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Capacity Mechanisms

An option for ensuring an affordable and secure electricity supply in the EU?

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- The growing proportion of electricity generated from fluctuating renewable energy sources in the EU hampers the financing of power plants that can, as reserve capacity, reliably generate electricity at any time, and thereby ensure security of supply.
- Before mechanisms are brought in to ensure sufficient electricity generating capacity, it is necessary to examine whether the expansion of cross-border power lines and greater integration of the internal energy market are already sufficient for this.
- The harmonised implementation of capacity mechanisms, at least at regional level, may reduce the overall requirement for a secure generating capacity and prevent „free riding" by individual Member States when it comes to financing them.
- The decision by the German government of July 2015 to temporarily transfer lignite-fired power plants to a capacity reserve without prior tendering procedures breaches the principle of a competitive EU internal energy market.

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1 Introduction

In July 2015, the European Commission presented a consultative Communication on the reform of the European electricity market design.[1] In this context, it reinforced its aim of achieving a secure and climate-friendly electricity supply at affordable prices.[2] Measures to ensure the security of the electricity supply will be coordinated EU-wide and will not distort competition in the internal market. In order to achieve this, the Commission will propose legal provisions for the security of the electricity supply in 2016.[3]

To achieve a secure electricity supply, in addition to secure access to fuels such as coal or natural gas and a well-developed electricity network infrastructure, it is crucial to have sufficient "secure generating capacity" in the EU. This refers to power plant capacity which can be relied upon to feed into the network at any time irrespective of the time of day or weather conditions. Thus, wind and solar power plants, in particular, whose electricity input fluctuates heavily depending on the time of day and/or weather conditions, do not constitute secure generating capacity.

There is currently no shortage of secure generating capacity in the EU Member States. In fact, at peak demand times, the secure capacity available exceeds the demand for electricity generation due, in particular, to the relatively low demand for electricity as a result of the economic crisis and the still high number of old power plants which have been written down.[4] Whether the electricity supply in the EU can also be guaranteed in the future, without a reform of the existing electricity market, has been the subject of controversy for some years. Thus, the European Commission believes that in 2020 the capacity for secure electricity generation in the 14 Member States may be insufficient.[5]

Many of the power plants currently still in the market will be shut down in the medium term due to their age. As, in addition, the incentive to invest in new secure power-plant capacity is low, due to low wholesale electricity prices, more and more Member States are starting to develop "capacity mechanisms" which provide extra remuneration for the provision of secure capacity. In July 2015, the German government also decided to introduce a so-called "capacity reserve".[6]

This cepInput will contribute to the current discussion on the advantages and disadvantages of capacity mechanisms in the EU internal energy market. Section 2 describes the peculiarities of the electricity market and the developments which have led to an increasing shortage of secure generating capacity. Section 3 looks at the various different types of capacity mechanism which are already being planned or have already been introduced in some Member States. Section 4 provides an economic impact assessment of the various mechanisms and specifies the general ordoliberal requirements for capacity mechanisms. Section 5 sets out the European legal framework for the introduction of capacity mechanisms.

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[1] European Commission, Communication COM(2015) 340 of 15 July 2015, Launching the public consultation process on a new energy market design.

[2] European Commission, Communication COM(2007) 1 of 10 January 2007, An Energy Policy for Europe, p. 3 et seq.

[3] European Commission, Communication COM(2015) 80 of 25 February 2015, A Framework Strategy for a Resilient Energy Union with a Forward-Looking ClimateChange Policy, p. 20.

[4] European Commission, Staff Working Document SWD(2013) 438 of 5 November 2013, Generation in the internal electricity market – guidance on public interventions, p. 9; see cepPolicyBrief No. 17/2014.

[5] COWI; THEMA Consulting Group; E3M-Lab (2013): Capacity mechanisms in individual markets within the IEM, p. 65.

[6] Political Agreement of the Party Leaders of the CDU, CSU and SPD of 1 July 2015 (2015): Eckpunkte für eine erfolgreiche Umsetzung der Energiewende, p. 3 et seq.; Federal Ministry for Economic Affairs and Energy (2015): Ein Strommarkt für die Energiewende, Report by the Federal Ministry for Economic Affairs and Energy (White Paper), p. 79 et seq.

2 The need for secure generating capacity

2.1 The peculiarities of the electricity market

The electricity market differs in many respects from other merchandise markets. In particular, in order to maintain the stability of the electricity system, it is necessary to ensure that the physical electricity supply corresponds at all times to the demand, otherwise the mains frequency may fall and cause power cuts. In addition, both the supply of and demand for electricity only have limited flexibility. Thus demand for electricity is very price-inelastic because most end users currently have little opportunity to react to price signals on the wholesale electricity market. The demand for electricity fluctuates instead according to the time of day and the weather conditions. For the foreseeable future, the possibility of storing large volumes of electricity will remain limited.[7] Many Member States only have limited availability of natural storage potential – such as pumped storage plants - and alternative technology – such a battery storage – is currently still very expensive.[8]

Thus, it is necessary to ensure that electricity producers have sufficient "secure generating capacity". However, in the short and medium term, even power stations that are reliably able to produce electricity, will only be flexible up to their capacity limits. The planning and construction of new power plants involves a time-frame of several years. In addition, they are only built if they are going to be profitable for the operator which means they must be reliably able to supply the grid with electricity sufficiently often and at a sufficiently high price. However, in deregulated electricity markets, this is not certain.

2.2 The deregulation of the electricity markets

2.2.1 The sale of electricity and security of supply as a public good

In the EU Member States, it has traditionally been vertically integrated electricity companies (VICs), with control over the generation and sale of electricity as well as over the grids themselves, that have been responsible both for supplying the consumer and for the security of the system in the national electricity grids. The supply of electricity was long seen as the responsibility of the public utilities with the assumption that only a limited number of large state controlled companies were able to ensure a reliable, affordable and comprehensive electricity supply to a country.[9]

In the course of the deregulation of the electricity supply, by way of what is known as the Third Internal Energy Market Package[10], VICs had to give up their control of the electricity grids and open up their networks to all potential electricity producers.[11] This created a wholesale market for electricity on which various producers compete with each other. Since the operators of power plants are only remunerated for the actual volume of electricity which they supply, at wholesale prices, the electricity market is also referred to as an "Energy-Only Market" (EOM). The commodity "security of supply" – i.e. the ability to provide the required volume of electricity at any time – is not traded on the EOM and is thus not accorded a price. Instead it constitutes a public good.[12] Security

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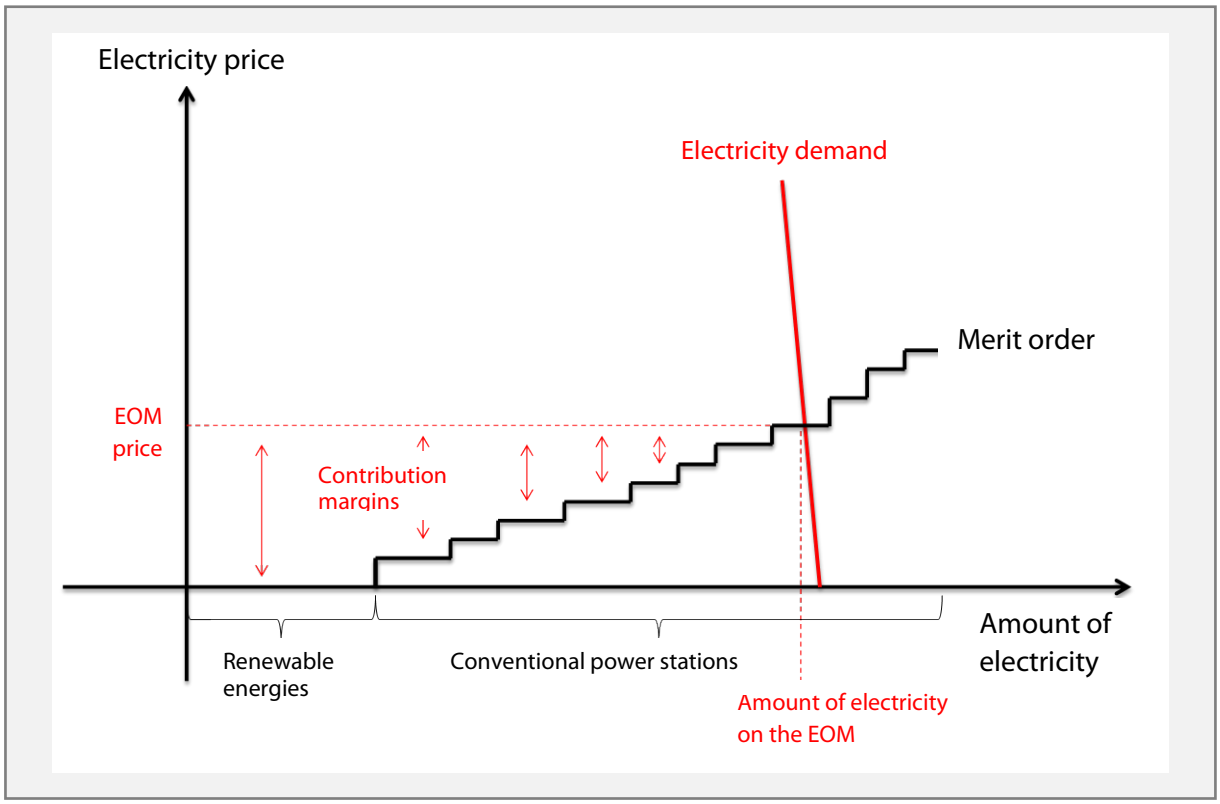
[7] Joskow, P. (2012): Creating a Smarter U.S. Electricity Grid, Journal of Economic Perspectives, Vol. 26, p. 31 et seq.
[8] Bode, S.; Groscurth, H.-M. (2015): Knappheitspreise oder Kapazitätsmechanismen – Wie lassen sich Anreize für Investitionen in neue Kraftwerke schaffen?, Kurzstudie, arrhenius Institut für Energie- und Klimapolitik, p. 16.
[9] Fischer, p. (2011): Auf dem Weg zur gemeinsamen Energiepolitik, p. 162 et seq.
[10] Bonn, M.; Heitmann, N.; Nader, N.; Reichert, G.; Voßwinkel, J. (2014): cepKompass Die Klima- und Energiepolitik der EU – Stand und Perspektiven, p. 46 et seq.
[11] Article 9 Directive 2009/72/EC of the European Parliament and of the Council of 13 July 2009 concerning common rules for the internal market in electricity and repealing Directive 2003/54/EC.
[12] A public good is an asset that can be used collectively with the same level of quality irrespective of the number of users. An additional criterion is generally considered to be the fact that no user can be excluded from it.

of supply is primarily dependent on the willingness of various energy producers to make sufficient capacity available to allow the demand for electricity to be served at all times. By contrast with centralised electricity generation by a few electricity producers, however, the many individual producers in a deregulated electricity market do not, when making investment decisions, take sufficient, if any, account of the fact that the construction of new power plants contributes to the public good "security of supply".[13] Since security of supply is not remunerated separately, there is also no incentive for the individual company to provide it. As a result, there is underinvestment in new power plants.

2.2.2 The Energy-Only Market and the increasing share of renewable energies

On the EOM, electricity suppliers submit bids amounting to the marginal costs of their electricity generation (Fig. 1). Ranking these bids in order of price ("Merit Order") represents the offer function on the EOM. The price on the EOM lies at the cross-over between electricity supply and demand and thus corresponds to the variable electricity generation costs of the last power plant that is required to cover the demand. All power plants with lower electricity generation costs are then remunerated at this price and thereby achieve a marginal return to finance their power plant investments.

Figure 1: Equilibrium on the Energy-Only Market



Source: cep

[13] European Commission, Staff Working Document SWD(2013) 438 of 5 November 2013, Generation in the internal electricity market – guidance on public interventions, p. 2.

Competition on the EOM can lead to the wholesale price being so low on many days of the year that power plants with relatively high marginal costs cannot supply any electricity and will at some point be shut down due to the resulting under-utilisation. For the same reason, investment in new power plant capacity does not take place. On days with unusually high demand for electricity, this can result in a failure to provide a secure supply of electricity as the generation capacity on the EOM market is too low to cover demand.

The fact that an increasing share of the electricity supply is coming from renewable sources, which are dependent on the weather and the time of day, has exacerbated this problem in two respects. Firstly, wind and solar power plants do not provide secure output because they can only supply the grid with electricity when there is sufficient wind speed or solar radiation. Secondly, the variable costs of generating electricity from wind and solar energy are almost nil. On windy and sunny days, wind and solar power plants will therefore cover most of the demand for electricity and, by way of the Merit Order, force conventional power plants with their significantly higher variable costs out of the market. A growing share of renewables therefore means that conventional power plants are less able to finance themselves from gains made on the EOM.

2.2.3 Lack of investment incentive from the Energy-Only Market?

State regulation – e.g. by way of maximum prices set by the government – can prevent price spikes on the EOM in times of shortage. However, it reduces the power plant operator's ability to finance the cost of operating and constructing new power plants by way of marginal returns on the EOM.[14] This problem is known as "Missing-Money".[15]

It is therefore often argued that there would be enough incentive for investment in secure power plant capacity if price spikes were permitted on the EOM in times of shortage.[16] Electricity traders could insure themselves against such price spikes by way of forward transactions which would finance the construction of new power plants.

Without state regulation of electricity prices, however, price spikes in the market would only arise in the event of a significant shortage of electricity[17] when in fact they would need to arise often enough to allow for the necessary power plant investments. This requires frequent periods with electricity price spikes. On this basis, the aforementioned argument is problematic for two reasons:

Firstly: Even without state restrictions on the electricity price, the risk of a lack of electricity price spikes is a high one for investors[18] because the occurrence of possible price spikes involves a great deal of uncertainty and is difficult to forecast several years in advance. Electricity prices are very volatile and depend on a number of developments which are currently very difficult for investors to include in their calculations.[19] These include, e.g. possible reforms of the EU Emissions Trading

[14] Vázquez, C.; Rivier, M.; Pérez-Arriaga, I.-J. (2002): A Market Approach to Long-Term Security of Supply. IEEE Transactions on Power Systems, 17 (2), p. 1.
[15] Cramton, P.; Stoft, S. (2006): The Convergence of Market Designs for Adequate Generating Capacity, Manuscript, p. 9 et seq.
[16] Kranner, K.; Sharma, S. (2013): Das europäische Strommarktdesign der Zukunft, Energiewirtschaftliche Tagesfragen 1,2/2013, p. 64.
[17] bdew (2014): Ausgestaltung eines dezentralen Leistungsmarkts, Positionspapier, p. 4.
[18] Cramton, P.; Ockenfels, A. (2012). Economics and Design of Capacity Markets for the Power Sector, Zeitschrift für Energiewirtschaft 36: 113–136.
[19] Richert, J.; Paulun, T. (2013): Kapazitätsmechanismen: Der Bedarf ist unklar, die Lösungsvorschläge komplex, Energiewirtschaftliche Tagesfragen 9/2013, p. 13.

System and the future design of support for renewable energy.[20] If we also consider the fact that investment in new power plants involves a time-frame of several years and ties up a lot of capital, it is doubtful, to say the least, whether the vague hope of future price spikes will offer sufficient incentive for investment in new power plants.[21]

Secondly: In many countries, electricity price spikes are politically undesirable because they reveal the fact that companies that are still in a position to offer additional volumes of electricity wield significant market power. This market power could, in principle, be misused to impose excessive surcharges.

The ban on the misuse of a dominant market position takes effect (Art. 102 TFEU[22], Sections 19, 29 German Law on Restrictions of Competition, GWB)[23]) in such cases however. Thus, in Germany, companies with a dominant market position are, in particular, prohibited from claiming fees "which unreasonably exceed the costs" (Section 29 (1) No. 2 GWB). Prices above the marginal costs therefore require particular justification. They may be permitted in the individual case where the company proves that surcharges on the marginal costs are required in order to generate the total average costs of a fleet of power plants.[24]

2.3 Roll-out of cross-border electricity infrastructure

In order to create the internal EU electricity market, in which electricity can be traded across borders, it is essential for a roll-out of cross-border electricity connections between Member States ("border interconnectors"). Interconnected cross-border electricity infrastructure will contribute significantly to facilitating competitive electricity prices, enabling CO_2 reduction ("decarbonisation") in the electricity sector and increasing security of the electricity supply in the EU.[25] The European Council of Heads of State and Government already decided in 2002, therefore, that in 2005 the capacity of cross-border electricity connections ("electricity interconnection level") in all Member States to other Member States had to be at least 10% of domestic electricity generation capacity ("electricity interconnection target").[26] In recent years, there has therefore been a significant expansion of border interconnectors.[27] In October 2014, the European Council laid down an interconnection target of 15% for 2030.[28]

The roll-out of cross-border electricity networks is seen, in particular in view of the growing share of wind and solar energy in electricity generation in the EU, as a possibility for smoothing out fluctuations in electricity generation EU-wide by exporting surplus electricity from one country to another. The need to provide secure generating capacity would be reduced as a result. This only has a significant impact on the security of the electricity supply if the fluctuations in the influx of

[20] European Commission, Communication COM(2015) 80 of 25 February 2015, A Framework Strategy for a Resilient Energy Union with a Forward-Looking Climate Change Policy.
[21] De Vries, L. (2007): Generation Adequacy: Helping the Market do its Job, Utilities Policy 15, S. 21.
[22] Treaty on the Functioning of the European Union.
[23] Law on Restrictions of Competition.
[24] Federal Cartel Authority, Sector Inquiry into Electricity Generation and Wholesale Markets. Final Report pursuant to Section 32e GWB, January 2011 p. 26 et seq.
[25] European Commission, Communication COM(2015) 80 of 25 February 2015 on achieving the 10% electricity interconnection target; see cepPolicyBrief No. 11/2015.
[26] Conclusions of the European Council of 15/16 March 2002, para. 37.
[27] European Commission, Communication COM(2015) 82 of 25 February 2015 on achieving the 10% electricity interconnection target, p. 4 et seq.
[28] Conclusions of the European Council of 23/24 October 2014, para. 4.

electricity, arising as result of the weather, are asymmetric in the EU. Thus, there cannot be a lack of wind and/or heavy cloud at the same time across the EU.[29]

In addition, consideration must be given to the fact that the roll-out of border interconnectors may intensify competition on the wholesale markets. This may further reduce the possibility for power plant operators to finance themselves via the EOM. It becomes even more difficult to provide the public good "security of supply" in an internal market with an even larger number of potential electricity producers.

3 Capacity mechanisms

3.1 Background

Since there is increasing doubt as to whether the roll-out of cross-border electricity infrastructure and the incentives from the EOM are suitable for achieving a high level of security in the electricity supply, numerous EU countries have planned and introduced "capacity mechanisms" in recent years, aimed at ensuring that sufficient incentives are generated for investment in secure supply. Capacity mechanisms allow producers to be remunerated not just for the actual volume of electricity produced but also for the provision of capacity. This will solve the "Missing Money Problem".

In the case of all capacity mechanisms, the network operator or another central office ("Regulator") fixes a maximum price in the EOM to indicate a shortage ("exercise price") which aims to protect consumers against price spikes on the EOM. The level of the exercise price determines when a "shortage" arises on the EOM. The lower the setting, the sooner a shortage will occur on the EOM.

In addition, capacity mechanisms can be divided into three groups: In the case of the "Strategic Reserve" (SR), which will probably be in use in Sweden and Finland by 2020[30], reserve power plants are available exclusively as security for extreme situations without, however, being able to participate in the EOM (3.2). The "Capacity Reserve" being planned by the Federal Republic of Germany is also a Strategic Reserve. In the case of a "Central Capacity Market" (CCM) like that of the United Kingdom, the electricity producers receive income both from the pure marketing of electricity and from the provision of secure capacity; its allocation is determined by a central office by way of an auction (3.3). In the case of a "Decentral Capacity Market" (DCM), like that currently being planned in France and Greece, consumers must acquire so-called "capacity certificates" for the commodity of "secure capacity", i.e. for the guarantee of a secure electricity supply. Technically flexible consumers can save on the cost of these certificates by way of demand-side management.

3.2 Strategic Reserve (SR)

In the case of the Strategic Reserve (SR), the Regulator will secure the availability of a fixed power plant capacity for a specified period[31] by making regular "capacity payments" to its operator. The provision of the reserve capacity is generally put out for tender on a technology-neutral basis and awarded to the bidder with the most favourable bid.[32] Alternatively, the Regulator itself may buy or

[29] Bode, S.; Groscurth, H.-M. (2015): Knappheitspreise oder Kapazitätsmechanismen – Wie lassen sich Anreize für Investitionen in neue Kraftwerke schaffen?, Kurzstudie, arrhenius Institut für Energie- und Klimapolitik, p. 25.
[30] Agora-Energiewende (2013): Kapazitätsmarkt oder strategische Reserve: Was ist der nächste Schritt?, p. 12.
[31] In the case of new power plants, a longer period is usually specified than for existing power plants.
[32] Short-term adjustment auctions are usually also necessary.

lease the capacity.[33] The power plant reserves being planned in Germany also provide for power plants to be determined by way of auction, in the medium term. However, for reasons of climate policy, old lignite-fired power plants which are still economic will be transferred to the power plant reserve temporarily before they are finally shut down.[34]

The main feature of the SR is the fact that its power plants are not permitted to take part in regular electricity trading. They are withdrawn from the EOM and used successively for electricity generation exclusively in times of shortage.[35] The overall volume of secured capacity is thus made up of the SR and the secured power plant capacity in the EOM.

As soon as the electricity price in the EOM reaches the level of the exercise price, the SR is deployed; the reserve power plants begin to produce electricity. This counteracts shortages in the market and prevents the electricity price from rising any further than the exercise price.[36]

The SR is intended to avoid undesirable price spikes – which are often seen as a sign of a lack of security in supply. The Regulator simply has to determine the price which is still just about permissible on the EOM. The lower the setting, the sooner the SR will be triggered and the more reserve capacity must be made available. At the same time, a low exercise price will force relatively expensive electricity generating capacity out of the EOM. The chosen exercise price therefore also influences the allocation of capacity between the EOM and the SR.

Insofar as the SR is used, the power plant operator (only) receives compensation amounting to the variable electricity generating costs. The capacity payments are financed by way of a fee which is usually passed on to the electricity consumers.[37]

3.3 Central Capacity Market (CCM)

Central Capacity Markets (CCM s) are in some respects similar to the SR. Here too, a Regulator has to ensure that secure production capacity is available in sufficient volumes. By contrast with the SR, the Regulator does not however procure a certain volume of reserve capacity in addition to the capacity in the EOM but specifies centrally the overall volume of secure capacity required and procures it by auction. The companies which are awarded the contracts receive, as in the case of the SR, regular capacity payments. Unlike the SR, however, they are allowed to purchase electricity on the EOM at the same time.

Typically, in the case of CCMs, capacity payments are attached to the requirement to assume the costs arising as a result of price spikes when there is a shortage of electricity on the EOM. This takes place in the form of availability options ("Call Options") which guarantee the purchasers on the EOM that they can acquire the electricity at any time at the exercise price. If the price on the EOM is above the exercise price, electricity producers who receive capacity payments must pay the

[33] De Vries, L. (2007): Generation Adequacy: Helping the Market do its Job, Utilities Policy 15, p. 25.
[34] Federal Ministry for Economic Affairs and Energy (2015): Ein Strommarkt für die Energiewende, Report by the Federal Ministry for Economic Affairs and Energy (White Paper), p. 79 et seq.
[35] Institute of Energy Economics at the University of Cologne: Untersuchungen zu einem zukunftsfähigen Strommarktdesign, Köln 2012, p. 50.
[36] Ibd., p. 48.
[37] Neuhoff, K., Diekmann, J., Schill, W.-P., Schwenen, S. (2013): Strategische Reserve zur Absicherung des Strommarkts, DIW Wochenbericht No. 48/2013, p. 9.

difference between the electricity price and the exercise price. The risk of high price spikes is thus transferred to the electricity producers.[38]

Companies that want to take part in the auction have to undergo a "pre-qualification" in order to ensure that they can actually provide secure capacity. In this regard, other criteria may be laid down which further restrict the number of power plants taking part in the auction. This is also referred to as a "focussed CCM" as compared with the "comprehensive CCM" where no further requirements are made in relation to power plant characteristics.

Possible criteria in the case of focussed CCMs may be e.g. that the power plants wanting to compete for capacity payments must be low carbon or must prove that without capacity payments they are liable to closure.[39] Thus, as with the SR, support is concentrated only on a certain number of power plants which, by contrast with the SR, can also take part in the EOM. Restricting support to the selected types of power plant will avoid deadweight losses and at the same time other aims

– such as e.g. climate protection – can be pursued in addition to security of supply. The extent of secure capacity is made up of the power plant capacity acquired by capacity payments in the focussed CCM and the secure power plant capacity which only obtains revenue on the EOM.

3.4 Decentral Capacity Market (DCM)

In the case of the Decentral Capacity Market (DCM), in addition to the commodity "electricity" which continues to be traded on the EOM, a second asset is also traded, namely "secure capacity". Suppliers of secure capacity sell "capacity certificates" with which they guarantee that, in the event of shortfalls on the EOM, they are in a position to provide specific volumes of electricity.[40]

Where the exercise price on the EOM is exceeded, the electricity suppliers must prove that they have acquired sufficient capacity certificates to cover the electricity demand of their customers. The same applies to large-scale consumers that buy electricity directly on the EOM. Anyone without sufficient certificates must pay a penalty amounting to a multiple of the certificate price.

The level of the exercise price and the penalty is determined by a Regulator. The overall number of certificates is not determined centrally, however, but arises from the total volume of secure capacity made available to the EOM. The certificate price is therefore not determined by an auction carried out by the Regulator but arises on a decentral basis from the interaction between the (fixed) number of certificates supplied by the electricity producers and the demand for certificates from the electricity suppliers and large-scale consumers.[41]

In the event of a shortage of electricity on the EOM, it becomes more likely that the electricity price will exceed the exercise price and the electricity suppliers will incur penalties for holding insufficient certificates. The electricity suppliers therefore have an incentive to buy a sufficient number of certificates and thereby finance the construction and maintenance of power plants. The incentive for large electricity consumers, in particular, to switch off their machines and plant during electricity shortages ("Demand-Side Management") is also greater because no certificates must be

[38] Institute of Energy Economics at the University of Cologne: Untersuchungen zu einem zukunftsfähigen Strommarktdesign, Köln 2012, p. 55 et seq.
[39] Agora-Energiewende (2013): Kapazitätsmarkt oder strategische Reserve: Was ist der nächste Schritt?, p. 51 et seq.
[40] Richert, J.; Paulun, T. (2013): Kapazitätsmechanismen: Der Bedarf ist unklar, die Lösungsvorschläge komplex, Energiewirtschaftliche Tagesfragen 9/2013, p. 13 et seq.
[41] bdew (2014): Ausgestaltung eines dezentralen Leistungsmarkts, Positionspapier, p. 13.

held for that proportion of the electricity demand which can be flexibly reduced during periods of shortage.

Tab. 1: How various capacity mechanisms work

	SR	Comprehensive CCM	Focussed CCM	DCM
How are suppliers of secure capacity remunerated?	By capacity payments determined in auctions	By capacity payments determined in auctions	By capacity payments determined in auctions	By the sale of capacity certificates
Which power plants may be considered for payments?	In principle, all suppliers of secure capacity	In principle, all suppliers of secure capacity	All suppliers of secure capacity that fulfils certain requirements (e.g. CO_2 intensity, new power plants).	In principle, all suppliers of secure capacity
How is the amount of secure capacity determined?	Centrally by the Regulator	Centrally by the Regulator	Centrally by the Regulator	De-centrally via the market for capacity certificates
What are the Regulator's main variables?	(1) Size of SR, (2) Exercise price	(1) Size of comprehensive CCM, (2) Exercise price	(1) Size of focussed CCM, (2) Requirements for pre-qualification, (3) Exercise price	(1) Penalty for holding insufficient certificates in the case of electricity shortage, (2) Exercise price
What makes up the entire amount of secure capacity?	Total amount from SR and secure capacity in EOM	Total from the comprehensive CCM plus any additional power plants which only gain revenue on the EOM.	Total from the focussed CCM plus any additional power plants which only gain revenue on the EOM.	Corresponds to the supply of capacity certificates.
Can power plants that are remunerated for secure capacity, sell electricity on the EOM?	no	yes	yes	yes

Source: cep

4 European Commission State Aid Guidelines

4.1 Concerns relating to law on State aid

The European Commission is sceptical about capacity mechanisms for reasons arising from the law on State aid.[42] In April 2015, it therefore initiated a Sector Inquiry to find out more about the functioning of capacity mechanisms which have already been introduced in individual Member States. For this purpose, it will obtain information, in the Member States concerned, from ministries, energy regulators and competition authorities as well as from relevant market participants such as network operators, electricity generators, non-generation capacity providers, power exchanges and traders. The interim results of this survey will be published as part of a public consultation and a final report will be issued in 2016.

From the Commission's point of view[43] there is a risk, with the uncoordinated introduction of capacity mechanisms by Member States, that they will be inefficient and significantly distort cross-border trade and the competition between capacity providers. Generally, the Commission fears distorted pricing in the internal electricity market. In addition, the mechanisms might only include specific electricity generating technologies or exclude activities which do not involve electricity generation – such as demand-side management. In addition, they might ignore the contribution which can be made to security of the electricity supply by capacity providers outside national borders or by improving the connection to neighbouring markets.

In June 2014, in its Guidelines on State aid for environmental protection and energy 2014–2020[44] ("Commission Guidelines"), the European Commission laid down inter alia criteria for assessing "aid for the promotion of generation adequacy" according to the law on State aid.[45] A final assessment of capacity mechanisms under the law on State aid, which will be prepared along with the Sector Inquiry, will have to be based on the actual designs used by the individual Member States. However, the following analysis will highlight the main conditions which capacity mechanisms must fulfil under the Commission Guidelines.

4.2 System of State aid control pursuant to Art. 107–109 TFEU

In order to protect the internal market against distortions of competition, the EU, under Art. 3 (1) (b) TFEU has exclusive competence for establishing the required competition rules. Crucial in this regard is EU State aid control pursuant to Art. 107-109 TFEU. The term "aid"[46] within the meaning of Art. 107 (1) TFEU covers allowances granted by a Member State or through State respources to companies or industries for which no reasonable and/or customary consideration is required.[47] In order to prevent State aid from distorting competition in the internal market and thereby affecting trade between Member States, Art. 107(1) TFEU constitutes a basic ban on State aid in the usual case. In the exceptional case, however, State aid may be compatible with the internal market under Art. 107(2) or (3) TFEU. Whilst the aid which falls under the exceptional cases set out under Art. 107(2) TFEU is compatible with the internal market per se (legal exceptions), the

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[42] European Commission, Decision C(2015) 2814 of 29 April 2015 initiating an inquiry on capacity mechanisms in the electricity sector pursuant to Article 20a of Council Regulation (EC) No 659/1999 of 22 March 1999.
[43] Ibd., Recital 4.
[44] European Commission Guidelines on State aid for environmental protection and energy 2014–2020, Official Journal of the European Union of 28 June 2014, C 200, p. 1 et seq.
[45] Ibd., Section 3.9, para. 216 et seq.
[46] Langner, B. (2011): cepStudy Die europäische Beihilfekontrolle auf dem Prüfstand, p. 5.
[47] Callies/Ruffert-*Cremer*, EUV/AEUV, 4th Ed. 2011, Art. 107 AEUV, para. 10 with further references; Streinz-*Kühling*, EUV/AEUV, 2nd Ed. 2012, Art. 107 AEUV, para. 28. with further references.

Commission has a broad scope for discretion when assessing aid under Art. 107(3) TFEU.[48] The relevant exceptions for determining whether State aid in the areas of the environment and energy is compatible with the internal market in general, and in order to "promote adequacy of supply" in particular, are those contained in Art. 107(3)(c). They state that aid to facilitate the development of certain economic activities or of certain economic areas may be considered compatible with the internal market where such aid does not adversely affect trading conditions to an extent contrary to the common interest.

Under Art. 108(1) TFEU, the European Commission keeps the Member States' systems of State aid under constant review and they must notify the Commission, under Art. 108(3) TFEU, of any plans to grant or alter aid (Reporting Procedure). In addition, the Commission sets out the criteria which it uses in exercising its discretion in the course of State aid control in what are called "Guidelines"[49], as in the case of the aforementioned Guidelines on State aid for environmental protection and energy 2014–2020[50]. Such Commission Guidelines are not in themselves directly binding but the Commission may "in exercising its discretion" in the course of Stae aid control under Art. 107 et seq. TFEU, bind itself by way of "measures such as the Guidelines, in so far as those measures contain rules indicating the approach which the institution is to take and do not depart from the rules of the Treaty".[51] Although Guidelines are not binding on EU jurisdiction, they serve as a point of reference[52] for courts in reaching their decisions and thus take on a "*de facto* binding character"[53] beyond the Commission's administrative practice and the principle of compliance with its own rules, thereby gaining legal relevance.

4.3 Guidelines on State aid for environmental protection and energy 2014-2020

4.3.1 Scope

The Commission Guidelines on State aid for environmental protection and energy 2014–2020 also cover aid for "generation adequacy measures".[54] This means a mechanism "which has the aim of ensuring that certain generation adequacy levels are met at national level"[55]. In this regard "generation adequacy" refers to "a level of generated capacity which is deemed to be adequate to meet demand levels in the Member State in any given period"[56]. This definition covers the various types of capacity mechanism (Section 3) which are assessed by the European Commission in the context of aid control in accordance with the criteria of its Guidelines on State aid for environmental protection and energy 2014–2020.

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[48] Streinz-*Kühling*, EUV/AEUV, 2nd Ed. 2012, Art. 107 AEUV, para. 6.
[49] Re. legal classification and definition see Streinz-*Kühling*, EUV/AEUV, 2nd Ed. 2012, Art. 107 AEUV, para. 110 et seq.; Callies/Ruffert-*Cremer*, EUV/AEUV, 4th Ed. 2011, Art. 107 AEUV, para. 4 with further references.
[50] European Commission Guidelines on State aid for environmental protection and energy 2014–2020, Official Journal of the European Union of 28 June 2014, C 200, p. 1 et seq.
[51] ECJ, Case No. C-288/96, ECR 2000, I-8237, para. 62 (Germany/Kommission). See Schwarze-Bär-*Bouyssiére*, EU-Kommentar, 3rd Ed. 2012, Art. 107 AEUV, para. 60 with further references.
[52] Callies/Ruffert-*Cremer*, EUV/AEUV, 4th Ed. 2011, Art. 107 AEUV, para. 4; Schwarze-Bär-*Bouyssiére*, EU-Kommentar, 3rd Ed. 2012, Art. 107 AEUV, para. 60.
[53] Streinz-*Kühling*, EUV/AEUV, 2nd Ed. 2012, Art. 107 AEUV, para. 7 with further references.
[54] European Commission Guidelines on State aid for environmental protection and energy 2014-2020, Official Journal of the European Union of 28 June 2014, C 200, p. 1 et seq., para. 18(l).
[55] Ibd., para. 19, sub-para. 36.
[56] Ibd., para. 19, sub-para. 34.

4.3.2 Objective of aid

According to the Commission[57], aid for generation adequacy may contradict the objective of phasing out environmentally harmful subsidies such as for electricity generation based on fossil fuels. Member States should therefore pursue alternative ways of achieving generation adequacy which do not have a negative impact on the objective of phasing out environmentally or economically harmful subsidies. Possible in this regard, would be e.g. facilitating demand side management or increasing cross-border interconnection capacity. In any case, the Commission is calling on the Member States to provide a clear definition of the objective of a specific State aid measure. In addition, they should identify when and where a capacity problem could arise.

4.3.3 Need for State aid

The Commission requires the Member States to analyse and quantify the nature and causes of the generation adequacy problem and the resulting need for State aid to ensure generation adequacy, e.g. in terms of a lack of peak-load or seasonal capacity or peak demand where there is a failure of the short-term wholesale market to match demand.[58] In addition, Member States will have to prove why the market cannot be expected to deliver adequate capacity in the absence of State intervention.[59]

4.3.4 Appropriateness of State aid

Under the Commission Guidelines, State aid should remunerate solely the service of pure availability provided by the generator. In this regard, the operator should be able to guarantee its availability to deliver electricity and the corresponding compensation for it, for example, in terms of remuneration per MW of capacity being made available. The aid should not include any remuneration for the sale of electricity (i.e. remuneration per MWh sold).[60] In principle, this Guideline criterion can be met by all types of capacity mechanism (Section 3). Even under the CCM (Section 3.3) and the DCM (Chapter 3.4), sales of electricity which power plants may be allowed to make in addition to receiving capacity payments for the provision of generating capacity, can only be remunerated on the EOM (see Table 1).

According to the Commission Guidelines, the measure should also take into account to what extent interconnection capacity could remedy any possible problem of generation adequacy.[61] In addition, the measure should, firstly, be aimed at both established and future producers, secondly also at operators using "different technologies" (e.g. demand-side management or storage solutions) and provide "appropriate incentives" for them. This guideline criterion can become problematic in particular in relation to the design of focussed CCMs which, in accordance with their definition, can exclude power plants from participating in auctions by way of certain selection criteria (e.g. CO_2 intensity). Using demand-side management as substitutable technology, considered to be desirable under the Guidelines, is best incorporated into a DCM.

[57] Ibd., para. 220.
[58] Ibd., para. 222.
[59] Ibd., para. 223.
[60] Ibd., para. 225.
[61] Ibd., para. 226.

4.3.5 Proportionality of State aid

The calculation of the overall amount of aid should, according to the Commission Guidelines, result in beneficiaries earning a rate of return, which can be considered "reasonable".[62] In this regard, in the Commission's view, a bidding process on the basis of clear, transparent and non-discriminatory criteria, effectively targeting the defined objective, will be considered as leading to "reasonable rates of return" under normal circumstances.[63] The aid should be designed in such a way as to avoid "windfall profits"[64] and such that the price paid for availability automatically tends to zero when the level of capacity supplied is expected to be adequate to meet the level of capacity demanded.[65]

As required by the Commission, in the case of the SR (Section 3.2) and the CCM (Section 3.3) capacity payments are determined, in principle, by transparent and non-discriminatory tendering procedures. Particularly in the case of the comprehensive CCM, however, windfall profits, viewed critically by the Commission, cannot be ruled out because it allows power plants that already achieve sufficient marginal returns on the EOM to receive capacity payments in addition. Only the DCM allows a shortage-based remuneration of secure generating capacity because the price for the certificates fluctuates according to shortage on the EOM. The other capacity mechanisms specify constant capacity payments in advance in auctions. Thus, the level of the capacity payments is not linked to shortages at certain times and can therefore not drop to nil where there is sufficient availability of generating capacity.

4.3.6 Negative effects on competition and trade

Under the Commission Guidelines, in order to avoid "undue negative effects" on competition and trade, all capacities which can effectively contribute to addressing the generation adequacy problem, should be eligible to receive Sate aid. In this regard, the participation of operators from other Member States in particular should be made possible[66] if this is "physically possible" in the regional context, i.e. where the capacity can be physically provided to the Member State providing aid and the obligations set out in the measure can be enforced. It should also be possible to stipulate the participation of a sufficient number of generators to establish a competitive price for the capacity. Finally, negative effects on the internal market, for example due to export restrictions, wholesale price caps ("ceilings"), bidding restrictions or other measures undermining the operation of market coupling, should be avoided.

The measure should not reduce incentives to invest in interconnection capacity, undermine market coupling or investment decisions on generation which preceded the measure or unduly strengthen existing market dominance.[67]

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[62] Ibd., para. 228.
[63] Ibd., para. 229.
[64] Ibd., para. 230.
[65] Ibd., para. 231.
[66] Ibd., para. 232.
[67] Ibd., para. 233.

5 Assessment

On the basis of the assessment criteria under the law on State aid set down by the European Commission in its Guidelines on State aid for environmental protection and energy 2014-2020, we will first compare and evaluate the advantages and disadvantages of the various types of capacity mechanism. Based thereon we will formulate the general ordoliberal requirements for the introduction and design of capacity mechanisms.

5.1 Comparative assessment of the various capacity mechanisms

5.1.1 Strategic Reserve

Introducing an SR avoids price peaks in excess of the exercise price. At the same time, the SR provides operators of secure generating capacity with a secure source of income and thus a sufficient level of investment security.

The SR can be set up at very short notice, at least where the power plants which it contains would be liable to closure without capacity payments. Setting up the SR is also reversible, i.e. it can be dissolved relatively easily and replaced by an alternative capacity mechanism. Insofar as no providers of secure capacity are excluded, the SR is technology neutral and thus allows competition for capacity payments to take place between the various power plant technologies.

As the power plants in the SR do not take part in the EOM, windfall profits are rules out as rightly required by the Commission Guidelines[68] (Chapter 4.3.5). These arise where power plants which in any case achieve sufficient income on the EOM also receive capacity payments in addition. The power plants in the SR cannot, however, generate any marginal returns in the EOM and must therefore receive correspondingly high capacity payments in order to cover their fixed costs. The larger the SR the larger the number of power plants that have to be financed by capacity payments and the higher the costs of the SR.

In addition, where there are shortages, the capacities in the EOM may be used ("dispatch") uneconomically so that the demand for electricity is not covered at minimal cost. This occurs e.g. where demand-side management measures are taken involving costs which are high but below the exercise price, whilst reserve power stations from the SR, which are cheaper by comparison, are not allowed to be used.[69] Inefficient dispatch also applies in the case of the capacity reserve planned in Germany where old lignite-fired power plants which are still economic will be forced, for reasons of climate policy, out of the EOM and into the reserve.

The Regulator also has the difficulty of correctly setting the level of the capacity required for the SR in advance. This is principally due to the fact that the level of the required reserve capacity depends on the choice of exercise price as this also influences the capacity of the power plants taking part in the EOM. This uncertainty in setting the size of the SR can mean that consumers (if the SR is too small) have no security of supply or (if the SR is too big) security of supply is unnecessarily expensive.[70]

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[68] Ibd., para. 230.
[69] Institute of Energy Economics at the University of Cologne: Untersuchungen zu einem zukunftsfähigen Strommarktdesign, Köln 2012, p. 51 et seq.
[70] De Vries, L. (2007): Generation Adequacy: Helping the Market do its Job, Utilities Policy 15, p. 25.

5.1.2 Central Capacity Market

CCMs can also prevent price peaks in excess of the exercise price and/or divert their effect on costs from the consumer to the electricity producer. Like the SR, CCMs also offer power plant operators a high level of investment security as a result of their constant flow of payments. Since all participants can also offer electricity on the EOM at the same time, the level of the capacity payments is lower than with the SR. During the capacity auction, those bidding for capacity payments will take account of future income on the EOM and make correspondingly lower bids. With the CCM, dispatch is also more efficient because all recipients of capacity payments can also offer electricity on the EOM as a result of which short-term deployment in the EOM is not affected by the capacity payments.

The major disadvantage of the CCM as compared with the SR, is that it can result in windfall profits – which the Commission Guidelines[71] rightly indicate is to be avoided – whereby power plants offer on the EOM whilst at the same time receiving capacity payments. This is particularly true of the comprehensive CCM where all suppliers of secure capacity – i.e. including power plants that are not affected by closure – can receive income from capacity payments. Ensuring a high degree of security of supply may then become unnecessarily expensive.

In the case of focussed capacity markets, which are financed solely by income on the EOM, power plants can be excluded from the auction. This enables windfall profits to be lowered and the costs significantly reduced. However, due to selective allocation, technology neutrality is no longer provided. In the medium term, this can result in power plants, that are actually efficient and therefore not worthy of aid, being forced out by inefficient ones which are worthy of aid ("slide effect").[72]

By comparison with the focussed CCM and the SR, the comprehensive CCM has the advantage that the necessary capacity to be put up for tender can be accurately determined. This is because, in the case of the comprehensive CCM, only the overall need for secure capacity has to be estimated whereas with the CCM and the SR, it is necessary to determine the capacity that is required over and above the capacity financed in the EOM. This is significantly more difficult to estimate due to the interaction between the EOM and the respective capacity mechanism.[73]

The focussed CCM is two-edged in that by supporting certain types of power plant, objectives other than security of supply can be pursued. For example, the CCM may function as a climate protection mechanism in that suppliers of secure capacity are subject to the additional requirement of low carbon intensity in order to receive aid. Linking different objectives in this way may be politically desirable. From an economic point of view, it is inefficient. The Emissions Trading System already represents an effective instrument for achieving climate protection targets and also covers electricity generation. All power plants that are able to provide secure capacity should therefore be able to bid for capacity payments as well.

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[71] Ibd., para. 230.
[72] Richert, J.; Paulun, T. (2013): Kapazitätsmechanismen: Der Bedarf ist unklar, die Lösungsvorschläge komplex, Energiewirtschaftliche Tagesfragen 9/2013, p. 14.
[73] Ibd.

5.1.3 Decentral Capacity Market

In comparison with the SR and CCM, the DCM offers cost effective availability of secure capacity. There are no capacity payments. Instead, the price of secure capacity – the certificate price – adjusts itself to the likelihood of a shortage on the EOM which ensures that not too much additional capacity is remunerated. Windfall profits, such as those occurring with the comprehensive CCM, are thereby avoided. In addition, there are no inefficiencies relating to dispatch on the EOM because, by contrast with the SR, no power plants are withdrawn from the EOM.

The decentralised character of the DCM favours technology neutrality and, by contrast with the focussed CCM, prevents certain types of power plants being disadvantaged by politically motivated requirements when it comes to the provision of secure capacity. Measures for demand-side management, in particular, are easier to integrate than in the case of the SR and the CCM, and this primarily results in increasing the incentive for large electricity consumers to use such measures to reduce their demand at peak demand times.

The decentralised basis of the DCM, however, provides (even) less of a guarantee than the SR and CCM, that a sufficiently large volume of secure capacity to ensure security of the electricity supply can actually be accurately determined.[74] This is because in the case of the DCM, unlike the SR and CCM, the Regulator can only influence the total volume of secured capacity indirectly – by setting the exercise price and the penalty. Setting both parameters requires a huge amount of central planning in order to forecast the effect on the development of capacity in the market. Thus, despite the introduction of a DCM, it is not possible to exclude the possibility of extreme price spikes on the EOM in times of shortage – also affecting the electricity suppliers that have acquired sufficient certificates. It may therefore be necessary to create another capacity mechanism in addition to the DCM in order to be able to ensure security of supply.[75]

As no auction takes place, the DCM needs a shorter time-frame than SR and CCM. Since power plants are not promised payments over a long period, the DCM is also relatively easy to dissolve. The DCM has the disadvantage, however, that it cannot guarantee the power plant operators a long-term supply of payments and therefore provides less incentive for the construction of new power plants than the SR and the CCM.

5.1.4 Advantages and disadvantages

Overall, it is clear that no capacity mechanism is superior to the others in all areas. Whether one should be introduced into a country, and if so which, therefore depends on the actual objective being pursued, the peculiarities of the electricity market and the preferences of the electricity consumers in the respective Member States.

Thus the Strategic Reserve represents a cheap and effective instrument for counteracting impending capacity shortages for a specific period. Above a certain size, however, it becomes inefficient and unnecessarily expensive because the power plants which it contains cannot offer on the EOM and have to be financed completely by way of capacity payments. On the other hand, Central Capacity Markets have the advantage that they are the most accurate in guaranteeing

[74] Frontier Economics (2013): Dezentrale Leistungsverpflichtungssysteme – Eine geeignete Alternative zentralen Kapazitätsmechanismen?, p. 123 et seq.
[75] Richert, J.; Paulun, T. (2013): Kapazitätsmechanismen: Der Bedarf ist unklar, die Lösungsvorschläge komplex, Energiewirtschaftliche Tagesfragen 9/2013, p. 16.

secure generating capacity. However, in this case, severe deadweight losses cannot be ruled out. Decentral Capacity Markets are a cheaper, if less accurate, alternative which best meet the criterion of technology neutrality due to the inclusion of demand-side management measures. In addition, in the case of the DCM, no payments have to be made unless there are capacity shortages. Table 2 summarises the advantages and disadvantages of the various mechanisms.

Tab. 2: Positive and negative effects of the various capacity mechanisms[76]

	SR	Comprehensive CCM	Focussed CCM	DCM
Level of costs from capacity payments	– – –	– –	– –	–
Accurate provision of sufficient generating capacity	+	+ + +	+	+
Prevention of extreme price spikes Price spikes in EOM	+ +	+ +	+ +	+
Effect on dispatch efficiency in EOM	–	0	0	0
Deadweight losses	0	– –	–	–
Technology neutrality	+	+	–	+ + +
Investment security for companies	+ +	+ +	+ +	0

Source: cep

5.2 General requirements for capacity mechanisms

The advantages and disadvantages of the various types of capacity mechanism give rise to the following ordoliberal requirements for their design.

5.2.1 Distribution of costs

The costs of the respective capacity mechanisms should be financed by the electricity consumers because they profit from the increased level of security of supply. In the case of the SR and the CCM, this happens insofar as the expenditure in respect of capacity payments is transferred to the

[76] In this regard, it is assumed that the EOM cannot guarantee security of supply.

network charges payable by the electricity consumers.[77] In the case of the DCM, where no direct capacity payments arise, the supplier will pass on their costs for the acquisition of certificates to their customers via the retail electricity price. In this respect, they can grant their flexible customers price concessions so that the latter have additional incentive to reduce their share of peak load.[78] Alternatively, electricity producers who are unable to offer any secure capacity – particularly renewables such as wind and solar power plants – could share in the costs of the capacity mechanisms.[79] In an electricity market with fixed renewables targets and government aid for renewables, however, this is not feasible because if renewables plants share the costs their remuneration would have to be increased accordingly so that the fixed expansion targets continue to be achieved. These additional costs would again have to be financed by the end-consumer – in Germany e.g. via a higher renewable energy levy.

5.2.2 Setting the exercise price

There is no standard EU definition of "electricity shortage". This occurs in a Member State where the price on the EOM exceeds an exercise price which has been set by the respective Regulator. Varying exercise prices in the EU indicate that preferences vary between the Member States with regard to shortages of electricity. Standardising the exercise price might therefore contradict national preferences.

At the same time, Member States should not be permitted to set very low exercise prices as a result of which the price mechanism of the EOM and thus competition among electricity suppliers would be restricted. In order to avoid this, the exercise prices selected by the Member States could be subject to approval by the European Commission, or an EU-wide standard minimum exercise price could be introduced which must be above the variable costs of the most expensive power stations.

5.2.3 Compatibility with the EU internal energy market

Capacity mechanisms to secure adequacy of the electricity supply can easily come into conflict with important EU targets. This includes – in addition to the EU's long-standing aim of decarbonising the economy by gradually phasing out fossil fuels[80] together with the abolition of related subsidies – in particular the creation of an EU-wide internal energy market in which energy can be traded across borders.[81] This conflict of targets also triggered e.g. the decision by the German government to temporarily transfer – without any prior tendering process – German lignite-fired power stations to a capacity reserve as this prevents power stations in other EU countries from being able to take part in the German capacity mechanism. In order to make national capacity mechanisms open across borders, it is however necessary to ensure that there are sufficient power lines between the Member States so that capacity made available in country A can actually increase the security of supply in country B. Otherwise foreign competitors will be excluded, not de jure, but de facto from competition for remuneration of secure power station

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[77] Dyllong, Y. (2013): Märkte stärken, Versorgung sichern – Konzept für die Umsetzung einer Strategischen Reserve in Deutschland, Energiewirtschaftliche Tagesfragen 9/2013, p. 40.

[78] Frontier Economics (2013): Dezentrale Leistungsverpflichtungssysteme – Eine geeignete Alternative zentralen Kapazitätsmechanismen?, p. 127.

[79] See cepPolicyBrief 29/2012 and cepPolicyBrief 05/2013.

[80] Council dated 21 October 2009, Conclusions, Doc. 14790/09, p. 6, para. 15; European Commission, Communication COM(2011) 112 of 8 March 2011, A Roadmap for moving to a competitive low carbon economy in 2050; see cepPolicyBrief of 30 May 2011.

[81] Article 194 (1) TFEU; see Bonn, M.; Heitmann, N.; Nader, N.; Reichert, G.; Voßwinkel, J. (2014): cepKompass Die Klima- und Energiepolitik der EU – Stand und Perspektiven, p. 46 et seq.

capacity. Capacity mechanisms must on no account be used as an alternative to the construction of cross-border power lines.

In view of this target conflict, the Commission Guidelines rightly categorise the deployment of capacity mechanisms, including from the aid perspective, as a subsidiary strategy[82] (Section 4.3.2) for solving the problem, in relation to which, Member States are subject to a correspondingly higher degree of proof and justification[83] (Section 4.3.3). The Commission Guidelines[84] also rightly require that capacity mechanisms avoid negative intervention in the internal market (Section 4.3.6) which they can bring about e.g. by way of export restrictions, wholesale price caps, bidding restrictions or other measures undermining the operation of market coupling.

Furthermore, it is essential for the national capacity mechanisms to be coordinated with each other. On the one hand, the situation where the same secure power station capacity is financed simultaneously in two countries by way of two national capacity mechanisms must be avoided because a simultaneous shortage of electricity in both countries cannot be ruled out. On the other, time differences in the generation of electricity and demand for electricity between the Member States in the EU internal electricity market must be incorporated into capacity planning because, at certain times, the shortage in one Member State may be balanced by surpluses in another. Thus the required capacity in each country may decrease. If, however, capacity mechanisms are introduced in several countries without any coordination, substantial overcapacities of secure power may arise.[85]

The coordinated development of capacity mechanisms – taking in several Member States – at regional level may avoid "free riding". This problem occurs where individual Member States profit from the capacity mechanisms of other Member States without sharing in the costs. This can result in too little secure power plant capacity being made available in the whole region.[86]

[82] Ibd., para. 220.
[83] Ibd., para. 223.
[84] Ibd., para. 232.
[85] Federal Ministry for Economic Affairs and Energy (2014): Ein Strommarkt für die Energiewende, Discussion Paper by the Federal Ministry for Economic Affairs and Energy (Green Paper), p. 33.
[86] Institute of Energy Economics at the University of Cologne: Untersuchungen zu einem zukunftsfähigen Strommarktdesign, Köln 2012, p. 68.

6 Conclusion

In principle, capacity mechanisms can help to increase the security of the electricity supply in individual Member States where the marginal returns of power station operators on the EOM are insufficient to finance the construction and maintenance of secure power plant capacity. The comparison (Section 5.1) shows, however, that no capacity mechanism is superior to the others in all areas. Whether one should be introduced into a Member State, and if so which, therefore critically depends on the peculiarities of the electricity market and the preferences of the electricity consumers in the respective Member States.

Before introducing capacity mechanisms in a Member State however, there should be an examination, not least in view of the additional costs involved, of whether the expansion of cross-border power lines and the resulting improvement in the integration of the internal energy market, are sufficient to ensure an adequate electricity supply in the Member State. This subsidiary deployment of capacity mechanisms also corresponds to the accurate assessment by the Commission in its Guidelines on State aid for environmental protection and energy 2014-2020 (Section 4.3.2) which rightly imposes a more onerous duty on the Member States to examine, prove and justify why the market cannot deliver adequate capacity without state intervention (Section 4.3.3). National capacity mechanisms should on no account be permitted to exclude power plants in other Member States from participating or be set up as an alternative to the construction of cross-border power lines because the introduction of a capacity mechanism would then favour the fragmentation of the European energy supply into individual national energy markets and defeat the aim of a competitive internal energy market. For this reason, the politically-motivated decision by the German government in July 2015, to temporarily transfer German lignite-fired power stations to a capacity reserve without any prior tendering process, should be rejected.

For this reason, too, capacity mechanisms in different Member States should be coordinated, at least at regional level because this will reduce the overall demand for secure power plant capacity. A collectively financed capacity market at regional level may also prevent free riding by individual Member States in relation to the financing of capacities. Here too, cross-border collaboration within the framework of the EU internal energy market is preferable to attempts to solve the problem at a purely national level.

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