

CAPACITY MECHANISMS WORKING GROUP

30 JUNE 2015

ENABLING THE PARTICIPATION OF INTERCONNECTORS AND/OR FOREIGN CAPACITY PROVIDERS IN CAPACITY MECHANISMS

This paper compiles the requirements in the Guidelines on State aid for environmental protection and energy (EEAG) related to the participation of interconnectors and/or operators in other Member States in capacity mechanisms ('cross border participation'). It describes the challenges to accessing reliable capacity across borders, and identifies some of the main design questions that must be addressed by a Member State seeking a solution.

It also considers the possible benefits of a more harmonised approach to this issue and explores the high level form that common rules could take and the questions that would need to be addressed to further develop such an approach.

1. WHAT DO THE GUIDELINES REQUIRE?

The EEAG include the following requirements related to cross-border participation in a generation adequacy measure:

(226) The measure should...take into account to what extent interconnection capacity could remedy any possible problem of generation adequacy.

(232) The measure should be designed in a way so as to make it possible for any capacity which can effectively contribute to addressing the generation adequacy problem to participate in the measure, in particular...

(a) the participation of...operators offering measures with equivalent technical performance, for example...interconnectors.

(b) the participation of operators from other Member States where such participation is physically possible in particular in the regional context, that is to say, where the capacity can be physically provided to the Member State implementing the measure and the obligations set out in the measure can be enforced (footnote: schemes should be adjusted in the event that common arrangements are adopted to facilitate cross-border participation in such schemes).

(233) The measure should:

(a) not reduce incentives to invest in interconnection capacity;

(b) not undermine market coupling, including balancing markets.

Figure 1: Summary of EEAG requirements related to the cross-border participation

Summary	
EEAG requirement	Objective
(226)	1. Should take the contribution of interconnection into account.

(232)	<p>2. Should be open to interconnectors if they offer equivalent technical performance to other capacity providers.</p> <p>3. Where physically possible, operators located in other member states should be eligible to participate.</p>
(232)	<p>4. Should not reduce incentives to invest in interconnection, nor undermine market coupling.</p>

2. AIM OF THESE REQUIREMENTS

The more participation in a capacity mechanism, the more competitive it should be and therefore the higher the chance that the mechanism provides value for money for consumers. This is why the EEAG include a general requirement for all types of capacity provider to be able to participate in capacity mechanisms.

If the contribution of imported electricity is not taken into account when capacity is procured through national capacity mechanisms, this would result in significant overcapacity.

If cross border participation in capacity mechanisms is not enabled, there will be greater distortion of the signals for where new capacity should be built, and an increase in overall system costs. And capacity mechanisms will fail to adequately reward investment in the interconnection that allows access to capacity located in neighbouring markets.

If cross border participation is enabled by requiring physical delivery of electricity into a particular market, or capacity payments are made per MWh to generators participating in a capacity mechanism, there is a risk that the market coupling rules (which ensure the most efficient use of interconnection) are undermined. There is also a risk of distorting the merit order in neighbouring markets.

Therefore the aim of these requirements is to maximise competition in capacity mechanisms, ensure efficient signals for investment in the right types of capacity and network infrastructure where they are most needed, and enable market coupling to continue to deliver the most efficient use of existing resources in real time.

3. DESIGN CHALLENGES

3.1. Where does electricity flow at times of system stress?

Bidding zones in the European Union are being 'coupled', in line with the target model. Market coupling aims to ensure the interconnectors that link bidding zones are used most efficiently to send power between markets to where demand is greatest.

Most of Europe is now coupled day ahead with implicit allocation of cross-border transmission capacity. This means that prices and interconnector flows are jointly determined in a single step, for each hour of the following day. This is established through the matching of bids and offers across the power exchange/s operating in Europe. Roughly characterised, the prices for each hour in neighbouring markets are then compared, and the capacity of interconnectors is used to allow power offered in the lower priced zone to be matched with bids in the higher priced zone

until either the prices in the two zones converge, or all available interconnection capacity is exhausted.

The draft network guideline on Capacity Allocation and Congestion Management, due to come into force in the next few weeks, will require the development of market coupling rules for intraday markets as well as day ahead markets.

This price-matching process creates flow schedules for the interconnectors in real time. As intraday market coupling is introduced this will adjust any day ahead scheduling to reflect any differences in prices that emerge in intraday trading.

Participants in coupled markets will continue to be able to buy hedging products: called 'physical transmission rights' (PTRs) and financial transmission rights (FTRs)¹.

Physical transmission rights will enable the holder to nominate a flow on the relevant interconnector at the day ahead stage. However, if this nomination is for a flow from a higher priced zone to a low priced zone and the price difference is sufficient, the market coupling algorithm will reallocate the full interconnector capacity (including the nominated amount) to flow power from the low to the high priced zone.²

Financial transmission rights allow the holder to be paid the difference in price between two coupled markets, but do not give any nomination right or allow the holder to influence the flow of energy between coupled markets.

Although EU rules require TSOs to resolve network congestions without limiting commercial transactions (including across borders), in emergency situations TSOs can nevertheless curtail nominations. Also relevant is Article 4(3) of the Security of Electricity Supply Directive³, which states that 'Member States shall not discriminate between cross-border contracts and national contracts'. This rule requires system operators to allow market coupling to determine flows, even if this means that in a situation where two coupled markets are both facing scarcity, the result of market coupling could be more severe scarcity in one country because the price of electricity is higher in the neighbouring zone⁴.

¹ These will be defined in the guideline network code on Forward Capacity Allocation.

² This is an important difference between European and US markets, and explains why the physical participation of interconnection in capacity mechanisms – which is possible in the US – cannot be enabled with the same certainty of delivery in Europe.

³ Directive 2005/89/EC of the European Parliament and of the Council of 18 January 2006.

⁴ Note in practice however, system operators may have rules that contradict this requirement. This lack of respect for the requirements of the Security of Supply Directive leads to an additional concern for those seeking to include foreign participation in capacity mechanisms, since they may fear that in an emergency situation a foreign system operator could in fact take action to constrain exports to a neighbour, regardless of the presence of a capacity mechanism and its associated contracts and rules.

Market coupling is an effective way of ensuring the most efficient use of interconnection, but creates a challenge for enabling foreign participation in capacity mechanisms in Europe, because interconnectors have no influence over which direction power flows between markets, and individual capacity providers in a coupled market have very little influence on which direction power flows. With market coupling, it is not possible for a generator in a neighbouring country to guarantee that its power will flow to consumers in another bidding zone. Ultimately, power flows will flow to the bidding zone which offers the highest price.

4. CONSIDERATION OF IMPORTS IN THE GENERATION ADEQUACY ASSESSMENT

When the demand requirement is set in a capacity mechanism, the total capacity demanded can be adjusted to account for expected imports (at times of scarcity). This meets the basic requirement of EEAG 226, but may not meet the requirements of EEAG 232 because it does not actually enable interconnector participation, and would not provide any remuneration for the value of foreign capacity to the market with the capacity mechanism unless the value of capacity is somehow paid to existing and/or new interconnectors.

For the GB Capacity Market (SA.35980), the UK took this approach for the first year of operating the mechanism, but the approval of the scheme included a commitment that from the second (2015) auction interconnected capacity would be able to directly participate in the Capacity Market.

5. DESIGN OPTIONS – EXPLICIT PARTICIPATION

5.1. De-rating interconnectors and foreign capacity

This issue is critical for the overall efficiency of a connected system containing capacity mechanisms. The EEAG require the inclusion of foreign capacity 'where the capacity can be physically provided to the Member State implementing the measure'. Therefore it may be necessary to de-rate the interconnectors and/or foreign capacity eligible to participate according to the extent to which their capacity can be physically provided at times when it is needed in the capacity mechanism zone⁵. So, while in principle Member States should not discriminate against providers located in any other Member State, in practice it could be justifiable to exclude providers whose location meant they could never realistically deliver the required service.

As with most central decisions taken in regard to capacity mechanisms, there may be a bias for conservative judgements. TSOs may decide they cannot rely on imports at times of system stress, and if they expect to be exporting (because they expect higher prices in a neighbouring country at the times they will experience stress) a negative assessment would also be possible. This would lead to the Member State using a capacity mechanism to construct not only enough

⁵ Note an alternative capacity mechanism design might enable participants to 'self de-rate' rather than relying on central de-rating. Such a design may require high penalties to avoid participants selling more capacity than they could reliably provide, but could avoid the difficulty of centrally establishing appropriate de-rating.

capacity to meet domestic demand, but also enough to export to its neighbour at times of local stress.

It is in consumers' interest to ensure the full value of interconnection is taken into account, otherwise excess capacity will be built across Europe at unnecessary cost. De-rating of resources across borders will likely require good cooperation between TSOs. **More rules or guidance on de-rating of interconnectors may be required – particularly to assist with de-rating in complex flow based coupled systems. It may be necessary to task ENTSO-E with coordinating work to establish suitable capacity figures for each border.**

In addition, **to ensure judgements about the level of imports that can be expected are not overly conservative, it may be necessary to define common rules for all TSOs to apply in stress and emergency situations, and for example exactly what procedures are followed when there is concurrent scarcity in two neighbouring markets.**

5.2. Obligations and penalties for interconnector / foreign capacity

As discussed in a previous paper⁶, there are various ways of designing obligations and penalties in a capacity mechanism.

Capacity providers may be required to either be available (for example by declaring that they are available, or by placing a bid to deliver electricity) or they may be required to actually deliver electricity regardless of whether the market price is sufficient to cover their running costs. For cross border capacity, a delivery requirement could require a foreign capacity provider to deliver electricity into its local market, or it could require that capacity provider to deliver electricity in its local market and require the interconnection between the two markets to be sending electricity towards the market where the capacity mechanism is operating. With market coupling in operation, however, it is clear that an individual foreign capacity provider will in most cases have a very minor influence on the direction of flows across an interconnector (and the interconnector operator would have no influence over the flow direction).

Different capacity mechanisms also apply different penalties when obligations are not met. They could apply a flat rate financial penalty, for example, or a penalty linked to the value of lost load. Over delivery payments may also apply – as is increasingly seen in US markets under the 'pay for performance' principle.

In principle, if the allocation process for capacity contracts allows interconnector or foreign capacity to compete directly with domestic capacity, the obligation and penalties faced by the interconnector or foreign capacity providers should be the same as the obligations and penalties faced by the domestic capacity providers. However, there are issues with imposing obligations and penalties on interconnectors or foreign capacity providers, in particular:

- In coupled markets, even if foreign capacity providers face additional incentives from a capacity mechanism to deliver capacity into their local market, in most cases this will

⁶ 'Designing appropriate obligations and penalties':
http://ec.europa.eu/competition/sectors/energy/capacity_mechanisms_working_group_6.pdf

not significantly increase the chances of delivery in a particular direction across a constrained interconnector.

- Any obligations, penalties or over delivery payments that result in the delivery of capacity that would not otherwise have delivered may impact on market coupling. For example, if a generator in country B is penalised if not delivering energy into the market in country B whenever there is stress in country A, this means that generator's decision to run is no longer based only on its marginal costs and the price of electricity in country B. It is also based on the cost of the penalty that will be levied by country A if it does not produce. This could create additional distortions since it may mean this plant runs out of merit, displacing other plants in the local merit order.

In practice, in a situation where there is sufficient stress in country A to trigger the possibility of penalties for capacity providers located in country B participating in country A's capacity mechanism, the price in country A should rise high enough to ensure the interconnector flows 100% in the direction of country A. In this situation a delivery obligation on the capacity providers in country B would have no impact.

Some obligations, testing and penalties may still be required to ensure that foreign capacity is at least a verifiable and reliable source of capacity in its local market. But because of the potential for delivery obligations to create distortions in neighbouring markets and the fact that anyway such obligations can only incentivise actions which are likely to have a very limited effect on cross border flows, delivery obligations may not be appropriate for interconnectors or foreign capacity.

As intraday markets are improved, for example through scarcity pricing rules that enable prices to rise towards the value of lost load when there is a risk of demand being involuntarily disconnected, or as the demand side develops and allows reliable price-setting in the market up to the value of lost load, even without a capacity mechanism capacity providers will face strong incentives for actually delivering capacity into the market at times when electricity is scarce (expensive). This should reduce the need for obligations and penalties (and ultimately the need for capacity mechanisms).

5.3. Counterparty for a cross border capacity contract

To meet the requirements of the EEAG, a design could enable the direct participation of interconnector operators, foreign capacity, or a combination of the two.

An efficient design should ensure the revenues from the capacity mechanism that end up being paid to the interconnector and the foreign capacity reflect the relative contribution each makes to security of supply in the zone operating the capacity mechanism.

A system where foreign capacity providers are included directly in a capacity mechanism can reveal the value (from a generation adequacy perspective) of additional interconnection capacity. For example, if a zonal auction for capacity in a neighbouring country cleared at a lower level than the main capacity auction, the difference between the two clearing prices would reflect the value of increased interconnection capacity between the two zones. Member States should ensure that interconnection investment reflects these signals. Under a "merchant" model for investment in interconnection, this could be achieved by rules ensuring

that the interconnector could receive the difference between the zonal capacity prices⁷. Competition should ensure that if there is plentiful supply of cheap capacity in the neighbouring market relative to the amount of interconnection, then the interconnector receives most of the capacity revenue – sending signals for investment in more interconnection⁸.

If capacity contracts are awarded directly to an interconnector operator, the extent to which foreign capacity is appropriately rewarded may depend on the obligations and penalties associated with the capacity contract. With a delivery obligation (obligation for power to flow to the capacity mechanism country at times of stress) and high enough penalties, the interconnector may seek to contract with capacity providers in the connected market to pass on the delivery risk to counterparties better able to manage this risk (since the interconnector operator has no control of the direction in which electricity flows). However, **it is not clear how interconnectors as a counterparty with a capacity payment for availability and no delivery obligation (or obligation to 'subcontract' with foreign capacity providers) would ensure appropriate revenues are awarded to foreign capacity providers.** In this model, it seems likely that all the capacity revenue would accrue to the interconnector itself, regardless of the relative scarcity of interconnection and foreign capacity.

In some situations there may be a greater justification for including interconnectors as a counterparty – for example, where there is a very large supply of foreign capacity and the interconnector is clearly the scarce resource. **But the concern in the previous paragraph, combined with the potential distortions of imposing delivery obligations across borders (see Section 5.2), may mean the most appropriate solution to meet the EEAG requirements would require foreign capacity to participate directly across borders, rather than the interconnector participating.**

Note in principle the same eligibility rules as apply in the domestic market should apply to foreign capacity – with foreign demand response and storage eligible to compete alongside generation⁹.

5.4. Conclusions:

- Simply accounting for imports when establishing demand for capacity does not meet the requirements of EEAG 232.

⁷ Just as for congestion rents earned where electricity prices differ in neighbouring interconnected markets.

⁸ If there is abundant interconnection capacity and not much foreign capacity available, the foreign capacity would receive the bulk of the capacity revenues – sending signals for increased investment in foreign capacity. Likewise, if capacity can be most efficiently provided by building more domestic capacity this should be the outcome – signalled by the foreign capacity bidding too high to be competitive in the neighbouring capacity mechanism.

⁹ Harmonised rules for de-rating, baselining, testing and verifying demand response may need to be developed to enable this.

- Common rules may be needed to calculate transmission capacities for cross-border participation in CRMs.
- Availability models probably do not distort market coupling, nor distort foreign markets (except possibly for some distortions due to any required testing).
- With the interconnector as counterparty, it is not clear that an availability model delivers appropriate revenues to foreign capacity providers.
- The most appropriate design choices may therefore be to enable foreign capacity to participate directly, with no delivery obligations imposed on either the foreign capacity providers or the interconnector operator.

6. CORRECTING MARKET FRAGMENTATION

Designing appropriate rules for cross border participation in capacity mechanisms is challenging. Given the different capacity mechanism designs already emerging across Europe, there may be value in developing harmonised rules at least for cross border participation in these different mechanisms. This section presents a tentative high level proposal for a harmonised approach to cross border participation in capacity mechanisms. This is presented to stimulate discussion and does not represent an established position of the Commission, nor a formal consultation proposal.

6.1. Harmonised rules for cross border participation in volume-based market-wide capacity mechanisms

Some commentators have suggested that the same capacity product (eg. a certificate) would have to be traded in different capacity mechanisms to enable such mechanisms to be opened up to cross-border participation. While harmonised capacity product definitions would no doubt simplify the design challenge and would probably increase overall efficiency by simplifying the range of rules investors, market participants, regulators and system operators have to understand, they are not necessarily a pre-requisite for cross-border participation in capacity mechanisms. However, a harmonised set of rules specifically for cross border participation, including defining a common product to account for the capacity to be supplied from neighbouring markets may be required to facilitate cross border participation¹⁰.

Such rules could address a number of issues:

- i) situations where there is concurrent scarcity in neighbouring countries;
- ii) problems related to the reliability of interconnector flows at times of system stress that cannot be overcome unilaterally by a single Member State; and

¹⁰ Note such a product would not necessarily match the product contracted in the different capacity mechanism/s connected by these common rules.

iii) ensuring capacity providers do not commit their capacity into more than one mechanism for the same time period (unless the potential for this is decided to be an appropriate design choice – see 'Interconnector de-rating' below).

High level approach

The objective would be to create harmonised rules that simplify cross border participation¹¹ and define a single cross border capacity product, the way in which it will be competitively allocated to capacity providers, and the way in which capacity providers and interconnectors will be remunerated (and penalised) for the service they provide (or fail to provide). The model would need to respect the principles in the EEAG.

To achieve this, (common) rules would be needed to:

- a) Define the way in which the amount of imports that can be relied upon at times of scarcity in each country operating a capacity mechanism should be calculated (interconnector de-rating);
- b) Identify the capacity providers that could be eligible to provide capacity into a capacity mechanism in a neighbouring market;
- c) Define a competitive process for offering this import capacity to eligible capacity providers;
- d) Define rules for the trading of this import capacity once allocated;
- e) Define the obligations and penalties that would apply to those who hold capacity contracts in relation to a capacity mechanism in a neighbouring market;
- f) Define any obligations and penalties applicable to the interconnector operator;
- g) Influence flows in the direction of the capacity mechanism if market coupling cannot deliver sufficient certainty;
- h) Allocate the costs of foreign capacity to consumers;
- i) Appropriately remunerate the interconnectors that enable the participation of cross border capacity; and
- j) Ensure compliance of TSOs.

a) Interconnector de-rating

The determination of the amount of foreign capacity that can participate in a capacity mechanism is critical as conservative assumptions will lead to overcapacity, and overly generous assumptions will potentially lead to unmet demand (and potentially reduced confidence in the value of interconnection).

One consideration concerns de-rating the interconnector in relation to its technical availability (ie. is the line itself operational or not). The full capacity of the interconnector could then be offered to participants seeking to sell capacity into a cross border capacity mechanism. However, the extent to which an interconnector can reliably provide imports to the countries it connects depends not just on the line's technical availability but also on the potential for concurrent scarcity in the connected markets. If country A only has a winter peak demand

¹¹ This will always be complicated, but a harmonised approach with a single cross border product could be a lot simpler than designing different approaches for each border.

problem and connected country B only has a summer peak demand problem, both may expect 100% imports at times of local stress. However, if countries A and B are neighbours with similar demand profiles and some similar generation types there may be some periods of concurrent scarcity.

Where two connected markets both operate capacity mechanisms, one approach would be to take the full capacity of the interconnector and allocate it between the two connected capacity mechanisms. This would enable capacity providers to make a choice between participation in either their domestic capacity mechanism or a neighbouring one. For example, if there was a 2GW link between country A and country B, 1.5GW of capacity could end up being sold to providers located in B wishing to participate in the capacity mechanism of country A, and 500MW to providers located in A wishing to participate in the mechanism of country B.

The problem with this approach is that, with the two markets considered together, the interconnector is assumed to make a net zero contribution to security of supply. In this situation, the domestic capacity demanded in the national capacity procurement process in country B would be increased by 1 GW to compensate for the net capacity contracted to deliver cross border to country A. This would be an efficient outcome if country A and country B always experienced coincident stress.

In practice, however, it is unlikely that stress events will be perfectly correlated between two neighbouring countries. **So, to avoid a situation where overall less value is assumed for imports than is truly the case, a statistical judgement is needed for each capacity mechanism about the value of imports at times of scarcity and reduce the amount of capacity demanded accordingly. This capacity is then available for allocation to foreign capacity providers.**

A more efficient system would require either:

- i. A more granular definition of stress periods in Member States operating capacity mechanisms. It would no longer be possible for them to require capacity to be available/deliver at any time during the year; they would have to specify particular time windows for availability/delivery. However, this would only allow increased efficiency for periods in which the requirement to be available/deliver does not overlap in two connected capacity mechanisms.
- ii. The possibility for capacity providers to sell capacity into more than one system for delivery in the same time period. It is difficult to see how this could be consistent with requirements in capacity mechanisms requiring participants to be available whenever there is a stress event for the duration of their contract. However, with sufficiently high penalties for not being available at times of stress, this could create the right incentives for capacity providers to judge for themselves the likelihood of concurrent scarcity occurring in two connected systems since with high penalties they should only choose to participate in more than one mechanism if the risk of concurrent scarcity was perceived to be low. Another advantage would be that this could remove the responsibility for making a difficult central calculation of the appropriate interconnected capacity de-rating from the system operator. This option may merit further discussion, but the general direction in capacity mechanism development seems to favour verifiable physical capacity and relatively

low penalties supported by testing¹², rather than high penalties driving self de-rating.

- iii. **De-rating of interconnectors to reflect perceived maximum import capacity at times of stress, calculated separately for each connected market, so that the total cross border capacity auctioned may be more (or less) than the total capacity of the interconnector.** For example, if the total expected import capacity to country A from country B at times of stress in country A is expected to be 1.5GW, and the total expected import capacity to country B from country A at times of stress in country B is expected to be 1.5GW, a total of 3GW capacity could be auctioned on that border (rather than the 2GW total capacity of the interconnector). This system could however be vulnerable to the same conservative assumptions that affect the implicit interconnector participation model (see section 5.1), so common rules may be required to enable TSOs to make the calculations of the total maximum capacity to be offered. **At least in the short term, this may be the most appropriate route to pursue.**

b) Eligible foreign capacity providers

The eligibility of foreign capacity, and any de-rating that should be applied, could be decided based on the criteria in the capacity mechanism for which capacity is being procured, or common rules could be established. The determined eligibility in either case would need to meet the requirements in the EEAG requiring all potential capacity providers to be able to participate¹³. Some restrictions on eligibility might be appropriate to avoid cumulation and overcompensation – for example to avoid beneficiaries receiving compensation from a capacity mechanism and another support scheme.

Depending on the penalties applicable for capacity providers that do not meet their obligations, de-rating may be required (ie. if penalties and testing are not strong enough to encourage appropriate self de-rating). Common rules requiring TSO cooperation in the de-rating of capacity in neighbouring markets may be required.

A common registry may be required to facilitate de-rating and any certification or pre-qualification of foreign resources, and to ensure resources do not commit to offer capacity into more than one capacity mechanism for the same time period (unless the decision is taken that this would be more appropriate than central de-rating of interconnector capacity). A registry could also facilitate secondary trading of capacity contracts.

¹² This seems to be for two reasons: i) political reasons, where there are suggestions that politicians responsible for security of supply wish to have a verified / proven source of capacity contracted, rather than a capacity mechanism potentially being open to financial market participants; and ii) to enable financing, since the potential for high penalties may mean capacity contracts are less suitable as a basis for seeking financing.

¹³ See http://ec.europa.eu/competition/sectors/energy/capacity_mechanisms_working_group_4.pdf

c) Competitive cross border bidding process

The import capacity established for each interconnector (into each capacity mechanism) could be competitively allocated in at least three ways:

- explicit auction: where TSOs (or exchanges, or even the interconnector operators) auction the available cross border capacity in advance of any capacity allocation process within a national capacity mechanism. Effectively, they would be auctioning a ticket allowing entry into the related capacity mechanism. Those successful in the ticket auction would then be able to bid into the capacity auction in the related capacity mechanism (if a central buyer model) or offer their capacity in the market to suppliers needing to fulfil their obligations (if a de-central obligation model).

- implicit auction (only in a central auction model): where foreign capacity bids directly into the national capacity auction, which establishes a price for each cross border capacity zone. Designing a zonal element in certain auction types may be more complex.

- direct selling to suppliers (only in a de-central obligation model¹⁴): where foreign capacity providers offer their capacity directly to suppliers in a capacity mechanism seeking to fulfil their obligation. Exchanges may be able to help limit trade to the maximum import capacity – for example if foreign capacity providers were required to trade only on exchanges. Ensuring the interconnector operator also receives remuneration for its service could be challenging in such a system. It might be possible for the interconnector to offer a 'capacity rights' product on an exchange, and for capacity providers to be required to simultaneously buy these capacity rights at the same time as an offer to provide capacity is accepted. If the transactions cannot be concluded simultaneously some basis risk (see below) will remain.

With an explicit auction, the gap between the entry ticket auction and the domestic auction would create an additional risk ('basis risk') for participants, since when competing in the ticket auction they would be uncertain about the value of capacity in the system for which they were bidding to participate. This could result in a lower price being bid for the entry tickets to compensate for this risk and/or reduced competitive pressure, as this risk presents a barrier to entry.

An implicit auction or direct selling to suppliers (depending on the capacity mechanism design) should be more efficient since these options eliminate this basis risk. This may be an area in which the common rules need to allow for two different approaches depending on the type of capacity mechanism involved.

¹⁴ Though the registry and other rules required might also be relevant for enabling secondary trading of capacity contracts in a central buyer or de-central obligation model.

d) Trading of cross border capacity

Foreign capacity providers should be able to trade their capacity contracts to allow them to manage risks of changing circumstances (for example required maintenance or unplanned outages). Foreign capacity providers should therefore be free to trade their contracts to other eligible providers that do not currently hold a capacity contract. Some kind of registry is likely to be required to enable this.

e) Obligations and penalties on foreign capacity providers

Given the potential distortions that could arise with a delivery obligation, the obligation on capacity providers would likely need to be a relatively simple availability obligation – perhaps with an obligation to bid into its local market below a certain threshold, and periodic testing to ensure reliability.

Careful design of the availability obligation and no or very limited exceptions to it, along with a clear set of procedures for cooperation (and any appropriate remuneration) between TSOs for testing capacity resources would be required to ensure the reliability of contracted resources (and avoid the problems encountered in US markets with resources paid for availability rather than delivery¹⁵).

The availability obligation is weaker than a delivery obligation for ensuring reliable capacity is in place, so should be complemented by robust penalties for non-availability. At a minimum, parties that consistently fail to meet their obligation should be able to lose 100% of any revenue earned through capacity contract payments (though this may not be sufficient and higher penalties may be required).

It may make sense to limit contract lengths to one year, even where some mechanisms allow for longer contracts for domestic capacity. With different capacity mechanisms in Europe already applying different contract lengths, it will not be possible to choose a single rule for cross-border capacity that matches each current national model. Short contracts would avoid fixing the remuneration between interconnectors and foreign providers for the duration of the contract, and allow more easily for future adaptation or removal of the cross border participation model if required.

More granular time-bound products may also be appropriate – for example to allow capacity providers to deliver capacity for one period in one mechanism, and another period in another mechanism. These more granular products could emerge through secondary trading.

f) Obligations and penalties on interconnector operators

Interconnectors would have an obligation to be operational (**technically available**) at times of system stress in either connected system. The risk of interconnector availability is mainly within

¹⁵ See 'Designing appropriate obligations and penalties' for more on this.

the control of the interconnector operator. If not available, they should face the same penalty as foreign capacity providers (and foreign capacity providers should not be penalised in periods when the interconnector is unavailable).

However, since interconnectors have no control over the direction of flows on the interconnector, they should probably not be penalised if the flows over the interconnector are not what was expected when the de-rating based on expected flows was carried out. This would effectively mean the interconnector has an availability obligation, just like the foreign capacity providers.

g) Influencing interconnector flows (without distorting market coupling)

Member States may argue that an availability obligation provides less security of supply than a delivery obligation. However, market coupling should increasingly ensure price signals draw in imports at times of scarcity, and if this is not the case then Member States have the power to modify their market rules – for example by improving the operation of the balancing market and the way in which reserve prices affect market prices at times of scarcity – to ensure that imports are possible at times of local system stress.

Harmonised rules would enable a more nuanced approach than is available to a national authority seeking to ensure reliable cross border participation. With a harmonised approach, if there are credible concerns about the possibility of market failures causing market coupling to fail to deliver imports at times of stress, additional (transitional) rules could be established relating to the capacity contracts traded that could ultimately influence interconnector flows. For example, although there should be no possibility for interconnector flows to be influenced by capacity contracts until market coupling price caps are reached, **rules could be developed to ensure electricity flows in proportion to the cross border capacity contracts held in an episode of concurrent scarcity where market coupling price caps are reached in two interconnected countries.**

If markets develop to the point where market coupling price caps reflect the value of lost load in the connected markets, the capacity contracts should have no further effect once these caps are reached. If capacity mechanisms were able to influence flows once value of lost load price caps were reached, this would unfairly undermine security of supply in a Member State that had chosen an energy only market and implemented a theoretically efficient design for ensuring security of supply, just because they happened to neighbour one or more Member States operating capacity mechanisms.

h) Paying for foreign capacity

Foreign capacity should be paid for in the same way as domestic capacity. If it participates implicitly in a central buyer auction, or directly through contracts with obligated suppliers, this should be straightforward. If it participates through an explicit auction, financing arrangements would have to be designed to allocate the costs to the suppliers (ultimately consumers) benefitting from the capacity mechanism.

Any penalties paid by foreign capacity providers should be refunded to the suppliers that paid for the capacity.

i) Appropriately remunerate interconnectors

In a central buyer model where foreign capacity participates directly through an implicit auction, interconnectors should be rewarded with the difference between the zonal capacity price and the overall capacity mechanism clearing price.

In a de-central obligation, further work would be required to determine whether direct participation of foreign capacity providers into the market with suppliers seeking to fulfil their obligation could be possible while also appropriately rewarding the interconnector. Alternatively, an explicit auction of entry tickets would allow the interconnector to access revenues, but would create inefficiency in the form of basis risk.

j) Ensuring compliance with the common rules

Despite existing legislation preventing interference to stop exports at times of system stress (see Section 3.1) some commentators still fear potential action by TSOs to limit exports if necessary to prevent local unmet demand. This is an issue with or without capacity mechanisms. Harmonised, transparent protocols for TSOs may be required, along with appropriate sanctions for any infringement, to ensure everyone has confidence that market coupling will always deliver electricity to higher priced zones.

6.2. Harmonised rules for strategic reserves

The high level approach described here could potentially enable cross border participation in market-wide, volume-based capacity mechanisms. However, it does not tackle cross border participation in other designs, such as strategic reserves, tenders for capacity or capacity payments.

Strategic reserve capacity could in theory be procured in a neighbouring bidding zone. However, this would only help security of supply in the country paying for the reserve in certain circumstances.

Figure 2 shows a scarcity event in country A, which has contracted a strategic reserve in country B. Country B either has less scarcity than country A, or has a lower price cap. The reserve is dispatched because A is experiencing scarcity. However, if the interconnector between A and B was already sending power from B to A, the dispatch of the reserve will make no difference to security of supply in A.

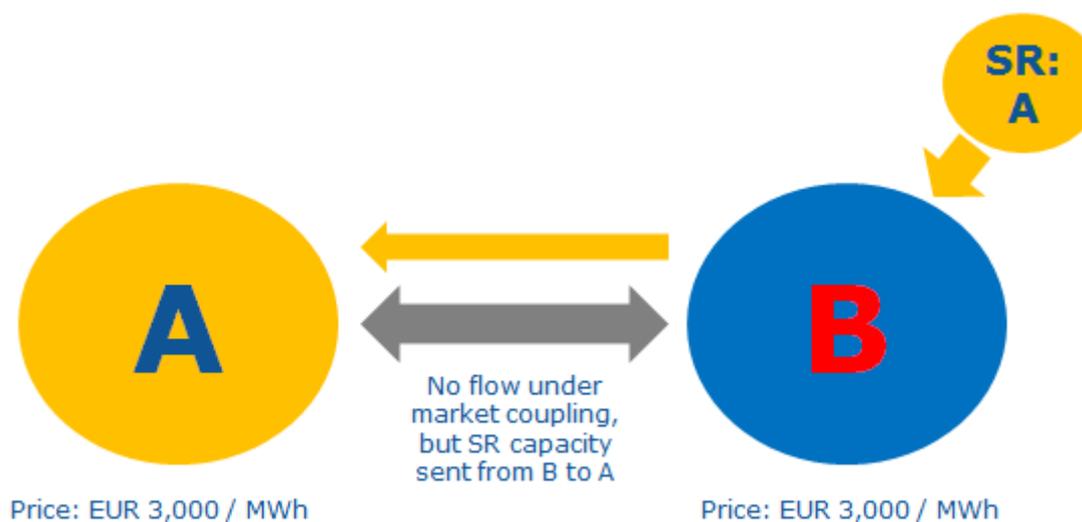
Fig 2: Cross border strategic reserve – no benefit to A



In general, the dispatch of the strategic reserve should push prices in the market to the price cap, because this should reflect the value of electricity at a time when delivery of the reserve capacity is required (and because if it is dispatched at a lower price it may create missing money in the market where it is located). However, if the dispatch of A's strategic reserve into B would set market prices in B to the price cap in A then the establishment of a cross border reserve may have to be limited to situations in which two countries share the same price cap.

The dispatch of such a reserve may also need to be limited to situations in which the price caps were reached in both A and B to avoid distortions in B. Similar rules to those proposed for the market-wide volume-based mechanisms could however be used to ensure that, in a situation of concurrent stress in two Member States which have the same price cap, the power contracted in the reserve could be used to send power from country B to country A (see Figure 3).

Fig 3: Cross border strategic reserve – forced flow to A



If country B also had a capacity mechanism, however, then presumably any capacity contracted from capacity providers in country A would also have to be taken into account before interconnector flows were adjusted in favour of A by the dispatch of the strategic reserve.

Further discussion of the possibility of enabling foreign participation in strategic reserves or other models of capacity mechanism may lead to better solutions.

7. QUESTIONS FOR DISCUSSION

- Have we identified the main design choices in this area?
- Would it be helpful for the Commission to develop common rules for cross border participation?
- Have we identified the right areas for common rules to cover?
- Would the high level design described here be appropriate as a basis for common rules?
- Can cross border participation be enabled effectively for other capacity mechanism designs, or only for volume-based market-wide designs?