EU Energy Market Policy: Local and Regional Experience and Policy Recommendations

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Catalogue number: QG-02-17-062-EN-N
ISBN: 978-92-895-0911-4
doi:10.2863/11310

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1 Introduction

Local and regional authorities (LRAs) deal in many ways with the range of subjects under the Energy Union strategic framework such as electricity market design, energy efficiency, energy performance of buildings and renewable energy. LRAs are key actors in the conception and implementation of EU common policies and legislation. They act *inter alia* as licensing authorities, owners of public buildings, energy utilities and RES or CHP installations, purchasers of services and energy, etc. They are responsible for a large part of the economic structures in their cities and regions and have many direct tasks and responsibilities in the field of education. LRAs are closest to citizens, energy consumers as well as initiators of local and regional sustainable energy projects and their needs and problems. Local governments play a significant role in influencing energy systems; the designers and financial supporters of these systems, however, mostly are national and international bodies. So, while there is a lot that local and regional entities can do on their own, there are many areas where there is a need of support from the national and European level as well as a need to take into account the specific conditions on the local and regional level in order not to create (additional) obstacles when it comes to the promotion of sustainable energy on the local and regional level.

Against this background this report contains the following chapters:

- Chapter 2: An overview of the key latest documents and principles of EU energy market policy, with the most relevant provisions in these policies for LRAs.
- Chapter 3: Summary of main criticisms on EU Energy Market Policy from key industrial, societal and expert organisations at the EU level, containing relevance for the local and regional level and checking where appropriate against the CoR's Opinions.
- Chapter 4: Local and regional case studies having successfully coped with the current shortcomings of the energy markets (or have failed to do so).
- Chapter 5: Market regulatory and economic problems for local and regional energy efficiency initiatives and projects.
- Chapter 6: Conclusions on local and regional experience in implementation of EU energy market acquis and policy recommendations with regard to the consideration of the role of LRAs in future EU policy initiatives related to the energy market, and notably to energy efficiency and renewable energy/state aid.

2 Part 1: EU energy market policy: overview, principles, roles for local and regional authorities and criticisms of key stakeholders

This chapter aims to give a concise overview of EU energy market policy and the roles of local and regional authorities. In Chapter 2.1 a short overview of the key latest documents and principles of EU energy market policy is given that is most relevant for local and regional authorities (LRAs). The focus is largely on the Third Energy Market package and the recent Energy Union strategy as well as the Energy Efficiency policy and Energy Performance of Buildings directive. In Chapter 2.2 we focus on the roles of LRAs under the analysed policies.

2.1 EU energy market policy

Energy policy is one of the key policy areas of the European Union. Community action on this topic has long been covered by the area of the common market and the environment, but is a competence area of the EU that is shared with its Member States since the Lisbon treaty.

There are a number of challenges with the workings of the EU's energy markets: the markets are currently too fragmented, there is a high levels of fuel import dependency, CO_2 emissions are high, key parts of the infrastructure are outdated, with investment levels being inadequate. Also the retail market functions poorly and energy prices for final end users are high. Therefore, in 2015, the Framework Strategy for Energy Union (COM (2015) 80[1]) was launched to be one of the European Commission's top 10 priorities. The Energy Union Strategy is to address these challenges.

The Energy Union consists of five mutually-reinforcing and closely interrelated *dimensions* designed to bring greater energy security, sustainability and competitiveness. These dimensions are:

[1] 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: a framework strategy for a resilient Energy Union with a forward-looking climate change policy.

- **Energy security, solidarity and trust.** Focuses on diversification of supply (especially for gas), on improving member state coordination in response to crises, on a stronger European role in global energy markets, and on more transparency over gas supply.
- **A fully integrated European energy market.** Focuses on 'hardware' (such as pipelines) to link markets through physical interconnections, as well as on 'software' in terms of enforcing energy related legislation and removing regulatory barriers to integration. Also targets increased regional cooperation and a stronger focus on consumers and vulnerable energy customers (generally the poor and the elderly, for whom affordability is a key issue).
- **Energy efficiency contributing to a moderation of demand.** Focuses on increasing energy efficiency, particularly in the building and transport sectors.
- **Decarbonising the economy.** Focuses on integrating the 2030 Climate and Energy Package into the Energy Union process, continuing the EU Emissions Trading System, and retaining world leadership in renewable energy.
- **Research, innovation and competitiveness.** Focuses on developing a new strategy for research and innovation in areas such as RES, smart grids, carbon capture and storage, and nuclear technology.

The Energy Union builds upon two decades of EU's internal energy market policies that aim to harmonise and liberalise its energy markets to the benefits of consumers.

For the market design, addressing largely the first and second Energy Union's dimensions, three consecutive legislative packages of measures were adopted between 1996 and 2009, addressing market access, transparency and regulation, consumer protection, supporting interconnection, and adequate levels of supply. As a result of these measures, new gas and electricity suppliers can enter Member States' markets, while both industrial and domestic consumers are free to choose their own suppliers. Other EU policies related to the internal energy market address the security of the supply of electricity, gas and oil, as well as the development of trans-European networks for transporting electricity and gas.

For the decarbonisation through the use of renewable energy sources (RES) the main energy policy measure is currently the Renewable Energy Directive[2]

[2] Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC.

(RED). For energy efficiency, the key directives are the Energy Efficiency Directive[3] (EED) and Energy Performance of Building Directive[4] (EPBD).
In the remainder of this chapter, we will first detail these policies and directives and describe their relevance for LRAs. We will end with a description of what currently are the main aspects of the European Energy Union strategy that are related to LRAs.

2.1.1 Third Energy Market Package

The third round of EU energy market legislation that was adopted is known as the third package[5]. Its purpose is to further open up the gas and electricity markets in the European Union. The package was proposed by the European Commission in September 2007 and adopted by the European Parliament and the Council of the European Union in July 2009. It entered into force on 3 September 2009. The Third Energy Package consists of two directives and three regulations,[6] covering unbundling energy suppliers from network operators, strengthening the independence of regulators, establishment of the Agency for the Cooperation of Energy Regulators (ACER), cross-border cooperation between transmission system operators and the creation of the European Networks for Transmission System Operators (ENTSO), and increased transparency in retail markets to benefit consumers. These are detailed below.

2.1.1.1 Unbundling

Unbundling refers to the separation of energy supply and generation from the operation of transmission networks. If a single company operates a transmission network and generates or sells energy at the same time, it may have an incentive to obstruct competitors' access to infrastructure. This prevents fair competition in the market and can lead to higher prices for consumers. Under the third package, unbundling must take place in one of three ways, depending on the preferences of individual EU countries:

[3] 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.
[4] Directive 2010/31 of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings and its amendments (the recast Directive entered into force on 9 July 2010, but the repeal of the previous Directive took place on 1 February 2012).
5 Source: https://ec.europa.eu/energy/en/topics/markets-and-consumers/market-legislation
[6] Directive 2009/72/EC: common rules for the internal market in electricity; Directive 2009/73/EC: common rules for the internal market in gas; Regulation 713/2009: establishment of the Agency for the Cooperation of Energy Regulators ACER; Regulation 714/2009: conditions for access to the network for cross-border exchange of electricity; and Regulation 715/2009: conditions for access to the natural gas transmission networks.

- *Ownership unbundling*, where all integrated energy companies sell off their gas and electricity networks. In this case, no supply or production company is allowed to hold a majority share or interfere in the work of a transmission system operator,
- *Independent System Operator*, where energy supply companies may still formally own gas or electricity transmission networks but must leave the entire operation, maintenance, and investment in the grid to an independent company,
- *Independent Transmission System Operator* where energy supply companies may still own and operate gas or electricity networks but must do so through a subsidiary. All important decisions must be taken independent of the parent company.

Operators that comply with the unbundling rules can apply for certification with their national energy regulator. Every operator in Europe must be certified and the Commission provides its opinion on the certification procedure.

2.1.1.2 Independence of regulators

A competitive internal energy market cannot exist without independent regulators who ensure the application of the rules. Under the third package, the requirements for national regulators have undergone a number of changes. Specifically:

- regulators must be independent from both industry interests and government. They must be their own legal entity and have authority over their own budget. National governments must also supply them with sufficient resources to carry out their operations,
- regulators can issue binding decisions to companies and impose penalties on those that do not comply with their legal obligations,
- electricity generators, gas network operators, and energy suppliers are required to provide accurate data to regulators, and
- regulators from different EU countries must cooperate with each other to promote competition, the opening-up of the market, and an efficient and secure energy network system.

2.1.1.3 Agency for the Cooperation of Energy Regulators (ACER)

In order to help the different national regulators cooperate and ensure the smooth functioning of the internal energy market, the EU established the Agency for the Cooperation of Energy Regulators (ACER) (Regulation (EC) No 713/2009). ACER is independent from the Commission, national governments, and energy companies. As a supervisory body with an advisory role, the Agency

makes recommendations to the Commission regarding market regulation and priorities for transmission infrastructure. The Agency is mainly responsible for:

- drafting guidelines for the operation of cross-border gas pipelines and electricity networks,
- reviewing the implementation of EU-wide network development plans,
- deciding on cross-border issues if national regulators cannot agree or if they ask it to intervene,
- monitoring the functioning of the internal market including retail prices, network access for electricity produced from RES, and consumer rights.

The Commission will review the regulatory framework, in particular the functioning of ACER and the ENTSOs, in 2016 and will propose appropriate actions to reinforce the European regulatory framework.

2.1.1.4 Cross-border cooperation

National transmission system operators (TSOs) are responsible for ensuring that electricity and natural gas is effectively transported through pipelines and grids.

Due to the cross-border nature of Europe's energy market, they must work together to ensure the optimal management of EU networks. This is done through the European Network for Transmission System Operators for Electricity (ENTSO-E) and the European Network for Transmission System Operators for Gas (ENTSO-G) (Regulation (EC) No 714/2009 and 715/2009). These organisations:

- develop standards and draft network codes to help harmonise the flow of electricity and gas across different transmission systems,
- coordinate the planning of new network investments and monitor the development of new transmission capabilities. This includes publishing a Europe-wide 10 year investment plan to help identify investment gaps every two years.

In October 2013, the Commission adopted the first EU-wide gas network code on cross-border capacity allocation (Commission Regulation (EU) No 984/2013). In November 2013, the Commission also issued a guidance document on public intervention in the internal electricity market with, notably, a checklist that Member States are to use in designing adequate generation capacities (COM (2013)7243).

2.1.1.5 Open and fair retail markets

The third package includes rules designed to benefit European energy consumers and protect their rights. They include the right to choose or change suppliers without extra charges, receive information on energy consumption, and quickly and cheaply resolve disputes.

2.1.2 Security of Electricity Supply and Infrastructure Directive

Directive 2005/89/EC, based on Article 95 of the EC Treaty, results from the assumption that a competitive internal market for electricity necessitates harmonised, transparent and non-discriminatory security of supply policies at national level, the absence of which could lead to distortions of competition. Adopted in December 2005, the Directive requires Member States to define standards on the security of their power networks and seeks to increase interconnections between countries to enable effective competition between businesses in a liberalised electricity market. The main driver behind this is the discrepancy between the reality of today's electricity markets, which are increasingly integrated, and the persistence of national, largely uncoordinated responses to security of supply. Therefore, Directive 2005/89 required Member States to lay down an unambiguous, appropriate and stable framework which would facilitate security of electricity supply, as a precondition for the proper functioning of the internal market for electricity. In particular, it required Member States to ensure:

- an adequate level of generation capacity,
- an adequate balance between supply and demand, and
- an appropriate level of interconnection between Member States.

Regarding network investment the Directive obliges the EU countries to establish a regulatory framework that provides investment signals for both the transmission and distribution system network operators to develop their networks in such a way that they can meet foreseeable demand and that facilitates maintenance as well as the renewal of their networks. Merchant investments in interconnections should be allowed. However, any such investment must be taken in close co-operation between the relevant TSOs.

Directive 2005/89/EC created a general framework on security of electricity supply, but left it largely to Member States to define their own security of supply standards and policies, as long as the latter "are not discriminatory and do not place an unreasonable burden on the market actors" (Article 3(4)).

Many provisions of Directive 2005/89 have been superseded by more recent EU legislation, mainly by the Third Energy Package. A preliminary assessment indicates that this directive, as it stands currently, has a limited added value only. It provides a number of very open-ended obligations only, which have been implemented in many different ways by Member States.
In its Energy Union Strategy, the Commission announced its intention to propose new legislation on security of electricity supply in 2016, as part of a broader set of initiatives to reform the EU framework governing electricity markets[7].

2.1.3 Price Transparency Directive

This Directive 2008/92/EC aims at establishing a European procedure to ensure transparency of gas and electricity prices charged to end-users. At present, the degree of transparency in prices varies from one energy source and one Member State or one Community region to another, thus calling into question the achievement of an internal energy market. Transparency on prices is needed to improve the working of the internal energy market by improving possibilities to choose (between different energy providers and also between energy sources). The transparency of energy prices ensures that competition is not distorted and thus contributes to the smooth functioning of the internal market.

The Directive lays down procedures relating to the circulation of information and the prices of gas and electricity. The Member States shall ensure that the undertakings that provide industrial end-users with gas and electricity communicate information to Eurostat on the prices and terms of sale of gas and electricity to industrial end-users (Art.1(1)), the price systems in use (Art.1(2)), and the breakdown of consumers and the corresponding volumes by category of consumption to ensure the representativeness of these categories at national level (Art.1(3)). These prices must include all charges payable, such as network costs, taxes and other levies, and must also be corrected for rebates, exemptions and extra premiums. Initial connection charges are not to be included, and must be communicated by an independent statistical body. Transparency can be at odds with confidentiality of the prices that is important at the level of the individual enterprise. The Directive is set up in a way that both aims can be met.

In October 2011, the EU adopted Regulation (EU) No 1227/2011 on wholesale energy market integrity and transparency aiming to guarantee fair trading practices on European energy markets. It gives ACER the competence to gather,

[7] European Commission (2016). Evaluation of the EU rules on measures to safeguard security of electricity supply and infrastructure investment (Directive 2005/89/EC).

review and share data from wholesale energy markets, monitor markets and trading, investigate cases of market abuse and coordinate the application of appropriate penalties with the Member States. The responsibility for applying sanctions applicable to infringements lies, however, in the hands of the Member States. The European Council meeting of 22 May 2013 called on the Commission to provide an analysis of the composition and drivers of energy prices and costs in the Member States, which the Commission issued in January 2014 (COM (2014) 0021) and SWD (2014) 0020).

2.1.4 Renewable Energy Directive

By using more energy from RES to meet its energy needs, the EU lowers its dependence on imported fossil fuels and makes its energy production more sustainable, and also drives technological innovation and employment across Europe. The Renewable Energy Directive (RED, 2009/28/EC) is up to 2020 the main framework for the promotion of the use renewable energy, with mandatory national targets for the overall share of energy from RES in gross final energy consumption and in transport[8].

The RED sets a binding target of 20% final energy consumption from RES by 2020 (Article 3). To achieve this, EU countries have committed to reaching their own national RES targets ranging from 10% in Malta to 49% in Sweden. They are also each required to have at least 10% of their transport fuels come from RES by 2020 (Article 3). All EU countries have submitted national renewable energy action plans (NREAPs) showing what actions they intend to take to meet their renewable targets. These plans include sectorial targets for electricity, heating and cooling, and transport; planned policy measures; the different mix of RES technologies they expect to employ; and the planned use of cooperation mechanisms.

A new target for 2030. RES will continue to play a key role in helping the EU meet its climate goals and energy needs beyond 2020. EU Member States have agreed on a collective renewable energy target of at least 27% of final energy consumption in the EU by 2030, this target is part of the EU's energy and climate goals for 2030 as proposed by the Commission in its Climate and Energy Framework (COM (2014) 15). The 27% RES target is related to a 40% cut in greenhouse gas emissions compared to 1990. The target is binding at EU level, but has no specified Member State targets:

[8] Also it lays down rules relating to statistical transfers between Member States, joint projects between Member States and with third countries, guarantees of origin, administrative procedures, access to the electricity grid for energy from renewable sources, and it establishes sustainability criteria for biofuels and bioliquids.

"While binding on the EU, it would not be binding on the Member States individually but would be fulfilled through clear commitments decided by the Member States themselves which should be guided by the need to deliver collectively the EU-level target and build upon what each Member State should deliver in relation to their current targets for 2020" (COM/2014/015 final).

To meet these targets, the European Commission has proposed new policies, including a reformed EU Emissions Trading System (ETS) for the fourth trading phase (2012-2030), some new indicators for the competitiveness and security of the energy system, as well as ideas on a new governance system based on national plans for competitive, secure, and sustainable energy, following a common EU approach to ensure stronger investor certainty, greater transparency, enhanced policy coherence and improved coordination across the EU - relating to the Energy Union strategies. The European Commission will develop proposals to implement these goals in post-2020 European energy and climate policies and regulations.

2.1.5 Energy Efficiency Directive

The 2012 Energy Efficiency Directive establishes a set of binding measures to help the EU reach its 20% energy efficiency target by 2020 including through efficient cogeneration and district heating and cooling (Article 14). Systems using at least 50% renewable energy, 50% waste heat, 75% cogenerated heat or 50% of a combination of such energy and heat can be qualified as efficient district heating and cooling (Article 2).

Under the Directive, all EU countries are required to use energy more efficiently at all stages of the energy chain from its production to its final consumption. Member States were required to transpose the Directive's provisions into their national laws by 5 June 2014.

2.1.6 Energy Performance of Buildings Directive (EPBD)

The EPBD contains a range of provisions to improve the energy performance of new and existing buildings. Under the EPBD:

- EU countries have to draw up lists of national financial measures to improve the energy efficiency of buildings (Article 10),
- Member States must set minimum energy performance requirements for new buildings, for the major renovation of buildings and for the replacement or retrofit of building elements (heating and cooling systems, roofs, walls, etc.) (Article 4; Article 5),

- Member States must implement a methodology for the calculation of the energy performance of buildings, taking account of all factors that influence energy use (Article 3),
- energy performance certificates are to be included in all advertisements for the sale or rental of buildings (Article 11; Article 12; Article 13),
- Member States must establish inspection schemes for heating and air conditioning systems or put in place measures with equivalent effect (Article 14; Article15), and
- all new buildings must be 'nearly zero energy buildings' by 31 December 2020 (public buildings by 31 December 2018) (Article 9).

2.1.7 Energy Union

In February 2015 the Commission adopted a 'Framework Strategy for a Resilient Energy Union with a Forward-Looking Climate Change Policy' (COM/2015/080 final), in short the EU-wide Energy Union. It is one of the political priorities of the Juncker Commission. It builds on themes and policies of the Third Energy Package and is also guided by analysis of shorter and longer-term energy security challenges; challenges in building a well-functioning and fully integrated internal market, diversifying external supplies and coordination of national policies.

The framework strategy also contains a fifteen point action plan detailing specific aims of the Energy Union across the policy dimensions. While wide-reaching, the action points vary in their scope from aims such as the diversification of gas supply, regional electricity market integration and a better performing retail market, to more specifically targeted ones such as renewable electricity generation and energy savings targets. For electricity markets, two communications are important: a 'new deal' for energy consumers (SWD (2015) 141); and even more so the intended redesign of European electricity markets (SWD (2015) 142). Achieving the Energy Union means delivering on the actions mentioned in the strategy.

2.2 Role of local and regional authorities

Local and regional authorities, together with other stakeholders, have vital roles to play in achieving the EU '20-20-20' targets. LRAs are crucial actors in the preparation and implementation of several common European policies. In particular, they can contribute by promoting the use of renewable energy and the improvement of energy efficiency at the local and regional level, for example by

setting ambitious targets, by streamlining administrative procedures and regulations, or by providing financial support (e.g. grants or guarantees).

2.2.1 Third energy market package

The Electricity and Gas Directives (Directives 2009/72/EC and 2009/73/EC) have introduced a new set of rules with regard to the national regulatory authorities (NRAs). Member States must designate a regulatory authority at the national level. In the Third Package, independence of NRA's concerns not only the electricity and gas industry but also any other public body (including national, local or regional government, municipalities and political organisations or structures) or private body. Legally distinct means that the NRA must be created as a separate and distinct legal entity from any Ministry or other government body. This provision is closely linked to the requirement that the NRA should be able to take autonomous decisions[9].

However, while preparing the network codes (electricity and gas), the draft Community-wide network development plan and the annual work programme, the ENTSO for Electricity and Gas shall conduct an extensive consultation process, at an early stage and in an open and transparent manner, involving all relevant market participants, and, in particular, the organisations representing all stakeholders. That consultation shall also involve national regulatory authorities and other national authorities, supply and production undertakings, network users including customers, distribution system operators, including relevant industry associations, technical bodies and stakeholder platforms. It shall aim at identifying the views and proposals of all relevant parties during the decision-making process (Article 10 of regulation No 713/2009, 714/2009 and 715/2009).

Local and regional authorities have no distinct role in these Directives except that they will be consulted (through their national authorities).

2.2.2 Security of Electricity Supply and Infrastructure Directive

Member States must define general, transparent and non-discriminatory policies on security of electricity supply compatible with the requirements of a competitive single market for electricity. They must define and publish the role and responsibilities of competent authorities and different players in the market (Art. 3). The specific role of LRAs in strengthening the security of energy supply and infrastructure investment is not emphasised in this Directive.

[9] Commission staff working paper 22/01/10. The Regulatory Authorities.

However, Art. 3 provides general provisions of implementing measures and needs to take account of:

- the degree of diversity in electricity generation at national or relevant regional level (Art. 3(3)(a)),
- the importance of reducing the long-term effects of the growth of electricity demand (Art. 3(3)(b)),
- the importance of encouraging energy efficiency and the adoption of new technologies, in particular demand management technologies, RES technologies and distributed generation (Art. 3(3)(c)), and
- the importance of removing administrative barriers to investments in infrastructure and generation capacity (Art. 3(3)(d)).

Development and reinforcement of the grid infrastructure, including intelligent networks and interconnections. Directive 2009/28/EC requires Member States to take the appropriate steps for ensuring these necessary developments and to accelerate authorisation procedures for grid infrastructure and to coordinate approval of grid infrastructure with administrative and planning procedures for the further development of electricity production from RES. Hence, LRAs give permission to construct and operate plants and associated transmission and distribution network infrastructures for the production of electricity, thus could remove administrative barriers which could hamper investments in infrastructure and generation capacity.

2.2.3 Price Transparency Directive

Local and regional authorities have no clear role in this Directive. Member States need to communicate prices and price systems in place to the Statistical Office of the European Communities (Eurostat).

2.2.4 Renewable Energy Directive

The RED sets targets and regulations on the national level, and does not as such address local or regional level authorities directly. Nevertheless, the involvement and role of LRAs in achieving the national targets is recognised in various provisions and in the preamble. In order to comply with the RED, Member States have submitted their National Renewable Energy Action Plan (NREAP), which should include adequate measures to achieve the national targets, including cooperation between local, regional and national authorities. Member States may encourage LRAs (Articles 4, 13 and 14):

- to set targets in excess of national targets,

- in drawing up NREAPs,
- in raising awareness of the benefits of energy from RES,
- to ensure equipment and systems are installed for the use heating and cooling from RES and for district heating and cooling when planning, designing, building and renovating industrial or residential areas, and
- to use minimum levels of energy from RES in new buildings and in existing buildings that are subject to major renovation.

The lack of transparent rules and coordination between the different authorisation bodies has been shown to hinder the deployment of energy from RES according to the RED. Therefore the RED includes a number of provisions which address this issue in Article 13. The specific structure of the renewable energy sector should be taken into account when national, regional and local authorities review their administrative procedures for giving permission to construct and operate plants and associated transmission and distribution network infrastructures for the production of electricity, heating and cooling or transport fuels from RES. Administrative approval procedures should be streamlined with transparent timetables for installations using energy from RES. Planning rules and guidelines should be adapted to take into consideration cost-effective and environmentally beneficial renewable heating and cooling and electricity equipment. In addition, Member States may allow that obligation to be fulfilled by complying with standards for zero energy housing, or by providing that the roofs of public or mixed private-public buildings are used by third parties for installations that produce energy from RES.

2.2.5 The Energy Efficiency Directive

The EED includes many elements to improve energy efficiency and achieve energy savings. Public bodies at national, regional and local level are important drivers as regards energy efficiency, and the EED includes a number of provisions that encourages Member States to involve the local and regional government levels in their efforts.

Member States shall encourage public authorities to adopt an energy efficiency plan (Article 5(7)), freestanding or as part of a broader climate or environmental plan, containing specific energy savings and efficiency objectives and actions. For example, to purchase only products, services and buildings with high energy-efficiency performance (Article 6) and using efficient cogeneration and heating and cooling systems (Article 14). Member States may require competent local, regional and national authorities or operators of individual installations to carry out the cost-benefit analyses in relation to measures for promoting efficiency in heating and cooling (Article 14; Annex IX).

Secondly, Member States shall encourage public authorities to put in place an energy management system, including energy audits (Article 5(7); Article 8; Annex VI). In the EED, energy audits are defined as systematic procedures used to identify, quantify and report existing energy consumption profiles and energy savings opportunities in buildings, industrial or commercial operations or installations, and in private or public services. Energy management systems are defined as sets of elements of plans establishing energy efficiency objectives and strategies to achieve these objectives. Energy audits are an integral part of energy management systems.

Thirdly, Member States shall encourage public authorities to use, where appropriate, energy service companies, and energy performance contracting (when tendering service contracts) to finance renovations and implement plans to maintain or improve energy efficiency in the long term (Article 5(7)).

And lastly, Member States shall encourage public authorities in raising awareness of the benefits of taking energy efficiency improvement measures (Article 17).

2.2.6 Energy Performance of Buildings Directive

Measures are needed to increase the number of buildings which not only fulfil current minimum energy performance requirements, but are also more energy efficient, thereby reducing both energy consumption and carbon dioxide emissions. For this purpose, Member States should draw up national plans for increasing the number of nearly zero-energy buildings and regularly report such plans to the Commission (Article 9).

Since local and regional authorities are critical for the successful implementation of this Directive, they should be consulted and involved (Article 20; Article 21), as and when appropriate in accordance with applicable national legislation, on:

- planning issues,
- the development of programs to provide information on energy performance,
- training and awareness-raising, and
- the implementation of this Directive at national or regional level.

Such consultations may also serve to promote the provision of adequate guidance to local planners and building inspectors to carry out the necessary tasks.

2.2.7 Energy Union

The most important aspects mentioned in the framework strategy for the Energy Union relevant for LRAs are:

- In order to empower consumers, Member States and their authorities need to fully implement and enforce existing European rules, including consumer protection rules. Necessary support measures should be undertaken also by regional and local authorities, so that consumers have understandable, readily-accessible information, user-friendly tools, and financial incentives for saving energy.
- The Energy Union also needs an integrated governance and monitoring process, to make sure that energy-related actions at European, regional, national and local level all contribute to the Energy Union's objectives.
- This governance process should, at the national and local levels include actions to protect vulnerable consumers. Energy poverty negatively affects living conditions and health. It has many causes, mostly resulting from a combination of low income and general poverty conditions, inefficient homes and a housing tenure system that fails to encourage energy efficiency. Energy poverty can only be tackled by a combination of measures, mainly in the social field and within the competence of authorities on the national, regional or local levels. When phasing out regulated prices, Member States need to propose a mechanism to protect vulnerable consumers, which could preferably be provided through the general welfare system and otherwise through the energy market.
- On energy efficiency, most of the work has to be done at national, regional and local level, but the Commission can play a strong role creating the appropriate framework for progress. The Commission will, therefore, encourage Member States to give energy efficiency primary consideration in their policies.
- Particularly at the local and regional levels, actions are needed to exploit the energy efficiency potential of buildings. Attracting investments at the scale needed remains a challenge, especially at the local level, mainly due to lack of awareness and expertise in small-scale financing. The Commission will support ways to simplify access to existing financing and offer ‘off-the-shelf’ financing templates for financial instruments to the European Structural and Investment Funds managing authorities and interested stakeholders, promote new financing schemes based on risk and revenue sharing, develop new financing techniques and support in terms of technical assistance. Financial support needs to be combined with technical support to help aggregate small-scale projects into larger programs which can drive down transaction costs and attract the private sector at scale.

Regional approaches to market integration are an important part of the move towards a fully integrated EU-wide energy market. The Commission will develop guidance on regional cooperation and engage actively in regional cooperation bodies with Member States and stakeholders.

2.2.8 Summary

In the preceding sub-sections the role of LRAs in the analysed policies has been summarised. We conclude that LRAs have no distinct role in the Third Package except that they will be consulted (through their national authorities). The specific role of LRAs in strengthening the security of energy supply and infrastructure investment is also not emphasised. Likewise, their role in improving the transparency in gas and electricity prices charged to industrial-end users is not known.

Contrary, in the Energy Union's objectives, the role of LRAs is much more important, and they will play a pivotal role in:

- Necessary support measures for consumer protection e.g. tools, providing information, promote new financing schemes and provide financial incentives for energy savings, and explicitly combat energy poverty,
- Actions at the regional and local level need to contribute to the Energy Union's objectives, and
- Give energy efficiency primary consideration in policies, and particular exploit energy efficiency potential of buildings.

It is now more recognised that LRAs are important in achieving the EU '20-20-20' targets and can, together with central governments, define and implement national energy strategies and develop plans for specific areas.

LRAs are, however, not addressed directly in the RED, EED and EPBD. In the RED, Member States may encourage LRAs to set requirements (e.g. minimum levels of RES and use of district heating and cooling systems) in existing and new buildings in all stages of construction. The role for LRAs is more pronounced in the EED, where they are involved in adopting an energy efficiency plan containing efficiency objectives and actions and implementation of this plan through an energy management system. Cost-benefit analyses are to be carried out to make well informed decisions for the purpose of heat planning. They should also fulfil an exemplary role in purchasing only products, services and buildings with high energy-efficiency performance and stimulate other parties through service contracting in doing the same. In the EPBD, LRAs should be consulted in the effective implementation of the Directive at national or regional level and also ensure that buildings owned by these authorities are

nearly zero-energy by 2020. In general, LRAs have furthermore a relevant role to play to inform citizens of the opportunities and implications of the development of energy from RES and energy reduction as these public bodies are closest to citizens as underlined in the directives.

2.3 Summary and conclusions of criticisms on EU energy market policy

The summary of main criticisms to EU Energy Market policy by key major industrial /expert/societal stakeholder organisations at the EU level can be found in Annex I to this report. The focus is on the criticism that is relevant for the local and regional level. The table below summarises the most often mentioned statements by the key stakeholder groups, on the topics of the price mechanism (energy only market with scarcity pricing; capacity remuneration mechanisms), on the cross border markets and interconnection, the necessity of RES support mechanisms, how demand response should/could be facilitated, whether long term contracts should be strengthened, as well as the topic of policy coherence.

The criticisms were checked with the opinions of the Committee of the Regions: In the rightmost column we have indicated with X whether the criticism is in accordance with a voiced opinion of the CoR (the relevant opinions since 2012 were checked), the footnote indicates the exact wording. If there is no X in the rightmost column, the CoR has not explicitly affirmed/confirmed/mentioned the criticism, but it has also not voiced a contrary opinion. If there is an O in the column, the opinion of the CoR is contrary to what is expressed by the stakeholder.

Figure 1: Summary of criticisms on EU energy market policy by stakeholder

Topic	Criticism	Process industries	Electricity sector	Renewable supply	NGO consumers	NGO env/ climate	Experts	CoR opinion
Scarcity pricing	Scarcity pricing is welcomed as investments should be directed by price signals generated by markets; market design should reflect scarcity and also reward flexibility	X	X		X	X	X	X (2013) [10]

[10] "*… points out that wholesale energy markets provide the price signals which affect the choices of producers and consumers, as well as the investment decisions in production facilities and transmission infrastructure. These signals should reflect the real conditions of energy supply and demand…"*

Topic	Criticism	Process industries	Electricity sector	Renewable supply	NGO consumers	NGO env/ climate	Experts	CoR opinion
	Scarcity prices can make CRMs redundant		X					
	Scarcity prices should be reflective of loss of load and not be capped by artificial/regulatory price caps		X			X	X	
	Scarcity prices and the procurement of ancillary/reserve services may be insufficient to drive renewable investment			X			X	
	Differentiated prices / scarcity prices may affect some consumer groups negatively and can be socially unacceptable.				X			X (2012) [11]
Capacity remuneration mechanisms (CRMs)	CRMs not needed, or only as a measure of last resort, contain many risks	X				X		X (2013) [12]
	EU harmonised rules should be introduced for CRMs / for system adequacy	X	X			X	X	
	When designed, CRMs should be responsive to market needs (e.g. scarcity; regional assessments) and incentivise the 'right type' of investment		X					
	A proper flexibility market for ancillary or grid support services is needed, alongside the energy-only market			X				X (2013) [13]
	CRMs needed to attract specific investments (e.g. RES)			X			X	
Cross border electricity markets and interconnection	Need to align intraday and balancing markets; bidding zones should be as large as possible.	X	X					
	Need to align bidding zone size with requirements of flow based market coupling (bidding zones should be smaller - reflecting zones with limited interconnection capacity)						X	

[11] *"… doubts whether the proposed EC measures are satisfactory to empower consumers and to combat energy poverty and demands special focus to be given to the protection of consumers…."*

[12] *"…stresses that prematurely introduced and badly designed capacity mechanisms may result in fragmentation of the internal market and hinder investments."*

[13] *"…believes that, for the effective functioning of a European energy market, it is crucial to develop network codes, tackle remaining regulatory issues with respect to the European balancing market network code and to establish a co-ordination initiative to address emerging regulatory and technical issues.*

Topic	Criticism	Process industries	Electricity sector	Renewable supply	NGO consumers	NGO env/ climate	Experts	CoR opinion
	There is a need for more interconnection capacity (as reflected by price spreads between countries). More interconnection capacity should be projects of common interest.	X	X				X	X (2012) [14]
	Cross-border participation is a fundamental design feature of electricity markets as well as of CRMs / Security of supply should be considered in the European context		X			X		X (2013) [15]
RES support	RES support system (subsidies) should be phased out as soon as possible	X						O[16]
	RES should be able to compete in liberalised markets on its own merits	X						X (2012) [17]
	An EU-prescriptive approach on RES support schemes might fail to tackle the most urgent barriers for self-generation. National policies needed, respecting diversity of current systems.				X			X (2012) [18]
	Current RES support systems should be revised; they should be aligned between Member States; CO_2 should either be the main driver or an important element		X				X	X (2012) [19] (2015) [20]

[14] *"… emphasises that infrastructure development is critical for the success of a single market and for the integration of renewable energy into power systems . The improvement of energy infrastructure can be achieved through investment in distribution grids, upgrades to transmission infrastructure, investment in interconnections, especially between Member States and their regions, development of smart grids, support for decentralised/small-scale power generation…."*

…

[15] *"… The CoR endorses the Commission's policy to look for cross-border solutions. Before any regional or national measures are set, proper analyses should be conducted to confirm there is a capacity problem and there are no alternative solutions, and to verify that the measures proposed take into account cross-border effects. A coordinated approach to security of supply is essential;…"*

[16] In all opinions, the need for RES support is expressed.

[17] *"…shares the EC's opinion that the competitiveness of RES operating in energy markets needs to be improved. The subsidy systems should be constructed in a way that encourages investors to develop RES and ensures that they operate effectively in the competitive energy market. "*

[18] The CoR stresses elaborately the importance of the role of regions, more so than the national level, and the scope is wider than just self-generating, but also relates to investment, where to invest etc.

[19] *"…In particular, a well-functioning carbon market is crucial for decreasing the need for subsidies for mature technologies in the long run. Support will, however, be necessary in the case of new, less mature technologies. … / … calls for a proper structure and realistic objectives for the EU Emissions Trading Scheme (ETS) which was supposed to act as an indirect form of support for RES…"*

[20] *"…considers it essential to link energy policy to the EU policy for combating climate change and emphasises that a well-functioning carbon market leading to an effective price for CO_2, together with increased energy efficiency and investment in renewable energy are the most efficient tools for achieving the desired investment in a green low-carbon economy; … stresses the need to put an end to "subsidy shopping" by fully internalising energy costs and reducing the imbalance between different support schemes and subsidies; asks the European*

Topic	Criticism	Process industries	Electricity sector	Renewable supply	NGO consumers	NGO env/ climate	Experts	CoR opinion
	Support mechanisms are needed, be tailored to RES technology maturity European state aid rules should continue to allow specific aid for RES until the technologies become fully cost competitive			X		X	X	X (2012) [21]
	Support mechanism convergence depends upon elimination of structural barriers in the internal energy market.			X				
	Variable RES should bear its own balancing costs; full programme responsibility for vRES	X					X	
Demand response (DR)	Prioritise DR (and storage) over generating capacity	X		X				X (2016) [22]
	DR participation should be voluntary; not all consumers are either interested or able to participate				X		X	O (2013) [23]
	Market rules and regulation should be systematically reviewed to allow DR and storage to participate on equal footing to supply (and provide capacity, ancillary, balancing and security services)			X		X		X (2013) [24]

Commission to publish guidelines and recommendations to harmonise the various support schemes, subsidies and tax incentives across the EU;"

[21] "*…points out that a simple and effective support scheme for RES should be developed, based on a common European strategy. In line with the principles of subsidiarity and proportionality, only a general framework should be specified at European level, focussing especially on cross-border effects. The future subsidy mechanisms could be based on verified cohesion policy procedures in order to support the production and distribution of renewable energy as well as promote a wider implementation of new RES technologies. Stresses the key role that local and regional authorities have to play..". Furthermore, the entire fourth chapter of the Opinion is on outlining ideas for a new European support system for RES, with elements such as a pan-european fund, coordination of support schemes at European level, increasing the role of regions ant optimising the use of RES technologies in different regions etc."*

[22] "*…notes the extremely high number of services and technical solutions that exist or are currently being developed in the fields of management and demand response, as well as in the management of decentralised production. The European Union must ensure that priority is given to encouraging and supporting the development of these tools, assessing their value and impact, whether economic, social, environmental or in terms of energy, and monitoring their usage to make sure that energy is safe, easy and affordable;…*"

[23] CoR opinion has confidence of the idea that information leads to behaviour-change : "*…believes that, next to the proposed information campaigns on energy providers and prices, implementation of smart real-time metering systems for energy production and consumption and distribution networks/grids with a sound technical basis is crucial for providing decision-making information to consumers, enabling them to become more aware of energy prices, energy consumption (patterns) and the relation between consumption and price of energy, therefore leading to a more well-considered and sustainable use of energy, creating the conditions for the use of smart electrical (household) appliances, and resulting in energy savings. …"*

[24] "*… believes that the future European energy market should no longer be determined solely by supply but also by control of demand, especially during peaks in consumption."* [note that CoR only addresses peak demand, not peak renewable surpluses!]

Topic	Criticism	Process industries	Electricity sector	Renewable supply	NGO consumers	NGO env/ climate	Experts	CoR opinion
Long term contracts (LTCs)	LTCs are and should be a voluntary element in well working markets, public sector should not shape these contracts or influence it	X						
	Voluntarily bilateral LTCs serve primarily for hedging price risks,		X				X	
	LTC's do not ensure security of supply, and do not signal the need for investment		X					
	The right kind of LTCs will not materialise without regulatory backing due to counterparty risks, mobility of households and firms, as well as EU guidelines.						X	
	LTCs or long term price signals are needed to provide stability to facilitate RES investments, LTCs should not be allowed for fossil generation					X		
	Public action is needed for removal of barriers to liquidity of long term contracts / they will likely not materialise otherwise			X			X	X (2016) [25]
Taxes, levies and charges	Inhibit development of the wholesale market, influence dispatch decisions, hamper investments in power plants and at consumers, distort competition between technologies and across borders.	X	X					
	Cause distortions for end-users: stimulate self-generation beyond socially cost effective level, shifting costs to other users		X					
	Cause distortions for end-users: weakening of the whole sale price signal; distorting competition between different energy carriers, pose a barrier for electrification		X	X		X		
	Community-based and small-scale renewables consumption and production should be exempt from paying grid charges, tariffs, duties and value added tax in order to provide investment security				X	X		

[25] Actually, the worry of the CoR is on energy poverty: … *demand response risks exposing consumers to wholesale and retail market changes, which could result in excessive tariffs that are beyond consumers' means. Price models providing for guaranteed and* ***long-term fixed prices*** *should be offered to protect consumers against price instability*;

Topic	Criticism	Process industries	Electricity sector	Renewable supply	NGO consumers	NGO env/ climate	Experts	CoR opinion
Policy coherence	Public sector should provide investment protection in the first place by articulating a long-term view and promoting a predictable and coherent energy policy		X	X				X (2012) [26]
	Need for more policy coherence in Energy Union strategy than just energy market design						X	
	System thinking and sectoral integration need to play a key role in RES integration, as the power sector represents only a part of the energy system					X		

From the table, we can derive some general observations:

- Different stakeholders stress different things, voice concerns based on their perception and immediate interests. Most of the criticisms are somewhat compatible with each other, but sometimes not (e.g. pricing/bidding zones should be larger/smaller).
- On many topics, the CoR had articulated opinions. These were generally not conflicting to the ones voiced by the stakeholders, however the focus and the level of detail is sometimes slightly different.
- There is clear disagreement on the need for RES support mechanisms: Industry wants to phase out all subsidies, but other stakeholders and the CoR stress that support mechanisms for RES are positively needed. The question is how to align long term investment in RES and volatile energy markets, with minimum investor risk and minimum price risk for industry, consumers etc.

[26] "*considers that one of the main reasons behind the problems in RES development is that EU energy policy lacks long-term vision and coordination between the countries, regions and parties involved, in line with the subsidiarity principle* …."

3 Part 2: Local and regional case studies

In this part, we consider in some detail representative examples of local and regional "good practices" having successfully coped with shortcomings in energy markets. In the case studies we show that – while shortcomings in energy markets, regulation, policy, support schemes, etc. pose obstacles – there are communities or regions that find innovative solutions that contribute towards the larger policy goals: a sustainable energy supply. There are five full case studies and some short more illustrative ones:

1. Power to Heat in Denmark and the Netherlands
2. Cooperatives/small case generators (SOM Energia/Sifnos/KRK/Croatia)
3. Misalignments between ETS and RES policy
4. Potential problems of state aid guidelines for smaller market participants: the transition to a tender system in Germany
5. Potential distortive effects of capacity markets
6. Illustrative cases:

    a) Cooperatives in Croatia
    b) Cooperatives in Portugal
    c) Dutch 'Passive Control' – flexibility provision outside of formal market
    d) Scarcity pricing: high prices and investment boom
    e) Conflicting policies: LCP plant closures

The case studies will be detailed below, culminating in conclusions in section 3.7.

3.1 Case study: Power to Heat in Denmark and the Netherlands

3.1.1 Introduction to project/case

The variable nature of production from wind and solar-PV necessitates that their variations in output have to be met by flexibility from conventional generation, from storage and/or from demand. As parts of conventional generation and electricity demand is inflexible, when the installed capacity for wind and solar increases, ever larger volumes of wind and solar exceed the flexibility capabilities of the conventional generation and regular flexible demand.

Furthermore, variable renewable electricity generation's low marginal costs drive conventional generators out of the market, potentially diminishing

conventional flexibility but also heat supply to homes and businesses. In the Danish system, a large share of conventional generation includes combined heat and power generators of municipal heating grids. These are important for heat supply to homes. Therefore, it is necessary to search for new flexible and large scale demand response applications that have merit in accommodating RES surpluses and are aligned with the requirements of the Danish energy system with its heat demands. These flexible demand response applications should be able to increase electricity demand when wind is in surplus, and decrease electricity demand when wind output is momentarily insufficient to meet power demand.

One of the first large scale techniques for accommodating surpluses of wind energy in this manner are power-to-heat applications. These can entail for example placing electric boilers or alternatively heat pumps in heating grids that otherwise use a different energy feedstock. Power-to-heat applications can be very cost effective if there is a sizeable heat demand und utilise proven, reliable and affordable technology.

If the new flexible power to heat can be attuned to match the frequency and volumes of the fluctuations of wind surpluses, then they can be key in properly utilising the renewable energy, and this would avoid the necessity of curtailment (e.g. by stopping the turbines – the ultimate solution).

The Danish case shows widespread adoption of power-to-heat techniques with more room to grow. In this case study we highlight on Denmark, focus on the rationale for power-to-heat, how it has seen successful application, and what the remaining challenges are. We then focus on the Netherlands where there are market parties that want it but where there are clear barriers in implementing the option in the short term.

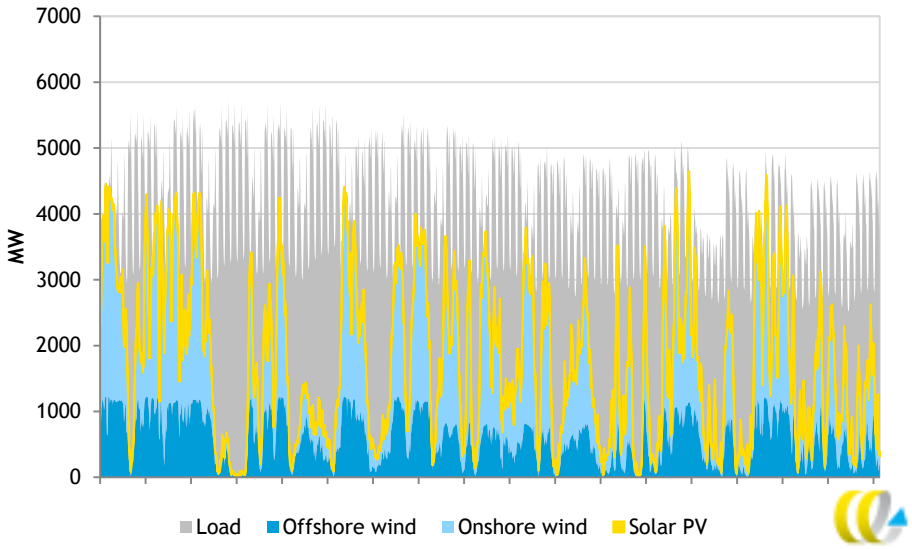
3.1.2 Elaboration of the relevant challenges and innovative approaches

Denmark has been at the forefront of implementing large shares of especially wind energy. At the end of 2015 5.1 GW of wind capacity was installed (EWEA 2016), approximately equal to peak electricity demand. Further policy goals towards increasing the share of wind energy are equally ambitious, from 2010 to 2015 the production of wind energy in Denmark increased from 20% to 40% of the electricity consumption, the goal for 2020 is 50% and the goal for 2035 is 100%. It is a challenge to integrate these volumes in the electricity and wider energy system without undue effects on other energy system parts.
For integrating wind Denmark's TSO Energinet.dk sets a number of priorities (Sto-RE 2013). The challenge is to balance the RES supply fluctuations without

resorting to curtailment of wind. Within electricity markets, the focus is on increasing interconnection and strengthening the power grid, improving forecasting as well as increasing flexibility of power generation. There is also an explicit focus on a number of measures with the objective of integrating renewable electricity in other sectors. In this respect, in the short and medium priority is given to power to heat applications and electric vehicles.

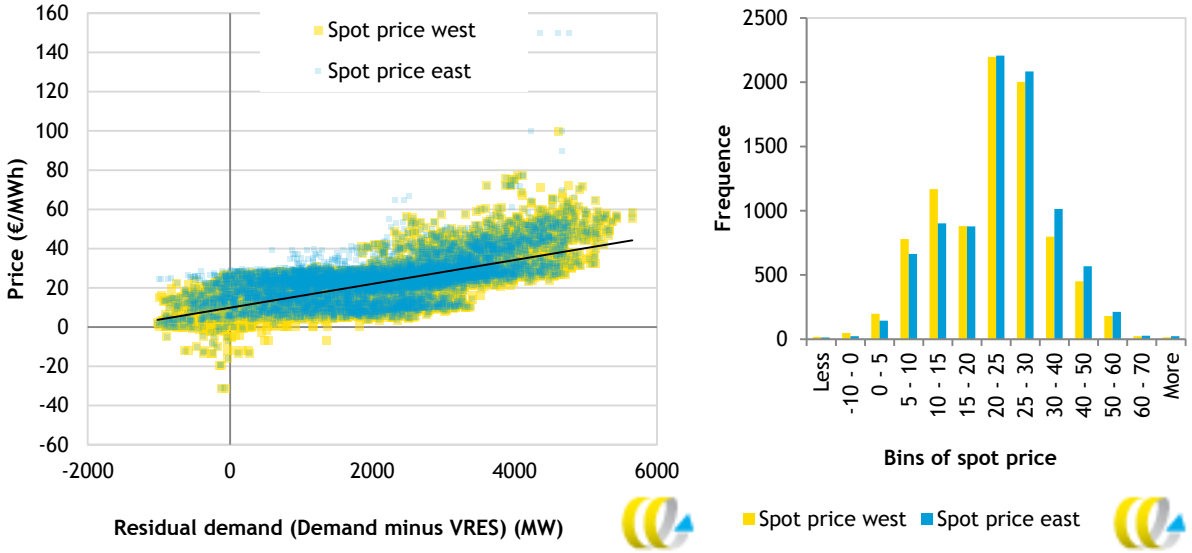
To get a view on the magnitude of the challenge, the following figure shows, for the first winter months of 2015, how Danish wind and solar output combined are now frequently meeting or exceeding the total electricity demand (CE Delft 2016a). The grey area in the figure must be met with conventional generation, and when the grey area is not present, all conventional generation including CHP is shut off. As outlined below, CHP is of special relevance for Danish heat supply to businesses and households.

Figure 2: Combined wind and solar output and load in Denmark for the first winter months 2015 in Denmark



The hourly dynamics should also have repercussions on pricing in the spot markets. Pricing is relevant because it affects not only profitability of conventional central and decentralised generation, but also CHP. In the figure below, for the year 2015, Western and Eastern Danish hourly spot prices are plotted against the demand corrected for variable renewable input ('residual demand') and the histogram is shown (CE Delft 2016a).

Figure 3: Hourly spot prices and residual demand in Denmark



One would expect a strong correlation between residual demand and spot price, which can be observed. About 20% of the time of the year price was below 15 €/MWh and 50% of the time it was below 24 €/MWh. These price levels at high RES output are low make it hard for gas fired CHPs to compete[27].

Combined heat and power

From the 1980s on, Danish energy production has been subject to decentralisation, and this was a critical factor to allow for a larger role of CHP combined with heating networks. This has led to a large share of district heating in Denmark: about half of all electricity produced in Denmark is currently produced at CHP plants and around 1.5 million houses and buildings in Denmark are heated from district heating (six out of ten consumers receive heat from a district heating system or a CHP plant) (Danish Energy Agency 2010). There are currently over 600 decentral CHP installations.

This large share of decentral CHP has enabled one innovative short term solution to the wind power excesses: use wind power for locally meeting heat demand. In the typical ideal Danish CHP energy system in the past, CHP would have run at baseload through the year generating electricity and heat. The

[27] What is further striking is that the majority of prices at negative residual demand (about 500 hours in the year) are still substantially positive, so there still is demand. As of yet, Denmark can rely on exports to other European regions.

wintery peak demands of heat would be met by generation in gas or oil fired supplementary boilers.

More flexibility for CHP

In many communities, the setup has already shifted during the past decades by adding hot water tank storage capacity to be able to operate CHP in accordance with the realities in the power markets (CHP is operated when demand in RES is high). This achieved greater energy efficiency, and makes the setup more compatible with the high share of wind energy.

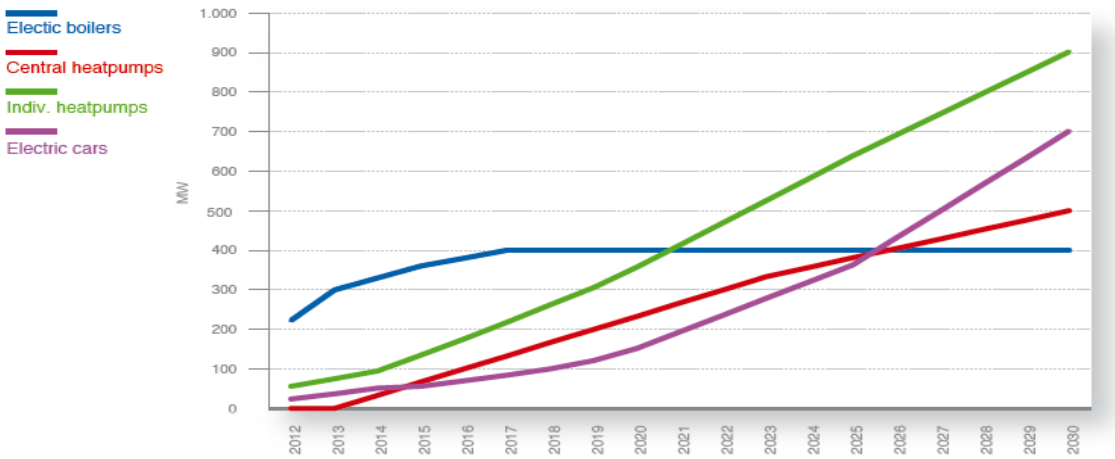
However, to even better utilise wind production, the next step is to add electric heating capacity to make the heat /electricity market configuration even more flexible whilst securing uninterrupted heat delivery. There are two distinct options:

- Heat pumps: investment and maintenance cost are higher, advantage of efficiencies of 200-300%;
- Electric hot water boilers: low investment costs, low maintenance, efficiency 99% allows operating when power costs drop below variable cost of heat.

Both of these options achieve further reductions in biomass or fossil energy consumption, with possibilities for CO_2 emissions reductions. Heat pumps use the full exergetic content of electricity but need large amount of operating hours to be profitable. Electric boilers don't use the full exergetic qualities, but have the advantage of being rather cost competitive, and still result in large savings of energy especially if wind energy would be lost otherwise.

From 2010 onwards, even before there were real surpluses of wind energy, already the first electric boilers were installed at decentral CHP plants and installed capacity now stands at over 400 MW (Agora Energiewende 2014). The relevance of this was recognised by the TSO Energinet.dk, and the following figure shows what the TSO expects of the development of the four most important new demand categories (Sto-RE 2013).

Figure 4: Development of demand categories in Denmark as expected by Energinet.dk



Source: Sto-RE 2013.

As of 2014, 400 MW of electric boilers have been installed. The TSO expects the other solutions to grow faster, but that would depend on the shifts in e.g. relative CAPEX figures of heat pumps vis-à-vis resistance heating, and the production profiles (how the true maximum peaks in RES generation of only a couple of hundreds of hours a year can be best utilised).

3.1.3 Lessons learned and upside potential

Now we draw towards conclusions and relevance for policy:

1. What worked well in overcoming the challenges?
2. What didn't work well, what obstacles weren't overcome?
3. What of the remaining obstacles can be effectively tacked by EU-level policy?

The critical success factors in the Danish case to enable the potential of the electric heat potential is the district heating with CHP infrastructure that is in place in Danish communities. A key factor for this is that, from the 1990's onwards, the development of CHP was supported with a support scheme aiming for flexible CHPs (with high electric capacity and thermal storage units). These CHP units could operate more flexible than those installed in other markets, e.g. the typical heat demand driven CHPs ("must-run") in the Netherlands and consequently far better in volatile electricity markets with frequently low prices.

There are threats to the Danish case. A specific threat is for example how to go about the ageing of the CHP fleet (Bach 2015). In the 1980s and 1990s as many new installations were built, there was technical innovation and much commercial activity. As of now, generating units phase closures because

reinvestments are not feasible without support or subsidies, given the low power prices. In the longer term, one could argue that further electrification with heat pumps, wind energy and larger storages could go a long way in meeting heat demand, but dispatchable electricity generation also needs to be available. Denmark is no longer self sufficient in dispatchable power generation. As Bach states: *Very little has been done to specify and develop a fossil-free and dispatchable CHP plant, which must be profitable even with a low capacity factor. Nobody has presented a vision for the perfect power and heating system for the future.*

Power-to-heat in the Dutch case

For a look at obstacles that need to be overcome, we also note the Dutch case. The Netherlands have also been a country at the forefront of wind energy, only starting to lag behind from the 1990s. The Dutch have oftentimes looked to the Danish on how they manage to integrate their proportionally large share of wind. In the Netherlands, there is much interest in power-to-heat applications, and like the Danish example, there is a large installed capacity of central and decentral, industrial municipal and horticultural CHP generation (amounting to some 9 GW of electrical capacity, roughly allotted in equal shares industry, district heating, horticulture). In all of these segments there is potential to apply power-to-heat, up to the limits ultimately of the electrical connection.

In many of these segments market studies were undertaken. From these studies one key barrier stands out and those are the grid tariffs, which are only on the side of take-off and not on feed-in. The Netherlands has the following main tariff components in use:

- annual charge for the grid connection;
- monthly transport charge per unit of contracted off-take capacity;
- monthly transport charge per unit of peak off-take capacity used in month; and
- volume component of transport for some voltage level.

The way these tariffs are allotted to in-feed and takeoff poses an obstacle to power-to-heat.

A CHP facility needs to pay the fixed charge for the connection, but the transport tariffs are imposed only on takeoff of electricity from the grid. Now, when a district heating or horticulture CHP facility wants to meet heat demand with electricity from the grid and the CHP is shut down, the direction of flow over the electricity grid connection reverses. This means that, proportionally large tariff charges are incurred, as 100% of the transport fees are applicable

now. If the power-to-heat facility operates only a limited number of hours a year (say 1,000), then proportionally, these are high costs, prohibitive of a positive business case (CE Delft 2015). The extra tariff charge allotted to the volumes of power taken from the grid, can be significantly higher than the saved fuel cost by turning off the conventional gas heater or CHP.

Solutions are in adjusting the tariff system (tarievencode) to allow a reduced tariff in certain circumstances – e.g. subject to whether there is sufficient grid capacity. Depending on the tariff levels, a sizeable uptake of the technology is foreseeable.

From the perspective of businesses operating CHPs, it would be an improvement if the regional applicable tariff system would not impose this barrier, and that they would be able to utilise this economic technology that allows benefitting from dips in power prices and stabilising local in-feed and/or the market prices.

However, the grid companies need to be compensated for their investments in the grids, and if a larger electricity connection is required and the local infrastructure is not yet up to the task, in the current frame work the grid operator has a mandatory connection policy and will make costs, costs that – if only for capacity that is used limited number of hours each year – are very significant.

Thus, we see the dilemma, an optimum tariff for power-to-heat capacity is not easy to find. The optimum certainly is not the status quo (not allowing any power-to-heat because of rigid fixation to current tariff system), but it is also not allowing power-to-heat at zero grid costs. Where the optimum lies - allowing some power-to-heat capacity as decentral flexibility provision, but also being sensible about grid capacities and reinforcement costs, can only be evaluated case by case on the local level. Therefore, a policy framework that would allow local grid operators to experiment with reduced charges would help, but also generally tariff system harmonisation (with of course due note of local circumstances), would also be beneficial.

3.2 Case study: Cooperatives/small case generators – the case of SOM Energia

3.2.1 Introduction

Som Energia is a successful example of a community-owned RES cooperative. Catalonia’s first not-for-profit RES cooperative’s ultimate goal is changing the

current energy system to a more inclusive, participative and community-led model. Som Energia started with selling to its members green energy bought from third party sources in October 2011, with the goal to soon produce 100% of its members' consumption via small scale projects, owned by the cooperative and set up close to where the coop's members live.

Som Energia is now owner of three companies, which develop all the cooperative projects. It produces electrical energy from several installations (solar, hydro, wind, biogas, biomass, etc.), financed, developed and set up through voluntary economic contributions of the members of the cooperative. The cooperative is based on general criteria agreed on by the General Assembly, which selects the projects and makes the investments. Som Energia participates in both energy production and commercialisation, while the grid is owned by REE and the distribution network is property of several distributors, part of the regulated electric market.

Som Energia started as a small initiative focused around the University of Girona and it soon spread to Barcelona and the rest of Catalonia. Now almost 40% of the membership lives in other parts of Spain. Since then, thirty local support groups have sprung up, holding regular town meetings to explain the business model to other interested citizens and enlarge the membership. The economic crisis and the recent regulatory barriers to decentralise RES in Spain corresponded to an exponential increase in the membership of Som Energia.

3.2.2 Elaboration of the relevant challenges and innovative approaches

Som Energia faced several non-technical barriers. These include overburdening administrative requirements and retroactive changes in regulations and tariffs. The combination of a solid business model and governance, based on voluntary commitment and direct investment by the members of the cooperative proved to be the key element to ensure the resilience of this project.

Administrative hurdles

The hurdle of overly-bureaucratic and complex administrative requirements is a common issue faced by community-led projects, and puts small producers and communities at disadvantage compared to large, centralised energy producers.

The time for **acquiring a permit** (nine month in the case of Som Energia), and the large amount of documents required to operate in the Spanish system put the developers of new installations through a frustrating and challenging process.

Unfavourable regulatory frameworks

Changes in regulatory frameworks, especially when retroactive, hinder small-scale RES production. Spanish RES are presently facing difficulties, in relation to the national government's decision to reduce support for renewable energy retroactively, introducing a tax on generation[28], and to the recent Royal Decree on self-consumption of solar energy signed into law in October 2015.

The Royal Decree 900/2015[29] regulates administrative, technical and economic modalities for electricity supply and generation with self-consumption. The regulations apply to any RES generation facility that produces electricity for self-consumption and is connected to the national grid. Consumers are subjected to distribution and transport grid access fees charges in order to ensure technical and economic sustainability of the grid.

A Manifesto for the repeal of Decree 900/2015 on self-consumption was developed highlighting the importance of self-consumption as a civic right and a key instrument for the development of a new more sustainable energy model able to reduce energy dependency. The manifesto highlights how decentralised RES increase energy efficiency, create jobs, boost the local economy, and allow the Public Administration to alleviate energy poverty and to re-invest the savings directly in community projects.

Financial obstacles

The costs of producing electricity from RES are for the major part constituted of initial investment costs for cooperatives. A cooperative has to be able to attract large amounts of capital from the start of the project, when revenues are not guaranteed on the short term, and investors need to assume take risk before the project can produce its first kWh.

With absence of subsidies, investments are hard to secure through commercial banks especially for small-scale producers. Som Energia's business model is

[28] Renewable electricity support costs were high partly because of exceeding the capacity targets set in the 2005-2010 Plan. With the aim of curtailing the electricity tariff deficit and stabilise public spending, the Royal Decree-Law 1/2012 suspended support schemes for future renewable electricity plants, and later, it introduced a 7% tax on electricity generation (22% for hydropower).

[29] The Real Decreto 900/2015 applies to facilities no larger than 100 kW, and targets two types of consumers: electricity generated for self-consumption with surplus exported to the grid but not remunerated; and consumers in a single facility or supply point, associated to one or several production facilities connected within its grid, or sharing connection infrastructure with it or is connected to it. The surplus of the generated electricity can be exported to the grid and is remunerated with economic compensation.

based on direct investment by its own members, and it has been able to provide a good financial stability to the cooperative.

This stability, combined with an increase in Spanish citizens' willingness to invest in citizen managed projects, in response to the policy on RES and the economic crisis, was able to attract not only new members and investment, but also new partially developed projects. The cooperative was able to take over projects set up by other developers, affected by the regulatory situation and economic crisis, and unable to secure financing. Many of these projects were already at an advanced stage, and foresaw feed in tariffs.

Innovative and participatory approaches

"Generation kWh" is an initiative developed by Som Energia in response to the latest policy and market developments in Spain. Generation kWh is an option to boost RES through offering an alternative model to overcome collectively the withdrawal of incentives and the barriers to decentralised RES projects. It engages 1,924 people who collected 1,753,200 € for production of 2,980,440 kWh of green energy. Through this initiative, members are invited to provide a zero interest loan, starting from 100 Euro, through "buying energy shares" (one for 100 Euro) in relation to their yearly energy consumption. The money is then used to finance new RES projects, and members can then buy electricity at cost price for at least 20 years. Som Energia guarantees that the contributions will be returned in 25 years through reductions of the energy bill.

Several projects have already being set up and are being developed including PV, micro-hydro and wind energy projects.

3.2.3 Lessons learned and upside potential

Citizens' direct engagement in energy results in an increased acceptance of RES, and it can tap the local potential both in terms of private investments and in terms of capacity.

Cooperatives create options for direct investment in RES and allow people to have an active role in the transition. They can also capitalise on local resources not only in terms of investment but also of capacity and skills. Through the cooperative model, members participate directly in defining the price tariffs, which are ratified by assembly. This enhances the transparency of the process as well as the accountability of the company, whose profits are reinvested within the cooperative.

Som Energia is driven by a strong voluntary-driven commitment, which also allows for reducing fixed costs. Twenty support groups that actively promote the cooperative in their community, where enthusiastic unpaid, volunteer members, who run the company for the first year, act as salespeople or project ambassadors. The technical development is also run by volunteers, with dedicated work groups on the different technologies, and on the development of investments plans according to the energy market. Som Energia does not have a formal media budget, and it actively uses social media to reach new members.

Enabling the energy transition

There are several models of financial participation of citizens in cooperative projects including buying equity shares, direct investment, financial guarantees and membership fees. While financial tools are currently available administrative, legal and economical factors can affect the validation of a project's business plan.

Lack of knowledge and trust in the cooperative model hinders its legitimacy as a market player. For their average size and scale, cooperatives face a series of both economic and management issues (e.g. lack of guarantees), as well as legal and administrative barriers, such as public offering regulation, access to equity capital, cost and access to the grid. Unstable regulations, especially concerning public support schemes for RES, are a strong challenge to this model.

3.3 Case study: Misalignments between ETS and RES policy

3.3.1 Introduction

There are a number of interactions between EU's CO_2 and RES policy that work against each other, making one another less effective than if the policies were designed to complement each other. In this short case study we address this issue. A full review of all improvement possibilities and proper policy aligning is beyond the present scope.

3.3.2 The challenges, solutions and innovative approaches

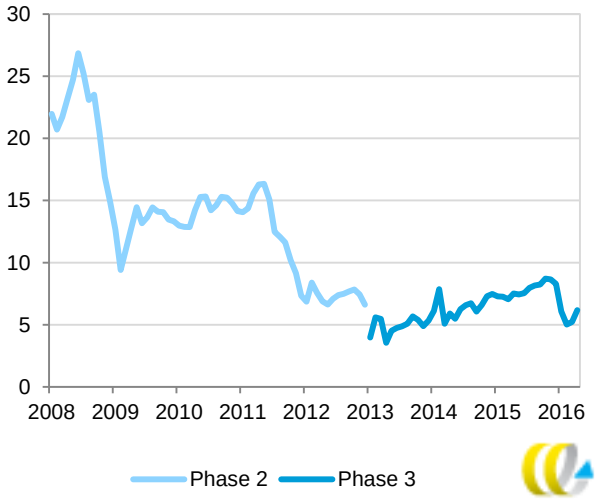
Whilst European 2020 energy and climate targets are part of an all-inclusive 2020 policy package, the specific policies aim for different things (e.g. reducing greenhouse gas emissions from the European economy, achieving a higher supply of renewable energy, etc.). The specific policies, however, impact

overlapping activities, and in those overlaps interactions occur that are not serving to mutually reinforce them but that rather render them less effective than would be the case if the policies would be better attuned to each other. One could call this 'misalignments' or 'contradictions' if one would like. We will detail an example for the policies impacting the power sector. This text is not specific to one regional example, but installations across EU 28 are impacted.

ETS

- The power sector is one of the key emitting sectors under the EU ETS. From 2013 onwards, the majority of power generating stations had to buy the certificates in auctions or on the market. The cost of this has declined because ETS prices have been severely depressed due to a number of coinciding developments (shifting of industries, efficiency improvements, lower than anticipated economic activity) as well as design aspects of the policy.

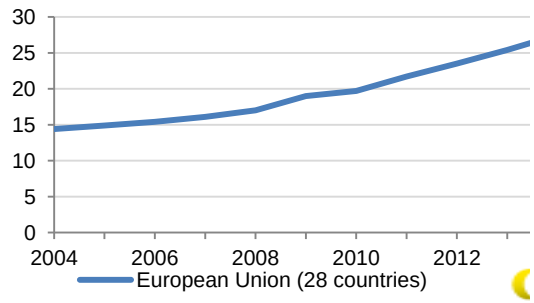
Figure 5: EUA prices (nominal, €/t)



- At time of writing, prices for EUAs are at a level of €5-6/t CO_2. This reflects the fact that the EU ETS market has been 'long' ever since 2009, the onset of the economic recession. For every year since 2009, supply of allowances (through free allocation and auctioning) has been higher than the demand for allowances. Due to backloading, 2014 has been the first year since 2008 that demand exceeded supply. However, with banked allowances equivalent to 2.2 billion t CO_2, such shortage does not do much on the price. Moreover, participants to the EU ETS may have even increased their banked allowances by using cheap CERs (Certified Emission Reductions), which can be bought at prices below €0.05/t CO_2, for compliance.
- RES supply leads to decreased use of conventional fuels in power generation, meaning that the power sector uses less allowances. But this keeps the present surplus of banked allowances high and the carbon price low. A low carbon price is ultimately an advantage for conventional producers, especially carbon-intensive generation, and contrary to the goal of further growth of RES that would be further driven by market prices.

Power sector

Figure 6: Share of renewable energy in electricity (EU28)



In power generation, key developments have been observed in the share of RES, power prices and the impacts on fuel mix.

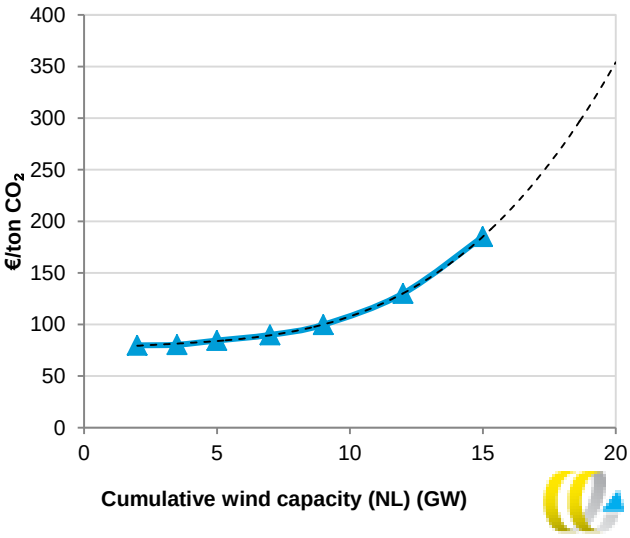
- The share of RES in power generation has seen a significant growth in many markets across Europe. Wind generation doubled between 2009 and 2014 and solar-PV grew six-fold over that period. Together with hydro and biomass, RES share in electricity stood at 28% in 2014 (up from 19% in 2009). The increased output of RES has decreased the power sector's use of conventional fuels.
- Pricing at European power markets is affected deeply by the surge in variable renewable generation. In European markets where hourly spot power prices are reflective of intersection of the curves of demand and supply, low marginal cost renewable electricity suppliers (wind, solar, run of river hydro and similar) offer their supply typically below the bid price of fossil and nuclear generation. If their output is low, this does not significantly impact pricing, but if it is significant, the so-called "merit order effect" (see e.g. (Pöyry 2010)) depresses momentary as well as average European wholesale power prices significantly (e.g. PV magazine (2015)).
- Besides the surge in variable RES output, pricing is also directly impacted by ETS and commodity fuel costs. At time of writing, the trend in both is downward.

The depressed power prices (and especially the power prices at the moments when the renewable generators operate) can be seen as a profound problem for RES growth.

With large-scale deployment of energy sources such as wind and solar, one should expect markets to be increasingly well-supplied when these facilities operate, so that revenues from sales of electricity at the sport markets are increasingly diminished. The following text box goes into this deeper and relates this to a necessary CO_2 price to achieve break even.

Figure 7: CO_2 price needed for wind averaged price to equal LCOE of Wind (70€/MWh)

This figure plots the necessary carbon price that would be needed to make a marginal new built wind turbine (with an assumed levelised costs of electricity of 70 €/MWh) break even (grid parity) in absence of alternate support schemes. The figure contains results of power market simulation of the Dutch wholesale spot market under different wind penetration levels (CE Delft 2016b).



The figure shows that current breakeven point can be achieved with carbon prices of around € 80/t CO_2. Up to 8 GW of wind power serving about 20% of total electricity demand could be installed without problems as marginal returns only slightly decrease. However, for capacities exceeding the 20% threshold, marginal revenues rapidly decline. If 40% of Dutch electricity demand has to be served by wind power, the carbon prices need to increase to values of the € 180/t CO_2 in order for wind to be able to compete in the market without subsidies.

We see as a clear misalignment between ETS and RES policy that, as installed capacity grows, RES will need a progressively higher CO_2 price to be able to achieve break-even depending on saturation, but the trend is the other way round, power and CO_2 prices decrease as a result of progression in RES output.

Fuel switch

One special remark must be made on the fuel switch from gas to coal. Whilst at time of writing natural gas traded in NW-Europe at a low price of 13 €/MWh (EPEX TTF spot), the present low costs of CO_2 emissions under the EU ETS makes it in the short run cheaper to burn coal than gas for power generation. The use of coal in power generation combined with the merit order effect of RES makes it harder for gas fired power stations to compete. We have in the past years seen many GWs of gas fired base load/mid merit capacity be mothballed or semi-permanently shut down, across Europe (see e.g. (FT 2014, GreenTechMedia 2014)).

Because gas fired generation is shifted to coal, CO_2 emissions from power generation are now higher than would be the case if gas fired generation would not be replaced. In some markets (e.g. NL) also high-efficiency combined heat and power generation from natural gas suffers severely with plant closures as a result (CE Delft & DNV GL 2014). This leads to efficiency loss and CO_2 emissions being even higher, due to separate production of heat and power.

Due to these developments electricity prices are declining, which has a number of repercussions, and as we have elaborated, does certainly not help in RES investment due to market prices.

3.3.3 Lessons learned and upside potential

Following up on the above, we can draw some conclusions and relevance for policy:

What can be learned? As countries are on track on reaching the 2020 RES targets, due to the coming on stream of many GW of renewable generation in EU countries and due to a number of other aspects there is a surplus of ETS emission allowances of more than 2 billion tons of CO_2, that keeps prices of the EUAs down, which makes the ETS essentially ineffective in the short term, but it also makes it relatively cheap to burn coal in central generation plants. Because this drives down the average power price, this makes RES even less competitive. In addition RES growth itself depresses power prices further. In countries that support RES with instruments such as feed-in tariffs or other mechanisms that complement the market price, it makes it more expensive to support RES, the cost of the subsidy scheme will be borne by taxpayers or energy users.

These issues are not yet overcome. What should be done to overcome the remaining obstacles is aligning ETS and RES support policy, so that effects RES support has on CO_2 emissions are factored in ETS policy and RES support policy is not frustrated by low ETS prices. RES support policy should be at supportive of further market drive uptake of RES. Furthermore, market effects of RES such as the merit order effect, should not affect low-carbon techniques such as high-efficiency gas fired generation including CHP to the current extent.

A first step is made with the upcoming revisions of the EU ETS. First, the linear reduction factor is going to be increase from the current 1.74% (e.g. 38 Mt CO_2 annual reductions in EU) to 2.2% (e.g. 48 Mt CO_2 annual reductions in entire EU). If no other mechanisms would be applied, this would imply that shortage of allowances would appear in 2022 and that the total surplus would have been exhausted by 2030. In addition, the Market Stability Reserve (MSR) will be put

in operation which will regulate the access of the market for the allowances that are put in the stability reserve. This is an approach that contributes to higher and stable prices, but it does not specifically aim for CO_2 prices that - given the issues identified - propel progressive investment in variable renewable capacity.

3.4 Case study: Potential problems of state aid guidelines for smaller market participants: the transition to a tender system in Germany

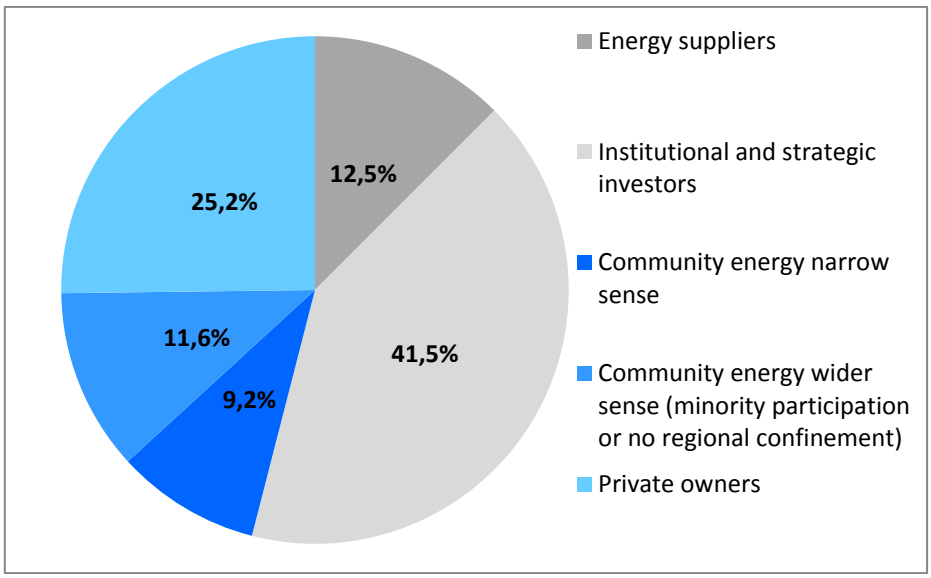
3.4.1 Introduction

According to the Guidelines on State Aid for environmental protection and energy 2014-2020 (2014/C 200/01) communicated by the European Commission on 28 June 2014, from January 2017 Member States have to set up competitive auctions, otherwise they risk EU state aid procedures. This requirement deviates from the RED leaving Member States the choice of their RES support systems. Even before the entry into force of these guidelines, Germany faced an EU state aid procedure concerning its Federal Renewable Energy Sources Act. As result of negotiations with the COM (DG Competition) to settle this procedure, Germany is gradually switching from its former Feed in-Tariff (FIT) system to a market premium system and ultimately to a tender system. As a first step a pilot phase for the auctioning of energy from ground-mounted PV was completed and is currently reviewed. One major challenge of this transition is whether it will be possible to maintain the decentralised ownership structure which has been crucial for the successful deployment of RES in Germany. In this case study we address this issue in a nutshell. The aim is rather to highlight the relevance of the issue and to give an overview of the process than to provide any definite results.

3.4.2 The challenge

Diversity of players in RES deployment in Germany
One of the pillars of RES deployment in Germany has been the diversity of players, resulting in a remarkable ownership structure consisting of a high percentage of private owners and of community energy (Figure 8).

Figure 8: Installed Capacity for RES total in Germany by ownership group, 2012



Source: IEA-RETD, Cost and financing aspects of community renewable energy project, Volume II: German case study, March 2016.

For a project to be defined as community energy ("Bürgerenergie", citizen energy) in the narrow sense it needs to fulfil following criteria (IEA-RETD 2016):

- **Actors:** Private persons and/ or small agricultural businesses (along with other legal entities) invest individually or together into RES installations;
- **Form of participation:** actors invest equity in the project so have voting rights and rights of control;
- **Participation quota:** Citizens hold at least 50% of voting rights; and
- **Regionality:** Investing company members come from or live in one region, although that region can cross administrative boundaries.

A wider definition of "Bürgerenergie" would include lower requirements towards the participation quota (minority participation) and the principle of regionality (community of interest rather than community of locality). Whilst community energy projects (in the narrower sense) are 9.2% of total renewable capacity, in the onshore wind sector community projects (in the narrower sense) make up 20.4% (6,301 GW) of the installed wind capacity. In the other sectors, e.g. PV and bioenergy, community energy makes up less than 2% of those markets (IEA-RETD 2016).

Challenges of tenders for small actors

In a tender system, small actors typically face the challenge that they cannot sprinkle the risk not to obtain the tender award to a reasonable price on several

projects as big actors do. Accordingly, they cannot take the same risks as big actors concerning project development costs (von Bredow, Valentin, Herz 2016). This was acknowledged by the Federal Ministry for Economic Affairs and Energy in its key points on tenders for renewable energy installations by highlighting that the auctioning design had to secure that the diversity of players was not impaired (BMWi 2015). In the consultation of this paper, some stakeholders raised doubts that this could be afforded (e.g. Greenpeace Energy 2015).

Results of the pilot phase for ground-mounted PV auctions

According to the Federal Renewable Energy Sources Act 2014 and a corresponding ordinance, the Federal Network Agency (Bundesnetzagentur) performed three rounds of pilot auctions for altogether 500 MW of ground-mounted PV in 2015. From 101 awards, individuals received three, civil law entities four and energy cooperatives two, most of them in the last auctioning round (Bundesnetzagentur 2016). While the Federal Ministry for Economic Affairs and Energy concluded that the tender proved successful due, inter alia, to the participation of many different stakeholders, including small players, the Green Party claimed that the repartition of awards proved that diversity of players was not safeguarded (PV Magazine 2016).

Extension of tenders to other technologies in the 2016 revision of the Renewable Energy Sources Act

In line with the current Renewable Energy Sources Act, the Federal Ministry for Economic Affairs and Energy is currently preparing the extension of the tender system to wind energy and large scale PV installations for the period from 2017. Due to the need to comply with the timeline of the State aid guidelines, this extension will not include further pilot phases, although the experience with auctions for ground-mounted PV cannot simply be transferred to other technologies.
In key points to the 2016 revision amending the Renewable Energy Sources Act, the Ministry stated that the high level of diversity of players had to be maintained through a combination of measures (Federal Ministry for Economic Affairs and Energy 2016):

- Exemption of installation of less than 1 MW (mainly applying to small and medium-scale rooftop PV installations) according to the State aid guidelines;
- A simple and transparent design of the auctioning system to cater to the needs of small actors and increase their chances to win;
- Advisory and support services for smaller players;

- Regular assessment of the impact on diversity of players in Germany.

In addition, a first Ministerial draft includes special provisions for renewable energy cooperatives taking part in tenders for onshore wind, enabling them to bid under less stricter conditions than larger players. However, the rather strict definition of those cooperatives in the draft may restrict the impact of these special rules (von Bredow, Valentin, Herz 2016).

3.4.3 Lessons learned

It is too early to assess the impact that the current transition to a system based on auctions will have on the diversity of players in Germany, notably smaller actors like individuals and renewable energy cooperatives. Particularly, while the draft provisions of the 2016 revision amending the Renewable Energy Sources Act may well lead to reduce the impact of the transition for smaller players, it remains to be seen whether they are suitable to remove the disadvantages for smaller players compared to larger players inherent to a tender system (von Bredow, Valentin, Herz 2016). In case of success, however, these tender design provisions could serve as a model for other Member States with a certain amount of smaller players switching to tenders.

At this stage, some more general conclusions can be drawn concerning the impact of the Guidelines on State Aid for environmental protection and energy 2014-2020 on the promotion of RES and the diversity of players in Germany. Although the Renewable Energy Directive leaves it to the Member States to choose their RES support systems, the state aid procedure initiated by DG Competition lead Germany to change its FIT/market premium based RES system to a tender system irrespective of the issue whether the Renewable Energy Sources Act really constitutes State aid. This system change may have significant impact on the diversity of players in Germany which is considered to have been one of the pillars of the successful development of RES in Germany. Thus, at least concerning Germany, the new State aid guidelines achieved a result not required by the Renewable Energy Directive, a harmonization of RES support systems. This raises several critical points:

- The non-binding State aid guidelines, issued by the COM, *de facto* supersede the provisions of the Renewable Energy Directive, being the core EU instrument for RES deployment;
- Contrary to the Directive, the guidelines were not based on an impact assessment and could thus not take into account the impact of tenders for the smaller market players on the local level;

The lesson learnt from this is that the EU should better coordinate its policy instruments concerning RES deployment, in particular concerning the division of competences between DG Energy and DG Competition. In doing so, it should take into account the interests of smaller players and thus facilitate the acceptance of RES deployment at the local level. An opportunity to better align the two fields is the upcoming revision of the RED.

3.5 Case study: Potential distortive effects of capacity markets

3.5.1 Introduction

After more than a decade of ongoing liberalisation efforts in the European electricity sector, a growing concern with regard to the dynamic efficiency of the existing energy-only markets (EOM) has emerged in a variety of Member States in notably Northwest Europe. To a large extent this concern seemed to be sparked by a sharp decline of electricity prices, and resulting margins for conventional generation, following declining demand that resulted from the financial crisis in the last decade as well as a strong growth of RES. While the investment climate deteriorated, several Member States in the region faced the challenge of the phase-out of baseload facilities like coal-fired and nuclear baseload, be it due to nuclear phase-out policies (Germany and Belgium) or as a consequence of the Large Combustion Plant Directive (UK and France). Hence, a growing concern regarding generation adequacy emerged. In addition, increasing penetration of non-dispatchable resources wind and solar PV gave rise to concerns regarding system security and network operation and the increasing need for flexible peak-load resources in the system, often taken to imply gas-fired resources but also demand response and storage options.

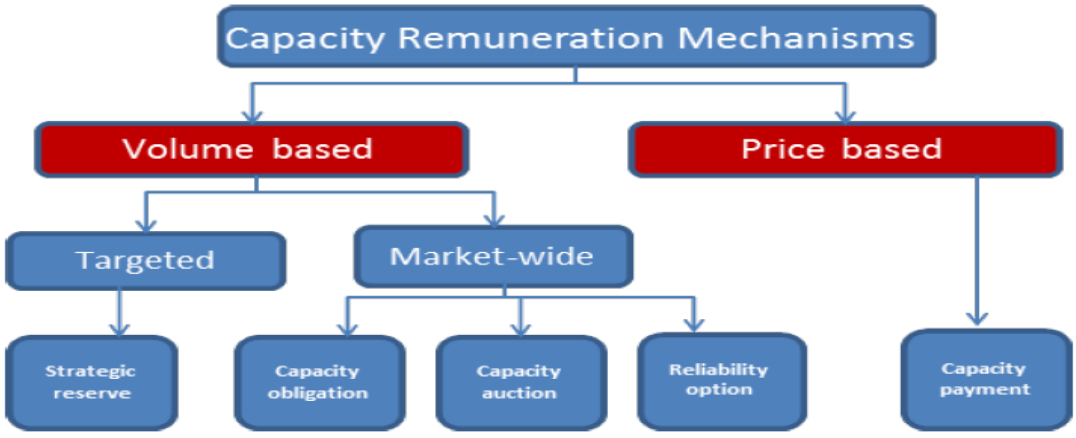
The growing concerns about generation adequacy, instigated a debate on the need for regulatory intervention to assure generation adequacy, by form of capacity remuneration mechanisms. Since then several Member States (Belgium, France, UK) have set out to introduce such mechanisms. Yet, CRMs are not new and were introduced in earlier stages of liberalization. In summary (see for example (IEA, 2014)), capacity mechanisms have been used in various Member States in the past with a view to face inelastic power demand and/or weak investment incentives or energy constraints in small and/or isolated power systems (i.e. Ireland, Italy and Spain). By the end of 2014, targeted capacity measures are in place as a strategic reserve in Belgium, Sweden, Finland, and Poland and in form of capacity payments in Spain, Portugal, Greece, and Ireland. Belgium has introduced an additional tender. The United Kingdom

launched a centralised capacity market with market-wide capacity auctions in 2014. Following the adoption of primary legislation, France has plans to introduce a decentralised capacity obligation, pending finalisation of secondary legislation. Centralised capacity markets are to become a reality in the United Kingdom (2018), Italy (2017), and Romania. Ireland considers moving from capacity payments to reliability options. Discussions over the need for capacity markets are ongoing in Germany, Poland and Denmark-West. There is no capacity mechanism in place or under discussion in neither Austria nor the Netherlands. The Swedish system has a strategic reserve which is of temporary nature as the government announced plans to phase it out over time, as demand response has increased in the reserve.

3.5.2 Capacity Payments

A variety of CRMs have been under consideration. A high-level classification (see for example (CREG, 2012) or (ACER, 2013)) such mechanisms may be distinguished as to whether they are volume-based or price-based. In case of volume-based mechanisms the amount of capacity is imposed, while the mode and level of remuneration varies. Price-based mechanisms on the other hand, set the level of remuneration, while the capacity quantities vary. Volume-based CRMs can be further classified into targeted and market-wide categories (see Figure 9). Targeted mechanisms, also called selective mechanisms, typically tender the required amount of new builds only. Market-wide or comprehensive mechanisms in contrast, consider the total stock of capacity applicable for participation in the mechanism. More detailed accounts have been offered in earlier contributions, see for example (Vries, 2007).

Figure 9: High-level classification of Capacity Remuneration Mechanisms



Note: Some price-based mechanisms can be targeted.

Source: ACER

Capacity payments are typically a fixed payment for availability paid to all generators. The level of payment is set by a central body. The payment could be paid when the plant runs (per energy unit generated) or also when it does not run, in which case some kind of availability (firmness) criteria have to be met. Capacity payment schemes may be implemented for a year at the time, for a certain number of years or indefinitely (open-ended). It may apply to all capacity independent of a capacity adequacy assessment or dynamically depend on a capacity adequacy assessment. The market effects depend on the design of the capacity payment. Below we distinguish between the following designs (See for example, (TU Wien, 2011) and (E3M-Lab, Thema, COWI, 2013)):

1. Fixed (annual) capacity payment.
2. Dynamic capacity payment.
3. Long term fixed capacity payment (subsidy).

3.5.3 Distortive Impacts: The Case of Spain

The impact of capacity payments, and more generally CRMs, is difficult to distinguish from other national design features. In addition, within the context of the EU, in many cases such mechanisms have been implemented only recently so that timespans to accumulate empirical evidence are relatively short. Based on structural analysis, recent accounts (see for example (ACER, 2013) and (Leigh Hancher, 2015)) conclude that CRMs are likely to affect:

- Short-term prices

The threshold price in strategic reserves may act as a cap on wholesale price and prevent or limit scarcity signalling, while capacity payments may induce higher levels of reserve capacity so that scarcity pricing does not occur.

- Investor decisions

CRMs may induce the overall reserve margin to result higher, as typically is the objective, but also the underlying technology base may be affected in case the mechanism induces technology preferences. CRMs may further shift investor preference with regard to location to markets with CRMs rather than markets without such mechanisms.

- Welfare distribution

CRMs will affect the welfare distribution among producers and consumers as well as across borders.

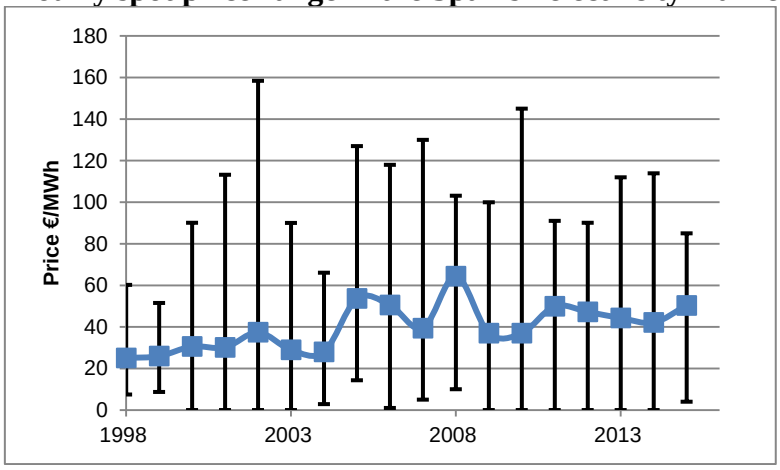
Further, like any regulatory measure, CRMs may induce distortions due to incorrect design or implementation. Notably the methodologies applied for assessing generation adequacy and security of supply typically differ widely across MSs and, hence, are likely to have an asymmetric impact.

In case of Spain, capacity payments were introduced as early as 1998, along with the onset of the liberalisation of the Spanish power sector. At the time, capacity payments were introduced in order to compensate for stranded costs associated with assets that failed to render profitable exploitation in the market environment ((E3M-Lab, Thema, COWI, 2013), (Leigh Hancher, 2015)).

Impact on short-term pricing in Spain

As observed above, as in any other case, the impact of capacity payments on pricing in the Spanish spot market will be complex to distinguish from other price determinants. Yet, since the mechanism is expected to induce higher reserve margins as it disincentivises decommissioning of old capacity or other capacity that would render unprofitable under EOM conditions, it should suppress scarcity pricing. Hence, one should expect no or limited scarcity pricing to occur in the Spanish spot market. Accordingly, electricity prices should not or rarely diverge from marginal cost levels of the high end of the merit order, i.e. peak facilities like OCGT or oil-fired facilities. Indeed, as can be observed in Figure 10, hourly electricity prices in the Spanish market reached up to 160 €/MWh only since 1998. Such price levels match typical marginal cost levels for peak load facilities.

Figure 10: Hourly spot price range in the Spanish electricity market since 1998



Source: CE delft assessment based on OMIE data.

Impact on investor decisions in Spain

The impact on investor decisions is complex to demonstrate robustly on the basis of development of installed capacity. As far as the impact on reserve

margins is concerned, the lack of scarcity pricing demonstrated above suggests reserve margins have typically been comfortable in the Spanish market since 1998. One may note that however that since 2007 reserve margins would typically have rendered high due to the downturn in demand following upon the financial crisis as well. With regard to the impact on the installed capacity base, one may turn to a series of appeals by Spanish market parties with regard to the regulations involved with the capacity payments. Elements relating to differentiation with regard to technology, introduced in 2006 and 2007, were appealed in several instances (see also (Leigh Hancher, 2015)). As far as decisions regarding location of new investments are involved, little risk of tilting investment decisions towards the Spanish market should be expected, as the Spanish market shows limited interconnection capacity only.

Impact on Welfare Distribution in Spain

Impact on welfare distribution in Spain is severely affected by the origins of the problem of the ´electricity tariff deficit´ in Spain (see also (Leigh Hancher, 2015)). Though the electricity market was liberalised from 1997 onward, the Spanish government has kept end-user tariffs for households and small enterprises regulated. Tariff setting was however not cost-based and tariffs were kept consistently low, well below market price. As a result, a tariff deficit emerged, a debt the 'electricity system' owes to the electricity suppliers in Spain. If a cost-based tariff system would have been in place, the cost of capacity payments would (in part) have been covered by the end-users.

3.5.4 Lessons learned

Capacity mechanisms may be necessary and legitimate to face a generation adequacy problem. However, they also raise some substantial concerns as to the impact on the Internal Energy Market. These mechanisms effectively replace market-driven investment with government intervention, which has the potential to add considerable regulatory risk and cost for investors and consumers alike.

With the emergence of new capacity mechanisms, the European Commission therefore set off to assess the impact on the Internal Energy Market and set several criteria to guide the Member States and limit negative impacts on market coupling (EC, 2013) and included this in the Guidelines on environmental and energy aid for 2014-20, which entered into force on 1 July 2014 (see also IEA, 2014). Capacity mechanisms should:

- Be based on an objective, facts-based, and comprehensive prior assessment including of the impact of Union internal electricity market

acquis, e.g. with regards to infrastructure, emissions trading and energy efficiency.
- Be preceded by an assessment of alternative measures such as the promotion and enabling of demand response and expansion of interconnection capacity.
- Reflect the objective of phasing out fossil fuel generation subsidies by 2020.
- Be open to cross-border supplies and consider interconnections.
- Be technology-neutral.
- Be limited in duration.
- Not impose any import or export restrictions.
- Ensure the transparent distribution of their cost.
- Be organised in an open, transparent manner for all technologies and flexibility solutions, if tendering for new capacity is chosen as the mechanism, including demand-side response operators and operators from other member states.

3.6 Other illustrative cases

In the sections below, we highlight some other good practices of local and regional projects, in concise form shortly.

3.6.1 Cooperatives in Croatia

In Croatia renewable energy is highly accepted by citizens. The project developers are usually local entrepreneurs who often lack specific expertise or large foreign investors. Community energy was endorsed through the new renewable energy law, but clear community energy targets have not been set. While communities´ investment is limited mostly to PV roof-top installations, the 83% of RES in Croatia comes from wind, and only 6% from solar (not counting large hydro power plants).

There is long tradition of cooperatives in Croatia, mostly rooted in agriculture, of which few thousands of citizens are members. Nonetheless, currently there are only around 12 energy cooperatives, a number expected to grow rapidly. These cooperatives can tap the potential of the link between agriculture and energy, for example through introducing RES solutions in farms. The aim is to boost the impacts of circular economy in the country, and for this, cooperatives in Croatia engage for boosting community participation in energy production.

Challenges

Small-scale local and regional producers in Croatia face the challenge of an overburdening bureaucracy, which require knowledge, time and financial capital to be overcome. According to the Croatian Law on Cooperatives, after covering expenses, co-ops are required to reinvest at least 20% of the profit in further development and new projects. This reinvestment is taxable, when at the same time, all other legal entities are exempt from tax on reinvested profit.

The national support for PV in Croatia foresees FiT, which are stopped at 30 MW of solar and 400 MW of wind power generated. In addition, the high connection charges often discourage consumers to install small PV and become a prosumer.

The cost and access to the grid has been identified as one of the barriers for financing cooperatives projects. For wind power, issues related to the saturation of the grid result in a delay in the connection to the grid itself, hindering the development of the project. Improved regulation, infrastructures and procedure could support increase of wind energy.

A barrier to the investment and the development of local RES cooperatives has been the presence of fossil fuel subsidies. In particular the islands are dependent on fossil fuel supply, very costly, and heavily subsidised for these territories.

The new Renewable Energy and High Efficient Cogeneration Act enables citizens' installation and connection of solar systems to their households for private consumption, with the possibility to give back the surplus to the network at a retail price. Bylaws that could enable new business models, net metering, and citizen participation should be considered.
New financing models are needed so RES development would be less dependent on subsidies, and cooperative such as ZEZ are exploring, successfully, innovative options such as crowdfunding.

Solutions

While national regulations can become a barrier to the development of cooperatives in Croatia, very diverse solutions implemented are all very local.

The Green Energy Cooperative (ZEZ),[30] with the support of UNDP, provides direct support and training to new energy cooperatives on how to start their

[30] Green Energy Cooperative - http://www.zez.coop

project. In addition, ZEZ and UNDP Croatia have actively provided recommendation to policy makers at local and national level, to encourage the development of citizen owned energy in Croatia. ZEZ is a co-founder of the first ethical bank in Croatia, expected to start investing and supporting community projects within this year.

The Island of Krk Cooperative works on strengthening the reputation of Krk as an eco-island. The municipality and the small businesses are members of the Cooperative, together with the community. The Cooperative, using a group purchasing model including more than 50 households, managed to decrease the costs of obtaining the required permits and to lower the costs of the solar PV systems.

The cooperative also issued comprehensive feasibility studies for wind energy on the Islands that have been accepted by the national government, and is currently pursuing new projects.

The elementary school in Kaštel Lukšić is a member of the **Energy Cooperative Kaštela** and its rooftop is covered in PV. This small solar power plant (25 kW) makes of this school the first energy independent school in Croatia. Crowdfunding was chosen as the method for funding the project, introducing a new business model that can be applied in other schools and energy cooperatives across Europe. This is one of the first examples of local citizens forming an energy cooperative to realize a specific RES project in Croatia, without government subsidies.

Lessons learned

- Green projects in local communities create positive trends in the local economy. The examples of cooperatives in Croatia highlight the importance of connecting community-owned project with the potential for local growth, and employment, as well as in fostering community values.
- The quota system, mainly directed at the electricity market operator, affects negatively the development of citizen-owned energy in Croatia, and, while the recent Croatian Law on Renewable Energy has brought a positive shift, appropriate bylaws need to be identified.
- Inspired by the Danish cooperative model, the provision of an obligatory offer of ownership shares to citizens in new RES projects, in EU member states (e.g. minimum of 15% local ownership for projects above 500 kW), could boost community-ownership of RES.
- Net-metering could also encourage energy self-consumption, and connection charges should better reflect real costs, for example in systems up to 10 kW.

3.6.2 Cooperatives in Portugal

COOPERNICO is the first Renewable Energy cooperative in Portugal. It is an example of an international joint venture cooperative, which saw the involvement of the European federation of RE Cooperatives (REScoop.eu), as well as of three cooperatives, respectively from Spain, Belgium and the Netherlands.

Acquiring the necessary start-up capital for a cooperative can be very difficult, and collecting enough investors or citizens able to buy shares for a project before it starts being developed can prove very challenging. This Joint Venture was set up to rapidly mobilise funds to start a cooperative in Portugal, without assistance form financial institutions.

A joint venture refers to a partnership or conglomerate, in which two or more companies combine part of their assets. It corresponds to a new legal entity, and is often created to share risk or expertise on a temporary basis. In this case, an international joint venture was set up, as several of the partner organizations were based outside the country of operation. Joint ventures are not a passive investment, and partners contribute directly, establishing a collaborative extension of their commercial activities, regulated by a written agreement between the parties. The return on investment is also agreed upon in the terms of the agreement.

The RES citizen initiative Boa Energia, which had previously developed four PV projects was interested in setting up a community-energy project before the deadline for the feed-in tariff application in Portugal (2012). To this aim, Boa Energia contacted REScoop.eu which sent out a request for investment and support to their members. The cooperatives interested in the projects, decided that including Portuguese citizens in the investment would have been a pre-requisite for the set up of this cooperation, and supported Boa Energia in setting up a new Portuguese RES cooperative COOPERNICO, as local partner and developer in this international Joint Venture. The three cooperatives Beauvent, Belgium, Som Energia, Spain and CWW Waterland, the Netherlands provided the start-up capital for the investment, as well as their skills, and the joint venture bought the projects and became owner of the PV installations. The total amount invested was around 315,000 € between the four partners, proportionally to the participation of each partner. COOPERNICO acquired a 4% share in the joint venture, with the possibility to buy back up to 100% shares of the joint venture, when the cooperative´s member base, and its social capital, would grow to become fully autonomous. Each partner in this Joint Venture brought its experience, and capital for a relatively small-scale and low risk investment (50,000 €), and boosted the successful start of a community-owned project.

For the innovative approach and outstanding results, COOPERNICO is a finalist in the European Energy Award 2016.

3.6.3 Dutch 'Passive Control' - Flexibility provision through arrangements outside of formal TSO balancing market

ESD SIC is an industrial power user in the north of the Netherlands, that uses a lot of electricity as for its silicon carbide ovens (to several tens of MW). It has some combined heat and power generation from a residual gas stream, but the special thing about its configuration is that ESD SIC's production process has a high degree of flexibility; the ovens may even completely go without power for a few hours. ESD SIC wants to make use of the flexibility in the production process in order to facilitate the integration of renewable energy. This requires close cooperation between the various departments within the company (inter alia power procurement, product sales, product production and maintenance).

In the day ahead time frame, production is scheduled based on day ahead spot market price. On the day itself, the company closely follows the price on the balancing market. For this, the company developed its own software and balancing market assessor to give the plant operator an advice, based on interpretation of the market signal from the TSO. The algorithm every 5 minutes tells the operator "follow the preset profile" "extract as much power from the grid as possible" or "halt off-take as much as possible".

The software algorithm is designed to translate the published delayed real-time signal from the TSO that is not directly usable into something that works in the operation of an industrial company. The company does not participate in the formal ancillary market, e.g. it does not put in full bids for flexibility up/down, because it cannot comply with all of the market rules or suffer the applicable penalties.

Therefore, in the chosen setup, the company is self-acting and is not steered by any direct steering signal. The TSO does not 'see' the flexibility of the company, rather it sees the effects the flexibility has, as the take-off switching strategy of the company is always countering the system imbalance as much as possible. The effects are beneficial for the power system: system is imbalance is less, system imbalance volumes and costs are lower and therefore, costs to balancing responsible parties are lower. It is from this cost savings to BRPs that the company sees its revenues.

The case shows that – whilst formal market rules are not compatible with the said process/mode of operation – it is still possible to participate in the market as long as the financial effects of actions are attributed to the responsible actor.

This is the case in the Dutch system characterised by a system of balancing responsible parties and allowing participants to do "passive control".

3.6.4 Scarcity pricing: High prices and investment boom

The case of the gas engine CHP boom in the Netherlands horticultural sector, located for a large part in the Westland region, makes clear how scarcity pricing can lead to an investment boom. Scarcity pricing in 2005-2008 led to an investment boom, that resulted in 2 GW_e CHP capacities in the Dutch horticultural sector being realised in a couple of years time.

The speed with which this was realised was – due to investment in gas engines that are quick to build – so much that the gas engines were quicker to market than central generators, who also built CCGT and coal fired generation. By the time the large amounts of conventional generators came online, 2011-2016, scarcity pricing is nonexistent and the CCGTs and new coal power cannot sufficiently recoup the investment costs.

The case shows that it is possible to have an investment boom, and that many small gas engines combined can matter a lot even in an interconnected power system.

3.6.5 Conflicting policies: LCP plant closures

In both the UK and France, the Large Combustion Plants Directive led to numerous plant closures. This has led to security of supply concerns, and instalment of capacity markets because there were worries that the capacity could not be built quick enough.

This case shows conflicting policies: the aim to reducing toxic and harmful emissions leads to a lowering of the stated outcome of other policies (security of supply). The instalment of capacity mechanism has inherent risks on the effective workings of the liberalised power market, yet another internal energy market policy.

3.7 Conclusions

Through the case studies we have showed that – while shortcomings in energy markets, regulation, policy, support schemes etc. pose obstacles – there are communities or regions that find innovative solutions that contribute towards the larger policy goal of a sustainable energy supply. This holds for any of the following dimensions of EU policy challenges:

- *Demand*: The case of power-to-heat in Denmark shows how this flexible demand side technology has contributed and will contribute even more to the large scale integration of wind energy. Whilst obstacles to this flexible demand response were overcome in Denmark, in the case we sketched how the same case does not yet hold for the Netherlands due to grid tariffs that are an obstacle to any power-to-heat business case. Whereas local grid operators should have a decisive say, a general beneficial framework of EU policy on these matters could certainly help.

- *Supply*: The case of Som Energia is one example that shows how entry barriers to small scale RES generation and problems faced by RES cooperatives in unfavourable regulatory climates can be overcome by soliciting direct engagement and active participation from citizens. Through the cooperative model, acceptance is stimulated and more investment takes place.

- *Capacity payments*: Locally/regionally experienced distortive impacts of capacity payments are certainly experienced by market parties and established in literature. Capacity mechanisms may be necessary and legitimate to face a generation adequacy problem in special circumstances. However, they also raise some substantial concerns as to the impact on the internal energy market. These mechanisms effectively replace market-driven investment with government intervention, which has the potential to add considerable regulatory risk and cost for investors and consumers alike. The EC has drawn up guidelines on environmental and energy aid that aim to limit these distortive effects to an extent. In the case of Spain that was investigated, a number of problems with market prices have been observed, but it was not noted what the precise effects of capacity payments were and what observed effects could be attributed to other market design aspects.

- *Policy contradictions (EU ETS CO_2 policy vs. sustainable energy; affordability vs. sustainability vs. security of supply)*: The case on the ETS and RES support policy has shown that EU policy needs better alignment and the support measures for RES are not coherent with ETS policies. A general new framework is needed for long term stable investment conditions in RES and having the right amount and type of backup capacity, including the right kind of conventional CO_2 emitting.

- *Problems due to new state aid guidelines for energy*: The case on state aid guidelines shows that the EU should better coordinate its policy instruments concerning RES deployment, in particular concerning the division of competences between DG Energy and DG Competition. In doing so, it should take into account the interests of smaller players and thus facilitate the acceptance of RES deployment at the local level. An opportunity to better align the two fields is the upcoming revision of the RED.

4 Part 3: Market regulatory and economic problems for local and regional energy efficiency initiatives and projects

4.1 Overview challenges

While there is mention of the importance of local and regional authorities in the Energy Union Package, in the RED, EED and the EPBD in contributing to their respective objectives (as elaborated on in chapter 2), significant barriers for local and regional authorities to fulfill these roles exist, and insufficient assistance is offered to the authorities to be able to succeed in filling these roles, e.g. through local and regional energy efficiency initiatives including renewable energy generation. The recommendation in the EPBD that 'Member States should include within their national plans measures to support public authorities to become early adopters of energy efficiency improvements and to implement the recommendations included in the energy performance certificate as soon as feasible'[31] should be strengthened to affect better support for local and regional government.

The barriers are mainly of an economic or regulatory nature, and they sometimes highlight misalignments of these directives and other European free market policies such as the Guidelines on State Aid for environment protection and energy 2014-2020. This chapter aims to identify these barriers and to offer suggestion how these can be overcome, mainly but not exclusively through the expected reviews of the EED and the EPBD. Already proposed options contained in the Inception Impact Assessment for the EPBD[32] (IIA) will be commented on.

Revisions of the EED and EPBD will have an impact on local and regional authorities, by requiring them to adopt national transposition measures and adapt their building codes, but also by affecting their budgetary positions by imposing new duties and roles, by accelerating expenditure on government building renovations (in the long run reducing energy expenditure on buildings), and by affecting tax revenue through increased local economic activity.

[31] Recital (23).
[32] Inception Impact Assessment: Review of the Energy Performance of Buildings Directive, including the 'Smart Financing for Smart Buildings' initiative, DG ENER, UNIT C3 – 2016/ENER/001, 11/2015.

4.2 Financing of energy efficiency initiatives and projects

Current levels of investment are insufficient to deliver on the Union's climate and energy objectives for 2030. Estimates suggest that € 60-€ 100 billion need to be invested annually in the EU to achieve Europe's energy efficiency targets – nearly all of this in buildings. At present, annual investments are below half of these requirements[33]. Public bodies such as local and regional governments are challenged to attract investments at the scale needed. Innovative financing models to attract (private) investment such as the involvement of Energy Services Companies (ESCOs) can provide a path to increase energy efficiency investments.

4.2.1 The role of Energy Service Companies

The EED encourages public bodies, including at regional and local level, to use ESCOs and energy performance contracting to finance renovations[34], and to assess the possibility of concluding long-term energy performance contracts[35].

Measures by Member States to promote the energy services market and support the proper functioning are further developed in Article 18, and include inter alia:

- access to clear information about energy services contracts (in particular about guarantees and customers' rights), financial instruments and opportunities for energy efficiency projects;
- develop and ensure access to a list of certified and/or qualified service providers;
- support the public sector to use ESCO services;
- remove regulatory and non-regulatory barriers; and
- enable independent market intermediaries.

Following these measures to date the ESCO sector is at varying stages of development in the Member States and is growing gradually. Some countries have many ESCOs (e.g. over 500 in Germany, over 300 in France, 80 in Italy) but most have typically less than 20 ESCOs established (14 countries each have 10 or less) (Bertoldi et al. 2014).

[33] Energy Efficiency Financial Institutions Group Report: "Energy Efficiency – the first fuel for the EU Economy. How to drive new finance for energy efficiency investments", February 2015, www.eefig.eu
[34] Article 5 (7).
[35] Article 6 (3).

The market has therefore not developed sufficiently in most Member States, despite ESCOs and energy performance contracts being effective in relieving public budgets and shifting investment and risk to the private sector.
While relatively well developed in public buildings, public accounting and procurement rules can be a barrier. However, the public sector needs to continue taking an exemplary role to assist in rolling out the model into the wider building sector.

Barriers to uptake in office buildings have included the split incentive problem and a mismatch between the long-term nature of an ESCO project and the volatile nature of companies that own office buildings (ADENE 2016). This may be addressed by developing mechanism to transfer (part of the) energy savings from tenants to owners, and to transfer contracts to new owners.

For many projects or initiatives lack of scale to cover high transaction costs is a deterrent for ESCOs. Local and regional authorities may act as aggregators to increase project scale, and the promotion of model contracts and guarantee mechanisms needs to be strengthened in order to lower transaction costs and to provide confidence.

Because of their particular place in the energy market, Distribution System Operators (DSOs) and energy retailers have natural incentives and advantages in acting as an ESCO, such as implicit accounting for system wide benefits or on-bill financing. In designing the IEM and recasting the EED care should be taken not to prevent DSOs and retailers through restrictive unbundling provisions from bringing these advantages to market, while at the same time putting measures into place to prevent the blocking of the energy services market and abuse of market power, as is done in the existing EED[36].

4.2.2 Development and implementation of innovative financing instruments

Efforts by the Commission to support the development of innovative financing mechanisms, investment instruments and schemes for energy efficiency through projects and programs such as Horizon 2020 EE-22-2016-2017: Project Development Assistance[37], EE-24-2016-2017: Making the energy efficiency market investible[38] and EE-25-2016: Development and roll-out of innovative

[36] Article 18 (3).
[37] http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/4099-ee-22-2016-2017.html
[38] http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/4093-ee-24-2016-2017.html

energy efficiency services[39] are highly welcome and need to specifically include and address the special financing requirements and constraints of local and regional authorities.

As proposed in the IIA a voluntary agreement with Financial Institutions and Investors adhering to agreed standards will be explored under the 'Smart Financing for Smart Buildings'- initiative. Such agreed standards between the European Commission and Financial Institutions and Investors would provide a common framework for underwriting procedures necessary for up-scaling of private capital financing. In addition, regulatory options to incentivize investments into energy efficiency and on-site/nearby renewable energy will be considered. These proposals are strongly supported.

The 'Smart Financing for Smart Buildings'-initiative aims to facilitate access to existing and new funding instruments. To this end the initiative is strongly supported, and its outcomes and resulting options need to be made accessible to local and regional authorities.

4.2.3 The role of cooperatives and citizens' engagement

As the example of Som Energia in Spain shows, citizens' direct engagement in energy through cooperatives can result in an increased uptake and acceptance of RES and it can tap the local potential both in terms of private investments and in terms of capacity. Successful cooperatives can also provide the start-up capital and knowledge in setting up new cooperatives, e.g. through joint ventures, as demonstrated in the Coopernico example from Portugal.

The IEM, free market and unbundling regulations must not restrict the ability of local initiatives to have access to the market and to make their full contribution meeting EU climate and energy objectives.

LRAs can get actively involved in setting up energy cooperatives in a number of ways, either as a (cornerstone) financial member, or simply acting as a facilitator, coordinator and knowledge centre. Even without setting up a cooperative, just the organisation of a local bulk purchasing scheme can often assist in overcoming economic hurdles.

For typical building energy efficiency projects the actual savings or income streams resulting from the implementation are often harder to quantify and therefore to monetise, when compared to funding energy generation projects.

[39] http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/4094-ee-25-2016.html

Investments by citizen groups or cooperatives are therefore harder to achieve for energy efficiency projects compared to RES projects.

4.3 Data access, collection and exchange

Lack of access to energy consumption data is a major obstacle in strategic energy planning for LRAs, to draw up greenhouse gas inventories, to evaluate the impact of planned energy efficiency measures or to monitor the result of implemented energy efficiency measures, or to evaluate the impact of local RES generation projects (MESHARTILITY 2015).

4.3.1 Local and regional energy data

The EED makes provisions for Member States to collect from obligated parties[40], on request, aggregated statistical information on their final customers, including information on final customers' consumption, load profiles, customer segmentation and geographical location[41].

In the transposition into national law most Member States have provided for the ability to request data from the obligated parties, but this request is not always made, i.e. the data is often collected inconsistently or not at all.

While the data, if collected, would be invaluable for local and regional energy planning, the directive is not explicit in the detail of the customer and geographical segregation required, and thereby it does not ensure that this is suitable for LRAs' use, nor does it specify what parties can request information from the obligated parties or have access to the data.

A review of the EED should ensure that relevant measures are actually put into place by Member States to request and collect the data as defined in the EED, preferably in one central place (e.g. national or regional ministry of energy, ministry of statistics, energy agencies). Furthermore, any review should regulate more specifically what energy consumption data has to be provided by the obligated parties and in what format, this information has to be collected in a form suitable for local and regional energy planning, and it needs to be freely accessible to LRAs.

[40] Essentially the energy providers.
[41] Article 7(8).

A requirement for obligated parties (particularly electricity suppliers) to regularly (once a year) publish emission factors for the energy sold would further facilitate the assessment of the emission reduction impact of measures proposed and implemented by LRAs.

While voluntary direct data sharing between DSOs and LRAs has been very successful in some Member States (e.g. Italy), some national regulations can also stand in the way of this process by specifically disallowing any additional services from the DSO to the local authorities without adequate payment[42]. This is interpreted by some DSOs as preventing cost-free data sharing. A European guideline providing legal clarity on this point would remove this hurdle.

4.3.2 Individual building energy performance data

LRAs seeking access to their own facilities' consumption data are assisted by the directives concerning common rules for the internal market in electricity and gas (2009/72/EC and 2009/73/EC). They mandate that consumers should have access to their own consumption data and associated prices and services costs, and that they be properly informed about their energy consumption[43]. Regulatory authorities shall also ensure access to customer consumption data, the provision, for optional use, of an easily understandable harmonised format at national level for consumption data, and prompt access for all customers to such data. Customers to have at their disposal their consumption data at no additional cost, and to be properly informed of actual consumption and costs frequently enough to enable them to regulate their own consumption.

Furthermore, the EED requires Member States to provide data on public buildings and their energy performance[44], and to encourage public bodies including regional and local government to adopt an energy efficiency plan[45].

In transposing the EPBD Member States have set up an Energy Performance Certificate (EPC) database to monitor EPBD implementation, to control the energy certification process, and to collect data on the building stock in order to provide data for decision making. Utilisation opportunities depend on how access to the EPC database is regulated and whether EPC information can be linked with other data (ADENE 2015). These databases should be publicly available to the widest extent possible, and should be linked to other energy

[42] E.g. network concession agreements (Konzessionsabgabenverordnung – KAV) between network operators and municipalities in Germany.
[43] Recital (50).
[44] Article 5 (5).
[45] Article 5 (7).

related databases, in order to tap the full potential for decision making and policy development.

The IAA suggests that the experiences with the first building renovation strategies in the context of the EED need be taken into consideration when reviewing the EPBD. Reviews in the proposed areas of

- providing clear, relevant and comparable building information, going beyond existing Energy Performance Certificates in order to incentivise investments in energy efficiency in public, commercial and residential buildings for both tenants and home owners (e.g. building on the existing national EPC databases, to consider the need for an EU wide EPC database)
- ensuring that the building sector can take full advantage of the opportunities that NZEBs present towards saving energy and drawing RES in buildings

are seen as essential.

The IAA also suggests that, in order to improve the net energy performance of buildings not only at the level of the building itself, but also when seen in the context of the infrastructure a building is connected to, the building's interaction with this infrastructure also needs to be addressed. This view is supported, since it also takes into account primary energy use (as asked for in Recital (22)) and downstream conversion efficiencies of the infrastructure supplying the building. This differentiation becomes important to enable the advantages of low primary energy consumption technology such as district cooling and the associated carbon emissions reduction potential to be clearly identified (RESCUE 2015).

4.3.3 Data privacy and commercial sensitivity

The sharing of local or regional energy data can be hindered by data privacy and commercial sensitivity issues (either the data provider not wanting to make their commercially sensitive data discoverable to competitors, or large industrial end-users not wanting to be identifiable in a data set of only a few energy users). Clear rules on confidentiality and data access are required when guidelines on data sharing are developed and should be part of an EED review.

Concerning access to EPC databases, data privacy issues are important in some countries and must be dealt with care. However, accessing EPC databases and making use of EPC data offers interesting opportunities, which have to be considered as well. Investment in building renovation opens new opportunities for new services. For this purpose, it could be useful to provide at least limited

access to EPC databases because new services can only be developed if comprehensive data analysis is possible (ADENE 2015).

4.3.4 Economic challenges

The exchange of energy data itself is a low cost process, with most of the expenses being incurred in moderate system set-up costs. These set-up costs can be further minimised if the data exchange process for regional and local data is closely aligned with and linked to the numerous energy data reporting processes that the obligated parties under the EED are already party to (e.g. intra-industry for market balancing and cost allocation, or under existing national or regional statistical data collection).

4.4 Access to the grid for local RES

The RED currently asks for guaranteed or priority access for renewable energy installations[46]. However, multiple permits and licenses are often required in some Member States before small- and medium-size projects can be realised (also see case study on Som Energia, Spain). Information on the exact requirements and how to meet them is also often not readily accessible. For inexperienced and non-expert generators, navigating the administrative hurdles to complete an installation is often too time consuming, complex or cost-prohibitive.

Obligations in the RED to streamline and expedite administrative procedures[47] have not been sufficiently effective to date in simplifying the connection process. There is a need for these to be further strengthened, e.g. by providing for limits on costs and administrative timelines, and for the transposition into national law and subsequent implementation to be further verified.

Citizen and community owned generators should enjoy the right to priority connection to the distribution grid, and the right to market energy through the grid to end-users in their vicinity at fair cost without incurring disproportionate or dissuasive pricing. This needs to specifically include local energy storage and other demand control options.

[46] Article 16.
[47] Recital (41) and (43).

4.5 Small-scale production and distribution network

While opening up the benefits of a trans-regional energy system such as better balancing of load and demand should be promoted, regulations should at the same time encourage and support the exploitation of opportunities to increase overall grid resilience and security of supply by making local and regional small-scale grids self-sufficient as far as possible, both in terms of short term supply resilience in case remote supply is interrupted through smart grids, as well as for long-term supply security by sourcing energy supply from local and regional resources.

Heat and cold distribution systems and with this CHP systems by their very nature are of a local basis, since heat or cold transmission over large distances is uneconomic. Local and regional authorities have a special role to play in the provisions for the 'Promotion of efficiency in heating and cooling'[48] in the EED, asking Member States

- for a comprehensive assessment of the potential for the application of high efficiency cogeneration and efficient district heating and cooling;
- to take adequate measures for efficient district heating and cooling infrastructure to be developed and/or to accommodate the development of high-efficiency cogeneration and the use of heating and cooling from waste heat and RES;
- to adopt policies in relation to local and regional levels that encourage the due taking into account of the potential of using efficient heating and cooling systems, including the potential identified in the comprehensive assessment; and
- to adopt authorisation or permit criteria and procedures for operators of electricity generation installations, industrial installations and district heating and cooling installations ensuring that they carry out an installation-level cost-benefit analysis.

These policies to be adopted will have a direct bearing on the development of regional and local authority's energy planning, and their capacity to contribute to the obligations above need to be strengthened[49].

The EED allows for alternatives for Member States to setting up an energy efficiency obligation scheme[50], which includes 'regulations or voluntary agreements that lead to the application of energy efficient technology or

[48] Article 14.
[49] See more details for example in Lucha, Christine et al. 2016.
[50] Article 7.

techniques and have the effect of reducing end-use energy consumption'. While this obligation aims to introduce energy efficient technology, the focus on reducing end-use energy consumption rather than primary energy consumption is a weakness of the Directive. It has the potential to hinder the development of primary energy efficient initiatives such as district cooling (RESCUE 2015) and should be reviewed.

4.6 Incentive for investments in generation, transmission, and storage

Despite numerous efforts around the world to design a cost recovery structure for electricity systems that truly reflects the costs and benefits of services such as demand control, system balancing, reserve capacity, ancillary services such as frequency and voltage support, or even avoided network investment through distributed generation assets, and thereby arriving at truly market based incentives for investment into generation, transmission, and storage, no fully agreed model has been found.

The often very location-specific and time-specific nature of the costs and benefits works against finding a formula universally applicable all over Europe. However, the need exists for Europe-wide guidelines on how to assess costs and benefits to the grid and how these should be translated into tariffs and rate structures in order to ensure non-discriminatory distribution of these costs and benefits and to thereby provide value-based incentives.

System operators should be properly incentivised, through reforms to revenue-setting regulation based on EU principles and guidance, to develop and manage the grid in alignment with achieving EU energy policy goals (Roberts, Josh 2016).

While harmonising markets across Europe through a common general policy framework or guidelines is desirable, care must be taken not to curtail the ability to take account and to take advantage of local opportunities, and of opportunities to exploit synergies between systems of different energy forms, such as in the Danish and Dutch examples above of feeding excess power into the heat network.

While stronger locational price signals for transmission pricing might assist in cost optimisation of the energy system overall through signaling incentives, care needs to be taken that more remote and possibly economically already disadvantaged regions are not further set back in their economic development

through higher energy costs, e.g. by ensuring that local generation gets fully rewarded for the local value of its contribution to the grid and by providing LRAs with the right information and the resources to respond themselves to high price signals through local energy efficiency and generation initiatives and projects.

4.7 Role of energy consumers/ prosumers

As a specific (and increasingly important) type of market actor, prosumers face a number of unique barriers to fully participate in the energy market. However, there is currently no dedicated space in the EU legal framework to guarantee, or even support, citizen participation in the energy system (RESCUE 2015).

The often large asymmetries between the players in information, in technical knowhow, in size of market participants and in market power generally puts prosumers at a significant disadvantage, and thereby prevents them from playing a bigger role in achieving the EU climate and energy objectives.

Any reform of the EED, RED or IEM should address the following areas:

- guarantee the right for every end-user (consumer) to become a prosumer;
- by becoming a prosumer, the end-user must not lose any rights they currently enjoy as a consumer, e.g. the right to freely choose their supplier;
- remove administrative barriers for prosumers to provide value services to the grid such as demand-side management;
- ensure system-reflective pricing and award prosumers fairly according the value of their services to the grid (also see discussion on investment incentives above);
- provide investment security to prosumers by addressing the market asymmetries, providing long-term pricing signals and by preventing retroactive changes; and
- facilitate access for new market entrants such as citizen and energy cooperatives, aggregators and ESCOs.

4.8 National support schemes, and state aid

State Aid regulations appear to limit the right of Member States to freely support renewable energy generation through national support schemes as envisaged under RES, such as for example the FIT scheme in Germany. The emphasis on

auctions and competitive bidding for new renewable generation disadvantages local initiatives with limited resources and less ability to absorb the tender preparation risk. A raising of the size limits below which aid may be granted without a competitive bidding process is recommended, in order to limit the impact of the State Aid regulations on local and regional energy efficiency and generation initiatives.

State Aid regulations explicitly acknowledge that State Aid may be needed to overcome the split incentive hurdle for energy efficiency measures in tenanted buildings[51]. Revisions of the EPBD and the EED should build on this and promote measures to address the split incentive hurdle.

Regulations under State Aid should not prevent local and regional governments from supporting local development and increased self-sufficiency as they see fit in their particular circumstance.

4.9 Emission trading scheme

The low cost of carbon in the current ETS trading scheme already leads to the undesirable trend to substitute high carbon (coal based) generation for lower carbon (gas based) generation.

Also, the increased share of renewable electricity generation is leading to lower wholesale electricity costs, undermining the economic argument for further renewable energy generation and high efficiency fossil fuel generation such as CHP, both of which by their very nature tend to be more local.

Any upcoming revisions of the EU ETS should be aligned with RES support policy so that effects RES support has on CO_2 emissions are factored in ETS policy and RES support policy is not frustrated by low ETS prices (see case study from Croatia above).

Any reform of the EU ETS should reflect the true cost of carbon emissions including all externalities. The failure of the current ETS market to arrive at a carbon price that reflects these costs sufficiently to influence investment and operating decisions to a large enough extent calls for decisive measures to address these market failures, including measures to reduce the surplus in allowances. This is seen as a prerequisite to allow RES to compete fairly in the energy market.

[51] Section 3.4.2

5 Conclusions and recommendations

The conclusions as well as the recommendations are given as a result of the analysis conducted by the consortium as laid down in the preceding chapters, based on desktop research and the results of the case studies.

5.1 Local and regional experience in the implementation of the EU energy market acquis

1. It is now more recognised that LRAs are important in achieving the EU '20-20-20' targets and can, together with central governments, define and implement national energy strategies and develop plans for specific areas. In particular, they can contribute by promoting the use of renewable energy and the improvement of energy efficiency at the local and regional level, for example by setting ambitious targets, by streamlining administrative procedures and regulations, or by providing financial support (e.g. grants or guarantees). LRAs are important for identifying an ideal location for the energy production installations, taking into account local and regional energy potential.
2. In general, LRAs have furthermore a relevant role to play to inform citizens of the opportunities and implications of the development of energy from RES and energy reduction as these public bodies are closest to citizens as underlined in the directives.
3. In the Energy Union's objectives the LRAs play a pivotal role in:

    - Providing the necessary support measures for consumer protection e.g. tools, information, new financing schemes and financial incentives for energy savings, and explicitly combat energy poverty;
    - Contributing to the Energy Union's objectives, such as reducing the Europe Union's dependency on energy imports, promoting a sustainable energy supply and affordability of enery and competitiveness of energy prices; and
    - Giving energy efficiency primary consideration in policies, and particular exploiting energy efficiency potential of buildings.

4. While there is mention of the importance of LRAs in the Energy Union Package, in the RED, EED and the EPBD, significant barriers for LRAs to fulfill these roles exist, and insufficient assistance is offered to the authorities to be able to succeed in filling these roles.

5. While main criticisms on EU Energy Market Policy by key major stakeholders is mostly compatible with each other and do generally not conflict with CoR opinions, there is clear disagreement on the need for RES support mechanisms between industry on the one side and other stakeholders and the CoR on the other. More research seems to be needed as regards the question of how to align long term investment in RES as well as highly-efficient CHP and highly volatile energy markets, with minimum investor risk and minimum price risk for industry, consumers, etc.
6. Some stakeholders call for larger markets (larger bidding zones; aligning of balancing markets; aligning intraday markets). However, others have called for pricing zones reflecting physical layout of the EU transmission grid, to prevent unintended power flows over the different interconnectors.
7. The case studies show that, in spite of many obstacles, there are communities or regions that find innovative solutions that contribute towards a sustainable energy supply, e.g. the use of power-to-heat in Denmark and citizens' direct engagement in energy through cooperatives in Spain.
8. We have also seen in the case studies that the costs of the regulated grid are remunerated in different regions differently (examples Denmark and Netherlands) with different impacts on the possibilities of regions to absorb RES in the power system.
9. Lack of access to energy consumption data is a major obstacle in strategic energy planning for LRAs, to draw up greenhouse gas inventories, to evaluate the impact of planned energy efficiency measures, to monitor the result of implemented energy efficiency measures, or to evaluate the impact of local RES generation projects.

5.2 Recommendations with regards to the consideration of the role of LRAs

EU energy market

1. The **market for ESCOs** has not developed sufficiently in most Member States. The public sector needs to continue taking an exemplary role to assist in rolling out the model into the wider building sector.
2. The need exists for Europe-wide guidelines on how to assess **costs and benefits to the grid** of investments in generation, transmission, and storage, and how these should be translated into tariffs and rate structures,

in order to ensure non-discriminatory distribution of these costs and benefits and value-based incentives for these investments.

3. **(Coordinated) Capacity mechanisms** may be necessary and legitimate to face a generation adequacy problem. However, they also raise some substantial concerns as to the impact on the Internal Energy Market. These mechanisms effectively replace market-driven investment with government intervention, which has the potential to add considerable regulatory risk and cost for investors and consumers alike.
4. The case studies on **power-to-heat** (Denmark and The Netherlands) show that an optimum tariff for power-to-heat capacity is not easy to find. A policy framework that would allow local grid operators to experiment with reduced charges would help, but also generally tariff system harmonisation (with of course due note of local circumstances) would be beneficial.
5. The right of **prosumers** to fair access to the energy market needs to be protected, expanding on their rights as **consumers**. The establishment of a regulatory framework is needed that is profitable both for energy consumers and for the prosumers.

Revision of the EED

6. Passages in the EED on high efficiency cogeneration and efficient district heating and cooling have a direct bearing on the development of regional and local authority's energy planning, and their capacity to contribute to the obligations need to be strengthened.
7. A review of the EED should ensure that relevant measures are actually put into place by Member States to request and collect the data as defined in the EED, preferably in one central place (e.g. national or regional ministry of energy, ministry of statistics, energy agencies). Furthermore, any review should regulate more specifically what energy consumption data has to be provided by the obligated parties and in what format, this information has to be collected in a form suitable for local and regional energy planning, and it needs to be freely accessible to LRAs.
8. A requirement for obligated parties (particularly electricity suppliers) to regularly (once a year) publish emission factors for the energy sold would further facilitate the assessment of the emission reduction impact of measures proposed and implemented by LRAs.
9. While voluntary direct data sharing between DSOs and LRAs has been very successful in some Member States (e.g. Italy), some national regulations can also stand in the way of this process by specifically disallowing any additional services from the DSO to the local authorities without adequate payment. This is interpreted by some DSOs as

preventing cost-free data sharing. A European guideline providing legal clarity on this point would remove this hurdle.

Revision of the EPBD

10. Databases of individual building performance certificate data set up under the EPBD should be made publicly available to the widest extent possible, in order to tap the full potential for decision making and policy development.
11. The recommendation in the EPBD that 'Member States should include within their national plans measures to support public authorities to become early adopters of energy efficiency improvements and to implement the recommendations included in the energy performance certificate as soon as feasible' should be strengthened to affect better support for local and regional government.
12. State Aid regulations explicitly acknowledge that state Aid may be needed to overcome the split incentive hurdle for energy efficiency measures in tenanted buildings. Revisions of the EPBD and the EED should build on this and promote measures to address the split incentive hurdle.

Revision of the RED

13. There is a need for the obligations in the RED to facilitate grid access for local RES to be further strengthened, and for the transposition into national law and subsequent implementation to be further verified.
14. The German case study (state aid guidelines) shows that the EU should better coordinate its policy instruments concerning RES deployment, in particular concerning the division of competences between DG Energy and DG Competition. In doing so, it should take into account the interests of smaller players and thus facilitate the acceptance of RES deployment at the local level. An opportunity to better align the two fields is the upcoming revision of the RED.
15. In particular the Spanish case study shows that individual and collective self-generation and self-consumption of locally-available RES has huge potential. Thus, stable policy frameworks to support civic renewable energy should be established and investments in this field fostered. Regulatory and financial obstacles to developing these initiatives should be analysed and measures adopted that enable them to be overcome.

16. The case studies also show that feed-in tariffs provide simple and reliable ways to calculate investments and returns accurately and to obtain the necessary credit. FiTs should be fine-tuned to decrease investment costs and could be complemented by energy management mechanisms, e.g. net metering, smart grids and the development of storage capacity.

State aid guidelines

17. Complex and expensive procedures for tenders place a disproportionate burden on small-scale producers and may effectively exclude civic energy from RES support. Giving large centralised producers an advantage and reducing competition could increase consumer prices. The Guidelines on State aid for environmental protection and energy 2014-2020 should be clarified in this respect.
18. A raising of the size limits below which state aid may be granted without a competitive bidding process is recommended, in order to limit the impact of the State Aid regulations on local and regional energy efficiency and generation initiatives.
19. Regulations under State Aid should not prevent local and regional governments from supporting local development and increased self-sufficiency as they see fit in their particular circumstance.

ETS reform

20. Any reform of the EU ETS should reflect the true cost of carbon emissions including all externalities. The failure of the current ETS market to arrive at a carbon price that reflects these costs sufficiently to influence investment and operating decisions to a large enough extent calls for decisive measures to address these market failures, including measures to reduce the surplus in allowances. This is seen as a prerequisite to allow RES to compete fairly in the energy market.
21. Any upcoming revisions of the EU ETS should be aligned with RES support policy so that effects RES support has on CO_2 emissions are factored in ETS policy and RES support policy is not frustrated by low ETS prices (see case study from Croatia above).

Funding

22. Efforts by the European Commission to support the development of innovative financing instruments are highly welcome and need to specifically include and address the special financing requirements and constraints of LRAs.

23. It is necessary to ensure sufficient and easily-accessible funding for LRAs who contribute to the energy transition towards sustainable and inclusive retail energy markets.
24. Funds for RES development and grid improvement should be earmarked in EU Structural and Cohesion Funds as well as national budgets.

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7 Annex: Main criticisms by key stakeholder organisations at the EU level

In this Annex we present a summary of main criticisms to EU Energy Market policy, by key major industrial /expert/societal stakeholder organisations at the EU level, to the extent that the criticism is relevant for the local and regional level. The main sources of the criticisms are the published inputs from the stakeholders in the public consultation round on a new energy market design (summer/autumn 2015).52 We check these inputs where appropriate against the CoR's opinions. For each stakeholder, we describe the type of stakeholder, which companies/viewpoints they represent, and what the main positions of the stakeholder are regarding the EU energy market policies treated and the relevance for LRAs. We check the CoR opinion on the criticism, if it has expressed

7.1 Criticism from key industrial stakeholders

From the industrial stakeholders we selected the most relevant sectors based on their electrical energy consumption (according to Eurostat table nrg_105a). The criticisms as reflected below are based on the policy papers the industry stakeholders publish on their websites and on the basis of their public input to the open consultation on energy market design. Most of industry's policy recommendations are formulated on a general level and do not specify a clear role for a local or regional authority or local/regional energy projects.

7.1.1 Chemical Industry

The most important industry organisation representing chemical industry stakeholders is CEFIC, the European Chemical Industry Council. It has more than 600 member organisations representing 29,000 large, medium and small chemical companies from the European Chemical industry (organic and inorganic bulk chemical industry as well as fine and specialty chemicals). According to its input on public consultation round to a new energy market design (October, 2015), CEFIC supports an EU energy market based on full and

[52] All published stakeholder inputs to the 2015 consultation on a new energy market design can be downloaded from the following website: https://ec.europa.eu/energy/en/consultations/public-consultation-new-energy-market-design

open competition, designed to lead to uninterrupted and competitively priced secure energy for all consumers. CEFIC expresses concern that future electricity prices will not be internationally cost competitive, because the prices will be inflated with costs for CO_2 under the ETS and multiple levies to recoup the costs of subsidies, capacity remuneration mechanisms, extra transport costs and so on.

Some more specific recommendations from CEFIC:

- *Price signals:* investments should be directed by signals generated from liberalised markets, where all technologies compete on a "level playing field".
- *Taxes and charges and RES support*: All political interference and market distortions, including subsidies for RES should be phased out. Distortions and interventions, including subsidies, create market uncertainty that harms incentives for investment and makes markets less efficient.
- *Capacity remuneration mechanisms* (CRMs): these should only be a measure of last resort, and EU harmonised rules should be introduced for these mechanisms.
- *Cross-border aligning* of national balancing markets and smooth implementation of EU wide intraday trading platform should be accelerated, with legal measures if needed.
- *Long term contracts*: CEFIC is not favouring the public sector of taking any position in a market or attempts to shape markets in order for the markets to provide specific kinds of products e.g. long term contracts.

7.1.2 Iron and steel industry

The most important industry organisation representing the steel industry is EUROFER. Eurofer published a position paper on Energy Market policy as part of the Energy Union position paper (2015-06-10) with a number of key criticisms and partly containing local/regional relevance. One key aspect is that energy-intensive industry is under large price pressure and faces global competition, including trade deemed 'unfair'. Therefore, whilst Eurofer welcomes an energy market where price signals reflect long term needs and policy objectives, "… the price signal has to be carefully assessed, and protection measures including exemptions are necessary wherever the ability to compete on an international basis may be endangered." Some specifics from this policy paper:

- Policy should aim to reduce the industrial energy price and cost gap between EU and international competitors, with the objective to secure globally competitive energy prices for European energy intensive industries (EIIs).

- A cost-effective strategy for decarbonising power generation should be used that does not adversely impact European EIIs.
- Full offset of indirect costs passed on energy prices should be possible (exemptions from taxes, levies, including grid levies, and other costs relating to the support and development of low carbon generation), but the current Commission's Environment and Energy Aid Guidelines limit to a certain extent this possibility.
- Encouragement of exploitation of indigenous energy resources: EU policies must not constrain Member States in exploiting indigenous energy resources, including unconventional gas. The only constraint on a Member State's energy mix should be its national decarbonisation target.

Relating to production costs, one of the most pressing concerns of the steel industry with regards to energy and climate policy, are the implications of ETS policy developments on competitiveness. Eurofer published a number of position papers and studies on this subject. In its position paper on the European Commission proposal for ETS post 2020 (2015-11-25) a number of specific wishes are expressed, e.g. 100% free allocation at the level of the top 10% best performers for 'carbon leakage' sectors (including steel), no linear reduction factor on benchmarks and cross-sectoral correction factor; allow for compensating for indirect carbon costs to the level of best performers, and so on. The relevance of these criticisms for LRAs is limited, but it is obvious that consequences of developments at specific installations are locally very relevant, given e.g. the level of employment offered. Also the criticism on exploiting indigenous resources (e.g. shale, lignite, coal) has local/regional relevance.

Regarding the new energy market design, Eurofer gives input via its response to the public consultation (08/10/2015) and Energy Union position paper (10/06/2015):

- *Taxes and charges*: these distort and hinder investments both in producing and consuming installations. They weigh heavily on the competitiveness of European industry in the global playing field. Therefore, such taxes and levies should be phased out.
- *RES*: should be integrated in the market, compete with all other energy sources, and bear its balancing costs. A quick phase out of existing support schemes is needed.
- *Investments:* investment into grids should match investments into production capacities. Where there is misalignment today, grid investment should be prioritised.
- *Demand response*: In order to balance out the impact of intermittent energy sources, demand-side response measures should be prioritized over capacity mechanisms.

- *Capacity mechanisms* should only be introduced as a last resort solution; in that case, they should be temporary and address specific issues. If, however, capacity mechanisms were introduced, a harmonised methodology to assess power system adequacy should be used if it leads to more cost-efficient and effective solutions. Should capacity mechanisms be used, EIIs must be protected from any cost burden on account of capacity payment and demand response must be part of the mechanism against adequate payment. Should capacity mechanisms need to be implemented, they should not result in any additional cost for energy intensive industries; capacity mechanisms carry the risk of introducing a co-financing scheme in its own right, which would have to be created, administered, regulated and maintained separately and additionally. Also, concepts for linking wholesale and retail markets should be designed with special care, thereby not to establish capacity markets in the process.
- *Demand response:* EIIs need a full value of their balancing function and their ability to have a flexible energy demand response as an economically efficient solution and a priority tool to stabilize the power grid, which is needed due to increasing fluctuating renewable generation. For this, it is required to encourage development of voluntary demand response with adequate compensation as an alternative to capacity mechanisms. Regulatory obstacles to the use of demand response should be removed; relevant offers or markets should be introduced.

7.1.3 Refining industry

The European oil refining sector is represented by FuelsEurope, up to 2014 EUROPIA. FuelsEurope represents the interest of 43 companies operating refineries in the EU. Members account for almost 100% of EU petroleum refining capacity in the EU and three quarter of the sales of motor fuels. FuelsEurope did not hand in public response to the consultation on energy market design, but takes a position on climate and energy policy and has three criticisms on the EU Energy Union policy in general and suggests three things to help achieve the Energy Union goals more effectively ("policy priorities / climate and energy / energy union"). FuelsEurope expresses three main criticisms:

Firstly, the *role of petroleum products* in the EU's energy mix should be recognised. Whilst the markets for these are well developed and free, the refining sector would like to see that the Commission pays more attention to the role of petroleum products in the European economy – deemed essential - and does not see them as "old technologies".

Second, the Commission should place greater weight on *market-based systems*. Whilst regulations such as the ETS boosts energy efficiency and plays certainly a role, FuelsEurope proclaims that the greatest contributions to efficiency and carbon dioxide reduction come from technologies that can compete on their merits without distortive mandates and subsidies.

Thirdly, it is therefore necessary to describe how *energy costs* can be lowered in the period between today and the Energy Union as envisioned by the commission, because without assured competitive energy prices in the EU during this transition, industries will be reluctant to invest in Europe, thus harming the prospects for job creation.

The criticisms on high energy prices and the role for market based systems (distortions of subsidies etc.) are shared with the iron and steel and the chemical industries.

7.1.4 Pulp and paper industry

The European Pulp and Paper industry is represented by the Confederation of European Paper Industries (CEPI). CEPI represents some 515 pulp, paper and board producing companies across Europe, ranging from small and medium sized companies to multi-nationals, and 940 paper mills. Together they represent 23% of world production.

The key opinions of CEPI from their public input on the energy market consultation are partly overlapping with the other industries treated above, with some more input on e.g. biomass and the potential of industrial flexibility.

- *Taxes and charges*: The exposure to regional or national taxes and charges clearly increases the level of uncertainty, distorting competition and the free flow of energy.
- *RES support*: Subsidies to electricity produced from RES distort market price formation and shield away a substantial (and increasing) share of electricity generation from the electricity market. If subsidies to electricity generation are nevertheless deemed to be necessary, they should be limited to initial investments only. In particular, support to electrical generation from *biomass* is leading to significant and increasing pressure on wood supply at the expense of the wood-using industry such as the pulp and paper industry and this distortion is an obstacle to the emergence of a bio-based economy.
- *Cross border:* There is a need for more cross-border capacity in order for RES to reach the market maturely.

- *Capacity mechanisms*: If these are introduced, a common EU framework is useful, a full harmonisation of capacity mechanisms in the EU is deemed unnecessary complex, the current system works.
- *Flexibility provision*: The potentials of demand response from industry are very large, bigger than residential, and it is more cost-effective, reliable and uses stock technology. It is therefore necessary to ensure a level playing field for demand-side response mechanisms. Industrial demand side flexibility can be a more cost-effective and quickly implementable solution compared to all other alternatives (capacity remuneration schemes, grid expansion, household D.R. programmes, etc.). Regulatory barriers related to grid tariff legislation need to be removed.
- *CHP:* At the same time, current incentives for on-site generation should be maintained, in order to keep baseload industrial demand off-grid and to save investments in distribution by decentralised production.

7.1.5 Electricity sector

EURELECTRIC represents the electricity industry in Europe, representing more than 3,500 companies in power generation, distribution, and supply. They have voiced an elaborate public input to the design of the energy market, key parts of which are summarised below:

- *Prices*: Energy prices that reflect market fundamentals, including scarcity in terms of time and location, are an important ingredient of the electricity market design. Undistorted prices (without regulatory intervention) should thus trigger optimal dispatch and signal the need for investments/divestments. Prices that reflect scarcity provide incentives and opportunities for market players to develop new products, enhancing flexibility resources both on the demand side and on the supply side.
- *Market integration/cross border*: All steps to further integrate the European electricity market are welcome. Wholesale scarcity is already expressed at bidding zone level. Price spreads between bidding zones actually express the scarcity of transmission capacity between the bidding zones and therefore usually signal transmission investment needs. EURELECTRIC generally favours larger bidding zones as they present more advantages for the functioning of the market and its liquidity.
- *Capacity mechanisms*: When introduced, capacity markets reflect the level of system adequacy and signal the need for investments in generation assets, storage and demand response when capacity is scarce. In well-functioning energy markets without any type of intervention and where governments accept the adequacy level delivered by the energy-only market, scarcity

prices can make capacity markets redundant. Capacity markets are by no means an alternative to a well-functioning and well-designed energy market.

- *Retail prices/flexibility*: At retail level scarcity prices give a signal for market-based demand response, which is an indispensable part of the future market design. Consumers that wish so should be able to choose time-varying prices that reflect wholesale prices variations and receive all necessary information on the risks linked to the exposure to volatile energy prices.
- *Taxes and charges*: Member States apply a large variety of taxes, levies and charges on power generation and storage. The more interconnected the markets are (both physically and operationally), the more sensitive they become to distortions in cost structure and pricing. Specific criticisms on the wholesale market and on the effect on final end users:

    - Taxes, levies and charges on power generation and storage inhibit the development of the internal electricity market, influence dispatch decisions, hamper investments in existing and new power plants and distort competition between technologies and across borders.
    - The introduction of new taxes also increases regulatory risks. Fixed taxes/levies/charges influence mainly investments (and in some cases decommissioning/mothballing of plants), while taxes/levies/charges that are based on the volume of generated electricity influence both the operation of plants and investments.
    - Taxes and charges levied on the bill distort investment decisions between centralized and distributed generation. The higher they are, the more attractive self-generation becomes, although this might not be a rational decision from a total system cost perspective.
    - Policy support costs, which form a large share of levies in the final consumers' bills, tend to be fixed costs which are billed as volumetric charges. As prosumers consume less electricity, such costs are shifted to other customers, a trend poised to accelerate as the share of prosumers grows unless the regulatory frameworks evolve.
    - Taxes and levies that constitute a major part of the final electricity price weaken the wholesale price signal which is transferred to the customer in case of dynamic/time-of-use prices and thus limit incentives for demand response and storage.
    - Competition between different energy carriers (electricity, gas, oil, biomass, etc.) in heating, cooling and transport is distorted. Thus taxes and levies in the final consumer's bill may act as a barrier for electrification.
    - *RES and markets*: RES support schemes should be revised without delay to ensure cost-effectiveness, maximise market orientation and minimise

market distortion to achieve competitiveness. A clear CO_2 price should become the main driver for investments to foster the transition towards a low carbon economy, including RES investments. Purchasing obligations, non-market-based net-metering and price regulation are barriers for market-based, cost-effective development of distributed generation and development of innovative solutions. Opting for distributed generation should be a customer choice that does not result from artificial incentives.

The former are a number of the key inputs to a lengthy voiced opinion. In the paper "Renewable Energy and Security of Supply", EURELECTRIC proposes recommendations that ensure a cost-efficient, market-based transition towards decarbonisation while securing electricity supply. They comprise enhancing market functioning as a "no regret" option – completing the IEM is fundamental; making RES fit for the market – achieving operational integration of RES in the market, designing more cost-efficient and less market distortive RES policies; making the market fit for RES – adopting a European mind-set and following a regional approach to market design that avoids uncoordinated national developments, in particular in regard to the implementation of capacity markets.

7.1.6 Renewable Energy Sector (European Wind Energy Association)

The European Wind Energy Association represents 600 organisations across the European wind energy supply chain including turbine manufacturers, component suppliers, research institutes, national wind and renewable associations, developers, electricity providers, finance and insurance companies, consultants, contractors.

Scarcity prices: Scarcity prices and the procurement of ancillary and reserve services may not be sufficient to drive the needed amount of renewable investment to ensure that European targets on RES are achieved, and a complementary mechanism therefore has to be developed.

Capacity mechanisms: In the long term, the current energy-only market model might not always deliver this desired outcome. As a result, the EU could still face an investment dilemma, especially for low marginal cost and CAPEX-intensive power generation technologies such as wind energy. To deal with this challenge, an additional market based investment support for zero carbon technologies will likely be necessary, a system defined on a competitive basis that would provide investors certainty and visibility in the long term. Reducing the need for keeping inflexible, antiquated and carbon intensive supply assets in the market, thereby reducing the need for CRMs, should be achieved by

refocusing liberalisation efforts away from the power supply side solely and to include demand side participation and storage in the markets.

Long-term contracts have the potential to mitigate volume risk as complementary hedging tools for short-term market risks. Policy makers should look into ways to remove barriers to liquidity of long-term products.

Regulatory risk: While long-term products would be applied on a voluntary basis, as seen in already recent B2B contracts, investors should be able to rely on underlying general principles of continuity and stability of the regulatory regime. Importantly, this includes the rule of grandfathering and the avoidance of any retroactive measures. As uncertainty remains on market players voluntarily entering into this kind of contracts, additional measures would help increase the volume of capital available for investments in wind power plants, such as the development of public guarantees. In these instruments project developers would have to pay a fee for insurances that would cover them against regulatory and counterparty risks

Stable and coherent policy: In general, the public sector can provide investment protection in the first place by articulating a long-term view and promoting a predictable and coherent energy policy, effective implementation and enforcement of the rules, elimination of harmful subsidies, and avoidance of unpredictable or even retroactive changes.

Retail prices, demand response, role of consumers: Crucially, household and industrial consumers' electricity bills currently do not respond to variations in wholesale prices. Consumers have not benefited from the downward trend that wind power produces on the wholesale market. Any future design of the energy market should seek for an increased link between wholesale prices and retail prices in order to guarantee a pass-through effect to consumers. Enabling consumers to base their decisions during scarcity periods on market price signals will be a major step away from the dominant supply-side focus at present. Consumers are also relevant for long run cost-efficient solutions for decarbonisation that include the use of electricity in the heating/cooling and transport sectors, and potentially an increase of energy storage. This allows for a greater share of balancing variable renewable energies, particularly at the local and regional level.

Flexibility markets: EWEA states that current market conditions give no value to increased plant flexibility whereas a lot of flexibility services from wind power plants are technically feasible. These new market forms are an important building block of the IEM, given the lack of timely investment signals coming from energy-only markets. EWEA calls for a proper market for ancillary or grid

support services, alongside the energy-only market. New products such as ramping margins and cycling incentives can be envisaged. Furthermore, compulsory grid support requirements that are not remunerated should be minimised or replaced by remuneration schemes (it is neither cost-efficient nor necessary to mandate services from all connected generators in most systems). A differentiation could be made between non local services and local services, such as reactive power, U-control or damping.

RES support: RES support mechanism convergence will depend strongly upon the elimination of structural barriers preventing the completion of the internal energy market (e.g. regulated prices, subsidies for conventional power generators, insufficient interconnection, no access to balancing markets etc.) and should also be adapted to renewable energy technology maturity. Furthermore, such move would have to be accompanied by regional approaches in planning and operating the power system and the market. Regional impact assessments, regional system adequacy analyses and regional cost-benefit analyses have to be developed in parallel in order to provide an equitable, fair and transparent evolution. Opportunities to launch such regional support schemes lie in both onshore and offshore wind industries.

ETS: A structural reform of the ETS will provide for a high and stable carbon price that truly internalises greenhouse gas emissions, health impacts and climate change effects of fossil fuel power generation, thereby creating market exit signals for carbon-intensive and inefficient power plants. In addition, the ETS should function as a tool to create longer-term investment signals for all available carbon abatement options.

Regional Security Coordination Initiatives should act as more regional system operators and market facilitators. A dedicated roadmap towards establishing such regional system operators should therefore be adopted. They should develop common network operation tools to ensure coordination of network operation in normal and emergency conditions, provision of network information day ahead, intraday and real-time, and all other measures to increase operational coordination between TSOs. As regards delegating responsibility to regional or even centralised bodies, EWEA urges the Commission to consider a refinement and technical differentiation of tasks and duties to be performed.

Role of DSOs: Given the fact that more electricity will be coming from distributed generators, the role of DSOs and their share of responsibility will change. This impacts less the trading of electricity but rather the different ancillary system services. Some responsibilities can be defined regionally (overlapping TSO), some can be applied on smaller scale (TSO) but still some can only be defined on the DSO level. With regards to data management,

EWEA deems that DSOs are best positioned to act as data hub in the countries where they are also responsible for operating the metering infrastructure and collecting the metering data. In such countries, DSOs have developed the necessary technological and organisational know-how to ensure a neutral and non-discriminatory access to these data (under customer consent).

7.2 Criticisms from societal organisations and NGOs

In this section we focus on criticisms from societal organisations and NGOs with main focus on consumer organisations, environment protection organisations and RES organisations. Positions reflect the opinions to the internal energy market design consultation of 2015 on the subject "price signals with a focus on scarcity pricing", "long-term contracts", "RES integration", "taxes and charges", "link between wholesale and retail prices", "ETS reform", and "energy data".

7.2.1 BEUC – The European Consumer Organisation

The Bureau Européen des Unions de Consommateurs (BEUC) is the European Consumer Organisation with the objective to defend the interests of all Europe´s consumers. It was established in 1962 by consumer organisations from six European countries. The BEUC represents 41 independent national consumer organisations from 31 European countries (EU, EEA and applicant countries) and acts as the umbrella group in Brussels. BEUC investigates EU decisions and developments likely to affect consumers, with a special focus on five areas identified as priorities by our members: Financial Services, Food, Digital Rights, Consumer Rights & Enforcement and Sustainability. Key parts of BEUC response to the EU public consultation on the new energy market design (BEUC 2015) are summarised below:

Scarcity pricing: According to BEUC retail electricity prices are to reflect the wholesale prices and price asymmetries should be prevented. In general, BEUC welcomes a market design which reflects actual scarcity, however, is concerned that some consumer groups might be negatively affected in terms of higher bills by a shift to time differentiated tariffs. Regarding regional or local pricing that reflect scarcity of available transmission capacity the BEUC fears that this might lead to socially unacceptable prices for some consumers. The BEUC therefore asks for a further analysis of the impacts of prices reflecting scarcity on the different types of household consumers and discussions with stakeholders, respectively. Besides this, the BEUC states that energy markets need to be easily manageable for consumers in order to allow them well-informed and sustainable choices. This could be achieved by setting minimum standards all over Europe,

e.g. clear and simple conditions and information for consumers that are not energy professionals. A better understanding of households' energy behaviour and willingness as well as ability to be flexible according to the BEUC is a precondition for this. At a fundamental level, consumers in vulnerable situations need to be protected and the new role of consumer to be clearly defined.

Long-term contracts and RES integration: Grouping generation capacities that use variable RES together with dispatchable capacities ("virtual power plants") can provide the necessary safeguard to participate in long-term hedging products. Long-term contracts between generators and suppliers could back wholesale price based electricity tariffs for household consumers – allowing consumers to opt for a retail electricity offer that is based on an average wholesale market price. The BEUC also points to the necessity to enable specifically small-scale RES self-generation units to participate in the balancing and intraday markets. However, the conditions of the wholesale submarkets still might not provide investment security for small-scale RES self-generation. The BEUC thus suggests to consider ways to enable the direct sale of RES electricity beyond existing power exchanges and established market places (e.g. the operator of a PV unit on a multi-storey dwelling should be able to directly market the electricity produced to residents and neighbours and a local citizens' cooperative should be able to supply its member on a regional level with cheaper electricity from their wind turbine without being forced to fully transform into a utility). This – according to the BEUC – could ensure that the economic benefits of RES are transferred to end-consumers. Long-term contracts could function as an useful tool, however, not serve as a pretext to suspend priority feed-in of RES.

Taxes and charges: The BEUC points out that consumers' small self-generation projects still need stable and specific remuneration schemes for investment security (e.g. well-designed FiTs or net metering) and that taxes and fees imposed on self-consumption need to be removed. According to the BEUC, price asymmetries mainly occur due to high concentration of incumbents, lack of competition and consequent low switching rates. Moreover, many suppliers have longer term hedging strategies for purchasing wholesale gas and electricity while cost reductions to their businesses are not necessarily passed on immediately to their customers.

RES support schemes: While the BEUC welcomes highlighting and disseminating national good practices it points out that a prescriptive approach on RES support schemes might fail to tackle the most urgent problems that consumers face when they want to become prosumers. These problems have been clearly identified in the "PV Grid" and the "2020 Keep on Track" projects and need to be solved mainly on the national level. Besides this, EU legislation,

according to the BEUC, should respect the diversity of regional RES and Member States' different approaches to mobilise their potentials in the most effective way. Forerunners should not be moderated artificially. Regional cross-border cooperation involving RES supply projects and local authorities could improve the exchange of good practice and help to reduce administrative barriers. The BEUC, however, indicates that the current relevance of such regionally integrated schemes for consumers' actual problems with their small-scale RES self-generation investment is relatively limited. Besides this, the BEUC advocates access to RES self-generation, going hand in hand with energy efficiency measures in the building sector, should also be provided for tenants.

Demand response: The BEUC points out that participation in dynamic tariffs and demand side response should be voluntary, especially for household consumers. The EU Commission should, according to the BEUC, assess the degree consumers will rely on home automation to deliver the expected benefits. Consumer representative bodies should be involved in the future policy development processes both at national and European level, in order to help policy makers to strengthen consumer interests in the energy market as well as to design retail markets where consumers are expected to participate as active players.

Energy data: In the future energy markets the relationship between consumers, especially those that become self-generators, and DSOs needs to be strengthened according to the BEUC. Consumers should have access to real as well as historical information, accurate bill, advice and easy switch where smart meters are rolled out. It is essential to ensure compliance to the data protection framework by an effective enforcement.

7.2.2 The German Renewable Energy Federation (BEE)

The Bundesverband Erneuerbare Energien (BEE) is the umbrella organisation for the German RES associations. This federation was founded in 1991 and represents the overall interests of the RES industry in the political and public sphere. Its 30 member organisations unite the sectors of wind and solar energy, biomass, water power and geothermal energy and represent a total of over 30,000 individual members and companies.

Scarcity pricing: The BEE points out, that price peaks are crucial in signalling scarcity of adequate generation capacity and demand management, or of other sources of flexibility to potential investors. Market prices should therefore be allowed to shape freely and, in particular, undistorted by regulatory or other types of caps.

Taxes and charges: The BEE points out that tapping the potential of the various flexibility options does require a thorough revision of state-imposed price

components – this however has to be done on the national level as the energy systems of Member States differ widely.
RES integration: The BEE advocates system thinking and sectoral integration to play a key role as the power sector represents only a part of the energy system. The RES integration according to the BEE needs to be incentivised by specific measures targeted at their inclusion within balancing markets, strengthening the role of CHP or incentivising self-consumption. Prerequisite for the RES integration is the reform of the EU ETS to reflect the true costs of greenhouse gas emissions and reducing the fossil-nuclear overcapacity and the minimum generation of conventional power plants.

Security of supply and capacity mechanisms: BEE states that security of supply should be considered in the European context, and not as a national issue. According to BEE, Regional Coordination Initiatives can play an important role in strengthening its regional dimension through transnational contracts, which would in turn render the introduction of capacity markets obsolete. BEE supports the development of a harmonised methodology to assess regional power system adequacy, which includes all currently coupled markets. A next step could be the inclusion of future coupled markets, so as to be able to forecast and evaluate possible interactions.

7.2.3 German League for Nature, Animal and Environment Protection

The German League for Nature, Animal and Environment Protection (Deutscher Naturschutzring - DNR) is the umbrella organisation of the German environmental NGOs. It was set up in 1950 by 15 founding members and today counts 91 member organisations. The DNR takes up issues that are of regional, national and international relevance. The main points of the response to the public consultation (DNR 2015) are summarised hereinafter:

Scarcity pricing: The DNR points out that adequate price signals, better reflecting scarcity, would make the market develop demand and supply-based solutions, while rewarding flexibility.

Long-term contracts and RES integration: According to the DNR the new market structure should be designed to provide long-term price signals and the necessary stability to trigger investments and lower the cost of capital for renewable energy. As such conditions are currently not in place for (variable) RES (stable) RES support is still needed. Besides this, the design of the market should make it possible for new actors to participate, in particular citizens and energy cooperatives. Prosumer policies should facilitate the reduction of peaks and unlock demand-side flexibility through specific programmes that could

bring new technologies to the market. The demand pattern should, as much as possible, be made to match as closely as possible the (variable) renewable production. Therefore, an expansion of demand-side management is needed, including industrial, households and prosumers as well as the roll out of smart grids.

7.2.4 Greenpeace European Unit

Greenpeace is a global non-profit organisation that aims to protect and conserve nature and to promote peace by investigating, exposing and confronting environmental abuse, challenging the political and economic powers that can effect change, driving economically responsible and socially just solutions that offer hope for current and future generations, and inspire people to take responsibility for the planet. Greenpeace European Unit is based in Brussels, from where it monitors the work of the EU institutions.

Scarcity pricing: Greenpeace advocates price signals to reflect actual scarcity and surpluses. The electricity market design should ensure that market values electricity at true cost and enables those forms of electricity with the lowest cost to enter the market and be fed into the grid first.

Long-term contracts and RES integration: Renewable electricity generation and in particular decentralised, community- and citizens-owned renewable electricity generation, as well as demand response and storage should be promoted, supported and not discriminated against. Greenpeace asks to enshrine the right to self-produce, self-consume and sell to the grid in the new market design legislation. In particular, according to Greenpeace the issue of community- and citizens-owned renewable electricity generation should form part of the imminent Commission review of the Energy Consumers' Charter and be included in the new RED. Besides this, European state aid rules should continue to allow specific aid for RES until the technologies become fully cost competitive. Long-term contracts should be limited to RES in order to ensure that Member States do not get locked into fossil fuels. With regard to the tendering for RES generation Greenpeace asks the Commission and Member States to ensure that the respective frameworks are carefully designed to achieve cost-effective expansion of RES generation. For small scale and emerging RES technologies, an alternative support system should be used.

ETS reform: Greenpeace points out that the CO_2 price reflected in the ETS is far too low. The Commission should therefore work to strengthen the EU ETS and propose additional measures, such as an Emission Performance Standard.

Taxes and charges: Greenpeace points out that decentralised energy generation, in particular community-based and small-scale RES consumption and production should be exempt from paying grid charges, tariffs, duties and value added tax.

Demand response: Greenpeace asks for a support for demand response activities through e.g. financial support for R&D and pilot projects at national and European level. Besides this, the Commission and Member States should ensure that consumers have the option to benefit from managing their own demand. Moreover, the right to choose and change providers should be expanded to include the right to choose the energy source of the purchased electricity. In order to allow demand response to participate in the energy markets and provide capacity, ancillary, balancing and security services a systematic review of market rules and regulation to allow demand response to participate on equal footing to supply is needed according to Greenpeace.

Energy data: The energy data according to Greenpeace should be managed by a public institution ensuring that various private or public service providers only have access to the information that is essential for their particular service. The management and use of the data should be guided by the same principles and logic that is behind the deployment of the meters, i.e. to maximise the economic benefits for consumers, to increase energy system security, foster energy savings and contribute to environmental protection.

7.2.5 EREF

The European Renewable Energies Federation (EREF) is the federation of national RES associations from EU Member States, representing sectors such as wind, solar, small hydro, bio-energy, tidal, wave, and geothermal. Its objective is to defend the interests of independent power, fuel and heat production from RES and to promote non discriminatory access to the energy market. The main points from the response to the public consultation (EREF 2015) are summarised below (the vision of EREF is supported by RESCoop, the European Federation for Renewable Energy Cooperatives):

Scarcity pricing: The EREF welcomes prices that reflect actual scarcity and reward flexible production and consumption. On the production side, flexibility should be rewarded for those RES that are dispatchable. On the demand side, providing advice on the offers, tariffs, financial liabilities and tools to ‘buffer’ demand such as heat storage, should be foreseen, also as a way to empower consumers. This also includes the need to reflect scarcity of available transmission capacity, to better manage transmission congestion and better identify the needs for investment. Capacity markets are not needed.

Taxes and charges: The EREF advocates identifying and removing state imposed price components that weaken or neutralise the effect of the wholesale prices, leaving consumers not interested in increasing their flexibility and increasing the overall system costs. Especially the barriers to self-consumption, such as tariffs, duties and value added taxes, should be removed. However, well-designed national RES support schemes will still be necessary due to remaining market distortions.

RES integration: RES integration would be facilitated by the existence of a level playing field with conventional generation, which is not the case as the fossil fuel industry still is the biggest beneficiary of public support. Thus, according to EREF, RES deployment needs to be incentivised by specific measures targeted at their inclusion into balancing markets, strengthening the role of CHP an incentivising self-consumption. The Guidelines on State Aid for environment protection and energy 2014-2020 with their introduction of mandatory auctions and the lack of remuneration for RES under negative prices constitute a big obstacle in this context, which is - according to EREF - both economically and ecologically imprudent.

ETS reform: With regard to the ETS the EREF highlights that it needs to adequately make power prices reflect the true cost of CO2 emissions.

EREF stresses that prosumers and cooperatives should be at the heart of the new market design, in which the rights of self-consumption and –production should be determined. In this context prosumer policies should facilitate the reduction of peaks and unlock demand-side flexibility through specific programmes bringing new technologies to the market. The market should facilitate access and participation for actors like municipalities and citizens and its governance should always include a local player, such as a city representative or a representative from a municipal energy producer. In this context priority access to the grid for local energy actors such as municipalities and communities or rather local RES projects according to EREF is essential. Besides this municipal and community RES projects often have difficulties in obtaining accurate information on the grid connection process, such as timetable for processing requests and establishing connection. In addition to this grid connection costs often are high for municipal and community RES projects because they do not have the opportunity to locate their locally bound project to the most suitable, unconstrained grid connection point. RES suppliers should be allowed to use the low voltage and distribution grid to transport electricity to his own neighbouring location where he consumes the electricity without restrictions.

Demand response: The new market design should incentivise industry, commerce and households to reduce their power demand in times of high

residual load and shift their demand. Administrative barriers to self-consumption according to the EREF are one of the obstacles to kick-start demand response and therefore a framework to facilitate self-consumption should be included in the revision of the RED based on the guidance published in July by the Commission.

7.3 Criticisms from expert organisations

In this section we focus on criticisms from a number of expert organisations. The difference with societal organisations is that these expert organisations are more neutral and independent think tanks that do not strive for some specific set of goals and policies but have a more general mission such as wanting to improve functioning of markets/economic efficiency, increase provision of public goods. Due to their expertise and different background these organisations have sometimes a different perspective.

7.3.1 International Energy Agency

The IEA is an autonomous organisation which works to ensure reliable, affordable and clean energy for its 29 member countries and beyond. The IEA has four main areas of focus: energy security, economic development, environmental awareness and engagement worldwide. The IEA conducted a review of European Union energy policy in its publication 'Energy Policies of IEA Countries – European Union - 2014 Review'. The IEA is of the opinion that the EU needs to strengthen the EU internal energy market by (amongst others):

- Further integrate EU electricity markets across borders (in particular intra-day and balancing markets) in order to enable more effective accommodation of variable RES and to enhance the adequacy of generation.
- Enlarge coordination of system operation and adequacy assessments to the level of regionally interconnected systems.
- Ensure that under market rules the value to the system of the time and location of the electricity generated is reflected in the level at which it is remunerated.
- Boost the level of interconnectivity of the EU energy network by implementing infrastructure investment into projects of common interest.
- Phase out regulated retail prices and create more competitive retail markets, with stronger consumer engagement in energy markets through demand-side response, smart meters and grids, and greater choice of products and tariffs.

For market based progression on climate and energy policy (2030 package and 2050 goal) the IEA recommends the following:

- Track all energy subsidies and reduce distortive impacts of public intervention.
- Reform the EU-ETS to reduce the surplus in allowances, enhance its responsiveness to ensure a consistent carbon price signal, and complement the EU-ETS with policies to attract critical investment in low-carbon technologies through sector-specific measures to enhance technology innovation and address non-economic barriers.
- Periodically strengthen and expand requirements for cost-effective energy-efficient buildings (including renovations), appliances, lighting, equipment, transport and district heating and cooling systems in cities, ensuring that these are enforced by member states. Quantify the multiple benefits of energy efficiency for social and economic purposes.

COR opinions:

The request to end regulated retail prices is contrary to what is stated in CDR 2182/2012 "doubts whether the proposed EC measures are satisfactory to empower consumers and to combat energy poverty and demands special focus to be given to the protection of consumers. In this respect, attention is required for the asymmetrical position of energy users vis-à-vis huge companies".

7.3.2 Clingendael International Energy Program (CIEP)

CIEP is affiliated to the Netherlands Institute of International Relations 'Clingendael'. CIEP acts as an independent forum for governments, non-governmental organizations, the private sector, media, politicians and all other interested in changes and developments in the energy sector. CIEP contributes to the public debate on international political and economic developments in the energy sector (oil, gas and electricity). CIEP contributes includes research, events, publications, comments, lectures and training.

The key opinions of CIEP from their public input on the energy market design consultation of 2015 and their report 'Reflections on coordination mechanisms':

RES support: Investments in low-carbon power generation can be incentivised in different ways. No policy instrument is a silver bullet, and interactions between policy interventions are faced with the risk that market failures could be replaced by regulatory risks. Regulatory risk is usually seen as the most important disincentive, so new risk-hedging approaches should be introduced.

One approach could be to introduce new and innovative long-term coordination mechanisms which would enable investors to come together with financiers and public entities or other interested (industrial or cooperative) consumer groups. This could be done for specific technologies, such as the contracts for differences (CfDs) as applied in the UK, or on a plant-specific basis as applied in Finland and in discussion in some eastern EU-member states. The State Aid Guidelines offer a comprehensive set of conditions for such an approach.

RES support and ETS: Strengthening the ETS seems to be an option for RES support, and has several advantages. However, this may not be sufficient to stimulate options such as offshore wind. Continuing of feed-in tariffs/premiums or CfDs may thus seem indispensable for the time being. One could also consider more radical changes by introducing CRMs, possibly in combination with a regulatory asset base. This is certainly not without problems, but could have merits as well. Finally, a bridge towards a situation with substantially higher CO_2 prices could be constructed with specific regulation, either aiming at closing old ordinary coal-fired power plants or prohibiting new ones from being built. It could make sense, however, in all cases to reflect on time frames of developing the necessary low-carbon generation. A more gradual development of the large-scale investments, combined with learning by means of technology and policy innovation, could decrease costs.

RES integration/investments in networks: Network investments take time, and with investments in generation, additional network costs are probably the largest part of increasing system costs due integrating RES. From a societal viewpoint, reconsidering the paradigm that network investments follow decisions with regards to generation could lead to a more optimal approach. Also, a further look at who causes costs and has to pay, along with introducing more flexibility in the grids (incl. demand-side integration) could decrease additional costs. More market elements can be introduced, such as on-the-day cross-border and intraday trading, innovative demand response schemes and an Operating Reserve Demand Curve. Efficient use of network grids could be further improved by transmission pricing signals with stronger locational signals. All these changes would imply different types of regulatory innovation.

Capacity mechanisms Adequacy of the system is becoming more complicated and can no longer be guaranteed per definition, as existing flexible generation is closing down and new investments in back-up are at risk. The academic literature draws no final conclusions about whether separate remuneration for capacity is needed, as a possible improvement of adequacy has to be weighed against costs. Flexibility of prices, the certainty that no price cap will be used, the further development of market coupling, intraday and balancing markets, markets for ancillary services and demand-side integration (including operating

demand reserves) do offer ample new chances but in the end may not diminish the eventual need for dedicated mechanism to stimulate back-up capacity. Before considering additional capacity remuneration, it makes more sense to improve these aspects of daily market operation. If CRMs are introduced, uncertainty will increase, as nobody knows how future politicians will implement the rules. Governments and regulators don't like to take any risk with adequacy (real or perceived). When considering the next steps, the least they could do is to do this jointly in a regional (as a group of neighbouring countries) context. That would mean that wherever the Commission is able to promote or facilitate or to enhance regional cooperation, working cross-border balancing should be a key component, where some basic fundamentals could be formulated at EU -level in a generic way (i.e. balancing obligations in a non-discriminatory way for all market parties, following the rules of the State Aid Guidelines). The Commission should then on an ex-post basis check of the regional system is in conformity with these rules.

Figure 11 gives a brief summary about regulatory and policy adaptations proposed by CIEP. Improving EU ETS and implementing the recent EU Guidelines on State Aid by changing feed-in-tariffs to feed-in-premiums would be a logical starting point. Introducing programme responsibility for all Variable Renewable Energy Sources (VRES), except maybe the smallest ones, seems inevitable to be able to deal with a larger share of VRES. A larger role for balancing and intraday markets would be a next step. Introducing and using the opportunities for demand-side integration, such as allowing larger price fluctuations is another. All these options can be implemented within the existing regulatory framework. Introducing Emissions Performance Standards (EPS) for both old and new coal-fired plants is then an important fall-back option when adequate carbon price levels are not reached. A serious reconsideration of the generation grid paradigm will have large potential benefits as well, but this cannot be implemented overnight. Finally, capacity remuneration could still become necessary, but other flexibility and adequacy options will have (much) larger net benefits. Therefore, capacity remuneration is more an option for last resort and for further consideration than for fast introduction.

Figure 11: Policy options proposed by CIEP

Basic package	To be further considered
– Improvement of ETS	*Quickly*
– Giving feed-in tariffs priority	– Generation network paradigm
– Programme responsibility for all	– EPS
– Balancing and intraday markets	*Later, if needed*
– Room for demand-side integration	– Capacity Remuneration (eventually with a Regulatory Asset Base)

Source: CIEP (2014), Reflections on coordination mechanisms.

Role of ACER/cross-border cooperation: The role of ACER should be specifically seen in the cross-border context of the wholesale markets and especially when regional approaches are becoming more important, regional cooperation at the level of the National Regulatory Authorities (NRAs) could heavily benefit from some kind of regional regulatory oversight, hence ACER. The experience in the Cross-Border Cost Allocation (CBCA) process of the Projects of Common Interests (PCIs) could be seen as a relevant example. It would mean however that the governance within ACER would allow stronger regional decision-making, maybe by giving more mandates to the ACER-director and/or amending the role of the NRAs in the process.

The internal decision-making process of the European Networks for Transmission System Operators (ENTSOs) should be more transparent, including the reactions on the market-consultations. The ENTSOs should not be given "operational tasks" that belong to their members. The need to expand the mandate of the ENTSOs is questionable.

Enhancing system adequacies (including on generation) by increasing inter-TSO cooperation on cross border levels are profiting from the Regional Security Coordination Initiatives (RSCIs). All ENTSO-E members should be obligated to participate in one of them. RSCI developments are a very useful stepping-stone to increasing cross regional TSO-cooperation, where regional responsibilities on system security would be a logical next step. The ultimate step in that process would be coordinating cross border system operation at regional levels, eventually leading to the model of a regional ISO.

7.3.3 German Institute for Economic Research, DIW Berlin

The German Institute for Economic Research (DIW Berlin) is one of the leading economic research institutions in Germany. Its core mandates are applied economic research and economic policy advice as well as provision of research infrastructure. As an independent non-profit institution, DIW Berlin is committed to serving the common good. The key opinions of German Institute for Economic Research from their public input on the energy market design consultation of 2015:

Scarcity pricing: If transmission capacity and flexibility in the power system is scarce, then price signals that reflect the time and location of scarcity are necessary for an efficient and secure operation of the power system. The success of day-ahead market coupling illustrated the benefit this can bring to the power system. The same scarcity price signals will have to be reflected by intraday and real-time transactions with the introduction of coordinated intraday auctions based on multi-part bids so as to further realize efficiency potentials and ensure

consistency of power market design across time frames. Continuous trading via a joint order book cannot deliver this price signal.

Cross border: The Net Transfer Capacity (NTC) approach of transmission allocation does not result in an allocation of transmission capacity in the network to transactions where it adds most value. A shift towards flow-based transmission allocation is a first improvement step[53]. However, the experience with the flow-based approach points to the importance of ensuring an accurate reflection of the physical network in the market model. This requires also a *reduction of the size of pricing zones*.

Long term contracts: In principle, generators and consumers would like long-term contracts, to protect generators (consumers) from low (high) wholesale prices. Such long-term contracts would reduce financing costs for investors and thus at the same time also lower electricity costs and prices. However, due to counterparty risks, mobility of households and firms, as well as EU guidelines, contracts of the necessary type and duration are unlikely to evolve without regulatory backing.

RES remuneration: It will be beneficial for consumers (lower capital cost for investors and thus ultimately cost of energy provisions) and sustainability of energy supply, if RES remuneration mechanisms replicate long-term contractual arrangements with feed-in type tariffs or contracts for differences so as to hedge all parties against volatile prices.

State aid: Technology specific (automated) adjustment mechanisms to feed-in tariffs and auctions have been successful in creating a market based tariff level for renewable remuneration. To date there is no conclusive evidence that the shift from (automated) feed-in tariff structures to auctions as means of determining remuneration levels is beneficial to the system. However, a rapid and almost simultaneous shift across Europe creates significant risks for the investment pipeline of a multi-billion industry at the core of European industrial and energy perspectives. Given the lengthy period of convergence towards market equilibria after such an imposed change, the Commission should consider revisiting the respective state aid guidelines so as to not distort and therefore strengthen the market signals during an extended transition period.

[53] The flow-based method, instead of calculating aggregated transfer capabilities per bidding zone, determines physical margins on each "critical grid element" (transmission lines which are likely to become congested) and their influencing factors. This normally allows an increase in cross-border transmission capacity where it is most needed because it more accurately reflects the actual situation on the grid.

Capabilities of ACER: It will be important that the Commission or ACER, (i) has sufficient capacity for an early involvement at technical level (so as to balance the interests of TSOs dominating the process through ENTSO-E) (ii) will ensure that any approach pursued at regional level is compatible with the physical requirements of countries outside of the region so as to allow for subsequent European wide application of solutions that are successfully advanced at the regional level, and (iii) strengthen its proprietary modelling capacity or advance open source solutions so as to enable robust evaluation of policy choices.

The dual role of ENTSO as both representing the interests of regulated national network owners and operators and serving regulatory-like functions relating to market design, might have been appropriate for a transition period in the absence of similar capacity to fulfil these functions in the public space. Any further strengthening of the role of ENTSO does not seem warranted.

The focus on "Regional operational centres [that] will have to be created, so that they can effectively plan and manage cross-border electricity and gas flows" (consultation document) indicates that institutional choices might pre-empt and dominate far more important decisions on the operational approach to short-term power markets. Large improvement potentials remain untapped and system security is at risk because current governance processes are consensus oriented and might be dominated by organized business interests of various actors in the power sector, rather than focusing on the needs of less organized European citizens and energy users. Hence an enhancement of the decision power and resources available to prepare decisions of European regulation (ACER/Commission) might be appropriate to overcome this problem. It will have to be ensured, that any strengthened institution implements the political mandate from EU 2020 strategy or Energy Union.

7.3.4 E3G – Third generation environmentalism

E3G is an independent, non-profit European organisation operating in the public interest to accelerate the global transition to sustainable development. E3G builds cross-sectoral coalitions to achieve carefully defined outcomes, chosen for their capacity to leverage change. E3G works closely with like-minded partners in government, politics, business, civil society, science, the media, public interest foundations and elsewhere. E3G has delivered input to the stakeholder consultation. Their inputs also go beyond the questions asked and call for a new institutional structure for the internal energy market with more far going changes.

E3G deem that governments and regulators play a significant role in determining certain market outcomes and ensuring a more *integrated approach*. Specifically, integration is needed along the value chain between generation, networks and demand, across borders between Member States and between the requirements of different sectors: power, heat and transport.

Furthermore, E3G deems that effective functioning of markets depends on a *coherent and stable policy environment* and an *institutional structure* that effectively delivers the required outcomes. The energy transition makes it necessary to do more than change market rules, policy coherence is needed.

Topically, more specific inputs:

Scarcity pricing: It is an important ingredient but E3G argues that delivering an 'Energy Union' with consumers at its core requires a more in-depth review of the nature of markets and institutional structure. Major changes, not minor tweaks, will be necessary to deliver such a far-sighted vision.

Policy coherence: E3G states that no amount of changes to market rules and pricing structures will matter unless the underlying political conditions are addressed that deliver policy coherence. Two issues are assessed to be of paramount importance: First, Member States should be prepared to establish clear national delivery plans and submit these to an independent body for scrutiny; secondly, they should also agree a framework to secure funding for the energy transition and define how the costs should be allocated between consumers.

Consumer's role: The current agenda of the internal energy market does not place consumers central, but focuses on level playing fields, barriers to entry, price signals. This essentially restricts participation to large or very well-informed consumers. Whilst this will deliver some improvements in market efficiency, it will fall far short of maximising the system benefits from demand side engagement and will fail to deliver the wider economic and social benefits associated with a smart, IT-enabled society. The EU ought to initiate a fundamental review of consumer-facing markets.

It should become easier for consumers to reduce costs and improve lifestyles, for this the framework for consumer choice needs changing. The right approach will inevitably vary widely from region to region and city to city, particularly as heat and transport sectors begin to converge with electricity. The EU must create a new framework that ensures consistency with the internal energy market,

should encourage sharing of best practise and allow innovation and diversity of approach at the local level.

Integrating fragmented markets: The key issue for the internal energy market is to establish a structure that makes it easy for Member States to share resources, should they wish to take advantage of these opportunities. Those aspects of the electricity market that have the potential to deliver particular cost savings are those which are typically delivered by regional independent system operators (ISOs) in other international power markets. Establishing such a structure within the IEM would have significant advantages and this should be investigated as a matter of urgency.

Obstacles to demand response: The key obstacles are primarily that the majority of consumers are not motivated by price and do not find home energy services sufficiently interesting, and second, that the technological fragmentation and lack of a reliable market opportunity make it difficult to finance businesses looking to deliver their products and services to a broad consumer base.

C*apacity markets*: It should be left to independent system operators to design a common framework or harmonized methodology for capacity markets with regional requirements and challenges in mind.