EUROPEAN ENERGY JOURNAL

Volume 8 Issue 3/4, July 2019

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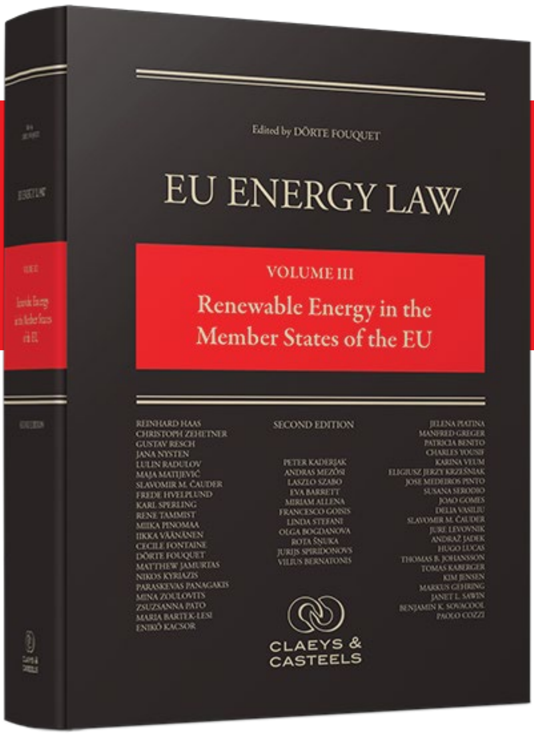
EU ENERGY LAW

VOLUME III - SECOND EDITION

Renewable Energy in the Member States of the EU



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Description

Renewable Energy has become a game changer in Europe and on the national energy markets. It has started from fairly low participation in the market in the last decade of the last century, mostly driven by traditional hydro and some biomass use, becoming the big winner in new capacity in Europe and worldwide as of to date. Nowadays, access of renewables to the market is being organized differently in the EU 28 Member States with some established patterns such as priority grid access and a majority of countries having used various feed-in mechanisms now, steered by the Directorate General for Competition of the EU Commission towards auctioning systems. We have seen progress and roll-back, legal and investor certainty or the opposite. More and more it is no longer so much about market access of renewables but about a new market design. Incumbent Energy production becomes the obstacle for system change. The coming decade until 2030 will have further barriers to jump but the pathway towards sustainability is set, with different speed restrictions in the various Member States. A look over the big pond to the United States gives further fruitful insight.

This new book Volume III - Renewable Energy in the Member States of the EU focuses from a broad perspective on the latest development in the EU Member States in the renewable energy sector as well as on energy efficiency. It also describes energy market legislation with a special focus on market design and system integration including support mechanisms, grid access, licensing, planning, auto production, interconnection, network planning and security of supply. It also elaborates on structural fund use within this sector.

EU Energy Law, Vol. III - Renewable Energy in the Member States of the EU

Nr. of Pages:	1.300
Price:	€ 295 | £ 258 | $ 364
ISBN hardback bound:	9789081690478
ISBN e-book:	9789491673283
Publication Date:	April 2018

Claeys & Casteels Law Publishers bv
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Phone: 0031 (0) 570 606100
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COLOPHON

European Energy Journal (EEJ) is a quarterly journal which presents accessible coverage on the key legal and regulatory energy issues and developments throughout Europe to practitioners and academics in the field. It reports recent and forthcoming legislative and regulatory changes in the areas of energy policy, internal market, energy competition law, energy security, energy efficiency, renewable energy and climate change. It covers European Energy Union case law, legislation and its implementation by member states. With contributions from leading practitioners, judges, EU energy authority officials and academics, EEJ provides authoritative legal analysis of the law and policy, all of which is presented in an accessible manner. Potential contributions are welcome. For more information please write, mail or phone to the publisher.

European Energy Journal is published by

Claeys & Casteels Law Publishers bv
P.O. Box 2013 7420 AA Deventer Netherlands
Phone +31 (0)570 606100
Fax +31 (0)570 606769
info@claeys-casteels.com
www.europeanenergyjournal.eu
Publisher **Aernoud J. Oosterholt**
Coordination **Thea van Dartel**
Design **studio026**
This journal should be cited as follows:
2019/3/4 EEJ

Subscription information

Four issues per subscription. Subcription price hard copy EUR 395 per year, excl. VAT / including postage and handling. Electronic editions EUR 395 per year, excl. VAT. Combination hard copy & electronic
EUR 474 per year, excl. VAT / including postage and handling. Multi user subscription fees on request.
Issue only service (order@claeys-casteels.com).
Claeys & Casteels Law Publishers bv

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ISSN 2211-9175

Volume 8 Issue 3/4, July 2019

EDITORIAL

By Johannes Reichl, Project Manager, Energy Institute, the Johannes Kepler University Linz

On the 22nd of May 2019, the last batch of legal provisions completing the *Clean Energy for all Europeans Package* (CEP) was adopted by the Council of Ministers. Ten years after setting the first binding quantitative climate and energy targets (the so called 20/20/20 targets) for all member states in the *2020 climate & energy package*, the EU has now defined a set of new rules for the provision of energy to further enhance competitiveness and improve environmental sustainability. In the ten years since these 20/20/20 targets have been set, remarkable progress has been made. However, these targets are insufficient endpoints in light of new results from climate research. Additionally, the benefits from the resulting national legislations and support schemes were not equally distributed across European regions, industry sectors and citizens with different social status. Hence, the CEP was designed to address these shortcomings, and the intensified consideration of consumer rights and distributional effects is underpinned by the EC promoting the CEP as *providing a fair deal for consumers.*

Two Directives of the CEP are particularly relevant in this respect; these are the 2018 recast of the Renewable Energy Directive (RED II Directive), and the 2019 recast of the Electricity market Directive (and the corresponding Regulation). Both of these Directives significantly strengthen the position of energy consumers, including those from the household level, and aim at making the energy transition accessible for those who might have felt left behind so far. One important step in this respect is the provision of opportunities for joining the growing club of prosumers, where membership for the majority of European households was impractical before. Certain constraints, such as the lack of a self-owned roof area, or limited household budgets, rendered participation in the energy transition possible only upon meeting limiting preconditions. Considering that e-mobility, as well as renewable generation, are subject to significant subsidies in many EU countries, while access to the subsidies is tied to these preconditions – usually associated with higher income levels – has led to an odd phenomenon of regressive subsidization in many cases.

Both aforementioned legal provisions address the challenge of opening the energy transition to a wider group of Europeans by a set of dedicated measures. As one cornerstone, the Directives regulate the participation of legal entities or individual citizens to communities producing renewable energy, potentially reducing entry barriers related to minimum required investments or the lack of suitable, self-owned premises. Such communities can potentially allow actors to jointly meet the preconditions for producing and distributing renewable energy, who would not meet such criteria individually.

In this issue, Urbantschitsch and Proidl explain the approaches of both Directives to these community concepts, and highlight aspects to be considered when transferring the Directives into national laws. Sharing experience with the Austrian law for establishing a legal base for renewable energy communities, implemented already in 2017, they then derive a set of principles any new regulation for energy-producing communities in response to the Directives should meet. While their discussion reflects their background in a regulating authority, Roberts examines the same topic from the perspective of the European federation of renewable energy cooperatives, REScoop. He assesses several critical issues that are still holding back energy communities from their potential of becoming an important building block of the EU energy system. From his analysis he derives the call for comprehensive incentive schemes to support the spread of renewable energy communities that account for their contribution to climate change mitigation and their positive impact on the acceptance of the energy transition as a whole.

Metaxas et al. add to the discussion a thorough analysis of the electricity Target Model as it has evolved from the EU's Third Energy Package since 2009. Their study starts by explaining the legal provisions on which the Target Model is based, and identifies the key factors and regulatory reforms relevant for an expanded utilisation of market coupling. While the article of Metaxas et al. analyses how the Target Model has developed over the last 10 years up to the current status, and draws attention to the potential obstacles still to be addressed, Nies investigates the development of energy policy related institutions since before the establishment of the European Union. Her contribution lists and categorises the institutional players in the European energy policy domain, including those beyond formal EU institutions, such as the Florence Forum providing input to legislation in matters of wholesale market integration, or the Covenant of Majors pushing forward the achievement of energy and climate targets on a voluntary basis. Her analysis of energy policy related institutions is concluded by identifying gaps not yet covered by the existing landscape, among these she calls for a more structured approach how the EU Internal Energy Market interacts with non-members, in particular when the UK becomes such.

Buschle and Westphal extend the scope of this issue by the dimension of energy security and its interrelation to the objective of decarbonisation. Promoting both dimensions at the same time is identified as a significant challenge for governance by the authors, and the CEP is a step in the right direction in this respect. They illustrate the interwoven nature of energy security and decarbonisation, while showing that governance schemes in the past have not accounted for the mutual dependence by sufficiently coordinated approaches. Consequently, the authors point to the need to let progress in the technological dimensions of both aspects be succeeded by innovative governance schemes that are tailored to these critical challenges.

In their contributions, Vidlička and Nenova both scrutinize the CEP against their respective background. Vidlička assesses how the CEP will impact the distribution sector in their operations, and while binding targets and new rules are evident, he ascribes the potential to trigger a mind-set change to the Directives. However, while some adaptation from distribution system operators (DSOs) will be paramount, also regulators and law makers have to respect the central role of DSOs in the Energy Union and provide regulations not hampering innovation by dynamically reacting on emerging opportunities and challenges. Nenova elaborates on new tasks and duties of TSOs to further enhance market integration and cross-border cooperation. Additional competence of TSOs is introduced in the area of adequacy assessment, where increased levels of renewables require further instruments for detecting and preparing for seasonal crisis risks and security of supply risks in the shorter term. In her concluding paragraphs, Nenova addresses the topic of TSO-DSO cooperation, a cornerstone of the CEP with respect to the creation of new models for the provision of flexibility along the chain of stakeholder: TSOs, DSOs, customers, aggregators, suppliers, traders, and other market actors.

Taken the articles of this issue together, it's safe to say that he CEP introduces the most significant changes to how the energy provision in the EU is organised since 2009. All sectors and all levels of society are affected by it, and while directly addressing energy policy in EU only, it has the potential to become a landmark of sustainable energy policy even on an international level. This issue provides analysis and viewpoints from distinguished experts of how these changes may play out.

STATE OF PLAY OF ENERGY POLICY DOSSIERS

By Alex Wilson, Policy Analist, European Parliament [01]

INTRODUCTION

The Austrian Presidency of the Council of the EU (July-December 2018) concluded with several achievements in the energy field. Revised EU directives on the promotion of renewable energy sources and on energy efficiency, as well as a new regulation on governance of energy union, were all endorsed by the Parliament and the Council, becoming part of European law after their publication in the Official Journal of the EU on 21 December 2018. In that same month, four trilogue agreements on electricity market design were concluded between the European Commission, the European Parliament and the Council of the EU. The agreed texts on electricity markets were endorsed by the Parliament and the Council in early 2019, completing the adoption of the Clean Energy package (originally proposed by the Commission in November 2016), which broadly sets the framework for the EU's energy and climate policies over the 2021-2030 period.

A notable achievement of the Romanian Presidency of the Council of the EU (January-June 2019) was to have secured a trilogue agreement in February 2019 on a targeted revision of the 2009 Gas Directive, that extends its legal jurisdiction to encompass pipelines between the EU and third countries. Originally proposed by the Commission in November 2017, the Council only adopted its negotiating position (known as 'general approach') in February 2019, due to strong resistance from some member states. The Council's general approach was swiftly followed by a single round of trilogue negotiations that concluded positively. The agreed text was endorsed by the Parliament on 4 April 2018 and now needs to be endorsed by the Council before it can become part of European law.

[01] See EEJ legislative state of play Volume 8 Issue 1.

CLEAN ENERGY PACKAGE *(30 NOVEMBER 2016)*

Energy Efficiency Directive

This Commission proposal to revise the 2012 Energy Efficiency Directive set a binding EU-wide target of at least 30% energy efficiency improvements by 2030. Whereas Council adopted its general approach in June 2017, Parliament adopted a plenary resolution outlining its negotiating position in January 2018 (2016/0376/COD, EP rapporteur Miroslav Poche, S&D, Czech Republic). Council broadly supported the Commission proposal but sought more flexibility for member states, while Parliament pushed for a more ambitious binding minimum target of 35% efficiency improvements, together with more stringent provisions on annual energy savings obligations.

Trilogue negotiations started in February 2018 and concluded with a provisional agreement on 19 June 2018. The agreement set an indicative EU target of 32.5 % efficiency improvements by 2030, to be realised through 0.8 % of real annual energy savings between 2021 and 2030. The 32.5 % target will be reviewed by the Commission in 2023 to take into account any significant cost reductions resulting from economic or technological changes. The headline target could then be raised (but not lowered). The revised EED will include a mandatory requirement for member states to use a share of their efficiency measures to help vulnerable customers, including those suffering from energy poverty. Council and Parliament formally adopted the agreed text in autumn 2018, and it was published in the Official Journal of the EU on 21 December 2018. member states have to transpose all of its provisions into their national law by 25 October 2020 at the latest.

Energy performance of buildings

The revised Energy Performance of Buildings Directive (2016/0381/COD, EP rapporteur Bendt Bendsen, EPP, Denmark) was published in the Official Journal on 19 June 2018 and entered into force on 9 July 2018. The text agreed in 2017 trilogue negotiations was endorsed by the Parliament on 17 April 2018 and by the Council of Ministers on 14 May 2018, and signed into law on 30 May 2018.

This targeted revision of the Buildings Directive focuses on developing longer term strategies for energy efficient building renovations; introducing electromobility parking and charging requirements in new or renovated buildings; improving the existing provisions on inspections of heating and cooling systems; and finding ways to improve energy performance through better use of technologies. It entered into force on 9 July 2018.

Energy from renewable sources

The Commission proposed a recast of the 2009 Renewables Directive, in order to set a binding EU-level target of at least 27% share of renewable energy sources (RES) in final energy consumption by 2030. The Commission proposal also addressed the empowering of consumers and renewable energy communities, and modified the sustainability criteria for biofuels. Council adopted its general approach on 18 December 2017, which supported the Commission's 27% target. Parliament adopted a plenary resolution on 17 January 2018 (2016/0382/COD, EP rapporteur José Blanco López, S&D, Spain) calling for a more ambitious 35% EU target as well as a binding 12% target for the transport sector (where use of renewable sources is patchy and below target). Trilogue negotiations started in February 2018 and concluded with a provisional agreement on 14 June 2018.

The provisional agreement set several RES targets to be met by 2030: a binding 32% EU target for RES; a 14 % target for RES in the transport sector; a 3.5% share of advanced biofuels and biogas (with an interim target of 1% by 2025); and a 7% cap on the share of first-generation biofuels in road and rail transport. The recast directive also plans to phase out the use of palm oil and other food-crop biofuels that negatively impact on CO2 emissions, by means of a certification scheme. Consumer rights to RES self-consumption are strengthened, the 'energy efficiency first' principle is to become a guiding one, and an indicative annual increase of 1.3% for RES in heating and cooling is introduced. Council and Parliament formally adopted the agreed text in autumn 2018, and it was published in the Official Journal of the EU on 21 December 2018. member states have to transpose all of its provisions into their national law by 30 June 2021 at the latest.

Governance of the Energy Union

The Commission proposal for a new Regulation on the Governance of the Energy Union aims to establish an integrated monitoring and reporting framework, in order for the EU and its member states to deliver on their 2030 climate and energy policy goals. Whereas Council adopted its general approach on 18 December 2017. Parliament adopted a plenary resolution on 17 January 2018 (2016/0375/COD, joint ITRE/ENVI rapporteurs: Claude Turmes, Greens, Luxembourg; Michele Rivasi, Greens, France). Trilogue negotiations on this file started in February 2018 and concluded with a provisional agreement on 20 June 2018.

The provisional agreement foresees that the first integrated plans will be finalised by 31 December 2019 and cover the period 2021-2030. Subsequent plans would also cover 10-year periods. The plans should include assessments of the number of households facing energy poverty, together with an indicative objective (and related measures) to reduce energy poverty where this is a significant problem. member states must have submitted draft plans by the end of December 2018. The Commission has to assess these draft plans and make recommendations or adopt remedy measures where it considers that insufficient progress is being made or not enough actions are being undertaken to reach agreed EU goals. The plans will include long-term strategies setting the policy vision until 2050, and measures towards greater regional cooperation. Council and Parliament formally adopted the agreed text in autumn 2018, and it was published in the Official Journal of the EU on 21 December 2018, entering into force three days later.

Common Rules for the internal market in electricity

The Commission's proposed recast of both the 2009 Directive on Common Rules for the Internal Market in Electricity (2016/0380/COD) and the 2009 Electricity Regulation (2016/0379/COD) seeks to modernize the general framework of electricity markets in Europe, with the aim of improving competitiveness and flexibility in an increasingly decentralized electricity system. Meeting the EU's climate targets will require a further increase of RES-generated electricity, which will necessitate new solutions in terms of grid balance management, such as better use of ICT. Financing the energy transition is also addressed.

The Council adopted its general approach on 18 December 2018. The European Parliament's ITRE Committee adopted a report on 21 February 2018, which was endorsed in the plenary session on 28 February 2018. The ITRE committee rapporteur for both files was Kariņš Krišjānis (EPP, Latvia). Trilogue negotiations started on 27 June 2018 at the end of the Bulgarian Presidency. Further rounds of negotiations took place under the Austrian Presidency, with an agreement finally secured on 19 December 2018. The agreed texts were endorsed by the Parliament on 26 March 2019 and now need to be endorsed by the Council before they can enter into force as part of European law.

European Agency for the Cooperation of Energy Regulators (ACER)

This Commission proposal would repeal and replace the 2009 ACER Regulation, reflecting the new tasks attributed to ACER by existing and proposed EU legislation, including the above changes to electricity markets in the Clean Energy package. The new regulation would also include provisions on partially financing ACER through own resources. The Parliament's ITRE Committee adopted a final report on 21 February 2018 (2016/0378/COD, rapporteur Morten Helveg Petersen, ALDE, Denmark), which was endorsed in the plenary session on 28 February 2018. The Council agreed a general approach on 11 June 2018. Several rounds of trilogue negotiations took place under the Austrian Presidency, with an agreement reached on 11 December 2018. The agreed text was endorsed by the Parliament on 26 March 2019 and now needs to be endorsed by the Council before it can enter into force as part of European law.

Risk-preparedness in the electricity sector

The Commission proposal for a directive on risk-preparedness in the electricity sector would repeal and replace the 2005 Directive on the subject. It would establish a common methodology for assessing crisis scenarios, implement regular monitoring of security of electricity supply as well as pre-planned and coordinated reactions during an eventual crisis. The Council adopted its general approach on 5 December 2017.

The Parliament's ITRE committee adopted its final report on 21 February 2018, which was endorsed in the plenary session on 28 February 2018 (2016/0377/COD, rapporteur Flavio Zanonato, S&D, Italy). Several rounds of trilogue negotiations took place under the Austrian Presidency, with an agreement reached on 5 December 2018. The agreed text was endorsed by the Parliament on 26 March 2019 and now needs to be endorsed by the Council before it can enter into force as part of European law.

REVISION OF THE GAS DIRECTIVE *(8 NOVEMBER 2017)*

The Commission proposed a targeted revision of the 2009 Gas Directive ('common rules for the internal market in natural gas') that would make its main provisions fully applicable to pipelines between the EU and third countries (2017/0294/COD). The revised gas directive was not foreseen in the original Energy Union strategy, but rather emerged from discussions concerning the project to double the capacity of the Nord Stream gas pipelines between Russia and Germany (known as Nord Stream 2), and the particular issues this project raises with regard to the EU single energy market and security of gas supply.

In Parliament this file was allocated to the ITRE committee, whose chairman was appointed rapporteur (Jerzy Buzek, EPP, Poland). Mr Buzek delivered a draft report in December 2017. The final report was endorsed by the ITRE committee on 21 March 2018 after amendments (41 votes in favour, 13 against, 9 abstentions), and was formally approved as a plenary resolution in April 2018, together with a mandate to enter into trilogue negotiations. The plenary resolution was broadly supportive of the Commission proposal but also suggested more stringent and time-limited requirements on derogations and exemptions, as well as an accelerated process of transposition into national law.

In the Council this file was discussed several times in the Working Party on Energy, in COREPER meetings, and at the level of energy ministers (18 December 2018). However, a general approach proved elusive because of the political and legal concerns of several member states. A general approach was finally adopted on 8 February 2019, when a compromise was reached that would make the country of first interconnection primarily responsible for application of EU law on third country pipelines, and provide clearer terms for derogations and exemptions. This was followed by a single round of trilogue negotiations on 12 February 2019 that resulted in a provisional agreement among the EU Institutions.

The agreed text was endorsed by the Parliament on 4 April 2019, and now needs to be endorsed by the Council before it can enter into force as part of European law.

TACKLING THE ENERGIEWENDE ONE ENERGY COMMUNITY AT A TIME

By Wolfgang Urbantschitsch, Executive Director, E-Control, and Harald Proidl, Head of Renewable Energy and Energy Efficiency, E-Control

Promoting the development of renewable energy sources (RES) is one of the main goals of the European Union. It is often surrounded by buzzwords like smart meters, smart grids, prosumers, decentralisation, etc. All of these stand for new technologies and solutions that are meant to optimise integration of RES into the market and to provide local generation and demand. The idea behind taking the local approach is to increase consumer visibility and acceptance of RES. In the past, local energy solutions could not grow beyond individual projects, mainly because the market models for electricity offered only limited options for local energy distribution. The European Commission decided to amend this situation and to set up new rules that boost local energy systems. Both the new Renewables Directive (RED II) and the recast Electricity Directive provide a new framework for energy communities; while the RED II talks about "renewable energy communities" (RECs), the recast Electricity Directive defines the term "citizen energy communities" (CECs). In this article, we discuss the idea of energy communities as part of the electricity market from a regulator's perspective.

THE STARTING POINT

Austria is a member of the UCTE area, where TSOs are generally responsible for electricity highways and for maintaining a stable 50 Hz frequency. Unlike gas pipelines, the electricity grid cannot store energy; if supply and demand do not match, the frequency drops or rises. Outside of a narrow margin, this can damage supply and demand units or even cause blackouts. The entire electricity market has developed around this fundamental principle.

The market model is directed towards maintaining the fragile balance between demand and supply to safeguard secure system operation. In Austria, this is achieved by way of balance groups, i.e. virtual groups that require and incentivise their members (mainly suppliers) to balance their portfolio themselves. They have to provide their customers with the amount of electricity needed when it is needed; any deviations are penalised by way of imbalance fees.

Over the last 20 years, the development of the electricity market was marked by liberalisation and unbundling. Trade and sale were liberalised and competition was introduced; at the same time, the old corporate structures were split up, separating competitive branches from the monopolistic system operator function. The result was an electricity market model whose structure had clearly delimited market participants with specific rights, tasks and duties. In spite of market opening, the electricity sector remained heavily centralised, dominated by big players and local incumbents. But things are changing. Slowly but surely, the old structures are dissolving. Innovative companies enter the market, using digitalisation and new technologies to offer new products and services. Often, they have a different take on supplying electricity, e.g. focussing on jointly used generation units and/or the direct sale of locally produced energy. We could imagine residents of an apartment building jointly using a PV rooftop unit. In another case, the operator of a PV unit could use a privately owned cable to supply energy to a neighbour on the other side of the property line. Or, in an even more advanced example, the electricity generated at a PV installation could be sold to a buyer at a completely different location. In the past, such examples quickly ran into two types of constraints:

- The legal and regulatory framework limited the options for alternative electricity supply.
- Such models were often not competitive and could not provide a feasible business case under the applicable rules.

Since then, it has become apparent that digitalisation and new technologies can only be effective if the framework is modernised so that new generation and sales models are enabled. Following this line of thinking, the recast directives for renewables and electricity now require member states to change their systems and legislation so that energy communities can be set up.

The two directives have the same goal and follow similar approaches. The differences between them might appear to be small, but from a regulator's perspective, they could be fundamental.

THE RED II

The new directive on the promotion of the use of energy from renewable sources (2018/2001) addresses renewable energy communities in Article 22, stating that member states *"shall ensure that final customers [...] are entitled to participate in a renewable energy community while maintaining their rights or obligations as final customers"*. Even private undertakings can participate, as long as the REC does not constitute their primary commercial or professional activity.

RECs are entitled to produce, consume, store and sell renewable energy, including through renewables power purchase agreements. The RED II extends to all renewable energy sources.

On top of the Article 22 entitlement, member states have to implement rules that support and promote RECs. For instance, DSOs must cooperate with RECs to facilitate energy distribution within the RECs (which does not free member states of their obligation to ensure that all market participants receive all information in a non-discriminatory manner and that all rights and obligations are upheld). RECs should also receive special consideration under another major element of the RED II: the design of support schemes. Crucially, RECs are not to be put at a disadvantage compared to other market participants when support is awarded.

THE ELECTRICITY DIRECTIVE

The RED II is not alone in promoting energy communities. The recast Electricity Directive addresses them as well but calls them citizen energy communities (CECs). A CEC *"has for its primary purpose to provide environmental, economic or social community benefits to its members [...] or to the local areas where it operates rather than to generate financial profits. [It] may engage in generation, including from renewable sources, distribution, supply, consumption, aggregation, energy storage, energy efficiency services or charging services for electric vehicles or provide other energy services to its members or shareholders"*.

CECs, as opposed to RECs, are meant for electricity only. From a regulator's point of view, CECs are broader in two main respects: they are not limited to a particular location/area, and member states can grant them the right to manage a distribution network in their area of operation.

RECs	CECs
▪ focus on local level ▪ citizens can jointly use RES (not limited to electricity from RES) ▪ RECs can participate in all relevant markets (directly or via aggregators) ▪ RECs must be considered in relevant support schemes ▪ RECs meant to increase acceptance of RES and reduce energy poverty	▪ similar to RECs but without local constraints ▪ electricity only ▪ CECs can participate in all relevant market places. In addition: balancing responsibility ▪ Very important: CECs may operate distribution grids themselves

Table: Summary of differences between RECs and CECs

THE OVERALL CHALLENGES

This kind of transformation can produce winners and losers. With energy communities, no matter how they are designed, the winners should be society and the economy as a whole: use of renewables is optimised and they are better integrated into the market. Local acceptance and the Energiewende are promoted, mitigating the "not in my backyard" mentality by having members of the community benefit from local production.

The losers of the energy community approach could be suppliers and their shareholders: they might sell less electricity, though they could also establish new business models in combination with RECs. Also, RECs will impact all consumers of electricity, in this case mainly households: if the amount of electricity taken from the grid decreases but the overall costs of the grid stay the same, network charges will rise.

THE CHALLENGES FOR AUSTRIA

In 2017, Austria laid the legal basis for a forerunner of the energy community: the "gemeinschaftliche Erzeugungsanlage" or community generation plant (section 16a of the 2010 Austrian Electricity Act). Residents of multi-party dwellings are enabled to jointly use a generation plant, for example a PV installation on the roof or a micro CHP plant. The cornerstones of this kind of energy community are as follows:

- Electricity can be divided between the members of the community based on a static or dynamic model.
- Smart meters are a prerequisite.
- There is a designated party responsible for representing the community.
- The members' rights and obligations stay the same, especially the freedom to switch suppliers.
- DSOs are responsible for metering and know how the electricity is shared amongst members (static/dynamic).
- The generation plant is linked to the building's main connection, i.e. it is not considered to be part of the public grid in this model.

The community generation plant model has taught us that property and tenancy rights are an obstacle to installing new plants, especially on existing buildings: this requires a unanimous decision of all owners in a multi-party dwelling. Also, the question of economic feasibility is problematic, particularly if it is not clear who will participate in the scheme, and for how long. It comes as no surprise, then, that the model is mainly used for new buildings. These insights will feed into the current process, as transposition of the RED II is prepared. This will essentially be achieved by way of a dedicated RES act, replacing our previous Green Electricity Act and extending also to the promotion of renewable gas to be fed into the grid and to guarantees of origin. Most likely, RECs will also be part of this RES act. In a second step, the Austrian Electricity Act will be amended, and we expect CECs to be part of that process.

REQUIREMENTS FROM A REGULATOR'S PERSPECTIVE

A regulator's core function is to regulate the grid, and in this to weigh the advantages and drawbacks of each element of the electricity market model against each other. We follow the polluter-pays principle, i.e. costs should be paid by those who cause them.

Considering this, the following basic tenets are key for regulating energy communities:

- Consumers must continue to have their own metering point.
- Consumers can still choose their supplier and can switch suppliers autonomously.
- Operation of the grid and metering are done by the relevant DSO.
- Everybody who is connected to the public grid has to pay all related grid charges.
- Market rules and market mechanisms must not be undermined.

Energy communities must not have any negative effects on security of supply or quality of supply; whoever operates a grid is responsible for maintaining and servicing it. Also, the existing rules in terms of business risk and liability should apply to energy communities just like they do for any other market player.

The following points should be taken into account when implement RECs:

- The transformer of the local grid could be seen a natural boundary for RECs.
- A limitation regarding installed capacity could be implemented.
- It is not foreseen that RECs operate their own gird.
- To provide an economic incentive, a special grid charge could apply. Such a "local grid charge" for RECs could exclude the costs of the higher-level grid, i.e. it could be lower than the regular grid charge. This would reflect the advantage that local production and consumption represent for the grid.

CONCLUSIONS

Considerations around marketing electricity onsite are not new, and while the current electricity market model does not prohibit this, the applicable rules and requirements are so strict that endeavours of this kind often become uneconomical. The potential of and interest in energy communities is difficult to evaluate but will strongly depend on the applicable regulatory framework. Under a strict regime, the model most likely to emerge is a combination of PV installations and storage. To enable more extensive applications, a special grid charge for local consumption including the use of the public grid should be considered.

As a regulator, we believe that RECs along the above lines would be feasible from a legal, technical and organisational point of view. CECs will be considerably more challenging, especially if a member state allows them to develop and operate their own grid. CECs would also, in principle, be compatible with transferring or directly supplying electricity e.g. using a blockchain mechanism, without any restrictions regarding location or timing – and this would immediately raise a number of questions: what grid charges apply, and how are they paid? Who pays taxes and duties? Who is responsible for metering supply and demand and how? How does this model combine with the balance groups we use in Austria? Who even has balancing responsibility? And what kind of power plants can participate in a CEC?

In conclusion, new instruments for the development, integration and acceptance of renewables are needed. Technological development has provided us with options, but some of them are not yet profitable. Legal and organisational implementation will be a major challenge. Again, it comes down to striking a balance: enabling new technological solutions and further expansion of renewables must be weighed against safe, reliable and affordable electricity supply for all customers.

WHAT ENERGY COMMUNITIES NEED FROM REGULATION

By Josh Roberts, Advocacy Officer, REScoop.eu

INTRODUCTION

The clean energy transition poses many challenges and opportunities for society. At the higher political levels in Europe, political paralysis prevents appropriate ambition from materializing. Increasingly, therefore, citizens are taking matters into their own hands. Together, technological advances and decreasing costs of uptake are allowing citizens to becoming active participants in the energy transition – both individually and together through communities.

Community energy initiatives, often using co-operative and other social-enterprise legal forms that integrate open, democratic, and non-commercial ownership and governance principles, have grown steadily over the past 30 years. Such initiatives, particularly in the area of renewable energy production, have operated at national level without targeted policy support from the European Union (EU). However, due to increasing market integration of renewables and other clean energy technologies, community initiatives risk being locked out of the market.

With the conclusion of the *Clean Energy for All Europeans* Legislative Package (CEP), these 'non-commercial' market actors, officially defined as 'citizen energy communities' (CECs) and 'renewable energy communities' (RECs), are now guaranteed a place in Europe's Internal Energy Market (IEM). Nevertheless, energy communities are a brand new concept in many countries. As member states begin to revise their laws and regulations in order to comply with the CEP, many details will be left to national decision makers. This paper aims to provide recommendations on how national regulations must support the development of energy communities so that they can realize their potential and contribute towards social innovation in Europe's energy transition.

ENERGY COMMUNITIES – WHAT ARE THEY AND WHY DO THEY NEED SUPPORTIVE REGULATION?

To appreciate why energy communities need specific legal recognition and regulatory support, it is important to understand what they are and how they differ from other traditional energy market actors.

What do energy communities do?

Energy communities come in various shapes and sizes, and engage in any number of energy related activities. Historically, most energy communities have produced electricity from renewable energy for export to the grid. In Denmark, for instance, energy communities have performed this activity since the 1970s when groups of citizens collaborated to build the first wind turbines. Communities usually form at the local level, including inhabitants that are impacted by the project. These projects vary between full community ownership and co-ownership between citizens and professional developers.

Some energy communities have professionalized and can provide other energy-related services to their members, for instance retail electricity supply. These energy communities often aim to own enough local renewables production to be capable of providing all the electricity supply needs of their members. Some energy community suppliers, such as Enercoop in France, also buy renewable energy produced by smaller energy communities.

Increasingly, energy communities provide energy efficiency services to their members and the local community. This includes providing online platforms for monitoring consumption, education, training, and information initiatives to support investment in renovations and other actions that help reduce energy consumption. Increasingly, energy communities use profits from renewable energy production to fund energy efficiency initiatives aimed to help vulnerable and energy poor members.

A small number of energy communities own or manage power distribution systems or district heating networks. In Denmark, out of around 400 smaller district heating networks, 340 are consumer-owned through co-operatives.[01] Most of these networks are very old and exist in rural areas. This is due to the fact that in the early 20th century people had to develop their own networks, because there was no utility or capable municipal government to invest. A very small number of energy communities, particularly in Germany, have become owners of their local distribution grid by winning a local concession tender.

Finally, as technology develops and becomes cheaper, many energy communities are now looking into renewables self-production and consumption, sharing locally generated energy (e.g. through peer-to-peer trading), storage, demand response, balancing, aggregation of different distributed community energy resources into 'virtual power plants', and ownership and operation of micro-grids.

Distinguishing energy communities from other market actors

From an organisational perspective, energy communities represent a different type of market actor unique to the energy system. These differences stem from the motives that drive citizens to set up energy communities, and 'how' they organize the activity – that is, through a legal entity that incorporates particular principles around participation, ownership and decision-making.

Energy communities have a non-commercial purpose

An energy community exists primarily to provide social innovation rather than the distribution of profits. Revenues or profits from economic activities may be foreseen, particularly if the energy community produces and exports renewable energy. However, instead of being distributed to the shareholders, profits are

[01] Herbemont, S, and Roberts, J (2019). *Final Report on Best Practices and Legal barriers for supplying REScoops and promoting energy efficiency*, for the H2020 REScoop Plus Project, p 9.

reinvested in the activities of the energy community, providing services to members, or undertaking socio-economic initiatives that benefit the local community (e.g. education, investment in local infrastructure, funds to address energy efficiency or fight energy poverty, creation of solidarity schemes to help vulnerable members pay their bills, and construction of social housing). Correspondingly, the participants in an energy community, particularly in co-operatives, often accept a lower level of return on investment.

Energy communities operate according to different ownership and governance principles

Due to their specific purpose, energy communities operate unique ownership and internal governance structures, namely around:

- **Membership:** Participation focuses on economic participation (i.e. ownership). As such, members are entitled to participate in strategic decisions and direction over the community, including where and how benefits are distributed, to receive services from the community, and a return on investment.
- **Open and voluntary participation:** Energy communities do not discriminate against individuals that wants to join, and membership is open to anyone that is willing to undertake the responsibility of becoming a member. Likewise, subject to internal rules designed to ensure fiscal stability, members are able to leave if they choose.
- **Governance/decision making:** Internal decisions are based on democratic governance (i.e. equal decision-making rights for all members), regardless of the amount of investment. Furthermore, decision-making 'autonomy' is ensured so that the collective will of the members is not compromised due to the investment or decision-making power of one or a small group of individual members, or outside business partners.

These characteristics are reflected in the statutes of the energy community, and the use of specific ownership models. In Europe, a number of different legal forms have been used including, but not necessarily limited to: co-operatives, partnerships, companies with a community interest, foundations, non-profit organisations, social enterprises, and associations.[02] Cooperatives in particular embody these characteristics, which have their foundation in the seven International Co-operative Alliance (ICA) Principles, or 'Rochdale Principles'.[03]

The seven ICA principles of co-operatives:

1. Voluntary and open membership
2. Democratic member control
3. Member economic participation
4. Autonomy and independence
5. Education, training and information
6. Cooperation among co-operatives
7. Concern for community

The ICA principles can be integrated into any legal form, not just into the legal form of a co-operative. For instance, the European Federation of Citizen Energy Co-operatives (REScoop.eu), which has about 1,500 members across 12 different EU member states, represents co-operatives that perform a range of activities.[04] While its members reflect a range of legal forms, they are all committed to the ICA Principles.

Unique challenges operating in the market

While the characteristics of energy communities allow them to excel in driving social innovation, they also pose challenges when it comes to participating in the market.

First, the governance model utilized by energy communities presents challenges to decision-making efficiency. Commitment to democratic governance makes taking decisions within the energy community more complex. As such, energy communities are slower movers compared to experienced companies. This can place energy communities at a significant

[02] *See* Roberts, J, Bodman, F, Rybski, R (2014). *Community Power: Model Legal Frameworks for citizen-owned renewable energy* (ClientEarth: London), pp 16-28.
[03] International Co-operative Alliance. *Cooperative identity, values and principles*. Available at: https://www.ica.coop/en/cooperatives/cooperative-identity.
[04] *See* https://www.rescoop.eu/federation.

disadvantage when, for instance, new grid capacity for additional generation becomes available.[05]

Energy communities also experience difficulties raising finance. Because energy communities are generally initiated locally, raising money from local citizens and businesses can be challenging. These challenges are greatest during the preliminary stages of developing a renewables project, where finance is needed for feasibility studies, bank guarantees, or a grid connection. Moreover, the use of alternative legal forms can make it difficult to access finance from mainstream banks or lending institutions.

Energy communities are often driven by dedicated individuals that may or may not have expertise in the energy field. Because of their start-up nature, they often rely on limited paid staff or volunteers. Furthermore, because of their local nature, energy communities are unable to take advantage of economies of scale in the same way as larger market actors.

Furthermore, because they often lack experience or human resources, energy communities often experience difficulties navigating complex administrative procedures (e.g. obtaining necessary permits, licenses, and grid connection approvals).[06] In particular, the lack of professionalization can make engaging with distribution system operators or regulators difficult.

Lastly, communities are often disconnected from national level decision makers. This leaves energy communities at a significant disadvantage compared to well-resourced companies when it comes to influencing development of energy policies.

Growing pains – impacts of market integration of renewables

Despite their unique challenges, the number of energy communities has grown in various member states. This growth has been possible largely due to operational support afforded to electricity generated from renewable energy sources, in particular feed-in tariffs (FiTs). Due to simplicity of administration and investor certainty, fixed price FiTs have been the most effective option for supporting community energy, and have generally been associated with large growth of energy communities and other citizen initiatives in member states such as Germany.[07]

However, as the EU and member states have shifted towards market-based approaches to renewables support and the removal of FiTs, energy communities have struggled to keep up. It is well known that auctions/tenders pose significant barriers to participation from smaller players.[08] However, because of their unique characteristics, energy communities have found it particularly hard to operate in tenders. Energy communities are unable to spread higher risk across multiple projects, because they have a very small or non-existent portfolio of projects to hedge risk against. Furthermore, communities are unable to shoulder the risk of financing sunk costs for feasibility studies, permits, and other administrative procedures and participation criteria without certainty of success.

Perhaps the best example of the challenges that energy communities experience with in competitive bidding comes from Germany. In its 2017 Renewable Energy Act (EEG), Germany moved towards a tendering process for new onshore wind and solar PV projects above 750 kW.[09]

For wind projects, to make sure that citizen initiatives were not crowded out by the move to tenders, the EEG established a definition that contains specific yet broad criteria, and special rules for "citizens' energy companies."[10] A citizens' energy company can take any legal form as long as it meets the criteria. Therefore, an energy co-operative (or 'Genossenschaften', which is the name of the legal form for co-operatives in Germany) is just one way to set up a citizen energy project.

[05] Ofgem (2014). Community Energy Grid Connections Working Group report to the Secretary of State (July 2014), p 4.
[06] *Ibid.*
[07] Roberts, J (2015). *Promoting citizen participation in the energy transition: recommendations for an EU legal framework to support community energy* (ClientEarth: London).
[08] Ecofys (2013). *Design features of support schemes for renewable electricity, Task 2 report* within the European Project "Cooperation between EU MS under the Renewable Energy Directive and interaction with support schemes"; IRENA (2015). "Renewable Energy Auctions: A Guide to Design"; and AURES (2016). "Recommendations on the role of auctions in a new renewable energy directive".
[09] Renewable Energy Sources Act (EEG 2017), Division 2, Section 22, paragraphs 2-3 (English Translation).
[10] EEG 2017, Section 3, paragraph 15, and Section 36g.

In the first three rounds of bids, 97 percent of successful bids came from projects that were legally eligible to be considered citizens energy companies. However, because of the high number, it was doubtful that all these projects were really ground-up initiatives driven by the local community. After assessing the individual projects in detail, it was shown that nearly all of these projects were established by bigger market players, whereas only eight projects could be considered a real citizen energy project.[11]

For solar PV, the situation was much different. Unlike for wind projects, there were no preferential conditions developed for community solar projects. Out of eight bidding rounds, there were 11 bids by co-operatives, representing 1.35 per cent of the total bids. Of these 11 bids, only two were successful – both occurring in the third round. All of these bids were submitted in the first four rounds, meaning that co-operatives declined to participate in the subsequent rounds. This demonstrates that co-operatives concluded it was not possible to compete in the bidding process, and were therefore excluded.

The above suggests that in order for energy communities to have a secure place in the IEM, policies and regulations need to carefully acknowledge, and take into account, their peculiarities.

THE LEGAL PRINCIPLE OF EQUALITY - THE NEED TO REGULATE ENERGY COMMUNITIES AS A 'DIFFERENT' TYPE OF MARKET ACTOR

The different way that energy communities organize, and the inherent challenges they face to participate in the market justify acknowledgment as a class of economic actor in need of special considerations when it comes to regulation.

Under the general principle of 'equal treatment', EU law prohibits "treating similar situations differently and treating different situations in the same way, unless there are objective reasons to do so."[12] If a particular market actor, or class of market actor, is in a sufficiently different factual and legal situation from other market participants, they should be subject to different national regulatory requirements unless justified by an overriding objective reason. Likewise, where actors are in sufficiently different positions or situations, different treatment is not considered discriminatory.[13]

This interpretation of the principle of equal treatment has been adopted by the Court of Justice of the EU (CJEU). In *Paint Graphos Soc. coop. arl*,[14] the CJEU determined that certain tax exemptions afforded to co-operatives did not distort competition within the meaning of Article 87(1) of the Treaty establishing the European Community (EC), as long such exemptions were consistent with the principle of proportionality. This was due to the fact that co-operatives are not in a comparable factual or legal situation as commercial companies. This conclusion was supported by the fact that co-operatives conform to principles that clearly distinguish them from other economic operators, in-

[11] Fraunhofer-Institut ISI & IEE, Institut für Klimaschutz, Energie und Mobilitat (IKEM) (2018). *Vorbereitung und Begleitung bei der Erstellung eines Erfahrungsberichts gemäß § 97 Erneuerbare-Energien-Gesetz*, Teilvorhaben I, Querschnittsvorhaben, Wissenschaftlicher Gesamtbericht, Anhang, p 2.

[12] *VEMW and Others* (Case C-17/03) [2005], ECR I-4983, paras. 41-48; and *Citiworks AG* (Case C-439/06) [2006] ECR I-3913, para. 42.

[13] Kruimer, H (2014). *The Non-discrimination Obligation of Energy Network Opreators: European Rules and Regulatory Practice*, p 275 (Intersentia: Cambridge).

[14] *Paint Graphos Soc. coop. arl.* (Joined Cases C-78/08 to C-80/08) [2011] C 311/06.

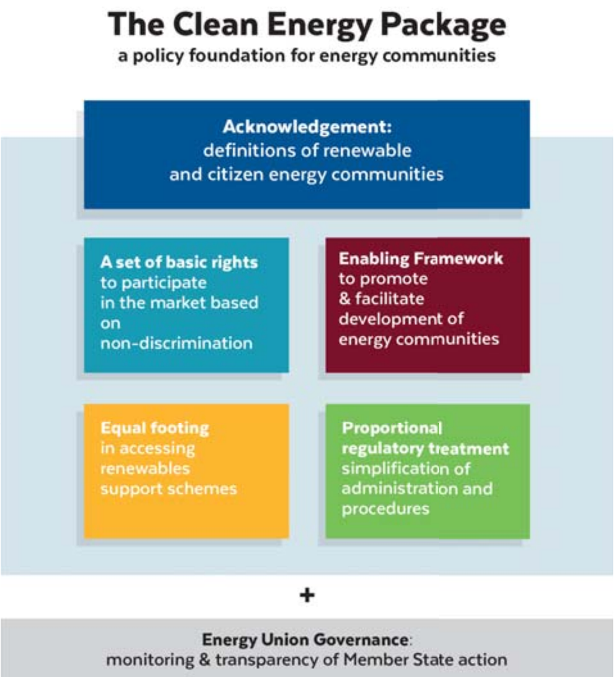
cluding autonomy from the interests of outside investors, control equally vested in members, commonly held reserves and assets, the performance of activities to the mutual benefit of the members, limited access to equity markets, dependence on their own capital or credit financing, and a profit margin that is considerably lower than that of capital companies.[15]

Based on the criteria established by the CJEU, to the extent that energy communities integrate a non-commercial purpose, democratic, open and voluntary ownership, participation and governance, they are different from traditional market actors. As such, unless justified by an overriding objective reason, they should be subject to different national regulatory requirements where such treatment is justified by the need to ensure an equal playing field.

THE CLEAN ENERGY PACKAGE – BUILDING BLOCKS FOR SUPPORTING CITIZEN OWNERSHIP IN THE ENERGY TRANSITION

Liberalization of the energy sector in Europe has allowed energy communities to engage in certain activities, such as supplying their members with their own renewable energy. Nevertheless, because the first three IEM legislative packages did not acknowledge citizens or communities as active market participants, a legal basis for acknowledging and supporting them through regulation has been missing.

The Clean Energy for All Europeans package (CEP) fills this legal gap. Together, Directive 2018/2001 (the recast Renewable Energy Directive, REDII)[16] and the Internal Electricity Market Design legislation (namely, the recast Electricity Directive (IEMD)[17] and recast Electricity Regulation (IEMR))[18] establish key building blocks that acknowledge energy communities and ensure their fair and equal treatment in national regulation.



Source: REScoop.eu (2019)

[15] *Paint Graphos Soc. coop. arl*, paras 55-61.
[16] Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources (recast), OJ L 328, 21.12.2018, p 82 (REDII).
[17] At the time of writing, the Council and the Parliament had both voted to confirm a final text. However, it had not yet been published in the Official Journal of the EU. Therefore, reference is made to the Provisional text adopted by the European Parliament on the 26th of March, 2019. European Parliament legislative resolution of 26 March 2019 on the proposal for a directive of the European Parliament and of the Council on common rules for the internal market in electricity (recast) (COM(2016)0864 – C8-0495/2016 – 2016/0380(COD)). P8_TA-PROV(2019)0226 (IEMD).
[18] At the time of writing, the Council and the Parliament had both voted to confirm a final text. However, it had not yet been published in the Official Journal of the EU. Therefore, reference is made to the Provisional text adopted by the European Parliament on the 26th of March, 2019. European Parliament resolution of 26 March 2019 on the proposal for a regulation of the European Parliament and of the Council on the internal market for electricity (recast) (COM(20160861 – C8-0492/2016 – 2016/0379(COD)). P8_TA-PROV(2019)0227 (IEMR).

At the heart of the CEP's support for community participation in the energy market is the official recognition of communities as distinct market actors through two definitions: 'Citizen Energy Community' (CEC), which is contained in the IEMD, and 'Renewable Energy Community' (REC), which is contained in the REDII.

Both definitions acknowledge a particular way to organize collective action around an energy-related activity – namely through a legal entity that organizes around specific ownership, democratic governance and a non-commercial purpose.

The main aim of the CEP's provisions on CECs and RECs is to ensure they have a right to engage in all potential activities and access all potential energy markets on the basis of non-discrimination and equal treatment.[19] One of the building blocks of this level playing field is a "well-defined catalogue of rights and obligations," both for individual participants and energy communities themselves.[20] The REDII and IEMD also require member states to put in place 'enabling frameworks' for energy communities. For CECs, these enabling frameworks aim to ensure energy communities can participate across the electricity market subject to non-discrimination and proportionate regulatory treatment.

The REDII goes further, however, requiring member states not only to guarantee an equal playing field, but to "promote and facilitate the development of renewable energy communities." This connotates a much more positive obligation to put measures in place to ensure that RECs can grow and thrive at national level.

The REDII also requires member states to take RECs into account when designing their national renewable energy support schemes, so they can compete on an equal playing field with larger market actors.

Article 2(14), REDII – 'Renewable Energy Community'	Article 2(11), IEMD – 'Citizen Energy Community'
A legal entity: a which, in accordance with the applicable national law, is based on open and voluntary participation, is autonomous, and is effectively controlled by shareholders or members that are located in the proximity of the renewable energy projects that are owned and developed by that legal entity; b the shareholders or members of which are natural persons, SMEs or local authorities, including municipalities; c the primary purpose of which is to provide environmental, economic or social community benefits for its shareholders or members or for the local areas where it operates, rather than financial profits.	**A legal entity that:** a is based on voluntary and open participation and is effectively controlled by members or shareholders that are natural persons, local authorities, including municipalities, or small enterprises; b has for its primary purpose to to provide environmental, economic or social community benefits to its members or shareholders or to the local areas where it operates rather than generate financial profits; and c may engage in generation including from renewable sources, distribution, supply, consumption, aggregation, energy storage, energy efficiency services or charging services for electric vehicles or provide other energy services to its members or shareholders.

[19] Roberts, J, Frieden, D, and Herbemont, S (2019). *Energy Community Definitions – Explanatory Note.* For the COMPILE Project.
[20] IEMD, Recital 45 and 46 and REDII, Recital 72.

LOOKING FORWARD: WHAT DO ENERGY COMMUNITIES NEED FROM REGULATION?

Now that EU legislation acknowledges and requires member states to support an equal playing field for energy communities, national decision makers face the immediate challenge of integrating RECs and CECs into national legislation, policy and regulations. However, many are starting from scratch and with little understanding or awareness of energy communities.

The following points aim to raise this level of awareness as ministries, national legislators, and regulators begin to wade through many conceptual and technical challenges of building out national regulatory frameworks for energy communities.

Proper acknowledgment of energy communities as an 'organisational' concept

Before looking at how to regulate market access or specific technical activities of energy communities, decision makers need to understand exactly 'who' is being regulating. In order to regulate energy communities effectively, they need to be properly defined at national level.

Energy communities need to be properly distinguished from activities enabled by the CEP

The IEMD and REDII list a number of activities that energy communities may or are entitled to undertake. These activities were listed in order to acknowledge what energy communities already – and in the future – can perform, and to ensure they are not prevented from undertaking these activities. Some of these activities, most notably collective self-consumption, are dealt with in other separate provisions, without an explicit focus on their organisational format.[21] Nevertheless, industry stakeholders often conflate energy communities with activities listed in the directives, such as self-consumption and energy sharing.

To ensure a proper distinction between these separate concepts, energy communities should be transposed separately from specific rules on activities such as renewables self-consumption and energy sharing, unless member states choose to limit these activities to energy communities exclusively. One country that has taken a rational approach to the acknowledgment of energy communities is Greece. In 2018, Greece passed two pieces of legislation: one that focuses solely on energy communities, and another on virtual net metering, or collective energy sharing.[22]

The first piece of legislation defines energy communities, who can participate in an energy community, how they can be established and operated, and how profits may be used. Importantly, the legislation frames energy communities as co-operatives that aim solely to promote social and solidarity-based economy and innovation in the energy sector, address energy poverty and promote energy sustainability, generation, storage, self-consumption, distribution and supply of energy as well as improve end-use energy efficiency at local and regional level. Profit-making is limited to certain instances. The legislation also lists a wide scope of activities that energy communities are allowed to engage in, and lays out certain support measures so that energy communities may flourish.

Separately, legislation on virtual net metering lays out technical rules for how this activity may be carried out by various market actors, and lays the foundation for further implementing regulations. Importantly, the legislation explicitly allows energy communities to engage in this activity, whereas previously the activity had only been open to municipalities and farmers organisations.

[21] Frieden, D, Tuerk, A, Roberts J, and Guina, A (2019). *Collective self-consumption and energy communities: Overview of emerging regulatory approaches in Europe.* A Working Paper for Compile, a H2020 Project, p 2.

[22] Available at https://www.hellenicparliament.gr/UserFiles/bcc26661-143b-4f2d-8916-0e0e66ba4c50/e-enerkoin-pap-aposp.pdf.

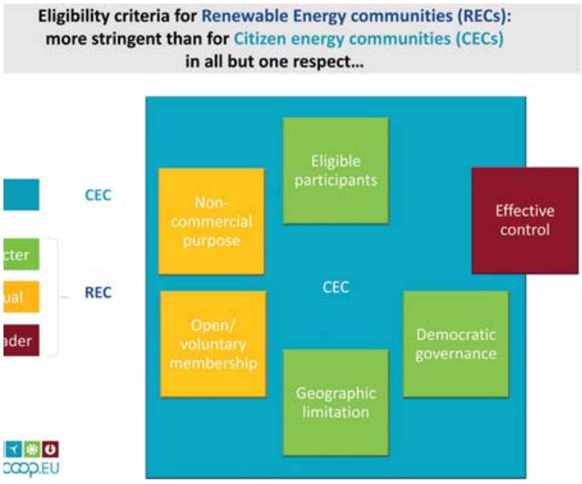
Proper distinction between energy communities and other citizens initiatives

Citizen and community initiatives can take many different forms and involve different actors including citizens, local small and medium enterprises, utilities, project developers, and local authorities. Depending on the initiative and the actors driving it, the level of citizen ownership may vary. While acknowledging that citizens initiatives can take different forms, the CEP explicitly differentiate energy communities from other initiatives developed by traditional market actors.[23] National legislation and regulation need to ensure that these distinctions are clear.

Many existing energy companies would like to use the energy communities definitions to develop new business models to market consumer-centric services for commercial purposes. However, the CEP did not intend to empower traditional market actors to set up these activities through an 'energy community'. The IEMD states that it "aims to recognize certain categories of citizen initiatives at the Union level as 'citizen energy communities', in order to provide them with an enabling framework, fair treatment, a level playing field and a well-defined catalogue of rights and obligations."[24] Energy companies may participate as members within energy communities and provide them with services, but they are forbidden from exercising control over the community.[25]

The IEMD also states that "the provisions on citizen energy communities do not preclude the existence of other citizen initiatives such as those stemming from private law agreements." In particular, the CEP enables these types of business models by entitling final consumers to, *inter alia*, become 'active customers' through facilitation by a third party, have access to dynamic price contracts, participate in demand response including through an independent aggregator, and participate in renewables self-consumption – both individually and jointly with others. Companies will not need to set up energy communities in order to utilize the opportunities offered by the CEP.

Proper differentiation between community and non-community citizen initiatives will be very important for the successful development of energy communities. If they are not sufficiently distinguished, it will be easier for companies to abuse beneficial treatment, eroding public support for energy communities. Furthermore, it will be more difficult for regulators to monitor energy communities. Lastly, to ensure trust and empower choice, consumers must be able to to differentiate between various options offered by market participants.



Source: RESCoop.eu (2019)

Ensuring coherence between CECs and RECs at the national level

Another legal challenge will be how to define both CECs and RECs at national level in a coherent manner. The relationship (including the similarities and differences) between these two concepts must be clear for both stakeholders and regulators.

At their core, both definitions describe a way to organize collective cooperation of an energy related activity around specific ownership, governance and a non-commercial purpose. Therefore, from an organisational perspective, both definitions share many commonalities and for the most part RECs can be seen as a subset, or type, of CEC.[26]

In reality, however, the situation is more complex. An REC will almost always be a CEC, with the follow-

[23] IEMD, Recital 46, and REDII, Recital 71.
[24] IEMD, Recital 43.
[25] IEMD, Recital 44.
[26] REScoop.eu (2019). *Q&A: What are 'citizen' and 'renewable' energy communities?* (REScoop.eu: Brussels).

ing caveat: to also be a CEC a medium-sized enterprise cannot be involved in the effective control of the REC. This is because in CECs only micro- and small enterprises can be involved in the effective control besides natural persons and local authorities. Likewise, a CEC could also qualify as a REC if it does not have any members that are larger than a medium-sized enterprise, and as long as the effective control is held by local members.

From a technical perspective, the activities of CECs fall within the electricity sector, while the activities of RECs are more narrowly focused around renewable energy. In reality, however, there will likely be overlap in the activities that RECs and CECs engage in, making them hard to differentiate. There is also a lack of clarity in the activities that are implied from the directives (in particular the IEMD).[27] For instance, while energy production, consumption, sharing, and distribution are mentioned for both types of energy community, for RECs 'sale' is specifically mentioned while 'supply' is the term used for CECs. To ensure coherence, the ability to sell or supply - directly through PPAs or through interaction with the market (wholesale and retail) - should be implied for both CECs and RECs.

These differences will need to be reconciled at national level to ensure coherent implementation between the two definitions. Ideally, the common elements of the two definitions should be brought together to create one coherent definition, in order to ensure clarity and simplicity.

High level political support from decision makers

The level of ambition adopted by member states for the support of energy communities will also impact the approach to regulating them at national level. In Regulation (EU) 2018/1999 (the Governance Regulation), member states are encouraged, but not required, to include objectives for renewable energy production by RECs, cities and self-consumers in their 2030 climate and energy plans.[28]

Where they have been adopted, high level objectives for citizen energy have provided a basis for strong political commitment, as well as the development of policy and regulatory frameworks to ensure that the objective or target can be met.[29] In their draft National Energy and Climate Plans (NECPs), several member states or regions have proposed to introduce quantitative targets for energy communities or to update existing targets, including Greece, Wales and Scotland.[30] More member states should consider adopting high level targets or objectives to support the development of energy communities.

A bike lane for RECs in national renewables support schemes

Given the unique characteristics of RECs, renewables support schemes should contain special provisions that either exempt them from auctions or tenders, or at least ensure that they are can participate on equal terms. The REDII requires member states to take RECs into account when designing their renewables support schemes, but it does not prescribe how member states must do this. Nevertheless, the recitals provide guidance for how to ensure RECs can compete on an equal footing with other market participants.

In Belgium, municipalities have integrated criteria or policy objectives for citizen involvement and public acceptance in local tenders for renewable energy projects on public land.[31] Furthermore, in its new Renewable Electricity Support Scheme (RESS), Ireland is cre-

[27] Roberts, J, Frieden, D, and Herbemont, S, *supra* note 19.

[28] Regulation (EU) 2018/1999 of the European Parliament and of the Council of 11 December 2018 on the Governance of the Energy Union and Climate Action, amending Regulations (EC) No 663/2009 and (EC) No 715/2009 of the European Parliament and of the Council, Directives 94/22/EC, 98/70/EC, 2009/31/EC, 2009/73/EC, 2010/31/EU, 2012/27/EU, and 2013/30/EU of the European Parliament and of the Council, Council Directives 2009/119/EC and (EU) 2015/652 and repealing Regulation (EU) No 525/2013 of the European Parliament and of the Council, OJ L 328, 21.12.2018, p 1 (Governance Regulation), Annex I, Part I, Section A, 2.1.(v).

[29] Roberts, J (2014). *Enhancing support of community energy in Scotland: The case for stronger community energy targets to 2030.* (ClientEarth: London).

[30] Roberts, J and Gauthier, C (2019). *Energy communities in the draft National Energy and Climate Plans: encouraging but room for improvement* (REScoop.eu: Brussels; European University Viadrina: Frankfurt (Oder)), p 7.

[31] REScoop.eu, Friends of the Earth Europe, Greenpeace EU, Energy Cities (2018). *Unleashing the Power of Community Renewable Energy*, p 21. Available at https://www.rescoop.eu/blog/unleashing-the-power-of-community-renewable-energy?categoryId=381.

REDII, Recital 26

member states should ensure that renewable energy communities can participate in available support schemes on an equal footing with large participants. To that end, member states should be allowed to take measures, such as providing information, providing technical and financial support, reducing administrative requirements, including community-focused bidding criteria, creating tailored bidding windows for renewable energy communities, or allowing renewable energy communities to be remunerated through direct support where they comply with requirements of small installations.

ating a special category for RECs so they can compete against each other instead of other large developers.[32] This will be supplemented by a programme to help provide upfront financial support for early phases of community-led projects, which are usually the hardest phases to finance.

Therefore, the transposition process allows member states to take a number of innovative approaches to ensure that RECs are given equal access to national renewables support schemes.

Eeklo Tender for local wind development (20 MW) according to provincial wind plan(33)

- Aiming for at least 50% direct participation for municipality and local citizens;
- Contribution of 5,000€/year for each wind turbine (paid to a community benefit fund);
- Contribution of 5,000€/year for each wind turbine (paid to the municipality); and
- Including social-societal criteria in the public tender (not only financial criteria)

Simplified regulatory treatment where possible

National licensing procedures and requirements will need to be assessed with a view to reducing, simplifying or streamlining them so that it is easier for energy communities to engage in certain activities such as sale (e.g. retail supply) of renewable electricity to their members. Entry barriers to become a supplier are very uneven across the EU and in many cases they are over-burdensome for new market entrants.[34] Responsibilities that do not pertain either to security of supply or consumer protection will need to be eased for these entities, for instance certain requirements around bank guarantees, licensing and administration fees, reporting, and the choice of a certain legal form. Furthermore, certain responsibilities, for instance around balancing will need to be tailored to the size of the communities, particularly to enable them to engage in self-production, and local supply or energy sharing. Where certain responsibilities cannot be simplified or done away with, energy communities need to be allowed to easily contract with third party service providers.

Lastly, technical requirements will need to be revisited to ensure that energy communities and other small actors can participate in various markets. This includes both decentralized markets (e.g. markets for the procurement of local flexibility), and centralized markets (e.g. wholesale, balancing and ancillary service markets). For the latter, the ability to participate through aggregation will be essential, while standards for bidding size must be minimized as much as possible to facilitate participation from smaller loads.

Assessment of national regulations impacting the ability of energy communities to participate in specific activities should be undertaken as part of member states' broader assessments of potential and existing

[32] See Government of Ireland (2019). Renewable Electricity Support Scheme (RESS) High Level Design, pp. 14-15. Available at https://www.dccae.gov.ie/en-ie/energy/topics/Renewable-Energy/electricity/renewable-electricity-supports/ress/Pages/default.aspx.

[33] RESCoop MECISE (2019). Mobilising European Citizens to *Invest in Sustainable Energy: Final results oriented report of REScoop MECISE*, a Horizon 2020 Project, p 87.

[34] Roberts, J (2016). *Prosumer Rights: Options for an EU Legal Framework post-2020* (ClientEarth: Brussels), p 26.

barriers for RECs that are required under the REDII.[35] These assessments will help provide a basis for reducing unjustified and overburdensome regulatory and administrative barriers.

Clear frameworks to enable energy communities to engage in innovative activities

In order to give effect to the rights of energy communities to engage in activities such as energy sharing and renewables collective self-consumption, new regulatory frameworks will need to be constructed. While regulatory frameworks for renewables self-consumption already exist in some member states and are currently under development in others, there are few regulatory frameworks that allow for energy sharing.[36]

The REDII defines collective renewables self-consumption, or 'jointly-acting' renewables self-consumption, and the activity is regulated under Article 21 of the REDII and Article 15 of the IEMD. However, while both directives provide energy communities with a right engage in energy sharing, other than a brief description in the recitals it is not technically defined and few rules for how it should be enabled at national level are mentioned.

In order to enable energy sharing at national level, a number of issues will need to be dealt with by national decision makers and regulators. First, both directives require member states to ensure that DSOs cooperate with CECs and RECs to facilitate 'electricity transfers' within the community.[37] Therefore, specific arrangements will be needed between DSOs and energy communities regarding connection to, and use of, the public grid, as well as various roles and responsibilities that will be assumed by the community, or by the DSO in the form of different services to the community (e.g. accounting).

The full extent and scope of relationships and roles assumed between DSOs and energy communities needs to be more fully explored. However these arrangements are regulated, they should ensure proportionality, and provide energy communities with sufficient autonomy to assume certain responsibilities directly, or to contract these roles out to a DSO or other third party.

Second, national regulations will need to reconcile the maintenance of consumer rights with the nature of consumer-to-consumer relationships inherent in sharing energy. Importantly, both directives guarantee that final household consumers should not lose any of their rights as final customers simply because they participate in an energy community. This is important, because although by participating in an energy community consumers engage in an economic activity, they still maintain their status as final consumers and are in need of the requisite protections. However, it does create issues with regard to energy sharing, particularly if it is conducted through peer-to-peer trading.

In both directives, it is fairly clear that the individual participants, at least household consumers, would not be considered 'traders' in the traditional sense, because any profits they might make would not be significant

IEMD, Recital 46 - energy sharing

Citizen energy communities should not face regulatory restrictions when they apply existing or future information and communications technologies to share electricity produced using generation assets within the citizen energy community among their members or shareholders based on market principles, for example by offsetting the energy component of members or shareholders using the generation available within the community, even over the public network, provided that both metering points belong to the community. *Electricity sharing enables members or shareholders to be supplied with electricity from generating installations within the community without being in direct physical proximity to the generating installation and without being behind a single metering point.*

[35] REDII, Article 22 paragraph 3.
[36] *See* e.g. Frieden, D, Tuerk, A, Roberts J, and Guina, A (2019), *supra* at note 21.
[37] IEMD, Article 16 paragraph 1(d), and REDII, Article 22 paragraph 4(c).

enough to establish their activity as primarily commercial or professional.[38] However, in the event of a dispute between one or more members, two important questions must be addressed: how do individual members maintain their traditional energy consumer rights, and against whom can these rights be enforced in a peer-to-peer relationship: the other members and/or the energy community?[39]

Amidst this legal uncertainty, organizing energy sharing between different customers under a legal entity (i.e. an REC or CEC) can help solve this issue. In their governing statutes, members of the community will need to develop rules for how their activity should be carried out, including penalties for non-performance of obligations, and mechanisms for settling disputes between members. Alternative forms of dispute resolution have long existed in countries with legislation on co-operatives. Moving forward, such examples should be studied for their instructive value.

There is also the question how the benefits of engaging in energy sharing should be divided among the members, particularly if the energy community provides services to the energy system. Energy communities will bring together actors of different sizes and capabilities, which may contribute less or more in terms of generation of energy or provision of flexibility. This situation will likely present itself where energy communities bring together both companies and households, or in shared dwellings where some members are vulnerable or experiencing energy poverty. In this latter context, energy sharing can be used as a solidarity mechanism to help alleviate energy poverty. Therefore, energy communities will need to be provided sufficient autonomy to decide how benefits are divided among members, subject to certain ground rules, transparency, and regulatory oversight.

Acknowledging the benefits energy communities provide to the energy system

Energy communities are increasingly able to participate in the provision of flexibility and other resources and services (e.g. through storage, demand response, etc.) to the distribution grid and the energy system as a whole. This concept, which is referred to as the "value of solar" or "value of distributed energy resources approach," is currently being developed in a growing number of states in the USA, including California and New York.[40]

Therefore, remuneration and grid charges for energy communities must reflect the value or cost savings (e.g. reduced transmission/distribution losses, and avoided/deferred investment in infrastructure, reduced CO2 emissions, reduced air pollution) realized to the grid or the DSO through their activity.

The IEMD and IEMR acknowledge the benefits that energy communities and other new market actors can offer the energy system by providing flexibility. They also require regulation to incentivize more efficient network operation through the use of energy efficiency, storage, demand response, and the procurement of services instead of investing more grid capacity. In particular, before developing network tariffs for RECs and CECs, a "transparent cost-benefit analysis [CBA] of distributed energy sources" will need to be elaborated by the "national competent authorities."[41]

It is unclear how this CBA should be carried out, other than that it should include public consultation and involvement of relevant stakeholders, including citizens and energy communities. Moreover, it is not specified which national authority should undertake the CBA. To ensure transparency and independence, the national energy regulator should undertake such an analysis.

Ultimately, in order to be viable activities like renewables self-consumption and energy sharing need an economic business case. Where these activities take place at lower networks levels and are capable of minimizing impacts beyond substations, they can help in-

[38] Schneiders, A, and Shipworth, D (2018). *Energy Cooperatives: A Missing Piece of the Peer-to-Peer Energy Regulation Puzzle?* (University College London (UCL), Energy Institute, August 2018).

[39] *See* Jasiak, M (2018). "Energy Communities in the Clean Energy Package: Regulatory Framework for Collectively Involving Citizens in the Energy Transition." *European Energy Journal*, Volume 8, Issue 1, Number 26 (1 September 2018), pp29-39, at 36.

[40] *See*, e.g. National Association of Regulatory Utility Commissioners (NARUC) (2016). *NARUC Manual on Distributed Energy Resources Rate Design and Compensation*, Prepared by the Staff Subcommittee on Rate Design (November 2016).

[41] REDII, Article 22 paragraph 4(d) and IEMD, Article 16 pvaragraph 3(e).

Comparing different provisions on energy communities' contribution to energy systems costs

Renewable Energy Directive (Generally)	• Must be subject to ***fair, proportionate, transparent cost-reflective*** network charges • Must be subject to relevant charges, levies and taxes, ensuring they contribute in an ***adequate, fair*** and ***balanced*** way in line with a transparent cost-benefit analysis of distributed energy resources
Electricity Directive (Generally)	• Frameworks must ensure CECs are subject to transparent and ***non-discriminatory*** and ***cost-reflective*** charges • In line with the Electricity Regulation (no mention of cost-benefit analysis, unlike in RED II) • Ensure adequate and balanced contribution to system costs (fairness not mentioned, unlike in RED II)
(Renewables) Self-consumption	• Renumeration: market value, ***may take into account long-term value to the grid, environment and society*** • No net metering (same for community networks) • CECs are subject to ***cost-reflective, transparent*** and ***non-discriminatory*** network charges
Energy Sharing	• Must be subject to ***applicable*** network ***charges, tariffs and levies*** in line with a transparent cost-benefit analysis of distributed energy resources by the competent authority (same between ED & RED II)
Community networks	• Must be subject to ***appropriate charges*** at the connection point • No net metering

Source: REScoop.eu (2019)

crease renewables penetration while minimizing impact on the grid. Economic incentives, in particular reduced network tariffs and remuneration for different services, should be commensurate with the value that the energy community can providing the energy system.

Room to innovate

Lastly, it is important to acknowledge that most regulatory frameworks for energy communities are starting from scratch. The CEP enables many new activities, which currently exist in legal gray zones or are illegal. As is usually the case, regulation cannot be expected to evolve in the same rapid pace as innovation.

As such, energy communities require sufficient space to test innovative concepts and technologies. Several member states, such as Germany, the UK and the Netherlands, already provide space allowing market actors to operate outside existing regulations, through the use of 'Regulatory Sandboxes'.[42] While no common definition of a regulatory sandbox exists, they usually grant certain regulatory exemptions for a limited amount of time, on a case-by-case basis, allowing projects to test new technologies, business models or processes. They are monitored closely by the regulatory authority, and at the end of a trial period the results are often fed into the further evolution of the regulatory framework.

[42] Vlerick Business School (2019). *The Future of DSOs: Our take on energy communities and regulatory sandboxes* (Vlerick Business School: Brussels), p 9.

Moving forward, member states should make more use of regulatory sandboxes, in particular for energy communities.

A proactive role by energy regulators

The IEMR establishes "empowerment of consumers to act as market participants in the energy market and the energy transition" as a regulatory principle of the internal energy market.[43] Therefore, national regulatory authorities (NRAs) need to prioritize consumer participation, including through energy communities, along with consumer protection, competition, and proper functioning of the market – particularly where high level political objectives for energy communities are established.

NRAs will have an important role in developing proportionate regulations for energy communities and monitoring their implementation. In particular, the IEMD provides NRAs with a new duty to monitor the removal of unjustified obstacles and restrictions on the development of CECs. In addition, NRAs will have an active role in:

- assessing how DSOs are compensated for facilitating energy sharing within CECs and RECs;[44]
- conducting cost-benefit analyses of distributed energy resources that provide the basis for the determination of adequate, fair and balanced contribution to energy system costs by CECs and RECs, and remuneration for excess renewables self-consumption that is exported to the grid;[45] and developing and/or approving, as well as making public, methodologies and underlying costs used to calculate network charges that are applicable to CECs and RECs, particularly those that engage in renewables self-production, energy sharing and operation of community networks.[46]

These new responsibilities and duties will require more engagement between NRAs and energy communities, as there is currently very little understanding among NRAs of the characteristics, added value, and regulatory challenges, of energy communities. Once regulations are in place, NRAs will need to actively monitor to help ensure that energy community labels are not abused by larger, well-resourced companies. NRAs will also need to ensure energy communities are not discriminated against, preserve existing consumer protections, and ensure quality and security of supply – particularly if energy communities establish and operate 'community networks'.

CONCLUSION

The CEP aims to guarantee energy communities a central role in Europe's clean energy transition. However, significant reforms to national legislation and regulation are still needed to ensure that new rights of energy communities are respected, and that they have an equal playing field to participate across the energy market. Governments need to show ambition towards empowering energy communities, and regulators must ensure that unjustified regulatory and market barriers are removed, in line with the legal principle of equality and proportionality. RECs and CECs need to be defined at national level in a clear and coherent way that acknowledges the organisational nature of energy communities based on inclusive, democratic and non-commercial principles, and prevents abuse from traditional energy companies. Renewables support schemes need to be designed so that they do not exclude RECs. Clear frameworks for renewables self-consumption and energy sharing, including clarification of roles and responsibilities of energy communities other market actors within these activities, need to be developed. Network charges and remuneration for energy communities need to acknowledge the value of energy communities to the energy system. Finally, where regulation cannot keep up with the pace of new developments, energy communities need to be provided with sufficient space to innovate.

[43] IEMR, Article paragraph 1(d).
[44] REDII, Article 16 paragraph 1(d).
[45] REDII, Article 22 paragraph 4(d).
[46] REDII, Article 22 paragraph 4(d) and Article 21 and IEMD, Article 16 paragraph 4(b) and Article 59 paragraph 9.

IMPLEMENTATION OF THE TARGET MODEL: REGULATORY REFORMS AND OBSTACLES FOR THE REGIONAL MARKET COUPLING

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Volume 8 Issue 3/4, July 2019

INTRODUCTION

When aspiring to identify the origins of the Target Model, we need to look into the very core of the European integration process and the expansion of the common internal market concept into the European energy sector. The term "Target Model" essentially describes the process under which the EU's Third Energy Package is designed around a benchmarking model, thus a "Target Model". It is the result of a long period of work involving the European Commission, ACER, TSOs, national regulators and stakeholders to develop a single market model for Europe/EU.

The Target Model derives from EU's Third Energy Package, a legislative initiative aiming to open up and regulate the internal gas and electricity markets in the European Union[01]. Adopted by the European Parliament and the Council of the European Union in July 2009, the relevant legislation entered into force early in September of the same year. Corresponding legislation includes one Directive and four Regulations regulating both the natural gas and electricity markets.[02] Out of these, Directive 2009/72/EC contains common rules for the internal market in electricity, Regulation (EC) No 714/2009 contains conditions for access to the network for cross-border exchanges in electricity, Regulation (EC) No 713/2009 foresees the establishment of the Agency for the Cooperation of Energy Regulators (ACER), Commission Regulation (EU) 2015/1222 establishing a guideline on capacity allocation and congestion management (CACM)[03] and Commission Regulation (EU) 2016/1719 establishing a guideline on forward capacity allocation (FCA)[04]. Both CACM and FAC can overall be considered the cornerstone of a European single market for electricity[05]. For the FCA Regulation the main points of attention are the harmonisation of the Long-Term Transmission Rights rules and the regulatory authorities' decisions on cross-zonal risk hedging opportunities. For the CACM Regulation the main points of attention are the methodologies related to capacity calculation and to redispatching and countertrading, the bidding zone configuration, the Market Coupling Operator ('MCO') Function, and the design of the Intra-Day coupling. The Target Model proposes a market design for each timeframe (i.e. Forward, Day-Ahead, Intra-Day and Balancing Markets) and a coordinated approach to capacity calculation.

Essentially the Electricity Target Model aims at the coupling of the different national markets into one European electricity market, ensuring optimal use of cross-border transmission capacity while utilizing a set of proposals and network codes to achieve its goals. However, successful integration requires that electricity markets across Europe share a set of common features and are linked by efficient organisation of interconnection capacities. To this end, several issues still need to be addressed in order to effectively improve the electricity markets' design and functioning.

[01] Michelaki S. (2018), The Integration of the European Gas Market, In: A. Metaxas, L. Hancher (ed.) (2018), *The transformation of the EU and Eastern Mediterranean Energy Networks, Legal, Regulatory and Geopolitical Challenges*, European Energy Studies, Claeys & Casteels, Belgium, pp. 45-58.

[02] European Commission. "Questions and Answers on the third legislative package for an internal EU gas and electricity market". http://europa.eu/rapid/press-release_MEMO-11-125_en.htm?locale=en (accessed January 10, 2019).

[03] Commission Regulation (EU) 2015/1222."Capacity Allocation and Congestion Management (CACM)".

[04] Commission Regulation (EU) 2016/1719."Forward Capacity Allocation (FCA)".

[05] ACER, "Monitoring report on the implementation of the CACM Regulation and the FCA Regulation" (February 2019).

THE BASIC FRAMEWORK OF THE ELECTRICITY TARGET MODEL

The implementation of the Target Model in the European electricity sector will:

- Increase competition and reduce the potential for market concentration and market power issues, decreasing prices
- Create an equal level playing field between Market Participants providing cross-border trade opportunities and the possibility to reduce barriers to entry into markets through a clearer and more stable framework
- Optimally use existing transmission capacity and clearly signal the investments in order to build new capacity
- Enhance the integration of renewable energy by providing liquid Intra-Day Markets in which positions can be adjusted
- Limit risk for all market players by providing opportunities to hedge risk in different timeframes

Hence, the implementation of the Target Model will produce significant results in regional markets, leading to increased price convergence, enhanced competition, lower overall energy system costs and increased security of supply. Overall market integration is however stalled by slow and complex decision-making and implementation processes, diverging national policies and interests and inadequate interconnection capacity coupled -in some cases- with problematic capacity allocation procedures.

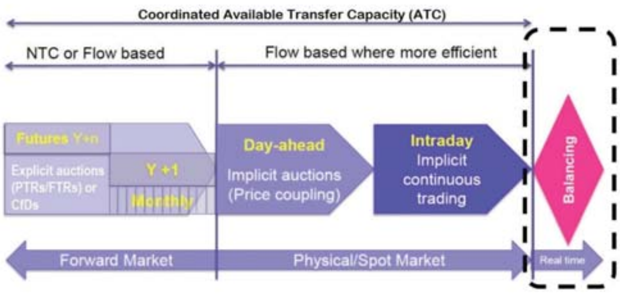
It needs to be noticed that the effective implementation of the Target Model is actually also challenged by the dynamic but uneven development of Renewables in the various member states, leading to higher congestions in the grid as well as lower electricity price convergence. As a result, some member states are closer to achieving the formation of effective, competitive electricity markets while others fail to establish the structure that leads to real benefits for the consumers.

On a regional level, success of the target model presupposes the rapid but careful implementation from MS of the relevant EU legislation and network codes, the efficiency of governance structure in accelerating structural change at a national level, the increase in interconnection capacity, the optimisation of capacity-calculation & allocation processes and last but not least, the openness of retail markets for undistorted competition with robust participation from a competent number of market operators.[06]

Wholesale markets in the Target Model

As in any well-functioning liberalized wholesale market, trade in the electricity sector comes either in the form of direct bilateral agreements or via an organized exchange. Producers can sell electricity to large end-consumers, traders and suppliers via bilateral over-the-counter (OTC) contracts or via one of the various European power exchanges and multilateral trading platforms where market participants submit their offers and bids, the market is cleared, and a single market price is determined on the basis of the marginal bid. Taking into consideration the well-known constrains that currently exist in the ability to store electricity, that calls for electricity systems to be balanced between supply and demand at all times, the Target Model determines the mechanisms for the function of a sequence of markets necessary for the proper function of the electricity system. The Target Model therefore regulates the function of a Forward and Futures Market, a Day-Ahead Market, an Intra-Day Market and a Balancing Market.[07]

The electricity Target Model markets



Source: ENTSO-E

[06] Mohr J. (2018), The Foundation of Energy Regulation in Europe on the basis of art. 102 TFEU- The example of energy grids, In: A. Metaxas/ L. Hancher (ed.) (2018), *The transformation of the EU and Eastern Mediterranean Energy Networks, Legal, Regulatory and Geopolitical Challenges*, European Energy Studies, Claeys & Casteels, Belgium, pp. 13-21.

[07] ENTSO-E, "Network code on Capacity Allocation & Congestion Management (CACM)" https://www.entsoe.eu/fileadmin/user_upload/_library/consultations/Network_Code_CACM/120323_NetworkCodeConsultation_FINAL.pdf (accessed January 11, 2019).

In the forward and future market, electricity is traded one or several years in advance. In a future or forward contract, parties agree on a price for the sale of electricity in the future (e.g. year x+1 or x+2). Futures are standardised contracts which can be traded further on power exchanges, whereas forwards are mostly bilateral contracts that are usually not traded further. The future and forward markets allow market parties to hedge their price risks. Forwards and futures can be traded within and between market zones.[08] The Forward market enables the market participants to limit their exposure to the more volatile Intra-Day Market by ensuring their position (price-quantity), provides an alternative choice of forward contracting, when the market price is susceptible to strategic behaviour preventing market power abuse, enhances longer-range activities, such as system planning for generation, transmission, distribution and demand response investments, by indicating long-term future expectations of hourly market prices.

The Day-Ahead regional electricity markets are organised under a -primarily- liberal market structure where the revenue of power producers depends largely on the price for each marginal unit of energy supplied. An additional aspect refers to the Coupling of regional electricity markets by linking Day-Ahead spot markets into a virtual market, so that the lowest priced bids are accepted up to the point where congestion constraints limit further trade.[09]

In the Day-Ahead Market (DAM), electricity is traded both with OTCs and at a power exchange. Transactions to buy or sell electricity with physical delivery obligation in day (D) are auctioned in day D-1 where all transactions of energy financial products with physical delivery are also declared. Participation is mandatory for the producers and optional for all other participants. Producers are obligated to submit sell orders for the available capacity of their units that has not been already allocated via energy financial products transactions or other transactions concerning wholesale energy products with obligation of physical delivery. The Day-Ahead Market will operate prior to pre-dispatch and real-time. At the time of closure of the day-ahead market, each market needs to be in balance in the sense that scheduled generation needs to equal forecasted demand plus/minus net export-to or import-from other market zones. In the day-Ahead market, market zones can be coupled with each other. The main benefits of a Day-Ahead Market among others are that it increases system reliability by providing sufficient notice for plants to be scheduled, reduces the impact of uncertainty in real-time market prices, because a smaller proportion of generation is exposed to real-time price volatility, increases liquidity, as trades can be financial contracts rather than contracts for physical delivery; this creates an arbitrage opportunity between the day-ahead market and the balancing market, again increasing liquidity.

The Intra-Day market refers to electricity traded on the same day of delivery (D). This allows market participants to proceed with corrections when deviations from their offers in the Day-Ahead Market occur. It also permits the correction of the trading position as approaching to real-time in the case of changes in demand or power plant outages and the submission of more accurate short-term forecasts for renewables. Transactions of volumes with physical delivery obligation are auctioned after the Day-Ahead market closes, (D-1 and D) while for physical delivery auctions take place at day D. In the Intra-Day market, participation is optional for all market participants. In the Intra-Day Market, the Cross Border Intraday (XBID)[10] Trading Solution applies. The XBID project objective is to establish a common cross border implicit continuous intraday trading solution across Europe, where all the cross border capacities are allocated. The XBID Project started as a joint initiative by Power Exchanges and TSOs from 11 countries to create an integrated intraday cross-border market.

One of the most crucial markets for the function of the wholesale electricity system is the Balancing Market. The core scope of the Balancing market is to cor-

[08] ACER, "European Electricity Forward Markets and Hedging Products – State of Play and Elements for Monitoring". https://www.acer.europa.eu/en/Electricity/Market%20monitoring/Documents_Public/ECA%20Report%20on%20European%20Electricity%20Forward%20Markets.pdf (accessed January 15, 2019).

[09] European Commission. "Market Legislation". https://ec.europa.eu/energy/en/topics/markets-and-consumers/market-legislation (accessed January 10, 2019).

[10] Klaus-Dieter Borchardt, "Cross Border Intraday (XBID) Trading Solution Pre-launch Event", Brussels (January 2018).

rect imbalances between input and output in the electricity system in real time. A precondition for this is the adoption of a Central Dispatching model. The TSOs need to act in real time for the procurement of balancing capacity to cover the system's reserve requirements as well as the procurement of energy volumes in order to balance differences between real-time production and demand. In the Balancing Reserve Market, the TSO needs to contract three types of reserves: Primary Reserves, used to almost instantly stabilise the grid frequency by activating locally controlled reserve capacity, secondary Reserves activated centrally within a minutes time-frame and Replacement Reserves, activated locally for longer time-periods (hours) that are needed to restore system balance in cases where the two previous systems are not adequate to restore balance between supply and demand.[11]

The TSO is responsible for settling the imbalances by setting tariffs to the contacted parties for imbalances in their portfolios[12]. Tariffs are set based on the TSO's Marginal Cost for the procurement of energy including, in some cases, incentives towards the contracting parties to keep their portfolio in balance in the form of penalties or bonuses. Imbalance settlements take place after physical delivery of the contracted energy.

Key factors for expanded utilisation of market coupling

Differences among member states in consumer and producer surplus of market coupling need to be balanced and more equally distributed amongst member states and market participants. Market coupling, as a vital part of the Target Model, needs to overcome obstacles linked to conflicts of interests by market participants on a national level in order to elevate towards the goal of optimal positive social impact on a supranational, European, level.

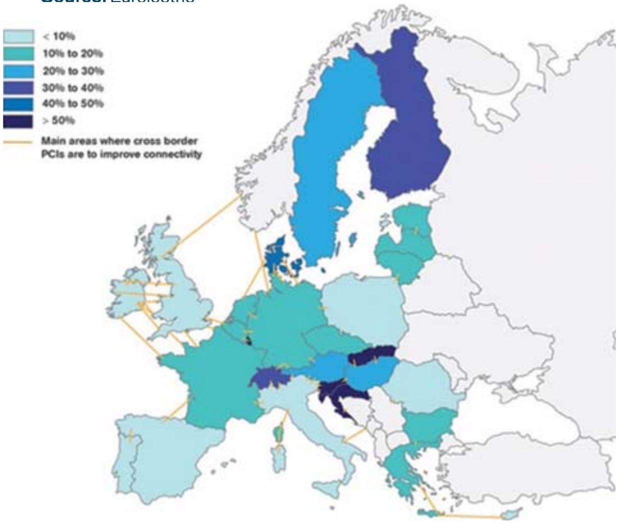
Under this framework, member states need to commit to the development of liberalised and competitive markets, trading mechanisms used in member states need to be compatible across borders, and adequate cross-border and intra-state transmission networks capacity needs to be made available. In addition, expanded utilisation of market coupling entails the necessity for a balanced governance approach, including a reinforced role for ACER and sturdier cooperation between TSOs. Furthermore, as we enter an era of increased significance of Power Exchanges in the integration processes of energy markets in Europe, the necessity for more elaborate regulation of Power Exchanges is deemed inevitable. The aforementioned key factors need to be complemented with additional transparency and technical coordination in the design and implementation process of market coupling. Setting up the proper methodology for calculation and allocation of cross-border transmission capacities is key to maximise the benefits that can derive from the whole process.

The critical role market-coupling holds in the overall framework of the Target Model, determines the one general principal functioning as a common denominator to all the aforementioned factors; the need for more harmonised national energy policies and market rules. Together with further integration of Day-Ahead, Intra-Day and Balancing markets at supranational level as well as cross-border procurement of ancillary services, they construct the basis for a truly effective utilisation of market coupling as a key tool of the Target Model concept. When targeting to promote market coupling, the issue of interconnection capacity is critical. Providing the existence of well-defined financial justification, interconnection capacity needs to be extended and availability for commercial -and not only for security of supply- purposes should be maximised. Preliminary conditions should be met for effective market coupling and price convergence. Therefore, a key factor for the expanded utilisation of market coupling, relates to the levels of interconnection capacity between member states. In its 2002 meeting, the European Council decided on a common target of an interconnection capacity for each Member State exceeding a minimum of 10 % of its installed electricity production capacity by 2020.[13]

[11] ADMIE "Balancing Market Detailed Design" http://www.admie.gr/uploads/media/Balancing_Detailed_Design_-_Public_Consultation_201712.pdf (accessed January 23, 2019).
[12] KU Leuven Energy Institute. "EI Fact sheet: The current electricity market design in Europe" https://set.kuleuven.be/ei/images/EI_factsheet8_eng.pdf/ (accessed January 23, 2019).
[13] European Commission. "Barcelona European Council – Presidency Conclusions" (15-16 March 2002) http://ec.europa.eu/invest-in-research/pdf/download_en/barcelona_european_council.pdf (accessed 04.02.2019).

Achieving the 10% goal demands extensive investments in some cases, particularly for member states with significant installed capacity while it still presents a problem for smaller MS struggling to attract investments within their borders. While interconnection capacity has increased significantly since 2002, still, eight member states are below their target of 10%.[14] In October 2014, the European Council called for "*speedy implementation of all the measures*" in order for all MS to meet the target of achieving interconnection of at least 10% of their installed electricity production capacity.[15]

Source: Eurelectric

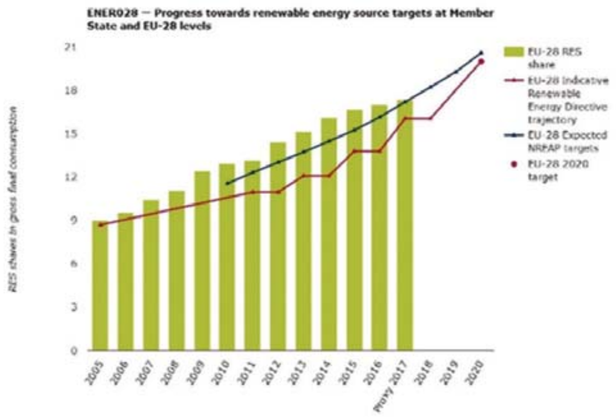


The Commission estimates that up to 12 member states are insufficiently connected with the EU electricity market and about €40 billion will be needed until 2020 to reach the 10% target across the EU.[16] While EU funding is available primarily through the Connecting Europe Facility (CEF) for Projects of Common Interest (PCIs), it should be noted that various TSO's lack the capacity to finance their share of the required investments.

For Greek companies for example, access to cheap funding can be a difficult task due to the ongoing negative effects of the financial crisis leading to non-competitive interest rates for access to loans. For ADMIE, the Greek TSO, it is believed that it will be able to take advantage of its Chinese stakeholder's (State Grid Europe Limited) access to cheap funding.[17] However, higher country risk for Greece and differences in its assessment affect WACC calculations between ADMIE and the Greek NRA (RAE), leading to up to 2,3% difference between the WACC that ADMIE asks and the one RAE approved for the period 2018-2021, thus posing barriers to the volume of investments finally implemented by the Greek TSO.[18]

Success for expanded utilisation of market coupling policies between member states is undoubtedly linked to the overall ability of European electricity markets to adapt to increasing volumes of variable Renewable Energy Sources production. The share of RES production in the European electricity mix has significantly increased in the past few years as a result of robust European policies combined with rapidly declining investment cost.[19]

Source: European Environment Agency.



[14] Union of the Electricity Industry. "Power Statistics and Trends" https://www3.eurelectric.org/the-five-dimensions-of-the-energy-union/internal-energy-market/# (accessed 22.01.2019).

[15] European Commission "2030 framework for climate & energy" (October 2014) https://ec.europa.eu/clima/sites/clima/files/strategies/2030/docs/2030_euco_conclusions_en.pdf (accessed 04.02.2019).

[16] European Commission. "Connecting power markets to deliver security of supply, market integration and the large-scale uptake of renewables" (25 February 2015) http://europa.eu/rapid/press-release_MEMO-15-4486_en.htm (accessed 11.02.2019).

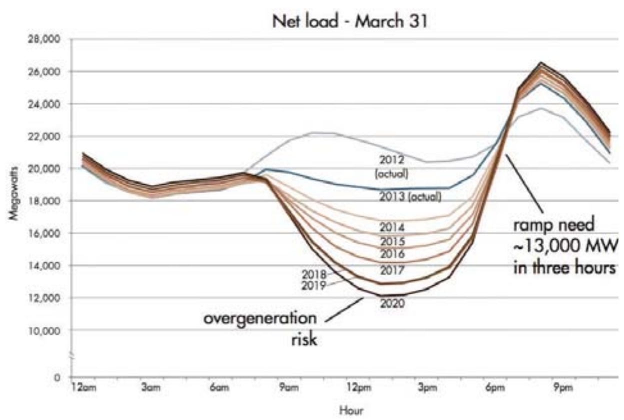
[17] REUTERS. "Greek power grid operator turns to China for fresh funding" https://www.reuters.com/article/admie-china/greek-power-grid-operator-turns-to-china-for-fresh-funding-idUSL8N1N92AU

[18] RAE, "WACC calculation for 2018-2021" (7/3/2018) http://www.rae.gr/site/file/categories_new/about_rae/actions/decision/2018/235?p=files&i=0

[19] European Environment Agency. "Share of renewable energy in gross final energy consumption" https://www.eea.europa.eu/data-and-maps/indicators/renewable-gross-final-energy-consumption-4/assessment-3 (accessed 14.02.2019).

While higher RES share is crucial for the struggle against climate change, it is creating a significant set of challenges for the proper function of the overall electricity system. Fluctuations in RES production during the day formulate the so-called Duck-Curve graph where oscillations of power production over the course of a day cause a timing imbalance between peak demand and renewable energy production.[20]

Figure 2: The duck curve shows steep ramping needs and overgeneration risk



Source: California Independent System Operator (CAISO)

This effect influences prices in the Intraday Market and leads to the "missing money" problem where increased RES production leads to declining utilization rates for thermal power plants and declining power prices power, making it almost impossible for power stations to recover their capital expenditure (CAPEX), thus threatening future capacity investments across power markets.[21]

However critical the afore-mentioned issue, electricity market governance seems to be adapting in a slower pace to these changes with the electricity system and market demonstrating difficulties accommodating the increasing share of fluctuating RES generation. Demand-Side Management (DSM) could help modify consumer demand and encourage a shift in energy use from peak to off-peak hours. Combined with extended storage solutions, DSM could contribute to even-out part of the imbalances caused by the growing penetration of RES into the energy mix, however, both solutions have not been adequately implemented yet. Furthermore, lack of balancing responsibility for RES produces and slow implementation of the relevant enabling regulatory framework lead to insufficient market function in various member states including the Greek electricity market.

KEY ELEMENTS OF THE EU POWER TARGET MODEL IN GREECE

EU Regulation 714/2009 sets the regulatory framework for the implementation of the European Single Market in Electricity. The Regulation specifies the common rules on the conditions that need to be met for access to the network for cross-border exchanges in electricity, thus setting the framework towards the creation of an internal market in electricity.[22] Greece is set to apply all four markets deriving from the relevant legislation, namely the Forward Market, Day-Ahead Market, Intra-Day Market and Balancing Market.

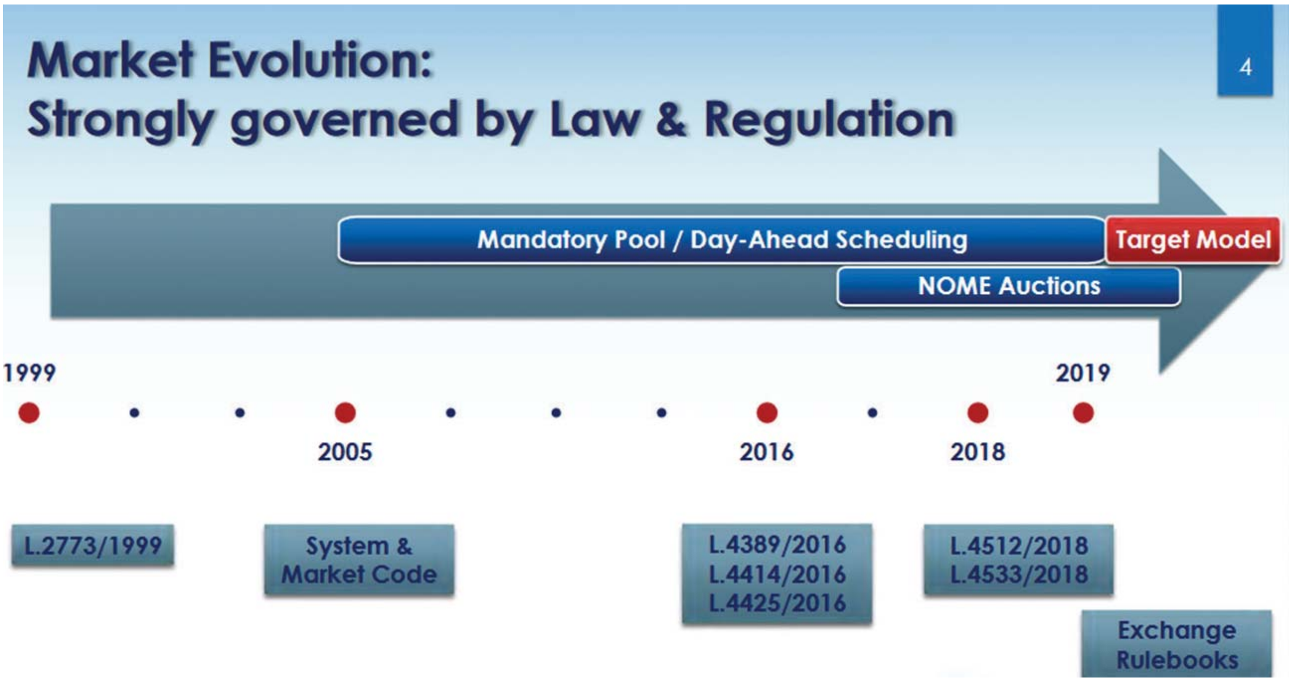
In the new market structure of the Greek Market, the Hellenic Energy Exchange (HEnEx), the Greek NEMO[23] manages the Energy Markets of physical delivery and the Energy Financial Markets in accordance with the provisions of Law 4512/2018 and its

[20] Denholm, Paul, O'Connell, Matthew, Brinkman, Gregory, and Jorgenson, Jennie. Sun. "Overgeneration from Solar Energy in California. A Field Guide to the Duck Chart". United States. doi:10.2172/1226167. https://www.osti.gov/servlets/purl/1226167

[21] M. Hildmann, A. Ulbig and G. Andersson, "Empirical Analysis of the Merit-Order Effect and the Missing Money Problem in Power Markets with High RES Shares," in IEEE Transactions on Power Systems, vol. 30, no. 3, pp. 1560-1570, May 2015. http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7080941&isnumber=7087410

[22] Official Journal of the European Union, "Regulation (EC) No 714/2009 of the European parliament and of the Council". (13.07.2009) https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=celex%3A32009R0714

[23] A NEMO can be designated for trading services in the day-ahead market, the intraday market or both (see Ref. 23). Today, all designated NEMOs offer services in both markets (Decis. ACER No 04/2017). NEMO(s) designated in a MS have the right to offer trading services with delivery in another MS without the need for designation as a NEMO in that Member State (Article 4(6) of the CACM). In CACM, Article 7(1) the tasks of the NEMOs are outlined.



Source: HEnEx https://bit.ly/2TLtv9v

delegated acts, while ADMIE, the Greek TSO for electricity established in compliance with Law 4001/201, manages the Balancing Market. On the critical issue of the Greek balancing market, it needs to be pointed out that currently the balancing market holds a small share of approximately 5%.[24] This, however, should be expected to grow as more RES enter the market and market coupling is progressing.

Further RES integration into the Balancing Market is also related to the effective implementation of the role of Aggregators in the system, functioning as virtual power plants, pooling RES production and/or electricity consumption of households and selling off their unused power during peak hours, when demand is high.[25]

Current market structure

Currently, market structure in Greece is based in a gross mandatory pool system that uses a technical algorithm to determine prices and schedule for the entire energy market, in order to help encourage new entries by providing a guaranteed route to market and robust reference price. The system provides for co-optimisation of energy and reserves to help maintain security of supply. Multiple generation inputs are integrated into the Pool algorithm, including economic bids, cost data -including shut down costs- and technical characteristics of the generator units. The system is based on a Central Dispatching Model of generation and prices are produced by an ex-post run of the Pool algorithm for settlement of instructed and uninstructed imbalances.

The market functions under a Cost Recovery Mechanism intended to ensure that all units generating upon receiving a dispatch instruction, cover at least their costs (plus an additional margin). This mechanism will be abolished after the recent (December 2018) decision by RAE. Currently in the Greek market, Bilateral and Over the Counter Contracts (OTC's) are not possible, while auctions are conducted for electricity forward products with physical delivery (NOME).

The Market Operator (HenEx), solves the day-ahead market, conducts its clearing, and engages into contracts with renewable producers. DAPEEP is responsible for the compensation of RES producers and Guarantees of Origin, while the Transmission System

[24] Kambouris, "The balancing market" (in Greek), RAE conference on Target Model, Athens (20/7/2018) http://www.rae.gr/site/file/system/docs/various/anartiseis/2207_1 (accessed 5/2/2019).

[25] RAE. "Greek Transportation System Network Code" http://www.rae.gr/site/file/system/docs/codes_and_regulations/01022012_2

Operator (ADMIE), owns the network, conducts the real time dispatch, the clearing of the imbalance market and the settlement of all other charges or payments.[26]

Source: RAE https://bit.ly/2TLvnz3

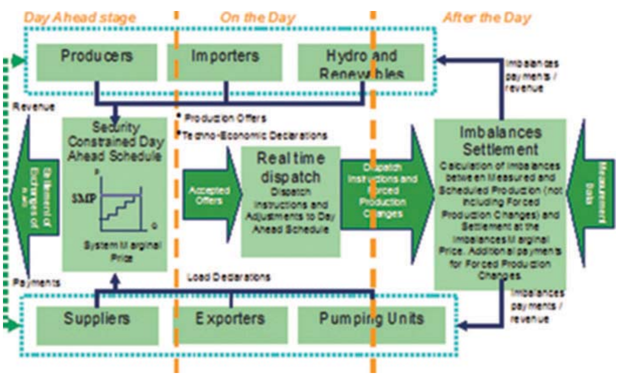
The Greek wholesale power market consists of two distinct markets, the Long-term Capacity Market designed to provide adequate capacity and security of supply and the Short-term Wholesale Market for Energy and Ancillary Services.[27] It also includes the acquisition of Physical Transmission Rights (PTR) - explicit auctions, to serve cross-border exchanges with all the interconnected countries: Italy, Albania, FYROM, Bulgaria and Turkey.

Interconnectors in the region

Cross-border exchanges of energy volumes and prices remains a vital element for the successful implementation of the Target Model. The Greek electricity market will be coupled with Italy and Bulgaria in accordance with Article 15(1) of CACM Regulation in ACER Decision no. 6/17.11.2016.[28]

At European level, the primary tool to achieve the goal of functional cross-border exchanges of energy, should be considered to be the Price Coupling of Regions (PCR); the project developed by eight major European Power Exchanges in order to create a single price-coupling algorithm, called EUPHEMIA (EU + Pan-European Hybrid Electricity Market Integration Algorithm), that is used to calculate electricity prices across Europe, taking into consideration the capacity of the relevant network elements on a Day-Ahead base.[29] The PCR project combines the ability to calculate electricity prices across different European power markets with the ability for an efficient allocation of cross-border capacity. There are two markets that operate under the PCR, i.e. the MRC (Multi-Regional Coupling) market which covers the entire EU except Central-Eastern and South-Eastern Europe and the 4MMC market including Czech Republic, Slovakia, Hungary, Romania.

EUPHEMIA is an algorithm that solves the market coupling problem on the PCR perimeter.[30] Euphemia takes into consideration each market's particular features as well as the specific constraints of its respective electricity network. The algorithm is built to maximise the welfare of the solution in order to achieve competitive prices, increase of the overall welfare and efficient capacity allocation. This is crucial in order to achieve the overall EU target of an harmonized European electricity market; expected to increase liquidity, efficiency, transparency and social welfare. By developing a common market-coupling algorithm and coordinating the governance structures between Power Exchanges, the PCR initiative is considered to be a solid functioning solution for the achievement of the European Day-Ahead Target



Source: RAE https://bit.ly/2IoASTg

[26] Metaxas A. (2015), Greece, in: Hancher L., Hauteclocque A. and Sadowska M., *Capacity Mechanisms in the EU Energy Market: Law, Policy and Economics*, Oxford University Press, pp. 288-301. Also see Tzortzis I. (2017), The New Greek RES Support Scheme in it European Context: Expectations, Challenges and the Green Project, In: L. Hancher/ A. Metaxas (ed.) (2017), *EU Energy Law and Policy: A South European perspective, Meeting the challenges of a Low Carbon Economy*, European Energy Studies , Volume XII, Claeys & Casteels, Belgium, pp. 105-151.

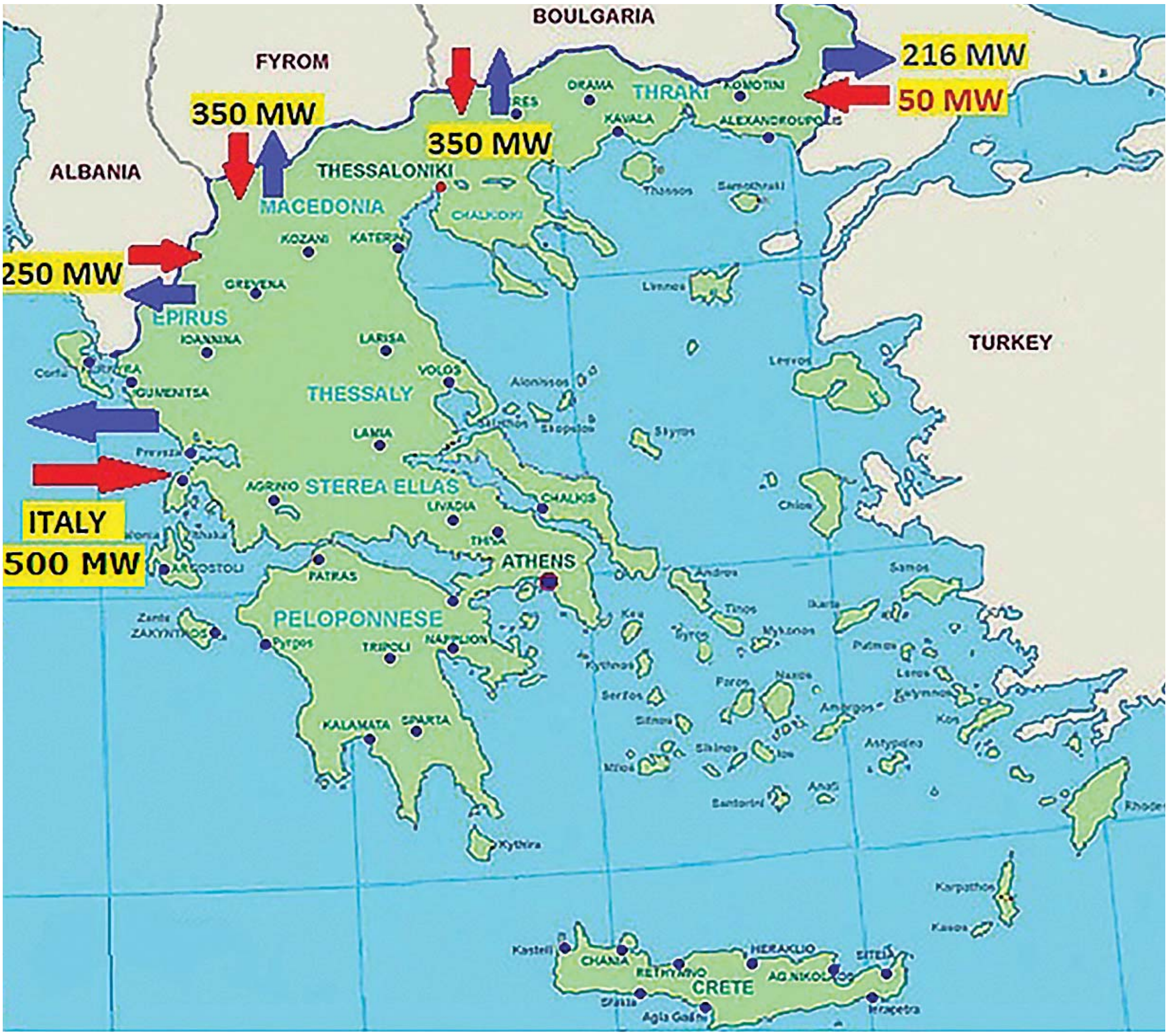
[27] RAE. "Wholesale Electricity Market" http://www.rae.gr/old/en/SUB3/3A/3be1.html (accessed 05.02.2019).

[28] ACER – "Decision on Capacity Calculation Regions (CCRs Proposal)" http://www.acer.europa.eu/Official_documents/Acts_of_the_Agency/Pages/ANNEXES_CCR_DECISION.aspx (Accessed 21 Feb. 2019).

[29] GLACHANT, J. "The Achievement of the EU Electricity Internal Market through Market Coupling." (2019) Available at: http://cadmus.eui.eu//handle/1814/15189 (Accessed 21 Feb. 2019).

[30] PCR, 2016. EUPHEMIA: Description and functioning (July 2016).

Interconnections between Greece and neighbouring countries (2017)



Source: Hellenic Energy Regulation Institute with data from HEnEx.

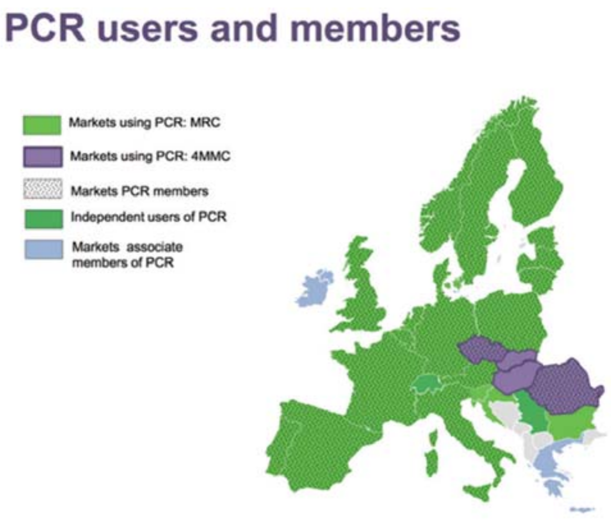
Model, compliant with Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on Capacity Allocation and Congestion Management – (CACM).[31]

PCR is creating a governance structure based on co-ownership and cooperation agreements among its members[32]. The initiative started in 2009 and the PCR parties signed the PCR Cooperation Agreement and the PCR Co-Ownership Agreement in June 2012. The project is currently being operated by eight Power Exchanges, that include EPEXSPOT, GME, HEnEx, Nord Pool, OMIE, OPCOM, OTE and TGE, while it is used to couple 25 countries; Austria, Belgium, the Czech Republic, Croatia, Denmark, Estonia, Finland, France, Germany, Hungary, Italy, Ireland, Latvia, Lithuania, Luxembourg, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and the UK.[33]

[31] Official Journal of the European Union. "Regulation (EU) 2015/1222" (24/07/2015) https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32015R1222&from=EN (Accessed 21 Feb. 2019).
[32] ENEX GROUP. "Price coupling of regions" (2019). http://www.enexgroup.gr/en/market/price-coupling-of-regions/
[33] EPEXSPOT. "NWE Day-Ahead Market Coupling Project - 1st Regulatory Report" (July, 2012) https://www.epexspot.com/document/22762/NWE%20-%20%201st%20Progress%20report%20-%20July%202012 (Accessed 21 Feb. 2019).

Greece in the PCR initiative

While HEnEx's involvement in the initiative is meant to send a clear signal of its commitment to promote the single European energy market in Greece, various political and technical obstacles, create the need to treat cautiously when it comes to the timeframe under which it will become fully operational.



Source: ENEX GROUP
http://www.enexgroup.gr/fileadmin/groups/PCR/PCR_Standard_Presentation_short.pdf

When examining the current status of the Greek market design, we identify a number of issues that need to be addressed in order to achieve a functional implementation of the Target Model. Various aspects of these issues have been addressed with the establishment of the Hellenic Energy Exchange S.A. (HEnEx) as well as with a number of recent regulatory reforms analyzed further into this analysis. However, caution is advised in relation to the timetable and degree of implementation of these reforms in the Greek market.

The main gaps that need to be covered between the current Greek market design and the Target Model include the introduction of a Day-Ahead Market (DAM) to implement price coupling in line with the Target Model, since the current Greek market does not offer price-coupling, the introduction of an Intra-Day Market (IDM) and the supporting trading platform, since currently no opportunities for intraday rebidding exist in Greece, and the requirement for Balancing actions to face a marginal price, since at present, activation of downwards balancing energy in Greece is subject to a cost-based payment.

REGULATORY REFORMS IN GREECE

The most recent regulatory reform related to the implementation of the electricity Target Model in Greece, is Law 1090/2018 published in the Official Government Gazette of the Hellenic Republic on 31/12/2018.[34] The law specifies that the new Balancing Market comes into effect on July the 6th 2019 under the jurisdiction of ADMIE, the Greek Transmission System Operator for the Hellenic Electricity Transmission System. Following the Target Model structure, the Greek Balancing Market includes the Balancing Capacity Market, the Balancing Energy Market and the Imbalance Settlements. Market participants are required to submit bids with the obligation for physical delivery. Under the Balancing Market framework, the new law determines that the Balancing Capacity Market will function with the submission of bids for the procurement of balancing capacity to cover the system's reserve requirements in real time. It also determines the conditions of the function of the Balancing Energy Market with bids to ADMIE for the inflow and outflow of energy into the system. Under the law, ADMIE is the Independent Power Transmission Operator (IPTO) carrying the responsibility to manage the aforementioned markets and balance the system in real time.

The new market design is based on a Central Dispatching Model where the scheduling process and dispatching bids include unit-based instead of portfolio-based participation. The unit-based system comprises

[34] Official Government Gazette of the Hellenic Republic. Law 1090/2018. https://energypress.gr/sites/default/files/media/document_14_0.pdf (Accessed 13 Feb. 2019).

of producer participation in the Day-Ahead Market with one energy bid per generating unit as well as participation in the Intra-Day Market with separate purchasing and selling bids per generating unit. Unit-based participation entails central scheduling performed by the ADMIE in D-1 and real-time balancing conducted by ADMIE in order to dispatch the units to cover the load and reserves, and to centrally handle system imbalances in generation and demand.[35] It should be noted that as a general principal, the Central Dispatching Model is considered as the preferable option in systems where localized market imbalances pose a substantial threat to the security of the system.[36] In the case of Greece, a Central Dispatch is deemed necessary in order to ensure system security and reduced cost of energy delivery to final consumers. This framework includes the use of the Integrated Scheduling Model (ISM) for the co-optimization of the balancing energy (Balancing Energy market) and reserve capacity (Balancing Capacity market). ISM is used for the procurement of simple, half-hour, balancing products for upward and downward Balancing Energy and simple divisible half-hour products for different types of Reserve Capacity.[37]

Forward, Day-Ahead and Intra-Day Markets fall under the authority of the Hellenic Energy Exchange (HEnEx) and are not expected to function before the end of 2019. HEnEx is set to provide access to new liquid energy markets, and new energy trading products, which satisfy the set prerequisites for compliance with the EU target model. Those products should support greater domestic competition, reduce barriers to entry for new energy market participants and allow the effective participation of renewable energy producers in the electricity markets. The regulatory framework for the establishment of HEnEx is set by laws 4425/2016 and 4512/2018 that generate the majority of regulatory change in the Greek energy sector. The Hellenic Energy Exchange in particular, was established by Law 4512/2008 published in the Official Government Gazette of the Hellenic Republic on 17/01/2018.[38] Its shareholders are LAGIE with a 22% share, ADMIE with 20% share, DESFA -the Greek natural gas TSO- with a 7% share, the Athens Exchange Group (ATH.EX.) with 21% share, EBRD with a share of 20% and the Cyprus Stock Exchange with a share of 10%.

At the closing of 2018, RAE, published in the Official Government Gazette of the Hellenic Republic its approval of the new Clearing Entity Rulebook and Market Code.[39] Under this, the Balancing Market is set to initiate operations on the 6th of June 2019. The Code also stipulates that RES units will not participate in the balancing market before the fourth quarter of 2021. This is related to the fact that RAE declares in the Code its will to assess the liquidity of the Intra-Day Market after collecting registered data of twelve months of continuous intra-day transactions, setting a time limit of at least until the third quarter of 2021. The new Market Code sets the time frame for coupling and continuous intraday trading with Italy & Bulgaria in the second quarter of 2020. It also includes guidelines for Market Participants and Pricing, while it regulates Day-Ahead Market bids by setting unit-based bids for conventional power generating units and portfolio-based bids for RES and aggregators[40]. The Code includes the abolishment of the Minimum Variable Cost rule for conventional units. The issue of the Minimum Variable Cost rule has been considered of great importance for the Greek industry since its abolishment is expected to improve conventional unit's position in the system's Merit Order, thus contributing in lower prices in the Day-Ahead Market.

[35] RAE. Qualitative Assessment of the Alternatives for Reorganizing the Wholesale Electricity Market in Greece by ECCO. (13.06.2014) http://www.rae.gr/site/file/system/docs/consultations/30092014/file1 (Accessed 05 Feb. 2019).

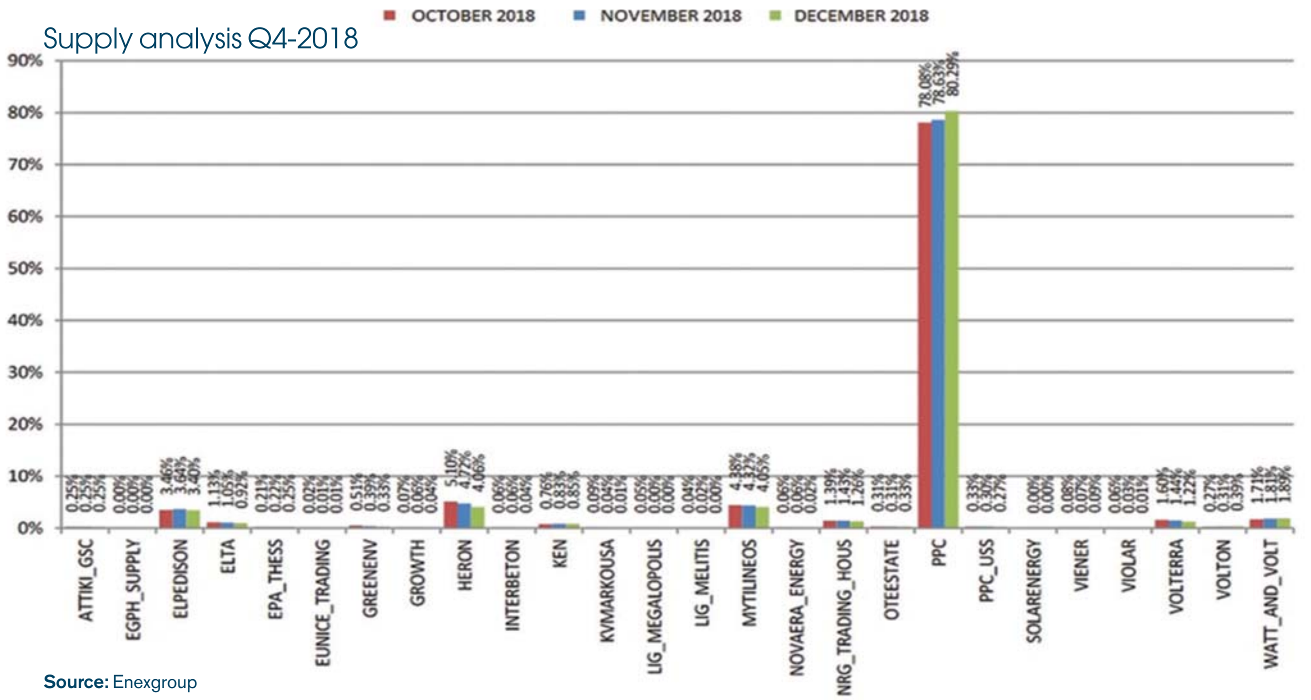
[36] ACER. Supporting Document for the Network Code on Electricity Balancing. (04.08.2014) https://www.acer.europa.eu/Official_documents/Acts_of_the_Agency/ANNEXES_TO_RECOMMENDATION_032015/140806_NCEB_Supporting_Document.pdf (Accessed 05 Feb. 2019).

[37] Biskas, P. "Integrated Scheduling Model for Central Dispatch Systems in Europe". (2015) 10.13140/RG.2.1.4754.3842. https://www.researchgate.net/publication/274953726_Integrated_Scheduling_Model_for_Central_Dispatch_Systems_in_Europe [Accessed 07 Feb. 2019]

[38] Official Government Gazette of the Hellenic Republic. Law 4512/2018. https://bit.ly/2DqDmxc (Accessed 09 Feb. 2019).

[39] Official Government Gazette of the Hellenic Republic. New Market Code 1090/2018. https://energypress.gr/sites/default/files/media/document_14_0.pdf (Accessed 09 Feb. 2019).

[40] A. Metaxas / M. Tsinisizelis, The development of renewable energy governance in Greece: examples of a failed (?) policy, in: Evanthie Michalena/ Jeremy Maxwell Hills (eds.), *Renewable Energy Governance – Complexities and Challenges*, Lectures Notes in Energy, Volume 57, Springer Publications, 2013, pp 155-168. Also, see A. Metaxas (2015), *The Reform of capacity Remuneration Mechanism in Greece – A Challenge to Create New Dynamics in the Greek Electricity Market?*, Renewable Energy Law and Policy Review, Vol 4/2015, Lexxion Publications, Berlin-Brussels, pp. 265-275.



Share (%) of total Monthly Supply per market participant - Comparison for Q4 of 2018

REGULATORY & POLITICAL CONCERNS

Liberalisation of the Greek electricity market remains problematic. Data for Q4, 2018 reveal PPC's dominant position with market shares reaching up to 80%.[41] Such an imbalance carries a significant negative impact in the chance for tangible progress in the Target Model. Progress cannot be achieved before PPC's share in the Greek market decreases at a faster rate. PPC's competitors struggle to overcome customer's reluctance in switching providers as well as functioning in a market dominated by uncertainty about the future.

Uncertainty is intensified by the ongoing delay in PPC's efforts to complete the required disinvestment of lignite units, a fact that presents a precondition before any negotiations about the sale of 17% of PPC's shares can commence. PPC's further privatisation could be the catalyst for the structure of a sustainable, liberalised market model. However critical, the issue of state control over the majority of PPC stocks as well as the precondition for PPC's disinvestment from lignite units remain highly political, thus casting doubts for the future of the entire electricity market. Political concerns related to the negative publicity any government can face with the prospect of losing majority control over PPC, strong opposition for the workers unions, and direct affect in the micro-economies of local communities related to PPC's lignite installations, lead to reluctancy from the political authorities to move decisively forward with the process.

PPC's disinvestment from lignite, however, has a direct effect to the future of the NOME auctions used in the wholesale electricity market. NOME auctions in the current market model represent practically the only option for other suppliers to enter the wholesale market and take advantage of competitive prices. If PPC's disinvestment from lignite units proceeds and is successfully concluded, the NOME auctions system can gradually be replaced by OTC's and the full spectrum of the Target Model functions. If, however it fails, uncertainty about the structural future of the Greek electricity market should be expected to produce a negative impact in attracting new participants, investments and depth to the market.

[41] ENEX GROUP. "DAS_Monthly_Reports" (December 2018) http://www.enexgroup.gr/fileadmin/groups/EDRETH/DAS_Monthly_Reports/201812_DAS_Monthly_Report.pdf (Accessed 21 Feb. 2019).

THE FUTURE

The future development of the Greek wholesale electricity market can be linked primarily on three crucial elements, namely the quality and effectiveness of a fully functioning competition framework in the wholesale and retail market, the implementation of drastically improved transaction and settlement procedures, and the degree of employment of bilateral contracts and Over-The-Counter contracts (OTCs) in the market. Precondition for the above-mentioned elements is the effective implementation of EU regulation by national authorities as well as the determination with which breaches of such legislation on a national level are addressed at EU level. Partial or incorrect national implementation of EU regulation can further deter Greece from substantial market integration and lead to additional distortion in competition. To that end, a stronger stance from the Commission and adequate intervention with launches of formal enquiries in due time in cases of continuous violation of the EU regulation could lead national authorities to withdraw any national legislation that is not -in effect- compliant with EU principles or legislation. The Commission needs to safeguard that national competition and State-Aid provisions are in line with the EU internal market and competition rules[42]. It is imperative that the electricity Target Model is implemented in full force without further delays, in order to accommodate increasing shares of variable renewable energy sources. Implementation of the Day-Ahead Market coupling with Bulgaria and Italy is a crucial step towards this objective. Liquid intraday and balancing market platforms between member states in the region need to come in full function in order to allow market stakeholders to efficiently participate in the market and find counterparts for their flexibility and balancing needs, thus providing depth to the Greek market necessary for the effective application of the spirit and essence of the Target Model in electricity.

CONCLUSIONS

The Target Model holds a key role in the overall design of EU's Energy Union strategy. Although by definition a quantitate policy, indeed the basic concept behind the Target Model falls on an ideological level, under the very core of EU's formation and existence; the creation of a single, integrated, internal market. Although in other aspects of economic activity the concept of free movement of goods and services has progressed adequately, technical and regulatory difficulties has made the transition to a single, integrated, well-functioning, internal market in energy, a challenging task. The Target Model in electricity is EU's key tool in its efforts to fulfil its purpose when it comes to one of the most basic elements of economic activity, the free flow of electricity among its member states. The extend to which electricity affects industrial production, business competitiveness, international trade, energy poverty, security of supply as well as the simplest aspects of everyday life for its citizens, deems the success of the Target Model crucial for the overall course of European integration.

Therefore, the necessity of the Electricity Target Model results from the necessity of creating a single internal European market for electricity removing barriers to trade and aligning electricity markets. For this reason, we provided an analysis of the fundamental elements that constitute the Electricity Target Model. We looked at the necessary reforms in order to achieve the goal of an internal market set by the Target Model and the potential obstacles for their application for the regional market coupling from a regulatory, economical and technical perspective.

[42] A. Metaxas, (2018) Greece - State Aid and the Energy Sector, in: Leigh Hancher / Adrien de Hauteclocque / Francesco Maria Salerno (eds.), *State Aid and the Energy Sector*, Hart Publishing, Oxford, pp. 475-484.

First, we provided a general description of the Target Model mentioning the relative legislation. Then, we sufficiently presented the basic framework of the electricity Target Model analysing the market design that it proposes for each timeframe (Forward, Day-Ahead, Intraday, Balancing Markets). Specifically, we looked at the design of the wholesale markets as it is proposed within the Target Model and we highlighted their utility and benefits. The novelty of our paper consists of the identification of the key factors and regulatory reforms that can permit an expanded utilisation of market coupling as well as the potential obstacles. An important factor is the cooperation and coordination between NEMOs, TSOs and NRAs as well as the role of ACER in the design and implementation process of market coupling. The complete integration of the new markets in a supranational level also plays a significant role in this process. In order to achieve this, the issue of interconnection capacity between member states is critical. Another factor is the integration of the renewables in the electricity system given their extensive participation in the European energy mix. A special focus is being given on the application of the regulatory reforms and the potential obstacles to implement the EU Target Model in Greece. In particular, we presented the current structure of the Greek Market and we highlighted the role of interconnectors in the region given the significance of the cross-border exchanges of energy volumes and prices for the successful implementation of the Target Model. An important role on this has the PCR project developed by the major European Power Exchanges in order to create a single price-coupling algorithm. Greece participates in the PCR initiative by being actually one of the eight Power Exchanges that operate the PCR project which shows the will and commitment of Greece to meet the goal of a successful implementation of the market coupling. Finally, we identified the regulatory reforms for the successful implementation of the Target Model in Greece and we highlighted the regulatory and political concerns which is mainly the liberalization of the national electricity market in view of the dominant position of PPC. To end, we highlighted the key elements related to the future development of the regional electricity markets (including Greece) and we made some suggestions for the effective implementation of the EU regulation within it.

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2 European Commission. "Questions and Answers on the third legislative package for an internal EU gas and electricity market". http://europa.eu/rapid/press-release_MEMO-11-125_en.htm?locale=en (accessed January 10, 2019).

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AN INTRODUCTORY OVERVIEW ON INSTITUTIONAL CHANGE

By Susanne Nies, Managing Director Strategy & Communication, ENTSO-E

This overview provides the reader with a broad perspective on institutional development: What are the different phases of energy policy development on a European level? How will the various stakeholder forae from Florence to Madrid and Dublin evolve in the future? What is the role of institutions on standardization, like CEN CENELEC and how do they interface with the Internatu? Of the new and important structures resulting from the engagement of local communities, like the Covenant of Mayors? What will be the institutional Impact of Brexit, but also of an electricity agreement between the EU and Switzerland? How to frame the energy relations with neighbors like Ukraine, but also the Mediterranean? Should the incoming Commission reconsider the current breakdown of Directorates General into DG ENER, DG Clima, DG Move, DG Research, Technology and Development (RTD), DG Connect, as to address, in a matrix structure, the most burning energy questions of our time? How will sector coupling and digitalization translate institutionally? And how, finally, are the EU institutions and structures interacting in the broader international context, with the UN led climate agenda called COP, the IEA, IRENA, the Clean Energy Ministerial and Mission Innovation?

Volume 8 Issue 3/4, July 2019

THE RISE OF EU ENERGY POLICY OVER SEVEN DECADES

The seven decades of European institutional development on energy have taken us from the initial European Community of Coal and Steel (ECCS) to a complex setting conceived to deliver security of supply, competitiveness and the climate agenda at once. It should be noted here that we mean by Europe until the end of the Cold War the Western European integration project, disregarding institutional developments in the Eastern bloc. The accession of Central European countries in 2004 and 2007 has indeed led to an unprecedented standardization and integration move uniting East and West. It should be noted here as well that the Energy Union was inspired by Poland.

Energy has long been placed under national primacy, even though the European project saw the European Community for Coal and Steel (ECCS) as an early symbol of the new Europe, formalized with the Treaty of Paris, in 1951, and operational as of 1952. This starting point seeing the strategic assets of six European countries under a centralized authority sought to avoid any future war, to make it 'materially impossible', as Robert Schuman put it, by a common oversight on those assets fundamental to warfare. ECCS was conceived foremost for Germany and France: the cooperation of the two was considered unanimously as the *conditia sine qua non* for any European project. The importance of the ECCS can hardly be overestimated and it should be noted as well that it represented the first international organisation built on the principle of supranationalism, ultimately translating into the European Community. 1957 saw the Euratom Treaty being established under the Treaties of Rome. Euratom ensured the cooperation of the six founding members Benelux, Federal Republic of Germany, France, and Italy on this promising new area for energy, and that was also meant to provide a solution for the declining coal reserves as well as the increasing dependency on oil.

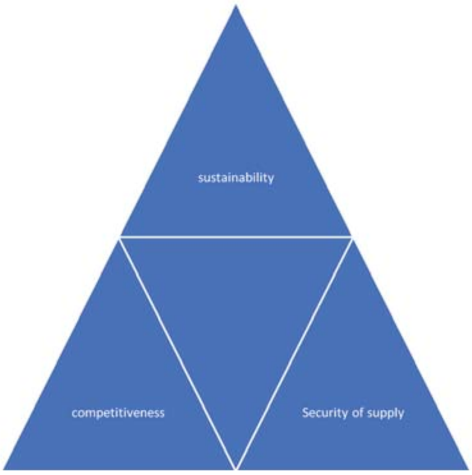
Looking at the complex institutional development that the EU has undergone the following phases of development, and the following types of institutions can be identified:

An initial ECCS phase starting in 1951, expanded to Euratom in 1957 and followed by three decades of national energy policy primacy, and where energy and economic policy were intrinsically linked. These three decades did not take environmental externalities into account but prioritized the strategic asset approach, whereby the State was owning and in charge of common goods like infrastructure, airports, airlines etc.; an approach indeed inherited from the early days of industrialization. The Maastricht Treaty (1992) completed the development from the initial Free Trade Area of the Treaties of Rome to the Customs Union as set in 1968: a unique *sui generis*, first of its kind governance model, labelled European Union was established here. Its uniqueness, called by Jacques Delors the Non-identified European object, is related to the fact that it is nor a state nor a confederation, nor a federation; but something different, and stable in this difference. The four liberties came with Maastricht, representing the free movement of goods, services, capital and labor within the EU. This major shift meant for energy a series of three consecutive liberalization packages. The starting point was of course the 1986 Single Act.

At once the emerging environmental agenda, centering around the discussion on DDT, on dying forests, and acid rain contributed to enhancing the Europeanisation of energy policy from 1996. Environment itself had only been politicized in European countries and later Europe in the early 70s. The paramount publication of Rachel Carsons 'The silent spring' (1962) and the rise of Green parties in Europe have incentivized this shift. It is worth noting that the Greens celebrated their first victory with the first direct elections to the European Parliament in 1979.

TRIANGLE OR OVERLAPPING CIRCLES?

The well-known triangle of Security of supply, competitiveness and sustainability, as below, has been 'invented' in the early 2000s by European policy makers. And the World Energy Council invented, based on it, the notion of 'energy trilemma'. Energy policy has to 'square' the triangle, the implicit assumption being that the three corners are not compatible. Many academic papers have been published on the triangle, and affordability has often been used in lobbyist discussions to question notably sustainability.



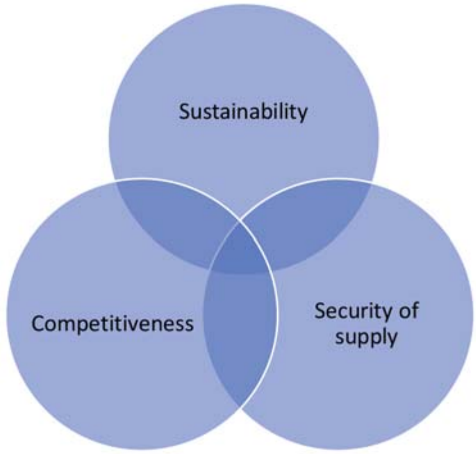
Source: author 2018

However, there is a different way of presenting these three dimensions, and to insist on their deep link and cross fertilization, rather than opposition. For example sustainability is, from an economic perspective, nothing more than putting externalities into the equation. An alternative representation would show overlaps and efficiency gains through an integrated approach to these three dimensions that need each other.

The European Environmental Agency (EEA) was established as early as 1994 in Copenhagen: obviously environment and climate later on proved to be convincing topics asking for more Europe at times where national economic priorities pushed repeatedly back, in the name of an often-misinterpreted subsidiarity. The period of the 90s corresponds thus to a fundamental change of what energy policy is all about: from strategic resources (ECCS) and early strategic innovation clusters at European scale (Euratom) to energy policy,

Market based tools to improve security of supply

Source: Author 2018



Externalities put into competitiveness improving overall competitiveness

Addressing sustainability challenges, like climate challenge increases security of supply; like RES development -solar availability- in Summer 2018

and from energy policy to the famous triangle where competitiveness, security of supply and environmental and sustainability policies are equally important. The article 194 of the Lisbon Treaty that entered into force in 2009 sees energy for the first time mentioned in a European treaty as a community domain. The triangle security of supply, competitiveness and sustainability was conceived in 2006 in the EU Green paper "A European Strategy for sustainable, competitive and secure energy" and has gained a quasi-religious status ever since.[01] Obviously the 'big bang' enlargements of 2004 and 2007, uniting the continent, put considerable emphasis on the security of supply dimension, as a result of the East-Central East divorce it represented at once.

What does the future hold? A new phase of institutional development on energy is likely to see an overarching priority on climate take the lead, encompassing the field of energy, transport, buildings, innovation, as well as a relevant part of digitalization. Agriculture, while being a paramount sector of climate change mitigation is likely to stay out of this climate cluster. More traditional aspects of energy policy will fall under economic and competition policy.

[01] For an overview on institutional development and energy policy in the Sovietunion see https://www.osti.gov/biblio/6116770

Graph: the background for institution building on energy in the EC and EU and a potential future

Source: Author 2018

WHAT INSTITUTIONS?

As a matter of fact, institution building of all kinds is prolific in phase 3, and has not yet come to an end: it includes the institution building in the national context- setting up regulatory agencies, or TSO and DSO through unbundling, as well as informal institutions, expert groups, but also, due to a "democratization" of energy, the various stakeholder groups and NGO that emerge. The future is likely to see internationalization through COP 21 push for new types of institutions, as they started to emerge with Mission Innovation (conceived by IEA) or the Clean Energy Ministerial. The EU is represented as a bloc in all of these.

Our scope of institutions focusses on political institutions, including formal ones, as well as agencies, expert structures, and informal structures. We do not consider pan European interest groups like EURELECTRIC or environmental NGO like the European Climate Foundation or Greenpeace, the Smart energy demand coalition, BEUC or Solar Power Europe, that play of course an important role.[02]

The author suggests to rely on a limitation to 'organisations which create, enforce and apply laws. They often mediate conflict, make (governmental) policy on the economy and social systems and otherwise provide representation for the populous'.[03] The soft fora and working groups that constitute the ecosystem around the above institutions are also taken into account.

THE DEMOCRATIZATION OF ENERGY IN EUROPE AND THE EXPANSION OF INTEREST GROUPS AND INSTITUTIONS, AS WELL AS START UPS

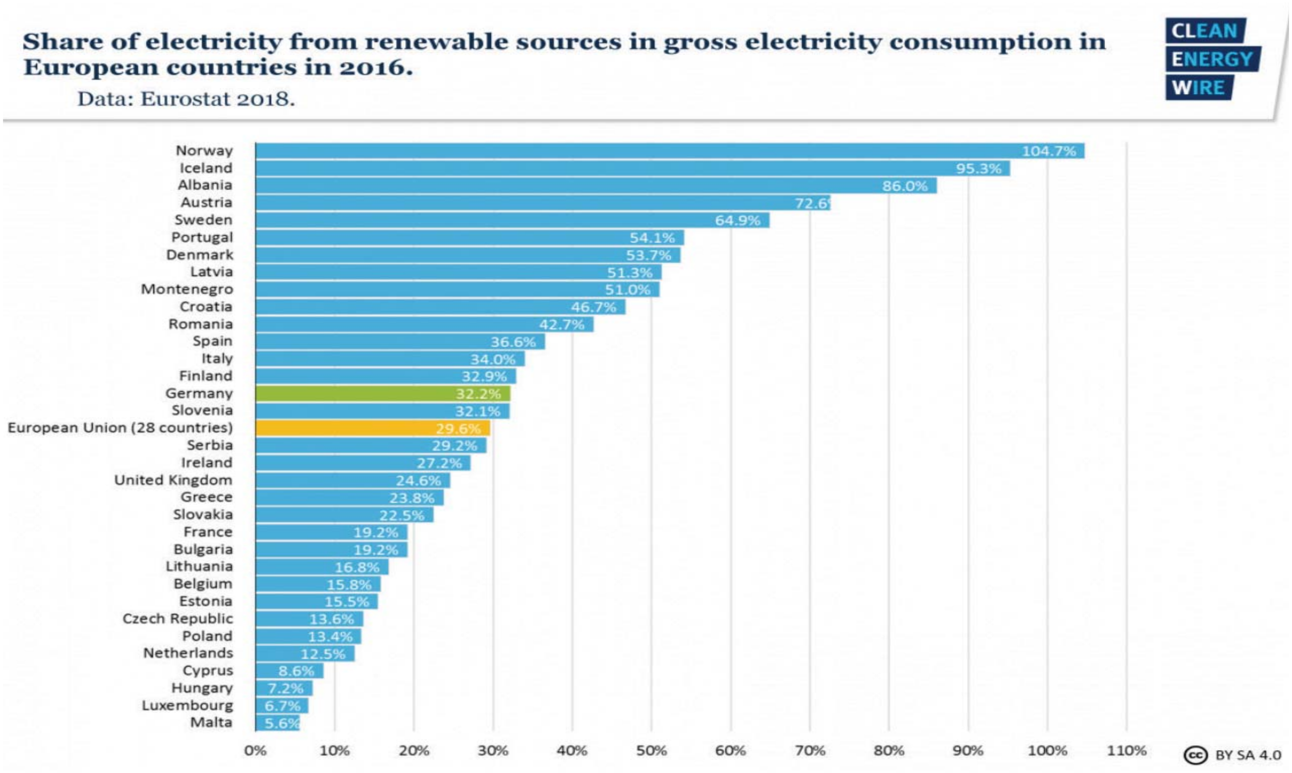
In particular phase 3 has led to an explosion of groups and institutions of all kinds, as a direct result of the liberalization and small scale prosumer type Renewables development, leading in a cascading way to more companies and structures: aggregators could be mentioned here as much as the Covenant of Mayors or e-mobility suppliers. It is also interesting to note that the European energy transition is the first taking place in a context of liberalized markets, different from previous major changes that took place in a state run economy: the number of startups delivering single solutions for energy is unprecedented and contributes to the explosion of cascading structures and interactions.

The German example is illustrative for the multiplication of generators in the last 10 years or so: with 33% of mainly solar- and wind based Renewables in the mix the number of generators, including prosumers, has exploded in the last decade, overhauled business models of incumbents like E.ON and proliferated many new companies.

[02] Robert Schuman, foreign minister of France, 9 May 1950, the Schuman declaration, 'make war not only unthinkable, but materially impossible'.

[03] Initially Jean Monnet wanted Euratom to be part of an enlarged ECCS setting. As the Benelux opposed the French plan a separate authority was created in 1957. Euratom and ECCS have been merged institutionally with the EC 1967 ; Euratom, different from the ECCS the treaty of which expired in 2002 continues to exist and ensures in particular the monitoring of civil nuclear installations, in close liaison with the International Atomic Energy Agency. The UK withdrew in January 2017. It is based in Luxembourg.

New actors such as aggregators bundle services, sell and buy on behalf of their clients. At once new associations and interest groups have emerged at European level, dealing with energy and participating in the expanded stakeholder interactions that the European institutions provide for.



Source: Clean Energy Wire 2018

EUROPEAN COMMISSION, EP, COUNCIL

After having left the era of a technocratic numbering of the General Directorates and the introduction of names to them, energy and transport were put together in DG TREN. In February 2010 both were split. Today DG ENER is organized in six directorates two of which are dealing with Euratom.[04] The European Parliament deals with energy within its Industry, Transport, Research and Energy Department (ITRE). The European Council finally addresses energy at working level through the Energy Working party, that meets every week and is composed of the permanent representatives of the EU member states, and then the Energy Minister Council taking the more high level decisions, with the European Council of Heads of State and Government above it. Commission, Council and European Parliament interact on legislative proposals through the so-called trilogues, like currently with the Clean Energy for all Europeans package. Other Directorate Generals closely related to energy are of course DG COMP, dealing with competition and market abuse; DG CNECT, dealing with digitalization and networks, DG Clima, looking in an overarching manner on climate issues, DG RTD, dealing with innovation -while DG ENER has also its innovation team, working on applied RD for energy and closely interacting with DG RTD. New trends like digitalization and the related cybersecurity will require the next Commission most probably to reconsider how to organize itself between the related DGs.

[04] In French OPNI- objet politique non-identifie, reminds OVNI- objet volant non identifie- the latter referring us to science fiction.

REGULATORY INSTITUTIONS AND THEIR ARCHITECTURE

Energy regulators are represented on a European level through the Agency for the Cooperation of the Energy Regulators, ACER, as well as their "own" association, Council of the European Energy Regulators (CEER). While the second is funded directly by the NRAs, ACER is funded by the EC, as an Agency. Both boards have the same chairperson. The focus areas of the respective actions are clearly defined for ACER by the ACER regulation, as updated with the Clean Energy for All Europeans Package. CEER sets its own work-programme, and typically focusses on those areas that are not covered by ACERs mandates. It should be noted that the expansion of ACERs mandate for example on retail and on the European DSO entity might see the role of CEER further shrink and lead to the risk of duplication.

TRANSMISSION AND DISTRIBUTION SYSTEM OPERATORS AND THEIR EUROPEAN FACES

Transmission system operators as regulated monopolies had already developed a European voluntary organisation for power, ETSO, followed by a mandatory setting up of ENTSO-E with the Third package. The electricity TSOs have also established regional security coordination centers, that they own and that have become mandatory with the System Operations Guideline entry into force. The gas transmission system operators have established ENTSOG, split from a lobbying organisation Gas Infrastructure Europe (GIE).

Distribution system operators have organized themselves on a European level through four associations EURELECTRIC, Geode, EDSO for smart grids as well as CEDEC, and will see with the Clean Energy Package a new structure emerge: the new EUDSO entity. This entity that should be established by the late decade and be fully operational after the entry into force of the new package, will have to deliver mandates and therefore to interact properly with ENTSO-E, on the transmission-distribution interface.

INFORMAL FORAE: FLORENCE FORUM, MADRID FORUM, DUBLIN FORUM

Informal forae were set up by the European Commission during the second liberalization package as a place was deemed necessary were the stakeholders could interact; previously energy policy was a matter of governments, as energy was largely government controlled.. Taking place in a hosting country that covers the cost for the venue, these forae typically gather once or twice a year and ensure an upfront interaction and exchange between European Commission, relevant institutions as well as stakeholders. They are concluded with formal minutes, that provide important input to legislation. The Florence Forum deals with wholesale market integration and was established in 1998.[05] Some forae like the Amsterdam Forum for Renewables or the Berlin Forum initially for Fossil fuels have ceased their existence. The Madrid Forum deals with gas market integration, and the newly established Infrastructure Forum in Copenhagen addresses the needs for energy infrastructure development. Retail and customer issues are at the center of the London Forum that has moved in 2018, because of Brexit, to Dublin.

[05] See chapter Helmut Schmitt van Sydow

THE REGIONAL AND THE LOCAL

Regional energy cooperation provides for the needed level of subsidiarity between Europe and national. The new regional dimension has seen voluntary organisations such as the Pentalateral Forum, the more institutional Baltic Energy Market Integration Plan (BEMIP), and of course the regional structures of the Transmission System operators, the RSC. Regulators have not yet set up their regional more formal interaction. The fact that Europe has a large variety of energy regions: from capacity calculation regions to planning regions has not helped develop a consistent set of regions. Regional interaction has in any case to be consistent with the overall pan-European development.

As for the local, the energy transition with its powerful decentralization paradigm, the rising consciousness on air pollution and quality of life in particular in cities has led to the rise of European structures of local communities, like the Covenant of Mayors.[06] These commit voluntarily to implement the European energy and climate targets. It is the world's largest such initiative and has been launched at the European Commission in 2008. By 2010 it already counted 2000 members. In June 2017 a global initiative was developed from the initial format and has seen the establishment of regional offices. EC should be seen as the initiator of the process to which it has remained close ever since.

COOPERATION BEYOND MEMBERSHIP

How does the EU interact with neighboring countries or regions? First and foremost, dedicated bilateral agreements frame the partnership with these countries: this applies for Ukraine, Moldova or Morocco, to quote some examples. The General Directorate NEAR, formerly neighborhood, is having the lead here. For non-neighbor third countries in the developing world partnerships are set up through the General Directorate for Development, DG DEVCO.

Institutionally the countries of South East Europe, synchronously connected in electricity and members of ENTSO-E (with the exemption of Kosovo), surrounded by EU member States, are organized in the Energy Community, established by treaty in Athens, in 2005.[07] Additional initiatives seek to boost the energy development and integration of the region, like CESEC, but also the WestBalkan6 process. The Mediterranean countries are organized through a common regulatory setting, MEDREG, a common TSO setting, MEDTSO, as well as the Union for the Mediterranean (UMP), and MEDELEC. Advancements in this heterogeneous setting have proved difficult in the past, as political unity was difficult to achieve.

Finally, the Energy Charter Treaty was established in 1994, the immediate aftermath of the Cold war, designated to ease and solve conflicts between countries. It has expanded its activities since and is focusing on a more global scale today.[08]

[06] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=legissum:l27062
[07] See for the development of these structures the contribution by Alicia Carasco and Frauke Thies
[08] Alistair Boddy-Evans, https://www.thoughtco.com/political-institutions-44026

STANDARDIZATION ARCHITECTURE- CEN CENELEC

The paramount importance of statistics and standardization is easily overlooked : without them and the related institutions the integration and the promotion of innovative solutions reaches fast its limits. The framework for energy standards in Europe is CEN -CENELEC, resulting from a new organisational setting between CEN and CENELEC in 2010, required by the European Commission that started to fund it institutionally, based on the corresponding Third package provisions.[09]

The mission is described as follows by CEN-CENELEC : '*By setting common standards that are applied across the whole of the European single market, CEN and CENELEC ensure the protection of consumers, facilitate cross-border trade, ensure the interoperability of products, encourage innovation and technological development, include environmental protection and enable businesses to grow. Products and services that meet these European Standards (ENs) can be offered and sold in all of the participating countries.CEN and CENELEC bring together the national standards agencies of 34 countries. Together, CEN and CENELEC provide a platform for the development of European Standards and other technical specifications across a wide range of sectors.*' As for international cooperation 'CEN and CENELEC cooperate with respectively the International Organisation for Standardisation (ISO) (ISO) and the International Electrotechnical Commission (IEC) to reach agreements on common standards that can be applied throughout the whole world, thereby facilitating international trade.'[10]

THE EU AS PART OF THE GLOBAL ENERGY AND CLIMATE ARCHITECTURE: INCUBATING PHASE FOUR OF A CLIMATE DRIVEN INSTITUTIONAL SETTING?

The global agenda requires an architecture of institutional relations, relating countries and regions within a new ecosystem of institutions. The stagnating Conference of the parties process of the United Nations Framework Convention for Climate Change (UNFCCC) has overcome deadlocks in COP 21. The test comes with 2020, when all signatories have to put their commitments and trajectories on the table. The EU as a signatory has committed itself to align its energy and climate agenda with the COP21 decisions. The Paris Climate Conference of 2015 saw also the establishment of Mission Innovation: a voluntary commitment of EU and 23 countries on the global level to upscale by 50 percent and by 2021 their clean energy related research and to encourage the private sector in the same direction.[11]

The International Energy Agency within the OECD framework and established in the 70s to address the oil crisis, plays an important role as a global clean energy hub and as an authoritative source of facts- and analysis based models. Interactions between DG ENER and IEA have increased recently, as to align more on scenarios and on solutions within the Clean Energy Ministerial, hosted like ISGAN by the IEA, the UNFCCC and Mission Innovation, last but not least. Finally, the International Renewables Energy Agency, IRENA, having 158 members, located in Abu Dhabi, was established in 2008 as to put particular emphasis on the need for Renewables Development. IRENA and the EC cooperate on points of common interest.

[09] https://ec.europa.eu/energy/; see also the contribution by Helmut van Sydow
[10] https://ec.europa.eu/info/events/meeting-european-electricity-regulatory-forum-florence-2018-may-30_en
[11] https://www.covenantofmayors.eu/

LOOKING FORWARD AND RECOMMENDATIONS FOR POLICY MAKERS

We have portrayed, in the above, the colorful landscape of energy related institutions and their recent expansion. New will emerge, some will disappear, and mandates of third will be augmented. The incoming Commission needs to break silos on digitalization, as to deliver. The incoming Commission and ITRE will also have to define in a more systematic manner how the EU Internal Energy Market interacts with non-members, such as UK, Norway, or Switzerland, defining categories of 'associates' and the conditions linked to them. It will thirdly need to ensure the delivery on COP 25, placing the EU in the lead on the climate agenda, and committing its member states to further efforts, including on coal phase out.

The most important task remains therefore to dare an institutional setting that is led by the climate agenda, and encompasses transport, buildings, innovation, digitalization in a more holistic manner. The Long Term Energy and Climate Framework that the EC is set to deliver in 2020 as it committed at COP 21 could be the institutional starting point.

Once in office the new teams will already have to deliver at COP 25. Avoiding the failure of the COP 21 breakthrough is therefore the priority.

[12] https://www.energy-community.org/aboutus/whoweare.html
[13] https://energycharter.org/
[14] https://www.cencenelec.eu/Pages/default.aspx
[15] Quote from mission statement CEN CENELEC
[16] http://mission-innovation.net/

A CHALLENGE TO GOVERNANCE IN THE EU: DECARBONIZATION AND ENERGY SECURITY

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Traditionally in the EU, energy security and decarbonization have been rather antagonistic principles and objectives pursued in separation. Under the impact of climate change as fundamental challenge for the survival of mankind on the planet, these objectives and their policy designs and implementation need to be reconciled.

Reconciling decarbonization with energy security becomes a matter of governance,[03] on a local, regional and global level. An appropriate governance system will have to be in place not only to ensure that decarbonization actually takes place but also to mitigate any potential security risks associated with the transition. The European Union and subsequently the Energy Community have been laboratories in adapting energy sector governance over the last twenty years.

The new European energy and climate governance is part of the Clean Energy Package. While the governance mechanism contains quantitative targets for energy efficiency, renewables and for the reduction of greenhouse gas emissions, the targets for energy security are qualitative ones.[04] The decarbonization commitment took center stage in the European Commission 2015-2019 under the label of the Energy Union, which initially was dedicated to traditional energy security issues.

The governance mechanism of the Clean Energy Package responds to the need to streamline energy policy in view or the overarching decarbonization goal. The whole package aims at promoting new transactional models and technology, reinforces

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[03] Governance can be defined as the "*establishment of policies, and continuous monitoring of their proper implementation, by the members of the governing body of an organisation*", http://www.businessdictionary.com/definition/governance.html.

the approach of setting EU-wide targets to be implemented on the level of member states and, most importantly, redesigns European energy policy by a new governance system based on long-term strategies as well as synchronized national energy and climate plans. The latter are to cover not only decarbonization targets but R&D policies and most notably also goals and actions related to security of supply.

The governance regulation constitutes the cornerstone of the Clean Energy Package.[05] Based on the requirement of drafting a ten-year national energy and climate plan, it includes a biannual reporting requirement for EU member states, a peer-review mechanism as well as monitoring and advisory functions for the European Commission. The national plans are tools for a more strategic energy and climate policy planning in and, taken together, by the EU. This is clearly inspired by the governance of the Paris Agreement. A certain centralization trend in European energy policy[06] will hitherto be complemented, if not replaced, by iterative horizontal and vertical coordination schemes (between member states and the European Commission) of a process which is increasingly decentralizing. This translates the abstract principle of subsidiarity into reality in the sphere of European energy policy, and offers a promising method to reconcile it with member states' treasured sovereignty. In the area of gas security of supply in particular, the EU has been quite successful in improving resilience through more intense cooperation instead of implementation of top-down policies. The new approach has been tested by and improved after crises, which adds credibility for its extension to the energy transition.

Decarbonization, to a large extent, is based on the replacement of fossil fuels by renewable energy resources. The change in fuels will inevitably affect the traditional energy security discourse based on the control over fossil fuels and their supply chains. The characteristics of renewable energy resources, including their relative abundance, local availability and intermittency, but also developments closely linked to their ascent, such as digitalization, technology development and decentralization, should be considered when discussing the impacts of decarbonization on European and global energy security. The focus of future energy security policy is likely to shift from a geopolitical perspective towards a more technological and trade-based one.

THE NOTION OF ENERGY SECURITY

There is no uniform definition of energy security. Very generally speaking, energy security is achieved if energy is delivered in the form, the quantities, at the time and at the location where, when and how it is needed. Yet the interpretation of the term and the importance attributed to it depend very much on local circumstances, which in turn may have their roots in geography, geology, history, economy etc. Based on these circumstances, nations and regions pursue their own energy security strategies. In Europe, as in other regions with a deficiency of fossil fuel production and reserves, energy security has been closely linked to the experience of import dependency, manifested in a series of crises in the 1970s (oil) and early 2000s (natural gas). The gap between demand and local production of fossil fuels continues to exist in Europe. With the production of fossil fuels in the EU rapidly declining,[07] dependency on import of fossil fuels in Europe

[04] For the Governance Mechanism see Ringel, Marc, and Michèle Knodt. 2018. "The governance of the European Energy Union: Efficiency, effectiveness and acceptance of the Winter Package 2016." Energy Policy, 112: 209–20.

[05] Regulation (EU) 2018/1999 of the European Parliament and of the Council of 11 December 2018 on the Governance of the Energy Union and Climate Action.

[06] Manifest in the creation of ACER and the ENTSOs as well as increased competences of the European Commission.

[07] EU Energy in Figures 2018, p. 37.

grows.[08] Import dependency and the vulnerability resulting from it have left a deep and lasting impact on the politics and public in Europe. They created the impression that fossil fuels can be used as political weapons, and promoted security of supply as one of the key objectives of the Energy Union's energy policy.

Concerns about security of supply and import dependency are specifically related to the main exporting countries for oil and gas, and are closely embedded in a geopolitical context. At the same time, it is fair to say that the proximity of Russian gas in particular has allowed Europe to pay a relatively modest price[09] compared to other regions dependent on fossil fuel imports such as Asia.

At the same time, new interconnections and interdependencies will be created also on a local and regional level, in particular through electricity networks. Regionally interconnected electricity grids can increase security of supply but also vulnerability, and in particular augment the dimension of any damage done due to increased reliance of our societies on electricity as a main fuel.

THE NOTION OF DECARBONIZATION

The term decarbonization is a more universally accepted one. The basis for this is the 2015 Paris Agreement. Decarbonization in this sense may be understood as the actions and processes required to fulfil the goal of that Agreement, namely to "*hold*[…] *the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial level*".[10] According to the most recent Intergovernmental Panel on Climate Change (IPPC) Special Report on Global Warming of 1.5 °C, achieving the 1.5°C objective will require a significant drop in greenhouse gas emissions of about 45% already by 2030, and zero emissions in 2050.[11] Decarbonization on such a large scale necessitates a change in energy source supplies for electricity generation, industrial uses, heating and cooling, transport etc., replacing fuels on which the design of the energy sectors since the industrial revolution has been based on, namely fossil fuels emitting greenhouse gases through combustion. Besides replacing energy supply with more carbon-free energy sources, decarbonization will also rely on demand-side measures, most importantly energy savings.

Decarbonization has two main dimensions. It can be understood as a process – often referred to as the energy transition – as well as a result, i.e. a state where a certain critical degree of fossil fuel substitution has been achieved. In the context of the energy security discussion, it is helpful to distinguish decarbonization as process from decarbonization as a result or condition. The former has started in many countries and regions already some time ago, and is gaining momentum. As any deep transformation of systems within a relatively short timeframe, the energy transition comes with high complexity, different dynamics around the globe, risks of inefficiency but also structural disruptions. In its most recent report, the IPCC described the transition required to achieve decarbonization at the level of 1.5 degrees as "*rapid, far-reaching and unprecedented changes in all aspects of society*". Potential impacts from the process of the energy transition on energy security is the more pertinent and imminent issue, and should be discussed with priority. That does not exclude that new (and some old) energy security risks will manifest

[08] It is currently above 50% of demand. Most recent energy statistics, however, show that import dependency peaked in 2015 for all fossil fuels except natural gas where it still increased in 2016, EU Energy in Figures 2018, pages 24, 55, 67. In 2016, the EU's dependency on gas imports was at 70.4%. For hard coal, import dependency in 2016 was at 61.2%, for petroleum and products at 86.7%.

[09] In some regions of Europe, the lack of interconnectivity combined with abuses by the dominant supplier, have led and partially still result in higher prices than achievable under more market-based conditions. This has triggered regulatory interventions in particular by competition authorities.

themselves once decarbonization has been achieved, which according to the level of ambition required by the Paris Agreement will be in around 30 years from now.

Decarbonization is a truly horizontal objective, requiring the substitution of fuels and saving of energy regardless of which sector of the economy its usage has been traditionally associated with. The energy sectors of power, heating & cooling and transport are already becoming more interconnected (sector coupling). Decarbonization will further blur the borders between and ultimately challenge the very concept of sectoral policies created around individual industries such as energy policy, transport policy, agricultural policies etc.

ENERGY SECURITY AND NATURAL RESOURCES

The traditional energy security discourse, to the extent embedded in geopolitics and international relations, originates in the uneven distribution of fossil resources locally, regionally and globally. Unequal distribution of fossil fuels has led to asymmetric mutual dependencies, and to conflicts at times. Decarbonization will deeply affect the established relations of interdependence between producers and consumers of fossil resources on a global and regional level.

In regions where the production of fossil fuels does not cover the demand – such as the EU[12] – the main *topos* in the energy security discussion has been dependence on imports, its reduction or at least diversification. By contrast to fossil fuels (and electricity generated therefrom), fuel costs for renewable energies are zero or close to zero.[13] To the extent decarbonization is achieved by switching to locally available renewable fuels and energy savings, it also enhances the security supply of countries and regions with a deficiency in natural resources, including large parts of Europe. Decarbonization in this sense reduces dependence not only on imported fossil fuels, but also replaces the traditional supply chain for these fuels, including ancillary aspects such as the predominance of the US currency and the risks associated with transport and transit, ashore and at sea. Risks associated with transit have traditionally played a big role in the parts of Europe depending on pipeline gas.

Yet it is important to keep in mind that decarbonization will not happen all at once. During the transition, "classic" supply security issues e.g. for oil products might become even more pressing. The shift of energy demand towards Asia-Pacific comes into play here, as does the relative loss of market weight of Europe. Refineries in Europe will be increasingly under pressure and import dependencies from Asia and the Middle East for refined products might increase. In this complex situation, regions such as Europe face the Herculean challenge in their policy of making the energy system more sustainable while at the same time guaranteeing the supply of fossil fuels for a transitional period without perpetuating the existing energy mix and system.

Moreover, the EU will be affected by the ramifications for resource-rich countries which have and still are benefitting from an excess in natural resources, oil and gas have an economic as well as a strategic value which can be disproportionately high in relation to the GDP or the geopolitical power the country concerned would otherwise hold. Decarbonization affects the value of fossil fuel reserves. This concerns different fossil fuel resources differently. In the short term, oil (at least in the energy sector) and coal are likely to be more affected than natural gas, which has established itself as a bridge fuel in the energy transition. In the long term, the future of natural gas is questionable as well.[14]

[10] Article 2 of the Paris Agreement.
[11] https://www.ipcc.ch/news_and_events/pr_181008_P48_spm.shtml
[12] In the European Union, energy production is on the decline. In 2016, the EU-28 produced 759 Mtoe, EU Energy in Figures 2018.
[13] This concerns the generating source. Investments costs, infrastructure costs including costs to balance intermittency are not considered.

The very notion of decarbonization requires that a large share of the existing reserves in oil, gas and coal will have to stay underground as stranded assets. For producer countries and regions, the energy transition and the prospects of decarbonized societies raise serious economic and social concerns as the rents to be distributed across the value chain will shrink. Countries rich in fossil fuels may be inclined to perceive decarbonization as a risk for their socio-political stability and, possibly also for their own energy security at home. Instability and geopolitical turmoil in the neighborhood might be proliferated. Europe will have to closely observe and support the energy transition (also) of its oil and gas rich neighbors.

DECARBONIZATION AND THE SUPPLY SIDE

Arguably the most important aspect of decarbonization with relevance for energy security will be the replacement of fossil fuels by renewable energies. Fossil fuels still account for the large majority (around 70%) of the entire world energy production. But the share of renewable energy sources has been rising and will further rise all over the globe.

In Europe, gross electricity generation from renewable sources was at 30.2% in 2016, which corresponds to 41.6% of installed capacity.[15] They have already become the most important fuel for electricity generation, more important than fossil fuels. The decarbonization of the electricity sector is in full swing. Besides the consumption-based renewables target for 2030 of 32% in the European Union, several member states have announced to completely decarbonize their electricity mixes by that time.[16] This trend is supported by drastic cost reductions in the technology used for generating electricity renewables. By 2020, the costs of renewables technology is expected to be equal to the costs of fossil fuel-fired generation, or even below.[17] By contrast, the share of renewables in other sectors such as heating and transport has not reached a similar scale yet.[18] Decarbonization based on the Paris Agreement will require the penetration of renewable energies in these sectors to increase as well.

The process of replacing fossil fuels by renewables changes the energy mix of individual countries and regions. While energy mixes have always been subject to evolution and affect energy security just because they are changes, decarbonization within the timeframe of only a few decades means more significant and radical changes. Moreover, the specific features of renewable energy resources and the technology and business models used for their optimization offer chances and pose new challenges to energy security.

Local availability and lack of scarcity

Renewable energy is generated from natural resources some of which can be found almost all over the globe, albeit not in the same intensity. This goes for the sun and the wind, to a lesser extent also for biomass and water. Universal availability and accessibility mitigates a major cause for energy security concerns, the uneven distribution of fossil fuels and the dependence on energy imports resulting therefrom. Sustainable economic development is the third paradigm besides energy security and climate protection. Renewable energy is an important enabler for human and socio-economic activities.

[14] Among other factors, it will depend on the future role of carbon capture and storage (CCS).
[15] EU Energy in Figures 2018, p. 88, 90, 91, 92, 93, 96, 98. The most significant renewable energy sources are hydro (38.7% of all electricity generated from renewables), wind (30.9%) biomass and renewable waste (18.4%) and solar PV (11.3%). Solar and wind account for 26% of installed capacity in 2016, wind for 15.6%.
[16] This is the case e.g. for Austria.
[17] IRENA, Renewable Power Generation Costs in 2017.
[18] Global heat generation by renewable energies was 5,5%, EU Energy in Figures 2018, p. 17.

While the impact of renewable energy is mostly discussed from the perspective of electricity generation – and we will take that viewpoint too – the replacement of fossil fuels either by adding biofuels and –gas, or by producing gas entirely from renewable sources (green gas) or excess electricity (synthetic gas) will play an important and beneficial role for energy security in the future.

Universal availability and accessibility do not entirely dispose of security concerns though. The power of the sun and the availability of wind differ depending on geography (land-locked areas can evidently not use the possibility to generate electricity from offshore wind, the solar radiation intensity differs across the globe etc.) or topology (affecting the conditions for onshore wind, small, large, run-of-river- or pump-storage hydropower, geothermal energy etc.). As in the case of fossil fuels, economic conditions also affect the accessibility and exploitability of renewable energy sources, and hence the possibility to take advantage of the security dividends they offer. They partially explain why Germany, where solar radiation is not particularly intense, became a front-runner in the deployment of PVs. Concerns about sustainability in case of biomass, biofuels or large hydro power plants also affect their availability on a large scale and over longer periods of time.

History also knows many instances of conflict for renewable resources as well, in particular access to water as a source of power generation or for other purposes.[19] New interdependences and even potential crisis may occur through imports of electricity generated from them. Large transnational or even transcontinental connectivity projects based on renewables are also affected by (geo)political developments such as political frictions.[20]

Being renewable rather than depletable is another advantage of renewable energy sources over fossil fuels. Their abundance manifests itself in lower variable costs of electricity production but also in increased energy security.

Yet this abundance is by far not absolute. The steady availability of water, wind and solar radiation depends on circumstances not controllable by humans, whereas biomass needs to be actively cultivated. The intermittency of solar and wind power in particular has posed and continues to pose security challenges to electricity systems which were frequently designed for baseload power generated from fossil fuels. The resulting energy security risks are mostly of a technical and/or commercial nature, which does not necessarily exclude their geopolitical relevance. The electricity system needs to be constantly in balance, and thus requires reserve capacities or storage. Experience so far, and the innovation trends suggest that solutions for the security risks associated with intermittency are available. Yet they need active design and support in planning and managing the energy transition.

Intermittency and energy security

Compared to electricity generation on the basis of fossil fuels, intermittent renewable energy resources require additional efforts to keep the networks in balance over different timeframes. Network operators and regulators are coping with the challenge as the renewable energy share increases. Measures are being taken to keep electricity supply security on the same level as decarbonization continues and volatility increases. They include technical and commercial arrangements such as balancing and redispatching, increased investments in smarter networks and regulatory tools such as the development of capacity mechanisms. On European level, the Clean Energy Package includes rules aimed at improving the institutional and procedural framework for maintaining security of supply standards also in times of decarbonization. One feature in this respect, taking into account closer integration of networks and markets and hence increased vulnerability, is a stronger focus on regional cooperation and governance. This may be interesting also for regions outside Europe where grids are being interconnected across borders.

Meeting the challenge of intermittency is being supported by technical innovation, in particular through the improvement of storage technologies which until now have not been systematically available. As much as the existing and new technologies and interventions targeted to cope with the renewables-inherent challenge of intermittency help keeping up or even improving energy security, they also raise new questions. One is related to costs, another one to the access to new technologies and the natural resources needed to produce them.

[19] In legal terms, see the 1997 ICJ judgment in the illustrative case of the Gabcikovo/Nagymaros dam project between Hungary and Slovakia.

[20] In Europe, the best-known scheme of this kind was the *Desertec* project.

DECARBONIZATION AND THE DEMAND SIDE

Besides the effects of the replacement of fossil fuels by renewable energy on the supply side, the impact of decarbonization on energy security will also depend on the development of demand for energy on local, regional and global level.

In Europe, overall energy demand has been declining.[21] This has to do with demographic reasons but also with energy efficiency measures kicking in. In the European Union, the overall energy intensity has been drastically decreasing, although not in the energy consumption per capita.[22] A decreased demand in fossil fuels improves security of energy as much as it contributes to attaining the objectives of the Paris Agreement, and does not come with the risks attached to the growth of renewables in electricity production. Demand-side measures and energy efficiency in particular deserve to be prioritized at least during the energy transition, to the extent they are cost-efficient. The European Union endorses this approach by putting energy efficiency first.

Economic and technological developments may result in demand increases,[23] including non-projected ones. Growth in overall energy demand or change in demand patterns etc. may slow down the pace of decarbonization as much as developments on the supply side, including a potential decrease in prices for fossil fuels. On the other hand, energy demand may also further decline on account of the economic development, or a global competition for industrial customers based on lower emission standards (carbon leakage), tax burden or similar factors in certain jurisdictions. The political consequences of fears for decrease in investments or even de-industrialisation may include abrupt policy changes affecting the energy transition in a disruptive manner. As a matter of fact, a whole number of factors may lead to slow-downs, aberrations from or even U-turns in a transition based on the assumption of swift and incremental renewable deployment. Uncertainty about the course of future developments needs to be factored in when designing energy policy and infrastructure for decarbonized energy sectors. Without some degree of flexibility and back-up options for cases of changing circumstances, the reconstruction of the energy systems as such may become a risk to energy security.

One particular manifestation of the interdependence between decarbonization, energy demand and energy security relates to auto-production of electricity by consumers on the basis of renewable energy sources. Commonly referred to as prosumers, these customers reduce demand for electricity produced and sold by utilities. Adaptions to the market designs and regulatory approaches are needed to ensure social justice as well as energy security.[24]

[21] In 2016, the gross inland consumption of EU-28 accounted for 11.6% of global energy demand.
[22] EU Energy in Figures 2018, p. 115, 116, 117.
[23] E.g. in the IT industries, where additional electricity is needed for servers, data mining etc.
[24] See Energy Community Secretariat Policy Guidelines PG 01/2018 of 5 February 2018 on the Grid Integration of Prosumers.

DECARBONIZATION AND THE TECHNOLOGICAL HARDWARE

The wave of innovation triggered by decarbonization affects the entire energy sector, from the way how energy services will be provided in the future to the design of the technology required to generate, transport and store it. It may be expected that at least some of the other nascent technologies such as storage, hydrogen etc. will take a similar course as renewable energies.

With the increase of freely available resources we are moving from a fuel-based to an equipment-based energy industry. Value will be created by the availability of this technology. Some countries and jurisdictions are more advanced in this respect than others. These advantages are due to tools such as well-defined R&D policies, industrial policy and strategic investments, intellectual property rights, the possibility to scale up production etc. These features and instruments will not only decide about economic success in times of decarbonization but also and ultimately about energy security. Just as the control over and access to fossil fuels was decisive to secure energy supply in the traditional energy world, control over and access to the technology will create new relations of dependency. As a matter of strategic rather than merely technical importance, it needs close observation and possible active intervention by policy makers.

The shift from a fuel-based to a tech-based energy supply chain as a result of the combined factors of renewable energy resources and innovation may create new monopolies relating to the raw materials needed in the production of some of the new technologies as well as to the technologies and the know-how needed to manufacture them.

Raw materials

Many renewable energy, storage and other technologies rely on rare earths and minerals like lithium or cobalt. They are natural resources with features similar to fossil fuel resources such as unequal distribution, scarcity and monopolization. And similar to the early days of fossil fuel exploitation, a race for the places on the globe were they are concentrated is going on. This creates dependency and ultimately risks energy security. Yet, recycling and the circular economy may positively affect this dependency.[25]

Technology dominance

Even more as the raw materials needed to produce them, know-how, intellectual property rights as well as the possibility to mass-produce the technology on which the energy transition relies give economies a head start in the energy transition. They also create new dependencies between those who control the technology and those who depend on them. Advantages may be the result of a well-designed R&D policies and fair competition. But they also may result from state intervention allowing domestic companies to scale up production, weak IP enforcement or granting of production or export subsidies or other support to national champions. In any case, it seems as the race for technology leadership between different countries and regions is already on.

The instrument designed to deal with market barriers resulting from distortive practices in both the quest for controlling raw materials and controlling technology on an international level is trade policy and trade law with the World Trade Organization offering the rules and also the dispute resolution. The system is currently struggling in the face of a renaissance of national sovereignty, unilateral action and trade wars. A situation where multilateral institutions and procedures are weakened may indeed lead to energy security issues as the EU very much relies on functioning markets in and outside the EU as well as rule-based order.

At the European level, the focus on individual technologies and trade is increasingly affecting conventional energy policy, which hitherto was mostly concerned about markets and structures in a technology-neutral manner. Open and non-distorted markets and their integration across Europe remain the cornerstone (also) for energy security.

[25] Andreas Goldthau, Martin Keim, Kirsten Westphal: The Geopolitics of Energy Transformation, SWP Comment 2018/C 42.

DECARBONIZATION AND THE NETWORKS

Together with the increase in the share of renewables, the overall volumes and relative importance of electricity in the energy mix will grow in general. This trend is fostered by enhanced battery storage technology and sector coupling on the basis of transformation of (excess renewable) electricity to other fuels (power-to-gas etc.) and back. Electricity is about to become the universal standard fuel in and from which the other energy carriers will be converted (sector coupling). Yet, the gas grid may also serve as a means to transport and store energy e.g. green and blue gases. This requires an integrated electricity and gas network planning which can be accommodated under the process of Ten-Year-Network-Development planning at the EU level.

While renewables-based generation makes our societies and economies as a whole less dependent on fossil fuel imports, it exposes them to dependence on electricity.

At least for the foreseeable future, electricity will remain a network commodity. The increased importance of electricity for our economies corresponds to dependence on the electricity networks for a greater share of energy supplies. The increased dependence on networks also raises new security issues. Decarbonization will not allow for an attitude of splendid isolation. With increased interconnections, the major electricity networks will be as geopolitically relevant as pipelines are today in Europe.[26] At the same time, the trend towards decentralization affects the grid topology and, ultimately, also its security.

As much as the networks are the backbone of decarbonization, they may also be its Achilles heel. While we may expect technology and innovation, to provide some answers and assurances in this respect – e.g. by improving electricity storage based on batteries including in electric cars or power-to-gas/power-to-x solutions – some areas of concern may remain.

Increased investment demand

Networks need to be maintained and developed which requires investments of a considerable magnitude. With new features introduced with decarbonization such as intermittent supply, demand-side activities, prosumption, storage etc., the level of investments required increase as well. Underinvestment generally jeopardizes the security of energy systems, which will be amplified with respect to the (electricity) grids required for a decarbonized economy. New infrastructure elements, e.g. the charging devices required to enable electromobility, will further increase investment needs.

At the same time, increased global investment activities have also been raising concerns. Europe is subject to a manifest interest by strategic investors from third countries in its electricity infrastructure such as the state-owned State Grid Corporation of China (SGCC). There is an obvious trade-off to be made between attracting the investments needed for an infrastructure upgrade in the face of energy transition challenges, including the maintenance of supply security, and the maintenance of sovereignty and control over the backbone of our societies.

Critical infrastructure

The existing electricity grids are susceptible to damages and disruptions which may originate in natural disaster – the likelihood of which increases due to climate change – terrorism or other criminal behavior. Their qualification as critical infrastructure requires an adequate protection regime to be in place. In the European Union, the 2008 Directive on European Critical Infrastructures[27] aims at providing an overall framework on top of the general electricity security rules (currently under revision).

Interconnectivity and 'supergrids'

Electricity networks will be increasingly interconnected across borders and regions. In the European Union, this development has been manifest for some time already. The 15% interconnectivity target for 2030 is underpinned by an enabling framework to promote

[26] With the exemption of the concept of classic transit countries as they are (still) common in gas transportation.
[27] Directive 2008/114/EC.

further cross-border integration of the energy networks.

Flows of electricity in "super grids" at the speed of light in interconnected networks do not lend themselves to a geopolitical use of energy and strategic interventions (such as disruptions of fossil fuel supplies) which have defined the energy security agenda in the past. They are replaced, or at least complemented, by new risks and vulnerabilities of a more technical nature. As a consequence, security of electricity supply increasingly turns into a concept addressed operationally through the management of networks, ensuring generation and system adequacy and precautions for crisis management. The decisive actors in this new world of infrastructure vulnerability are experts rather than diplomats. Moreover, vulnerability in an interconnected electricity network is different from pipelines essentially still subject to a one-way flow of the fuel transported. As risks and damages may affects producers and consumers alike, the vulnerability is a joint one. This may help reducing geopolitical tensions and conflict.

Yet this shift from strategic to systemic energy security does not necessarily mean that the overall level of energy security increases automatically. Interconnection and increased dependence on electricity supply increases the impact of any serious damage done to the network. The impacts of a blackout, caused by technical malfunctions or malicious actions, may cascade to all network levels and have disastrous consequences for societies and human life. Nor does interconnectivity fully dispose of geostrategic elements in network security. Recent experience in South Eastern Europe for instance shows that interdependence based on interconnected networks for electricity is no guarantee against conflict.

Decentralization and 'microgrids'

In parallel to the (centralistic) trend of interconnection between high-voltage transmission lines, decarbonization promotes the decentralization of electricity systems and grids. In Europe, liberalization of the markets have triggered a certain decentralization of the energy systems already by challenging monopolies, multiplying the number of actors and the transactional models. But decarbonization is about to accelerate this development. In terms of market development, renewable energy generation is less prone to monopolization than fossil fuels, at least to the extent it depends on public goods such as the air or the wind. In terms of business models, the focus of utilities will be increasingly on end use and the provision of energy-related services. In terms of the energy networks, electricity generated from renewable sources is increasingly injected at the distribution level, in particular when produced by individuals, energy communities and other actors emerging in the context of the energy transition. Increasingly autonomous production on household level and peer-to-peer exchanges transform the locally operated networks further into microgrids, or even off-grid installations.

In the EU, where decentralization creates pressure towards a reorganisation of networks and markets while the existing infrastructure architecture continues to be used, this trend also puts strains on the system, and hence on energy security. Decentralization significantly increases the complexity of our energy systems, to which it adds new stakeholders, transactional models and production/consumption patterns. The European Union attempted to address that complexity by putting the consumer in the center in its Clean Energy Package. Taken together with the digitalization trend, decentralization requires new coordination models which are yet to emerge. Specific issues already under discussion include increased congestion and costs associated with intermittency, issues of equal access and affordability (reflected also in network tariffs) as well as cyber security (also) on the level of distribution networks and individual households (smart meters). More generally, the decentralization trend may blur boundaries and the allocation of responsibilities and hence eventually may challenge country's authority over and capability to influence energy security.

DECARBONIZATION AND DIGITALIZATION

The increased use of digital algorithms for the optimization of energy network and system has not been caused by decarbonization. SCADA[28] systems for the operation of generators and system operators, for instance, have been in use for some time already. But digitalization gains in importance in the energy transition, as an enabler of new contractual models and technological development (block-chain, aggregation models, internet of things etc.) and, in the form of smart grids or storage systems, as a source for collecting and exchanging real-time data, and hence an necessity for managing the manifold challenges of the energy transition such as balancing volatile supply and demand patterns. In principle, all participants in the energy value chain, including consumers, benefit from increased digitalization. Yet, two security risks associated with digitalization are data protection and cybersecurity.

Data protection concerns arise particularly in connection with smart meters which rely on the collection and computation of real-time data from consumers. They may exacerbate if IT companies penetrate further in the energy sectors. Concerns about the use of energy-related data are not specifically linked to energy security, but may aggravate the impact of criminal attacks targeting the codes. Concerns as to too lax levels of data protection may also affect the pace of the energy transition.

Cybersecurity, on the other hand, is one of the most evident and direct security concerns related to the energy transition. Digitalization and the prevalence of internet-based communication expose an energy system which is interconnected not only in energy terms but also through the WWW. The ensuing exposure goes beyond criminal activities. It has a geopolitical dimension with respect to potential attackers and may get as serious as cyber warfare or terrorism. The technical dimension relates to the impact of a cyber attack on the energy systems, as well as the detection of malicious codes and possible defenses against them. The potential impacts of an attack not only on the energy sector but way beyond are appalling. This is not a theoretical scenario; the Stuxnet attack in Iran in 2010 as well as attacks on Ukrainian electricity distribution systems and other installations in and after 2015 show the seriousness of this risk. Cyber security and protection against attacks requires new governance solutions in coordinating actors from in- and outside the energy systems, but also across borders. The European Union is currently concerned with reorganizing and reinforcing its cybersecurity governance which is still fragmented.[29] It is to be assumed that the topic will feature even higher on the agenda under the incoming administration.

[28] Supervisory control and data acquisition.
[29] The so-called NIS Directive 2016/1148/EC which focuses, inter alia, on the energy sectors oil, gas and electricity.

CONCLUSIONS

The European Union, to some extent, reacted to this need to de-compartmentalize energy policy with the Clean Energy Package, and in particular its Regulation on Governance of the Energy Union. That, however, is only the beginning of the required reformation and streamlining of all sectoral policies, which are still widely oriented based on different focus, competences and instruments. Energy security is and will be no exception in this respect. Traditionally, its geopolitical aspects have been covered by foreign affair offices ("energy diplomacy"[30]), whereas the technical aspects are mainly taken care of by system operators, line ministries and regulators. In the future, the preemption and mitigation of risks occurring from within the energy industry and systems has to be addressed more broadly. Due to the holistic effects of decarbonization, risks will have to be identified and addressed by all actors involved, including outside the energy sectors. Cybersecurity is a good example in this respect. Just as the risk of manipulations of our digital codes cannot be addressed within the confinement of one sector alone, the risks associated with the energy transition may manifest themselves in essentially any technical, economical or other subsystem of our complex modern-day societies. Along with the evolution of new concepts, the term energy security may also have to be replaced by a more comprehensive one.

In a situation where future energy security issues resulting from global decarbonization are difficult to predict, developing a governance fit for preventing or tackling them in both an effective and realistic manner deserves special attention. The technical innovation should be followed by governance innovation. In this respect, the Paris Agreement created a gold standard. Its specific elements can serve as points of departure when discussing an extension of the Paris governance to the interface between decarbonization and security of supply. A relative have-not in terms of natural resources, Europe's wealth is an immaterial one, namely its experience in developing and testing governance models to be shared with the rest of the world.

[30] The concept of energy diplomacy has more recently been complemented by the concept of "climate diplomacy".

THE EU´S CLEAN ENERGY FOR ALL EUROPEANS PACKAGE CREATES NEW PERSPECTIVES FOR DSOS

By Richard Vidlička, Board of Directors member, E.DSO - European Distribution System Operators and Manager of EU Projects and Innovations, ČEZ, a. s.

The longest-awaited event in the European energy sector, since the Third Energy Package came into effect in 2009, is the adoption of a new set of Regulations and Directives, publicly known as the Clean Energy Package (CEP). It sets binding targets, ambitions, market rules and active energy market players' roles for the next decade. The implementation process has not been accomplished for all related legal acts yet (at the time this article was written), but the political agreement has been achieved and the content of the new provisions is already known. Due to the necessary fight against climate change, the European energy sector is going to adopt more *ambitious environmental targets.*

These broadly correspond to the following areas:

- Greenhouse gas emission reduction
- Renewable Energy
- Energy efficiency
- Interconnection
- Clean mobility
- EU financed programmes – innovations, research and development

It is not appropriate to see the CEP only as an act setting environmental targets and measures. The revolutionary step I see is a very significant signal sent to customers – namely *customer empowerment*, which is now one of the top priorities of European policy making. Last but not least, we need to strengthen our energy infrastructure in order to be able to adapt to, and even embrace, all phenomena and symptoms of a modern era – decentralisation, digitalisation, cyber security, etc. Therefore, *grid resilience*, including intensive system operator coordination has been included in strategic targets. The ambitious new targets and foreseen changes to the energy system must also be accompanied by a commonly shared acceptance (i.e. mind-set change) and by a general framework adjustment. For that reason, new Regulations and Directives have amended a large part of the present framework. The prepared legal acts set new terms for renewable energy, energy efficiency, and energy performance in buildings, governance, electricity regulation, electricity market design, risk preparedness and the role of the EU's Agency for the Cooperation of Energy Regulators (ACER).

The further text tries to provide a very brief overview of distribution system operators' (DSOs) roles and depicts DSOs noted reactions to the CEP.

The most European electricity distribution system operators, regardless if they are unbundled or integrated, have welcomed the updated climate and energy legislative framework. The energy sector generally understands the CEP as the pathway to a larger integration of the European electricity system, a completely liberaliszed market and a carbon-free industry. While conditions and market design in particular member states still diverge, there are principal CEP areas which affect all the DSOs. Among these, I consider the following as most important: market design, energy efficiency, risk preparedness and the regulatory framework (especially the ACER Regulation). The Clean Energy for all Europeans Package is the European commitment to the Paris Agreement, with two new binding targets for the EU for 2030 ("renewable energy target of at least 32% and an energy efficiency target of at least 32.5% plus interconnection target of 15%, following on from the 10% target for 2020"). Some Directives and one Regulation have already been published in the Official Journal and the texts of the remaining files are commonly known and can be consulted, following the adoption through the European Parliament. Instead of a reproduction of their content, the remainder of the article therefore concentrates on the spirit of the law – a mind-set change, and the DSOs'general approach to the energy transition.

The headline reads about new perspectives to DSOs. Why? Is it a "cliché"? Or a politically neutral formulation? In my opinion not at all. DSOs have really changed their mind-set in a dramatic way. I do not see evidence of an absolute consensus, which doesn't exist, but commitment to join the debate on cross-sectional long-term issues and in preparedness to cooperate with relevant stakeholders. For many years, DSOs were considered as strictly technical entities, among others responsible for security of supply, and were said not to be interested in a larger cooperation and in an innovation process. While such a description has never done justice to the actual role of DSOs, a transformation is on the way. Higher DSOs' self-confidence, orientation on customer needs and also energy sector decentralisation have caused a change in the behaviour and overall DSOs reputation. DSOs, their management and predominately DSO associations have accelerated their activities and organised conferences and seminars, issued many insight papers and led or participated in countless innovation projects during the last few years. The leading DSO associations (E.DSO, Eurelectric, GEODE and CEDEC) have issued many "joint public statements" which could contribute to an ongoing debate on the CEP and other issues as well. These statements also led to a better technical awareness of Flexibility, Grid Automation, and Active Network Management, etc. Referring to all pre-mentioned DSO activities, I assume that distribution system operators have by themselves realised their future roles and the CEP is helping to anchor those roles into a new concept. Therefore, there is no contradiction between the framework of "Clean Energy for all Europeans" and DSOs' own understanding of their role. The mindset has been transformed.

The importance of DSOs' roles in general in formulating and fixing the new framework has already been mentioned several times. The most important role they play is that all *electricity distribution system operators are neutral market facilitators*. This point seems to be crucial for further understanding electricity distributors' motivation. All the process changes, new technology deployments and legal framework amendments do not foster profit maximisation or bigger market share gaining.

DSOs are privileged to provide exclusive service to their customers under specifically designed regulatory rules, and the CEP has not changed this. Upon that logic the second role of DS0s is, *optionally, to become a customer-centric service provider* as many customers transform their roles from passive consumers into active prosumers.

New climate targets are very tightly linked to a continuous RES (Renewable Energy Sources) deployment, meaning that in practice DSOs must be able to absorb a bigger installed RES capacity into their grid. New technologies attract new parties to entering the energy market – aggregators, flexibility providers, ESCO companies, etc. Furthermore, customers have been contributing to the energy transition by themselves - new technologies and smart solutions help to decrease energy consumption and subsequently increase energy efficiency. Municipalities and local energy communities initiate new concepts of smart regions and smart cities upon an increasing interest and awareness of their residents and members. Clean mobility has been knocking on the door not only in Europe but worldwide. Let us compare today's world with the end of the last century or even better with the energy market situation after the millennium. Comparable? Not at all and further changes will gradually occur.

One could ask on which platform are the changes happening? Dominantly (but not only) on DSO level. All those facts provide good evidence that another role for DOSs is to act as energy transition enabler. From my point of view, DSOs take this role very seriously in many aspects. They want to be an integral part of an ongoing transition and not to prevent it. Therefore, electricity distribution companies initialise plenty of technical innovations to make their grid more clever and smart.

Another innovative contribution is data management. Empowered customers and energy communities need data to be efficient and to make correct decisions. There are many member states where DSOs support the concept of open data, whilst respecting critical data protection and data privacy. To sum up the brief argumentation – DSOs' importance in the energy transition processes has been increasing hand in hand with the increasing requirements on DSO´s capabilities and skills. These trends open new horizons and perspective for DSOs.

The Clean Energy Package highlights the importance of DSO´s role in a process of energy transition giving DSOs, along with TSOs, the responsibility for an energy system based on efficiency, reliability and security.

The creation of an EU DSO Entity - on similar principles as ENTSO –E (Association of European Transmission System Operators) - presents a very significant milestone in the field of EU energy policy. The future EU DSO Entity will act as a "single voice" partner to the European Commission's DG Energy and to further organisations like ENTSO-E, European Technology and Innovation Platform, CIRED, national associations and many others.

DSOs will elaborate all the governance and organisational details in the coming months in order to reach a full functionality in 2021. A Joint Task Force of experts nominated freely by the actual associations has already started the job. Responsibilities are allocated into four dedicated working groups which are to deliver a future code of conduct, financing rules, guidelines on stakeholders' consultations and all affairs related to membership of the new entity. The objective is to create an Action Plan in the beginning of 2020 concentrating on the methodology for calculating the annual contribution of membership and promoting the future EU DSO Entity in accordance with principles stated in the CEP. The new EU DSO Entity will act democratically and will represent both small, medium and large DSOs, and as voting rights have already been defined in the CEP, the real challenge will be keeping a consensual position on the future. That is why internal statutes guarantee that decision-making power is very well balanced, although it does not reflect the number of customers represented by large DSOs.

What kind of activities can be expected from DSOs in the near future? They will continue innovating on services and carefully test new technologies. The project activities of companies and associations give confidence that DSOs are in a position to solve technical aspects of the energy transition. EEGI and Horizon 2020 sponsored project experience, knowledge sharing and multilateral teams (DSOs, TSOs, academia, other industriy expert) have built a good footstone.

DSOs have valued new programmes and calls to develop their research, especially on new Horizon 2020 calls EC-3 Consumer Engagement /Demand Response, ES-5 Innovative grid services/Consumers, DSO, TSO and on calls supporting Hybrid Grids and Energy systems. Great expectations are on the DSO side linked to an amendment of the TEN –E guidelines (Regulation EU 347/2013) that formulate rules of Projects of Common Interest (PCI). Those projects can play an important role in the DSOs/TSO s collaboration and can overcome historically created bureaucratic barriers.

The joint responsibility among TSOs and DSOs on network codes brought by the CEP gives DSOs a large number of rights as well as responsibilities. Reaching a higher degree of integration, demanded by the CEP, is possible only under more intensive coordination and collaboration among European transmission system operators and distribution system operators. Another positive CEP outcome: pursuing for common targets stimulates a taste for dialogue and common actions.

Now both TSOs and DSOs are responsible for system functionality and security. Their grids are an integral part of the system and need to be increasingly integrated according to CEP targets. It implicates the necessity to catalyse TSO-DSO collaboration not only on technical platforms but to harmonise their security measures. DSOs operate in some member states critical infrastructure parts and therefore are not in a position to take measures in an isolated manner. Benefits of harmonization and collaboration have already been identified and hopefully commonly accepted in those areas – Active Grid Management, Security of Supply and Grid Resilience, Data Exchange and Coordinated Investment Planning.

The focus will also be concentrated on Smart City projects where closer coordination with ETIP SNET can be expected. In the first phase, clusters of common interest according to the Intensys4EU methodology will be identified, and in the second one the future deliverables will be coordinated with all stakeholders. Another priority is the development of charging infrastructure for e-mobility.

DSOs' role remains to be market-neutral with respect to the management of their grids and to address potential negative impacts on customer groups. On the customer side, DSOs take all the necessary measures to meet CEP customer rights requirements as use of smart meters, reliable quality of service, flexible supplier switching, and the right for free access to relevant data.

Another sphere of DSO´s interest is the creation of a Flexibility Market, based upon generally accepted EU principles but in accordance with tailor made national legislative acts. This market will provide flexibility services, also to DSOs, in order to manage local balancing in the distribution grid and to guarantee security of supply. Congestion management related to voltage management will also be a significant challenge for all the DSOs.

The CEP content is very comprehensive and influences not only our European future, but tackles many business and non-business issues, changing the market design of industry branches and bringing challenges and new opportunities. I hope that the CEP will trigger a change of the roles of DSOs and enable them to participate efficiently in the new European energy market development.

As we are soon moving into the implementation phase of the CEP and the new market design, several issues should be kept in mind. I would like to raise a few of them, also with a view at the new European Parliament and the constitution of a new College of Commissioners:

1 Decision-makers should acknowledge the key role that DSOs play in the energy transition and make use of their expertise.
2 Regulation should be dynamic and not inhibit innovation.
3 Proper implementation of the Clean Energy for All Europeans Package must be ensured. Legal certainty is needed for a functioning power sector. More specifically, the role of new actors in the energy system must be clarified (equal rights and obligations for actors with similar functions) and appropriate regulatory oversight is key.
4 Highlight the value of electricity grids to achieve environmentally sustainable objectives, which will also facilitate the right investment decisions. The energy transition will not happen without the networks.

I believe if these principles are taken into account, the new Market Design will be successful and the Clean Energy Package will bring the expected benefits to all actors across the energy sector, and to the citizens, in particular.

TRANSFORMATION OF EU AND EASTERN MEDITERRANEAN ENERGY NETWORKS: LEGAL, REGULATORY AND POLITICAL CHALLENGES

By Leigh Hancher, special Counsel, Baker Botts L.L.P. Brussels and

By Prof. Dr. Antonis Metaxas, National & Kapodistrian University of Athens, Vis. Professor, EU Energy Law and Regulation, TU Berlin, Chairman, Hellenic Energy Regulation Institute and

Review by Antonios Bouchagiar

This publication is an extremely useful tool for all those interested in the challenges that energy networks face in the area of the Eastern Mediterranean. The book addresses three aspects: (i) the formation of the current EU regulatory framework in the field of energy and its implementation in the Eastern Mediterranean, (ii) geopolitical considerations regarding the connection of the EU's energy networks in that area, and (iii) the future transformation of those networks through digitalisation that is expected to render consumers more proactive.

This collective work is a follow-up to the discussions that took place in September 2017 during the Athens Conference on European Energy Law, a prestigious event organised jointly by the Energy Union Law Area of the Florence School of Regulation (European University Institute) and the Hellenic Energy Regulation Institute. It includes six chapters written by practitioners and academics with a profound knowledge of energy networks in the Eastern Mediterranean.

The first part of the book deals with the formation of the current EU regulatory framework in the field of energy and its implementation in the Eastern Mediterranean. It includes three chapters.

In the first chapter, Professor Dr Jochen Mohr analyses how the EU regulatory framework on energy is based on the principles of EU competition law, especially the prohibition of abuse of dominance under Article 102 TFEU. He explains how the principles of competition rules, which normally apply *ex post* to a given conduct, have been transformed into (more invasive) *ex ante* regulation, on topics such as third-party access, price regulation and unbundling. He therefore proposes that Article 102 TFEU should guide the interpretation of EU energy regulations and directives, as well as national law implementing them.

In the second chapter, Professor Dr Metaxas analyses the Energy Charter Treaty with particular focus on dispute resolution mechanisms provided for by that treaty. He observes a double shift in such arbitrations. First, the respondents are increasingly western European States, whereas in the past they used to be mainly central and eastern European States. Second, recent cases increasingly concern alleged defects in or changes to regulatory frameworks encouraging the development of renewable energy. Finally, Professor Metaxas elaborates on the various interpretations given by the Court of Justice of the EU, by the European Commission and by arbitration tribunals regarding the validity of clauses of international investment arbitration in intra-EU disputes.

In the third chapter, Sofia Michelaki explores the evolution of the European gas market. She explains how the market has changed fundamentally in the direction of a well-functioning internal gas market in all parts of the EU by implementation of the Third Energy Package. On the other hand, she also describes why the market cannot yet be considered fully and perfectly liberalised and puts forward her view on the steps that need to be taken towards that direction.

The second part of the book deals with geopolitical considerations regarding the connection of the EU's energy networks in the Eastern Mediterranean. It includes two chapters.

In the first chapter, Michalis Mathioulakis and Fotini Bellou present the "Energy Matrix", a thought-provoking table that categorises States with interests in the Eastern Mediterranean into (actual or prospective) importers, exporters and transporters, in order to draw conclusions on shifts in the balance of power in that region. The results are very interesting for anybody who wishes to have an insight on how that balance of power may look in a few years from now, in particular concerning Egypt, Israel, Cyprus, Turkey and Greece, but also major global players like the USA, Russia and the EU.

In the second chapter, Fotini Bellou takes a deeper look into how recent energy findings in the Eastern Mediterranean have generated a cooperative dynamic amongst stakeholders and States in the region, which can build a level of strategic stability that effectively safeguards their energy security priorities. This is an interesting prospect of cooperation and stability in a region that has traditionally seen mutual suspicion between States.

The third part of the book deals with the future transformation of energy networks through digitalisation that is expected to render consumers more proactive.

In the sole chapter of that third part, Alexia Trokoudi, Marios Andrikopoulos and Georgia Patsaroucha analyse the possibility that the consumer becomes a "prosumer" as a result of empowerment stemming from recent regulatory initiatives in the EU, such as the Clean Energy Package. The authors explain how the move from centrally generated electricity from fossil fuels to electricity generated locally from renewable energy sources places the consumer at the core of the system in a way that he/she benefits from new technologies and reduces his/her expenses.

This book of approximately 100 pages is well documented and the chapters contain specific bibliography, as well as numerous footnotes referring to the pertinent legislation, cases and academic publications. It is definitely worth reading by those interested in the crucial challenges faced by energy networks in the Eastern Mediterranean.

CROSS-BORDER PARTICIPATION IN CAPACITY REMUNERATION MECHANISMS – PRACTICAL EXPERIENCE IN GREAT BRITAIN AND GERMANY

By Ann-Katrin Lenz, Christoph Riechmann, Dan Roberts, Florence School of Regulation/BNetzA-Forum, Berlin

About half the EU member states apply capacity remuneration mechanisms (CRM) in their national power markets. These publicly administered schemes provide that qualified market participants not only receive payment for the energy (MWh) delivered, but also for the capacity provided (irrespective of whether the capacity is used). Before implementation the schemes need to be vetted by the European Commission (EC) for compliance with EU State Aid rules. One particular concern is that member states could misuse CRMs to favour incumbent power producers and give them a competitive advantage over foreign rivals. One cornerstone of the EC's approach has therefore been to open CRMs to participation by foreign generators (i.e. generators from other member states). Practice however shows that various complications arise in a cross-border CRM. This paper explores the economics and State Aid principles of cross-border participation in CRMs and considers initial practical experience drawing on Great Britain (GB) and Germany. We note that this analysis necessarily rests on experiences gained before the adoption of the EU's "Clean Energy Package" with revised Electricity Directive and Electricity Regulation.[01]

[01] At the time of writing the Clean Package had been approved by the European Commission and Parliament, while adoption by the Council was still outstanding.

CAPACITY REMUNERATION MECHANISMS (CRM)[02]

1 Several distinct options for CRMs have emerged in the international debate, including strategic reserves, capacity auctions, capacity obligations, reliability options and capacity payments. These regimes can be classified in a number of dimensions.

- In terms of centralisation we can distinguish whether capacity is procured by central agents (e.g. the TSO or a state authority in the case of reliability options or the strategic reserve) or by decentralised agents (e.g. in the case of capacity obligations).
- In terms of reach and scope of the mechanism, we can distinguish whether all capacity on the system benefits from payments from a capacity mechanism (e.g. in the case of reliability options or capacity obligations) or only certain qualifying plant.
- In terms of continued participation of plants in the energy market, we can distinguish whether plants (benefitting from capacity mechanisms) can freely participate in the energy market or whether they are excluded from it. In the case of a strategic reserve, contracted plants are purposely excluded from the energy market (partly to ensure that the introduction of capacity contracts does not significantly distort price formation in the energy market). In reliability options plants can freely participate in the electricity market. However, in case the electricity spot price exceeds the strike price in the option contract, electricity committed under this contract is offered at the strike price. If all or most capacities are covered by such option contracts, the strike prices in these contracts may effectively cap the electricity spot price in the energy market in many periods. Only in periods of very high demand, e.g. in which expensive demand side options are called at very high prices the implicit price cap would be exceeded.

2 Figure 1 maps the design options discussed above in the dimension of centralisation and scope/reach.

Figure 1 Classification of capacity mechanisms
Source *Frontier Economics.*

3 Many EU member states meanwhile employ CRMs and in some member states there are multiple regimes in parallel. CRMs differ according to the dimensions above as well as further aspects like the compensation mechanism or the possibility of cross border participation. Figure 2 gives an overview on the applied CRMs and the changes from 2016 to 2017.

[02] For a wider discussion of design options for CRMs see Perner/Riechmann (2015).

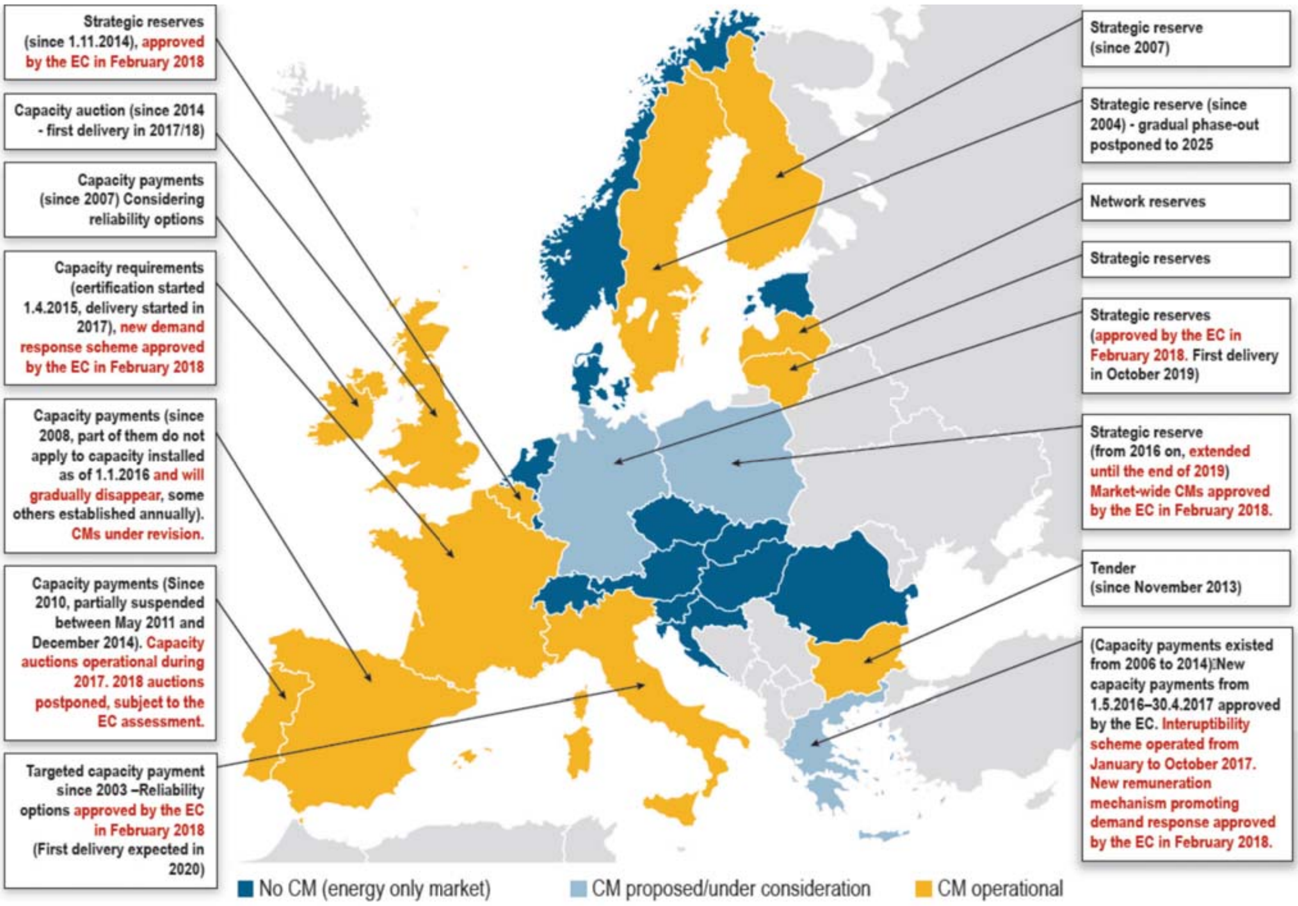

Figure 2 CRM proliferation in Europe in early 2018
Source *ACER/CEER (2018), p. 71.*

CROSS BORDER PARTICIPATION IN CRM – THE BASICS

4 Cross border participation in CRMs raises a number of issues:[03]

- Interconnectors or generators – should interconnectors and generators both be allowed to participate in the CRM of a neighbouring country at the same time, or should only one type of player be allowed? In theory both types of to deal with a small number of known (and regulated) entities. The downside would be that the operator of the interconnector may need to sign contracts with back-up generation to ensure that generation capacity is actually available behind the interconnector. This would raise concerns about the unbundling of transmission and generation. Alternatively, if generators participate, a simple rule (e.g. electrically connected neighbours only) could be used to limit participation.
- Interconnector (IC) availability and derating – The technical availability of ICs limits how much can be imported. In case of coincident stress in neighbouring countries, capacity may not be able to support both countries. This raises the question to what extent the interconnector capacity be considered in a country's CRM and in particular how should the capacity be de-rated when accounting for its contribution to local generation adequacy.

[Note] *In Germany, one scheme is in place (the network reserve), which was temporarily approved by the EC and another scheme is planned (the capacity reserve), which was approved by the EC in February 2018. Changes with respect to 2016 are outlined in red.*
In GB, the scheme was approved by the EC but this approval has now been struck down by the General Court of the Court of Justice of the European Union, and the EC is reassessing the scheme.

[03] ENTSO-E (2015) and Frontier Economics (2014).

- Obligation – As part of the design of each CRM, a decision needs to be taken as to whether the obligation on the capacity providers (in a stress situation) is one of physical delivery or of availability. Availability may be sufficient if the energy market provides sufficient incentive to generate in critical instances (including, situations with a potential for network congestion). The availability rule is likely to distort generation dispatch less, as only the most efficient plants would be called upon. By contrast, in a scheme with delivery obligation, all plants would be required to run in a critical situation, including high cost plant, that only run to prove obligation fulfilment, while their operation may not technically have been necessary. In the context of cross border participation a further question arises how to determine whether, in a stress situation, the capacity obligation held by a party that accesses the local CRM through a cross-border interconnector has actually been fulfilled. For example, in a delivery regime, is it required that power actually flows on the interconnector or is it sufficient to demonstrate that power could have flown, had this ultimately been required?
- Interconnector reservation – A further question is whether cross border participation in a CRM requires explicit physical capacity reservation, or whether no reservation is required. Reserving IC capacity for shortage events that occur very rarely (or practically never)[04] is most likely inefficient. But if IC capacity reservations are ignored, there is risk of too optimistic adequacy outlook.

GB EXPERIENCE WITH CROSS BORDER PARTICIPATION IN A CRM

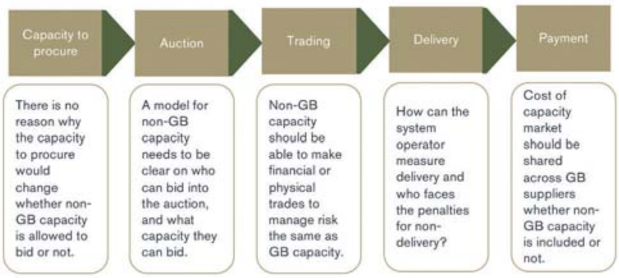

Figure 3 GB capacity auction processes
Source *Frontier Economics.*

5 The GB CRM and the auction at its heart has five key stages to it (Figure 3).

6 The key parts of the process which are relevant for cross-border co-operation are the capacity auction itself, through which plant capacity is procured (and the various parameters which feed into it) and the delivery process.

7 The GB government considered various different possibilities for the overall design, but in the end chose a regime in which:

- Interconnectors (rather than generators in other jurisdictions) participate in the auction – this was largely out of a desire for practicality, and the desire to avoid potentially "arbitrary" cut offs to participation from other generators in the IEM;
- Interconnectors are eligible to compete for a one year contract (rather than multi-year contracts) in the auction process;
- Interconnectors have a delivery obligation in line with domestic generators, with the assumption that they will either bear the additional risk or they will seek to lay this off with generators in other markets.

8 This regime was first implemented for the 2015 capacity auction. Initially, it was only existing interconnectors which participated and secured capacity agreements in the auction, despite new interconnectors having prequalified. This was potentially

[04] IC capacity was for example permanently allocated for exchange of ancillary services in the case of the Skagerrak 4 interconnector between Norway and Western Denmark. See the websites of Energinet.dk, retrieved on 02/04/2019: https://energinet.dk/El/Systemydelser/Projekter-og-samarbejde/Evaluering-af-Skagerrak-4.

because new interconnectors perceived an ongoing risk that their construction would be delayed and they may expose themselves to significant risk by committing to a capacity agreement which they might then not be able to meet. In 2018, however, three new interconnectors (Eleclink and IFA2 to France, Nemo to Belgium)[05] cleared in the auction and secured capacity agreements.

9 In this sense, the participation of interconnectors in the auction has been a success. Cross-border capacity has been able to add to competition in the capacity auction and hence reduce capacity prices relative to what they might otherwise have been. GB is expected to see a significant increase in interconnected capacity over the next 5-10 years[06], and the participation of interconnectors (as price takers) in the auction should help to reduce capacity prices, in turn reducing customers' bills.

10 There have, however, been areas of contention in relation to the arrangements as defined. A particular debate has surrounded the definition of derating factors for interconnectors. As noted above, these are important as they define how much 1 MW of cross-border capacity is deemed to contribute towards security of supply.

11 In theory, beyond the physical availability of the cable itself (which is typically very high for DC subsea cables), the derating factors should represent the probability of coincident stress in the interconnected systems. The logic behind this is relatively straightforward:

- if the two systems are 100% likely to have coincident stress events, then interconnector capacity between them will not contribute to security of supply in either market, as at the times when one market would need additional injections, the other market would be unable to provide them;
- if there were a 0% likelihood of coincident stress, the interconnector capacity could provide security of supply to both markets up to the limit of its physical availability. This is because it could be guaranteed that if one market were in a stress situation, the other would not be, and hence would be able to contribute supply; and
- in reality, the situation will lie between these two conceptual extremes.

12 However, assessing the probability of system stress is difficult to do. Conceptually, it should be based on a forward looking analysis of the evolution of the interconnected systems. This has not been the approach taken in the GB market. Instead, GB has relied on an analysis looking over a rolling 7 year history of demand. The analysis has differentiated between existing and new links:

- For existing links, the analysis has taken a subset of GB peak demands and assessed the proportion of time there was positive price differential (i.e. higher prices in the GB) and GB imported power; and
- For new links, the analysis has taken a subset of GB peak demands and assessed the proportion of the time there was a positive price differential.

13 It is not clear that this analysis is a good proxy for an assessment of the probability of coincident stress. However, it is clear that the analysis has resulted in derating factors which vary materially over time, as is shown in Table 1. It is also worth bearing in mind that that such analysis mainly highlights the expected coincidence of stress situations. This cannot rule out that with a certain low, but still positive probability a coincident stress situation does arise in both countries, even if this is not the typical expectation for a stress event.

Study	FR	EI	NL	BE	NO	DK	DE
2015	29%	2%	62%	58%	74%	-	-
2016	45%	2%	70%	65%	76%	-	-
2017	48%	4%	75%	65%	85%	87%	-
2018	55%	5%	70%	67%	96%	93%	82%

Table 1 Derating factors over time (by country connected to GB)
Source *An update of historical derating factors for GB interconnectors, see Davies/Deledalle (2018).*

[05] All three interconnectors were not yet in operation in 2018. The start of operation for Eleclink and IFA2 is planned for 2020, while Nemo is fully operational since 31st January 2019. See the websites of the single interconnector projects, retrieved on 01/04/2019: http://www.nemo-link.com/?page_id=6, https://www.nationalgridet.com/infrastructure-projects/ifa-2-connection and http://www.eleclink.co.uk/where-we-are.php.

[06] The timing of new links may be affected by Brexit uncertainty, as may the delivery of the most marginal projects.

14 This experience indicates that there is potentially some way to go to establish a stable and suitable approach to defining derating factors.

15 More recent events potentially indicate that the political direction of travel is not helpful in this regard. A severe cold snap in late February/early March 2018 highlighted that GB's interconnectors follow market conditions: despite high GB power prices, GB exported power to the continent on two out of six very cold days because prices on the continent rose even higher (in part because the French system has more electric heating than that in GB, and so saw an even bigger spike in demand).

16 The UK government highlighted this in its call for evidence in relation to the functioning of the capacity auction regime. They noted that:

17 This statement clearly depends on some critical assumptions (namely that the development of interconnectors is not necessarily linked to the development of incremental generation, storage or demand side response capacity). However, it serves to indicate the potential for government policy to take a more nationalistic and less regionally based view to securing supply. In this regard, not having a clear and established approach to assessing derating factors could allow more room for policy manoeuvre than may be desirable from a European perspective.

> "It has been suggested that the contribution to security of supply made by interconnectors… will face diminishing returns, as they are reliant on the same limited pool of spare capacity in the interconnected countries"[07]

GERMAN EXPERIENCE WITH CROSS BORDER PARTICIPATION IN CRM

18 Germany uses a number of CRMs which cover different aspects of generation capacity, but does not extend to full required generation capacity in the market. Cross-border participation has been considered in relation to each mechanism, but only implemented in relation to a local network reserve (which has partly been provided by generators from neighbouring Austria).

19 Germany generally distinguishes CRMs for (Figure 4):

- Network stability – here contracted plants are contracted in specific regions or at specific nodes to help avoid congestion within the national grid:
- Network reserve – this reserve, contracted from existing generation facilities helps to resolve localised congestion issues;
- Special network-technical assets – These are new/to be built technical assets (including generation units) to be installed within the transmission grid and directly controlled by the TSO to deal with local congestion situations in case of failure of network assets.

[07] Department for Business, Energy & Industrial Strategy (2018), p. 7.

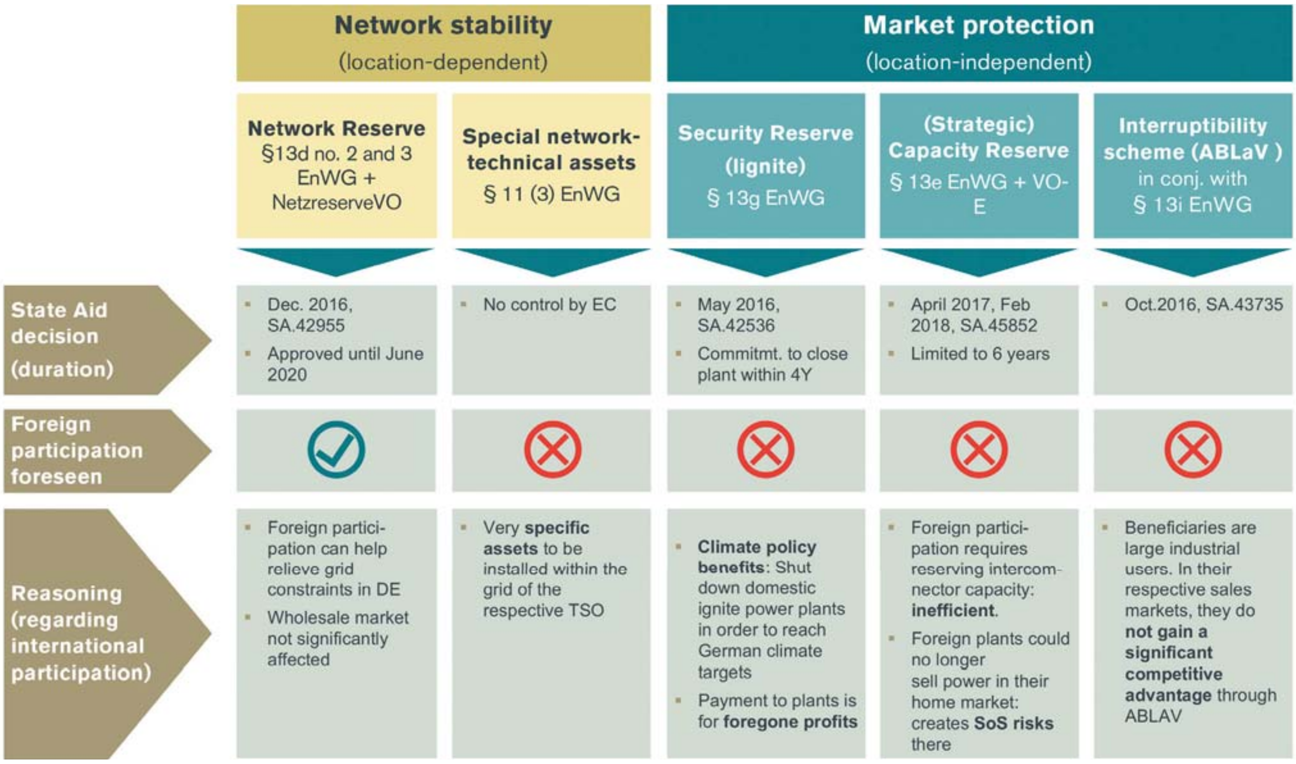

Figure 4 CRMs and international participation in Germany
Source *Frontier Economics based on German laws/regulations and EC State Aid decisions.*

- Market protection – here plants are contracted to secure overall generation capacity irrespective of its location on the system:
- Security reserve – Under this scheme the TSO contracts lignite power stations which have been decommissioned for climate policy reasons, but which could still provide a reserve in few hours or days of a generation shortfall.
- (Strategic) capacity reserve – This is a more traditional strategic reserve that is contracted by the TSOs and would be activated only if generation shortfall was such that the spot market would not clear.
- Interruptibility scheme – under this scheme the TSOs contract demand and loads from large industrial electricity users which could be lowered/shed in case of generation constraints.

20 Of these reserves, in the end only the network reserve included cross-border participation. If participation by domestic players is not sufficient, foreign operators can be contracted as well.[08] This was the case for the winter 2017/2018, when plants in Austria were contracted to provide a reserve in case of a generation shortfall in the South of Germany. However, for the following two winters domestic reserve was sufficient and no reserves were contracted abroad.[09]

21 The current regime regarding Network-technical assets does not appear to have required State Aid clearance by the EC (although an earlier regime was rejected by the EC).[10] This scheme does not involve cross-border participation as the assets need to be directly controllable by the TSO and this is not considered feasible for foreign assets.

22 The EC has explicitly considered the possibility of cross-border participation for the other (market focused) CRMs, but did not ultimately require cross-border participation:[11]

- The security reserve is linked to a climate policy measure (the closure of lignite plants) and it is thereby clear that the funding mechanisms can only extend to those qualifying stations which

[08] § 13 d para. 1 no. 3 EnWG; European Commission (2016a), pp. 20 f.
[09] Bundesnetzagentur (2018), pp. 47 f. and 66; Bundesnetzagentur (2017) p. 56.
[10] Energate (2017).
[11] For a discussion of wider State Aid issues in relation to CRMs see Hancher/Riechmann (2018).

are all located in Germany. The EC has required a time-limit on this regime of four years.[12]

- In the case of the strategic reserve, the German authorities did not include foreign capacity for two reasons. Firstly, the foreign power plants would have otherwise been put exclusively at the disposal of the German TSO, so that security of supply would have been reduced in the countries where the plants are based. Second, the strategic reserve would have required the reservation of transmission capacity on respective interconnectors, if foreign participation were to have a meaningful impact on generation adequacy in Germany. This would have meant that transmission capacity would have been blocked for practically all hours in a year, to secure a reserve that is ideally never called upon. This was not deemed efficient and therefore no requirement for foreign participation has been imposed.[13] This view may be slightly simplistic as it may not be ultimately necessary to reserve interconnector capacity in all hours. It may have been possible to define a transmission product where the foreign generator only had a transmission right if he was called under the reserve. The interconnector capacity could have been available to the wider market in all other instances. Also the European Commission had cast doubts about the German authorities' second argument,[14] but finally did not request cross-border participation. This was due to the EC's belief that the strategic reserve would not lead to distortions in the wholesale market.[15]
- CRMs that cover the demand side rely on the ability to respond and the actual response of consumers. It is deemed that this can be best controlled if the load is connected to the domestic transmission grid. Therefore, foreign participation has not been considered for this reserve.[16]

CONCLUSION

Practical relevance

23 A large number of EU member states employ some form of CRM. Many member states employ multiple regimes in parallel. Cross-border reserves provide only limited (but potentially pivotal) contribution to generation adequacy in the country applying the CRM. On balance, cross-border participation in CRMs is of greatest economic benefit where interconnectors are relatively un-congested in the required flow direction (e.g. Austria to Germany).

Design Options

24 Foreign generator participation and IC participation are both feasible and practiced in Europe. In either case there is a need to consider derating of interconnector capacity, when considering the possible cross-border contribution to a CRM. The precise design can be differentiated by intended flow direction on interconnectors (and the likely congestion situation on the interconnector).

EC approach (so far)

25 In its State Aid decisions, the EC has so far acted prudently – not imposing cross-border participation where there are risks to Security of Supply, but favouring them where there is an obvious economic case (e.g. plants in Austria participating in the German network reserve).

26 The EC may require certain commitments to further develop regimes. The EC has also allowed transitional arrangements where cross-border participation has been left out on initial implementation of the CRM. For example, in the French and GB cases, the EC has requested or required more cross-border elements, but in doing so has also conceded that this

[12] European Commission (2016b), p. 4.
[13] European Commission (2018), p. 23.
[14] European Commission (2017), p. 32.
[15] European Commission (2018), p. 23.
[16] European Commission (2016c).

may take time to develop. State Aid approvals may be time limited – where the issue is of transitional nature and a corresponding CRM design (strategic reserve/network reserve) is applied.

27 The practice of cross-border participation in CRMs is still in its infancy and therefore it is possible that the views of the EC will evolve, potentially more stringently requiring foreign participation in certain CRMs. The EU's "Clean Energy Package" including the revised Electricity Directive and Electricity Regulation further encourage cross border participation in CRMs. In particular the Clean Energy Package requires e.g.:

- A coordinated (i.e. across member states) generation adequacy assessment – such assessment should also inform about the ability of neighbouring systems to "lend" each other reserve capacity;
- Transmission System Operators are to facilitate cross border participation in CRMs (except where a strategic reserve model is applied);[17]
- Generators are allowed to participate in the CRM regime of neighbouring systems and they are allowed to participate in multiple systems;[18]
- Cross border participation is limited to expected available interconnector capacity and must consider the possibility of coincident system stress in the system where a generator is located and the system for which capacity is procured.[19]
- The CRMs are focussed on incentives for availability.[20] They are to be designed such that they do not distort the normal and market-based dispatch.[21] This implies that – to check compliance of participating capacity providers - an availability criterion is preferred over the actual dispatch of plant (and delivery of energy). Logically, this would also extend to cross border participation.

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[17] "*Detailed rules for facilitating effective cross-border participation in capacity mechanisms should be laid down in this Regulation. Transmission system operators should facilitate the cross-border participation of interested producers in capacity mechanisms in other member states. Therefore, they should calculate capacities up to which cross-border participation would be possible, should enable participation and should check availabilities. Regulatory authorities should enforce the cross-border rules in the member states..*" Para 49 Electricity Regulation recast. See also Art. 26 Electricity Regulation recast (as approved by European Parliament; 26 March 2019, found at: http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//NONSGML+TA+P8-TA-2019-0227+0+DOC+PDF+V0//EN).

[18] Art 26 (3) and Art 26 (5) Electricity Regulation recast (ass approved by European parliament 26 March 2019).

[19] „They shall participate up to the expected availability of interconnection and the likely concurrence of system stress between the system where the mechanism is applied and the system in which the foreign capacity is located", Art 26 (5) Electricity Regulation recast (as approved by European Parliament; 26 March 2019.

[20] See e.g. Art. 21 (3) and (4) Electricity Regulation recast (as approved by European Parliament; 26 March 2019).

[21] See e.g. Art. 22 (1) Electricity Regulation recast (as approved by European Parliament; 26 March 2019).

THE IMPACT OF THE CLEAN ENERGY PACKAGE ON THE TSOS

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Volume 8 Issue 3/4, July 2019

INTRODUCTION

Ten years after the entry into force of the Third Energy Package, the EU is embarking on an even faster journey once the key electricity market design legislation under 'The Clean Energy Package for all Europeans' (CEP) enters into force in the summer of 2019. As proposed by the European Commission in November 2016 and adopted by the Council in May 2019 after lengthy negotiations, the CEP overhauls the existing internal energy market framework for electricity and security of supply and aims to lift up Europe on a much higher gear for this journey to 2030 and beyond, on both speed, depth, and ambition. The CEP framework is a big bold step forward for Europe on its path toward completing the integration of the internal energy market, decarbonizing its economy and successfully integrating a large share of variable renewables while keeping the costs of the energy system transformation as low as possible, providing secure access to electricity and ensuring that no one is left behind in this evolution. The CEP provides a clear direction and trajectory for the EU on its clean energy transition and transformation journey for the next decade and for achieving its ambitious energy and climate targets. The new regulations and directives aim at addressing the five key dimensions of the Energy Union, including energy security, energy efficiency, decarbonization of the economy, full integration of the Internal Energy Market, and research innovation and competitiveness. The European TSOs have a key role to play to support and enable further the clean energy transition, and to ensure a secure, sustainable and competitive energy system to meet the future challenges. The ambitious RES integration target of 32% by 2030, energy efficiency target of 32.5% and interconnection targets of 15% by 2030 put Europe on the path to pursue these objectives by bringing together all actors in the energy system to cooperate and coordinate closer and even help each other in various capacities and levels, and by empowering customers to contribute to the energy transition in the next decade. How will this new policy framework impact the European TSOs? What will be the new challenges for them and how can they best take up on the additional responsibilities to enable and facilitate the European energy transition while preserving both secure, sustainable and affordable energy supply and solve tomorrow's challenges?

[01] The views expressed represent my thinking, not the association's overall position

THE CEP POLICY FRAMEWORK AND IMPACTS FOR TSOS

The CEP provides an ambitious policy framework for the next decade and sets the ground for increased efforts for delivering the clean energy transition to all Europeans through a new stable and predictable set of rules. The European TSOs, as already set up as neutral unbundled entities with the 3rd Energy Package, will continue to play a key role as market facilitators in the European efforts for integration of the IEM as they connect the new market actors and develop new rules, tools and platforms enabling the energy transition at pan-European level. The TSOs' central role in the energy transition is further recognized and enhanced by the CEP as the new regulations entrust them further with a number of new tasks and responsibilities: strengthening on the one hand the provisions for efficient cooperation and coordination horizontally both at European level - with their neighbouring TSOs through ENTSO-E, at regional level through the establishment of the future Regional Coordination Centers (RCCs) and vertically, at the national level, with the DSOs and all market actors and prosumers to facilitate the integration of renewables, and enable the integration of energy markets. Ensuring the balance between greater decentralization, decarbonization and digitalisation, as well as democratization for the benefit of society at large will be a key challenge in the new power system of the future. In order to reap the greatest benefits of the energy transition, all of these levels, which are increasingly more interdependent, need to be linked together and looked at together – through an integrated and wholistic system approach. The TSOs are the ones central to integrating all these levels and orchestrating the power system of the future.

The CEP tasks in addition the TSOs to develop methodologies, rules and tools in a number of key areas to facilitate further market integration and enable all customers to participate in the IEM in order to reap the benefits of the energy transition further. Key new areas where the CEP grants additional tasks to the TSOs include provisions for enhanced regional cooperation through new regional coordination centers (RCCs) for more secure and efficient grid use, rules on capacity mechanisms to foster cross-border participation and subsequent integration of capacity markets, provisions for a European as well as regional and complementary national adequacy assessments on covering various timescales and scopes, provisions for regional crisis scenarios and risk preparedness framework; provisions for TSO-DSO cooperation, and drafting new network codes. In addition, the TSOs will need to invest in developing and implementing new digital solutions, platforms and tools or to enhance further existing ones to meet the new obligations under the CEP, especially in areas such as regional coordination and risk preparedness, and the development of a pan-European registry of foreign capacity providers as part of the ENTSO-E mandates, among others.

ENHANCED REGIONAL COOPERATION

Regionalisation has gained momentum in the recent decade, even more since the Energy Union' focus on regions becomes one of the stepping stones for achieving further integration of the IEM on various levels, including operational, market, as well as system planning aspects. On the one hand, there has been the bottom-up approach, as developed by TSO-led regional voluntary initiatives. On the other hand, the CEP strengthens further the regional approach and formalises the TSO cooperation through new legal entities, called Regional Coordination Centers (RCCs), to be based on newly defined system operation regions as per ENTSO-E proposals. These entities should provide a coordinated approach for delivering various tasks within the different regions, and with a very ambitious timeline to set up this stronger regional approach, under the overarching umbrella of ENTSO-E and pan-European methodologies and tools to be developed over time.

The CEP upgrades the existing framework for regional cooperation at TSO level through the RSCs and strengthens the provisions for efficient cooperation and coordination through the establishment of new legal entities with the objective to ensure secure operation of the system, reduce costs, increase efficiencies and capitalize on synergies at broader scale. Regional TSO cooperation started first through voluntary initiatives (also known as RSCIs) in 2008 (when Coreso and TSCNet were established), in the wake of the electricity blackout of 4 November 2006. These initiatives grew and developed bottom-up to provide the TSOs of the regions with capabilities to better coordinate and manage power flows at regional level more securely to meet new challenges such as integrating large-scale and non-controllable renewable energy sources. The RSCIs were further formalized through a multilateral agreement in 2015 and the System Operation Guideline in 2017, and their ongoing implementation provides for the development of dedicated forecasting and capacity calculation, outage planning coordination, short term adequacy forecasts, security analysis to support more efficient secure TSO coordination at regional level.

The Electricity Regulation Article 34 builds upon the existing framework for regional cooperation of TSOs by tasking them to establish regional cooperation within the ENTSO for Electricity to contribute to the relevant activities. The TSOs will further cooperate through ENTSO-E on the development of the RCC proposals and ten new tasks in addition to the tasks that have already been established pursuant to the European Network Codes and Guidelines as developed by ENTSO-E through the implementation of the Third Energy Package and Regulation 714/2009. This includes tasks such as to adopting a framework for cooperation and coordination between the regional coordination centres as per article 40.1.j of the Electricity Directive, submitting proposals for establishing the RCCs in each relevant system operation region, setting up the organisational structures of RCCs, and contributing to the implementation of relevant methodologies and digital tools for the new tasks. Setting up the RCCs and their new tasks will need to take place within very tight timelines as per the regulation (by 1 July 2022).

On the other hand, the interplay between the national, regional and pan-European level is clearly shown by giving different complementary tasks and clear roles, responsibilities and liability provisions to the various entities while preserving subsidiarity and ensuring an efficient framework for interaction without compromising the security of supply (TSOs at national level, RCCs at regional level, ENTSO-E at pan-European level). TSOs remain responsible for managing electricity flows and ensuring a secure, reliable and efficient electricity system in accordance with the recast Electricity Directive (EU) 2019/ while the RCCs will be set up to complement the role of transmission system operators by performing the tasks of regional relevance assigned to them in accordance with Article 37 of Electricity Regulation.

As per the Recast Electricity Regulation, *"the ENTSO for Electricity shall promote cooperation between transmission system operators at regional level ensuring interoperability, communication and monitoring of regional performance in those areas which have not yet been harmonised at Union level,"* thereby enabling the efficient and harmonised approach to building the IEM by both enabling regional flexibility while following the overall ambition at pan-European level. In addition, this flexibility will enable regions to develop solutions that are fit to serve their needs, to learn from each other and to scale up solutions from regional levels further up. The TSOs will also need to invest as well further the development of more efficient, innovative and large-scale IT tools and solutions as well as platform to support the new tasks and needs of RCCs as relevant, building upon the experience and learnings from the process of regional coordination and market integration so far. Enhanced regional coordination and cooperation of TSOs is key for achieving the objectives of the CEP and delivering the Energy Union benefits to final consumers, but it is by far not enough and should go together with stronger coordination at regulatory and political level between MSs. This is further recognized by requiring the RCCs to consult their regional energy forums of member states with respect to matters that could have political implications and relevance, and should then take into account the recommendations of the MSs and the respective regional forums. This will ensure that technical, political and regulatory approaches can be aligned to support further the needs of the regions and address challenges of regional and clean energy integration and to avoid divergent approaches and barriers to cooperation.

ADEQUACY ASSESSMENT

Ensuring longer term system adequacy is one of the key challenges ahead given the increasing level of variable RES penetration in the interconnected European power system. A pan-European analysis and scenarios for the future system adequacy are of paramount importance to ensure resource adequacy at European level in the long term to help decision makers and stakeholders take informed decisions with respect to the long-term development of the power system in a reliable and sustainable manner. The CEP recognizes the importance of such type of assessments and the need for common pan-European standards and methodologies to develop such resources assessments with various scopes and geographical levels but using a 'common language' to ensure comparable results and complementarity between the various types of assessments.

The recast Electricity Regulation upgrades the existing mid-term adequacy assessment as per Reg 714/2009 and establishes new provisions and requirements for an advanced more complex and encompassing European resource adequacy assessment to be developed by ENTSO-E with a number of new methodologies and a much larger scope and granularity compared to the previous generation outlook by ENTSO-E as prepared per the Third Package for this type of assessment. This long-term assessment based on robust methodologies will provide a common and objective and comparable basis for identifying and assessing adequacy concerns at Member State level, becoming a basis also for future decision of MS on how to address those long-term concerns of their power system, and to help them set their own levels of security of supply. The European TSOs will both contribute to the development of this comprehensive and advanced resource adequacy assessment and use the ENTSO-E methodology as a basis to develop further national adequacy assessments with a regional scope and using this common pan-European methodology as a basis, while further taking into account the national specificities and sensitivities as relevant. member states will have to justify market enhancements such as capacity mechanisms, subject to support from neighbouring countries as demonstrated in the ENTSO-E adequacy assessment.

In addition to the long-term pan-European adequacy assessment which serves as a basis to identify adequacy concerns and assess needs for developing capacity mechanisms at national level, the seasonal and short-term adequacy outlooks as per the new RPP are crucial instruments for both TSOs and stakeholders to detect and prepare for seasonal crisis risks and security of supply risks in the shorter term (6 months ahead). The future RCCs will further perform regional adequacy assessments with a very long-time horizon (week-ahead to day-ahead) on the basis of methodologies developed at pan-European level to support closer to real time system operation by the TSOs. Developing the methodologies and testing and implementing them will require a significant amount of additional new technical skills and expertise over time as well as new modelling tools, and the TSOs and ENTSO-E and the future RCCs will need to address resource challenges to take up these new tasks over time as the subsequent assessments will be in the basis of enabling a multitude of stakeholders to take well-informed decisions with respect to enhancing adequacy at the different levels.

In particular, when it comes the long-term system planning sides, the European adequacy assessment as an instrument goes hand in hand with the TYNDP as developed every two years by ENTSO-E. The TSOs also develop regional investment plans biennially, and may take investment decisions based on these regional investment plans, which are further aligned with the pan-European policy objectives and feed into the pan-European Ten-Year Network Development Plans as developed by ENTSO-E. The CEP preserves the existing requirements and framework regarding TYNDP and further enhances the network plans with requirements to be taken into account such as sector coupling, TSO and DSO network planning, and new 2030 targets for RES integration, renewables and interconnections. In the future that the different levels are aligned with and fit for purpose to deliver further on the European clean energy policy and climates objectives to reach those new 2030 targets and the TSOs will be key system integrators.

Interconnectors will continue to have a crucial role for the integration of the various sources in a cost-efficient and effective way across borders. ENTSO-E's TYNDP 2018 estimates that failing to properly develop the European grid beyond 2020 would result in a cost of 43bln euros per year of lost social welfare and will induce severe limitations in cross-border exchanges, significant market fragmentation and price differences as well as renewable energy curtailment. The new 15% interconnector target will need to be taken into account in TSO network planning forward and in the development of projects that can support the achievement of this target.

MARKET DESIGN PROVISIONS

The new market design rules aim to foster further wholesale market integration and improve conditions for efficient cross-border trade of electricity with new requirements which the TSOs will need to fulfil as of entry into force or soonafter. While the CEP builds upon the existing network codes and guidelines in implementation regarding a number of key market integration aspects, some also go beyond them in certain areas to more ambitious objectives and implementation timelines. Once implemented, the CEP framework will enable market parties to trade energy as close to real time as possible, and in time intervals as short as the ISP for DA and ID markets, which is set to go down to every 15min as of 1 January 2021. In addition, smaller bid sizes of 500kW or less will be also allowed to participate in DA and ID markets trading, and products need to be developed to support those new possibilities for DSR, energy storage and small-scale renewables, including also direct participation by customers and new energy actors. Forward markets will open to renewable energy generators and provide new opportunities for various market participants to hedge their risks across through the development of new models for partnerships (for example through power purchase agreements). All these new possibilities will facilitate further the integration of various types of new energy generation from RES further as well as aggregators and smaller customers, or local energy communities. Through properly functioning DA & ID markets, the opportunities for all market participants to trade as close as possible to real time across all bidding zones should be maximized, and prices reflecting properly market fundamentals as well as the real time value of energy will make it easier for market actors to benefit from more liquid cross-border markets. TSOs and NEMOs will continue working together on market integration, jointly organizing the management of the integrated DA and ID market, with a view to increasing the benefits to both consumers by bringing prices down for consumers and maximizing social welfare further at regional and European level. Harmonising the ISP across all control areas to 15 min offers new possibilities to improve market liquidity but will also imply additional costs for TSOs and will require a step-wise implementation in some countries to ensure a smooth, efficient transition at least cost to the new processes and IT systems which will be required to support such important changes.

The new market design framework resulting from the Electricity Regulation and Directive sets the basis for more effective and efficient RES integration by enabling through new rules the trading of electricity closer to real time, strengthens price signals to provide the right incentives and enable electricity to flow across border without limits to the places where it is most needed through the more efficient use of interconnectors. It further empowers consumers to be the driving force behind the energy transition by giving them freedom to switch suppliers, and choice as to produce, consume, sell, or store the electricity they have produced, based on real time prices, and provide system services to optimize their own energy bills, or help system operators, and contribute to reducing overall costs. New regulations will help them to play an active and central role on the energy markets in the future through new rules and tools, new possibilities to facilitate this participation in all energy markets so they can fully benefit from the energy transition, and rely on clean, competitive and secure electricity supply. The CEP rules enable additionally new actors such as aggregators, to emerge and provide new services to the network operators as intermediaries, bringing together various sources of load and generation and enabling the participation of different customers in the market, by pooling flexibilities together and helping reduce operational costs.

Another significant challenge for TSOs with respect to the new CEP rules will be to ensure operational security while allowing for maximum use of transmission capacity to meet the new targets for minimum cross-border capacity on the interconnectors. The Regulation stipulates that TSOs should not limit the volume of interconnection capacity to be made available to market participants as a means of solving congestion inside their own *bidding zone or as a means of managing flows resulting from transactions internal to bidding zones. The minimum levels of available capacity for cross-zonal trade are considered as reached if at least 70% of the net transfer capacity (or input to the capacity calculation if flow-based method is used), respecting security constraints as per the existing GL CACM and SO, unless there are operational security limits' violations, in which case temporary derogations can be granted*. The existing European Network Codes and Guidelines provide the basic framework and methodologies for implementing these provisions, which will be further amended to be aligned with the new requirements of minimum 70%. The future cooperation will be further strengthened not only at European level but mostly in this respect at regional level where the RCCs will have a key role to complement the role of the TSOs by performing tasks of regional of regional relevance such, as in providing ' coordinated actions' with respect to both capacity calculation and coordinated security analysis. In addition, member states may decide to opt for implementation plans allowing them to reach gradually through a well-defined trajectory the required values by 1 January 2026. It is still to be seen what choices will be supported at national level but they will subsequently impact how fast and how effective the new targets will be reached in the various regions and countries. The interpretation and proper application of these new provisions still need to be understood clearly and the impact of this new threshold and its implementation have not been assessed at European level and the risks regarding the secure power system operation and resulting redispatching costs at regional level to reach the new targets are still to be seen. This area will remain key for further cooperation between both TSOs themselves, with regulatory authorities, and market actors.

The CEP further provides new provisions for enabling cross-border participation in capacity mechanisms, and the subsequent integration of capacity mechanisms, based on new methodologies, common rules and a new registry for all for foreign generation capacity providers to be developed at pan-European level by ENTSO-E. member states have the freedom to choose their own desired levels of security of supply based on standard, transparent rules and tools and taking into account the regional context, and will be allowed to introduce capacity mechanisms only when they need to address adequacy problems as identified per either by the European adequacy assessments or the national one if done and which they can't solve through other means of removing other possible distortions. The Electricity Regulation lays down more detailed rules for facilitating effective cross-border participation in capacity mechanisms and tasks the TSOs for further facilitate *the cross-border participation of* interested producers in capacity mechanisms in other member states through the development of a number of methodologies, and rules to be developed; based on these rules, TSOs should calculate capacities up to which cross-border participation would be possible, should enable participation and should check availabilities, including also the recommendations of RCCs. The TSOs will then use recommendations of RCCs to set annually values for max entry capacity for foreign capacity participation as per RCC recommendations. This is a good step towards integrating further the internal energy market, support the removal of market distortive measures and maximizing the possibilities to ensure security of supply at least cost for consumers, taking into account the various possible levels of optimisation.

An integrated and holistic approach coupled with clear long-term objectives is instrumental to achieve the energy transition to meet key challenges for the power system. New challenges for TSOs resulting from the need to integrate more and more intermittent renewable energy sources while ensuring continuous security of supply include: need to modernize the network to adapt to the rapidly changing environment and to establish further cooperation and synergies among different energy operators; the take-off of the storage and conversion of energy into different vectors, the increasing necessity of system flexibility, also enabled by demand response, the security of supply and the affordability of the electricity services, the optimization of the energy system at a local/urban level and up to regional as well as the interaction and collaboration of TSOs and DSOs to manage the energy transition. In this context, the new Risk Preparedness Regulation is all the more important as it sets a new framework and rules for preventing and managing electricity crisis and ensuring security of supply across MS and fostering stronger regional cooperation and solidarity across MS. The TSOs will develop methodologies within ENTSO-E, which will help to prepare, manage and prevent electricity crises such as costly blackouts and set the framework for neighboring countries to cooperate and coordinate efforts and solutions to potential threats or crises at national and regional level within the context of an increasingly more interconnected European power system. By developing a number of short-term adequacy methodologies (seasonal, month ahead, week-ahead, day ahead, regional crisis scenarios), identifying crisis scenarios at regional level in Europe and then participating in the development of national risk preparedness plans, as well as supporting efforts on cybersecurity and digital tools, TSOs within ENTSO-E and at regional level will provide the basis for enabling security of the power system through fit-for-purpose risk-preparedness framework for cooperation between member states and a harmonized framework at European level to deliver those benefits at both regional and pan-EU level.

Last but not least, TSO-DSO cooperation and coordination is increasingly more critical in order to ingrate better wholesale and retail markets and to bring benefits to all consumers in the context of the energy transition. The CEP sets the basis and clear provisions for developing an integrated system approach at the basis of which the TSOs and DSOs roles and responsibilities are recognized and where it will be even more important that TSOs and DSOs interactions ensure at the different levels management of system services and data exchanges in a neutral manner to facilitate further market integration.

The new market design provisions should better enable flexibilities to participate in the market by removing further barriers: the rules support further the spread of smart meters, the need for data collection and delivery to any party which is mandated to manage such services. TSOs will further benefit from these new rules and from the new possibilities to pull together resources from various types of smaller and larger consumers to provide system services. TSOs together with DSOs have clear and distinct roles in this process, well as an agreement on mutual processes and data exchanges to support and guarantee a reliable, efficient and affordable operation of the electricity system and grid, and to guarantee non-discriminatory and efficient market operation. An efficient level playing field for market parties will be needed to foster new services and provide the right signals for flexibilities.

Enabling flexibility will be key for the future power system which is increasingly more complex to manage in the context of this paradigm shift to a more decentralized and digital world. TSOs and DSOs will increasingly need to cooperate and coordinate, to enable this more complex system to function securely given the increasing number of decentralized units to be connected especially at the distribution level by 2030 as well as the increasing number of players to interact with such as active customers, electric vehicles, and smart devices.

TSO-DSO COOPERATION

TSOs will contribute to facilitating markets and designing products for flexibility together with DSOs, customers, aggregators, suppliers, traders, and other market actors. The CEP provides a framework for developing an efficient level playing field for market parties, fostering new services and valuing flexibilities, which will be increasingly more important for the secure management of the power system. Enabling the efficient use of flexibilities for congestion management on the grids and for balancing of the power system will be a crucial challenge to address together and enable and incentivize customers to help system operators keep the power system running. In addition, TSOs and DSOs shall agree on mutual processes and data exchanges to guarantee a reliable, efficient and affordable operation of the electricity system and grid, and to guarantee non-discriminatory and efficient market operation. Last but not least, the CEP creates a new entity of the EU DSOs to facilitate and foster cooperation at the EU level between the DSOs themselves and between the DSOs and the TSOs at EU level in ENTSO-E. The Electricity Regulation provides a framework for the future cooperation of ENTSO-E & the future EU DSO entity on important tasks related to future Network Codes drafting, system operation and planning, demand response, interoperability etc. and will further facilitate the development of a one-system approach where the TSO-DSO cooperation will further create and maximise the value for the customer along the whole value chain.

In addition, future Network Codes and guidelines drafting jointly will ensure that greater integration both horizontally and vertically is enabled and that wholesale & retail level are better linked, including also the potential to develop together rules on cross-cutting area such as cybersecurity NC along the value chain or for integration of demand-side response (NC on DSR).

New tasks as foreseen by the CEP for the DSOs, such as demand response and participation of aggregators into the market, flexibility and product design, development of distribution network development plans, and data management will lead to both a more significant role of DSOs to play in the future of electricity markets and to the need for closer and stronger interactions with TSOs to ensure system security.

Digitalisation of the grid and development of smart grids increasingly impacts the TSOs and their interactions within the internal energy market and the system operation and management, and will provide solutions to both TSOs driving further innovation on developing new services, products and markets, which will support the whole value chain including TSOs and DSOs. The CEP explicitly recognizes these new trends regarding increasing digitalization of the power system, information exchange from new sources, and data management and explicitly mandates TSOs' roles and tasks regarding the digitalization of transmission systems and '*data management, including the development of data management systems, cybersecurity and data protection, subject to the applicable rules, and without prejudice to the competence of other authorities.' In a similar manner ENTSO-E should promote at European level* 'the digitalisation of transmission networks including deployment of smart grids, efficient real time data acquisition and intelligent metering systems; and to contribute to the establishment of interoperability requirements and non-discriminatory and transparent procedures for accessing data as provided for in Article 24 of the recast Electricity Directive. All of these provisions will be crucial to build an efficient integrated EU electricity market and bring substantial gains with respect to grid operation and planning by lowering costs for operators, reducing market barriers, enabling end-users to become active participants, bringing more transparency to the usage of data, and also creating new market opportunities, new business models, and further innovation. The CEP framework should enable those developments while also challenging, transforming the existing context of the IEM, data management and governance framework. The TSOs will have a central role to play in developing new platforms to facilitate market integration and to enable participation of all customers. The emergence of the digital grid complementary to the physical one will further offer new possibilities for both cross-sectoral optimization, including also gas, heat, e-mobility, and further economies of scale across geographical boundaries through connecting the local, national and regional levels towards the pan-European level.

In order to meet new challenges associated with greater energy cross-border exchanges, the development of local markets and active customers' participation in the internal electricity market, TSOs will need to invest more into research and innovation regarding technologies, processes, platforms, and IT solutions, together with other market participants and stakeholders too. Blockchain technologies, artificial intelligence, internet of things will be some of the new frontiers for TSOs to further research, develop and test as part of developing new tools for market facilitation and integration and to enable various types of prosumers to provide flexibility to the system.

Last but not least, the CEP will have an impact on the knowledge and skills that will be needed in order to meet the new challenges of the energy transition and filfill the new tasks as per the legislation. TSOs will need to further expand the set of talents and skills they look for and need in order to be able to meet these new challenges of the energy transition. The system complexity and as well as the challenges and risks are increasing as prosumers are increasingly put into the centre of this new digital power system. Raising awareness of risks and opportunities, and further capacity building, and training efforts will be important to facilitate consumer empowerment and protection while also enabling consumers to participate in the market and provide various services to the benefit of the electricity system. Open questions related to the effects of digitisation on the security of the electricity system, helping consumers to understand the new developments (cyber and data risks, etc), will be important to tackle as well in the future, in order to ensure that digitalisation and decarbonisation trends in the energy transition go together with further democratisation and ensuring access to energy to all consumers.

CONCLUSION

The experience of implementing the Third Energy Package has demonstrated the value of effective and efficient cooperation at all levels across Europe, and these efforts have delivered enormous benefits for the society during the last decade. With the acceleration of the energy transition, it will be even more important to use the lessons learned that moving in the right direction is more important than just moving at a fast pace. Looking ahead, the CEP sets an even faster pace and a much more significant amount of resources and commitment on all sides to manage this high speed for implementation and stay on the right track without leaving behind anyone in the energy transition. A balance will need to be found between the speed, the quality and the cost of the implementation.

Implementing all these new tasks and responsibilities will require the concerted efforts of all actors in the energy system, including not only the European TSOs, but equally Member State governments, regulators, DSOs, NEMOs, market actors, and final customers among others. While the costs of implementing the various new provisions at all levels, from European, to regional, to national may be significant depending on the paths, solutions, platforms and the model of cooperation chosen, the overall social benefit from these measures will certainly outweigh the costs of implementation ten years down the road. The CEP puts the TSOs in the center of developing and facilitating this new power system as a network of networks, giving them new responsibilities to develop further rules, tools and platforms to enable this network of networks to connect all the different realms and levels at a pan-European levels seamlessly.

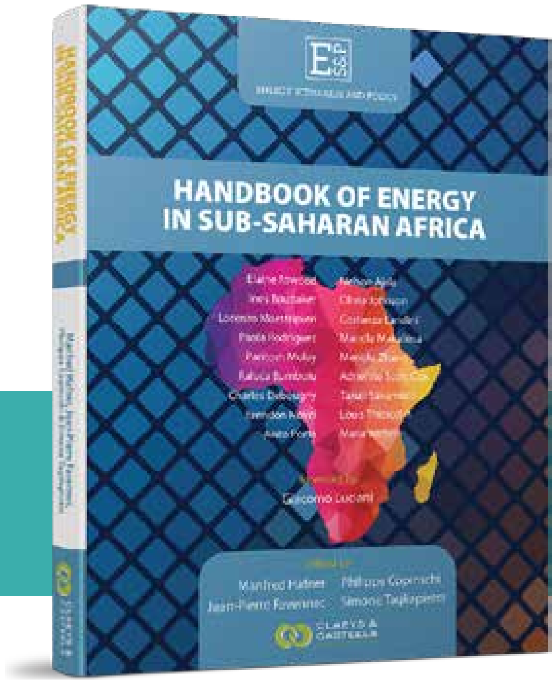
The journey is just starting but the trajectory and the final results will depend on everyone's commitment to deliver on their part. The direction is very clear as set up by the new targets for 2030 CEP recognizes that if Europe wants to go far and ambitious on the clean energy and climate agenda commitments, we all have to go together.

ENERGY SCENARIOS AND POLICY

FEEM Research Programme

VOLUME II

HANDBOOK OF ENERGY IN SUB-SAHARAN AFRICA



ABOUT THE BOOK

Sub-Saharan Africa is on the move. Since 2000, the region has seen rapid economic growth, improving social conditions and progressive political liberalization. Notwithstanding the fact that Africa's energy sector is vital to its socio-economic development, this remains one of the most poorly understood parts of the global energy system. This book seeks to contribute to the understanding of such a topical issue, by providing an analysis of the current trends and future prospects of sub-Saharan energy markets. Covered issues include patterns of energy production, demand and trade; energy investments; energy infrastructure; energy access; energy and development; regional energy cooperation; the role of China in Africa's energy. The book was elaborated by eighteen students supervised by their professors at the Paris School of International Affairs (PSIA) of SciencesPo Paris, in the framework of a collective project work in co-operation with the Energy Scenario and Policy (ESP) research program of the Fondazione Eni Enrico Mattei (FEEM) and with the Association for the Development of Energy in Africa (ADEA).

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ABOUT THE SERIES

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Energy Scenarios and Policy - Volume II
HANDBOOK OF ENERGY IN SUB-SAHARAN AFRICA

Nr of Pages:	398
Price:	EUR 125 | GBP 111 | USD 145 (prices are excl. VAT)
ISBN hard copy:	9789077644423
ISBN e-book:	9789077644478
Publication Date:	September 2018

CLAEYS & CASTEELS LAW PUBLISHING

www.claeys-casteels.com

Fondazione Eni Enrico Mattei

www.feem.it

Claeys & Casteels Law Publishers bv
P.O. Box 2013, 7420 AA, Deventer, The Netherlands
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European Energy Studies

European Energy Studies Volume XIV

The European Energy Transition

Actors, Factors, Sectors

NEW

Edited by Susanne Nies

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ABOUT THE BOOK

This book provides guidance for the incoming policy makers at a European level. It reflects on the latest policy developments, such as the Clean Energy for All Europeans Package.

The energy transition is one of Europe's flagship projects. It needs to provide sound answers to the climate and sustainability-, security of supply- and competitiveness imperatives. The energy transition corresponds to a large scale economic and cultural change. It encompasses sector coupling- linking up sectors that have ignored each other previously, like mobility and power. What is the meaning of digitalization, and how to face cybersecurity risks? What is the response to energy poverty, that 50 million Europeans are victims of?

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ABOUT THE AUTHORS

This comprehensive book on the European energy transition has been written by Europe's leading energy experts. It is edited by **Susanne Nies**, strategy & communications manager at ENTSO-E and is prefaced by **Jacques Delors**, former president of the European Commission. For more details on contributors see our website.

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This book will be used as dedicated reading material in a forthcoming online training course on the energy transition. This course, with the same title as the book, targets an international audience. The training has been set up by the **Florence School of Regulation** and **ENTSO-E** and will be launched to start on **17 May 2019**. The book's authors will be invited to submit contributions based on their various areas of expertise.

European Energy Studies, Volume XIV
The European Energy Transition
Actors, Factors, Sectors

Nr of Pages:	500
Price:	EUR 145 | GBP 130 | USD 165 (prices are excl. VAT)
ISBN (hard copy):	978 90 77644 60 7
ISBN (ebook)	978 90 77644 59 1
Publication Date:	19 February 2019

Claeys & Casteels Law Publishers bv
P.O. Box 2013, Deventer, The Netherlands
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www.claeys-casteels.com - info@claeys-casteels.com