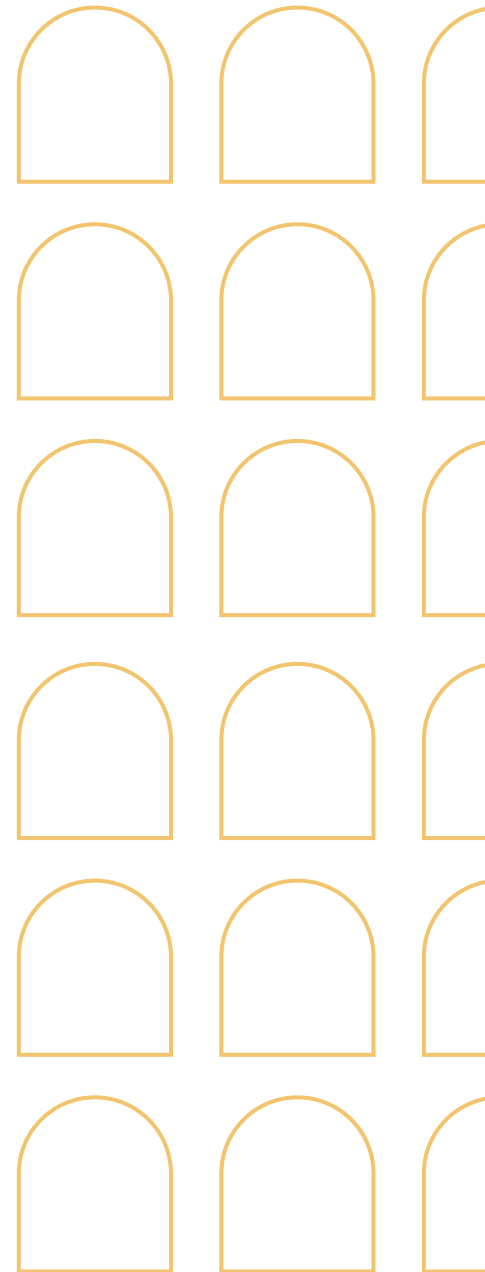


# POLICY BRIEF

## An easy fix to streamline capacity markets

### Highlights

- Following the EMD reform of 2024, the Commission is tasked to publish a report on the '*possibilities of streamlining and simplifying the process of applying for a capacity mechanism*' by January 2025.
- One approach to streamlining is to relax burdensome requirements that are not particularly beneficial. In this policy brief, we explore one such requirement which is today critical for capacity markets: *explicit* cross-border participation.
- Our short-term recommendation is to relax this requirement because
  1. it is particularly burdensome for Member States to implement, and
  2. it can be temporarily replaced by *implicit* cross-border participation, which is easier to implement and achieves comparable results.
- The EMD reform of 2024 moreover promoted capacity mechanisms as a "*structural element of the electricity market design*". However, they remain conceived and operated at the national level. Having national capacity mechanisms in an international electricity market leads to costly problems, which cannot be properly solved by any form of cross-border participation.
- Our long-term recommendation is therefore to reflect on alternative European solutions.



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### Author

Emma Menegatti, EUI; Leonardo Meeus, EUI.

## Introduction

Several EU Member States have introduced a capacity mechanism to make sure that there are adequate resources in their national system. In previous policy briefs, we already discussed that capacity mechanisms are likely to play a bigger role in the electricity markets of the future.<sup>1</sup> In this policy brief, we focus on the cross-border aspects of capacity markets, the most popular type of capacity mechanisms.

Capacity markets, defined as market-wide and volume-based capacity mechanisms, are already in operation in five Member States, i.e. Ireland, Belgium, France, Italy, Poland. Moreover, Germany and Sweden, two Member States who currently have strategic reserves are considering moving towards a capacity market.

Capacity mechanisms can lead to costly and undesired cross-border effects in neighboring zones having no such mechanisms in place.<sup>2</sup> This is especially the case for capacity markets. Strategic Reserves are less prone to cross-border effects because the resources procured are kept aside and do not interfere with wholesale price formation.

A capacity market reduces energy prices, in particular scarcity prices, and this reduction spills over the neighboring zones. While in the short term, the latter can benefit from cheaper imports and enhanced security of supply, the free-riding is only short-lived. Indeed, incentives in generation investments, and eventually the level of installed capacity, will be reduced. If the neighboring zone does not have any capacity mechanism in place to counter these effects, its security of supply can in the long term be endangered.<sup>3</sup>

## Why did we introduce *explicit* cross-border participation as a regulatory requirement in the Clean Energy Package?

Historically, capacity markets tended to overshoot their local capacity needs by underestimating the availability of imports in times of system stress.<sup>4</sup> Such a push towards national “autarky” goes against the very interest of the internal market, in which we share resources and make the best of complementarities between the national systems. One easy fix is to properly measure imports’ contribution and deduct them from the capacity market’s demand, i.e. implementing *implicit* cross-border participation. However, with this approach, interconnectors and non-domestic resources are not compensated as domestic resources are for the same service provided, which goes against the non-discrimination principle in EU law. Moreover, there has been evidence that capacity markets introduce cross-border externalities, as discussed in the introduction.

Therefore, the Clean Energy Package (CEP) made mandatory for capacity markets to allow for the direct participation of resources situated in neighboring zones, i.e. to apply *explicit* cross-border participation. The *direct participation of interconnectors*, which was historically applied in some capacity markets, was tolerated only temporarily. In addition to solving the discrimination issue, there was a hope that *explicit* cross-border participation would mitigate cross-border externalities by restoring investment incentives abroad. By increasing competition in the capacity market, it was also expected to reduce costs for its consumers.

This requirement was fully in line with the overall market integration efforts, and a study feeding into the impact assessment for the CEP seemed to confirm that *explicit* cross-border participation could be beneficial. Moreover, non-discrimination

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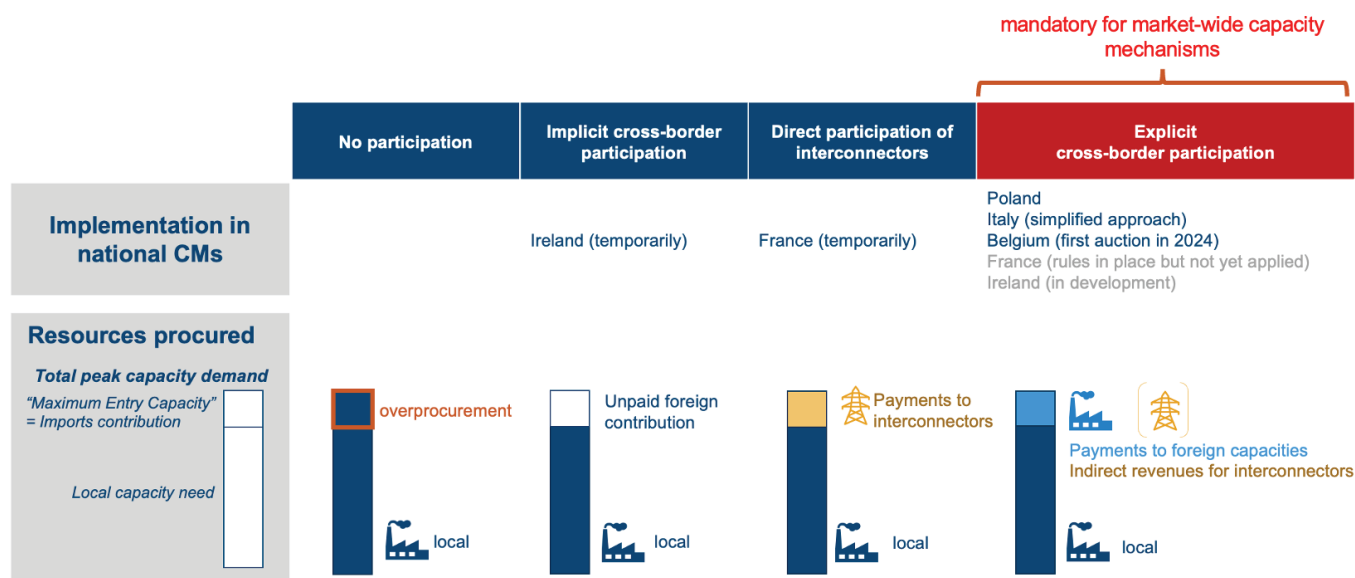
1 Meeus, L., May 2023. *Electricity market reform: what is (not) in the European Commission proposal*. <https://hdl.handle.net/1814/75580>

2 In our Working Paper, Menegatti, E., Meeus, L. (2024) *Cross-border participation, A false hope for fixing capacity market externalities* (available at <https://fsr.eui.eu/publications/?handle=1814/77489>), we explore four cross-border effects: the displacement of capacity from the neighboring zone, the increased costs for neighboring consumers, the displacement of energy not served towards the neighboring zone, and finally the distortion of congestion rents for the interconnector.

3 As highlighted by our colleagues (Lambin & Léautier, 2019), this could lead to a domino effect, where the introduction of one capacity market can in turn lead its neighbors to also introduce a form of capacity mechanism.

4 The underestimation of imports can be explained by multiple factors. First, some factors can be political, including distrust in neighbors or a will to achieve security of supply independently. Second, some factors are more practical. A TSO does not have control, nor complete oversight, over the foreign resources’ schedules and availability (including generators, demand response, and internal lines). Third, uncertainty also comes into play. If concomitant scarcity periods are likely, both zones might overprocure capacity by overestimating the likelihood of such events. The actual imports moreover depend on the available cross-border capacity, which can be limited due to technical and security issues.

Figure 1: Cross-border participation types and implementation



between domestic and non-domestic resources is crucial and economically relevant in most markets. However, our research and the research of other colleagues<sup>5</sup> suggest that allowing for *explicit* cross-border participation might not deliver the expected benefits, or at least not more than the simple *implicit* rule does.

### Why is it more complicated to implement than you might think?

The implementation of *explicit* cross-border participation has been slow and complicated<sup>6</sup>. This requirement appears to be one of the most complex to implement for capacity market operators. Relaxing it would therefore be an easy fix to help streamlining the approval process for capacity markets.

First, there are many ways to implement *explicit* cross-border participation. A central requirement is to allocate the limited interconnection capacity between the capacity market zone and the neighboring zone in a "market-based" manner (Electricity regulation, article 26.9). It is not clear what market-based means in practice, and there are, therefore, many ways to apply the Regulation. The capacity market can be split into local and foreign bidding zones, in which the price perceived differs when the interconnector is congested. There can be pre-auctions to select ex-ante the cheapest resources that will be

able to participate in the capacity market auction. Alternatively, foreign resources can be required to buy entry tickets, auctioned by the interconnector, to be able to participate. In Poland for example, a pre-auction is organized for each bidding zone, following which the foreign resources selected

can participate in the main auction (with the same bid as in the pre-auction). If the interconnection is congested, the local and foreign bidding zones prices will differ, and congestion rents are allocated to the interconnector based on the price differential. More resources are procured locally if foreign resources' participation is below the maximum entry capacity. In Belgium, a pre-auction is also organized, but local and foreign resources are all remunerated following a pay-as-bid principle and no revenue is recuperated for the interconnector.

Second, there are many implementation challenges. The capacity market operators (in general, the TSOs) must establish qualification, availability check, and penalty enforcement procedures for resources located outside of their jurisdiction. Due to the many specificities of capacity markets, specific arrangements and processes must be established by each capacity market operator, with the TSO of each neighboring zone.<sup>7</sup> In 2023, only Poland had agreements in place with neighboring

5 See in particular (Finon, 2018) and (Mengerink, 2021)

6 For more details see the dedicated chapter in (ACER, 2023)

7 Note that the technical specifications for cross-border participation developed by ENTSO-E and ACER provided a basis for common rules and processes. Despite these important efforts put into setting up a harmonized framework, the implementation appears to remain complex.

TSOs, and ACER noted difficulties for capacity market operators to conclude agreements with foreign TSOs (ACER, 2023). The processes in place should be as equivalent as possible for local and foreign resources participating in the same auction<sup>8</sup>, but this is not always possible. TSOs operating a capacity market do not have the same control over the operation and maintenance of foreign units as they have on local units, and they also have no grasp on the foreign TSO maintenance schedule. Moreover, they could face legal difficulties with the enforcement of penalties outside of their jurisdiction.

An illustration of these difficulties is how to carry out availability checks abroad. Availability checks calculations are based on varying combinations of energy infeed, bids in energy markets, balancing, and ancillary services markets, as well as activation tests<sup>9</sup>. They can target only specific or more extended periods of the year. These checks are typically necessary to enforce penalties and are not so easy to implement abroad. First, capacity markets currently differ in how and when availability checks are performed, which prevents having a fully harmonized EU framework. Second, performing such checks abroad requires concluding comprehensive agreements with each neighboring TSO to access the necessary data, and perform activation tests. Third, the procedures can entail implementation and operational costs for the neighboring TSO, which raises the cost-sharing question. Finally, the capacity market operator might have to adapt its local availability check rules to fit the neighboring zones' specificities. For example, if bids in the balancing markets are considered, the methodology must account for specificities in national balancing markets and imbalance settlement methods. Italy, for example, chose not to perform any availability checks for foreign resources. They are only in-

centivized to be available in times of system stress through a Reliability Option contract.

## Is it even worth it?

Is *explicit* cross-border participation into national capacity markets important? To answer, we must differentiate between two possible border configurations: the capacity market's neighboring zone applies or not a capacity market.

With an energy-only neighbor: can we correct for the capacity market externalities?

What if the neighboring zone has no capacity mechanism in place ("energy-only" zone)? In such an asymmetrical configuration, the regulatory objective is to mitigate the capacity market's negative cross-border externalities<sup>10</sup>. We could expect that allowing for resources in the energy-only zone to perceive a payment would – at least partly – restore investment incentives and the resulting externalities. But this is not the case. Our accompanying research paper (Menegatti & Meeus, 2024) shows that the revenues raised by the neighboring generators from participating in the capacity market will tend towards zero. The intuition is as follows. The energy market in the energy-only zone has an implicit demand for capacity which is much higher than the amount of capacity that can enter the neighboring capacity market. In other words, there will always be an oversupply of capacity from the energy-only zone to the capacity market<sup>11</sup>. As a result, we can expect most payments to be captured by the interconnector as capacity congestion rents<sup>12</sup>. You can refer to Box 1 for more details on the payments to be expected from different implementations of *explicit* cross-border participation.

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8 Electricity Regulation article 26 para 13. "Regulatory authorities shall ensure that cross-border participation in capacity mechanisms is organised in an effective and non-discriminatory manner. They shall in particular provide for adequate administrative arrangements for the enforcement of non-availability payments across borders."

9 See for example the explanatory document (ENTSO-E, 2020)

10 Another objective of opening capacity markets to foreign resources' participation was to reduce capacity procurement costs. However, explicit cross-border participation cannot lower capacity procurement costs below those achieved by implicit cross-border participation, because the local price and amount of local capacity procured are equal (see Figure 1).

11 There might be exceptions in specific configurations, for example if the energy-only zone is highly interconnected with a large capacity market zone, or multiple capacity market zones.

12 We moreover argue that explicit cross-border participation should not be maintained to remunerate interconnectors in such a configuration. First, the congestion rents might already be increased by the asymmetrical introduction of a capacity market. Second, the "capacity congestion" observed here only reflects the market design asymmetry and not the value of the interconnector for adequacy per se. Third, most interconnectors in Europe are not merchant. Interconnectivity projects are more appropriately driven by EU-level planning frameworks such as the TEN-E regulation.

## BOX 1

We distinguish in the table below four, stylized, explicit cross-border participation options. We show in this box that revenues for generators located in energy-only zones from cross-border participation into a neighboring capacity market should tend towards zero with any of these options applied.

*Stylized representation of the total capacity market payments to the interconnector and foreign resources, for 4 cross-border participation implementation options.*

We expected explicit cross-border participation to be implemented following option 1 option 2, or option 3 in the above table.





In option 1 and 2, there are two bidding zones for capacity, the foreign resources can receive the same price as the local resources, if there is no congestion, but the price can also deviate to reflect congestion. As discussed earlier, in this case it is likely that there will be an oversupply of foreign resources with congestion, and a price for foreign resources that tends towards zero. The only difference between the two options is that option 1 can result in the generation and allocation of congestion rents to interconnectors.

In option 3, the foreign resources can get the same non-negative price for capacity as the local resources, but to access the local market, they need to procure access rights. Of course, their willingness to pay for these access rights will go up to the revenues they expect from the capacity market, so if we consider the payment for access,

and the revenues together, we again tend towards zero. Similar to option 1, this option can also result in the generation and allocation of congestion rents to interconnectors.

Option 4 is applied/considered in some Member States. We had initially not thought about this option. The approach is to organize a pre-auction to select the cheapest capacity bids by foreign resources, and the ones that get selected are then added to the local bids and get the same price as the local resources. If the local pricing scheme is pay-as-bid, they will be willing to bid zero to get selected, and they will not get any revenues. If the local pricing scheme is uniform pricing, the foreign resources would be willing to bid negative to get selected, and earn some revenues, but who is selected would be arbitrary rather than market-based.

In other words, explicit cross-border participation by foreign resources in capacity markets can generate some revenues for interconnectors, but not for other foreign resources who were supposed to gain something from their participation. The only exception is the above discussed implementation option 4, which is not what we expected to see when we thought about “market-based” participation.

		Allocation of congestion rents ?	
		Yes	No
Capacity market split into local and foreign bidding zones ?	Yes	<b>1</b> - Two prices, with recuperation of cong. rents 	<b>2</b> - Two prices, without recuperation of cong. rents 
	No	<b>3</b> - Single price, with auction of interco. access rights 	<b>4</b> - Single price, with selective pre-auction 

With a capacity market neighbor: can we properly coordinate capacity procurement?

What if the neighboring zone has a capacity market in place? In such a configuration, the regulatory objective is to coordinate between two (competing) capacity markets rather than to mitigate externalities. Coordinating capacity procurement across borders is essential to build (or maintain) resources in the right location, and to allocate procurement costs to the right consumers. But, there are different ways to do so, and we argue that *explicit* cross-border participation might not be the most appropriate.

First, *explicit* cross-border participation creates important complexities for market participants because it implies multiplying prices and auctions. If all European countries had a capacity market allowing for the *explicit* cross-border participation from their neighbors through separate bidding zones, there would be at least 129 capacity bidding zones. Today, complexity also results from the non-harmonization of mechanisms (type and length of contracts, penalty rules, de-rating factors...). Second, in the presence of uncertainty, having to select explicitly what to offer in multiple and non-synchronized national capacity markets auctions is likely to result in inefficient bidding. Third, procuring an amount of foreign capacity which is defined by an ex-ante estimation of its available amount, is a chicken-and-egg situation<sup>13</sup>.

Implicit cross-border participation avoids market complexity and bidding uncertainty, but is not satisfactory either. One main issue is that consumers only pay for the resources located in their jurisdiction, which might not reflect their actual share of the regional capacity demand.

With both *implicit* and *explicit*, there is no direct link between what the two capacity mechanisms effectively procure, and therefore no co-optimization during procurement. In other words, *implicit* and *explicit* are both limited or imperfect remedies to address the issues with uncoordinated capacity markets.

## Our short-term recommendation: tolerating implicit cross-border participation

We discussed above how *implicit* and *explicit* participation are equally imperfect remedies to capacity markets' cross-border effects on neighboring energy-only zones. As *explicit* cross-border participation is much more complex to implement, we recommend tolerating *implicit* cross-border participation from energy-only zones. We moreover showed that both *implicit* and *explicit* are imperfect tools to coordinate between two capacity markets. We, therefore, recommend temporarily tolerating *implicit* participation between capacity market zones when their designs and schedules do not align, while developing improved coordination solutions.

Are there any risks in going back to *implicit* cross-border participation? Implicit cross-border participation was not really appreciated because capacity market operators were responsible for estimating the imports to be deduced from their capacity demand and they tended to take conservative hypotheses. However, the CEP approach has provided a whole new framework to adequacy policies. The European Resource Adequacy Assessment (ERAA) helps define what will be needed, and the "Maximum Entry Capacity" (MEC) methodology quantifies the contribution of imports to national adequacy. With both the ERAA and the MEC, we have appropriate European instruments for implementing *implicit* cross-border participation better.

## Our long-term recommendation: Europeanizing capacity mechanisms

Cross-border effects appear primarily because of the heterogeneity between the national market designs, and cannot be fully mitigated by any form of cross-border participation. Moreover, multi-national coordination in capacity procurement appears essential considering increasing interconnectivity and renewable potential complementarities. If capacity mechanisms are considered a "structural" element of the EU electricity market design, we might need to "Europeanise" them.

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13 The amount of capacity to be procured by a capacity market from neighboring zones is fixed prior to the auction by the Maximum Entry Capacity (MEC). The MEC is currently estimated based on European level simulations of the future system. However, the availability of imports towards the capacity market zone in the future, the MEC, should in theory depend on what the capacity market procures from the neighboring zones.

We raise here four main questions in this regard. First, should we harmonize reliability objectives? Currently, the Reliability Standards<sup>14</sup> are defined at the national level and are, therefore, heterogeneous. But national markets are increasingly interconnected, and a principle of solidarity applies to share the burden of electricity curtailment among Member States.<sup>15</sup> In other words, while “long-term” regulation allows Member States to ensure their consumers a higher degree of security of supply, the “short-term” operation rules imply considering equally all EU consumers in the face of curtailment. An EU-level reliability standard could solve this paradox. Second, can we harmonize the methodology for defining capacity needs? In this regard, we already have the European Resource Adequacy Assessment framework in place. It could be further refined and used more systematically. Third, can we harmonize the means for procuring the capacity needs? Currently, capacity mechanisms are highly heterogeneous, and many countries have no such mechanism in place. To avoid cross-border effects, their harmonization is needed. Selecting one mechanism fit for all would be an uneasy task, as the optimal design for a capacity mechanism remains controversial and historically dependent on the local systems’ specificities<sup>16</sup>. The selected mechanism would moreover need to be future-proof, i.e., integrate decarbonization objectives, allow for consumers’ participation in the demand definition, and potentially include other system needs such as flexibility. Fourth, can we integrate capacity mechanisms? Once capacity mechanisms are harmonized, they could be integrated and coupled to co-optimize resource procurement. Capacity mechanisms could be next on the integration list after wholesale and balancing markets.

## Conclusion

Our short-term recommendation is to relax the requirement for Member States to implement *explicit* and tolerate *implicit* cross-border participation. The latter is simpler to implement, achieves comparable results, and we now have developed European methodologies to properly implement it. This could contribute to the short-term objective to streamline the approval process for Member States implementing a capacity market.

Beyond the short-term streamlining of capacity markets, we will also need more coordination between Member States with such a market, cross-border participation (*implicit* and *explicit*) is an imperfect remedy to deal with the coordination challenges and externalities. Discussing these issues, and possible solutions is the next step in our ongoing research.

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14 Reliability Standards, or “RS”, reflect the national reliability objective as a probability of disconnection expressed in hours per year (i.e., as a loss of load expectation, “LOLE”). They are defined following the European “VOLL/CoNE/RS” methodology.

15 By default, in the day ahead market coupling algorithm EUPHEMIA, curtailment ratios will be equalized as much as technically possible in times of system stress.

16 As described in (Roques & Verhaeghe, 2022)

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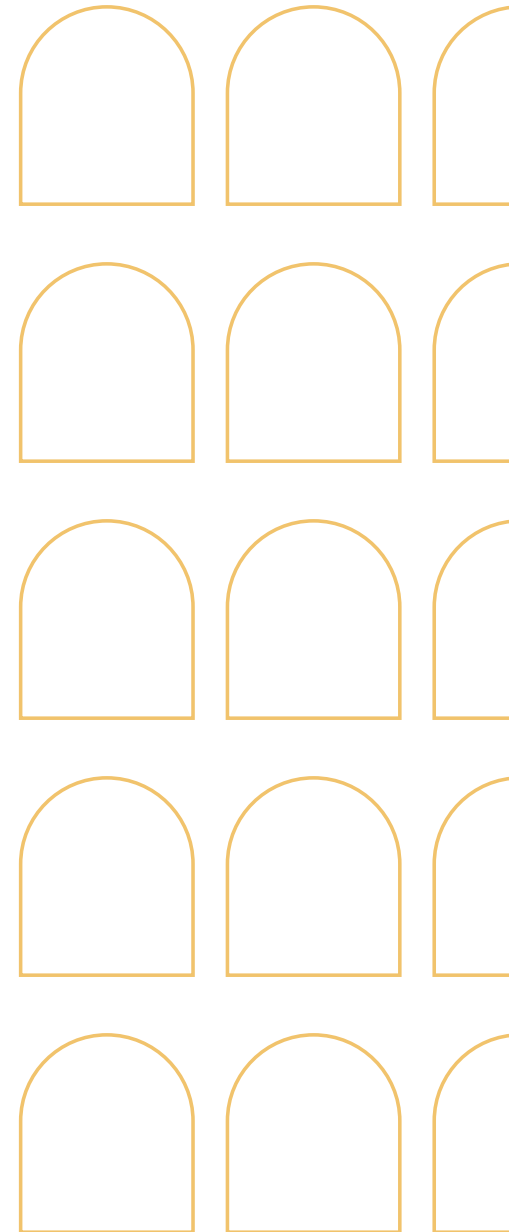
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