

## Comparing electricity transmission arrangements

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The publication of the EU Commission's proposal for the 3<sup>rd</sup> legislative energy market package in September 2007 reopened a much debated issue about the pros and cons of different electricity transmission institutional arrangements. The EU Commission and Member States have mainly debated on the advantages and drawbacks of two arrangements: the Independent Transmission System Operator (ITSO) and the Legally unbundled Transmission System Operator (LTSO).

ITSO arrangement corresponds to a complete ownership unbundling of transmission assets from generation and retailing companies. It appears to be the first-best option considered by the EU Commission for ITSO ensures the independence of the transmission company, an independence that is viewed as critical to guarantee a non-discriminatory access to the network. By contrast, transmission assets are just legally unbundled in the case of LTSO arrangement. Even if this alternative option was not considered by the Commission in the first proposal, now it appears to be a second-best option supported by the "third way" proposal of several Member States (France, Germany, etc.). It is fair to say, however, that the LTSO arrangement considered by the Commission in February 2008 includes additional implementation requirements to address the non-discriminatory access issue.

Surprisingly until now, the Commission has seemed to pay little attention to a third

transmission arrangement: the Independent System Operator (ISO). In a nutshell, the ISO is responsible for the system operation. It is independent from generation and retail but does not own the transmission assets that could still belong to the vertically integrated company.

How to compare and rank these three different arrangements for electricity transmission?

This note attempts to answer the question in looking both for theoretical and empirical evidence. It is based on a research financed by Endesa. It develops a comprehensive framework that has enabled us to assess the performances of each arrangement. Our ranking encompasses several criteria that are differently weighted according to factual evidence and national experiences.

As identified by the economic literature, the five following criteria are the most relevant to assess the relative pros and cons of each arrangement:

### Criterion 1: transaction cost savings

The integration of the transmission owner and the system operator reduces transaction costs.

### Criterion 2: performance based regulation implementation

The nature of the institutional arrangement affects the ease with which

an efficient performance-based regulation (PBR, hereafter) can be applied.

**Criterion 3: conflict of interest**

A conflict of interest, especially regarding investment, may arise when transmission owner and system operator functions are integrated.

**Criterion 4: non-discriminatory access**

The choice of the institutional arrangement has contrasting impacts on non-discriminatory access depending upon the degree of separation between generation, retail and transmission.

**Criterion 5: benefits from regional integration**

This criterion is relevant to assess how different institutional arrangements may capture the benefits from regional integration and geographic expansion of markets and networks.

The table below recaps the pros and cons of each arrangement regarding each criterion.

	ITSO	LTSO	ISO
<b>Criterion 1:</b> Transaction cost savings	+	+	-
<b>Criterion 2:</b> PBR implementation	+	+	-
<b>Criterion 3:</b> Conflict of interest	-	-	+
<b>Criterion 4:</b> Non-discriminatory access	+	-	+
<b>Criterion 5:</b> Benefits of market integration	-	-	+

At first glance, ISO seems a better option than LTSO for it scores 3 pluses against 2. There is no reason however, that each criterion enjoys the same importance. For instance, the savings of transaction cost can be lower than the benefits owing to market integration. The ranking of the arrangements ultimately

depends on the relative weight of each criterion.

Caveat

One should bear in mind that the ranking obtained for theoretically well-designed arrangements cannot be directly transposed to rank current implementations. We may find a well-implemented LTSO that does better than a badly-implemented ITSO even if a theoretical well-designed ITSO always ranks above a theoretical well-designed LTSO.

Our framework is however also useful to rank implemented arrangements. The most important factor mentioned as a reason for badly implementation is an imperfect regulatory framework (whether it is due to regulatory capture, lack of power of the regulator, absence of incentive regulation, etc.). Our report surveys several national experiences (UK, Spain, France, Germany, Argentina, the USA and Italy) and presents a ranking of the implemented arrangements.

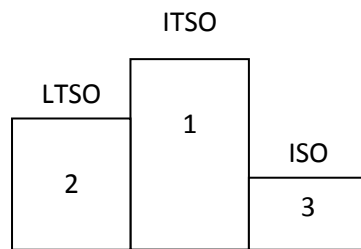
The rankings below are based on a series of assumptions and on empirical evidence. First we have adopted a national isolated perspective temporarily assuming that regional and network integration is not a relevant criterion. We then have taken into account the benefits of regional integration.

**Ranking of well-designed arrangements in an isolated system**

In an isolated system (e.g., UK), a well-designed ITSO is the first-best institutional arrangement whenever we assume that the costs of a potential conflict of interest are lower than transaction cost savings, benefits from PBR implementation and benefits from ensuring a non-discriminatory access. We have obtained two main rankings:

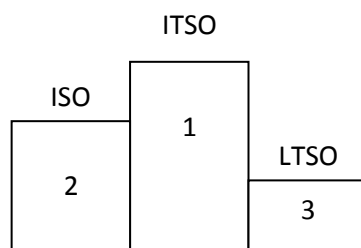
- If transaction cost savings and/or benefits from PBR implementation outweigh benefits from ensuring non-discriminatory access, LTSO becomes the

second-best institutional arrangement, above ISO.



This case would correspond to a system where the discriminatory access problem is not a big issue compared to the need to improve the network and to reduce transmission costs. An example would be a competitive market immersed in a tightly meshed and congested grid: in this case, the benefits from better coordination and an easier incentive regulation could outweigh the benefits from non-discriminatory access.

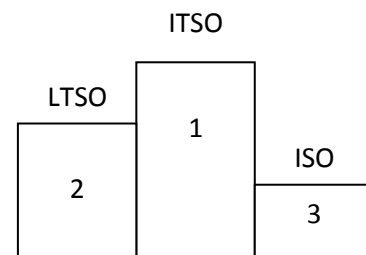
- If benefits from ensuring non-discriminatory access outweigh transaction costs savings and benefits from PBR implementation, ISO ranks second above LTSO.



This case would correspond to a system where the discriminatory access problem is a big issue for the deployment of competition compared to the need for improving the management of the network.

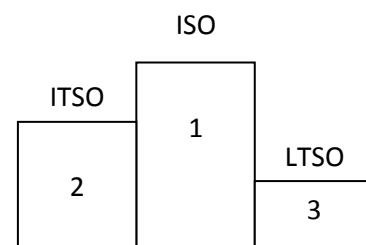
### Ranking of well-designed arrangements in an interconnected regional system

- If transaction cost savings and/or benefits from PBR implementation outweigh the benefits from ensuring non-discriminatory access, from market and network integration and from reducing the conflict of interest, LTSO becomes the second-best institutional arrangement, after ITSO but above ISO.



This case would correspond to a system where the discriminatory access problem and regional integration concerns are not a big issue compared to the need to improve the network and to reduce transmission costs.

- If the benefits from market and network integration and from reducing conflict of interest outweigh transaction cost savings, the benefits from PBR implementation and the benefits from ensuring non-discriminatory access, ISO ranks first, followed by ITSO and LTSO.



This case would correspond to a system where regional integration concerns are a more important issue than the need to improve the network and to reduce transmission costs.

## Conclusion

To sum up, we demonstrated that taking into account the potential benefits from market and network integration substantially modifies our ranking of the three different institutional arrangements: ITSO is no longer always the first-best option.

A key result is that the benefits from a non-discriminatory access do not enable us to choose between ITSO and ISO. Interestingly, we found the two following possibilities:

- ITSOs remain the first best option even when considering the benefits from market and network integration if we assume that transaction cost savings and/or the benefits from PBR implementation outweigh the benefits from market and network integration and from reducing the conflict of interest.

This case would correspond to a system where cross-border externalities and cross-border competition were not a big issue compared to the need for improving the (national) network and reducing transmission costs. An example would be two national systems weakly interconnected but with a tightly meshed and congested national network (and thus needing incentives to minimize costs).

- ISOs become the first best option when the benefits from regional market and network integration and from reducing the conflict of interest outweigh transaction costs savings and/or benefits from PBR implementation.

This case would correspond to a system where cross-border externalities and cross-border competition are a big issue compared to the need for improving the

network and reducing transmission costs. An example would be two systems with meshed interconnection and serious national generation competition concerns (e.g. Belgium, Netherlands, France and Germany). It would moreover correspond to an interconnected system where the regional regulatory and coordination framework is weak. In this situation we can conclude that ISO arrangements are better than ITSO arrangements.

As a conclusion, ITSO is not always the first-best choice. ISO is a better choice if coordinating regional interconnected power systems generates benefits through the increase in cross-border competition and the internalization of cross-border externalities, is the most important criterion. We believe that these benefits could be especially valuable in the case of continental Europe that is characterized by a tightly meshed network, critical cross-border externalities and a high potential for cross-border competition in generation. Market integration is certainly a key issue for the future of an interconnected EU power system. Moreover, the implementation of a strong EU wide regulatory framework is a challenging issue. Benefits from market integration could then be facilitated by ISOs which also efficiently ensure non-discrimination access.

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