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COMMISSION STAFF WORKING DOCUMENT

GENERATION ADEQUACY IN THE INTERNAL MARKET – GUIDANCE TO OPTIMISE PUBLIC INTERVENTIONS

Accompanying the document

Communication from the Commission

Delivering the internal market in energy - optimising public interventions

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On 22 May 2013 the European Council called for particular priority to be given to the Commission providing guidance on capacity mechanisms. The purpose of this staff working paper, together with the Communication *Delivering the internal market in energy - optimising public interventions*, is to provide such guidance based on ensuring that the concern in relation to generation adequacy is appropriately identified; the underlying cause of the problem is appropriately identified, in particular the market failures or regulatory failures contributing to the problem; that these underlying problems are effectively addressed; that the distortionary impact of any public intervention is minimised; and that public interventions in the market are time limited or at least subject to review taking into account market evolution.

This staff working paper follows up on a public consultation, launched together with the Commission Communication on making the internal energy market work. A summary of the response to the public consultation is at Annex III to this paper[1].

1. A COHERENT POLICY FRAMEWORK

Challenges to generation adequacy come in the context of liberalisation of the EU energy markets and the increased integration of national electricity markets into a single internal energy market.

As the Commission indicated in its Communication on making the internal energy market work, with the development of a competitive market with multiple producers and unbundled network operators, no single entity can on its own ensure the reliability of the electricity system any longer. The role of public authorities in monitoring and ensuring security of supply, including generation adequacy, has consequently become more important. At the same time the integration of electricity markets progresses,

[1] The Consultation Document and all response to the public consultation can be found at: http://ec.europa.eu/energy/gas_electricity/consultations/20130207_generation_adequacy_en.htm

bringing clear benefits to consumers which could amount to annual cost savings of up to 40 billion Euro in case of full integration. However, this integration of markets also implies that security of supply, including generation adequacy, can no longer be ensured on a purely national basis only.

Challenges to generation adequacy also come in the context of the move towards a low carbon energy system. As the Commission indicated in its green paper on 2030, by acting now in a way which is open and which recognises the real challenges we face in our climate and energy policy we will enable a framework to ensure proper investment that will give us sustainable growth, affordable competitive energy prices and greater energy security. One of these challenges is how to ensure generation adequacy during the transition and beyond.

The present paper, together with the other documents of the package adopted today, is intended to show how, going forward, the generation adequacy issue can and should be addressed in an integrated internal energy market that is moving towards decarbonisation:

- The starting point is that public authorities at EU and national level should let the market work to encourage appropriate investments. As in any other sector of the economy, price signals are pivotal to incentivize generators and consumers to balance supply and demand.

- In parallel, public authorities must regularly undertake an objective, facts based, assessment of the generation adequacy situation in their Member State, region and at the EU level. The Electricity Security of Supply Directive contains a number of provisions in this regard but the rules contained in that Directive and its transposition and implementation may be insufficient to tackle the challenges of the future in a satisfactory way. The Commission services may hence consider taking further legislative initiatives in this regard.

- Where a concern of generation adequacy emerges, its causes must be properly identified including regulatory failures which may cause or exacerbate a generation gap. Where possible, such causes must be removed.

- When intervening to ensure generation adequacy, the most effective and cost-efficient instrument must be chosen, taking duly into account their impact on the internal energy market and on the decarbonisation objective. These choices must be properly discussed and weighed against each other at the regional and EU level. The design and implementation of interventions, where necessary, must minimize distortions of competition and cross-border trade.

Each of the aforementioned points will be further addressed in the present document. The Commission is fully committed to work with Member States and regions in implementing these principles with a view to address generation adequacy concerns in the most effective and cost-efficient way. However, it also intends to intervene where national measures are not in line with the internal market or competition rules. The views expressed in the Communication and in this paper set out a coherent approach which the Commission will apply in that context to ensure that State interventions in relation to generation adequacy meet the requirements of both energy policy and competition policy.

Public interventions to promote generation adequacy may entail public service obligations imposed on generators, suppliers and/or transmission system operators. Such obligations should meet the requirements set out in the electricity directive and be clearly defined, transparent, non-discriminatory, verifiable and guarantee equality of access for electricity undertakings[2]. Member States must be able to show that public service obligations are necessary, proportionate and transitional in nature.

Depending on the form of public intervention State aid could be involved, for example in payments to generators or other capacity providers directly from the State budget or through capacity mechanisms. The test which the Commission applies to assessing State aid normally entails assessing if the measure pursues a well-defined objective of common interest, is targeted at a well-identified market failure, is the appropriate measure, is proportionate and limits aid to minimum necessary, changes the behaviour of the beneficiaries and has a limited distortive impact on competition and trade in the EU. The ongoing work of the Commission on Environmental and Energy Aid Guidelines will further address this issue.

2. HOW TO ASSESS OBJECTIVELY GENERATION ADEQUACY AND INVESTMENT NEEDS

The Commission expects Member States to carry out an objective in depth generation adequacy assessment before intervening to support power generation for the purpose of guaranteeing security of supply. Interventions to ensure generation adequacy are only acceptable if they are well targeted and objectively justified. This can only take place after clear identification of a gap between the capacity needed to meet security of supply objectives and the capacity which the market is likely to deliver.

[2] Judgement of the Court in Case C-265/08 " First, such an intervention must be limited in duration to what is strictly necessary in order to achieve its objective… Secondly, the method of intervention used must not go beyond what is necessary to achieve the objective which is being pursued in the general economic interest. Thirdly, the requirement of proportionality must also be assessed with regard to the scope ratione personae of the measure, and, more particularly, its beneficiaries

The impact of energy efficiency measures must be estimated as well, as should the potential increase in the use of electricity in other sectors such as heating and transport. Finally, the ongoing economic crisis and its impact on electricity consumption in the Member States most affected shows the relevance of adjusting demand prognosis regularly to economic parameters.

Inevitably a generation adequacy assessment requires judgement about likely energy market developments as well as wider economic developments, and thus a degree of uncertainty in the assessment is unavoidable. However, uncertainty is equally present when judging the likely impact of interventions, particularly if they are complex and therefore more likely to result in unintended consequences.

The Commission considers the degree of uncertainty can be reduced and the reliability and objectivity of adequacy assessments increased if the principles described below are respected. Process-wise, Member States can and should continue to rely on the expertise of transmission system operators in carrying out generation adequacy assessments. However, in order to enhance contestability and accuracy of generation adequacy assessments, full openness should be ensured on the modelling, data sets and assumptions feeding into the assessment and all stakeholders (including system users) should be given an opportunity to express their views.

2.1. Recognize the cross-border dimension of electricity systems and markets

In the EU, the very large majority of Member States have their electricity markets coupled with at least one other Member State. In Central West Europe, electricity markets are deeply connected through price coupling, a practice expected to expand throughout the EU by 2014-2015. Coupled markets imply that power flows out of a market when prices in a neighbouring market are higher. Inversely, power will be imported when domestic prices are higher. The traded volumes can constitute a multitude of the interconnection capacity available but physical flows will be limited to the available capacity on the given interconnectors.

Market coupling is a first step towards a fully integrated market allowing short and long term trading of energy, renewables, balancing services and security of supply without regard to political boundaries. Full market integration has the potential to generate huge welfare gains, estimated at up to €16 billion annually, potentially rising to €40 billion by 2030. Under these circumstances generation adequacy can no longer be assessed, nor ensured, on a purely national basis[3]. Member States' generation adequacy assessments must hence include existing and forecasted interconnector capacity as well as the adequacy situation in neighbouring countries. Surplus generation in neighbouring Member States may alleviate adequacy concerns;

[3] [Booz & Co , benefits of an integrated European Energy Market]

shortages may exacerbate them. Stochastic analysis may help evaluate the risk of unfavourable weather conditions or other forms of system stress affecting generation adequacy in an entire region and the impact it may have on individual systems.

Under the Electricity Directive and the Electricity Security of Supply Directive[4], Member States are required to monitor security of supply and produce bi-annual reports. These reports should assess the projected balance of supply and demand for the next five year period and the prospects for security of electricity supply for the following five to fifteen year period. However, the quality and frequency of these report has been variable in practice, and not all Member States have notified their reports to the Commission as required. As a practical matter the Commission will establish a streamlined reporting system to facilitate the notification of these assessments and their publication.

National generation adequacy assessments must be combined with regional and EU-wide assessments.[5] The common declaration that the Member States of the Pentalateral Forum recently issued is seen positively in this regard. ENTSO-E, the Network of European Electricity Transmission System Operators, produces EU wide generation adequacy assessments[6]. This important report is currently the main Europe-wide assessment of generation adequacy. It provides a very useful picture of developments at the European level. According to the latest report[7] "*generation adequacy is expected to be maintained during the entire forecast period until 2020 … When these results are compared to those of the previous [report], no deterioration is observed*".

However, the ENTSO-E report builds on national level assessments and hence it too continues to suffer from differing methodologies being employed at Member State level. As a result, the mutual interdependence of Member States when it comes to generation adequacy and security of supply is also not yet fully or adequately recognised in its generation adequacy assessments[8].

The Commission, working with the Member States, ACER and ENTSO-E in the Electricity Coordination Group, is currently examining ways in which the deficiencies in the assessment methodology at European and national level can be remedied to

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4 Article 4 of Directive 2009/72/EC and Article 7 of Directive 2005/89/EC

5 Council conclusions of 6 June 2013 on the Commission Communication "making the internal energy market work"

6 Required by Article 8 of Regulation (EC) No. 714/2009

7 ENTSO-E (2013) Scenario Outlook & Adequacy Forecast 2013-2030

8 For example national TSOs continue to be apply different methods to calculate the required margin against peak load; variable RES is not treated in a harmonised way despite the importance of understanding the cross border impact of changes in wind and solar production. Each of these impact on the potential availability of interconnection capacity at times of system stress.

ensure that generation adequacy assessment is more coordinated and that the EU wide report produced by ENTSO-E can meet the needs of policy makers, In this regard effective peer review of national generation adequacy assessments is important. Depending on the conclusions of this work, the Commission could propose the adoption of legally binding guidelines under the Electricity Regulation or the updating of the Electricity Security of Supply Directive.

However, already, Member States should integrate the ENTSO-E analysis as well as the generation adequacy assessments of their neighbours into their own adequacy assessment. Likewise, they should apply best practices as used by ENTSO-E or becoming available through further work, inter alia of the Electricity Coordination Group. Every effort should be made to ensure coherence with other, complementary, assessments and potential divergences should be explained. Member States should demonstrate that their generation adequacy assessments have been duly discussed with neighbouring countries and with stakeholders. These should be clearly explained in the security of supply reports notified to the Commission. The Electricity Coordination Group also represents an appropriate forum for the discussion of national assessments where common challenges can be identified.

2.2. Include reliable data on wind and solar

Wind and solar power generation can mean large and sometimes sudden swings in the amount of energy being fed into the system. As with any other change in electricity supply or demand, this needs to be balanced by deploying fast acting generation, releasing stored electricity or consumption responding. The availability of such variable generation is therefore becoming an increasingly important consideration when assessing generation adequacy.[9]

The Commission services expect Member States to integrate in their generation adequacy assessment clear assumptions on the development of variable wind and solar power in their own system, as well as in neighbouring systems which they are interconnected with. Those assumptions should be based on applicable renewables targets and/or on the expected contribution of power generation to CO2 emission reduction within relevant timeframes (e.g. a 1 year, 5 year and 20 year time horizon). Reliability factors for wind and solar may vary substantially depending on their location, but also on this point, the Commission services encourage Member States to cross-check methods applied with stakeholders and to exchange best practices, e.g. with ENTSO-E.

[9] Almost all responses to the consultation raised the impact of Renewable Energy Sources ("RES") on the market and its impact on generation adequacy. For example the UK Government response discusses the impact that more low marginal cost pricing will have on the market, a point addressed in detail in the Clingendael paper submitted in response to the consultation.

As variable wind and solar power grows in the EU energy mix, generation adequacy assessments – national and EU – can no longer focus on the amount of available generation capacity only. They should also consider the quality of available generation capacity, in particular how quickly it can ramp up or down.

2.3. Include the potential of demand response

Generation adequacy relates to balancing supply and demand of electricity. Both have a role to play in this. Where consumers voluntarily reduce demand, as part of their supply contract or in response to high prices, this is a sign of well functioning markets and not a sign of a generation adequacy problem. Where a gap between generation and demand exists, it can be bridged by increasing generation or reducing demand. Both are equivalent from a system security viewpoint.

The potential for demand side management in the EU is estimated to be at least 60 GW, i.e. the capacity of approximately 60 nuclear power reactors or 120 middle size CCGTs. To avoid stranded investments in generation, the demand management potential must be explicitly recognized in any generation adequacy assessment, including a realistic timeframe for it to materialize. The involvement of industrial users and aggregators of household demand in the preparation of generation adequacy assessment is important as other stakeholders, in particular generators and TSOs, may unconsciously be biased towards generation and/or network solutions.

2.4. Distinguish between missing money and missing capacity

Currently, there is overcapacity in many markets. This can be seen in the existing ENTSO-E system outlook and adequacy assessment[10], and national generation adequacy assessments. This is partly a result of the economic crisis and the resultant drop in demand, but may in individual Member States also at least in part be related to old capacity artificially being kept on the grid[11].

On the one hand, the situation may give some time to reflect on the challenges facing the internal market in relation to generation adequacy and security of supply. However, on the other hand, the financial and economic crisis has stalled investments in new-built generation capacity. Low demand, in combination with increased deployment of wind and solar generation, has also been pushing wholesale electricity prices down in some Member States like Germany, Belgium or Spain, exerting pressure on utilities' returns. Moreover, the recent evolution of coal and gas prices in combination with a low price of carbon has also resulted in modern gas plants being

[10] ENTSO-E (2013) Scenario Outlook & Adequacy Forecast 2013-2030

[11] See for example the recent analyses of the Commission services and of the Worldbank carried out at the request of the Bulgarian government as regards the Bulgarian energy system, published on the Bulgarian Government's website.

displaced in the running order by coal plants, including those due to be withdrawn soon to comply with Directive 2001/80/EC (the large combustion plant directive). Some operators of gas power stations are now expressing concerns about the financial viability of their existing plants, and discussing potential mothballing or even shutdown.

When faced with a structural generation overcapacity in the market, Member States may consider other measures such as facilitating exports by adding interconnection capacity or speeding up the retirement of environmentally inefficient plants, for example through application of environmental legislation. Creating market wide capacity remuneration schemes may under such circumstances be counter-productive as it may (depending on the criteria set for capacity to participate in the scheme) postpone the exit of inefficient capacity from the market.

In liberalised markets investments are not guaranteed by the State. Only where there exists a real threat to generation adequacy and security of supply as a result of closure or mothballing does the financial viability of existing plant become a matter of public concern. It is very important that there be no state support to compensate operators for lost income or bad investment decisions.

Nonetheless, there is a new challenge for generation adequacy assessment, as it becomes more important to assess the economic life of power plants and not just the technical life. Since this will in part be based on the declarations of generators, it is clear that there is a risk of companies deliberately exaggerating intentions to shut down capacity in order to get additional revenues. Therefore it is becoming more important to make reasoned judgements about expected economic developments and their impact on the financial viability of existing generation capacity over time.

Requirements before intervention

Before deciding to support power generators with the aim to enhance security of supply, Member States are expected to carry out an objective in depth assessment of the generation adequacy, and any expected adequacy gap which should:

- Be notified to the Commission in accordance with the requirements of the electricity Security of Supply Directive
- Take into account the cross-border dimension of electricity markets and be coordinated with neighbouring Member States.
- Be consistent with ENTSO-E's EU wide generation adequacy assessment and the methodologies used therein;
- Be based on widespread consultation with stakeholders
- Include reliable data on the development of variable wind and solar, including in neighbouring systems, and analyse the amount as well as the quality of generation capacity needed to back up those variable sources of generation in the system;
- Properly integrate the potential for demand side management and a realistic time horizon for it to materialize in order to avoid stranded investments in generation;
- Take existing overcapacity and the economic crisis into account in your assessment and avoid that inefficient plants are kept in operation through public support.

3. WHAT CAUSES GENERATION ADEQUACY CONCERNS?

With liberalisation, generators and suppliers, or consumers directly, buy and sell electricity on the market. An effectively functioning market should result in generation capacity being constructed to meet the demands of consumers for electricity at all times based on expected future electricity prices and demand.

Research identifies a number of reasons why this might the market could fail to deliver sufficient new investment to ensure generation adequacy. These are a combination of market failures and regulatory failures. For example when consumers cannot indicate the value they place on uninterrupted electricity supply, the market

may not be effective performing its coordination function. Equally however, regulatory interventions and the fear of regulatory interventions such as price caps and bidding restrictions limit the price signal for new investments. Likewise the prices on balancing markets operated by transmission system operators should not undermine the price signals from wholesale markets.

Power generators and investors have argued that regulatory uncertainty and the lack of a stable regulatory framework undermine the investment climate in the EU compared to other parts of the world and to other industries. These concerns must be taken seriously. Before deciding on public intervention to support generation adequacy, the causes of any investment gap must be objectively analysed. Where existing regulation causes or exacerbates an investment gap, it must be reviewed and adjusted. Remaining market failures must be identified as precisely as possible with the aim to ensure effective and proportionate interventions.

3.1. Regulated prices

Public authorities are rightly concerned to ensure competitive prices for industry and affordable energy bills for households.

However, investors must expect to recover their costs before they commit large sums to building new generation capacity. In the longer run prices must reflect the long run average cost of producing electricity, including capital costs. Wholesale prices should vary according to demand and the costs of generation needed to meet demand. Revenues for most generators will often be above their short run production costs, allowing the recovery of their investment. In particular, generators which operate for only short periods need to be able to recover capital costs during those short periods and short run prices will tend to rise above short run marginal costs. If public authorities directly intervene to keep prices below this may create or exacerbate an investment gap.

3.1.1. Wholesale

Explicit or implicit wholesale price caps can limit potential investment incentives, particularly for generators which operate only for very short periods and require very high prices to recover fixed cost. This has a detrimental effect on investment incentives for flexible generators and peaking units in particular. Price caps set substantially below reasonable estimates of the value of lost load prevent the market from fulfilling its proper function of matching supply with demand in times of system stress. Restrictions on bidding in wholesale markets (which have an equivalent effect to a price cap) which prevent the recovery of fixed costs have an equivalent effect.[12]

[12] Price caps on organised markets vary across Europe. Not all price caps are required by regulations or legislation, some are based on commercial considerations of exchange operators. EPEX spot has a price cap of €3 000, as does GME in Italy. The SEM between

Caps or restrictions may not be explicit, public statements by regulators or other policy makers can have the same effect. Governments and regulatory authorities often face significant pressures to intervene during periods of high prices. Such interventions are often called for on competition grounds or consumer protection grounds. If investors fear that there will be regulatory intervention during periods when electricity prices rise, even if those prices are justified, this reduces the expected return from new investments. Therefore it is important to establish the correct market framework to allow effective competition rather than relying on ad hoc or direct interventions.

Where an investment gap exists, it will be exacerbated if the returns that generators can make on the energy only market are artificially capped. The gap will have to be compensated through remuneration for reliable capacity, but capacity could be open to the same risk of excessive pricing in highly concentrated markets. In such circumstances, public authorities may be tempted to cap the remuneration for reliable capacity as well. However, where they do so the capacity remuneration scheme risks falling short of ensuring generation adequacy.

3.1.2. Retail

Regulated retail prices act as a barrier to effective competition and make it more difficult to justify new investment which would be necessary to ensure generation adequacy. Suppliers are discouraged from building their own generation or entering medium or long term contracts with generators to develop their competitive position.

As recognized by the Council, measures to support vulnerable consumers should not undermine energy efficiency policy or the correct functioning of the market, including price signals for demand[13].

If demand (either directly or through suppliers or aggregators) plays a role in the longer term market it effectively collaborates in risk management and facilitates investment in needed new generation. Both generation and suppliers or individual demand should want to hedge against the risk of rising prices. For generators hedging against volatile prices should facilitate financing of new projects.

For large consumers longer term contracting hedges against peak prices and, particularly for industry and facilitates better planning and more efficient management of production. This is recognised by the Recommendations of 12 February 2013 by

Ireland and Northern Ireland has a price cap of €1 000. Certain generators in Germany are obliged to bid into markets at short run marginal cost, as are all generators in Ireland. In the OMEL market in Spain and Portugal bids must be between €0 and €180 per MWh

[13] European Council of 22 May 2013 Conclusions EUCO 75/1/13

the High-level Round Table on the future of the European Steel Industry[14] who state that long term energy contracts, especially for EU energy-intensive industries such as the steel sector are an important element for ensuring their global competitiveness and can provide predictability to both buyers and sellers.

3.2. Existing support schemes

3.2.1. Renewables support

The aim of the EU is to ensure that renewables fully participate in the market, and it is important that national policies contribute to this. With increased renewables penetration the impact of support schemes for renewable generators becomes more important.[15] The benefits of reviewing RES support mechanisms regularly with the aim to limit support to what is necessary and proportionate and of ensuring that renewable generators fully participate in inter alia balancing markets has been reflected in the Staff Working Paper on RES support schemes published alongside this document. By contrast, the lack of a stable and predictable framework for investment in renewables and/or disproportionate direct or indirect support for renewables may cause or exacerbate generation adequacy concerns. This may in particular be the case when (short run) market price signals are distorted causing fossil generators to exit the market and leaving a reliability gap, particularly in the absense of other flexible solutions such as demand response or storage.

3.2.2. Other support measures

Removing environmentally or economically harmful subsidies, including for fossil fuels as called for by the Council in line with the G20 declarations may help correct market signals and reduce the need for further interventions. However in the electricity sector today, some Member States continue to provide financial support for generators which use inflexible and relatively inefficient technology. This displaces more flexible or efficient forms of generation as is seen for example by the impact of the support for coal in Spain on the revenues of newer gas powered stations or in Bulgaria. In 2011, the EU provided 26 billion Euro of support to fossil based power generation. In order for the EU to move towards an affordable low carbon electricity system, it must be ensured that this significant amount is spent in an optimal way to reach common objectives: safe, secure, sustainable and affordable energy.

Artificially retaining generation capacity that is economically obsolete and should be allowed to retire can, perversely, cause security of supply and generation adequacy concerns. This will happen if efficient and flexible generation is displaced because it

[14] http://ec.europa.eu/enterprise/sectors/metals-minerals/files/high-level-roundtable-recommendations_en.pdf

[15] An issue highlighted also by respondents to the public consultation, including ENTSO-E and the Council of European Energy Regulators (CEER).

cannot cover its costs. Similarly, subsidised generators are not flexible enough to manage rapid changes in supply and demand already occurring more frequently as a result of increased penetration of variable RES. However, investing in new flexible plant to complement variable RES would not be profitable due to the low expected running hours. These concerns will be particularly pronounced if operating support is provided through production related subsidies or obligations on suppliers to buy output. Of particular concern in this regard are subsidies for fossil fuels with high CO2 emissions.

3.3. A lack of effective intraday, balancing and ancillary services markets

It has been argued that the downward pressure on day ahead electricity prices in some markets leaves generators exposed to insufficient returns to cover their fixed costs. This could be a risk in particular for mid range and peaking plants which see their running hours go down as a result of increased proportions of wind and solar power on the system, including during the traditional lunch-time peak periods. However, where intraday, balancing and ancillary services markets operate efficiently, such plants can participate in those markets, deriving additional revenue to their day ahead operations. Prices in those markets should be allowed to raise above short run marginal cost, enabling generators to cover also part of their fixed costs.

Other flexibility providers such as large industrial users, aggregators or storage operators should be allowed to operate in in balancing markets, reserve markets and other system services markets as required by Directive 2012/27/EU on Energy Efficiency [16].

3.4. Ensuring generation adequacy in concentrated markets

In concentrated markets, interventions to ensure generation adequacy risk rewarding dominant incumbents for withholding strategies. In particular capacity mechanisms risk replicating, or even embedding, problems of market concentration which exist in some Member States.

[16] Article 15 (8)

Requirements before intervention

Before deciding to introduce new support measures for power generators with the aim to enhance security of supply, Member States are expected to identify and, where possible, remove regulatory or market failures which cause or may exacerbate generation adequacy concerns. In particular:

- In view of the detrimental effects of price caps on investments in power generation and on the transition towards a sustainable low cost carbon free electricity system, wholesale and retail price regulation (with the exception of social prices for vulnerable customers) should be removed. Competition rules and Regulation 1227/2001 on wholesale energy market integrity and transparency should be used as a more proportionate instrument to avoid and sanction price manipulation or excessive pricing by dominant undertakings.

- Member States are expected to review their renewable support mechanisms in line with the Guidance on renewable support before intervening on generation adequacy grounds.

- Member States should assess the impact of existing support schemes for fossil and nuclear generation on incentives for investments in additional generation capacity or maintenance/refurbishment of existing generation capacity.

- Member States should put in place effective intraday, balancing and ancillary services markets and remove any remaining obstacles, for example for demand side and storage participation in those markets.

- In highly concentrated generation markets, structural solutions to address problems of market concentration should be implemented either before or alongside the implementation of regulatory measures to ensure security of supply.

4. ASSESSING THE COSTS AND BENEFITS OF CAPACITY SUPPORT MEASURES AGAINST OTHER OPTIONS

Security of supply in electricity is essential to the functioning of the modern economy and society. Guaranteeing security of supply is therefore a key public policy

objective. As indicated above, it is very difficult to assess accurately how much generation capacity and what type of generation capacity will be needed exactly to ensure generation adequacy in the medium to long term. The tendency of policy makers, regulators and TSOs may therefore be to err on the side of caution and "over-insure" the risk of a supply disruption.

Generation adequacy is not the only factor for ensuring security of electricity supplies. In other to deliver continuous supplies of electricity to consumers, primary energy sources for electricity generation need to be available, sufficient (firm) generation capacity needs to be available and the transmission and distribution networks must be reliable to transport the electricity generated to final consumers.

It is essential that all three components are given sufficient attention. One element to avoid the risk of "over-insurance" is to verify whether generation adequacy standards in a Member State are comparable to the standards of adequacy required for network outages. A second instrument is to compare the generation adequacy standards applicable in neighbouring systems. Even if it might be legitimate for generation adequacy standards to be different against the background of differing circumstances in Member States, the system reliability in interconnected markets is interdependent. The Commission is committed to undertaking further work with the Member States, regulators, ENTSO-E and ACER in the Electricity Coordination Group on this topic.

Finally, the costs invested in avoiding generation shortages or network outages should be assessed against the "value of lost load", i.e. the costs to the economy and society of unforeseen supply interruptions.

Against the background of raising concerns on the competitiveness of energy prices for industry and affordability of energy bills for consumers, it is important for Member States to choose amongst different instruments the one which is most effective and less costly to enhance security of supply.

4.1. Avoiding stranded investments and lock-in effects

As indicated in the Commission Communication Delivering the Internal market – optimising public interventions it is important to look at public interventions in the electricity sector holistically so as to avoid that isolated interventions undermine the effects of other interventions and may end up being counterproductive.

A particular concern as regards public interventions with the aim to ensure generation adequacy is that they may lock-in (fossil) generation based solution that end up being stranded in the medium to long term when additional CO2 free capacity, interconnection capacity or demand and storage based solutions come on stream. Member States are therefore encouraged, before establishing additional intervention

measures, to assess holistically how such measures will impact on their renewables and CO2 emission reduction targets and how they can be phased out.

In this regard, the Commission is of the view that options based on increased demand side participation and increased interconnection are essential elements of any strategy to ensure generation adequacy. Therefore the impact of these measures should be explicitly considered before introducing capacity mechanisms even if alone they may not be sufficient to address a potential adequacy gap, at least not in the short term,

4.2. Demand response

The European Council of 22 May 2013 called for particular priority to be given to more determined action on the demand side as well as the development of related technologies, including the drawing up of national plans for the swift deployment of smart grids and smart meters in line with existing legislation.

Lack of participation of demand in the market is considered by most academics to be the most important reason for potential generation adequacy concerns. Demand response means consumers directly contribute to ensuring security of supply, reduce the need for investments in generation, and signal the true value of electricity. It can bring savings to consumers through direct revenue streams and/or by lowering the price of energy.

Member States have developed Smart meter roll out plans to assist the active participation of electricity consumers in accordance with Directive 2009/72/EC[17]. Given the positive impact on the market that smart meters can have on market functioning and security of supply, Member States should assess feasibility of extending or accelerating this roll out before implementing a capacity mechanism.

Even before the roll out of smart technology, there are opportunities to benefit from increased demand response. As stated by *Ifiec* in their response to the consultation ″voluntary demand side response could be released by adapting market structure, market products, and bidding procedures in the shorter term physical markets". Member States and national regulatory authorities should address the barriers which prevent this from happening to ensure that this potential is realised to the extent possible before implementing capacity mechanisms.

In particular where a limited capacity gap is identified for a limited period of time (i.e. during a limited number of peak hours per year), investments in additional generation capacity may turn out to be more costly than the price for which users could be found prepared to reduce or interrupt their consumption. Suppliers should be encouraged to explore the potential of interruptible supply contracts with (some of) their users to

[17] Point 2 of Annex 1

encourage demand response through variable price formula, instead of prematurely catering for additional generation capacity to be built.

4.3. More interconnection capacity

Interconnectors have historically been built to enhance security of supply in Member States which have less favourable conditions for electricity generation than in neighbouring countries. This beneficial role of interconnectors is today exacerbated with more wind and solar on the system (being unequally spread across the EU). Member States with high proportions of variable wind and solar will enhance security of supply by relying on interconnection capacity to export surpluses at times of high wind and/or sun and to rely on reliable capacity in neighbouring countries at times of deficit. The diverging energy mix decisions and natural conditions in our Member States offers a potential that the EU needs to harvest to enable to the transition to an affordable low carbon energy system. The alternative, namely to stay locked in to weakly interconnected national systems, will end up much more expensive. Trying to ensure security of supply on a national basis will cost the EU €3-7 billion extra per year[18].

The realisation of needed new interconnection capacity is therefore an essential part of the internal market in electricity, as recognised by the recently agreed Regulation on guidelines for trans-European energy infrastructure[19]. Thanks to interconnection, Member States are not reliant merely on electricity produced locally so overall costs can be brought down by an efficient siting of new generation, and the costs of system security are kept down through interconnection[20]. However, 10 Member States in the EU have less than 10% interconnection capacity compared to total consumption still today. It is notable that amongst those Member States several are contemplating or have installed capacity mechanisms.[21]

Interconnection allows generation capacity to be shared across borders, and allows peaking or flexible capacity (including demand side participation) to recover its costs from more than one national market. Storage has a particularly high potential to

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18 [Booz and Co.]

19 Document PE-CO_S 75/12 agreed by Council and Parliament

20 Where there are concerns about a lack of investment signals particular region within a wider price zone (generally corresponding to a Member State) this will either be a result of sufficient network strength, or a sign of a fundamental economic divergence between the two parts of the price zone. Once network strength and stability is ensured, the geographical location of generation does not in itself affect security of supply. Indeed this is one of the benefits of the internal market – as power can be bought and sold across borders, or within cross border price zones (as in Ireland - Northern Ireland). Transmission system operators should be able system support services for a limited period of time and in a regulatory approved manner while the network is being strengthened; however, a regional capacity mechanism within a single price zone would distort market functioning.

21 Ireland, UK, France, Spain and Italy.

benefit from increased cross border trading opportunities. Overall this reduces the capacity required to ensure generation adequacy in all Member States.

For example, according to the ENTSO-E system outlook and adequacy forecast, Belgium, Germany, Czech Republic and Poland could in some scenarios simultaneously require imports in the winter period. Import from all countries directly connected to this group remains possible however, because there the possibility to import from neighbours. Not only is the required 9.6 GW of generation capacity available but there is also more than sufficient interconnection capacity available on the external borders of the group (approximately 26 GW). Likewise the cooperation between transmission system operators in Belgium and the Netherlands in 2012 to free up capacity across their common border, thereby helping to address security of supply concerns in Belgium, shows how improving operation of the system can help address generation adequacy concerns.

Requirement before intervention

Before deciding to support power generators with the aim to enhance security of supply, Member States are expected to assess the impact of such intervention against alternatives. In particular,

- The impact of intervention must be assessed based on an holistic approach to climate and energy policy
- .As required by Directive 2009/72EC and Directive 2012/27/E Member States should unlock the potential of demand side, including by an accelerated roll out of smart meters
- Member States should expand interconnection capacity, in particular towards neighbouring countries with surplus electricity generation or a complementary energy mix;

5. WHICH CAPACITY SUPPORT MEASURE TO CHOOSE UNDER WHAT CIRCUMSTANCES?

Improving market functioning, bringing the demand side increasingly into the market and improving infrastructure and integration in the internal energy market should help minimise the need to intervene to ensure generation adequacy. However, they might not always be sufficient to avoid all generation adequacy concerns, as the benefits

might not be realised in time to avoid periods of genuine security of supply concerns during a period of transition.

In such cases a proportionate and targeted intervention may be necessary. The intervention must be transparent and non-discriminatory. Interventions cannot undermine the effective functioning of the internal market and in particular must not prevent access to national markets by electricity undertakings established elsewhere in the internal markets. Interventions designed to ensure that sufficient capacity is available to ensure generation adequacy are generally termed capacity mechanisms. There are various types of capacity mechanisms possible, ranging from relatively simple one off tenders for specific capacity or strategic reserves, to much more complex market wide capacity mechanisms.

5.1. Strategic reserves

One approach to filling a generation adequacy gap is to implement a strategic reserve under which capacity is procured, but only deployed in emergency situations (or equivalently only bid into the market at extremely high prices reflecting the value of lost load). Strategic reserves avoid the "wait for the tender" problem and do not affect the market during normal periods. They may be useful for addressing problems of exceptional peak demand, while still being easily reversible.

Strategic reserves have interacted well with energy only markets where they have been used in Sweden and Finland, causing a minimum of distortion. The cost of the reserves has amounted to between €0.10 and €0.30 per MWh to consumers. These have successfully included demand side participation.

Nonetheless, it is important that they be properly implemented. Procurement rules must be properly implemented to ensure that there is no overcompensation. Strategic reserves should not be used to keep prices low, which could result in high emissions from inefficient old plant and discourage the development and deployment of new and more efficient technologies, including storage and demand side response.

This means here must be objective and transparent criteria as to when they can be deployed. This should be clearly related to the failure of the (short run) wholesale market to match supply and demand. With market coupling and the introduction of cross border intraday trading such a failure would happen within a common price mechanism. The Commission will therefore consider whether it is appropriate to develop rules on the proper implementation of strategic reserves in the context of a Guideline developed in accordance with Regulation (EC) No. 714/2009.

5.2. Tendering procedures

The Electricity Directive provides for Member States to implement special tendering procedures to ensure security of supply[22]. Where a capacity gap has been identified, a tendering procedure has the advantage of being relatively easy to organise and will ensure that investors actually construct the capacity tendered, and then participate in the market as normal[23]. Unlike other mechanisms, tendering is effectively confined to new capacity or lifetime extensions of existing capacity.

New capacity which benefits from the tender continues to participate on the market. Consequently, it is important that the tender not be designed in such a way as to distort normal market operation. This means that additional payments over and above market revenues should not be production related, but rather related to availability, either overall or at times of system stress.

Properly implemented, tendering effectively constitutes a one off intervention on the market. However there is still a risk of distorting investment signals by encouraging 'a wait for the tender to be launched' approach on the part of investors to secure additional revenue.

Tenders have been used with varying degrees of success in a number of Member States to ensure security of supply as part of the transition to market based investments[24]. In the context of the current transition of the electricity system, and in some Member States, the decision to shut down nuclear capacity, well designed tenders could have a role to play. However, only if the connection between the tender requirements and the system transition is clear, is it likely that investors would consider a commitment not to repeatedly begin more tenders to be credible. Where a tender is implemented to correct for regulatory failures they are likely to undermine confidence in the willingness of public bodies to correct these failures.

Tenders must be conducted by a body, which may be public or private, fully independent of generation and supply interests. Transmission system operators may only conduct the tender if they are fully independent in ownership terms. In the case of public bodies, the test for independence should be that set out in Directive 2009/72/EC on the application of ownership unbundling where both the transmission system operator and generation/supply undertakings are publicly owned[25].

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[22] Article 7 of Directive 2009/72

[23] This means that the tender allows the cost of filling the identified gap to be properly identified but continuing distortions to the market are avoided.

[24] E.g. Ireland, Greece, Estonia

[25] Article 9(6) of Directive 2009/72/EC, see also Commission Staff Working Paper of 22 January on th e Unbundling Regime.

5.3. Market-wide capacity mechanisms

Market wide capacity mechanisms essentially create a second product "capacity" in parallel to the normal market wholesale market for electricity. Market wide capacity mechanisms come in different varieties, broadly either capacity payments where an administratively determined price is paid for available capacity or capacity markets based on central procurement or obligations on suppliers to buy "certified" capacity from generators.

Both centralised and decentralised capacity markets can be based on hedging products referenced to the market price, generally called reliability options, or a system of administratively determined penalties for non-availability[26]. Reliability options require a well specified reference price, generally related to intraday or balancing prices. However, if such a reference price is available then this avoids the complexity of designing a detailed penalty regime. Nonetheless, it is important that the option strike price is not set so low as to distort the operation of the balancing or intraday markets.

The costs of capacity mechanisms can be very high - for example in the single electricity market between Ireland and Northern Ireland they are equivalent to €15 per MWh, in Greece €9 MWh. Outside Europe the well-established mechanisms in the PJM market in the North Eastern United States results in a capacity price equivalent to €5.50 per MWh[27].

One particular concern about market wide capacity mechanisms is that they can over reward generation which was already financially viable. For example if the cause of an investment gap results from flexible generation not being adequately rewarded on balancing markets, there is little benefit from providing additional revenues to existing inflexible coal or nuclear plants. For this reason such capacity mechanisms are highly complex and difficult to implement. Professor William Hogan of Harvard University writing on capacity markets states "it is difficult to properly define the capacity product, determine the amount and location of capacity needed many years ahead, and integrate diverse products that blend capacity and energy in a variety of configurations. The problems are fundamental. It is not easy to build a good forward capacity market model based on first principles"[28]. Other prominent academics

[26] Although in theory it should be possible to rely solely on the financial incentive associated with a reliability option, usually only certified capacity are eligible to offer such options. Therefore the main difference in practice between reliability options and capacity markets based solely on certification is that in the latter the penalty for non-performance is administratively determined.

[27] Calculation from [Thema E3M Study] based on published figures

[28] Hogan, WW Electricity Scarcity Pricing Through Operating reserves: An ERCOT window of Opportunity. November 2012 Working paper available at http://www.hks.harvard.edu/fs/whogan/Hogan_ORDC_110112r.pdf

consider that the misguided attempts to solve generation adequacy concerns causes risks, inefficiencies and regulatory responses that are far more costly than any likely mistake in the provision of adequacy.[29]

Well-designed capacity markets can be effective at identifying new potential providers as well as facilitating the minimisation of costs – this has been the experience of the PJM capacity market which has facilitated participation by aggregators and demand[30]. Likewise obligations on suppliers relying on decentralised markets should limit the compensation to capacity to fill the identified gap to the minimum necessary. Capacity markets also facilitate secondary trading, which helps to reduces costs.

By contrast, establishing the correct value for capacity payments is difficult[31] and open to accusations of political interference. Neither can it be assured that required capacity will be delivered (particularly given regulatory uncertainty associated with the setting of the payment) or alternatively that excess capacity will not result from the scheme resulting in overcompensation. These concerns were reflected by the vast majority of respondents to our consultation.

Recommendations on choice of instrument

A strategic reserve or a credibly one-off tendering procedure is normally less distortionary and easier to implement than market wide capacity mechanisms, and should be implemented in preference to market wide mechanisms unless there is clear evidence that they are unsuited to filling the identified adequacy gap.

Mechanisms based on capacity payments should not be implemented as they do not ensure that the identified adequacy gap is filled and create significant risks of overcompensation.

[29] Cramton P & Steven Stoft S 2008, Forward reliability markets: less risk, less market power, more efficiency. Utilities Policy 194-201

[30] PJM is a regional transmission organization in the USA that coordinates the movement of wholesale electricity in all or parts of 13 states and the District of Columbia.

[31] The additional payment can be set in advance (then reset periodically) or an automatically updated formula applied as was the case in the pool market in England and Wales in the 90s.

6. Design features of Capacity Support Measures

Incompatible or poorly designed capacity mechanisms risk distorting trading, production and investment decisions in the internal market. They also risk discouraging innovative solutions, for example energy services providers who control demand based on wholesale market prices and instead locking in (high CO2 emitting) generation based solutions. If capacity mechanisms become more common in the internal market the potentially distortionary effects will become greater.

It is important that these risks are mitigated by careful design, ensuring that mechanisms are non-discriminatory and well-targeted.

6.1. Technological neutrality

The mechanism implemented should be open to all technologies able to meet the identified gap in generation adequacy. While it may seem clear that the gap is related to a specific technology (for example the need to ensure investment in combined cycle gas turbines is often raised) the choice of technology should not be established administratively.

Any restrictions on participation in the mechanism should be established in terms of performance specifications for the capacity, for example this might include the ability deliver electricity within certain periods (i.e. start-up times and ramping rates). With reliability options, it is possible to make these factors implicit, as the risk faced by less flexible plants will be higher.

Often it will be cheaper to retrofit or retain existing generation capacity, which would otherwise shut down, to keep it operational. This can also help potentially to avoid the lock-in effects of constructing new (fossil fuel) generation capacity.

Therefore, to ensure lowest costs and maximum competition mechanisms implemented should be open to capacity retention as well as new investments, without discrimination between the two categories. Avoiding windfall profits for already amortized plants requires that the selection process is competitive and market based. Combined with appropriate eligibility criteria this can also serve to minimise the risk of wasted expenditure by rewarding old and inefficient generation capacity. Likewise, where longer term commitments are required for new investments, the costs of giving such commitments must be appropriately valued and included in the assessment. New and innovative approaches must not be excluded, in particular the potential contribution from the demand side. Any mechanism implemented must be open to aggregation of demand and supply. Capacity mechanisms should be designed

fully taking into account the particular characteristics of demand response rather than defining products on the assumption that it will be filled by new generation.[32]

As already noted Directive 2012/27/EU on Energy Efficiency promotes demand side participation in balancing markets, reserve markets and other system services markets. These provisions, in particular those relating to the treatment of aggregation should be considered to apply equally to any mechanisms which are introduced to ensure generation adequacy.

Recommendations to avoid distortion of internal market

Capacity mechanisms should be fully and effectively open to demand side participation.

The assessment of mechanisms to ensure generation adequacy should consider the impact on CO2 emissions from the lock in effect of new generation capacity.

Mechanisms to ensure generation adequacy should be open to new and existing generation capacity

Restrictions on participation in a mechanism to ensure generation adequacy should be based on the technical performance required to fill the identified adequacy gap and not based on predefined technology types

6.2. Time bound intervention

There are two dimensions the length of interventions – the time during which support is given to individual capacity and time for which the mechanism is retained.

Regarding the time for which the mechanism is retained - any mechanism implemented should also be subject to regular review; this review should include an assessment of progress towards addressing the underlying market and regulatory failures and include a roadmap for the removal of the capacity mechanism. Such a roadmap should include annual assessments of progress made, with an associated indication of the expected phase out of the mechanism. Market based arrangements should be designed to allow the price of capacity to fall to zero as market failures are addressed, allowing smooth exit from the mechanism.

[32] This could be the case for example where bids in an auction was defined in 50 MW blocks.

Mechanisms based on decentralised supplier obligations mean that all certified capacity (ie new and old) will receive the same price. If this falls to zero, indicating that the mechanism is no longer required, this will apply equally.

Capacity markets based on central procurement allow for the duration of payments to be differentiated between new and old capacity. This requires careful design of auctions or tendering mechanism to avoid overcompensation. Best practice in the application of auction design and procurement rules in this regard should be followed. In any case commitments should be significantly shorter than the expected economic life of the capacity, in order to avoid distortion of the market in the longer run and locking in of fossil fuel based generation.

The timing of auctions or the fulfilling of supplier obligations is of critical importance; this is an important factor to take into account when designing a capacity mechanisms. In practice, this means that lead times should be just enough to commit to building a new generation plant, or implementing a programme of demand side response. Generally this can be done in around four years or less (depending on availability of existing sites etc.). Retrofitting can normally be achieved well within this timeframe. Lead times which are longer than this mean that the inevitable uncertainty in markets, for example regarding medium term economic developments, is transferred to consumers. Very short lead times by contrast are likely to result in investors not being able respond to the incentive in practice.

Recommendations to avoid distortion of internal market

Capacity mechanisms should be designed to deliver a price of zero when there is sufficient capacity available

Capacity mechanisms should subject to regular review in line with a roadmap for addressing underlying market and regulatory failures.

The lead time for a capacity mechanism should correspond to the time needed to realise new investments, that is 2-4 years

6.3. Cross border participation

In the internal market, both domestic and non-domestic capacity contribute to delivering security of supply; with further integration the already high degree of interdependence between Member States will deepen. Member States are obliged to respect commitments to export electricity even during periods of locally high demand. In this regard the Commission recalls that Article 4 of the Electricity Security of Supply Directive specifically requires Member States not to discriminate between cross border contracts and national contracts[33].

Any mechanism which is only open to domestic capacity is likely to distort investment signals, steering new investments away from neighbouring markets. A mechanism which excludes cross border participants could result in new generation capacity displacing imports. This would undermine the financial viability of generation in other Member State and could have a negative impact on regional security of supply. At worst this could cause a spiral effect, with both Member States intervening to protect generation adequacy and thereby undermining the benefits of the shared security of supply which the internal market brings.

Therefore, mechanisms should be open to any capacity which can effectively contribute to meeting the required generation adequacy standard. Just as the possibility should also exist for capacity located elsewhere to participate in a mechanism, it should also be possible for capacity to "opt out" of its national scheme, in order to instead participate in a mechanism established elsewhere. Therefore there should be no obligation on generators to participate in a mechanism implemented in their Member State.

[33] The Commission intends to include procedures for the allocation of cross border capacity in coupled markets when they reach technical price limits or are unable to clear in the network codes implementing market coupling.

It should be possible to include allow capacity equal to the maximum import capacity of the Member State to participate in a national mechanism. This would create a demand for demand for the use of the interconnection which could be marketed by transmission system operators separately from the normal allocation of cross border capacity. Alternatively, long term allocation capacity on interconnectors would allow for cross-border participation in capacity mechanisms by allowing generators to demonstrate their ability to deliver electricity to the Member State in question. This is compatible with Market coupling and could even work across several borders. With reliability options the incentive effect of the option should ensure that generators located in other Member States would anyway ensure they had sufficient interconnection capacity rights. Both these approaches ensure that while revenues are created for new interconnector operators (who are by definition transmission system operators) they do not bid directly into capacity mechanisms, preserving the unbundling of network operators and electricity supply and generation functions.

Obviously generation abroad or interconnector capacity should not be double-counted or double remunerated, but not remunerating anything implies favouring local generation over imports and slowing down new interconnection. Regional cooperation would facilitate addressing this problem and should be pursued where possible[34]. The Commission recognises there may be practical difficulties of implementing a framework for cross border certification of capacity and accounting for "capacity" import and export[35]. As a result, it may be necessary, as an interim step, for member States to calculate the contribution of imports to meeting the generation adequacy standards, and the implicit value of this in any capacity mechanisms implemented. This sum should then be used to develop of additional interconnection capacity for as long as it is not possible for external capacity to directly participate in the scheme.

The Commission will continue to work with Member States, ACER and National Regulatory Authorities, and ENTSO-E and transmission system operators to examine how cross border trading can be facilitated in capacity mechanisms.

[34] The example of Ireland and Northern Ireland shows that regional cooperation is possible, however, the mechanism implemented would seem to have resulted in high costs.

[35] These difficulties apply equally to the holders of interconnector capacity and to interconnector operators, by definition transmission system operators

Recommendations to avoid distortion of internal market

Mechanisms to ensure generation adequacy should be open to all capacity which can effectively contribute to meeting the required generation adequacy standard, including from other Member States.

Member states should allow the participation of cross border capacity based on holding of (financial or physical) interconnection capacity rights, or alternatively implement reliability options which ensure that participants are incentivised to hold capacity rights.

If the security of supply benefit of electricity imports can only be accounted for implicitly, this benefit should be calculated and these funds used to for the development of additional interconnection capacity

Member States considering interventions to ensure generation adequacy should cooperate with Member States in their region at an early stage, to examine the potential of implementing cross border mechanisms

6.4. Avoiding distortions of competition and trade

The introduction of a capacity mechanism should not jeopardise the benefits of efficient market functioning, a particular concern of respondents to the consultation paper. This is why it is important that the mechanism does not interfere with the operation of market rules.

Generation adequacy means the availability of sufficient capacity to avoid involuntary disconnection; wholesale energy markets continue to provide the best signals for the efficient use of the capacity which is actually available. The development of market coupling across the EU is an integral part of the full integration of the energy markets. Aligning market rules and expanding coupling across the EU will bring additional benefits of up to €1bn per annum on top of the €1-2 bn from the market coupling already implemented. Interventions which jeopardise these developments would be clearly detrimental to the functioning of the internal market.

Reserving capacity for the national market would result in systematic distortions in the functioning of the internal market, as would rules which restrict generators participation in Market Coupling (day ahead or intraday) or balancing markets[36]. Such reservation is not confined to explicit prohibitions on exports – export charges would have the same effect. Likewise the effective operation of market coupling requires that market participants be able to freely participate in the market.

With reliability options, generators no longer benefit from prices above the reference price, This means that the reference price could end up setting an implicit price cap in the market. Moreover, they could also displace normal trading between generators and suppliers, supplanting the normal wholesale market. Therefore the reference price needs to be set at a sufficiently high level that normal market functioning is not affected. This means that scarcity conditions can still be signalled from normal market operation.

Relatedly care should be taken that penalties for non-availability, or the formulation of capacity certification obligations, do not lead to inefficient production by operators. Otherwise the penalty could end up setting a "shadow price" for the energy market, as generators become more concerned with avoiding the penalty than actually delivering electricity when it is required.

Recommendations to avoid distortion of internal market

There should be no procedures to reserve electricity for the domestic market where a capacity mechanism is in place.

There should be no export restrictions or surcharges from the operation of capacity mechanisms

Price caps or bidding restrictions should not be implemented to offset impact of mechanisms on prices,

Penalties for non-availability should not lead to inefficient production decisions by operators, reliability strike price options should be significantly above expected market prices.

Capacity mechanisms should not adversely affect the operation of market coupling, including intra-day and balancing markets.

[36] This does not apply to strategic reserves, where the system is designed to ensure the availability of a reserve which does not operate in the normal market.

7. HOW TO FINANCE SUPPORT FOR CAPACITY

Interventions to ensure generation adequacy come with a cost, including direct as well as indirect costs. As indicated above, it is important that Member States undertake a detailed cost benefit analysis, including against other alternatives, before deciding upon public interventions to support generation adequacy. The impact of such costs on energy bills for industrial and household users should also be assessed. Thereby, administrative costs associated with operating the systems (e.g. certifying capacity, running auctions) should be explicitly included.

International experience shows that capacity mechanisms can cost up to 10% - 20% of wholesale electricity (i.e. energy only) prices. This is clearly a significant sum, and it is unlikely to be feasible for it to be met from the public budget directly. While it is imperative to keep energy costs low, it is reasonable that electricity consumers benefiting from the increased security of supply should bear the associated cost. Exempting industry or other class of consumer, from the costs of ensuring generation adequacy will push bills for all other consumers up even further.

The most effective way of passing costs to the beneficiaries of enhanced security of supply will normally be through their electricity suppliers, either directly in the case of capacity obligations or indirectly where surcharges are included on bills for the cost of centralised procurement. However, it is necessary that the costs passed on to suppliers reflect the actions of those customers; otherwise there is a risk that mechanism will lead to additional burdens falling only on some undertakings.

In practice this will normally be a function of their consumption at peak load, which requires that customer profiles are accurate and detailed. This also allows suppliers to pass on costs to the appropriate consumption groups. Consumers, and in particular industry, who are able to manage their demand flexibly should therefore end up paying less towards the capacity mechanism.

Recommendation to avoid distortion of internal market

The costs of capacity mechanisms should be should be allocated in a transparent and non-discriminatory manner, and should be allocated to consumers in proportion to their contribution to demand during periods of scarcity or system stress.

8. CONCLUSIONS

The Commission considers that interventions, such as the introduction of capacity mechanisms, can only be justified if the need has been clearly identified by a thorough generation adequacy assessment – and this will be an important point for the Commission when examining the appropriateness of any interventions. Far-reaching public interventions to address generation adequacy can be expensive. Therefore, while they may sometimes be necessary, they should only take place in combination with measures to promote demand response, and building the market and transmission infrastructure which a low carbon system requires.

Such interventions should not act as a compensation for the negative impact of subsidies to fossil fuels or poor implementation of internal market rules.

This means that the Commission would expect to see not just a high commitment to transitioning to a low carbon electricity system in countries proposing public intervention to ensure generation adequacy, but also RES support schemes which conform to best practice. Likewise Member States should remove price regulation and barriers to the participation of the demand side on wholesale electricity and balancing markets and accelerate the roll out of Smart Grids and Meters.

When considering whether and how to intervene to ensure generation adequacy a careful assessment of costs, and complexity involved is essential. Strategic reserves or credibly one-off tendering procedures avoid the complexity of market wide capacity mechanisms and are normally less distortionary. The intervention should also be subject to review in line with a roadmap for addressing underlying market and regulatory failures. To ensure non-discrimination, interventions should be open to all capacity, both demand and supply in the internal market (including in other Member States) which can effectively contribute to meeting the required generation adequacy standard.

There should be no adverse impact on the operation of market coupling as a result of interventions to ensure generation adequacy, and in particular there should be no bidding restrictions or export restrictions

> The Commission will also continue to work with Member States and national regulatory authorities, in particular through the Electricity Coordination Group, on addressing the challenges to ensuring security of electricity supply and generation adequacy as we transform the electricity system.

The Commission welcomes the opportunity to discuss with Member States considering the implementation of capacity mechanisms how the guidance set out in

this document can be applied so that the benefits of an integrated and competitive internal market in electricity can be fully realised.

Finally, the Commission will also continue to progress the work underway through the Electricity Coordination Group on ensuring consistent European generation assessments are available to policy makers which allow them to assess the national situations, and also understand the impact of their decisions on the internal market.

Annex I – Checklist for interventions to ensure generation adequacy

Requirements before intervention

Assessment of generation gap

1. Is the capacity gap clearly identified and does this distinguish between need for flexible capacity at all times of year and requirements at seasonal peaks? Has a clearly justified value of lost load been used to estimate the cost of supply interruptions?

2. Does the security of supply and generation adequacy assessment take the internal electricity market into account; is it consistent with the ENTSO-E methodology and the existing and forecasted interconnector capacity?

3. Does the assessment explain interactions with assessments in neighbouring Member States and has it been coordinated with them.

4. Does the assessment include reliable data on wind and solar, including in neighbouring systems, and analyse the amount as well as the quality of generation capacity needed to back up those variable sources of generation in the system?

5. Is the potential for demand side management and a realistic time horizon for it to materialize integrated into the analysis?

6. Does the assessment base the assessment of generation plant retirements on projected economic conditions, electricity market outcomes and the operating costs of that generation plant?

7. Has the assessment been consulted on widely with all stakeholders, including system users?

What causes generation adequacy concerns?

1. Has retail price regulation (with the exception of social prices for vulnerable customers) been removed?

2. Have wholesale price regulation and bidding restrictions been removed?

3. Have renewable support mechanisms been reviewed in line with the Guidance on renewable support before intervening on generation adequacy grounds.

4. Has the impact of existing support schemes for fossil and nuclear generation on incentives for investments in additional generation capacity or maintenance/refurbishment of existing generation capacity been assessed?

5. Are effective intraday, balancing and ancillary service's markets put in place and are any remaining obstacles, in those markets removed?

6. Have structural solutions been undertaken to address problems of market concentration?

What are the other options than generation support?

1. Have the necessary steps been taken to unlock the potential of demand side response, ,in particular has Article 15(8) of Directive 2012/27/EU on Energy Efficiency been implemented and do smart meter roll include the full benefit of demand side participation in terms of generation adequacy,?

2. Have the benefits of expanded interconnection capacity been expanded, in particular towards neighbouring countries with surplus electricity generation or a complementary energy mix been fully taken into account.

Recommendation on Choice of Mechanisms

Choice and design of intervention

1. Has the effectiveness of a strategic reserve been examined?

2. Has the potential for a credibly one-off tendering procedure to address the identified capacity gap been examined?

3. Mechanisms based on capacity payments should not be implemented as they do not ensure that the identified adequacy gap is filled and create significant risks of overcompensation.

Recommendations to avoid distortion of internal market

1. Is the chosen mechanism open to demand side participation?

2. The assessment of capacity mechanisms should consider the impact on CO2 emissions from the lock in effect of new generation capacity?

3. Is the mechanism (other than a tendering scheme) open to existing and new generation?

4. Are conditions for participation in the mechanism based on technical performance and not technology type?

5. Does the chosen mechanism deliver a price of zero when there is already sufficient capacity available?

6. Have you developed a framework for the phase out of the mechanism in line with a roadmap for addressing underlying market and regulatory failures?

7. Does the lead time for a capacity mechanism correspond to the time needed to realise new investments, that is 2-4 years?

8. Is the mechanism open to all capacity which can effectively contribute to meeting the required generation adequacy standard, including from other Member States? Insofar as imports are accounted only on an implicit basis, is a mechanism established to calculate this benefit and allocate funds to this value for the development of additional interconnection capacity?

9. Is it ensured that there are no export charges or procedures to reserve electricity for the domestic market?

10. Have all barriers to the equal treatment of national and cross border contracts been removed?

11. Are there no price caps or bidding restrictions as a result of the chosen mechanisms?

12. Is it ensured that the operation of the chosen mechanism does not lead to inefficient production by operators?

13. Is it ensured that the capacity mechanisms does not adversely affect the operation of market coupling?

14. Does the chosen mechanism allocate the costs to consumers on a non-discriminatory basis, taking into account their consumption patterns and without reductions for particular customer segments?

ANNEX I1 – ANNUAL CAPACITY COST OF EXISTING MECHANISMS – FROM THEMA, E3M, COWI STUDY

		Annual cost of capacity remuneration			
	Market design	Total cost Mill. €	Per gross electricity gen. €/MWh	Per committed capacity €/MW/year	Committed capacity MW
Greece	Capacity payment	451	9.18	41,030	11,008
Ireland	Capacity payment	529	14.9	78,000	6,778
Italy	Capacity payment	100 – 160	0.5	-	-
Spain	Capacity payment	758	2.7	30,506	24,847
Sweden	Strategic reserve	12	0.1	6,981	1,726
Finland	Strategic reserve	19	0.3	31,216	600
Norway	Strategic reserve	25	0.2	82,753	300
PJM	Capacity market	4,275	5.5	31,401	136,144

Sources: TSOs, Regulators, Eurostat.[37]

[37] Greece: *HTSO Capacity Assurance market Reliability year 2011 to 2012;* Ireland: *Decision Paper SEM AIP/Sem/12/078*; Italy: *Terna Annual report 2008 – 2011*; Spain: *CNE: CONSULTA PÚBLICA SOBRE EL MECANISMO DE PAGOS POR CAPACIDAD*; Sweden: *SvK Annual report 2011*; Finland; *Fingrid website*; Norway; *Statnett website and THEMA calculation*; PJM: *Monitoring Analytics, LLC: 2011 State of the Market Report for PJM.*

Annex III – Net generating capacity, Load and import capacity per MS (in GW)

	Winter reference point					Summer reference point				
2013	Net generating Capacity	Reliable Available Capacity	Load (normal estimate)	Peak load*	Import Capacity	Net generating Capacity	Reliable Available Capacity	Load (normal estimate)	Peak load*	Import Capacity
AT	23.30	17.60	10.00	10.70	0.00	23.30	17.20	9.40	9.90	0.00
BE	19.84	12.33	13.39	13.79	3.50	21.86	14.34	10.77	11.82	3.00
BG	13.73	11.27	6.70	6.95	1.45	13.83	9.63	4.00	4.32	1.45
CY	1.62	1.27	0.85	0.90	0.00	1.62	1.22	1.12	1.17	0.00
CZ	18.20	11.65	10.10	10.30	3.00	18.20	13.65	7.90	8.10	2.80
DE	182.16	93.04	91.77	91.77	16.90	186.66	83.18	76.86	76.86	16.90
DK	11.76	5.38	5.57	6.23	5.68	11.76	4.03	3.60	5.26	5.68
EE	2.81	2.02	1.44	1.64	0.65	2.81	2.02	0.87	0.97	0.60
ES	99.60	51.80	39.40	44.60	2.90	100.60	53.20	34.70	41.50	2.60
FI	17.66	13.31	14.10	15.00	4.70	17.66	8.76	9.20	11.00	4.70
FR	128.10	96.60	82.80	83.00	8.00	127.40	76.60	56.50	57.70	8.00
GB	80.75	61.99	57.70	57.70	4.19	80.75	46.90	25.68	25.68	4.19
GR	15.88	11.04	7.04	8.83	1.50	16.48	12.32	7.07	10.20	1.50
HR	4.30	3.40	3.00	3.20	3.10	4.30	2.90	2.60	2.70	3.00
HU	9.05	5.09	5.65	5.90	2.40	9.05	4.49	5.55	5.75	2.40
IE	8.99	6.66	4.53	4.94	0.80	8.99	6.16	3.48	3.76	0.80
IT	126.30	67.30	52.50	58.60	10.50	127.80	85.30	54.40	60.40	9.50
LT	4.05	2.40	1.74	1.85	1.30	4.05	2.06	1.44	1.50	1.30
LU	1.72	1.60	1.08	1.12	4.14	1.72	1.60	1.00	1.12	4.14
LV	2.66	1.32	1.28	1.28	2.00	2.66	1.22	0.96	0.96	2.00
NI	2.79	2.22	1.57	1.72	0.45	2.79	2.22	1.06	1.37	0.45
NL	31.28	26.37	16.42	18.40	5.17	31.28	26.37	14.67	16.93	5.17
PL	35.72	26.15	23.18	24.48	0.82	36.11	20.84	19.47	20.17	0.82
PT	17.92	11.42	8.01	8.43	1.28	18.00	9.89	6.58	6.88	1.60
RO	18.54	11.60	8.44	8.93	1.50	18.96	11.14	7.33	7.51	1.90
SE	38.67	27.21	22.62	26.00	9.70	38.89	25.54	14.18	17.82	9.70
SI	3.27	2.41	1.94	2.00	2.11	3.27	2.76	1.51	1.81	2.11
SK	8.02	4.17	3.82	3.82	4.66	8.02	3.43	3.20	3.20	4.39

Source: ENTSO-E