ENTSO-E tasks regarding the implementation of CACM and FCA, https://www.entsoe.eu/Documents/Publications/ENTSO-general-publications/entsoe_AWP_161221_20.pdf.

One possible solution for congestion can be to invest in the networks to expand capacity. However, expanding capacity may not always be a cost-effective solution, and congestion can also arise on a temporary basis. Due to the increasing share of intermittent renewable energy sources such as wind energy, congestion is expected to increase in the future. In order to manage congestion of cross-border transmission lines when it arises, it is important to set appropriate rules for determining the available capacity at the border and for allocating that capacity on a non-discriminatory basis¹⁵².

Following the decision tree, it is clear that **congestion management in the transmission grid** is largely related to **energy market policies**. The issues dealt with are **highly complex and technical** and **need well-defined rules** concerning the calculation and allocation of available capacity, for instance. These rules have been developed, but the implementation of CACM and FCA is not yet completed; different implementation tasks of ENTSO-E and the TSOs are only scheduled for autumn 2017¹⁵³. A complicating issue to be overcome in the process are diverging definitions, methods and standards used by different TSOs, such as diverging capacity calculation methods and different day-ahead bidding deadlines. A lot of harmonisation needs to be done before the guidelines will be fully implemented. Another major problem with CACM and FCA, according to experts in the field¹⁵⁴, is **enforcement**. Generally, reasons for the lack of enforcement encompass unclear task descriptions, unclear task allocation and little communication and coordination between the enforcing parties. There has been some indication of unclear task allocation in the past: ACER adopted a legally non-binding opinion in 2015 to split the German-Austrian single bidding zone for electricity, whereas ENTSO-E is planning to publish a bidding zone review and also contemplates about the splitting of bidding zones in France and Poland. This illustrates a lack of legislative clarity in the allocation of tasks between ENTSO-E and ACER and consequently resulted in new modified responsibilities for ACER and ENTSO-E¹⁵⁵. Research regarding enforcement issues related to CACM and FCA is, however, lacking, which might be due to the only very recent adoption of the guidelines. Such research, reflection and practical experience gained are crucial: NCs and guidelines not only need to be developed, such as the recently adopted regulations (CACM and FCA), but also need to be continuously revised and improved, based on research and practical experience.

In view of the discussion above, other instruments to improve the competitive outcomes and improve the enforcement of the adopted regulations might be needed, such as **transparency**

¹⁵² The CACM sets out rules for capacity calculations: it stipulates, for instance, that cross-border capacity needs to be calculated in a coordinated manner by the TSOs, for which purpose a common grid model including estimates on generation, load and network status for each hour is necessary. Another requirement is that the available capacity is to be calculated according to the so-called flow-based calculation method which takes into account that electricity flows via different paths. See also the Commission Regulation (EU) 2015/1222 of 24 July 2015, Art. 20 – 30.

¹⁵³ The legal deadline for submission of the re-dispatch methodology and the re-dispatch cost sharing methodology, for instance, is September 2017. See https://www.energy-community.org/portal/page/portal/ENC_HOME/DOCS/4174399/3447B2751682284DE053C92FA8C0DFE7.pdf and http://www.lsta.lt/files/events/160502_VKEKK/Elektra/A_Balins_CACM_other%20market%20NCs_implementation.pdf.

¹⁵⁴ This is an issue raised by Prof. Leigh Hancher in a phone talk with the researchers on 2 May, 2017.

¹⁵⁵ ENTSO-E will submit a draft methodology for the European resource adequacy assessment carried out on bidding zone level covering all Member States, which will be a yearly assessment. In the context of bidding zones reviews ACER shall approve and may request amendments to the methodology and assumptions used and submitted by ENTSO-E. The European Commission shall adopt a decision to amend or maintain the bidding zone configuration.

and information exchange measures, increased cooperation and coordination via **ENTSO-E** and via **ACER**¹⁵⁶. Ideally, these measures would be *'light-touch'* regulation, i.e. soft law or self-regulation.

Congestion management mechanisms are considered to be market-based. However, they have an effect on competition (e.g. by curtailing generation in a particular congested area) and can also be influenced by strategic behaviour of market participants (e.g. generators withholding capacity triggering congestion management). The question is whether dominant undertakings (still) have an incentive to abuse their power. If the answer is positive, more guidance would be needed: sector-specific regulation could entail transparency obligations for dominant players, and thus preventing the above mentioned strategic behaviour. A sector inquiry focused on the practices of dominant undertakings in the presence of congestion could be conducted to elucidate the **role for competition law** in this field.

Summing up, we do **not envisage competition law to play a role** with respect to solving problems related to congestion management in the transmission network. Competition law does have **a role to play in ensuring that dominant positions (at particular moments in time) are not abused**.

4.5. Capacity remuneration mechanisms

4.5.1. CRM distort the electricity markets (inter)nationally

Due to their merit order, all electricity generation is dispatched only after electricity from intermittent renewables with low marginal costs. The significant increase in the share of electricity generated by renewable sources in recent years has *'crowded out'* electricity generated by conventional sources. Some of the firm generation sources tend to be used predominantly during peak periods. This results in capacity *'under-use'* of these generation units. Furthermore, the increased renewable generation is lowering the average wholesale price which causes revenues for firm (conventional) generation to decline¹⁵⁷. In many countries, conventional generation sources have been closed (especially the older ones) or *'mothballed'* awaiting better market prospects.

Box 10: Marginal versus average costs of electricity production

A generation plant operator typically offers electricity in a competitive wholesale market on the basis of its short term marginal costs. This means that the revenue must cover at least the short term variable costs of the electricity production. Short term variable costs include fuel, carbon certificates, etc. In order to keep a plant active, an operator requires additional income (above its short term marginal costs) through electricity wholesale market prices to cover its fixed costs and, in the longer term, to cover the costs of new investments. Fixed costs include costs for operating staff, running repairs and maintenance. Due to the merit order effect and the (in recent years) declining average wholesale prices, electricity generators, which, in contrast to renewable energy generators, do need to pay for the fuel they are using, might not be able to cover their average electricity production costs (so including fixed costs).

¹⁵⁶ In fact, the European Commission is paving the way for a better coordination between TSOs by suggesting the formation of RCOs. Also the possibility of attributing more power to ACER is contemplated.

¹⁵⁷ For further information on *'firm capacity generation'* see the glossary.

The shutting down or mothballing of power plants would not be worrisome if a sufficient amount of electricity would be available at all times, to cover the demand for electricity. However, (intermittent) renewables cannot provide guaranteed electricity at all times and the cost-efficient storage of large amounts of electricity is still not a viable option at this moment. Therefore, **sufficient firm (conventional) generation capacity** is still **needed** on cold, misty, windless days to safeguard the security of supply¹⁵⁸. Re-igniting mothballed plants is not a solution in these cases, as longer periods of higher prices are needed to cover the additional costs made in that case.

A decline in the share of flexible capacity relative to intermittent power generators increases the risk of future blackouts. Furthermore a continuing low price period on wholesale electricity markets, causing prices below the average (full) costs of electricity generation, results in increasing uncertainties about if and when investors would maintain or build new (firm) generation capacity.

To tackle these problems and to secure a sufficient amount of firm generation capacity able to meet peak demand at all times several Member States, for example France and the UK, have introduced **CRMs** complementary to the existing energy (only) market¹⁵⁹. Different types of CRMs exist, but the same basic principle is applied: investment incentives via a remuneration of capacity. This is in a stark contrast to the current market design where generally only the electricity actually generated is remunerated (the so-called **energy-only market**). Typically, CRMs offer **additional rewards to capacity providers**, on top of the income obtained by selling electricity on the market. This is **in return for maintaining existing capacity or investing in new capacity** needed to **guarantee security of electricity supplies**¹⁶⁰.

In 2015 the European Commission expressed its concerns about the fact that these CRMs are introduced in an uncoordinated manner and that they risk being inefficient and materially distorting cross-border trade and competition within the European internal energy market¹⁶¹. Generally, CRMs **could distort price formation in the internal electricity market** and may **distort the market by only including certain generation technologies or excluding non-generation activities**, such as demand side response. They may also **disregard the potential contribution of capacity providers outside national borders**. Cross-border participation in capacity mechanisms is essential to remove investment signal distortions and to alleviate potential **market power concerns**. However, this is a sensitive issue as this means tax payers are funding capacity in other Member States.

¹⁵⁸ Energy transport from more remote regions with 'steady' energy from wind, hydro or sun, cannot be guaranteed due to congestion resulting from limited transmission capacities between countries and bidding zones.

¹⁵⁹ For the explanation of an energy only market please see the glossary. The need for CRMs is heavily debated. Some experts and decision makers argue that CRMs distort the market and that the energy-only market will lead to the appropriate price signals in case of real capacity scarcity. Others argue that price spikes on the energy market would not be allowed by the regulatory authorities. They argue that these price spikes would only occur when there is very low to zero safety margin left, leading to serious risks regarding (controlled) black outs. The case for capacity markets or some other form of CRM has already been made in an extensive literature (Batlle and Perez-Arriaga, 2008; Joskow, 2008; Rodilla and Batlle, 2012; Linklaters, 2014).

¹⁶⁰ http://ec.europa.eu/competition/sectors/energy/state_aid_to_secure_electricity_supply_en.html.

¹⁶¹ Capacity mechanisms may include State aid within the meaning of Article 107(3) TFEU. In such cases, Member States are subject to a notification obligation under Article 108(3) TFEU. The energy and environmental Aid guidelines (EEAG) adopted in 2014 contain specific criteria to assess State aid for capacity mechanisms in Section 3.9 thereof.

4.5.2. First-best: market reforms instead CRMs, second-best: design market-wide, (internationally) open CRMs

Many CRMs involve State aid and are subject to EU State aid rules. The European Commission has launched a sector inquiry in April 2015¹⁶², established a Working Group with Member States, on the basis of the EEAG¹⁶³, and started individual assessments of Member States' capacity mechanisms (section 3.9 of the EEAG)¹⁶⁴. The aim of the sector inquiry was to gain a better understanding of capacity mechanisms and the various types of capacity mechanisms which exist or are planned or described.

Box 11: Different CRMs found by the sector inquiry

The inquiry found **35 different CRMs in the 11 Member States**¹⁶⁵ covered by the inquiry. Almost two thirds of the identified CRMs are **targeted mechanisms**, which benefit only specific types of operators. For example in the case of '**strategic reserves**', governments pay providers for keeping power plants operational for emergency situations. In times of high demand, strategic reserve plants are called on to produce energy. This however also reduces peak prices which may **erode investment incentives** for the construction of new capacity. Therefore strategic reserves should have higher marginal costs than mothballed coal power plants, to preserve incentives for existing capacity. Another example of targeted mechanisms are **tenders for new capacity**, where support is given to new investment projects located in specific areas. These tenders are often characterised by specific types of technology or electricity generation (such as coal, gas, hydro), capacity size and location of eligible capacity providers. These pre-set requirements for new capacity **undermine competition between different technologies** and might **favour incumbents in certain regions**. Also **capacity from other countries is often excluded** and some Member States do not account for imports when assessing their need for domestic capacity. This possibly results in **national overcapacities** and **inefficiently high prices**. Finally, **administrative payments are made to a subset of capacity** on the market in targeted capacity payment schemes. The beneficiaries of these payments, typically one or more types of electricity generation, such as coal, gas, hydro with storage, must provide available capacity during peak demand periods. They face penalties if they don't provide this capacity. The **price of the administrative payments is unlikely to be equal to the true capacity value** and might hence result in **too much or too little capacity**. The example of Spain, where the cost of an interruptibility service halved after the introduction of a competitive auction, shows that a competitive process is more cost efficient. Furthermore, some (conventional) technology or capacity types profit from State aid under these mechanisms, whereas others do not, which could result in **an uneven playing field** for (mostly conventional) energy suppliers.

¹⁶² Commission Decision (C/2015/2814), see http://ec.europa.eu/competition/sectors/energy/decision_on_sector_inquiry_en.pdf.

¹⁶³ European Commission, guidelines on State aid for environmental protection and energy 2014-2020 (2014/C 200/01).

¹⁶⁴ European Commission, guidelines on State aid for environmental protection and energy 2014-2020 (2014/C 200/01). These guidelines state that aid for generation adequacy, i.e. CRMs, may contradict the objective of phasing out environmentally harmful subsidies including for fossil fuels. Member States should therefore primarily consider alternative ways of achieving generation adequacy which do not have a negative impact on the objective of phasing out environmentally or economically harmful subsidies, such as facilitating demand side management and increasing interconnection capacity.

¹⁶⁵ These Member States were Belgium, Croatia, Denmark, France, Germany, Ireland, Italy, Poland, Portugal, Spain and Sweden.

On 30 November 2016, the European Commission published the final report of its capacity mechanism sector inquiry¹⁶⁶, which concluded that Member States have often failed to adequately assess the need for a capacity mechanism before introducing one. Another outcome was that many Member States have yet to **implement market reforms** that are indispensable to deliver on security of supply issues¹⁶⁷. The suggested market reforms encompass:

1. Establishment of **electricity prices reflecting the true value of electricity** at each moment in time, providing the right signals for new investment and flexible capacity by:
 - Removing price caps.
 - Letting imbalance prices be paid by out-of-balance market participants reflecting the costs borne by network operators to keep the system in balance.
 - Letting the risk of high retail prices be managed by the markets themselves by introducing hedging products, allowing suppliers and consumers to protect themselves against price peaks¹⁶⁸.
 - Allowing broad market participation to mitigate the risk of market power.
2. **Participation of DR providers** in the market, leading to a higher responsiveness of demand to prices, flatter demand peaks and a lower need for capacity.
3. A **better delineation of bidding zones** with respect to capacity and transmission infrastructure.

Where a capacity mechanism is deemed necessary, the report provides practical guidance to Member States on which types of capacity mechanisms may be most suitable to solve the problem identified. It also identifies the following **criteria** which CRMs should fulfil to avoid competition related problems:

- CRMs should be **open to all types of potential capacity providers** and should entail a **price-setting process** to ensure efficiency and competition between the capacity providers. CRMs should also be **open for new entrants**.
- Incentives for **reliability** should be ensured. The CRM design should **coexist with electricity scarcity prices** in order to avoid trade distortions and domestic overcapacity.
- **Market-wide CRMs** should be **open to cross-border participation** to ensure incentives for interconnection investment and to increase EU-wide supply security.

The above analysis shows that most of the current CRMs designs result in market distortions and hence negatively affect competition in the national and European energy markets. The point was also made that the implementation of CRMs should be preceded by energy market reforms in the Member States. Therefore, CRMs lie both in the energy policy and the EU competition law fields and could be addressed both by energy market and EU competition legislation and instruments.

Despite the fact that the Member States' CRMs are subject to State aid rules, the **best way to address competition issues related to CRMs** lies in the field of **energy policy**,

¹⁶⁶ European Commission (COM/2016/752/final); http://ec.europa.eu/energy/sites/ener/files/documents/com2016752.en_.pdf.

¹⁶⁷ This is the reason why the 2016 Commission's Clean Energy for All Europeans package focusses on improving the European electricity market design, see http://europa.eu/rapid/press-release_IP-16-4021_en.htm.

¹⁶⁸ Hedging products can be found, for instance, in Australia and have been introduced in Germany by EEX.

following the decision tree in Figure 5: as suggested by the sector inquiry, energy market reforms can (partly) annihilate the need for CRMs. Moreover, as the Clean Energy Package proposes, a wider regional and European dimension should be taken into account when assessing capacity needs while national adequacy targets should be transparent and verifiable. In addition, enhanced **EU guidelines on State aid measures for capacity remuneration**, as also suggested in the Clean Energy Package, could be adopted to increase compliance of national State aid schemes with EU State aid rules as, currently, the design, requirements, provisions, etc. of the various CRMs differ widely between and within Member States. Guidelines on EU level could hence decrease the fragmentation of support schemes and increase the consistency between Member States and legal certainty for companies. Additionally, **transparency and information exchange measures** would improve the coordination and cooperation of regulators across the border. This can be done via existing bodies, such as ACER, encouraged by the creation of a special working group.

These are elements of energy market policy complementing existing State aid guidelines and facilitating State aid control by the European Commission. A second-best option¹⁶⁹ would be if the Member States **introduced or amended existing CRMs** as to **fulfil the aforementioned criteria** (openness, competitive price setting, cross-border participation etcetera)¹⁷⁰. This would require further harmonisation measures, such as agreement on common methodologies to calculate the technical performance of an interested capacity provider or the maximum available entry capacity for the participation of foreign capacity, to share revenues etc.¹⁷¹. ENTSO-E could take the lead to work out the necessary methodologies and submit them to ACER. Ultimately, it remains possible to **invoke State aid rules** where Member States are reluctant to change their CRM.

4.6. Integration of balancing markets

4.6.1. Integration of balancing markets enhances competition

Electricity day-ahead (and intraday) markets are increasingly integrated through the aforementioned market coupling mechanisms and form regional markets as an intermediate step towards a fully integrated EU market. A logical next step is the further integration of balancing markets¹⁷². However, currently **balancing is mainly dealt with at the national level**. After the intraday markets close, national TSOs are responsible for maintaining the (real-time) balance between demand and supply. To that aim, TSOs estimate the need for balancing services, procure the required services, and finally activate the services when their system faces imbalances.

The objective of **balancing market integration** is to reduce balancing procurement costs due to the more efficient, regional activation of balancing energy bids¹⁷³. Although the cost

¹⁶⁹ A first best option would be energy market reforms as suggested by the European Commission in their results of their sector inquiry.

¹⁷⁰ The stimulation of cross-border participation in national support schemes might be politically controversial as national taxpayers would have to fund projects in other Member States (Hancher, L. and B.M. Winters (2017), p. 8).

¹⁷¹ Hancher, L. and B.M. Winters (2017), p. 8.

¹⁷² As explained in Table 2, balancing refers to the situation after markets have closed (gate closure) in which a TSO acts to ensure that the demand for electricity is equal to the supply of electricity, in and near real time.

¹⁷³ Integration increases competition between Balancing Supplying Parties (BSPs). This can reduce high concentration levels on the (national) balancing markets, improve market efficiency, and ultimately help in accommodating larger amounts of intermittent generation by helping avoiding high balancing costs, see also <https://www.iea.org/media/workshops/2015/esapworkshopv/Montigny.pdf>.

reductions are limited by the physical availability of interconnection capacity between the balancing control areas, balancing market integration is expected to **improve the functioning of the European electricity markets by increasing competition** in both balancing service markets and day-ahead and intra-day markets¹⁷⁴.

There are two fundamental barriers to the international integration of balancing markets: (1) integration requires a certain level of **harmonisation of rules** and (2) sufficient available **cross-border capacity** for the exchange of balancing services.

A '*balancing market*' typically consists of three main pillars: balance responsibility, balancing service provision and imbalance settlement¹⁷⁵. **Harmonisation** focuses on the **equalisation of rules for balance responsibility and imbalance settlement in order to increase the equality of Balance Responsible Parties** (BRP). BRPs are financially responsible for their '*planned*' electricity generation and consumption. If their actual consumption and production differs from what they forecast, imbalances occur. These discrepancies must be settled with the TSO such that no power shortages or surpluses occur (the actual balancing activity). Electricity producers and consumers can set up these '*energy-programmes*' themselves, or assign the responsibility to professional programme responsible parties.

Contrary to harmonisation, **integration** focuses on the establishment of a cross-border balancing service exchange. Generally, integration requires at least some degree of harmonisation. International integration of balancing markets would create a higher level of competition in the various national balancing markets due to the bigger, more liquid international pool of balancing sources. This would most probably lead to lower balancing costs throughout the EU (and a lower energy bill for energy consumers) and hence could have an impact on the competitiveness of the European economy. Yet, the **integration of balancing markets** is largely an **energy policy issue**. Just as in the case of congestion management, regulation concerning guidelines on balancing is technical and complex¹⁷⁶.

The purchase of **ancillary services** is an important aspect of balancing: Various BRPs are contracted by TSOs to deliver services '*necessary for the operation of a transmission or distribution system*'¹⁷⁷, which encompass, for instance, the ability to restart a grid following a blackout (black start capability), the ability to maintain system frequency with automatic and very fast responses (frequency response) and a fast reserve providing additional energy when needed. The aim of contracting these services is to guarantee system security. Although traditionally ancillary services have been delivered by big (conventional) generation units connected at transmission level, the broad range of services to the TSOs can potentially be delivered by many providers: RES are expected to play an important role and new actors, such as aggregators are expected to compete with traditional providers, by offering flexibility from the demand side or other Distributed Energy Resources (DER)¹⁷⁸.

¹⁷⁴ Van der Veen et al. (2010), p. 3.

¹⁷⁵ Van der Veen et al. (2010), p. 2.

¹⁷⁶ As mentioned before, there is a draft Regulation establishing a guideline on electricity balancing. The guidelines to be established are a set of EU-wide technical, operational and market rules to govern the functioning of electricity balancing markets. Examples encompass rules for the procurement of balancing capacity, the activation of balancing energy and the financial settlement of balance responsible parties. The guidelines also require the development of harmonised methodologies for the allocation of cross-zonal transmission capacity for balancing purposes.

¹⁷⁷ As defined in Directive 2009/72/EC, Art. 2, (17), see <http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:32009L0072&qid=1434134009841>.

¹⁷⁸ Role of more DER, such as EV, in ancillary services, see also <http://ieeexplore.ieee.org/document/1709460/>.

The markets for ancillary services are still very national. Despite the fulfilment of several minimum requirements established by ENTSO-E, ancillary services and their mechanisms are freely defined by each country¹⁷⁹, resulting in heterogeneity. Whereas there is some similarity between countries regarding to frequency and voltage control services, the acceptance criteria for other ancillary services vary widely¹⁸⁰. Despite the aspiration that services should be provided freely also on the ancillary services market as stated by Directive 2009/72/EC¹⁸¹, the regulatory environment related to distribution activities is focused on traditional network investments and practically prevents using ancillary services from DERs as an alternative¹⁸², even though they may offer advantages over traditional ancillary service providers. Although there are initiatives to improve the access of DERs to the ancillary service markets, the outcome is uncertain yet¹⁸³.

4.6.2. More integration achieved by sector-specific regulation, more information exchange and transparency

In October 2016, the European Commission published a study on the integration of electricity balancing markets and regional procurement of balancing reserves to examine the costs and benefits of various models for the cross-zonal exchange of balancing energy and the regional dimensioning and procurement of reserves¹⁸⁴. This report concludes that further balancing market integration will lead to significant cost reductions by increasing the flexibility of the power system, strengthening regional cooperation and pulling additional resources in into the market. The draft Regulation establishing a guideline on electricity balancing (EB) received a positive vote in comitology procedure on 16 March 2017. It contains rules on the operation of balancing markets and aims at increasing the opportunities for cross-border trading and the efficiency of balancing markets¹⁸⁵.

The application of the decision tree logic points at sector-specific regulation to play an important role in integrating the balancing markets and, thereby, increasing international competition. As before, greater transparency and information exchange as well as greater coordination efforts between regulators across borders might also lead to integration of balancing markets. It would also be advisable to adopt the draft Regulation establishing a guideline on EB as soon as possible.

New market rules need to enable the market entry of new players to the ancillary services markets and to ensure open public procurement of these services. This does not only require cross-border harmonisation of service definitions, time frames and market participation rules, but also changes in the structure of the ancillary services markets and their products: the focus on large conventional service providers needs to shift to enable the participation of

¹⁷⁹ Austria, for instance, has a requirement that only production units with a capacity larger than 5 MW can provide primary control services, whereas many other European countries allow both producers and consumers. For more examples see Smart Net (2016), Appendix A.

¹⁸⁰ Smart Net (2016), section 2.1.4.

¹⁸¹ 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; <http://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX%3A32009L0072/>.

¹⁸² Smart Net (2016), p. 25.

¹⁸³ Smart Net (2016), p. 25.

¹⁸⁴ European Commission (2016), Integration of electricity balancing markets and regional procurement of balancing reserves; https://ec.europa.eu/energy/sites/ener/files/documents/dg_ener_balancing_-_161021_-_final_report_-_version_27.pdf.

¹⁸⁵ The provisional final version of the text can be found here: https://ec.europa.eu/energy/sites/ener/files/documents/informal_service_level_ebgl_16-03-2017_final.pdf.

small distributed flexible resources, as also postulated in the Clean Energy Package¹⁸⁶. Also the roles and responsibilities of the aggregator needs to be determined at market-design level¹⁸⁷. Therefore, a coordination process between national TSOs and ENTSO-E similar to the process taking place regarding congestion management in the transmission grid is required. NCs for ancillary services could be adopted as basis for further harmonisation and coordination efforts of the TSOs and ENTSO-E¹⁸⁸.

An important question for the future, after the opening of the ancillary services markets has been completed; whether the markets will be characterised by high entry barriers, and by dominant undertakings (former incumbents, large conventional generation units in particular) or its participants will be prone to the risk of market abuse of a vertical integrated position. The questions is whether it will be possible to keep these markets open? A sector inquiry may be desirable in the future, depending on the market concentration developments.

We conclude that **competition law at this stage is not expected to significantly contribute to a better integration of balancing markets**. Yet, competition law could have **a role to play in the future in ensuring that dominant positions are not abused and reducing any negative effects of vertical integration on competition**.

4.7. Effective competition between energy suppliers

4.7.1. Market entry barriers for electricity suppliers impede competition

The level of competition by energy suppliers on the retail market is characterised by many features, such as the number and size distribution of suppliers, the degree of product differentiation, barriers to entry and market regulation. The transparency of the market and products offered as well as the easiness to switch to another supplier also play an important role. If the option of switching to another supplier was not effectively and swiftly implemented, confidence in the functioning of the market would erode as people avoid switches.

Market concentration

In general, a high number of suppliers and low market concentration levels are indicators of competitive markets. The number of active electricity suppliers ranges between one in Cyprus and Malta respectively, and 970 in Germany, whereas the number of gas suppliers varies from one in Latvia to 750 in Germany¹⁸⁹. According to ACER, a much smaller number of suppliers are active nationwide in some countries: there are, for instance, only 39 electricity suppliers in Germany which provide electricity nation-wide. The majority of suppliers is active in their local areas, implying that the national number of suppliers is not very informative about the level of competition at local level. This relates directly to the demarcation of the relevant retail markets: the analysis presented in the Monitoring Report 2015 of the Federal

¹⁸⁶ Proposal for Directive of the European Parliament and of the Council on common rules for the internal market in electricity (COM/2016/864/final).

¹⁸⁷ Their role is not defined in many Member States, whereas they are even forbidden in others. Ancillary services are not open for DR in Ireland, for example, whereas they are open in Finland, Germany, the UK, but requirements for market participation may apply. For more information see Bertoldi P., Zancanella P., Boza-Kiss B. (2016).

¹⁸⁸ In fact, the European Commission paves the way by enlarging the possible content and area of NCs or guidelines to the provision of non-frequency ancillary services, see the Proposal for Directive of the European Parliament and of the Council on common rules for the internal market in electricity (COM/2016/864/final), as described by the context of the proposal; <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2016:0864:FIN>.

¹⁸⁹ ACER (2015), p. 52.

Network Agency (Bundesnetzagentur) and the Federal Cartel Office (Bundeskartellamt) in Germany concludes that 81% of the companies in the monitored group were suppliers serving less than 30,000 meter points. This corresponds to only about 14% of all registered meters¹⁹⁰. Around 16% of all suppliers deal with only one DSO as they are not active in other geographical areas. In contrast, all suppliers operate on national level in the Netherlands. The relevant markets might range from local, regional (in Germany, for instance) to national (in the Netherlands).

Concentration levels on many retail electricity and gas markets are relatively high¹⁹¹. The cumulative market shares of the three largest electricity and gas suppliers for households is more than 70% in most of the Member States¹⁹². In the time period from 2009-2015 market concentration has not changed strongly, only the Czech Republic shows a more than 10%-points decrease in the CR3 value¹⁹³. A lack of '*churn*' and '*dynamism*' (new entrants gaining significant market shares; changes in market shares between suppliers, new business models emerging) in the retail market is an indication of a lack of competition, and raises questions as to the causes of this.

Switching rates

Whether competition is intense with a high number of suppliers also depends on the propensity by energy consumers to switch their supplier. Only in cases where consumers are willing to switch do energy suppliers feel the pressure of competition. Factors besides price play a role when comparing offers encompass the type of fuel (electricity, gas or dual fuels), energy sources (fossil, renewable, or even specific sources like a particular windmill), type of energy pricing (fixed, variable, spot-based, daytime and night-time) and other elements (e.g. contract duration).

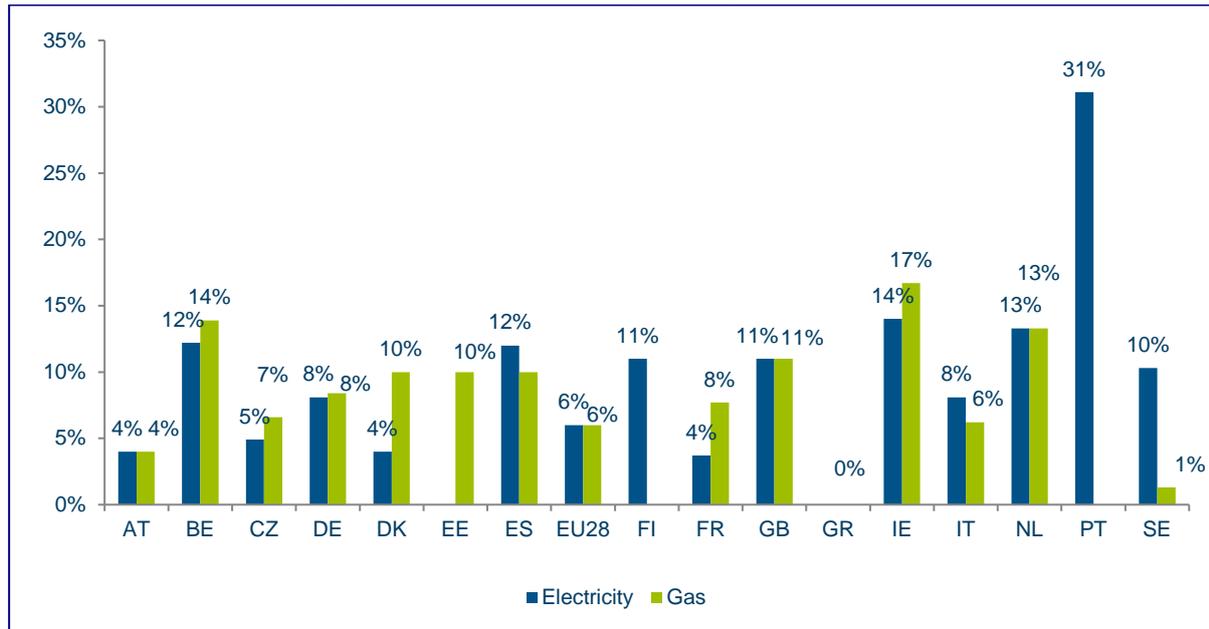
The ability and ease with which consumers are able to switch their energy supplier is therefore an important determinant of the functioning of the electricity retail market. When consumers are dissatisfied with their current energy products (e.g. high prices, high price variability, environmental aspects), consumers have a number of options. They can renegotiate their contract, choose alternative products from the same supplier (i.e. internal switching), or switch to other suppliers (i.e. external switching). Ireland, the Netherlands, Belgium, Spain and the UK are examples of countries with relatively high switching rates for both electricity and gas household consumers in 2014. Portugal has the highest switching rates with more than 30% of the consumers switching for electricity.

¹⁹⁰ Monitoring Report 2015, Bundesnetzagentur, Bundeskartellamt p. 172-174, https://www.bundesnetzagentur.de/SharedDocs/Downloads/EN/BNetzA/PressSection/ReportsPublications/2015/Monitoring_Report_2015_Korr.pdf?__blob=publicationFile&v=4.

¹⁹¹ According to the ACER Market Monitoring Report of 2015 the most competitive markets for households based on the results of the ACER Retail Competition Index in 2015 are the electricity markets in Finland, Sweden, Great Britain, Norway and the Netherlands, and the gas markets of Great Britain, Germany, Belgium, the Netherlands and Italy. Weak retail competition was found in Greece, Bulgaria, Cyprus, Croatia, Lithuania and Poland, see http://www.acer.europa.eu/official_documents/acts_of_the_agency/publication/acer%20market%20monitoring%20report%202015%20-%20electricity%20and%20gas%20retail%20markets.pdf.

¹⁹² ACER/CEER, (2016) Annual Report on the Results of Monitoring the Internal Electricity and Gas Markets in 2015, key insights and recommendations, based on the CEER National Indicators Database (2016), p. 10; http://www.acer.europa.eu/official_documents/acts_of_the_agency/publication/acer%20market%20monitoring%20report%202015%20-%20key%20insights%20and%20recommendations.pdf.

¹⁹³ The concentration ratio is a measure of the total output produced given by the number of players, which in the case of CR₃ means the market share of the three largest suppliers.

Figure 6: Switching rates for electricity and gas household consumers 2014

Source: ACER (2015), 'Annual Report on the Results of Monitoring the Internal Electricity and Natural Gas Markets in 2014', p 63, CEER National Indicators Database.

At the same time, price insensitive customers exist, who do not switch to other suppliers. This could be due to the price differences not being large enough compared to the perceived costs of effort to switch. Furthermore, consumers might be unaware of the prices of other suppliers or the necessary information to take a switching decision is too costly to obtain.

Barriers to entry and growth

Entry and expansion barriers may prevent or restrict players in the energy market from exploiting profitable opportunities in a market. This may enable incumbents to raise prices without losing market shares.

There are multiple methods to enter the energy supply market: organic entry, acquisition and white-label arrangements. Organic entry implies that a potential entrant needs to apply for a supply licence at the regulatory body. White-label arrangements refer to possible entrants who resell energy on behalf of an incumbent to retail consumers. In this case entry barriers will be lower, but the entrant is dependent on an incumbent and cannot sell its own product.

Many different types of barriers exist (see Box 12 below), and sector-specific regulation may represent one of them. Although the rules do not discriminate between different kinds of suppliers, they can be more burdensome for new and/or smaller suppliers. The reason is that many of the requirements are easier to fulfil for existing suppliers. Moreover, regulatory costs often entail fixed costs causing them to fall disproportionately on smaller suppliers.

Box 12: Market entry barriers for energy suppliers in the EU retail energy market

A 2016 report by the Council of European Energy Regulators (CEER) provides an inventory of the different kinds of barriers existing. Barriers relate to the following:

1. Accessing the market

- Licensing obligations.
- Lack of access to customer and market information for suppliers.
- Lack of price transparency.
- Wholesale market functioning.

2. Regulatory framework

- Existence of regulated end-user prices¹⁹⁴.
- Lack of consideration for innovation in regulation.
- Inefficient unbundling between distribution and supply companies, such as similarities in the name and logo of and incumbent supplier and a DSO.
- Legislation changes.

3. Differences in processes and standards:

- Billing format and IT systems.
- Business processes.
- Data management.
- Switching processes.

4. Specific issues to cross-border entrants

- Adapting to local languages and culture.
- Non-homogeneity of system / legislation.

Source: Based on CEER, <https://goo.gl/bVxhbb>.

In addition to the market entry barriers, consumers still lack **awareness** regarding the opportunities and possibilities to switch suppliers. Until recently, energy was considered a low-interest product, for which many consumers were not willing to invest time in finding the best service offering. A key reason for this is that the annual savings to be made by switching supplier are perceived by many consumers as being too low, both in absolute terms (euros per year) and in relation to the total energy bill (also comprising of network costs and taxes).

¹⁹⁴ Regulated retail prices act as a barrier to effective competition, making it more difficult to justify new investment necessary to ensure generation adequacy. Measures to support vulnerable consumers should not discourage suppliers from building their own generation or entering medium or long term contracts with generators to develop their competitive position. (South-)Eastern European countries tend to have regulated prices. For an overview, see ACER/CEER Annual Report on the Results of Monitoring the Internal Electricity and Gas markets in 2015 - Retail Markets, November 2016, http://www.acer.europa.eu/official_documents/acts_of_the_agency/publication/acer%20market%20monitoring%20report%202015%20-%20electricity%20and%20gas%20retail%20markets.pdf, especially Figure 18 on p. 35.

Moreover, independent and reliable **information** on the available service offerings is perceived to be lacking. The longer duration of energy contracts and the difficulties in estimating the calculated energy costs makes switching more complicated.

Finally, there are still problems with **door-to-door selling** and selling by **telemarketing** in several EU Member States despite the existing Directive on consumer rights¹⁹⁵. Problems in enforcement result in complaints about practices which were perceived as unfair, misleading or even fraudulent. Such incidents may have undermined the trust of consumers in the functioning of the market, which lowers the propensity to switch and hence is favourable for incumbents with a solid client base.

Vertical integration

Vertical integration can give suppliers better adaptation opportunities to short-term changes in demand and offers long-term certainty about electricity availability. At the same time there is an increased risk of coordination between different branches of the undertaking, such as generation, retail and possibly storage. The third energy package required unbundling of DSOs and suppliers within a vertically integrated utility. Whether this requirement applies however depends on the size of the DSOs. The question is whether this does not hamper effective competition in the energy market, since a DSO being an electricity supplier and controlling storage could be considered a dominant provider possibly creating risks of abuse of its dominant position. Full application of this requirement is recommended in order not to create any entry barriers to the retail market, also considering the DSOs' future role as neutral market facilitators.

4.7.2. Instruments are sector-specific and consumer regulation is required

The Council of European Energy Regulators is currently preparing **guidelines of Good Practice** on how to remove barriers to entry for energy suppliers in EU retail energy markets based on existing practices in some Member States¹⁹⁶. In order to ensure a well-functioning retail market, it is important that the outcome of this, and other work on regulatory barriers, is taken into account when revising the regulatory framework. A more pro-active approach would be to implement **periodic reviews of the regulatory framework**. In such a review it could be assessed whether the regulatory framework is still fit for purpose. Such review could also assess the regulatory framework from the perspective of the current functioning of the retail market. For example, where reliable trustworthy information on available retail service offerings is lacking, introduction of **price comparison tools** may be desirable.

Focussing on the more specific barriers to market entry outlined in Box 10, we observe that most of them can be dealt with by sector-specific regulation, such as improving the competitive outcomes by changes in the functioning of the wholesale market, removing inefficiencies regarding unbundling and considering innovation. Sector-specific regulation could make it obligatory to consider innovation costs in energy policy measures, e.g. when setting price-caps. Unbundling obligations for incumbents could be introduced. Abolishing **regulated end-user prices** (as proposed in the Clean Energy package) would help to reduce entry barriers and may also have a positive impact on the propensity to switch.

¹⁹⁵ Council Directive of 20 December 1985 to protect the consumer in respect of contracts negotiated away from business premises (85/577/EEC), see <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31985L0577:en:HTML>.

¹⁹⁶ CEER 2017 Work Programme; http://www.ceer.eu/portal/page/portal/EER_HOME/EER_CONSULT/CLOSED%20PUBLIC%20CONSULTATIONS/CROSSSECTORAL/2017_Work_Programme/CD/.

Licensing and registration is often the first step of new entrants. This, for the most part, entails contracts with TSOs and DSOs. Licensing procedures are not harmonised across Member States. Measures to tackle the hampering effects of licensing obligations on new entrants could be cutting the red tape, better information on the documents necessary for licensing, introduction of one-window procedures and simplified procedures and/or standardised processes, if they are not in place yet.

The available information about customers and markets can be improved by the introduction of transparency obligations for incumbents. In view of the large open data initiative at the EU level it could be ensured that this initiative applies also to the energy companies¹⁹⁷.

Consumer protection regulation can be used to reduce the switching costs for consumers: online portals could be set-up, where consumers obtain information about energy supplies in their location and compare prices. Retail companies could be obliged to participate in these online portals ensuring that information on prices and conditions are comparable. Regulators should be made responsible for periodically checking the reliability of the data.

Competition law is expected to play its traditional role in this domain by policing anti-competitive behaviour and controlling mergers.

4.8. Integration of DER, prosumers and aggregators in the market

4.8.1. Level playing field for DER, prosumers and aggregators

The emergence of DER, '*prosumers*' and aggregators to form part of the energy market is a new trend. New technological developments have enabled customers to play roles which are fundamentally different from the role of the passive consumer in the past. More generally, there has been an increased penetration of DER¹⁹⁸ of the distribution grid. DER are small-scale power generation sources which are located close to where the energy will be used, e.g. charging a car using solar panels on the roof of a house. Moreover, many new types of market participants have emerged in recent years. DER, '*prosumers*' and aggregators are new market participants will become important to bring forward the energy transition and change the energy markets in the future¹⁹⁹.

DER

DER systems play an increasingly important, although ambivalent role for the power distribution systems.

On the one hand, it can put the distribution network under pressure: Grid stability in some local areas in Germany has been impaired by the growth of solar photovoltaics. The significant rise in electric vehicles (EVs) could cause congestion issues in the future. A simultaneous charging of the projected 450,000 EVs in France by 2020, for instance, could account for 5-20% of the annual peak load²⁰⁰. The feed-in and electricity consumption of

¹⁹⁷ See the Communication from the Commission '*Open data - An engine for innovation, growth and transparent governance*', <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2011:0882:FIN:EN:PDF>.

¹⁹⁸ DER are potentially problematic for grid stability and reliability of the grid due to congestion and voltage issues (Eid et al., 2016).

¹⁹⁹ The term '*aggregators*' can refer to aggregated industrial and commercial users or aggregated consumers.

²⁰⁰ Studies show that investing in demand response tools, i.e., smart grid tools for shifting and/or reducing demand rather than investing in additional grid infrastructure can result in substantial savings (EA Energy Analyses, 2012, p. 6).

these DER can therefore become a challenge for securing the reliability of supply²⁰¹ and require new system management methods by distribution grid operators.

On the other hand, the development of smart ('*digital*') meters, increasing penetration by DER and the surge of '*prosumers*' have potential benefits for the flexibility of the electricity system, which can ultimately provide an alternative to the enhancement of the distribution grid. Higher flexibility or end-user response, often called demand response (DR), are possible (and cheaper²⁰²) ways to manage congestion than increasing transmission capacity by building additional transmission power lines.

The existence of DER opens trading options such as contracts for ancillary services managing transactions for system balancing in the (very) short term. Intermediary firms can act as aggregators of DER's and bundle capacity in order to sell the electricity generated to suppliers or other market participants (for example in hourly auctions in order to balance short-term energy supply and demand and smooth out prices). Balancing services, which are arranged slightly before real-time, are also open for aggregation and DR in many places in Europe²⁰³. The resulting **congestion management in the distribution grid** is hence a relatively new issue.

Prosumers

The term '*prosumers*' relates to energy customers who both consume and produce energy, thereby playing an active role on the energy market²⁰⁴. '*Prosumers*' often own DER and sell their non-consumed, excess electricity to the grid, while buying power from the grid when their production is insufficient.

The term '*prosumer*' refers not only to individual consumers, but also to collective or '**community energy initiatives**' representing a subset of '*prosumers*'. It could, for example, cover cooperatives, housing associations, district heating; foundations, and public '*prosumers*', e.g. schools and hospitals. All these groups increasingly invest in the production of renewable energies, but also trade and distribute the produced energy directly to a certain extent²⁰⁵, with or without the services of an aggregator.

A related issue is the development of micro-grids. **Micro-grids** are small, low voltage electricity networks with local (often renewable) supply sources and local storage. The total installed capacity often ranges from a few hundred kW to some MW. Micro-grids are usually attached to a central grid, but can also function on their own.

²⁰¹ There are over capacities built in the distribution net and so far only a few practical experiences with congestion have been made (EA Energy Analyses, 2012, p. 6).

²⁰² Schachter et al. (2016), Section 4: The authors present a case study which indicates that DR can be an economical option to delay or even avoid large irreversible capacity investments, hence reducing overall costs for networks and end customers.

²⁰³ According to the SEDC report (2017) '*Significant progress has been made in opening balancing markets to demand-side resources*' (p. 12). This report also provides an overview over the integration of DR and aggregators in various electricity markets, such as in the balancing market. See <http://www.smartenergydemand.eu/wp-content/uploads/2017/04/SEDC-Explicit-Demand-Response-in-Europe-Mapping-the-Markets-2017.pdf>.

²⁰⁴ There is not yet an official definition of the term '*prosumers*', but recent reports and thinking say they should be defined as active customers covering at least the following activities: 1. Generation, storage and/or supply of renewable energy; 2. Demand side response. See: Roberts (2016), Section 1.2, and Briefing European Parliament, Electricity '*Prosumers*', 2016, p. 2.

²⁰⁵ Some cooperatives are beginning to acquire their own power grid systems.

Just like DER, *'prosumers'* need to be integrated efficiently and effectively into the electricity market to make optimal use of their potential for creating a smooth energy transition: they might play a role in congestion management of the distribution grid, for instance, and smoothen out energy demand peaks²⁰⁶, thereby creating less need for firm capacity or grid expansion.

Key barriers for the further development of *'prosumers'* are the degree of and the uncertainty regarding national and regional policy support in some Member States, such as feed-in tariffs. In view of the roll-back of renewable support schemes in some Member States²⁰⁷, *'prosumers'* may need to find other ways of financing in order to gain access to the market or to scale up. Moreover, some *'prosumers'* might find it impossible to provide balancing services such as ancillary services since the general balancing market arrangements are predominantly applicable to conventional power generators: entry barriers make it difficult for renewable electricity generators to offer balancing energy in practice. Moreover, depending on the size of the prosumer initiatives, access to the grid may be complex because of high reporting obligations, complex national network codes that apply including high IT requirements.

Currently, EU law protects the rights of energy consumers, such as the right to choose and switch suppliers. Specific prosumer rights, however, are absent, as existing rules do not aim at facilitating active participation of consumers²⁰⁸. Some resulting issues are²⁰⁹:

- The possibilities to participate in energy markets differ between Member States;
- There is a risk that *'prosumers'* lose consumer protection rights which they would have enjoyed as *'ordinary'* consumers;
- There are doubts about the existence of a level playing field, if *'prosumers'* are required to comply with the same rules and are exposed to the same investment risks and uncertainties as established energy companies;
- There is an asymmetry for *'prosumers'* with regards to sufficient information or technical knowledge to overcome administrative hurdles to becoming active in the energy market.

The challenges related to *'prosumers'*, energy cooperatives and micro-grids lie in regulating the market participation and participation in the electricity network in a way which does not disturb competition and prevents the development of *'captive prosumers'*. There is no EU energy specific regulation on ***'prosumers'***, self-generation or self-consumption, however the Energy Efficiency Directive and EEAG include provisions on small-scale electricity producers. Other consumer activation forms, for example, energy cooperatives, need to encounter a

²⁰⁶ Smart technology, such as smart meters and smart appliances automatically switching on or recharging when prices are low or switching off when prices are high, could help consumers to modify their energy use (demand response).

²⁰⁷ In recent years, Germany has been a prominent example for the roll-back of renewable support schemes, see, for instance, <http://www.reuters.com/article/us-germany-solar-incentives-idUSTRE81M1EG20120223>.

²⁰⁸ This might change according to the provisions in the recast Proposal for a Directive of the European Parliament and of the Council on common rules for the internal market in electricity: Art. 13 gives final customers the right to contract with an aggregator directly, Art. 17 outlines minimum conditions for Member States to adopt in order to promote the participation of aggregators in retail markets. Accordingly, *'prosumers'* should not be required to pay compensation to suppliers or generators, for instance. Art. 15 enlists the entitlements of *'active consumers'* to be guaranteed by Member States.

²⁰⁹ Roberts (2016), p. 7-8.

level playing field where they are able to sell their non-consumed energy and feed it into the grid. Energy policy instruments need to safeguard this.

Aggregators

Aggregators are another new type of market participants which have emerged together with DER and 'prosumers'. Aggregators reach agreements with various types of customers (industrial, commercial, residential, 'prosumers' and DER) to 'aggregate' the customers' capability to use DR, i.e. to adjust their energy demand or energy supply. Aggregators aim to create a portfolio of flexible energy products and to offer it as a service to markets. Aggregators are active in several EU countries, including Belgium, Germany, Slovenia and Austria²¹⁰. The role of aggregators to provide flexibility is potentially important as power systems are expected to rely less on firm capacity generation in the future as most renewable energy sources are intermittent by nature²¹¹.

Regulatory frameworks might pose barriers for market participation of aggregators. Minimum bid sizes may be too high or scheduling periods may be too long in advance, not accounting for the fact that renewable sources such as solar PV can only bid into the market at certain hours during the day, since the weather forecast is uncertain in the longer term²¹².

The emergence of aggregators and 'prosumers' means that the **competitive environment is changing for traditional energy suppliers and producers**. An important prerequisite for both 'prosumers' and aggregators is that they have access to reliable data on production and consumption. Smart meters play a key role here.

Access to smart meter data

As mentioned in section 4.7, data management can be a barrier for new suppliers of energy. **Smart metering** is an on-going development in the EU. The aim is to replace at least 80% of the electricity meters with smart meters by 2020, if this can be done cost-effectively²¹³. The transition process is already completed in Italy and Sweden. In 2016 the European Commission published a proposal which entitles consumers to request a smart meter from their energy supplier²¹⁴.

The data produced by smart meters is relevant for grid operators, for both short term system management and long-term grid planning. Different models exist for handling the data generated by smart meters. The most common model is that the DSO is responsible for the smart meter and the data generated by it, however, an energy supplier or an independent third party may also be responsible.

Yet, smart meter data is also relevant for commercial operations of existing and new market participants, such as aggregators. According to the Council of European Energy Regulators (CEER), access to customer and market information is one of the challenges for new entrants, in particular information about the customers, their contract periods and smart meter data²¹⁵. It is necessary to identify business prospects, provide information about the characteristics

²¹⁰ Tuerk et al. (2016), p. 2.

²¹¹ Conventional fossil fueled energy generators often provide flexibility to the power system, enabling it to maintain continuous service, especially in the face of rapid and large swings in supply or demand. Intermittent renewable energy sources, in contrast, do not provide flexibility ('firm capacity'), as their energy needs to be fed into the power system whenever it is produced, see also Table 1, column 4, p. 28.

²¹² Ecofys (2014), p. 19.

²¹³ <https://ec.europa.eu/energy/en/topics/markets-and-consumers/smart-grids-and-meters>.

²¹⁴ <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52016PC0864R%2801%29>.

²¹⁵ Council of European Energy Regulators (2016), section 4.3.

of the network connections and give insights on consumption data, therefore directly influencing the competitive position of the entrant. An uneven playing field regarding smart meter access can result in market distortions, unfair competition and constitute a barrier to market entry.

It is therefore important that a level playing field exists for all data users, ensuring that all commercial market participants have equal data access. This also means that DSOs with commercial activities, e.g. energy savings advice, should not have access to energy consumption data at more favourable conditions than other market participants. This is especially relevant for DSOs that are exempted from the legal unbundling obligation due to having less than 100,000 customers, but may also be relevant for legally unbundled DSOs.

On the other hand, using smart meter data, suppliers can offer customised products based on actual usage and consumption patterns of their consumers. Energy procurement can be optimised to the exact sales amounts. Therefore, the **protection and distribution** of smart meter data between consumers, generators and suppliers is a key aspect of the access to smart meter data.

4.8.2. Energy and consumer protection policy to empower and protect

Customers are expected to play a different role in the energy market of the future. Extensive legislation on these new players is not yet in place and a legal definition for '*prosumers*' does not yet exist. The status of '*prosumers*' is likely to be defined at Member State level. A unified EU-level approach towards and protection of '*prosumers*' will be difficult if every Member State uses its own definition. The EU should therefore give some guidance on the **key elements of a definition of '*prosumers*'**.

The focus of the Market Design Initiative (MDI)²¹⁶ relies on the demand-side participation in the market as one of the successful reforms of the energy market: Empowerment of the European Consumer. The central question is: how can we reduce the barriers to entry for '*prosumers*' (owing DER) that prevent them from becoming active in the market? The barriers discussed are a consequence of regulatory provisions of energy policy and consumer protection policy. The issue is also linked to the successful integration of aggregators in the market as key enablers with respect to consumer activation. With the Clean Energy Package²¹⁷, the European Commission aims to create better market access for aggregators. Member States are to ensure that customers do not require the consent of the electricity supplier when they want to conclude a contract with an aggregator. Furthermore, the access to metering data for parties such as customers, suppliers, TSOs, DSOs, aggregators and other parties providing energy or other services to customers, shall be simultaneous and non-discriminatory²¹⁸. Additionally, transparent rules are necessary to assign roles and responsibilities to all market participants and to ensure easy access to data while protecting

²¹⁶ The electricity MDI package encompasses the Proposal for a Directive of the European Parliament and of the Council on common rules for the internal market in electricity (Recast), the Proposal for a Regulation of the European Parliament and of the Council on the internal electricity market (Recast) and the Proposal for a Regulation of the European Parliament and of the Council establishing a European Union Agency for the Cooperation of Energy Regulators (recast). See section 6 here: http://ec.europa.eu/energy/sites/ener/files/documents/1_en_act_part1_v9.pdf.

²¹⁷ For all documents within the Clean Energy Package see <https://ec.europa.eu/energy/en/news/commission-proposes-new-rules-consumer-centred-clean-energy-transition>.

²¹⁸ Hancher, L. and B. Winters (2017), p. 15.

this data as well. Other aspects include compensation payments to suppliers or generators and conflict mechanisms between market participants²¹⁹.

Smart meters and the use of smart meter data is one of the important innovations which could be used to empower consumer and stimulate supplier competition. The Energy Efficiency Directive supports the development of energy services based on smart meter data in order to allow for the emergence of dynamic prices²²⁰. Non-discriminatory access to smart meter data (e.g. between bundled and fully unbundled DSO's) is increasingly important with respect to securing a level playing field in energy retail markets for 'prosumers' and aggregators. There are different data standards, different models for the management of data and a harmonised data policy is not yet in place. This creates legal uncertainty. Member States need to put transparent rules in place on data access and ensure data protection as well as the impartiality of the entities handling the data. Sector-specific regulation is required to make sure that the 'prosumers' (public, household or company) themselves or aggregators have sufficient access to be able to enter the markets and compete with incumbents. Sector-specific regulation could ensure the level playing field regarding smart meter data and consumption data for customers, suppliers, TSOs and DSOs, aggregators and energy service companies. A common data format and transparent procedures for the access and exchange of data including metering and consumption data as well as data required for consumer switching, as proposed by Art. 24 of the Directive for the internal market in electricity, is necessary to secure a level playing field²²¹.

At the same time consumers as well as their personal data need to be protected²²². Personal consumer data collected in smart metering systems is subject to the **General Data Protection Regulation**²²³. **Access to smart meter data** is linked to **consumer protection policy** and touches upon **privacy**²²⁴ issues: How and for whom is it allowed to use the data? In the Clean Energy Package, the Commission proposes to establish common rules for data management: Member States should specify who may have access to the data of the final consumer with the customers' explicit consent²²⁵. Furthermore, better information on the conditions and impacts of their energy consumption activities, such as interactive metering of individual consumption, is needed to strengthen consumers' participation in the internal energy market. Consumers should be informed on their rights, privacy and data protection and on how to save energy using new technologies. The supply side should be nudged to think about the consumers' privacy issues. The Commission has taken initiative in this field and provides for a template for the implementation of a Data Protection Impact

²¹⁹ Art. 2 (12, 16), 13 of the Electricity Directive (COM/2016/864/final).

²²⁰ Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC, Art. 18.

²²¹ Art. 24 of the Proposal for a Directive of the European Parliament and of the Council on common rules for the internal market in electricity;
https://ec.europa.eu/energy/sites/ener/files/documents/1_en_act_part1_v7_864.pdf.

²²² See Article 38 of the Charter of Fundamental Rights of the European Union and Article 8 of the Charter of Fundamental Rights of the European Union.

²²³ Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation); http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2016.119.01.0001.01.ENG&toc=OJ:L:2016:119:TOC.

²²⁴ European Parliament, Cyber Security for the Energy Sector (2016), section 5.

²²⁵ Hancher, L. and B. Winters (2017), p. 15.

Assessment (DPIA) on how organisations managing or aiming at setting up a smart grid can identify and anticipate the risks of data protection, privacy and security of their initiatives²²⁶.

Consumer and prosumer issues should mostly be solved by **sector-specific regulation** and **consumer protection regulation**. A balance needs to be found between protecting passive indigent consumers and, at the same time, stimulating and encouraging '*prosumers*' to generate, consume and sell self-generated energy. This can be done by removing barriers, simplifying administrative procedures and better conditions for the sale of surplus energy²²⁷. However, the first step would be a **common framework of definitions** for these new entrants to prevent further differences between Member States.

4.9. Energy poverty

4.9.1. Member States' policies to combat energy poverty – mostly no competition effects

As discussed in Chapter 2, **Energy poverty** is still relatively prevalent in Europe: estimates range from 50 to 125 millions of homes across the EU suffering from '*fuel poverty*'²²⁸. There is no EU-wide definition of energy poverty. For instance, the UK measures it using the '*low income high costs indicator*'. Thereby it considers a household energy poor if its required fuel costs to maintain an adequate heating regime are above average, and, were it to spend that amount, it would be left with a residual income below the official poverty line²²⁹.

Energy poverty is a market failure and warrants state intervention. Yet, such a Member State intervention should not distort competition on the energy market. The distortive nature of different policy instruments depends on the intervention instrument used. Schumacher et al. (2015) identify different policy instruments devised to combat energy poverty in a selection of EU Member States²³⁰:

- Financial support of (low-income) households (Bulgaria, Ireland).
- Provisions through the social security system and advice on measures to reduce electricity consumption (Germany).
- A social tariff for customers with specific social characteristics and a 'free electricity' quota for households with energy debts (Greece).
- A lump sum contribution to vulnerable consumers (Italy, France).
- Measures to enhance the thermal efficiency of buildings (Ireland).
- Social subsidies, VAT and other tax reductions and agreements with energy companies to avoid disconnecting supplies for households which defaulted on their energy bill payments (e.g. Poland).

²²⁶ See <https://ec.europa.eu/energy/node/1748>.

²²⁷ Pietkiewicz (2016), section 5.16.

²²⁸ Schumacher et al. (2015), section 1.1.

²²⁹ <https://www.gov.uk/government/collections/fuel-poverty-statistics>.

²³⁰ Furthermore, the study relates energy poverty to increasing electricity and gas prices in most Member States, income inequality and GDP per capita. High income inequality persists in Bulgaria, Spain and Greece, for instance, whereas Bulgaria also has the lowest GDP, see chapter 2.

Most of the instruments used by Member States to combat energy poverty, as well as the study's recommendations²³¹, are competitively-neutral. Examples of these instruments encompass financial contribution or support to low-income households, energy saving information campaigns and measures to improve the energy efficiency of buildings and appliances to not distort energy markets. Yet, other policy measures, such as **social tariffs**, **limitations on disconnections due to non-payment** and **Member State control or capping of retail prices** might have competition effects. Energy suppliers, who are obliged to offer social tariffs or to keep consumers connected in spite of energy bill debts, might be disadvantaged as compared to suppliers in other EU countries or in other wealthier regions of the same Member State. The capping of retail prices could have a dampening effect on wholesale market prices and thereby discourage investment into new capacity.

In the Clean Energy Package, the European Commission proposes to abolish regulated retail tariffs, thereby pushing governments to consider alternative ways to protect vulnerable consumers, such as by specific non-tariff measures. According to ACER's 2016 report, regulated end-user prices compromise competition especially in markets where retail end-user prices are set below costs due to regulatory intervention, which means that they are set without taking into consideration wholesale market prices and other supply conditions²³².

4.9.2. Policies aiming at energy efficiency improvements and demand response instead of price caps

Energy poverty is evidently related to **social policy**²³³, but also to **consumer protection policy**²³⁴. Still, the way in which Member States address energy poverty often has a significant **impact on the level playing field within the relevant energy retail market**, because of the severe impact of such policies. Also the **level of competition in the retail market** may in its turn have an influence on the level of energy poverty. Hence this topic is also interrelated with integration of '*prosumers*' and aggregators in the market.

Despite the indirect effect on competitive retail markets, competition law instruments do not play a direct role in tackling energy poverty. Instead, **sector-specific policies** aiming at reducing energy consumption by **energy efficiency improvements** and **participation in DR** programmes (together with social policy) could be key tools to address energy poverty²³⁵.

²³¹ The study concludes that the targeting and the efficiency of spending must improve EU-wide. Their EU-level recommendations are to develop an adequate definition of energy poverty in Europe, to support national policies financially and to continue setting minimum standards for energy efficiency of buildings and appliances, section 4.

²³² ACER (2016), p. 49.

²³³ When considering lump-sum payments to vulnerable consumers or provisions through the social security net.

²³⁴ When considering retail price caps or control.

²³⁵ Schumacher et al. (2015), section 4.3. The European Commission allows member States to account for energy poverty in their energy efficiency obligation scheme (Art. 7, 7. (a) of the Energy Efficiency Directive). An enhanced participation in DR programmes would give energy poor households a better control over their energy consumption and access to more advantageous consumption schemes by allowing them to curtail consumption when energy prices are high, for instance.

5. CONCLUSIONS

KEY FINDINGS

- Issues predominantly related to competition law are: energy generation and State aid, capacity remuneration mechanisms and the level of competition between energy suppliers.
- The other issues discussed in this report – energy poverty, integration of DER, 'prosumers' and aggregators in the market, congestion management in the transmission grid and integration of balancing markets – should be primarily addressed by other instruments than competition law.
- There are tensions between energy policy objectives, consumer protection objectives and the objective of effective competition in the EU (internal) energy market.
- State intervention is necessary to reach the renewable energy targets, but it should be done with minimal distortions to competition.
- The application of competition rules is adapting to new challenges and developments in the energy market, ensuring that they will retain their significance for the market. Yet, a comprehensive assessment of what the provisions of the Clean Energy Package imply for the role of competition law is still lacking.

5.1. A brief summary of the analysis

5.1.1. The role of competition law regarding the seven energy market issues

As discussed in section 2.2.1, electricity has some characteristics which distinguish competition in this field from competition on other markets: electricity is a non-touchable good which cannot be stored. It depends on infrastructure, on transport by a physical network. Traditionally, the energy sector has been state controlled, but the Member States decided to gradually liberalise energy markets in the 1990s. Despite much progress, the liberalisation process is not completed yet. Furthermore, new developments regarding enhanced renewable energy generation and new technologies, such as smart metering, pose further challenges, but also provide new opportunities for the sector.

Since the third legislative package in 2009, further market liberalisation and integration has been pursued to achieve the overarching policy objective of creating an internal energy market in the EU, as illustrated in Figure 1 in section 2.1.1. At the same time, ambitious renewable energy objectives have been set. It is clear that these objectives cannot be reached within the prescribed timeframes by relying solely on market forces. State aid is expected to play a significant role in achieving the transition. In general the current **State aid** system functions well given its objectives²³⁶. Guidance is provided to harmonise possible state interventions with the aim of minimising competition risks and distortions. However, the State aid regimes cannot prevent a fragmentation of the internal market and thus put at risk the results already achieved by the market liberalisation process, as many different regimes currently exist, resulting in negative competition effects on the internal market. Further market integration can only be achieved by further harmonising national State aid regimes and providing adequate incentives for investments in (renewable) generation

²³⁶ See section 4.3 on energy generation and State aid.

capacity. Various options exist that are less harmful for competition, e.g. CO2 taxation schemes²³⁷.

Especially for **CRMs**²³⁸, provision of State aid should be regarded as a forceful measure of last resort: first-best solutions are energy reforms, better transparency, and information and coordination measures. As proposed by the Clean Energy Package, Member States should implement energy market reforms before assessing the need to introduce CRMs. In case the Member State proves the need for a CRM, the scheme needs to satisfy certain criteria, such as market wide procurements with explicit cross-border participation, thereby minimising distortions to cross-border competition.

Congestion management in the transmission grid and the **integration of balancing markets** are currently predominantly nationally organised²³⁹. Harmonisation cannot be improved by instruments of competition law and should be mainly solved by sector-specific energy market legislation. Congestion management in the transmission grid and the integration of balancing markets are very technical in nature and mainly need to be addressed by sector-specific regulation. EU-level solutions for congestion in the transmission grid are mostly based on recently adopted energy market policies (CACM and FCA), where problems may arise in the implementation and enforcement area. Instruments to improve the implementation process are more transparency and information exchange and regulatory coordination, also between national competition authorities and the European Commission. Competition law plays a role in preventing the abuse of market power by dominant market participants and preventing the negative effects of vertical integration.

While energy market laws set the '*rules of the game*' with respect to **competition between suppliers** on the retail market²⁴⁰, e.g. with respect to licensing, billing, etc., competition law plays an important role in preserving effective competition. Market entry barriers are still persistent leading to concentration in many markets. They also have a significant impact on **new market players, such as 'prosumers', DER and aggregators**²⁴¹. Many of these barriers find their origin in sector-specific regulation (e.g. grid codes) or stem from national requirements (e.g. licencing). In order to integrate new market players into the retail markets, a level playing field regarding market and smart grid data access is necessary which should be guaranteed by sector-specific energy market regulation.

Energy poverty is a market failure which is being addressed by different types of policies in the Member States²⁴², with sometimes negative effects on competition. Energy poverty is mainly a **social policy issue**, whereas consumer (activation) topics mostly relate to consumer protection policies and sector-specific regulation. Energy poverty should therefore mainly be addressed by social or consumer protection provisions. Negative competition effects should be dealt with by sector-specific policies, e.g. by banning price caps.

Summarising the conclusions of Chapter 4, the main issues are mapped in the energy policy triangle in Figure 5 below. The placement of each issue within the triangle indicates which competition policy instruments (competition law, sector-specific regulation, consumer

²³⁷ Guidelines on certain State aid measures in the context of the greenhouse gas emission allowance trading scheme post-2012, section 3.1; [http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:52012XC0605\(01\)](http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:52012XC0605(01)).

²³⁸ Please see section 4.5 on CRMs.

²³⁹ Please see sections 4.4 and 4.6 on congestion management in the transmission grid and on the integration of balancing markets respectively.

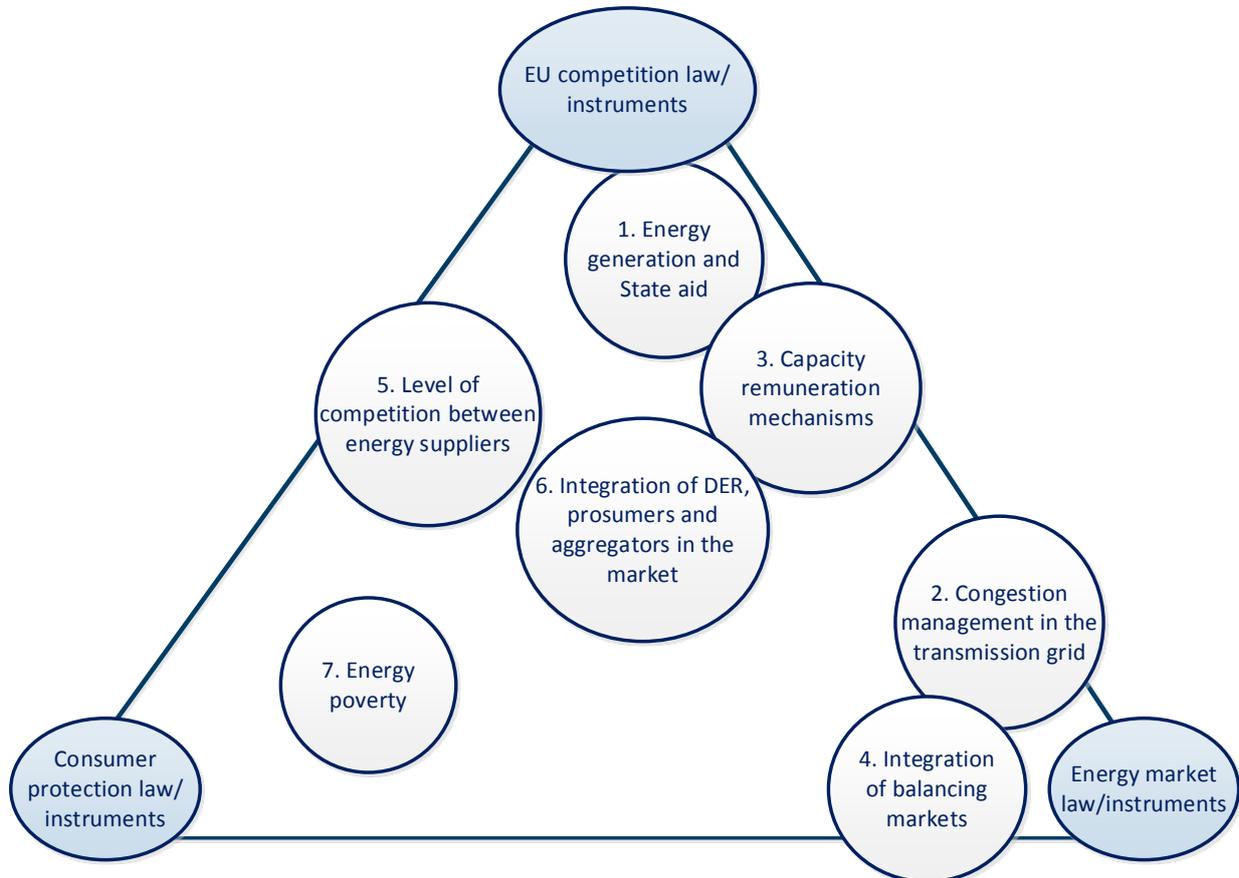
²⁴⁰ Please see section 4.7 on effective competition between energy suppliers.

²⁴¹ Please see section 4.8 on the integration of DER, 'prosumers' and aggregators in the market.

²⁴² Please see section 4.9 on energy poverty.

protection and other general rules that apply to all sectors) are best suited to address the issue. Note that consumer protection law is only relevant for issues that play a role on the retail level, whereas competition law and sector-specific energy market laws can play a role throughout the whole value chain.

Figure 7: Energy policy triangle



Source: Ecorys.

As illustrated by the energy policy triangle the issues relating most to competition law are:

- **energy generation and State aid;**
- **capacity remuneration mechanisms; and**
- **level of competition between suppliers.**

The other issues discussed in this study should be primarily addressed by other instruments than competition law.

5.1.2. Tensions between energy, competition and other policy objectives

This study has shown that there are tensions between energy policy objectives, consumer protection instruments and competition on the (internal) energy market in the EU:

- There can be a tension between **competition policy** and **consumer protection policy**: policies aiming at protecting (vulnerable) consumers, such as the price caps discussed in section 4.9, potentially have negative competition effects. While they are both designed to serve end-users, consumer protection policy aims at reducing the possibility for suppliers to take advantage of uninformed consumers. On the other hand competition policy starts from the view that rationally behaving consumers are able to make informed choices and benefit from more variety. Different views on information processing are a source of this tension, in case of consumer protection

policy the availability and processing of information is viewed as inherently problematic for vulnerable consumers.

- While **sector-specific regulation** and **competition law** can have the same point of departure, there are clear differences in the nature and goals of each of them. Generally, sector-specific regulation is perceived as being more intrusive as it has broader objectives than maintaining competition²⁴³. This is illustrated in the context of 4.7, where sector-specific regulation, consumer protection and competition law aim at safeguarding competition; yet, sector-specific regulation and consumer protection consider additional aims, such as the stimulation of innovation or transparency for consumers, and can reach these aims by many different means. Furthermore, in chapter 3, we elaborate on the differences in reach of sector-specific regulation and competition law using the example of CRMs.
- **Sector-specific regulation** can also help to protect consumers in areas where **general** consumer protection **rules** are deemed insufficient. This is most salient in the context of section 4.8: to ensure a level playing field between '*prosumers*' and traditional suppliers, the former need to be '*protected*' by, e.g., exempting them from requirements which traditional energy suppliers face. In order to make a choice regarding the type of instrument which is most suitable, which instrument is chosen depends on views regarding the consumer (well or ill-informed) and with respect to the effectiveness of competition law instruments.

As a general remark, it is helpful to distinguish between **structural** (e.g. natural monopolies, natural integration) and **behavioural** (e.g. contractual) issues to find the right balance between ex ante and ex post measures (of competition law instruments), because they require different (structural or behavioural) responses. An example of a structural remedies on the energy market is the requirement that merging parties are to divest part of their capacity, opening the market to new entrants and competitors. Virtual power plant (VPP) divestiture is an example of a behavioural remedy in which a company needs to release part of its production temporarily to competitors. Structural remedies could be a solution if there is a risk of a repeated infringement or when behavioural remedies are more burdensome.

5.2. What is the contribution of competition law in solving problems on the energy market?

The energy market has been characterised by a high degree of regulation and will remain so in the future. The already significant role of sector-specific regulation will become even more important in the near future given the ambitious energy and climate policy objectives. While the role of competition law instruments has and will continue to be important to protect and maintain effective competition, their role in achieving the **Energy Union Strategy** is a supporting role²⁴⁴.

5.2.1. Competition law adjusted to the specifics of the energy market

As always, when applying competition law instruments and executing the corresponding economic analyses, they need to be adjusted to the specifics of the market at hand. Distinguishing features of the energy market are the **temporal dimension determining the relevant market**, and the **central position of grid operators** as facilitators of market

²⁴³ Ibáñez Colomo, '*EU Competition Law in the Regulated Network Industries*', Society and Economy Working Papers 08/2016, section 3; https://www.lse.ac.uk/collections/law/wps/WPS2016-08_Colomo.pdf.

²⁴⁴ For the Energy Union Strategy, see COM/2015/080 final, from 25. February 2015, <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2015%3A80%3AFIN>.

participants. Both need to be taken into account when designing sector-specific regulation and applying competition law instruments. For example, high prices on the spot market would in most markets be seen as an abuse of a dominant position, however on the electricity market this need not be the case as temporarily high prices are needed to remunerate investments in generation capacity that can be called upon on short notice when electricity demand exceeds supply. Moreover, the role of grid operators has been under close scrutiny both by European and many national authorities due to their monopolies and (on the retail markets) sometimes close connections to suppliers. These characteristics raise the risk of potential abuses of a dominant position.

Duso et al. (2016) studied the impact of competition policy enforcement on the functioning of European energy markets²⁴⁵. They found that EU merger policy has had welfare enhancing effects: a positive impact on the level of competition, investment and productivity. Decisions relating to State aid and antitrust interventions did not have a consistent effect on the functioning of energy markets, but it is important to note that measuring such effects can be very challenging. Another finding of this study is that merger control is most effective in low-regulated sectors.

5.2.2. State Aid systems (renewables, nuclear energy, CRMs)

Renewable energy generation is stimulated by Member States through State aid. Also in case of nuclear energy, state subsidies are given to reduce investor uncertainty. CRMs often involve state subsidies for providing capacity and securing supply. In all three cases, State aid can distort competition if the instruments are not well-designed. The challenges lie in designing legislation which stimulates sufficient innovation in the long term, but at the same time does not distort competition in the short and medium run. The first-best solution would hence be to minimise or erase any negative competition effects already in the design of the respective instrument.

State intervention is necessary to reach the renewable energy targets; yet, this should be done while minimising distortions to competition. This means, for instance, that the support mechanisms should not favour specific renewable energy generation technologies to the detriment of others, and that the mechanisms are open for renewable energy generators from other EU Member States as well. Also, it should not be provided for longer periods than necessary and phased out if no longer needed. Similarly, State aid for nuclear energy needs to comply with State aid rules. There are also CRM-designs which minimise competition distortions, as discussed in Section 4.5.

While the first-best supportive measures minimise or erase any negative competition effects in the design of the respective instrument, negative effects on competition of State aid measures not designed in such a first-best way could in part be further addressed by refining the application of these competition law instruments. The same holds for State aid for nuclear electricity generation. CRMs which are price-based or exclude capacity from other Member States, should not be deemed compliant with EU competition law resulting in the necessity of Member States to amend them. However, there are limits as to what can be accomplished in terms of achieving the internal energy market through the application of State aid rules.

²⁴⁵ T. Duso, J. Seldeslachts, F. Szücs, (2016), 'The Impact of competition policy enforcement on the functioning of EU energy markets'; http://www.cresse.info/uploadfiles/2016_pa4_pa3.pdf, pp 29-30.

Harmonisation of key aspects at the EU level is hence preferable, as proposed in the Clean Energy package based on the findings of the sector inquiry with respect to CRMs²⁴⁶.

The EEAG sets out guidance to State aid measures in the energy field and the GBER clears out specific investment aids and block exemptions, for example on environmental investment aid for energy saving measures. Additionally, certain measures do not need to be notified to the Commission for assessment and approval because, in view of the limited amount of aid, they are deemed not to cause a large distortion of competition. However, one can imagine that aid to favour local production over central production, although very small individually, can over time have a significant effect on the share of decentralised capacity generation, up to the point where market distortions become significant. Purely based on State aid rules, this distortion cannot not be resolved because each individual case of State aid satisfies the De Minimis rules²⁴⁷. The current legislation and the new market design do not foresee or provide a solution for this problem; therefore, sector-specific energy market instruments are needed to remedy these issues in the case they arise.

In the Clean Energy Package, principles are designed for the allocation of State aid. Long-term stability and predictability of the market are named as two key aspects for investors in the energy sector. The proposed revised RES Directive provides clear guidelines for State aid in the long run: Member States need to assess the effectiveness of their support for electricity from renewable sources at least every four years; moreover support needs to be granted in an open, transparent, competitive, non-discriminatory and cost-effective matter²⁴⁸.

State aid is currently also used to create extra national generation capacity to ensure security of supply. However, security of energy supply is not necessarily only a national obligation, and could be organised more efficiently and competitively in a fully interconnected and synchronised European market. According to the proposed RES Directive, Member States need to ensure that support for at least 10% of the newly supported capacity in each year between 2021 and 2025 and at least 15% of the newly-supported capacity in each year between 2026 and 2030 is open to installations located in other Member States²⁴⁹. The new market design aims at creating a **more harmonised EU-wide approach to capacity markets** and renewable supporting schemes to ensure European security of energy supply. This implies, however, that the **stability of the grid needs to be guaranteed and interconnection needs to be sufficient** to allow reliable cross-border flows.

5.2.3. Competition level for suppliers and barriers for new entrants

Current important questions regarding the energy market encompass the removal of barriers to ensure sufficient competition on centralised and decentralised energy generation, wholesale, distribution and consumer/retail markets, and possible causes for inequalities in the level playing field between market players. These barriers can be found both on national and on EU level.

²⁴⁶ Art. 21 of the Proposal for a Regulation of the European Parliament and of the Council on the internal market for electricity prescribes cross-border participation of capacity providers across Member States; document available at <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52016PC0861R%2801%29>. The Final report of the sector inquiry can be found here: European Commission (COM/2016/752/final); http://ec.europa.eu/energy/sites/ener/files/documents/com2016752_en.pdf.

²⁴⁷ For further information on the current application of the De Minimis rules with respect to renewable energy generation in the EU see http://ec.europa.eu/competition/sectors/energy/environment_en.html.

²⁴⁸ Art. 4 of the Proposal for a Directive of the European Parliament and of the Council on the promotion of the use of energy from renewable sources (RES); <http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=COM:2016:767:FIN>.

²⁴⁹ Art. 5(2) of the RES proposal.

A lot of national market entry barriers are known, e.g. licensing obligations, lack of access to customer information, lack of price transparency, differences in processes and standards, variations of the national regulatory frameworks and specific issues related to cross-border entrants. However these identified barriers are often caused by the desire to fulfil other public policy objectives as well, e.g. safeguarding quality, protection of vulnerable market participants, etc. The main question is whether the proposed new market design as an EU-level initiative is able to address these issues, to resolve the frictions between different policy objectives and thereby to lower the barriers to enter and grow for new types of market participants such as aggregators and 'prosumers'. It is currently too early to tell whether the proposed changes in the market design indeed strike the right balance between these different policy objectives, or whether more far-reaching measures (e.g. ownership unbundling of distribution grid operators) are desirable.

5.3. Considerations with respect to the new market design

The current design of sector-specific energy regulation seems insufficient to abolish existing barriers and to prevent new barriers from developing (e.g. regarding priority dispatch and balancing rules)²⁵⁰. The new market design should pay special attention to safeguarding the level playing field for new market entrants, such as aggregators and consumers, while balancing symmetric and asymmetric regulation. At this stage, symmetric regulation can result in disadvantages for certain players, for instance in barriers for aggregators. If the policy objective is to achieve market participation of new market players, such as aggregators, favourable conditions need to be created in the beginning, resulting in a level playing field. With aggregators gaining market share, the asymmetric regulation needs to be made symmetric again step by step²⁵¹. This is a difficult balancing act because non-discriminatory rules that are consistently applied can still have a discriminatory effect. Below, we briefly touch upon some specific elements of the proposed new market design.

In the new market design only vulnerable customers are subject to regulated end-user energy prices, thereby ensuring that the general retail price paid by customers is market based instead of regulatory or political²⁵². In the current market design, all customers may benefit from regulated end-user prices, but the side-effect is that competition is less intense. Removing this regulatory barrier is expected to increase competition by allowing more price differentiation which creates incentives to switch.

Because most DSOs in Europe are legally bundled with generation and supply activities, legal unbundling of vertically integrated DSOs is required to prevent them from taking advantage of their competitive position²⁵³. This in addition to the requirements of the Clean Energy Package, which states that DSOs should continue to act as neutral market facilitators empowering customers and ensuring security of supply. The current Electricity Directive already prescribes that DSOs, as part of a vertically integrated undertaking, must have a separate legal form, and are independent in their organisation and decision making from

²⁵⁰ Indeed, the current rules on priority dispatch and balancing are to be changed: e.g. Art. 40, 4.b). In the revised Electricity Directive regarding balancing, and Art. 11 of the revised Electricity Regulation.

²⁵¹ The above mentioned Art. 11, 3. of the revised Electricity Regulation provides an example of asymmetric regulation becoming symmetric over time.

²⁵² Art. 4 of the Proposal for a revised Electricity Directive.

²⁵³ AERS (2016), '*Unbundling of distribution system operators*', guide and requirements for practical implementation, pp. 1-6; <http://www.aers.rs/FILES/MedjunarodniPropisiiSporazumi/2016-01-29%20unbundling%20of%20distribution%20system%20operators.pdf>.

other activities not related to distribution²⁵⁴. Unbundling is not required for integrated electricity undertakings serving less than 100,000 connected customers. With almost half of the Member States using this exemption at national level, the question is whether this requirement will be sufficient or whether it requires further revision in the Proposal for a revised Electricity Directive²⁵⁵. Moreover, any unbundling requirements should also hold for local energy communities to maintain a level playing field.

Another often mentioned point of discussion in relation to the degree of competition between suppliers is who will be allowed to own and operate storage facilities, as large-scale deployment of energy storage could overturn the energy market functioning as it is today²⁵⁶. According to the Clean Energy Package, DSOs would not be allowed to own, develop, manage or operate energy storage facilities²⁵⁷. Clarity in this area is urgently required in order to no longer stall potential (private) storage initiatives²⁵⁸.

The proposed new market design could improve the competitive conditions on the internal energy market by adopting guidelines on State aid regarding renewable energy generation, CRM design and 'prosumers', by sharpening guidelines regarding electricity price setting, billing and billing information, for instance, and by adopting guidelines regarding 'prosumers' and aggregators, data management and national renewable support schemes, among others. New issues without precedent but with the potential to distort the energy markets require a further sharpening of guidelines or the adoption of new guidelines. Such a potential disruptive issue is the *de minimis* case mentioned in section 5.2.3, in which individual 'prosumers' enjoy advantages from feeding subsidised energy into the grid, thereby falling under the *de minimis* principle, whereas, collectively, their subsidized production might distort competition.

Given that State aid is likely to be the most important competition law instrument in the transition towards reaching climate objectives, competition law will remain an important instrument (of last resort) to many issues to defend competition in the internal energy market.

Given the novelty of developments in the electricity and energy sectors and the ongoing developments, **there has not been enough reflection yet on the interrelation between market design and competition law**. With the Clean Energy Package having been proposed recently, more literature and commentaries on this topic are to be expected and should be welcomed in the future.

From the preceding analysis we note that certain market aspects are envisaged and should become part of a future market design. These new market aspects open new opportunities for the application of competition law. Please note that, due to the mentioned lack of reflection on the interrelation between market design and competition law, the following remarks are solely based on the analysis made in this study. More research in this area would be welcomed to provide a more solid evidence base.

²⁵⁴ Art. 26 of the Electricity Directive (Art. 35 of the Proposal for a revised Electricity Directive).

²⁵⁵ CEER Status Review (2016), '*Status Review on the Implementation of Distribution System Operators Unbundling Provisions of the 3rd Energy Package*', p. 6 ;
http://www.ceer.eu/portal/page/portal/EER_HOME/EER_PUBLICATIONS/CEER_PAPERS/Cross-Sectoral/2016/C15-LTF-43-03_DSO-Unbundling_Status_Review-1-Apr-2016.pdf.

²⁵⁶ D'Aprile, P., et al. (2016), '*The new economic of energy storage*', available at <http://www.mckinsey.com/business-functions/sustainability-and-resource-productivity/our-insights/the-new-economics-of-energy-storage>.

²⁵⁷ Art. 36 of the Proposal for a revised Electricity Directive.

²⁵⁸ ITREC, (2016), '*Energy Storage: Which Market Design and Regulatory Incentives Are Needed?*', section 6.5; [http://www.europarl.europa.eu/RegData/etudes/STUD/2015/563469/IPOL_STU\(2015\)563469_EN.pdf](http://www.europarl.europa.eu/RegData/etudes/STUD/2015/563469/IPOL_STU(2015)563469_EN.pdf).

The **level playing field** for new market entrants is a central aspect of the future energy market design. Although our analysis has shown that the level playing field is (and will be) predominantly determined by sector-specific policy, competition law instruments should play a continuing role to ensure effective competition.

Due to the **digitalisation** of the energy sector, it is going to be increasingly important that competitors (including 'prosumers'), but also participants of upstream and downstream markets, have **access to the data from smart grid**. In fact, some business cases may depend on access to this data, while for others the timeliness and reliability of this data will be more important. Access to timely and reliable data is increasingly important for many activities throughout the value chain, from storage to energy supply and many energy related services. Moreover, due to digitalisation, competition is also going to be increasingly '*data based*' in the sense that the more efficient competitors distinguish themselves also by better data and better data analysis. This gives a huge competitive advantage for potential market entrants such as Google²⁵⁹. This is the reason why data regulation (i.e., rules on data access, sharing and use) might become as significant as consumer regulation and sector-specific regulation. Furthermore, the linkage to clients in the energy sector is increasingly managed by new players, such as internet-based platform business models, which might have effects on the corresponding market structures. This means that the role of competition law is not only to maintain the current degree of effective competition, but also to **prevent the emergence of new types of market abuse, for instance based on data and from data intensive companies**.

In order to maintain competition and a level playing field on the retail level, **end-user price regulation** should be only used in a more targeted and tailored-for-the-purpose manner and apply only to **vulnerable end-users**. However, competition law prevails over sector specific regulation in EU law; new rules must be compatible with EU competition law in the final resort²⁶⁰.

Unbundling measures for DSOs must be handled more consistently and become more effective. This becomes vital especially with regard to new technologies and the corresponding energy services, such as future large-scale energy storage. Competition law should be used to police potential abuses of dominant market power and to prevent undesirable market concentrations, especially in the field of energy supply and storage.

A logical consequence of the point above is that **storage facilities** should be **privately owned and operated**, and that this new market for energy storage services needs to be competitive.

Whether it is safeguarding competition in the field of energy storage or guaranteeing a level playing field for both old and new market players, the application of competition rules needs to be interpreted in the light of these new challenges and developments in the energy market. This ensures that the importance and role of competition law in the energy market will be far from fading in the future.

²⁵⁹ <http://blogs.ft.com/nick-butler/2014/02/24/google-energy-amazon-power/?mhq5j=e3>.

²⁶⁰ If for example in sector specific regulation retail price control is abolished, but an NCA rules that the incumbent party has charged excessive prices and requires the introduction of price caps, sectoral rules need to be set aside on this particular point.

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