



ETSO comments on the new Guidelines on Congestion Management of the 1228/2003 EC Regulation

29 April 2004

INTRODUCTION TO ETSO COMMENTS

ETSO welcomes the new draft Guidelines on Congestion Management of the 1228/2003 EC Regulation, which are globally in line with the previous ETSO Vision on Congestion Management. ETSO believes that these Guidelines are a positive step forward towards the implementation of the forthcoming Regulation and, therefore, towards the development of the Internal Electricity Market.

In addition to this, ETSO feels that some of the issues raised by the Guidelines may still need to be completed or reviewed before its practical application. To that end, ETSO is hereby suggesting additional comments that should be included in the forthcoming Guidelines. Such comments have been structured as follows:

- First of all, in a separate document “Cross-border electricity exchanges on meshed AC power systems“, ETSO is providing a summarised description of the basic technical and commercial mechanisms that underlie the functioning of the European Interconnected Power System. By recalling such principles, ETSO is contributing to the achievement of a clear understanding of some of the crucial concepts that found a sound regulatory framework.
- In the first part of the text below, ETSO addresses the general comments on the Guidelines and on the Explanatory Note.
- In the second part, detailed comments on the Guidelines (in “track-mode”) are provided.

FIRST PART. GENERAL COMMENTS ON THE GUIDELINES ON CONGESTION MANAGEMENT

After having clarified the physical laws that govern any interconnected Power System through the previous chapter, this section addresses the general ETSO comments on the new draft Guidelines on Congestion Management.

1. ETSO has always fully agreed and supported the requirement to apply market-based solutions in all congested borders in the EU. In order to make this part of the Regulation unambiguous, it still appears necessary to clearly define what are market-based mechanisms (or what are not) through the Guidelines (e.g. explicit and implicit auctions). Similarly, the concept of “transaction based methods” should also be clearly defined.
2. As a general remark, it seems that TSOs alone are supposed to implement and comply with the principles described in the Guidelines. However, as regulated and unbundled monopolies, TSOs need to be fully supported by their national regulatory authority prior to the implementation of congestion management methods. ETSO suggests that the requirements to be fulfilled by the national regulatory Authority are also explicitly included in the guidelines.
3. It is not clear whether terms such as ‘transmission capacity’ and ‘congestion management’ are meant to apply to cross-border transmission only, or more widely, to the individual national market structures and internal arrangements. If the former, this should be explicitly stated. If the latter, many of the Guidelines may be unworkable since the harmonisation of internal markets may appear as infeasible in the short term (and, presumably, unenforceable within the terms of the Regulation). ETSO prefers that only cross-border issues are addressed, and has proposed a change in the guidelines subtitle in this respect (see second part).
4. The Guidelines stress the main roles of TSOs regarding the allocation of available capacities and ETSO is fully in line with those parts of the text. Nevertheless, ETSO would like to point out that the Guidelines may also need to take into consideration the specific cases of existing Market Operators and TSOs whose current roles in congestion management may differ from the situation of most European countries.
5. The Guidelines seem to have been drafted without allowing for the possibility of Entrepreneurial Interconnectors. For these, many of the roles and responsibilities of TSOs would be fulfilled by the interconnector owner, so the Guidelines may need to be re-drafted to allow for this. Similarly, no account is taken of DC interconnectors. For example, forecasts of transmission flows are not needed to calculate the capacity of DC links. In such areas, the Guidelines should distinguish between AC and DC interconnectors. In any case, ETSO’s current position on Entrepreneurial Interconnectors was published in November 2002 and available on line.
6. There is a general lack of clarity between capacity (which the TSO/interconnector owners have to calculate) and physical flows resulting from sources and sinks (which result from market decisions). ETSO hopes that the description provided in the previous section may avoid such confusion in the future.

7. Although its title seems to expand the scope of the Guidelines to “System Operation and Minimum Safety and Operational Standards”, and taking into account that no additional contributions seem to have been published in this regard, ETSO comments are not covering this topic. ETSO thus suggests that the title “Guidelines on Cross-Border Congestion Management”.
8. In relation to the Explanatory Note, the following general comments are proposed:
 - In the Introduction, it should be stated that the Guidelines apply only for cross-border congestion management on interconnectors between Member States of the European Union plus Norway and Switzerland.
 - In the second chapter “Economic efficiency and the promotion of competition”, ETSO suggests to add that the demand for long term capacity allocation might diminish when liquid financial markets have developed. In this regard, ETSO believes that the market participants should have the possibility to choose between forward physical transmission rights and financial tools (FTRs, CfDs, ...).
 - In the third chapter “Rules on maximising the available capacity and capacity use”, several misleading concepts such as “structural congestion”, “loop flows” and “origin and destination countries” should be modified according to the explanation provided in the previous section.
 - Also in the third chapter, ETSO would like to point out that co-ordinated capacity allocation methods may not be feasible in all cases (i.e.: borders with non-EU countries, different existing regulatory frameworks, ...). In such situations, it is proposed in the Explanatory Note to split the capacity in two equal parts being each TSO responsible for the allocation of capacity for each part. Since this method may not be efficient for the market, other possibilities for allocation of the whole capacity should be explored. In this respect, ETSO insists that having a common capacity allocation agreed by all concerned Regulatory Authorities is highly desirable for each intra-European border.

SECOND PART. DETAILED COMMENTS ON THE GUIDELINES ON CONGESTION MANAGEMENT

Please refer to ad-hoc file “*CMguidelines_track-mode.pdf*”, which includes additional detailed comments in track-mode.

GUIDELINES ON CROSS-BORDER CONGESTION MANAGEMENT, ~~SYSTEM OPERATION AND MINIMUM SAFETY AND OPERATIONAL~~ STANDARDS

The reader should refer to the general ETSO comments and to the document “Cross-border electricity exchanges on meshed AC power systems”.

1. MECHANISMS FOR CROSS-BORDER CONGESTION MANAGEMENT

1.1. The TSOs, or, where appropriate, Member States, shall provide non-discriminatory and transparent standards, which describe which cross-border congestion management methods they will apply under which circumstances. These standards, together with the security standards, shall be described in publicly available documents.

1.2.

~~1.2.~~In case of structural congestion, the congestion management method should ensure that the power flows ~~induced by~~associated with all allocated ~~commercial transactions~~transmission rights comply with network security standards ~~being at an acceptable level~~. A particular ~~commercial transaction~~request for transmission service should only be denied when the power flows resulting from its acceptance, in addition to the other accepted ~~commercial transactions~~request, lead to a situation where secure operation of the power system can no longer be guaranteed, and where that ~~commercial transaction~~request has an economic value (expressed through willingness to pay) lower than others ~~the transactions concurrently~~ accepted under the same contractual conditions whose rejection would also secure the power system.

(ETSO additional comment: the concept of “structural congestion” has to be defined)

1.3. Where ~~requests commercial transaction~~ do need to be ~~rejected~~constrained, the following rules shall be applied

- (1) Mechanisms may allow for capacity allocation to be both for long term and short term transmission rights~~transactions~~ and may be implemented on an annual, monthly, weekly~~and~~ daily basis. Weekends and public holiday have to be also considered.
- (2) A mechanism for an intra-day allocation of interconnector capacity may be established.
- (3) Each of these procedures should allocate a prescribed fraction of the available transfer capacity plus any remaining capacity that was not allocated in previous sessions~~auctions~~ and any capacity released by the capacity holders from previous procedures, e.g. “use-it-or-lose-it.”

- (4) ~~A proportion- minimum of X %~~ of the cross-border capacity agreed with the Regulatory Authorities must be retained for the daily allocation mechanism defined in point 3.2, unless unforeseen capacity shortage occurs.

(ETSO additional comment: there is no 3.2)

(ETSO additional comment: in these Guidelines, there seems to be an assumption that activity is concentrating on the day-ahead stage, although sufficient flexibility needs also to be considered in relation to intraday horizons).

- (5) Capacity allocation mechanisms shall allow ~~potential~~ network operators to reveal the value placed on capacity (either directly or indirectly) and produce directional price signals to market participants.
- (6) Capacity allocation mechanisms shall ensure that capacity is allocated to those who ~~ieh~~ places the highest values on capacity (through willingness to pay).
- (7) Network users shall be required to pay for allocated capacity according to a methodology based on the revealed value they have placed on that capacity.
- (8) ~~E~~Establishing minimum prices in short-term capacity allocation arrangements ~~methods~~ shall not be allowed. *(ETSO believes that the concept of minimum prices should be defined within the Guidelines)*
- (9) In principle, all potential network users will be permitted to participate in the allocation process without restriction.
- (10) Competition authorities may eExceptionally place, restrictions ~~-may be placed-~~ on individual companies ~~y~~ for reasons of market dominance taking into consideration that improper restrictions have the potentially to disturb the market.
- ~~(11) In order not to risk creating or aggravating problems related to any dominant position of market player(s), the competent regulatory authorities, if appropriate, may establish caps on the amount of capacity that can be bought, possessed and/or used by the different market players, when designing a congestion management scheme.~~
- (11)
- (12) Priority access rights to interconnection capacity should not be assigned to those contracts which violate Articles 81 and 82 of the EC Treaty. Existing long term contracts should have no pre-emption rights when they come up for renewal.
- (13) To promote the creation of liquid electricity markets, capacity bought at an auction should be freely tradable ~~before the moment of notification provided that the TSO is informed~~ in markets providing the necessary degree of co-ordination (see 1.1.4 below).

(14) To promote the creation of liquid electricity markets, the allocated capacity not used shall be left for the markets for reallocation (i.e.: use-it-or-lose-it-principle).

(15) Netting of firm schedules shall be applied as far as system security and access rules allow to do so. Firm schedules imply obligations for the concerned users, which are then responsible for imbalance costs if they do not use the capacity.

1.4. In cases where nomination for an expected flow between two countries significantly affects conditions in the interconnector joining third countries, congestion management methods shall be co-ordinated between the two countries concerned and the third country through a common allocation procedure. National Regulators shall ensure that no congestion management procedure with significant effects on power flows in other networks, be devised unilaterally.

2. CALCULATION OF NETWORK CAPACITY

2.1. The TSOs shall publish a general scheme for calculation of the total transfer capacity and the transmission reliability margin based upon the electrical and physical realities of their network. Such a scheme shall be subject to approval by the ~~R~~Regulatory Authority of the involved Member States concerned. The ~~security~~~~afety standards and the~~ operational and planning standards should form an integral part of the information that TSOs should publish in open and public documents.

2.2. The TSOs shall calculate Net Transfer Capacity (NTC) values on a commonly agreed network model based on a set of published base-cases ~~which are~~ representative of the common network situations. The bilateral NTC value has to be confirmed by the ~~two~~involved TSOs. The NTC values together with the main constraint limiting the NTC shall be published.

(ETSO additional comment: see the fundamental drawbacks of the NTC concept in the ETSO paper “Cross-border electricity exchanges on meshed AC power systems”)

2.3. TSOs shall offer to the market transmission capacity that is as 'firm' as possible. A reasonable fraction of the capacity may be offered to the market under the condition of decreased firmness, but at all times the exact conditions for transmission over cross border lines shall be made known to market participants.

~~2.4. TSOs shall actively seek to identify parts of the network where intermittent congestion might be solved without constraining scheduled commercial transactions across borders. Where such cases can be identified NTC shall be declared unlimited.~~

2.5. In case of a network constraint inside a control area is limiting the NTC at several interconnectors, the concerned TSOs shall publish the method how the capacity is distributed to the constrained interconnectors. This capacity distribution has to be non-discriminatory between interconnectors.

~~2.5.2.6.~~ 2.6. When balancing the network inside the control area through operational measures in the network and through operational countermeasures (i.e.: redispatching) ~~redispatching~~, the TSO has to take into account the effect of these measures to the other control areas. The TSOs shall exchange daily the available information ~~preliminary market results~~ in order to optimise the use of the overall network through operational measures in the network ~~and/or~~ through redispatching. The potential redispatching costs necessary to optimise the cross-border flows (refunds) shall be paid from (credited to) the congestion revenue for the border(s) in question according to the European Regulations.

(ETSO additional comment: the concept of redispatching in its role as either a curative, i.e. balancing measure or as a preventive, i.e. optimising measure, has not yet been thoroughly discussed. Notwithstanding the necessity to exchange information, some concerned ETSO members think that it is too early to implicate any conclusions concerning the application of preventive redispatch)

(ETSO additional comment: there is often no preliminary market results. For example, Power Exchange deliver only the final information some minutes after bid closure and market clearing. This sentence, with the word "information", may be useful when there are forward cross-border transmission rights, e.g. resulting from monthly auctions)

~~2.7. The maximum average hourly flows at an interconnector shall not deviate more than X% from the capacity to be nominated at that interconnector. When an imbalance is detected, network modelling shall be used to identify the causes for the loop flows and the interconnections where nominations shall be adjusted.~~

~~2.8. When the excessive loop flows are caused by internal imbalance in a control area, redispatching shall be made in order to diminish the loop flows to an appropriate level. In case of permanent imbalance, the control area shall be split to zones between which proper congestion management measures can be implemented in co-ordination with the congestion management methods at the interconnectors.~~

~~TSOs shall avoid limiting of the interconnector capacity in order to solve congestion inside their own control area; in any case it shall be used only to the extent it is economically justifiable.~~

(ETSO additional comment: see paper “Cross-border electricity exchanges on meshed AC power systems”)

3. TIMETABLE FOR MARKET OPERATIONS

ETSO additional comment: market participants may not welcome the idea of firm capacity nominations two days ahead the day of operation (chicken and egg...). Suggestion: replace the expression “Two days ahead of the day of operation” by “with enough anticipation from the application of the capacity allocation method in D-1”

It is not clear whether this section is seeking to harmonise internal markets, or just manage cross-border flows. For example, much of this section is incompatible with the internal England and Wales NETA market (and probably other markets based on bilateral contracting). For example, it is neither necessary nor desirable for power market operators to communicate market results to NGT (3.1.(5)).

3.1. The TSOs shall publish a general description of the method applied for ~~opti~~maximising the capacity available to the market based upon the ~~electrical and~~ physical realities of the network. Such a method should be subject to approval by the regulatory authorities of the involved Member States concerned.

- (1) X times per year the TSOs shall exchange the base case data ~~providing~~indication the best possible estimate of the ~~foreseen~~ transmission flows in the European network.
- (2) Two days ahead ~~of~~ the day of operation holders of capacity rights under the procedure in section 1 shall communicate to TSOs their intentions regarding the exercise of those rights.
- (3) Two days ahead ~~of~~ the day of operation the TSOs shall exchange the data on the nominations of all capacity reservations that are allocated on a basis of a time period exceeding one day and publish the available capacity for the day ahead allocation including the amount ~~allocated~~reserved under point 1.2.4 ~~(There is no 1.2.4)~~. This amount must take account of unused capacity rights from the procedure in section 1 and the results of netting.
- (4) Available capacity for day ahead nomination shall be allocated on a non transaction basis by a nominated agency for each Member State (except Luxembourg). Member States shall notify to the Commission by 31 Dec 2004 the nominated agency.

ETSO additional comment: the role of the nominated agency is unclear; it should be defined what are the task and the target of this agency and who is able to exercise the tasks: TSO, joined offices of involved TSO, regulatory authorities, etc.). For ETSO, capacity allocation is a clear TSO responsibility, as they have to bear the potential consequences on power system security. Thus capacity allocation should be carried out by TSOs themselves.

- (5) One day ahead of the day of operation at XX_-CET the market operators for power and capacity markets shall communicate the market results to the TSOs.
- (6) One day ahead of the day of operation at XX CET the market parties shall communicate the preliminary generation and load schedules to the TSOs.
- (7) One day ahead of the day of operation at XX CET the TSOs shall confirm the schedules to the market parties and to other TSOs, if deemed necessary by the TSOs, including possible eventual redispatching due to ~~capacity optimisation constraints solving in the interconnection~~ or security reasons. Any changes in schedules after XX CET day ahead the day of operation and exchanging information on them are subject to detailed rules agreed between the TSOs. These rules shall take into account the effect of such changes to the entire network, especially to cross-border capacities and to security of the network.
- (8) Two days after the day of operation hourly values of the nominated and physical cross border flows by interconnector shall be published by the TSOs.

ETSO additional comment: ETSO welcomes the efforts from the Commission in order to harmonise the different market arrangements across Europe. However, the above level of harmonisation of market timescales is very difficult to implement for the initial Guidelines, and in any case is too prescriptive at present because the most effective process for co-ordinated coupling of markets has not yet been developed.

4. TRANSPARENCY

- 4.1. Subject to the approval of the Regulatory Authorities, TSOs should publish all relevant data related to network availability, network access and network use including ~~a report~~ where congestion exists, ~~its reason*~~, the methods applied for managing the congestion and the plans to cope with it in the future.
- 4.2. TSOs should publish all relevant data concerning cross-border trade according to the best possible forecast. This includes the procedures for allocating capacity, including the time and procedure for applying for capacity, a description of the products being offered and the obligations and rights of both the TSOs and the party obtaining the capacity.
- (1) annually: all information on the long term evolution of the transmission infrastructure and its impact on cross border transmission capacity;
 - (2) monthly: month and year-ahead forecasts of the transmission capacity available to the market taking into account all information available to the TSO at the time of the forecast calculation (e.g. impact of summer and winter seasons on the capacity of the lines, maintenance on the grid, availability of the production units, etc.);
 - (3) (ETSO additional comment: this may be a huge amount of information. Providing this information one week-ahead could mislead the market, as the available information of the TSO is generally the same as for monthly forecasts. Of course useful information needs to be published on a week ahead basis) weekly: week-ahead forecasts of the transmission capacity available to the market for each market time unit (which may be an hour, half an hour or a quarter of an hour), taking into account all information available to the TSOs at the time of calculation of the forecast, such as weather forecast, availability of the production units etc.;
 - (4) daily: day-ahead ~~forecasts of the~~ transmission capacity available to the market for each market time unit;
 - (5) the total amount of all contracts predating the EU directive 96/92/CE and having a priority right of access to cross border transmission capacity, the daily values of the total capacity taken by them as well as its provisional evolution in the coming years;
 - (6) total capacity already given out by market time unit and all relevant conditions under which this capacity may be used (e.g. auction clearing price, obligations how to use the capacity, etc.), so that the remaining capacity is revealed;
 - (7) total ~~used~~~~nominated~~ capacity by market time unit ~~immediately~~ after the moment of nomination; (ETSO additional comment: in fact, the total nominated capacity can be announced at the earliest after the confirmation process with the neighbouring TSOs).

- (8) as soon as possible after real-time, realised commercial transactions (*ETSO additional comment: ETSO proposes to delete this section (8), because TSOs should not be reporting on commercial transactions between users, only the allocation and use of physical transmission rights*) by market time unit, including a description of the effects of any corrective actions taken by the TSOs (like curtailment) for solving network or system problems. (CEER)
- 4.3. All relevant information should be available for the market in due time for the negotiation of all transactions (such as the moment for negotiation of year supply contracts for industrial customers or the moment when bids have to be sent into organised markets).
- 4.4. All information published by the TSOs should be made freely available in an easy way. All data should also be accessible in an adequate and standardised means of information exchange format, to be defined in close co-operation with market parties. This includes information on past time periods with a minimum of two years, so that new market entrants also have access to this data.
- 4.5. When forecasts are published, the *ex post* realised values of the forecast information should also be published, in the time period following that to which the forecast applies.

5. USE OF CONGESTION INCOME

- 5.1. ~~Net congestion income will be shared equally by the two TSOs concerned.~~ When a co-ordinated congestion management method is applied, the net congestion income shall be shared according to criteria agreed between TSOs which reflect the value of the transmission capacity at each interconnector.
- 5.2. By 31 March in each year, the regulatory authorities must publish a report setting out the use made of the revenues in question with a verification that this applications comply with this principle and rules and that the total amount of congestion rents are devoted to any of the three purposes considered.
- 5.3. When taken into account in the process of calculating the network tariffs, congestion rents should lead to a reduction of tariffs on top of any other regulatory method used for the calculation of tariffs.

(ETSO comment: according to the text of previous publications by the EC in this regard, some ETSO members consider that, with the exception of entrepreneurial interconnectors, the congestion revenue shall be used as a first priority for the removal of the congestion rather than for the process of calculating the network tariffs. Other ETSO members consider that equal emphasis should be given to the possible uses of congestion revenues)

- 5.4. On how to assign costs incurred to maintain allocated capacity, to be developed...



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Cross-border electricity exchanges on meshed AC power systems

1. Physical and Commercial: two related but different dimensions

This short paper is aimed at describing the relationship between two dimensions, or views, of large AC interconnected electrical systems.

- *The "physical" dimension (operator's view) :*

Balancing the system: a key role of TSOs is to keep the balance between generation and consumption for the whole interconnected power system (which is in reality one single physical process, e.g. from Poland to Tunisia for the "UCTE grid"). As global pan-European control of such a balance is not currently feasible, the task has been devolved to "control areas". Individual control areas may be in imbalance (i.e. exporting or importing) while the global situation must always be balanced (i.e. the sum of exports minus the sum of imports is zero). It is not technically possible to organise a physical export directly from control area A to control area B. What is technically managed (by changes in the generation schedules), is a positive imbalance in area A and simultaneously a negative imbalance in area B.

Controlling the flows: an AC interconnected power system consists of sources (power plants), sinks (loads) and links (lines, cables, and substations - i.e. the grid). The flows in the lines result from the sources, sinks and grid topology, according to physical laws that fully determine the "loadflow pattern". TSOs must ensure that the flows always comply with security rules. If a potential security problem is detected before real-time, TSOs may set some restrictions on the regional load-generation imbalances. These restrictions are often expressed in terms of "transmission capacities" limitations for market requirements (as explained below), even if the concept of "transmission capacity" is a rather crude and simplistic translation of a much more complex interdependence.

- *The "commercial" dimension (trader's view) :*

In this dimension the system is considered as a market place that should allow maximum trading flexibility for different types of products. For short term horizons (day-ahead and intraday) the most common products are "energy blocks" (e.g. 1 MWh consisting of 1 MW during a given hour) without any specification of origin or destination. Thus, even if they may look "physical" to non-specialists, they are *not* physical but are "paper" tradable products. Only the final real-time settlement of the trade will find a physical translation in generation schedules and load levels.

As market participants should be able to trade throughout the whole Internal Electricity Market, they need to know the potential restrictions due to the grid in a format they can manage. This requirement has led to a strong demand for “NTC” and “ATC” definitions. These relate to commercial exchanges, not physical flows. They approximate, in a very simplified bilateral manner (typically country A to country B), the complex constraints of allowable regional imbalances and transmission security rules that apply to control areas. In this framework, control areas become “hubs”, and the exchanges between different hubs are subject to limitation (exchange capacities). Within UCTE, the only exchanges authorised at present are between neighbouring and physically interconnected hubs.

2. Flows and commercial exchanges refer respectively to these two different dimensions

What is the relationship between flows and commercial exchanges?

The flows are a property of the physical dimension. For a given real-time pattern of inputs and outputs on the grid, there is a unique pattern of flows on the lines. These can be summed over all the lines crossing a given border to yield a “border flow”.

Commercial exchanges are a property of the commercial dimension. They refer to “paper” linkages between generators, traders and consumers.

Commercial exchange capacities must be published before real-time to give traders the time to use the information. Thus while the concept is itself inherently approximate, the values result from guesses of an unknown future (the real generation and load schedules), as explained below in “the chicken and egg story”.

There is no unique relationship between the flows and the commercial exchanges:

1. For a given set of imbalances of the different control areas (i.e. a given set of exports and imports as a result of “products” trading), there is an infinity of possible generation and load schedules for each zone. These different schedules are not under TSOs responsibility, TSOs are only notified of the results from market participants’ decisions. Of course, these different schedules will result in different loadflow patterns on the whole European grid, including international interconnections.
2. Symmetrically, a given flow pattern can be the result of different commercial exchange patterns so long as each maintains the generation schedules of each zone (for example, a closed chain of commercial exchanges [e.g. A to B, then B to C, and C to A] can be added to an existing exchange pattern without affecting the physical flows at all).
3. In general, “border flows” (say the sum of the flows on power lines between control areas A and B) do not coincide with “border commercial exchanges” (traded products between hubs A and B). In fact, it is very common on the UCTE grid to have a significant “border flow” in one direction, while the “border exchange” is in the other direction.

3. Characterisation of flows

Concepts such as “parallel” and “loop” flows have been used to summarise the above situation. The introduction of these terms was meant to explain, correctly, that the flow on a particular tie line is the result not only of the commercial exchange between the two interconnected countries, but also of the whole generation/consumption pattern on the whole AC interconnected system. However, this explanation seems to assume that a border flow can be split into the sum of "direct flows" (equal to the commercial exchange) and "parallel flows". Unfortunately, this virtual splitting picture does not reflect the scientific reality (for example, the description “parallel flows” does not fit naturally when they are in the opposite direction to the main flow). The term "loop flows" (which originally was intended to convey the same idea), suggests that electricity circles in loops, using transmission capacity to no effect. Again, this does not reflect the physical reality since electricity always flows from a source to a sink, and never flows in closed loops around an AC transmission system.

In view of the above, it is suggested that flows should be characterised by adopting the following approach:

- It should be kept in mind that using terms as "parallel flows", "loop flows" and "commercial flows" may be misleading. A so-called "commercial flow" is the fictitious flow corresponding with the contract path chosen for a (group of) transaction(s). "Parallel flows" or "loop flows" are the resulting, difference between the measured physical flow and the fictitious "commercial flow". Therefore, the vocabulary used should discourage such terminology.
- The flow pattern should be regarded as being determined by physical laws that can be expressed as a set of equations. It can be easily computed using standard loadflow software if generation and demand patterns are either known (ex post) or estimated (ex ante).
- The relation between the flows can be simplified through linearisation, an approximation that is generally only valid in the vicinity of the initial situation used to evaluate the linear parameters. Then the flows on a specific border can be expressed as a linear combination of either the nodal inputs/outputs, or even the zonal balances (although the approximation is then more radical). ETSO has proposed such a model, using a Power Transfer Distribution Factor (PTDF) matrix, to improve the accuracy of the model in the commercial dimension.

4. Publishing transmission capacities: a chicken and egg story

It is often suggested that mismatches between measured physical flows at a given border and the previously published commercial exchange capacities simply arise from a lack of co-ordination between the involved TSOs. Typically, this happens when “free capacity” (i.e. border flows being less than the commercial exchange capacity) appears in practice after the allocation procedure has denied access because of anticipated congestion.

We have seen above that the two notions of flows and commercial exchanges are very different in nature and have no reason to coincide. However, it is still relevant to ask whether improved co-ordination between TSOs would enable them to declare higher commercial exchange capacities.

A better co-ordination between TSOs increases the quality of the real-time or close-to-real-time control of flows, thanks to a shared knowledge of generation and load schedules. Unfortunately, this has only a very limited impact on improving the calculation of commercial exchange capacities. A more important factor is the following chicken and egg problem. To predict commercial exchange capacities with an acceptable accuracy, TSOs need the generation and load schedules (to compute the loadflow pattern and check potential security problems). But these schedules (especially generation ones) are fixed only after all trades have taken place, both within the different hubs and between them. And in order to trade between hubs, traders need to know the commercial exchange capacities...

In a meshed interconnected network, the flow on a given border can be significantly dependent on the exchanges across neighbouring borders. Hence to evaluate the commercial exchange capacity of the given border, the TSOs have to make certain assumptions. In general terms, the evaluation of the commercial exchange capacity will rely on an estimation of the flows. This estimation depends on the whole generation/consumption pattern, including the effect of imbalances that are necessary to achieve the required exchange level on other borders. The TSOs must then predict the state of the market for the horizon to which they are computing the capacities (a prediction often referred to as "the base case"). With the growing volatility of trade from one day to the following, and even from one hour to the following, it is becoming more difficult to foresee such data accurately. For this reason, TSOs tend to be conservative, making a set of assumptions that ensure feasibility in the face of market uncertainty. This is especially the case if users require firm capacity.

Let us take an example with two neighbouring borders generally congested in one direction; the capacity on each one will be evaluated with an assumption of export on the other one. If the market results turn out to give schedules with one of the border in the export direction, and the other one in the import direction, the situation described before is likely to happen: the border in the export direction is finally not congested from the physical point of view because of the impact of the imports on the second one, whereas it appears to be congested from the market actor's perspective.

To cope with such a problem, one of the solutions is probably to authorise "iterations" through an intraday allocation and nomination procedure: then the assumptions on the commercial exchange capacity assessment can be updated with actual information, and "extra" capacity offered to the market. Obviously however, there remains a problem of liquidity of these intraday markets. Co-ordinated implicit capacity allocation (using a network modelling in the clearing algorithm) is also likely to improve the process.

5. The misunderstanding about netting

It is also often suggested that trading opportunities are lost "*because the TSO(s) do not net the capacity*". A clarification is necessary here: first of all it is very important to use precise vocabulary. The term "netting" can be applied to flows and commercial exchanges, but not to capacity, so the term "capacity netting" should be avoided. In practice, netting must always be connected to firmness of schedules notified by traders. As soon as firm schedules have been nominated in one direction, the traders have an obligation to manage the corresponding imbalance between the control areas. TSOs are then able to offer the equivalent amount of "extra" capacity in the other direction. This concept is quite simple in the case of a peninsular interconnection, but considerably more complex in highly meshed parts of the European system.

6. ETSO proposes substantial improvements

In the framework of the Florence Forum, ETSO has already presented its vision on Co-ordinated Congestion Management. In this regard, ETSO stated that its first goal should be to create the network access arrangements that the market needs to enable effective competition across Europe, and to optimise the use of the network in a pan-European perspective. This goal will be achieved by providing practical market-based mechanisms to manage congestion between regions, while allowing the co-existence and evolution of different market structures within regions.

A first step proposed by ETSO is to enrich the market model used within the whole IEM: today it is often what we call the "bilateral connex" model, meaning that commercial exchanges can only be scheduled between adjacent control areas. The commercial exchange capacities are therefore evaluated in compliance with that model, which means they are bilateral. The model described by ETSO allows providing the possibility to trade directly from any hub to any other. In this case, the bilateral commercial exchange capacities are replaced by a linear model that gives the relationship between the balances of each zone and the flows on the interconnection tie lines.

As explained before, the relation between the flows can be simplified through linearisation, so that the flows on a specific border can be expressed as a linear combination of either the nodal inputs/outputs, or even the zonal balanced. This is why ETSO has proposed such a model, using a Power Transfer Distribution Factor (PTDF) matrix, to improve the accuracy of the model in the commercial dimension.

Also, the model proposed by ETSO extends the concept of netting, since the conversion of commercial exchanges into flows through a matrix takes this netting property into account implicitly even in the case of a meshed grid, at least to the extent corresponding to the accuracy of PTDFs (the Power Transfer Distribution Factor matrix).

In conclusion, as commercial capacities and flow management have a direct impact on both security issues and IEM efficiency, it is very important that all concerned parties have a common understanding of the basic concepts of cross border electricity exchanges on meshed AC power systems.

ETSO is permanently working on improvements that allow increasing market efficiency without jeopardising power system security.