DISCUSSION PAPER

THE 2003 CROSS-BORDER TARIFICATION MECHANISM

1 Background

The proposed Regulation on cross border electricity exchanges envisages a mechanism to compensate national TSOs for costs associated with transit and loop flows of electricity ("TSO Compensation Mechanism"). The main guiding principles for this mechanism are set out in the draft Regulation. The text also proposes a Committee to decide on more detailed questions relating to the methodology used. This paper therefore discusses a possible regime that could be established following the entry into force of the Regulation under the Comitology procedure, and which would replace any voluntary agreement on a temporary mechanism during 2003.

The temporary mechanism proposed by ETSO in September 2001 is based on a compensation fund of €200m per annum. It has been proposed that the contributions to the fund will be made by TSOs in two parts reflecting different allocation keys:

i. in relation to declared exports, which would be collected through a specific charge imposed only on those operators which "have the responsibility for export flows".

ii. in relation to "net flows", defined as the countries net flow in export and import directions. Contribution would be collected from consumption (L).

There are three key issues to resolve to improve this temporary mechanism:

a. a more accurate methodology is needed to establish the costs incurred as a result of hosting transit flows of electricity and hence the size of the compensations to be received by each host country,[1]

b. a more cost reflective method is required to determine how much each TSO should contribute to the compensation fund,

c. a fair method is needed to reflect the results of the compensation mechanism in national tarification systems, in particular to settle the issue of how TSOs should collect their contributions to the fund.

2 Principles

There are a number of key "principles" that have been put forward regarding the allocation of costs. However two of these principles, namely that the mechanism should be "cost reflective" and also "non-transaction based", are at least partially, in conflict. A non-transaction based system, i.e. a system that does not provide for differentiated charges according to the circumstances of individual transaction, will in

[1] The draft Regulation suggested the use of "forward looking Long Run Average Incremental Costs (LRAIC)" as the appropriate method on which to base the level of compensation received by the hosts of transit flows.

principle only be cost reflective if each transaction generates approximately the same costs, which is not likely to be the case.

However a "non-transaction based" approach is advantageous from the point of view of simplicity. An approach based purely on "cost-reflectiveness" could be very complex and difficult to operate, indeed a perfectly cost-reflective system would never be possible. A balance therefore is necessary in applying these principles. Any system should be *as cost-reflective as possible* but without leading to excessive complication.

3 Determining compensation receipts

Currently, ETSO and the CEER are working together on a methodology to assess the costs incurred by countries hosting transit and loop flows. The assumption in this paper is that the result of this work will be a schedule, similar to that in the simplified table below, establishing approximate transit costs "per unit of flows hosted" for each of the countries affected.

Table 1 Cost of hosting transits

	€/MWh
Country A	3.0
Country B	2.0
Country C	4.0

This work should represent an improvement on the €200m per annum figure used in the temporary mechanism. In particular it will represent a more accurate estimate of the extent to which each network is affected by transit flows by evaluating more accurately the extent to which transit flows actually generate additional costs – including both network investments and losses. This will imply differences between Member States in the estimated cost of hosting each unit of transit flows since each network will be affected to a different extent.

4 Establishment of TSO contributions

There has been agreement on the general principle that the contributions of TSOs to the fund will be established on the basis of physical export and/or import flows of electricity (see Art. 3 (2) of the draft Regulation).

The temporary system proposed by ETSO in September 2001, contains an underlying assumption that all export/import flows of electricity in the EC have an equal effect in terms of transit flows, i.e. contributions to the fund are directly proportionate to measured physical inflows/outflows and programmed exports. In other words: it is assumed that an outflow of electricity from country A causes exactly the same amount of transit flows, and thus costs, as an outflow from any other country in the EC.

This assumption, whilst being justifiable for the sake of simplification during a temporary period, is inaccurate. A more accurate method would be to work out, as accurately as possible *and for each Member State*, the actual amount and path of

transit flows caused by a unit of electricity exported and/or imported from/into the Member State in question.

This data could be established using a load-flow model of the EC network, which would be divided into "zones" (which would initially be expected to correspond to one or more individual Member States). The objective would be to establish for each zone a "transit impact coefficient" for both exports and imports from that zone. The contribution of each TSO to the compensation fund would then be established on the basis of two elements: the physical export and import flows and the "transit impact coefficient".

Details of the methodology need to be further developed and will depend on the achievable accuracy of the basic load-flow model. Some simplifying assumptions may prove inevitable in the beginning since it may not be pratical to recalculate flows on a constant basis. However this situation could be improved over time, as the possibilities of modelling flows improve.

The "transit impact coefficients" would vary from Member State to Member State. In many cases they would be "zero", or even negative, for instance the impact coefficient for any exports from net importing countries. Negative co-efficients may be appropriate since exports from a net importing country do not, in principle, cause any additional flows but reduce existing incoming flows.

A simplified example, in order to illustrate the practical effect of such a system:

Total amount of contribution established on the basis of exports: 10
Country A: net exporter, export impact coefficient: 1; amount of exports 5
Country B : net exporter, export impact coefficient: 1,5; amount of exports 4
Country C: net importer, export impact coefficient: - 0,5; amount of exports 2

Result: Country A pays 5 into the fund, country B pays 6 and country C receives 1.

Such an approach would make the whole system more accurate and thus more cost reflective. It would thus constitute a major improvement compared to the simplistic approach of the provisional system mentioned above.

5 Reflection of the compensations in national tarification systems

There are two possible approaches relating to the allocation of TSO contributions to market participants. The first is that only those who carry out cross border transactions, via the underlying commercial arrangement, should pay the contributions to cover transit costs. The alternative is that all network users should pay with a principle that connection to the national network implies free connection to the European network.

The suggestion that exporters/importers should pay everything is based on the idea that those market players "causing" the transit costs and "benefiting" from exports or imports should be the ones to pay the additional surcharges. The corollary of this argument, is that only specific charges on exporters or importers can provide locational signals which are necessary to ensure that future generation capacity is

situated where it is economically most appropriate to do so from the point of view of their effects on transit countries.

This "causality" argument needs to be examined closely. Charges made explicitly to cross-border transactions would have to be based on declared exports/imports. However, it is in general impossible to determine whether and to what extent *individual* declared export/import transactions lead to actual physical flows. These do not always imply a physical flow of electricity since there may be offsetting flows from other transactions and, to be accurate, these would have to be taken into account. If one nevertheless wants to apply export/import charges the only practical solution is a certain degree of standardisation of the charges. It is clear, however, that such an approach can only be considered cost-reflective to a limited extent.

Secondly, when considering who benefits from trade, it is important to remember that, imports into a particular country may generate a general reduction in prices and thereby benefit all consumers. Similarly, the export of electricity from countries with a surplus of generation capacity may lead to an across the board increase in prices which will benefit all generators in the exporting country. There is therefore a case for arguing that the contributions to the compensation funds should be shared between all market participants.

It could also be argued that in an AC network, physical cross border flows are not caused by the existence of a contract but by the imbalance that exists between production and consumption in each control area. Not only exporters but all generators are, in principle, at the origin of this imbalance.

Finally, it should be noted that many national tarification systems tariffs are, in principle, applied independently of the destination/origin of the electricity (postage stamp). This means, for instance, that for a transaction where generation and consumption are located, say, 1000km from each other the total transmission tariff is the same as for a transaction where generation and consumption are located, say, 10 km from each other, provided in both cases generation and consumption are located in the same country. It could therefore be considered arbitrary to deviate from this principle only in cases generation and consumption are separated by a political border.

6 Options

Bearing these points in mind, two options seem to exist:

i. Compensation reflected in G and L charges providing locational signals

One option would be to reflect compensation payments in G and L according to the following rule.

In net exporting countries the TSO contribution would be collected from a surcharge on all generators in those Member States. Such an approach takes into account that in net exporting countries transit flows are caused by the generators since importing loads would, in principle, not cause additional flows but *reduce* the amount of the existing export flows.

In net importing countries the TSO contribution would be collected from a surcharge on all consumers in those countries. This takes into account that in net importing countries transit flows are caused by the loads since exporting generators would, in principle, not cause additional flows but *reduce* the amount of the existing import flows.

In both cases there would be no specific charge on declared exports or imports. However, exporting generators and importing load would contribute as part of the group of generators and consumers and this would provide locational signals. This excludes that net exporting countries collect contributions from consumers, which definitively do not cause any export flows.

Advantages

The approach is simple and would require only minimal change to the temporary mechanism. It would provide some locational signals. In particular, in net exporting countries there will be a variable surcharge on G resulting from the inter TSO compensation mechanism. This surcharge will vary in importance from Member State to Member State, depending on the level of cross-border flows and transits resulting from the Member State concerned.

Becuase in net importing countries there would be no additional charge, it is likely to encourage the creation of new generation plants in importing countries. This system would also prevent any major distortions to cross border exchanges through inaccurate measurement of costs or the relationship between contractual and physical flows.

Disadvantages

It might be argued that the locational signals from such a system would be relatively weak since the surcharge would be spread over all producers and this will dilute the incentives to either increase or decrease production in the control areas concerned. Thus the effect of the charges at the margin is diluted. However it should also be remembered that cross-border transactions often require payment of fees for the use of the interconnectors between system. Where lines are congested and capacity auctioned these fees can be very high, in some cases much higher than any export charge conceivable, for example up to €15/MWh. They therefore already provide an incentive not to situate new generation plants on site where the use of such interconnectors would be necessary to sell the electricity produced.

ii. Hybrid system based partly on explicit charges to exporter and importers

As outlined above, there are good arguments against the principle of specific export/import charges. Furthermore, the method suggested under option one, which is based on transit impact coefficients and which differentiates between net exporting and net importing countries, would already provide locational signals to some extent.

It could, therefore, be argued that there should not be any specific export/import charges, at least in the short term when it is important to boost trade activities in the

internal market and when the question of locating new capacity seems to be of secondary importance, given the existing overcapacities.

If one nevertheless wants to keep the option of export/import charges open, the only acceptable system seems to be a hybrid system as follows:

For net exporting countries, part of the contribution would be collected from generators in general and the other part collected by a specific charge on declared exports. There would be no surcharge on L .

For net importing countries, part of the contribution would be collected from consumers in general and the remainder coming from a specific charge on declared imports. There would be no surcharge on G.

It is important to note that, unlike the provisional system, the level of the specific charge on exporters and importers in this case would *not be identical in all Member States*. In fact, since the contributions of each TSO are established on the basis of a national "transit impact coefficient", the level of the individual export/import charges will be in proportion to the coefficient. This means, for instance, that countries with a high transit impact coefficient for exports will have a higher export charge than countries with a low transit impact coefficient. There would therefore be a differentiated set of export and import charges, instead of a standard charge identical in all Member States. In many cases there would be no positive specific export or import charge, namely if the relevant transit impact coefficient is zero, or even negative (see above point 4),

A further refinement of the system could be achieved through the application of differentiated export/import charges within a given Member State, depending on the destination/origin of the exported/imported electricity. Under certain circumstances it may, for instance, be reasonable to assume that exports into a neighbouring country cause, in principle, less transit flows than exports destined for more remote countries.

Advantages

It could be argued that this model would send stronger locational signals to generators by increasing the charge on only those producers engaging in cross border trade. This is likely to discourage the creation of new generation capacity in exporting countries, in particular production for export purposes.

Disadvantages

Any specific export/import would have to be imposed on declared exporters/importers. As described above under point 5, this raises concerns since it cannot be established whether and to what extent a given declared transaction actually causes flows and thus costs. However, in contrast to the approach envisaged under the provisional system, the application of the "transit impact coefficient" would ensure that specific export/import charges are not identical in all Member States but reflect the transit flows and costs caused by flows of electricity originating or respectively ending in the Member State concerned.

7 The proposed NORDEL approach

From 2002 TSOs within NORDEL will compensate each other for the costs associated with transit. Under the NORDEL system the objective is not to provide Nordic locational signals through the reflection of contributions and payments relating to the transit compensation system in the grid tarification systems. It is thus up to the TSOs themselves to decide how the how the net payments related to transit compensation is reflected in the tariffs as long as the agreed harmonisation of the G charge is followed. According to this agreement, the G is split into two parts. The first part reflects the marginal loss coefficents, which may be negative, and the second part covers the remaining need for income. This second part is harmonised with regard to absolute level. The L charge is not harmonised.

This means that the locational signals are provided by the use of charges to generators based on marginal loss coefficients. This coefficient relates not only to the area in question but to the entire Nordic network. In practice, this means that loss charges to generators in net exporting areas are, on average, higher compared to charges to generators in net importing areas.

Marginal loss coefficients generate revenue up to double the actual losses incurred. This model therefore means that relatively more of the losses in transit countries will be covered by generators from exporting areas, and there will thus be a contribution to some investment costs.

This model has some similarities to the first option above in that there are no explicit charges on declared exports and/or imports for cross border transactions.

8 Conclusions

The temporary mechanism would clearly be improved by a more accurate assessment of the costs implied by hosting transits in the relevant Member States. The CEER and ETSO are working on a proposal in this respect.

In addition, a more precise estimate of the extent to which different transactions are likely to generate transit flows - through the establishment of transit impact coefficients - would represent a major improvement. Most importantly, it would improve the level of accuracy of the locational signal stemming from the reflection of the compensation payments in national tarification systems.

In order to achieve the appropriate effects in terms of locational signals, a distinction has to be made between net importing and net exporting countries, irrespective of which system is opted for.

The first option, without specific export or import charges has, however, important advantages:

- it would ensure that locational signals are provided;

- it does not require the establishment of a causal link between individual transactions and physical flows, which would be necessary for a system of export and import charges to be accurate;

- by avoiding any surcharge on cross-border transactions it would boost trade activities in the internal electricity market.