

The viability of the EU approach to cross-border participation in capacity mechanisms?

Key issues for cross border participation in capacity mechanisms

CONFERENCE ON ENERGY, THE MARKET AND THE LAW:
A EUROPEAN DIALOGUE BETWEEN ECONOMISTS AND LAWYERS

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FTI Consulting overview

Overview

- Global business advisory firm established in 1982
- c.4,000 staff across 24 countries
- Dedicated to helping organisations protect and enhance enterprise value

History & scale

- Established in 1982
- >US\$ 1.5 billion revenues, NYSE listed
- >4,000 staff across 24 countries on six continents

Global reach



Services

- Five divisions:
 1. Economic Consulting
 2. Corporate Finance / Restructuring
 3. Forensic & Litigation Consulting
 4. Technology
 5. Strategic Communications



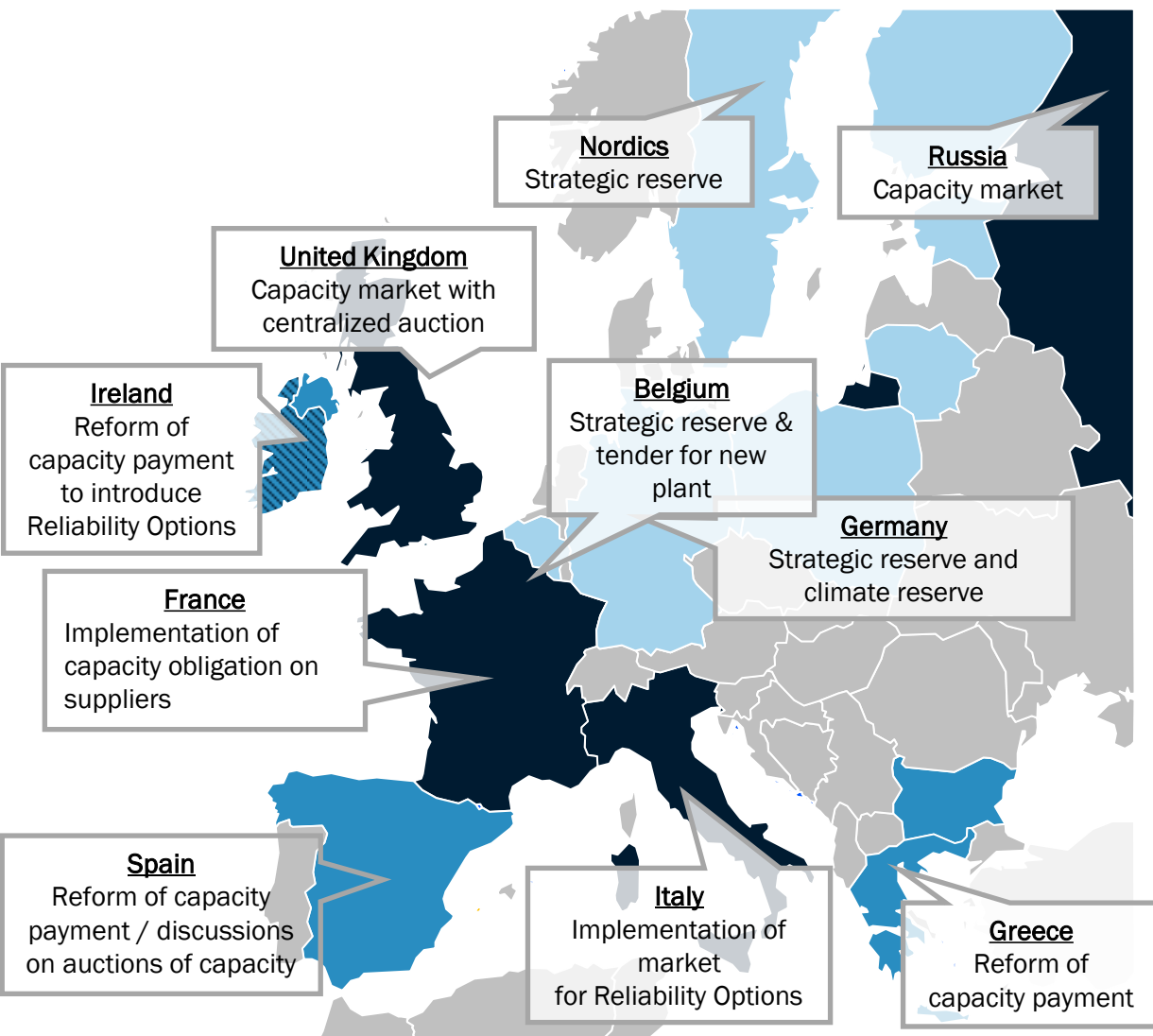
Agenda

- Context: state of play with CRMs in Europe and European Commission State Aid Guidelines
- Cross border participation in capacity mechanisms: key issues
- Comparison of options to take into account cross-border contribution
- Conclusion

Context: state of play with CRMs in Europe and
European Commission State Aid Guidelines

A patchwork of different capacity mechanisms across Europe

Capacity market Capacity payment Strategic reserve



- Ongoing reforms / discussions mark a shift toward market based capacity mechanisms
- Reforms in France, Italy, and United Kingdom share common approach (volume based and market wide)
- Significant differences in local needs and type of security of supply issues explains different design choices

CRM criteria introduced by the EC Guidelines on State Aid for environmental protection and energy (April 2014)

- 1/ Contribution to a well-defined objective of common interest
- 2/ Need for State intervention
- 3/ Appropriateness of the aid measure
- 4/ Incentive effect
- 5/ Proportionality of the aid (aid to the minimum)
- 6/ Avoidance of major undue negative effects on competition and trade between Member States
- 7/ Transparency of aid

Justification

Must be a clear need for state intervention and the objectives must be clearly defined

Objective must be consistent with phasing out environmentally harmful subsidies

Design

Aid should not change the behaviour of market players and be non discriminatory

Aid to the minimum: the amount paid should tend to zero as capacity available approaches the required level

Must have reasonable rates of return: a competitive bidding process is encouraged

International

Operators from other member states should be allowed to participate

Negative effects on the internal market should be avoided

Should not reduce incentives to invest in interconnection

The State Aid guidelines provide a framework to guide CRM design and to avoid negative effects on the internal energy market.

The guidelines, however, are likely to have only a limited impact on CRM harmonisation and do not address the issue associated with the long term coordination of generation investments.

Cross border participation in capacity mechanisms: key issues



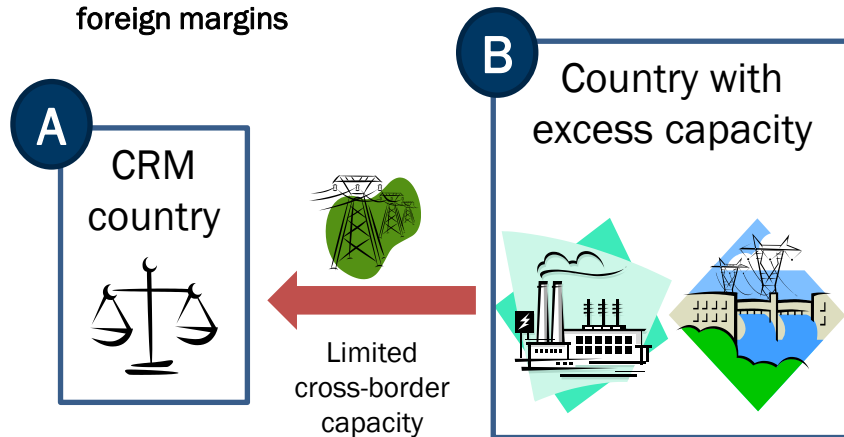
Cross border participation in CM: Key issues

■ It is well recognized that interconnection contributes to security of supply. However, when considering cross-border participation in CRMs, some overall issues arise:

1. **Role of interconnection versus generation for security of supply: “who brings the value?”**
2. **De-rating interconnection : “how much capacity can be provided through the interconnection?”**
3. **Guaranteeing equivalent contribution to security of supply from contracted cross-border capacity**
4. **Impact of product definition on energy market: availability versus delivery**
5. **In the case of explicit cross border participation, how to access interconnection capacity?**
6. **Complicating factors: AC/DC networks, flow based market coupling, etc.**
7. **What is the effect on economic efficiency and competition?**
8. **Implementation issues: how does foreign participation affect the different building blocks of a capacity market?**

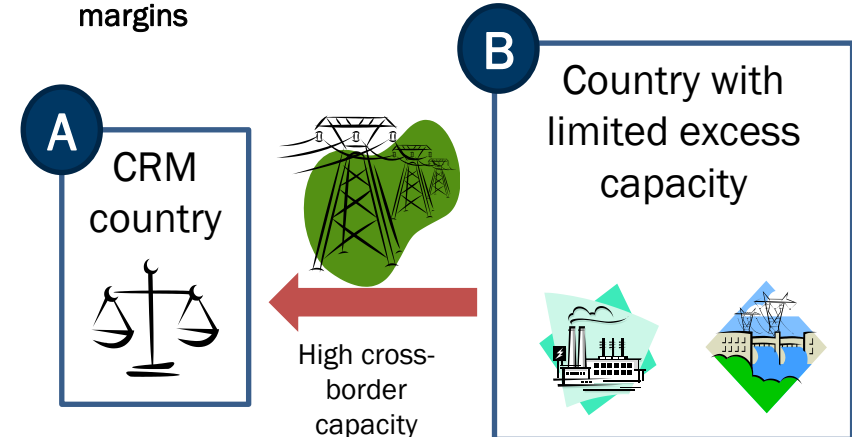
Where does the value of cross-border capacity come from: from the I/C capacity or from generators' capacity?

Case 1: limited cross-border capacity compared to foreign margins



Adding 1MW of generation in B does not provide any additional SOS to A. However, adding 1MW of cross-border capacity does increase ability of B to support A SOS.

Case 2: high cross-border capacity compared to foreign margins



Adding 1MW of cross-border capacity does not provide any additional SOS to A. However, adding 1MW generation in B does increase ability of B to support A SOS.

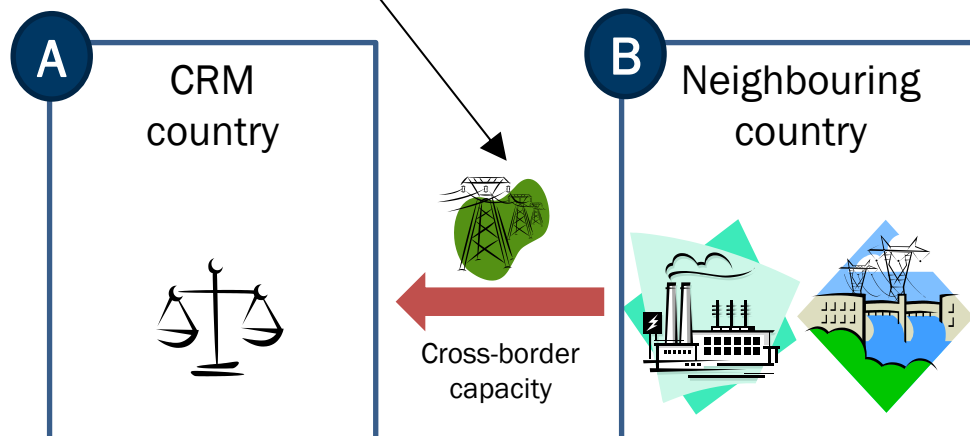
- Cross-border contribution to SOS depends on I/C capacity availability and generation margins across the border.
- Depending on the situation, the value might be brought by transmission and/or generation capacity:
 - If cross-border capacity is scarce, most of the value is brought by I/C;
 - If cross-border capacity is not scarce, most of the value is brought by generation across the border.
- In practice, it is not obvious to determine ex-ante in which situation one is, and value is shared between generation and transmission, so mechanisms should be adapted to share value.

How to evaluate the contribution of interconnectors to security of supply? The different types of risks to take into account

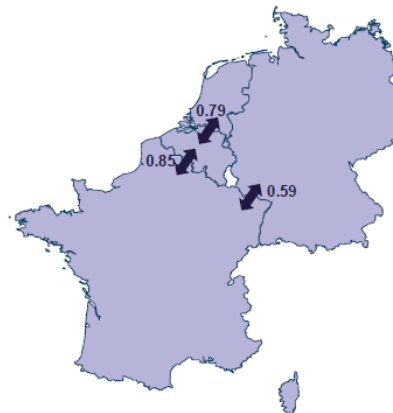
1

Operational Failure

Technical fault in the interconnector prevents the flow of electricity across to the CRM country at times of system stress



Probability of coincidental scarcity – source: Eurelectric



2

Market Risk

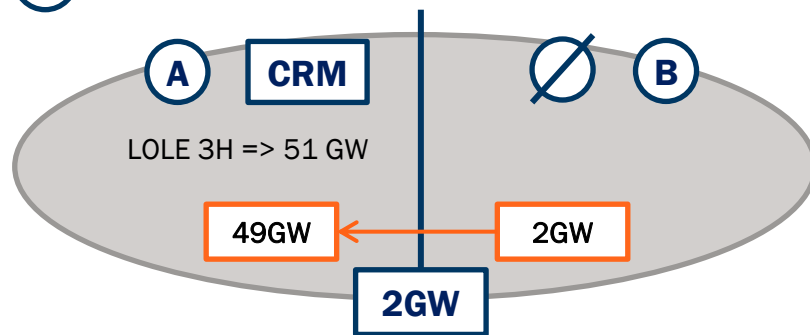
Coincidental scarcity - The interconnector does not import to the CRM country at times of system stress despite being technically available to operate, i.e., the connected market does not have sufficient surplus energy in excess of its own demand to allow exports to the CRM country.

Market failure risk – Flows on the I/C are determined by energy prices in the target model (TM): flows go from the low price to high price area. However, prices may not reflect scarcity, or the TM may not work.

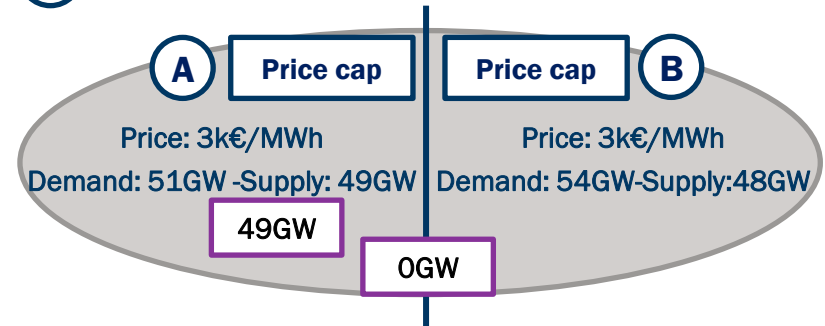
- Whatever the approach for cross border participation, it is necessary to evaluate the contribution of the interconnector to security of supply by taking into different kinds of risks.

Evaluation of the contribution to security of supply: the case of coincidental scarcity

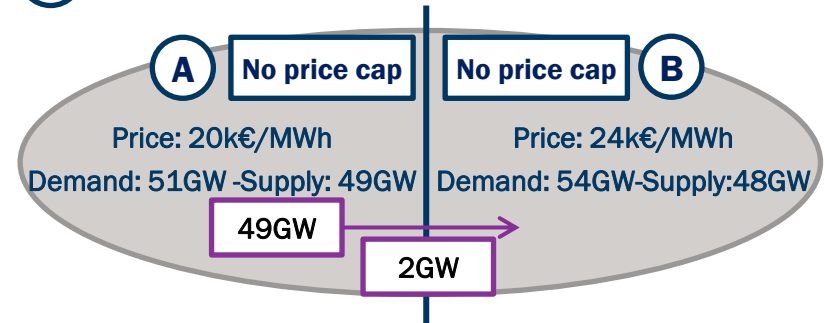
1 Capacity procurement



2a Energy market: scarcity situation simultaneously in A & B



2b Energy market: scarcity situation simultaneously in A & B



Consequences of the coincidental scarcity:

- Without intervention on energy markets: Whilst country A contracted capacity up to 51GW, only 47-49GW of its demand is satisfied depending on the situation.
- Country A paid to guarantee its supply, including for cross-border capacities, but cannot rely on them when supply tightens.
- A statistical approach would have led to the same outcome in the short-term, so what is the added value to pay for cross-border capacity?
- In the longer term, supply in country B may have been even lower without cross-border participation in the country A CRM, so net flows may have further deteriorated security of supply in country A (“capacity leakage”).

- Without specific rules / control on capacity contracted abroad – particularly at times of scarcity – cross border participation in CRMs has no value added in terms of security of supply over a simple statistical approach.

The definition of capacity products is a key – particularly whether the obligation is based on energy delivery or availability

a

Energy delivery obligation



Capacity providers must deliver energy into the network when the system operator calls for stress events, whatever the energy price signals are.

- **Dispatch efficiency:** risk of distortions as it may force generators to generate at prices below their costs; however, in scarcity events, prices should hit the roof, so limited inefficiency in practice
- **Security of supply:** guarantees that contracted capacities contribute to security of supply

With regard to cross-border participants:

- **Obliging committed foreign generators to generate is insufficient and potentially distortive**
- **Obliging committed foreign generators to export to the CRM country is incompatible with the functioning of the target model, but could be done through SO intervention**
- **Obliging the interconnection to import would lead the interconnection to intervene through close-to-real-time actions or hedging contracts**

b

Availability obligation



Capacity providers must only demonstrate their availability. Price signals ensure they deliver energy to contribute to security of supply. May be complemented by an obligation to bid in balancing market, so that the SO may use capacity as a last resort.

- **Dispatch efficiency:** should not create distortions as capacity providers continue to follow prices
- **Security of supply:** if prices are not reflective of scarcity, contracted capacities may not fully contribute to security of supply; however, giving the possibility to the SO to use the capacity as a last resort overcomes this issue

With regard to cross-border participants:

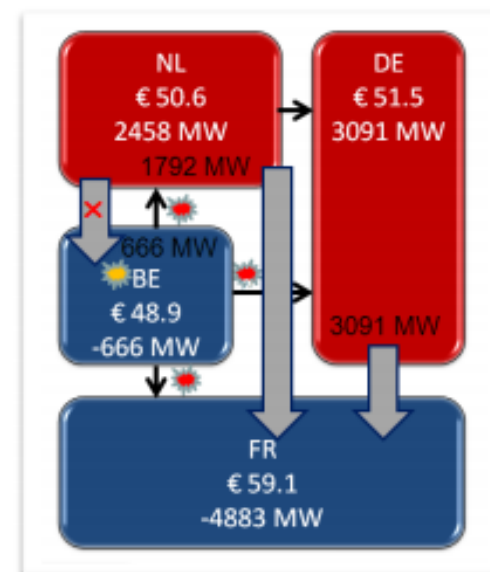
- **Contribution to security of supply in the CRM country is not guaranteed** – It guarantees the availability of the committed foreign generators, but not always to the direct benefit of the CRM country paying for it.
- **Added value of contracting abroad questionable** – *In fine*, limited benefits in the CRM country compared to statistical contribution, at least in the short term. Long-term incentives debatable, may depend on the existence of a CRM in the neighbouring country.

In the case of explicit cross border participation, how to access interconnection capacity?

	No constraints on interconnection access	Acquisition of transmission rights	Acquisition of specific interconnection “tickets”	Reservation of transmission capacity
Key features	<ul style="list-style-type: none"> Same obligation as national generators: either be available or generate No constraint on the interconnection access / use 	<ul style="list-style-type: none"> Same obligation as national generators In addition, obligation to acquire transmission rights (and potentially nominate them) 	<ul style="list-style-type: none"> Foreign generators have to acquire specific “tickets” to allow them to participate in the CM (“explicitly” or “implicitly”) Same obligation as national generators with adapted penalty regime 	<ul style="list-style-type: none"> I/c capacity withdrawn from the market and reserved for SOS situations Delivery on energy possible through the reserved i/c capacity
Assessment	<ul style="list-style-type: none"> All capacity revenues on foreign generators: no incentives to build new i/c + additional risk on i/c No guarantee (neither physical nor financial) that contracted foreign generators contribute to national SoS 	<ul style="list-style-type: none"> Same as previous options: <ul style="list-style-type: none"> Obligation to acquire TRs likely to have limited impact on i/c revenues Obligation to acquire / nominate TRs has no / limited impact on effective cross-border flows 	<ul style="list-style-type: none"> Complex implementation: <ul style="list-style-type: none"> needs certification and monitoring procedures question of geographical scope (only neighbouring countries?) No physical guarantee Investment incentives in interconnection OK “implicit” approach efficient 	<ul style="list-style-type: none"> Inefficiencies in the energy market (reduced social welfare, higher prices in tight margin country) Not compatible with target model

AC networks make de-rating more complex than with DC links, especially with the implementation of flow-based coupling

- There is a priori no major difference between AC and DC network but de-rating in a meshed AC network is more complex:
 - Based on commercial calculated capacities
 - But there is no “nameplate” capacity and commercial cross-border capacity varies with topology and generation configuration
 - Influence of other borders’ flows
- In this example, Belgium is importing although it is the lowest price area; however, this allows to maximise exports to France, which is the highest price area:
- The difficulties further increase with flow-based:
 - Increased complexity
 - Interdependencies: flows driven by prices in all region countries, critical branches and power transfer distribution factors (PTDF)
 - Counter-intuitive flows



- In an AC environment, responsibility allocation is more complex: a pragmatic solution may be that the TSO operating a given interconnector takes the risk, provided it can be covered by direct or indirect CM revenues.
- The issue is further exacerbated in a flow-based environment: De-rating, delivery and control become more complex as it is difficult to trace to which country generators provide their power.
- Where flow-based is implemented, this tends to plead for either a statistical approach within national CRM, or for a coordinated mechanism at the regional level.

Interactions between the different approaches for cross border participation and economic efficiency

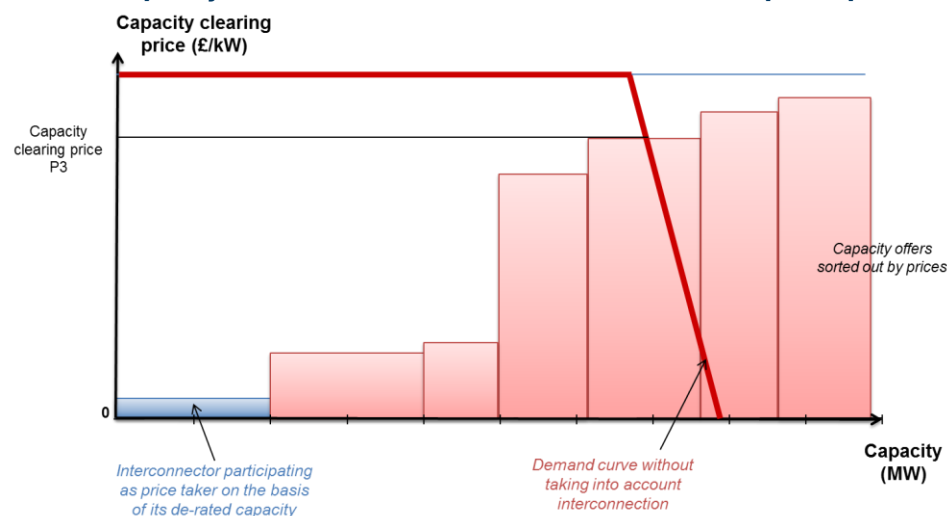
- In order to respect the EU target model philosophy, cross-border flows should follow prices (from low price to high price areas):
 - Cross-border participation should be designed so as not to create distortions and negative effects on the energy market functioning
 - The contribution should therefore depend on interconnection availability and availability of capacity on the other side of the border

- The determination of the amount of cross-border capacity varies depending on the approach and on the incentives it conveys to stakeholders:
 - **In statistical contribution:** an entity – often the TSO – determines the cross-border contribution
 - ⇒ Risk of conservatism / lower value?
 - **In an interconnection participation approach:** a de-rating methodology should be used to determine the volume
 - ⇒ Incentives on interconnection operator may lead to higher values
 - ⇒ But need to be designed so as to avoid negative impact on energy market
 - **In a foreign capacity provider approach:** de-rating methodology applied to the interconnection and foreign capacities
 - ⇒ Incentives on foreign capacity providers may lead to even higher values
 - ⇒ But need to be designed so as to avoid negative impact on energy market

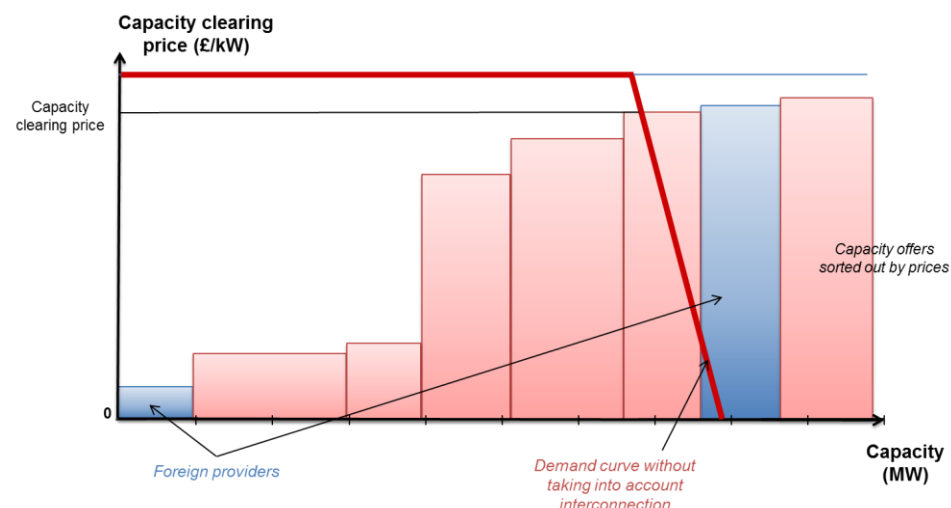
- In theory, if the statistical contribution is done under perfect information and without bias, in the short-term, the amount of cross-border participation should be equivalent.
 - The economic efficiency of cross-border participation not only depends on the high level approach, but also on how technical parameters are defined and how incentives are built.

Impact of cross border capacity participation on capacity prices depends on bidding rules and bidding behaviour

UK capacity market: Case 1 of interconnector's direct participation



UK capacity market: Case 2 of foreign generators' direct participation



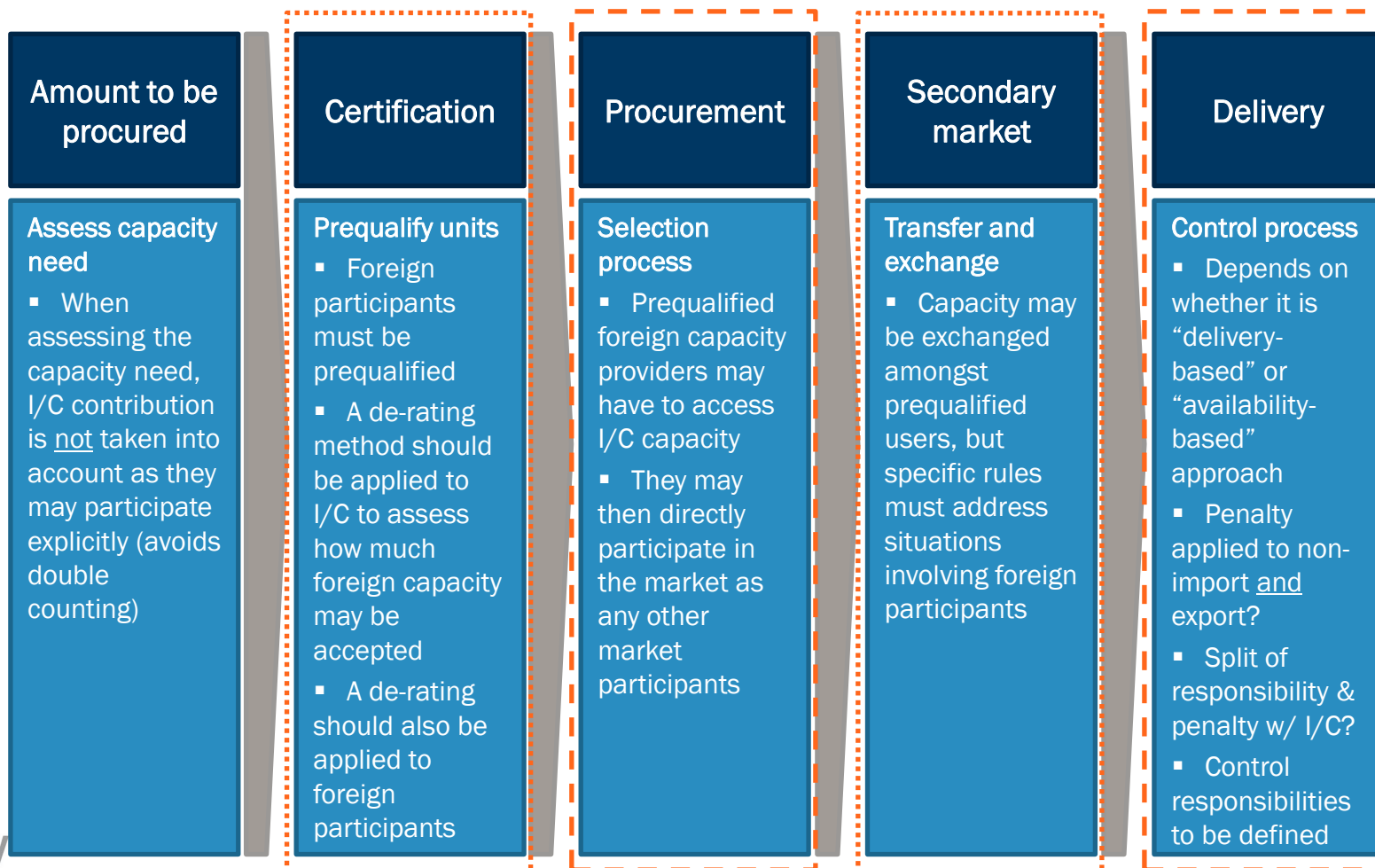
- In case 1, interconnection participates directly, as a price taker
 - assuming a similar de-rating, same clearing price as in the statistical contribution (mere translation of supply and demand curves);
- In case 2, foreign providers participate directly, with different bid prices
 - their total bid capacity is assumed to be equal to the de-rating value of interconnection
 - cannot lead to a lower price, but could lead to a higher price if their bids are less competitive

- Compared to statistical contribution, direct foreign generators' or interconnection's participation in a CRM:
 - Does not necessarily lower costs for consumers: capacity prices are actually equal or higher in the short-term
 - Does not necessarily lead to higher competition: competitive pressure is actually lower in the short-term
 - Bidding rules may influence the outcome (e.g. price taker / price maker rules in the UK CRM)
 - But it may give long-term signals to drive investments and limit dynamic investment inefficiencies
- One of the key questions is whether contracting with foreign participants / interconnection can increase the reliability of the foreign contribution, leading to higher security of supply (therefore lowering costs)

Impact of foreign participation on the different building blocks of a capacity market

■ Allowing the foreign capacity providers to participate directly in the CRM requires adaptations in all building blocks of the general design, but mostly on:

- **The procurement process:** the access to interconnection capacity and its coordination with the participation to the capacity procurement process is complex, but key for the efficiency of the mechanism
- **The delivery conditions:** as for I/C participation, the delivery conditions – especially the penalty regime – are very influential; in addition, strong cross-border coordination will be required to allow and monitor delivery



Comparison of options to take into account cross-border contribution

Overview of the different methods to take into account cross-border contribution

1

No Contribution

Neither interconnectors nor foreign providers contribute

This applies to most countries with capacity payment mechanisms (price based)

2

Statistical contribution

Contribution evaluated statistically and deducted from capacity target (but not included in formal mechanism)

FR capacity mechanism initial approach (~7GW out of 9GW of import capacity)

3

Interconnector participation

Interconnector participates directly in capacity mechanism

Solution in GB at least as a transition

4

Foreign Capacity participation

Foreign capacity providers participate directly in capacity mechanism

This has been implemented in the PJM Capacity Market

5

Cross-border Capacity Mechanism

Capacity mechanisms cover several zones OR national capacity mechanisms are "coupled"

No current international examples¹

¹zonal capacity mechanism exists for PJM and is proposed for IT

Seven criteria for the assessment of the different options

1) Economic Efficiency

Does the proposed method encourage capacity to be procured at the most efficient (i.e. lowest) cost?

2) Security of Supply

Does the proposed method ensure that objectives of security of supply e.g. acceptable losses are met?

3) Impact on market functioning

Does the proposed method introduce new incentives that significantly affect the operation of the capacity or energy market?

4) Impact on competition

Does the proposed method affect competition in the market?

5) Incentives to invest in generation and cross-border capacity

Does the proposed method give the correct incentives to potential investors in refurbishing or building new plant and interconnectors?

6) Complexity of implementation and operation

Is the proposed method easy to understand, implement and operate?

7) Compatibility with state aid regulation

Does the proposed method contravene state aid rules?

Summary of the assessment of the different approaches to take into account interconnection in CMs

	No Contribution	Statistical Contribution	Interconnector Participation	Foreign Participation	Cross-border Mechanism
Economic Efficiency	Red circle	Green and yellow diagonal stripes	Green and yellow diagonal stripes	Green and yellow diagonal stripes	Green circle
Security of Supply	Green circle	Green and yellow diagonal stripes	Green and yellow diagonal stripes	Yellow circle	Green circle
Impact on energy market	Red circle	Green and yellow diagonal stripes	Green and yellow diagonal stripes	Green and yellow diagonal stripes	Green and yellow diagonal stripes
Impact on competition	Red circle	Red and yellow diagonal stripes	Red and yellow diagonal stripes	Red and yellow diagonal stripes	Green circle
Incentives to invest in G° & C-B capacity	Red circle	Red and yellow diagonal stripes	Green circle	Green and yellow diagonal stripes	Green circle
Complexity of implementation	Green circle	Green circle	Yellow circle	Red and yellow diagonal stripes	Red circle
Compatibility with state aid	Red circle	Yellow circle	Green and yellow diagonal stripes	Green circle	Green circle

- The No Contribution option is clearly to be discarded.
- Cross-border CRM appears to be the most efficient solution.
- However, because of the complexity of implementation, all options except no contribution might still be worth considering, depending on trade-offs and local specificities.

Conclusions



Conclusions

- **Regional approaches toward a coordinated capacity mechanism (CM) are a ‘first best’ solution:**
 - Cost reductions stem from a coordinated capacity assessment and a “sharing of capacity” to reduce capacity to contract and avoid overinvestment on a national basis
 - BUT regional approaches require a common view by all countries of the region about the need and rationale to implement a CM
 - As a minimum, key design choices should be aligned: volume-based, market-wide, and consistent product definition
- **As long as there is no common view about CM implementation need and critical design choices, the statistical contribution approach is a pragmatic way forward.**
- **In case countries want to implement explicit foreign participation with structurally different CM designs, a number of complex issues need to be solved:**
 - Complexity of implementation: operational cooperation, ticket allocation processes, question of geographical scope, legal framework etc.
 - Improves economic efficiency and competition compared to implicit approach only if it leads the interconnection to be de-rated to a higher value
 - To do so, addressing situations of coincidental scarcity is key ... and requires a revision of current EU Security of supply Directive or bilateral agreements on security of supply
 - In any case there is a trade-off between securing contribution from cross-border capacity and intervening on energy markets

Thank you for your attention

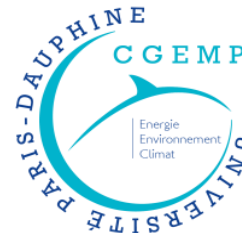
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References

Toward the Target Model 2.0 – Policy Recommendations for a sustainable market design

[Web link](#)



Publications on capacity mechanisms

- Market design for generation adequacy: healing causes rather than symptoms [Web link](#)
- Coordinating capacity mechanisms – which way forward? [Web link](#)
- European electricity market reforms: the “visible hand” of public coordination [Web link](#)

Publications on European electricity markets

- The new European Energy Union - Toward a consistent EU energy and climate policy? [Web link](#)
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