ERGEG Draft Proposal on Guidelines on Inter TSO Compensation

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EXPLANATORY NOTE

1. Introduction

The Regulation 1228/2003 on cross border exchanges in electricity allows for binding guidelines on inter TSO compensation (ITC) to be adopted by a regulatory Comitology process consistent with Commission Decision 1999/468/EC. This procedure requires the Commission to make a proposal for guidelines to be considered by the Committee referred to in Article 13 of the Regulation.
The attached document accordingly puts forward a proposal for ITC guidelines on the following subjects:

- details of the determination and payment procedure for compensation between TSOs relating to cross border flows; Article 8(2) (a) – (d)
- treatment, in the context of the inter-TSO compensation mechanism, of electricity flows originating or ending in countries outside the EEA; Article 8(2) (e)
- the participation of national systems which are interconnected through direct current lines; Article 8(2) (f)

The main principles adopted by the Commission in its proposal for the detailed ITC guidelines, which are taken from the Articles of the Regulation are set out and explained below.

Article 8(1) of the Regulation requires that when adopting the guidelines for the first time the Commission shall ensure that they cover in a single draft measure at least the issues referred to in paragraph 2(a) and (d), and paragraph 3 of the same article 8, i.e., the guidelines must specify:

8(2)(a) details of the procedure for determining which transmission system operators are liable to pay compensation for cross-border flows including as regards the split between the operators of national transmission systems from which cross-border flows originate and the systems where those flows end, in accordance with Article 3(2);

8(2)(d) details of the methodology for determining the costs and benefits incurred as a result of hosting cross-border flows, in accordance with Article 3(6);

8(3) appropriate rules leading to a progressive harmonisation of the underlying principles for the setting of charges applied to producers and consumers (load) under national tariff systems, including the reflection of the inter-TSO compensation mechanism in national network charges and the provision of appropriate and efficient locational signals, in accordance with the principles set out in Article 4. The guidelines shall make provision for appropriate and efficient harmonised locational signals at European level. Any harmonisation in this respect shall not prevent Member States from applying mechanisms to ensure that network access charges borne by consumers (load) are comparable throughout their territory.

The single draft adopted will include guidelines on Tarification and Inter TSO Compensation. It is expected that both sets of guidelines will apply from 1 January 2007.

2. Participating Entities

There will be 24 participating Member States of EEA in the inter TSO compensation after excluding those Member States or island systems not having any interconnection to the networks of other Member States.

When making calculations, the participating entities may be joined to larger entities for geographical or other well-founded reasons. Joining to larger entities means that participation in the inter TSO compensation will be realised collectively. This method shall be proposed by TSOs involved and approved by the regulators involved according to the Regulation Article 2(b).

Splitting the Member States into smaller entities shall only be allowed in well-founded cases, e.g. for geographical reasons, where the network between these split entities is weak or non-existent. The split shall be approved by the regulator in question.

Other countries (outside the EEA area) may be, de-facto, included in the inter TSO mechanism as a result of measures agreed on the basis of a Treaty between the European Union and the other countries in question or on the basis of a private contract between transmission system operators in those non-EEA countries and the participating entities. Such a contract may have certain conditions relating to the reciprocity in implementation, by non-EEA countries, of this and other guidelines adopted under the Regulation and Directive 2003/54/EC.

3. Approach for Inter TSO Compensation

3.1. Basis for calculating the costs incurred by hosting cross-border flows

According to the Regulation 1228/2003 Article 3(6) the costs incurred as a result of hosting cross-border flows shall be established on the basis of the forward looking long-run average incremental costs, taking into account losses, investment in new infrastructure, and an appropriate proportion of the cost of existing infrastructure, as far as existing infrastructure is used to transmit cross-border flows. When establishing the costs incurred, standard-costing methodologies shall be used. Benefits that a network incurs as a result of hosting cross-border flows shall be taken into account.

The approach described in these Guidelines to define network infrastructure costs applies only to the inter TSO compensation mechanism.

Weighting between forward looking LRAIC and existing network

The costs associated with network assets shall be based on two components:

- costs of existing network assets (“appropriate proportion of existing network”); and
- forward looking long run average incremental cost (LRAIC) of new network assets (“investment in new infrastructure”).

Costs of existing network can be estimated using national regulated values of network operation e.g. regulated asset base or total allowed network related revenues. Forward

looking LRAIC have a more standardised cost approach e.g. same depreciation and interest rate in all Member States. When combining these two cost components i.e. the forward looking LRAIC and the costs of existing network in order to determine the total ITC costs, a weighting between the two cost components has to be defined.

The cost approach for the ITC mechanism should be focused mainly on cost recovery. Therefore a value which is related to cost of existing network may be considered to be more suitable than a value based on a forward looking LRAIC. Further, having different cost values for the external and internal use of the network may lead to discriminatory costing when IEM is considered as the same network is used to facilitate both external and internal electricity transfers.

National regulated values are also more appropriate for the objective of cost recovery than values based on forward looking LRAIC because it is not self-evident that forward looking values would be less clustered and varied than national regulated values. Forward looking LRAIC may be considered to be more subjective because they forecast future costs leading in the worst case to less standardised network costs than when using historical costs.

Observations stated above imply that when weighting between the two costing components are considered the greater weight should be given to the national regulated values than to the forward looking LRAIC. The weighting of the national regulated values should be 80 % and the forward looking LRAIC 20 % during the first years of implementation.

Experience of the valuation of forward looking LRAIC can be achieved following the implementation of the ITC mechanism. Further studies are needed before a more standardised costing methodology with an increased weighting of the forward looking LRAIC can be implemented.

The cost of the existing network assets

The annual cost of the existing network is defined using total annual regulated revenue from transmission network operation. The approach implies that the external users of the transmission networks are charged on equal basis compared to the national customers. The approach leads to a more comprehensive view of the national regulatory package when applied to the ITC mechanism leading to more consistent treatment among Member States. However, the approach may result in a spread of regulatory costs as a result of different regulatory parameters among Member States but the spread can fairly be assumed to be less than with other approaches e.g. regulated asset base (RAB) where the definition of the cost of the network is based on only one factor, although a very crucial one, within the national regulatory package.

In some Member States the total annual revenues of TSOs include also non-network infrastructure related services, e.g. system operation, losses, peak load, congestion management and obligations to buy power production. Presently the non-network related revenues may not be separated in the accounting (or tariffs) from the total annual revenues of the network operation. Thus the evaluation of revenues directly related to network operation may lead to some inaccuracies and to less transparent cost figures. In the future, the non-network infrastructure related revenues should be separated more clearly from the actual transmission network operation. Congestion management income or the Trans-

European Transport Networks (TEN-T) project income shall be excluded from the total annual revenue.

3.2. Infrastructure – calculation of compensations

The Regulation sets out that Member States should receive compensation for cross border flows that imply additional costs to the TSO concerned.

The approach applied in the Guidelines relies on the following three concepts:

- Sensitivity factors which form the basis for evaluating the impact of flows on the network of an entity originating and ending outside of the entity (transit)
- Calculation of reference exchanges which form the basis for compensations to be paid
- Transit key in MWh·km to ensure that the impact of a transit on a given entity is correctly taken into account.

The impact of transits on an entity is evaluated using sensitivity factors. These factors describe the 'electrical distances' between ITC entities. The sensitivity factor of an entity A to an exchange of 1 MW from entity B to entity C is defined as the total amount of MW·km induced in all grid elements of an entity A by flows originating in entity B and ending in entity C. An injection of 1 MW shall be distributed proportionally on all generation nodes of an entity B and withdrawal of 1 MW shall be distributed proportionally on all load nodes of an entity C.
Sensitivity factors shall be defined for all possible combinations of entities taking part in the ITC mechanism. This requires the use of a merged European load flow situation. The calculation shall be made ex ante for the following year on snapshots representing the various yearly situations. At least seasonal and daily variations should be taken into account when sensitivity factors are defined.

Sensitivity factors can be computed in different ways depending on the use of the factor. Absolute sensitivity factors are calculated by aggregating all MW·km in all grid elements regardless of the direction of the transit flow compared to that of the actual flow in the snapshot. Absolute sensitivity factors will be used to reflect an "electrical distance" between exporting and importing entities when reference exchanges are calculated. Absolute sensitivity factors can be calculated using either a snapshot representing loading of the network or with an empty network representing the network without any load or generation. Net sensitivity factors are calculated by aggregating all MW·km in all grid elements with their sign depending on the direction of the transit flow compared to that of the actual flow. Net sensitivity factors can be applied to determine the share of total grid costs to be borne by transit flows.

Calculation of reference exchanges between entities reflects the real level of import and export of each entity and their consequences in terms of transits. Reference exchanges defined between pairs of entities are derived from measured net export and import of each entity under the assumption of minimized transits when measured imports/exports are shared between pairs of entities. This leads to the conclusion that the entities responsible for transits will be identified as those closest to the corresponding transited entities. Reference exchanges shall be calculated on an hourly basis reflecting the actual hourly exchanges of electricity. They shall be applied for the computation of compensations to be paid.

A transit key for each transited entity is calculated in MWh·km thus taking into account the size and length of the network impacted by the transit flows. The numerator of the transit key is the total of MWh·km transited through the entity and the dominator is the total of MWh·km in all grid elements of the entity describing actual use of the grid including domestic and foreign flows. The transited MWh·km through the entity are given by the sum of all reference exchanges (between third entities) weighted by the sensitivity factors of that entity. The different sensitivity factors calculated for different snapshots are applied to defined types of operating hours (e.g. peak, off-peak, week, weekend, etc.) that correspond to these snapshots. The transit key is applied to the total cost of the grid infrastructure of this entity to calculate the compensations for this entity. The evaluation of total costs of the grid is described in Section 3.1 of this explanatory note.

Depending on the applied sensitivity factors and the unit costs of the network it may be necessary to introduce a capping to the inter TSO compensation fund in order to avoid overcompensation of transited entities.

3.3. Infrastructure - calculation of contributions of exporting and importing entities

Article 3(2) of the Regulation states that compensation shall be paid by TSOs from which cross border flows originate and the TSOs where the flows end.

The calculation of compensations for transited entities also identifies the entities that should contribute to the inter TSO compensation fund. The contributors shall be the entities of origin or destination of the corresponding reference exchanges. As a consequence, the contributions paid by entities reflect their responsibility in inducing transit flows in other grids. Contributions shall be paid equally by the entities of origin and destination (exporting and importing countries).

3.4. Losses

For losses, the guidelines also make the assumption that cross border flows contribute to the total network losses according to the extent to which networks in each participating entity have been affected by cross border flows and in particular transits.

The effects of cross border flows on losses are calculated using a load flow based method described in Annex A. Transits are derived on the basis of actual physical inflows and outflows during a snapshot of the actual network situation. At least 72 snapshots per year shall be used to define losses. The definition of transit for the purpose of determining the effect of cross border flows on losses differs from the definition of transits which is used to determine the effect of cross border flows on infrastructure. Transit -for determination of the effect on losses- is defined as the minimum value of all inflows or all outflows at the interconnectors within a given time period.

To determine the impact of transit flows, a comparison of the network flows in the actual situation (with transits) and in a situation when transit flows are removed will be made. In order to get the new “without transit” system condition, the determined transit value is distributed among the interconnection lines according to a given relation as described in Annex A.

The costs of losses are allocated between users of the grid by distributing the losses due to transits equally on those exporting and importing. The calculation method accounts also for a possible beneficial effect of transits on the network, i.e. if transits have a relieving effect on the losses in the network.
During the ex-ante evaluation the reference price for the losses is preferably taken from a quoted power exchange, from a recognised price reporting service or from any other market based tendering process for bulk energy. During ex-post calculations the actual costs incurred due to losses shall be applied when the TSO has the responsibility for the purchase of losses. Otherwise the prices applied during ex-ante calculations shall be used.

3.5. Payment procedure

According to Article 3(3) and Article 8(2)(b) of the Regulation Inter-TSO Compensation Guidelines shall specify details of the payment procedure to be followed. Compensation payments shall be made on a regular basis with regard to a given period of time. Ex-post adjustments of paid compensations shall be made when necessary to reflect costs actually incurred.

Inter TSO compensation payments will be made per calendar year with regard to cross border flows of electricity hosted annually by TSOs. Provisional payments of compensations will be made between TSOs on a monthly basis during the year.

Monthly provisional payments of compensations will be based on ex-ante calculations using forecast data from cross border flows to be hosted by each TSO and from the transmission network costs incurred by the hosting of these cross border flows.

During the “on run” period, required data is collected monthly from each TSO and the monthly settlement procedure between TSOs is performed.

Based on data collected during the year an ex-post annual settlement will be carried out for the purpose of reconciliation to finalise the compensation payments of each year. Before this ex-post reconciliation payment, the Commission must receive the collected data and it will approve the final annual values of compensations to be paid or received per year by each TSO.

Audit procedures must be performed during different stages of the process by TSOs and regulators in order to give transparency to the process.

3.6. Determination of first period of time

According to Article 3(3) of the Regulation, the Guidelines shall determine the first period of time for which compensation payments shall be made.

4. Treatment of Flows Starting or Ending in Non-Participating Countries (Non – EEA Countries)

Under the Regulation, it is possible for TSOs in Member States to levy charges for flows from outside countries covered by Community legislation (i.e. the EU and EEA Member States). These countries outside Community legislation are denoted here as non-

participating countries or entities. The charges allow the TSOs to recover any costs on their own network associated with both imports from and exports to such non-participating countries.

Network users importing or exporting electricity to non-participating entities are required to contribute the compensation fund for each physical inflow or outflow according to methodology defined in Annex A. This amount may be collected from parties nominating flows from non-participating entities in order to recognise the potential effect of these flows on the participating entities. The Guidelines assume that the practice will continue in so far as the entities concerned are not subject to a separate legal agreement or legislative measure adopted under a bilateral Treaty in which the ITC mechanism to comply with this Guidelines is adopted.

5. Systems interconnected through DC Interconnectors

5.1. DC interconnectors that form part of the general regulated asset base

Article 8(2)(f) of Regulation states that the Guidelines shall specify the participation of national systems which are interconnected through direct current (DC) lines, in accordance with Article 3.

These Guidelines take the view that, in general, participation in the inter TSO compensation mechanism, and the removal of charges relating to cross border transactions will not be affected by whether power systems of Member States are connected by AC or DC lines.

Therefore DC lines, where they form part of the regulated asset base of the participant concerned, will be included in the network in that Member State. To the extent that the Member State concerned is hosting cross border flows, costs relating to DC lines would be included in the network costs for which compensation would be due.

5.2. DC interconnectors that are legally separate entities from TSO and do not form part of the regulated network

DC interconnectors which are separate from the general regulated asset base of the TSO and which do not form part of the general regulated network, including those with exemptions from third party access and exempted according to Article 7 of the Regulation, are excluded from the network for the purpose of inter TSO compensation.
The owners of these lines will contribute to the compensation fund according to the methodology defined in Annex A but they will not receive any compensation from the compensation fund.

5.3. DC interconnectors that have both regulated and unregulated features ("hybrids")

Interconnectors having both the regulated and unregulated features described in Sections 5.1 and 5.2 above are treated for the inter TSO compensation so that the regulated part of the interconnection may be included in the network asset base for the inter TSO compensation thus receiving also compensations from the cross border flows. The unregulated part of the interconnection is not included in the network asset base for the inter

TSO compensation and it shall contribute to the compensation fund as any other network entity but it shall not receive any compensation from the fund.

GUIDELINES ON INTER TSO COMPENSATION

1. Participants and Participation

1.1 Transmission system operators[1] (TSOs) in all EU and EEA Member States, which are connected to the network of another TSO, shall participate in the inter TSO compensation mechanism either as a single entity or collectively. Participation collectively in the inter TSO compensation mechanism shall be approved by the regulator(s) involved and notified to the Commission. A separate network within a Member State forms one entity as regards to the inter TSO compensation mechanism.

1.2 Transmission system operators in non-EEA countries may join the inter TSO compensation mechanism where a Treaty is established between the EU and the relevant non-EEA countries where the participation in the Inter TSO mechanism has been agreed. The Commission shall be notified in the case of a private contract between participating entities and non-participating entities from non-EEA countries before non-participating entity can join the inter TSO compensation mechanism.

2. Cost base – Network and Forward Looking LRAIC

General

2.1 Regulators shall provide costs associated with:
(a) network assets
(b) transmission losses
for the purposes of inter TSO compensation.

2.2 In relation to costs associated with network assets costs shall be based on:
(a) the costs of existing network assets; and
(b) the forward looking long run average incremental cost (LRAIC) of new network assets.

2.3 An overall unit cost, calculated as a weighted average of 2.2(a) and 2.2(b) above shall be calculated in Euros/km per year (for lines) or Euros/MVA[2] per year (for transformers) according to the following weighting:
(a) Costs of existing network asset = 80 %;
(b) LRAIC of new network assets = 20 %
These unit costs shall be applied in the calculation of the total cost of the grid in Annex A.

[1] Transmission system operator (TSO) means a natural or legal person responsible for operating, ensuring the maintenance of and, if necessary, developing the regulated transmission system in a given area according to Directive 2003/54/EC and, where applicable, its interconnections with other systems, and for ensuring the long term ability of the system to meet reasonable demands for transmission of electricity.
[2] MVA of nominal installed power of a transformer

2.4 Regulators shall provide jointly the unit costs associated with network operation to the Commission and TSOs yearly by the end of September. The values of unit costs shall be used to define the receipts and payments of compensations under Section 3 of the Guidelines according to procedure defined by TSOs and approved by regulators.

2.5 If significant differences among adjacent entities exist in unit costs and if they differ from those applied to national purposes the Commission may decide by proposal of regulators to set a cap to the maximum unit cost for a dedicated asset class.

Costs of existing network assets

2.6 In relation to 2.2 (a) above, the cost of existing network assets, regulators shall provide a unit cost estimate based on data from year t-1, both for the purposes of reconciliation of payments in relation to year t-1 and for the purposes of an ex ante estimate of year t+1 in the following way:

(a) For each participating entity under this jurisdiction, each regulator shall provide a value for total allowed network related revenue by participating entities. This amount should only include revenue related to network assets (including return on network assets, depreciation on network assets and operating costs related to maintenance of network assets). It should exclude any revenue related to System Operation, network losses and other non-network asset related activities such as the costs of control room and despatch operations, the net costs of balancing the system and the costs of procuring ancillary services. Each regulator shall deduct the share of the participating entity's congestion management and/or the Trans-European Transport Networks (TEN-T) projects income from the total allowed revenues in order to take account of existing assets being financed by congestion management and/or TEN-T project income.

(b) Each regulator shall also provide the total circuit length (in km) of transmission network assets within the network asset base of participating entities that they regulate for each of the following asset classes:
(i) Class A: above 300kV AC line;
(ii) Class B: 220kV to 300kV AC line;
(iii) Class C: other AC lines;
(iv) Class D: DC lines of any voltage;

(c) Each regulator shall also provide the total installed capacity (in MVA) of transformers within the regulated asset base of participating entities that they regulate in each of the following asset classes:
(i) Class E: transforming between voltages of assets in class B and class A, or between voltages of assets in class A or between voltages of assets in class B;
(ii) Class F: transforming between voltages of assets in class C and class B or class A;

(d) Each regulator shall give an estimate of entity specific weighting values which express the per km costs of line assets within class B, class C and class D as a percentage of the per km costs of line assets within class A. Each regulator shall also give an estimate of country specific weighting values which express the per

MVA cost of transformer assets in class E and class F as a percentage of the per km costs of line assets within class A. Regulators shall share their methodology for arriving at these weighting factors with each other, justifying significant differences between the values derived.

(e) These weighting factors shall be calculated based on
- (i) Estimates of the current (rather than historic) relative costs of procuring network assets in each different class;
- (ii) The cost of line assets should include a share of substation costs (for example by taking into account the average cost of line switchgear bays and the average number of line switchgear bays per km of line assets in each class);
- (iii) The costs of transformer assets should include a share of substation costs (for example by taking into account the average cost of switchgear bays of each voltage and the average number of switchgear bays of each voltage per MVA of transformer capacity in each class);
- (iv) The costs of regulated HVDC links should also include a share of converter costs (for example by taking into account the average cost of converter stations, and the average number of converter stations per km of HVDC line);

(f) Unit costs for class A, B, C and D line assets, and for class E and F transformer assets are required as inputs to the cost allocation method described in Annex A. Regulators shall calculate per km line costs for each asset class in accordance with the following formulae:

$$UC_A = \frac{TR}{\sum_{i=A}^{F} L_i * WF_i}$$

$UC_j = UC_A * WF_j$ for j = B, C, D, E and F

where:

UC_A	represents the unit cost of line assets in class A
TR	is the total annual revenue of the relevant participating entity
$\sum_{i=A}^{F}$	is the sum over asset classes A to F
L_i	is the length or MVA of equipment of a certain class *i*
WF_j	is the weighting factor representing the unit cost (km or MVA) of equipment of a certain class *j* as a percentage of the unit cost (km) of line assets in class A
UC_j	is the unit cost of line or transformers of a certain class *j*

Annex B shows an example how unit costs of different classes are defined.

Forward looking long run average incremental cost of new assets

2.7 In relation to the forward looking long run average incremental cost of new network assets regulators shall provide estimates of the annualised incremental investment cost of providing additional lengths of a new transmission line in one of the line asset classes described above in Euro/km. Regulators shall provide costs based on recent data for the purposes of an ex ante estimate of year t+1. There shall be no reconciliation of forward looking long run average incremental cost data in relation to year t-1. Regulators shall provide costs taking into account the following methodological guidelines:

(a) The estimate should be based on recent experience of the cost of constructing new transmission line capacity. Regulators should consider investment projects which are reasonably representative of the capacity provided by the chosen asset type elsewhere on the network. If no such representative projects have been undertaken recently, regulators shall exercise their discretion to estimate the construction costs (for example, with reference to costs in another international system or systems which are likely to have similar cost characteristics);

(b) installation, testing and commissioning expenditure should be taken into account when costs are estimated;

(c) in addition to the capital cost, the annual operating cost of the asset shall be calculated as 2% of the Gross Asset Value of the asset.

(d) only direct costs of transmission network and substations should be taken into account when incremental costs are estimated and there should be no allocation of joint and common costs to the incremental costs (e.g. project management overhead across a number of investment projects, corporate centre costs etc.);

(e) The investment cost of a line shall be divided by the total length to derive a cost per km. The investment cost of a transformer shall be divided by the total capacity in MVA to derive a cost per MVA.

(f) Regulators shall derive an annual forward looking average incremental cost by taking the annuity of the total cost estimate over a 40 year period and using a standard nominal rate of interest agreed by regulators.

2.8 In deriving the cost estimates referred to in paragraph 2.6, regulators shall exercise their discretion to estimate incremental costs which are genuinely representative of the network of the relevant participating entity as a whole. Regulators shall be transparent and share their methodology and outputs, in particular explaining their choices of representative projects.

2.9 Regulators shall estimate the annual forward looking incremental costs of assets in classes A, B, D and E by applying the weighting factors referred to in paragraph 2.5(d) to the cost estimated according to paragraph 2.6. These values shall be defined as $LRAIC_{A,B,D \text{ and } E}$ and applied to calculate the total cost of the grid required in Annex A.

Cost of transmission losses

2.10 In relation to the cost of transmission losses, regulators shall provide an ex ante estimate of the cost in each year in accordance with one of the following approaches, where approach (a) is to be preferred to approach (b), which is in turn preferred to approach (c):

(a) With reference to the forward price of electricity (for an appropriate volume profile) taken either from a quoted exchange, from a recognised price reporting service or any other market based tendering process for bulk energy (for example, tenders to provide losses);

(b) If a reference price for the jurisdiction in question does not exist or is not believed to be appropriate or reliable, with reference to the forward price of electricity in a neighbouring country (for an appropriate volume profile) taken either from a quoted exchange or from a recognised price reporting service, and taking into account as appropriate transportation costs and any cost (or, if relieving congestion, revenue) in relation to market based congestion management regimes (again, for an appropriate volume profile);

(c) If reference prices for the jurisdiction in question or its neighbours do not exist or are not believed to be appropriate or reliable, with reference to a method which attempts to estimate the forward price of electricity (for an appropriate volume profile), provided that the method is acceptable to regulators.

2.11 In relation to the cost of transmission losses, regulators shall provide an ex post estimate of the cost in each year in accordance with one of the following approaches:

(a) Where the TSO has responsibility for the purchase of losses, with reference to the unit cost in relation to the purchase of losses actually incurred by the TSO;

(b) Where the TSO does not have responsibility for the purchase of losses, in accordance with one of the following approaches, where approach (i) is to be preferred to approach (ii), which is in turn is to be preferred to approach (iii):

(i) If available, with reference to recorded short term prices of electricity (with an appropriate weighting over the year, representing an appropriate volume profile) taken either from a quoted exchange or from a recognised price reporting service;

(ii) Otherwise with reference to recorded short term prices of electricity in a neighbouring jurisdiction (with an appropriate weighting over the year, representing an appropriate volume profile), adjusted in accordance with paragraph [2.10(b)]

(iii) If recorded day ahead prices for the jurisdiction in question or its neighbours do not exist or are not believed to be appropriate or reliable, with reference to a method which attempts to estimate the short term price of electricity (for an appropriate volume profile), provided that the method is acceptable to regulators.

3. Determination of Receipts and Payments of Compensations

3.1 Annex A describes the methodology used to define the receipts and payments of compensations among the participating entities both for costs of infrastructure and losses. The net payments for each entity shall be defined summing up the net payments for both infrastructure and losses.

3.2 If the methodology described in Annex A leads to the unreasonable payments compared to the national remunerations of the grids the common decision to cap the amount of receipts and payments of compensations after established auditing procedure shall be made by the regulators. This decision shall be notified to the Commission. In the case the common decision is not reached the final decision to cap the amount of receipts and payments of compensations shall be made by the Commission.

4. Compensations from Non-Participating Entities

4.1 Non-participating entities shall, when their networks are connected to the networks of participating entities, contribute to the inter TSO compensation mechanism to the extent that physical inflows or outflows are recorded to these participating entities.

4.2 The contribution of these non-participating entities shall be defined according to the methodology defined in Annex A. However, the compensations for these non-participating entities will be zero for each hour of the year.

4.3 Participating entities affected shall recover these amounts from the network users, who have contracts or reservations to import the electricity from (or export the electricity to) the non-participating networks.

4.4 Where a specific collective agreement under a private contract or a Treaty measure to include countries outside EEA Member States in the inter TSO compensation mechanism exists between entities in participating and non-participating countries and adheres to the terms of the inter TSO compensation mechanism, the paragraphs 4.1 – 4.3 will not apply.

5. Payment Procedure

The procedure for the calculation and payment shall be:

(1) November year (Y-1): Calculation of indicative compensation to be paid on the basis of flows during the calendar year (Y-2), the methodology set out in Annex A and the unit costs defined according to Section 2 of the Guidelines.

(2) During Year Y: Monthly payments between entities according to the methodology to be notified by the entities to the Commission and regulators.

(3) March-June (Y +1): Calculation of the actual compensation due on the basis of flows during the calendar year (Y) and the methodology set out in Annex A.

(4) End of June (Y+1): The Commission shall approve the compensations in a Commission decision, pursuant to Article 3(3) of the Regulation.

6. First Period of Inter TSO Compensation

First period of payments according to these Guidelines shall be 1 January 2007 – 31 December 2007.

Annex A – DESCRIPTION OF METHODOLOGY

A1 Infrastructure – Cost Allocation

Procedure for calculation

Calculation proceeds in five steps:

(a) Calculation of sensitivity factors

(b) Calculation of reference exchanges between exporting and importing entities

(c) Calculation of compensations due to transits

(d) Calculation of contributions due by exporting and importing entities / contributions due to export and import flows

(e) Calculation of net payments by an entity

Calculation of sensitivity factors

A1.1 Sensitivity factors describing the electrical distance between the ITC entities shall be calculated as follows

(a) Sensitivity factors are defined in MW·km and are defined as the total amount of MW·km induced in the grid elements of entity C caused by an additional flow of 1 MW originating in entity A (distributed pro-rata to the amount of generation at each relevant node in the load flow snapshot of entity A) and ending at entity B (distributed pro-rata to the amount of load at each relevant node in the load flow snapshot entity B). Definition of sensitivity factors shall be made for all possible combinations of entities C, A and B.

(b) Different entities when making calculations shall apply the same load flow algorithm (either DC or AC load flow algorithm).

(c) An appropriate number of snapshots of load flow data sets (“scenarios”) from participating entities shall be used for calculating different sensitivity factors representing different system situations. The number of snapshots shall be as representative as possible of seasonal and daily variations within the power system. The snapshots from participating entities are merged to introduce the relevant flow paths between the participating entities.

(d) Sensitivity factors shall be defined to be consistent with the measured net import/export values of year Y.

A1.2 Sensitivity factors shall be computed in different ways depending on the use of these factors:

(a) Absolute sensitivity factors shall be calculated by aggregating all MW·km caused by induced flows in all grid elements regardless of the direction of the induced flow compared to that of the actual flow on the network during the snapshot. These absolute sensitivity factors shall be used to reflect the “electrical” distance between exporting and importing countries and they are taken into account when reference exchanges are calculated.

(b) Net sensitivity factors shall be calculated by aggregating all MW·km caused by induced flows in all grid elements taking into account the direction of the flow.

These net sensitivity factors will be used to determine the share of total grid costs to be borne by transit flows, i.e. transit key.

Calculation of reference exchanges between exporting and importing entities

A1.3 Reference exchanges refer to the electricity exchanges between two given entities. Reference exchanges take place between each net exporting entity and net importing entity. They form the basis for the calculation of compensations to be paid by participating entities. These exchanges will identify the entities responsible for transits as those closest to the corresponding transited entities.

A1.4 Reference exchanges X_{ij} for each pair of a net exporting entity *i* and a net importing entity *j* shall be defined for each hour such that:

(a) for a net exporting entity *i*, the sum of the reference exchanges between this entity *i* and all net importing entities is equal to its net export

$$\sum_j X_{ij} = Net\ export\ of\ entity\ i$$

(b) for a net importing entity *j*, the sum of the reference exchanges between all net exporting entities and this entity is equal to its net import

$$\sum_i X_{ij} = Net\ import\ of\ entity\ j$$

(c) the reference exchanges X_{ij} meeting requirements in equations in (a) and (b) are determined such as to minimise the use of the transited grids

$$\min \sum_{i,j} X_{i,j} (\sum_k \tau_{ij}^k)$$

where τ_{ij}^k is the absolute sensitivity factor of entity *k* for an exchange from entity *i* to entity *j*.

A1.5 An example of the calculation of the reference exchanges is included in Annex C.

Calculation of compensations due to transits

A1.6 Compensations due to entity *k* is defined by applying a transit key in MWh·km such as (transit key equation)

$$Transit\ key_k = \frac{MWh \cdot km\ transited\ through\ country\ k}{total\ MWh \cdot km\ through\ country\ k}$$

(a) the total MWh·km through entity *k* is defined as the total amount of MW·km for actual flows in all grid elements of the entity over all hours of the year using the same snapshots as to calculate the sensitivity factors.

(b) the MWh·km transited through the entity *k* is defined as the sum of reference exchanges weighted by the net sensitivity factors of entity *k*, for each hour of the year; here the sensitivity factors should correspond to the export/import situations used to define the sum of reference exchanges.

A1.7 The transit key *Transit key*$_k$ shall be used to calculate the net payments for entity *k* (compensation equation).

$$Compensation_k = Transit\ key_k \cdot total\ cost\ of\ grid_k$$

where the total cost of the grid is defined according to Section 2 of the Guidelines.

Calculation of contributions of exporting and importing entities

A1.8 Contribution paid by each entity *i* shall be based on the reference exchanges X_{ij} defined for each hour of the year for that entity. Contributions are split equally among exporting and importing entities. Each entity *i* will pay a contribution such as (contribution equation):

$$Contribution_i = \frac{1}{2}\sum_{j,t} X_{ij}^{t}\left(\sum_k \tau_{ij}^{k}\frac{total\ cost\ of\ grid_k}{total\ MWh \cdot km_k}\right) + \frac{1}{2}\sum_{h,t} X_{hi}^{t}\left(\sum_k \tau_{hi}^{k}\frac{total\ cost\ of\ grid_k}{total\ MWh \cdot km_k}\right)$$

where the first part of contribution is the payment for hours when entity *i* is exporting and the latter part of contribution is the payment for hours when entity *i* is importing.

A1.9 Contributions shall be defined for all entities *i* for each hour of the year.

Direct current (DC) interconnectors

A1.10 DC interconnectors shall be represented in the calculation as fictive and separate entities at each end of the DC interconnection. The formation of the fictive entities shall be made based on the ownership of the DC interconnector assets.

A1.11 Costs of DC interconnectors shall be separated from the total cost of the grid if DC interconnectors are a part of the regulated network of the entity *i* when payments for entity *i* are defined.

A1.12 The methodology to define receipts and payments of compensations for DC interconnector is same as presented in paragraphs A1.1-A1.9. However, when compensations and contributions are calculated the effects of entities residing on the other side of the interconnector shall be appropriately taken into account in line with principles defined in the paragraphs A1.1-A1.9.

A1.13 Payments for DC interconnectors that are legally separate entities from TSO and thus not a part of the regulated network shall be defined according to paragraphs A1.1-A1.9 but the compensation for these interconnectors is set to zero. Furthermore, the DC interconnectors having both regulated and unregulated features, i.e. hybrids, shall be treated for the inter TSO compensation so that the compensation of the unregulated part of the interconnection is set to zero.

Calculation of net payments to an entity due to use of infrastructure

A1.14 Net payments for an entity i shall be defined such as

$$Net\ payment_i = contribution_i - compensation_i$$

where the compensation is defined based on the compensation equation (paragraph A1.7) and the contribution is defined based on the contribution equation (paragraph A1.8).

A2 Losses – Cost Allocation

A2.1 The method considers the impact of transits on each participating entity. It is based on a comparison between the network flows for two situations. One is the reference situation (containing actual flows) and the other is a situation after removing transits.

A2.2 Each participating entity shall provide an appropriate number (at least 72) of load flow data sets ("scenarios"), preferably snapshots based on actual network operation. The selection of time stamps of load flow data sets shall be such that they represent one year covering weekdays, weekends, daytime, night time etc. The time stamps shall be identical for all participating entities. Time stamps will be proposed by TSOs and agreed by regulators. The determination of losses shall consider all network elements of asset classes A, B, C, D, E and F (as defined in paragraph 2.5(b) and (c)) that can be identified in the load-flow data sets, including interconnectors ending at so-called X-nodes. The interconnectors shall be modelled such that each interconnecting line is split into two parts which consist of the line lengths to the borders of Member States or respective TSOs. Participating entities and regulators shall agree on a common data format to be used for the load flow data sets (e.g. the UCTE format).

A2.3 The load flow data sets shall be checked for consistency by comparing the interconnector flows between adjacent parties. Flow deviations above a threshold level of five percent of the average of the two flows (so-called excessive deviations) shall be attributed as follows:

(a) If for a given scenario one participating entity *i* has excessive deviations on more than one border, but the respective neighbouring entities only have excessive deviations on their borders to *i*, the excessive deviations shall be attributed exclusively to participating entity *i*.

(b) In all other cases the excessive deviations shall be attributed by 50 % to each of the two entities connected by the interconnector with the respective deviation if not agreed otherwise among entities involved.

For each scenario, the absolute number of excessive deviations attributed to a participating entity shall be divided by the number of tie lines of that entity in order to determine the percentage of excessive violations. The average percentage of excessive violations over all scenarios attributed to each participating entity shall be made available to all regulators and all participating entities on a yearly basis.

A2.4 Losses shall be determined by a DC load flow algorithm that only considers active power flows. The determination of losses shall consider all network elements identified in the load flow data sets.

A2.5 For the determination of "transits" each participating entity shall compute the flows on interconnectors (including DC links and merchant lines) both in importing and exporting direction for each individual snapshot. The transit is defined as the minimum of imports and exports. Once the total value of transit has been determined, it is distributed among the interconnectors according to the following relations:

Flow on interconnector (ic) is in import direction	**Flow on interconnector (ic) is in export direction**
$Transit_{ic} = Flow_{ic} \frac{Total\ Transit}{Total\ Import}$	$Transit_{ic} = Flow_{ic} \frac{Total\ Transit}{Total\ Export}$

A2.6 Each participating entity shall determine the losses P_{Vs} per scenario s with a load flow calculation.

A2.7 For each individual scenario s, the losses shall be weighted with the proportion w_s of the year the considered snapshot is representative for. The weighting shall be defined by TSOs based on time stamps according to paragraph A2.2 of this Annex.

A2.8 Determination of compensations for losses

(1) With a first load flow calculation for the reference situation (situation containing the actual flows) total active power losses $P_{Vactual}$ induced on all the elements connected to the grid during the snapshot shall be identified.

(2) The determined transit on each interconnector ($Transit_{ic}$) is removed by adjusting the active power balance of each X-node to be found at the end of an interconnector.

(3) After removing transit flows on the interconnectors a second load flow calculation for the situation without transits shall be done. The calculated total active losses for this situation represent the losses caused by domestic network utilisation $P_{Vdomestic}$ on all the elements connected to the grid during the snapshot. The losses caused by transits on the grid are defined as the difference of the total active power losses (with transits) and total active power losses caused by domestic network utilisation (without transits):

$$P_{Vtransit} = P_{Vactual} - P_{Vdomestic}$$

(4) The compensation for losses caused by transits per scenario s is determined as follows:

$$Compensation_s = \left(P_{Vtransit,s} \cdot LossCost\right) \cdot w_s$$

where:

$P_{Vtransit,s}$ losses per scenario s

$LossCost$ cost of transmission losses determined according to 2.9 and 2.10

w_s weighting factor describing the annual representativeness of scenario s (scenarios from Annex A, paragraph 2.2)

(5) The total yearly compensation $Compensation_i$ for each participating entity i equals the sum of compensations across all scenarios (compensation for losses):

$$Compensation_i = \sum_{\forall s} Compensation_s$$

A2.9 Contributions due to losses for each entity *i* shall be distributed equally on those exporting and importing entities.

A2.10 Net payments due to losses for an entity *i* shall be defined such as

$$Net\ payment\ due\ to\ losses_i = contribution\ \ due\ \ to\ losses_i - compensation\ for\ losses_i$$

where compensation for losses includes cost of losses for an entity *i* caused by hosting cross border flows and contribution due to losses is defined based on net flows of exporting and importing entities.

A3 Payments due to both Infrastructure and Losses

Total payments by an entity *i* are given by summing up the payments due to both infrastructure and losses of entity *i*.

Annex B - COMPUTATION OF UNIT COST, EXAMPLE

Total regulated revenue for 2006	Euro 500m	
Length of line assets		
A	800	km
B	500	km
C	100	km
D	50	km
MVA of transformer assets		
E	10,000	MVA
F	5,000	MVA

Weighting factors	
A (by definition)	1
B	0.67
C	0.4
D	5
E	0.03
F	0.025

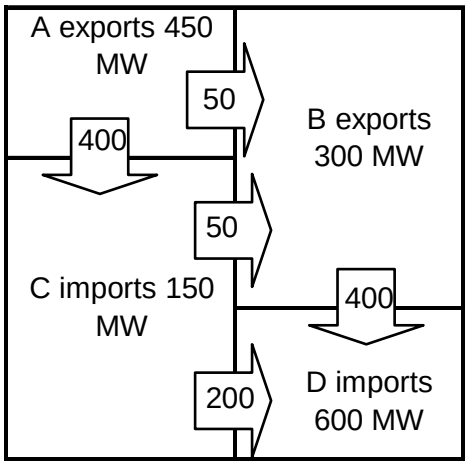
Unit of other asset classes expressed in km of class A			
A	800 * 1=	800	km of class A
B	500 * 0.67 =	335	km of class A
C	100 * 0.4 =	40	km of class A
D	50 * 5 =	250	km of class A
E	10000 * 0.03 =	300	km of class A
F	5000 * 0.025 =	125	km of class A
Total		**1,850**	**km of class A**

Unit cost of class A assets = €500m / 1,850 km = €270,270/km

Unit cost of class B	UCa * 0.67	€181,081/km
Unit cost of class D	UCa * 5	€1,351,351/km
Unit cost of class E	UCa *0.03	€8,108/km

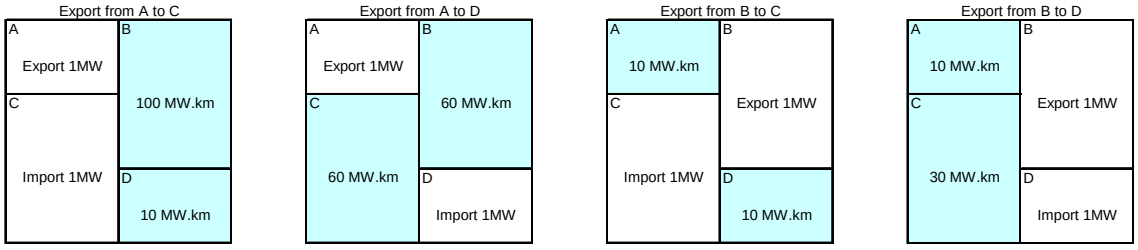
Annex C – EXAMPLE FOR DETERMINATION OF REFERENCE EXCHANGES WITH FOUR ENTITIES

Description of the example



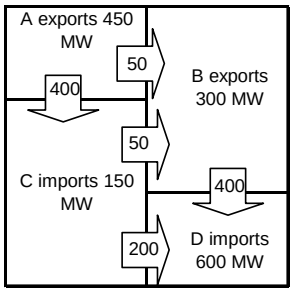
- In this example, we consider a network with four entities. Entities A and B are net exporters, entities C and D are net importers.
- Flows on borders are as shown.

Calculation of sensitivity factors



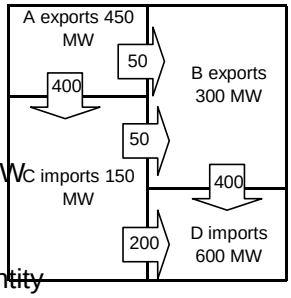
- Entities in blue are transited entities for a given pair exporting entity – importing entity.
- E.g. in the leftmost figure, a 1 MW exchange from generators in entity A to loads in entity C creates a 100MW.km use in entity B (sensitivity factor of entity B), and a 10MW.km use in entity D (sensitivity factor of entity D)
- The global sensitivity factor to an exchange from entity A to entity C (sum of sensitivity factors of all transited entities) is : G(A,C) =110MW.km

Export-import balance constraints



- Given the impacts of every possible unitary exchange on other networks, we need to find a combination of exchanges that matches real levels of export - import:
  - For entity A:
    - Exchange from A to C + Exchange from A to D = 450 MW
  - For entity B:
    - Exchange from B to C + Exchange from B to D = 300 MW
  - For entity C:
    - Exchange from A to C + Exchange from B to C = -150 MW
  - For entity D:
    - Exchange from A to D + Exchange from B to D = -600 MW

Determining the reference exchanges (1/2)



- There are many different combinations possible that satisfy the constraints defined in the previous slide:
  - Entity A exports 450MW to D and entity B exports 150MW to C and 150MW to D
    or
  - Entity A exports to 150MW to C and 300MW to D and entity B exports 300MW to D
    or
  - Both entities A and B export to both entities C and D.

- Of all these combinations, we want to choose **the one that minimises the use of transited networks while satisfying the balance constraints (previous slide).**

Determining the reference exchanges (2/2)

- The use (in MW.km) by an elementary exchange of transited networks is (for exchange between A and B):

$$G(A,B) * X(A,B)$$

Global sensitivity factor of elementary exchange A ⇨B on the rest of the network

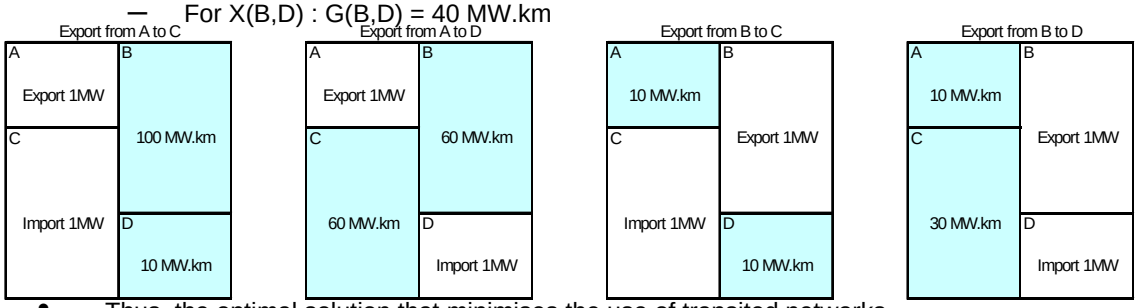
Level of exchange A ⇨B

- The global use of transited networks is the sum of all uses by the exchanges:

$$\sum_{A,B} G(A,B) * X(A,B)$$

Finding an optimal solution

- In this example, global sensitivity factors are :
  - For X(A,C) : G(A,C) = 110 MW.km
  - For X(A,D) : G(A,D) = 120 MW.km
  - For X(B,C) : G(B,C) = 20 MW.km
  - For X(B,D) : G(B,D) = 40 MW.km



- Thus, the optimal solution that minimises the use of transited networks while satisfying balance constraints is:
  - X(A,C) = 0