

CEER technical background paper

Inter-TSO Compensation Mechanism:

locational signals

Objectives and priorities

The objective of this technical note is to clarify the role that the mechanism of inter-TSO payments has in the provision of locational signals in transmission network tariffs in the Internal Electricity Market (IEM) of the EU.

In the first place the distinction between long and short term economic location signals will be described, and the function of transmission tariffs as provider of long-term signals will be explained.

In the second place it will be shown how correct long-term signals can be determined and the contribution that the mechanism of inter-TSO payments that has been adopted in Florence has on this scheme.

Finally, the potential of the inter-TSO mechanism in the current situation of lack of harmonization in transmission tariffs will be assessed, and consequences on the priorities in the harmonization effort will be drawn.

Short and long-term locational signals

Short-term economic location signals are a result of network losses and constraints that happen during system operation. They are energy charges, i.e. they are applied to MWh that are produced or consumed. The most characteristic and sophisticated of these signals are nodal energy prices, not to be confused with the long-term nodal transmission network tariffs. In a hypothetical system, without any capacity or technical constraint and without energy losses in the transmission equipment, these charges should be zero resulting in a nil value of the economic signal. These short-term signals are needed to achieve an efficient operation of the system, i.e. that the generators with the lowest variable costs are used and that consumers may respond to the actual costs of supplying electricity to each location. However, in many actual markets the energy prices do not contain these signals at all, or only in some crude way, with the subsequent loss of efficiency. These short-term signals also have a long-term impact, since the expectation of their values in the long-term has an influence in guiding long-term decisions of the network users, in particular the location of new facilities of generation or demand.

Transmission tariffs have the primary objective of recovering whatever fraction of the regulated transmission costs (most of them, actually) that has not been recuperated by short-term signals. Transmission tariffs can be considered as *long-term economic signals*, since the allocation scheme should be primarily based on the responsibility of the agents in network investment. Therefore, transmission tariffs should promote an

efficient use of the network that reduces the need for new investments and also appropriate location of new generation and consumption facilities.

Cross-border tarification, -and the mechanism of *inter-TSO payments* that for this purpose has been adopted in the Florence Forum-, result in modifications of *transmission tariffs*, the long-term signals.

We have to recall that in the conclusions of the Florence Regulatory Forum it has been accepted an almost complete separation in the procedures to deal with the economic signals for operation -which are inherently short-term related- and network costs recovery -which are inherently long term related-. The consistency between both depends on technical and economical hypotheses, for example concerning capacity investment decisions.

- *Operation*: Short-term locational signals are intended to maintain the efficiency in the dispatch of generation and load in the IEM. These signals must internalize the effect of congestions and losses in the network. Therefore adequate congestion management procedures must be adopted with the purpose of achieving maximum efficiency in the utilization of the limited network capacities. Progress has been already made in this respect. The resulting locational signals will be strong if systematic congestions take place in the system. Any revenues (congestion rents) that might be obtained from the application of the short-term signals should be deducted from the total network costs that need to be recovered.

The procedure to deal with loss signals in the short-term is far less advanced, since losses do not have security implications and an IEM-wide scheme of computation of loss factors for operation purposes still appears to have significant practical difficulties. So far it has been agreed that the extra cost of losses that a country incurs because of cross-border transits must be compensated and it will be a component of the inter-TSO payments. But the dilemma between charging marginal or average costs of losses remains an open issue, in order to obtain an appropriate short term economic signal.

- *Network cost recovery*: Longer-term (typically annual) charges are used to pay for the regulated transmission network cost. Since any locational signal that might be intended with these charges has a long-term nature, these charges must not be transaction-based, since transactions typically vary much with time and only the position of each agent in the network remains. National transmission tariffs, —the domestic G and L charges, which could include locational signals at national level—, serve this purpose. Inter-TSO payments introduce some adjustments into the mechanisms for network cost recovery at national level and therefore contribute a certain locational component.

Correct locational transmission tariffs and the contribution of the inter-TSO payment mechanism

The inter-TSO payment mechanism that has been adopted in the Florence Forum can also play a role with respect to sending correct locational signals. First, one has to acknowledge that inter-TSO payments are primarily meant to compensate economically those countries whose networks are being used by external users and not as a means to send precise locational signals to the individual agents of the market. However, inter-TSO payments in the end will result in a correction to the basic rule of using the local G and L charges as the basis for the access charge to the IEM transmission network. How significant could this correction be as a provider of locational signals?

Let us assume that a method, -“*the network cost allocation method*”-, exists that is able to assign the total cost of a transmission line to each one of its users¹. Let us also assume that the method for the assessment of costs for all transmission lines within the IEM has been harmonized, so that all Member States agree on the regulated annual cost of each one of the lines and other transmission facilities. Transmission tariffs must fully recover these costs. Then, application of “the network cost allocation method” to all lines in the IEM would result in a complete set of nodal transmission tariffs: a Gk tariff and an Lk tariff for generators and consumers located, respectively, at each transmission node k in the territory of the IEM. Political borders have been ignored in the computation. These are perfect *long-term* locational signals. No more could be asked for in terms of location and tariff harmonization.

What is the role of inter-TSO payments in all this? The model of computation of inter-TSO payments that is proposed by the CEER for the long-term mechanism starts precisely from a full allocation of standardized transmission costs to all the transmission nodes in the IEM territory, as indicated in the previous paragraph. Then, instead of using nodal transmission tariffs, the agreed procedure for inter-TSO payments aggregates the tariffs Gk and Lk for each country and determines how much each country has to be compensated or to be paid according to its usage of other networks and the usage of its network by others. The net amount of charges or compensation resulting from all this for each country should be applied to modify in a certain way its internal G and L charges. It should be noted that the inter-TSO payment scheme deliberately undoes the nodal tariffication that had been achieved previously, turning it into a scheme of aggregate compensations. Obviously it is up to the individual countries to apply internally the net inter-TSO payments so that nodal differentiation is maintained, but this would not be consistent with the current practices in most IEM countries, where tariffs have no geographical discrimination.

Summing up, the mechanism of inter-TSO payments can provide correct long-term locational signals at an aggregated country or TSO level. To be consistent, these signals must be based on standardized transmission costs at EU level. Because of practical reasons a regulatory choice must be made between, on the one hand, the best possible recovery of actual costs incurred by the loop flows and pure transit flows by using actual costs of the involved networks which are not equal throughout member states and the participation factors computed according the technical methodology¹ and, on the other hand, sending consistent European-wide locational signals which require the same computed participation factors but the use of consistent normative network costs regardless of actual costs. The overall consistency of both objectives could only be reached by a harmonization of the transmission costs in the member states which, from a realistic point of view, can only be a long term objective for the regulators.

Internal allocation of the net inter-TSO payments

The best possible use should be made of the locational signals that result from inter-TSO payments, even if they are not the ideal ones. Since the purpose of inter-TSO payments is to charge for the use of other networks and to compensate for the external use of the own network, the allocation of the compensation and charges of any given country j should follow some guidelines (i.e. some harmonization) that are location-related. Specifically, the application of the net outcome of inter-TSO payments to the tariffs of every country should be harmonized. It is interesting to realize that the

¹ In a companion paper the CEER is proposing a “Florence-model” for the computation of inter-TSO payments that makes use of a specific network cost allocation method.

allocation key of the net inter-TSO payment to the internal tariffs G and L in any given country j can be directly obtained from the outcome of the “network cost allocation method”. This method precisely determines how much the generators in country j are using of the network external to j, and also how much of the network of country j is being used by generators from outside country j. The excess of the first amount over the second one is the extra payment (or credit, if the amount is negative) that should be charged to the generators in country j. These locational signals ignore any geographical differentiation within each country, since the average value for country j is used instead of the individual value for each generator. The same reasoning should be used for consumers².

Conclusions

The inter-TSO payment mechanism, if properly defined and implemented correctly, contributes adequate long-term aggregated locational signals at TSO or country level to the transmission network tariffs that are locally implemented by countries or TSOs. The mechanism of inter-TSO payments, as agreed in Florence, does not provide detailed long-term locational economic signals per se -as it was not the agreed purpose of this mechanism-, since it aggregates charges and compensations at TSO level, although this does not prevent the individual countries or TSOs from recovering the individual nodal signals if they wish.

While the present lack of harmonization in the computation and design of transmission network tariffs in the IEM persists, the impact of the contribution of the inter-TSO payments mechanism, -even if it is applied with full attention to the locational effect-, is expected to be low in general.

And finally, it should also be realized that inter-TSO payments may correctly reflect, — although in an aggregated way at country level and once an acceptable “network cost allocation method” has been adopted—, the allocation of the costs of new network investments to the agents that make use of them, regardless of the adequacy of the locational component of the transmission tariffs. This is very important when devising regulatory procedures of promotion of future network investments.

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² Note that, when a country is exporting, its generators use the external networks of other countries. Conversely, when a country is importing its loads use the external networks of other countries. Therefore, an alternative solution that is broadly consistent with the more precise allocation scheme that has just been described is the following one:

- If the net outcome for a country is a charge: Allocate the charge to all generators (increase G) and to all consumers (increase L) in the same proportion that the country has exported or imported, respectively, during the last year. E.g. if the net annual outcome of inter-TSO payments for country j is 5 m€, and if country j has been a net exporter during a number of hours in the year for a total amount E (kWh), and also a net importer during the remaining hours for a total amount I (kWh), then a fraction $E/(E+I)$ of the 5 m€ should be charged to the G tariff (i.e. to all generators in country j) and the remaining fraction $I/(E+I)$ should be charged to the L tariff (i.e. to all consumers in country j).

If the net outcome for a country is a credit: Allocate the credit to all generators (decrease G) and to all consumers (decrease L) in the same proportion that the country has imported or exported, respectively, during the last year.