Transmission Risk Hedging Products

Solutions for the Market and Consequences for the TSOs

ETSO Background Paper - 20 April 2006

Executive Summary

In the framework of the EC Regulation 1228/2003, the goal of this background paper is to provide a description of the different market based solutions available for transmission risk hedging in congestion management. This paper presents three different transmission risk hedging products that can be offered to the market in the field of cross-border trade and congestion management.
Due to various facts several price zones exist within the overall European electricity market where the demand of each zone is met in real time by the production of the respective zone and a zone specific market price is found (e.g. on the respective Power Exchange). This raises the question of how a market player wishing to buy electricity in a certain price zone and to sell it in another one can hedge the risk of a price difference emerging between those zones.

This paper describes the three main kinds of transmission risk hedging products identified by ETSO:

- Physical Transmission Rights (PTRs);
- Financial Transmission Rights (FTRs);
- Financial Contracts for Differences (CfDs);

The paper also provides a first evaluation of the different solutions adopting a markets' perspective.
From a practical perspective, the implementation of forward PTRs only requires a minimum of market infrastructure and contractual arrangements. This is probably the reason for this product to be widely and successfully implemented on most European interconnections. However, Market Splitting or Coupling or co-ordinated implicit auctions would be the main prerequisite towards the implementation of market-based FTRs and CfDs in Europe. Vice versa, in case Implicit Auctions (Market Splitting or Coupling) are introduced FTRs form a reasonable complement to those schemes for transmission hedging.

1 Context and Motivations

One of the most significant properties of electricity markets is that due to the fact that electricity cannot be stored both production and consumption have to take place simultaneously. In addition, physical grid constraints prevent electricity from being transferred freely across interconnections. Due to both of these facts several price zones emerge within the overall European electricity market where the demand in a given price zone is met in real time by production in that zone and market price for this specific zone is found (e.g. on the respective Power Exchange). In case these market prices differ between adjacent price zones, market participants have an economic interest to shift (buy and sell) electricity from "low price" zones to "high price" zones. This, however, is only possible to the extent grid "bottlenecks" between the price zones allow for such transfers. In case for technical reasons transfers cannot be carried out until the prices of the adjacent zones reach exactly the same level, offers from the "low price" zone cannot reach the "high price" zone and prices will ultimately remain different in the adjacent price zones.

This raises the question of how a market player wishing to buy electricity in a certain price zone and to sell it in another can hedge the risk of a price difference emerging between those areas. An example for a market participant facing such a risk would be a seller in one price zone supplying a buyer in another area:

- One possibility would be to assign a physical transmission right to the seller entitling him to use a proportion of the congested "bottleneck" to supply his buyer. This is the concept of the so called "physical explicit auctions" where available transmission capacity is allocated directly to different market parties based on their bids for spare capacity submitted to TSOs or to an independent Auction Office. Such Physical Transmission Rights (PTRs) form an effective price hedging instrument as the underlying Electricity transfer possibilities allow for the realisation of arbitrages covering price differences between zones. Annual, monthly or daily PTRs are explicitly auctioned by a wide majority of European TSOs.
- Another idea would be to assign a Financial Transmission Right (FTR) entitling the seller to collect the market price difference between the price zones. He could then simply sell the energy generated by the power plant in the local price zone and buy the energy for his buyer in the customer's price zone. As the price difference between the markets is entirely compensated by the payouts of the financial transmission right (FTR), the seller would effectively be in the same financial situation as if the customer was supplied by the seller directly in his market area. This is the concept of the explicitly auctioning of FTRs where available transmission hedges are allocated directly to different market parties based on their bids submitted to an organisation entitled to issue these FTR's, preferably TSOs or to an independent Auction Office. The outlined concept is complemented with the so-called day-ahead "implicit auctions" (Market Coupling or Market Splitting schemes) where all available transmission capacity is allocated by energy market platforms (such as Power Exchanges) to shift selling bids between price zones. The income realised this way can be used to pay off FTRs. FTRs thus facilitate zonal price hedging by providing payoffs to their holders. Such payoffs ideally amount to potential losses resulting from buying electricity equivalent to the FTR in one price zone and selling it to another. The annual/monthly/weekly FTRs auctioned by TERNA on the Italian interconnection and PJM's auctions of FTRs in North America are real implementation examples of this concept.
- Rather than paying out FTRs from congestion income, collected by shifting bids between price zones, one could also imagine that market parties engage with each other directly by swapping contrarious risk profiles. In addition to the seller from the above example located in a certain price zone "A" supplying his buyer in another price zone "B", there could be a second market participant holding generation capacity in price zone "B" with a customer located in price zone "A". In order to hedge against potential price differences, those two players could simply swap their customer or generation portfolios. As this can hardly be done "physically" by e.g. exchanging owner-

ship of the power plants, the two market parties could simply compensate each other financially for any arising market price discrepancies. Neutral trading platforms providing "Contracts for Differences" (CfDs) and acting as one single counterpart to the market are being set up to bring such parties with different risk hedging preferences together. The financial Contracts for Differences available at Nord Pool and the eSPREAD products offered at EXAA are European implementation examples.

As the European electricity market design moves forward and harmonisation efforts made are showing results, ETSO would like to contribute to the analysis and further understanding of the transmission risk hedging solutions outlined above which could be offered to European market participants.

The contents of the ETSO-EuroPEX proposal "Flow-based Market Coupling" [2], which is basically a possible way forward to the implementation of the ETSO Vision on Congestion Management [0], included detailed arrangements for the day-ahead markets and simply outlined a variety of possible trading solutions for the forward markets (e.g. forward transmission rights and financial hedges). This paper could be seen as a first attempt to describe more in depth the forward market arrangements outlined in the joint ETSO-EuroPEX proposal "Flow-based Market Coupling.

2 Transmission Risk Hedging Products. Technical Description

This section intends to describe the three main kinds of transmission risk hedging products identified by ETSO:

- Physical Transmission Rights (PTRs);
- Financial Transmission Rights (FTRs);
- Financial Contracts for Differences (CfDs).

One fundamental characteristic of PTRs and FTRs as forward transmission rights is that they are associated or subject to the availability of transmission capacities between the electricity markets or price zones. In contrast to this, pure financial contracts (CfDs) between market participants using a central clearing house as a mediator can facilitate transmission risk hedging. Via such CfDs different buying/selling preferences are simply swapped between market parties indirectly by involving the clearinghouse a central counterparty

2.1 Physical Transmission Rights and Explicit Auctions

2.1.1 Prerequisites for PTRs: minimum market design harmonization

Within the meshed European electricity network TSOs dispose of Available Transmission Capacity (often referred to as "ATC") which can be used for electricity transfers between price zones. Such ATC can be allocated directly to market participants by means of explicit auctioning. This requires the establishment of an auctioning procedure, which is either held by an independent body (an "Auction Office") or by several TSOs collaborating with each other. Market parties can participate in such auctions and obtain – in case their bids are successful- the right to transfer electricity within certain capacity limits (a so called Physical Transmission Right, "PTR").

2.1.2 Basic Concepts; Auctioning Date & Time of Nomination

A Physical Transmission Right (PTR) gives its holder the right to notify (nominate) energy transfers between two zones in form of cross-border exchange programmes. The maximal amount of power that can be scheduled at the time of nomination is limited by the amount of PTRs previously acquired by means of explicit auctions at a certain auctioning date (date the auction takes place). The cross border exchange

programme is considered by the TSOs as an injection or a withdrawal of energy for the concerned balancing responsible parties in each price zone.

2.1.3 Risk Hedging with PTRs

As PTRs entitle their holders to carry out electricity transfers,- the accomplishment of zone-to-zone bilateral trades is effectively ensured. Equally, PTR holders can overcome price differences between zones by buying, transferring and subsequently selling electricity on organised energy markets. For the above reasons and taking the steps outlined before, effective risk hedges can be set up through the acquisition of PTRs. In order to provide long-lasting certainty about the market price differences risk hedges must be set up over a longer period of time (e.g. an entire month or year). If traders wish to set up long term hedges they may use longer term (yearly and monthly) PTRs rather than short term (daily) PTRs.

2.1.4 Explicit Auctioning of PTRs. Obligations or Options

PTRs are basically designed as options to establish an exchange programme between two zones. Such options are exercised at the time of nomination, e.g. before a certain deadline on D-1, in advance of the daily capacity allocation mechanism. In most implementation examples, the PTR's validity expires after the nomination process according the so-called "use-it-or-lose-it" principle. Up to now, only PTRs options have been implemented in European interconnections. One could, however, also imagine to auction PTR obligations. In this case, the exchange programme nomination is no longer voluntarily and PTR obligation holders are compelled to carry out the respective electricity transfers.

The amount of day ahead PTRs available for auctioning can be optimised through the application of the so called "netting" procedure. Once the electricity transfers legitimated by long term (monthly or yearly) PTRs are nominated (usually before a certain deadline on D-1), TSOs can rely on those transfers being carried out. In such cases, additional transmission capacity is freed for the following daily allocation. In this context one should notice that being short term products day ahead PTRs are only of limited use for zonal price difference hedging (see 2.1.3).
A Simultaneous optimisation (also called "netting" when applied to simple peninsular cases) of PTRs in opposite directions at the exact time of allocation is only possible if PTRs are obligations. In this case, TSOs can rely on the underlying electricity transfers being effected directly when the PTR obligations are allocated. An equivalent amount of PTRs can be instantly auctioned for the opposite direction.

The secondary trading of PTRs is possible and implemented in several cases but has been left out of the scope of this paper.

2.1.5 PTRs: Congestion Income and Financial Settlement Issues

Congestion income from explicit auctions is collected and used by TSOs as prescribed by the framework of EC Regulation 1228/2003. Market participants bid explicitly for PTRs. Once their bids are accepted PTR holders effect the respective payments (Clearing price times PTR volume) to the TSOs. PTRs entitle their holders to carry out electricity transfers, which under perfect market conditions, lead to congestion income equalling the payments that were affected to the TSOs. Figure 1 illustrates financial flows resulting from the allocation of PTRs.

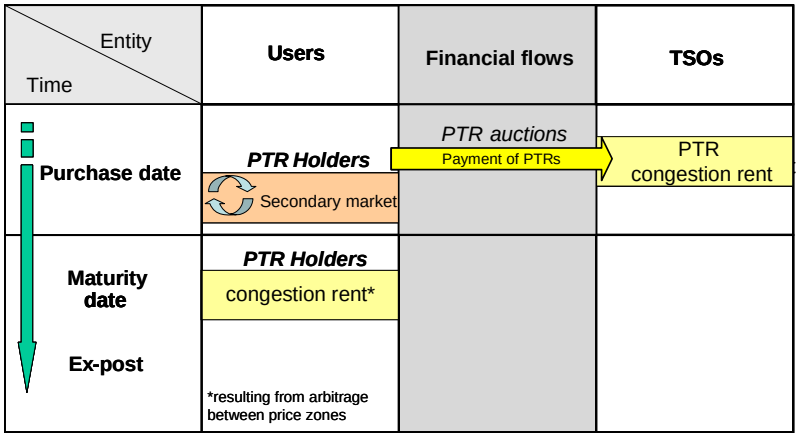

Figure 1. ***The financial flow cycle of PTRs (options and obligations).***

2.2 Financial Transmission Rights and Implicit Auctions

2.2.1 Prerequisite for FTRs: day-ahead coordinated implicit auctions

Under a day-ahead implicit auctioning concept, TSOs provide day-ahead Available Transmission Capacity between price zones in order to facilitate a simultaneous clearing of adjacent organised electricity markets (e.g. Power Exchanges). Roughly speaking, that is to say selling bids into those markets referring to one price zone are shifted to other price zones by a market facilitator (e.g. Power Exchange) as long as this is economically reasonable and technically feasible.

In this context, "economically reasonable" means that bids are only shifted to another price zone as long as there exist no lower selling bids in that price zone itself to meet the respective zonal demand. As another prerequisite ("technical feasibility"), sufficient ATC must be available for shifting the bids. As a result, either the prices of the two zones are equal before the ATC limit is reached or the ATC limit is reached, leaving a price difference between the two zones.

Finally, all accepted bids receive the market clearing price of their respective price zone irrespective of whether they were shifted to other price zones or not.

In case there is only implicit capacity allocation of the entire ATC , it is not possible for market participants to shift selling bids themselves, i.e. the so-called "physical" or explicit bilateral inter-zonal trades are impossible. In case forward PTRs have been previously allocated through yearly and monthly explicit auctions the respective underlying part of the available capacity would still have to be nominated by traders themselves. The so-called Financial Transmission rights (FTRs) can provide transmission risk hedging solutions without requiring the notification "physical" or explicit bilateral inter-zonal trades.

2.2.2 Basic Concepts; Purchase Date & Maturity Date

A zone-to-zone FTR is a financial instrument offered at a purchase date and entitling its holder to collect a revenue equal to the zone-to-zone price difference at a maturity date. The maturity date usually refers to the clearing of some underlying energy markets (e.g. Power Exchanges' day-ahead organised markets).

2.2.3 Risk Hedging with FTRs

A FTR protects its holder towards zone-to-zone price volatility due to the impact of transmission constraints at the maturity date. Purchasing a FTR provides price certainty to the FTR holder regarding its future transaction cost at the maturity date. A FTR is thus an efficient hedging towards energy market price spread volatility for a zone-to-zone ('bilateral') marketer, provided, of course, that the marketer did well manage his risk. A FTR, seen as a long-term transmission risk hedging product, would be purchased well before the maturity date (e.g. annually or monthly). FTRs are used for offering forward price

hedging in markets without longer term allocations of transmission capacity but where the available transmission capacity is allocated implicitly under day-ahead market coupling/splitting arrangements.

2.2.4 Auctioning of FTRs. Obligations or Options

One efficient way to have access to a good whose value is not known or common to all is to auction it. Therefore, FTRs (e.g. in MW for a given duration) could be defined and explicitly auctioned at different time horizons (e.g. from annual to daily). To be risk balanced for the TSOs (also called "revenue neutrality", that is to say statistical equivalence between income and revenue at the maturity date), the FTRs amount assigned must not exceed the available transmission capacity (ATC) expected to be used by the allocation mechanism (market coupling/splitting) at the maturity date. As an example, assuming that only FTRs and D-1 market coupling (e.g. there are no forward physical transmission rights) are in place between two zones, it is likely that 100 % of the ATC in the direction of the trade between the two zones would be allocated by the Power Exchanges at day-ahead level.

A FTR is generally a financial entitlement tradable by itself on secondary markets, independently from any "physical" output (OTC transaction or Power Exchange transaction).

As FTR prices reflect the price difference between price zones, they form an economic signal for transmission valuation from the initial purchase date to the maturity date.

FTRs can be options or obligations. Provided that they are obligations and not options, FTRs auctioned in opposite directions are simultaneously cleared using a simple maximisation program under network constraints. When FTR are "obligations", revenue has to be collected by the holder even if it is negative, which means in such a case that the holder of the FTR pays something at the maturity date. In the case of options, the simultaneous feasibility test, which is required for revenue neutrality, will lead to either the same or a lower volume of awarded or cleared FTRs after the auction performed at the purchase date: the worst case among all possible combination of optional use of FTR must indeed be considered in the simultaneous feasibility test.

When Physical Transmission Rights are options, the exercise of such options is performed through the so-called "nomination" process, which, as outlined in section 2.1, takes place in D-1. However, when Financial Transmission Rights are options, a "nomination" process no more exists and could be considered as replaced by the fact that buyers of FTR-options always collect a positive or zero (but never negative) amount of money at the maturity date.

2.2.5 FTRs: Congestion Income and Financial Settlement Issues

In the framework of the 1228/2003 EC Regulation, congestion revenues will finally be collected by the TSOs through yearly, monthly or weekly auctions of FTRs.

When applied to the European context, the "physical" congestion income at the maturity date (typically collected by some day-ahead Market Coupling between the two price zones associated to the definition of the FTR) would be totally or partially used to pay the FTRs' holders. This obviously depends on the initial amount of FTRs issued by the TSOs at the purchase date. This rough equivalence between income and charge at the maturity date is subject to some assumptions, the main one being that the overall quantity of FTRs sold at the purchase date must be simultaneously feasible under "physical" conditions at the maturity date. Of course, this does not mean that the TSO does not collect any congestion revenue, as the FTRs should be initially allocated using a non-discriminatory and transparent procedure (typically through market-based procedures like auctions). Therefore, this procedure effectively replaces the "physical" congestion rent at the maturity date (which is now totally or partially re-distributed to the FTR holders), by the initial FTR yearly or monthly auction revenue collected by the TSOs.

The financial flow cycle of a FTR is rather simple. Figures 2 and 3 below intend to summarise the financial exchanges between Users and TSOs related to the settlement of FTRs under day-ahead market coupling

conditions. The simultaneous feasibility test used by the TSOs to determine the amount of FTRs to be auctioned ensures that congestion income from market coupling always exceeds the amount corresponding to the settlement of FTRs or "pay-back" procedure. Whenever the amount of auctioned FTRs equals the D-1 ATC used by the Power Exchanges for the market coupling procedure, the only congestion income collected by the TSOs comes from the initial FTR auctions at the purchase dates.

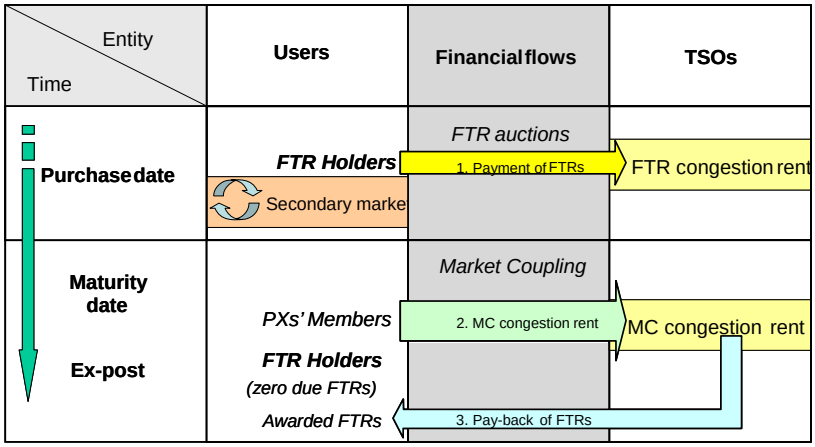

Figure 2. The financial flow cycle of FTRs options.

The simultaneous optimisation at the purchase date ("netting") makes the financial flow cycle bi-directional at the maturity date when FTRs are obligations.

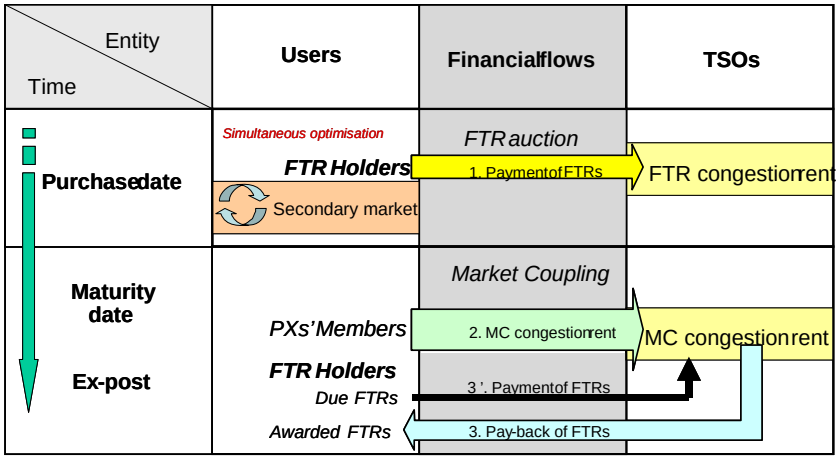

Figure 3. The financial flow cycle of FTRs obligations.

2.3 Financial Contracts for Differences (CfDs)

2.3.1 Prerequisite for CFDs: neutral trading platform and sufficient market liquidity

Different market parties might wish to set up trades 'in opposite directions' by buying and selling energy in the respective opposite price zones. One party might e.g. wish to buy a certain amount of energy in a 'Zone A' and sell it to a 'Zone B' whereas another party might intend to set up the exact opposite trade buying in 'Zone B' and selling to 'Zone A'. In this context, CfDs form a tool for bringing these parties together. Parties intending to buy/sell in one price zone effectively swap their trades with parties intending to sell/buy in the respective opposite area. For simplicity reasons, the settlement of CfDs is purely financial entitling/obliging their holders to receive/pay the price difference between two price zones. For the above reasons it is obvious that this scheme requires a sufficient amount of players with match-

ing interests taking part in such a CfD market (sufficient market liquidity). Compared to the auctioning of FTRs or PTRs, the fundamental characteristic of CfDs is therefore that their clearing is not subject to transmission constraints between price zones, but rather on the gathering of a minimum number of market participants around a neutral trading platform. As pure financial bilateral trades between market parties and a central counterparty are set up, TSOs are not directly involved in the trade of such products. Thus, the operation of such financial markets usually belongs to other financial marketplaces or institutions.

2.3.2 Basic Concepts; Purchase Date & Delivery Period

Basis CfDs with reference to zonal prices are purely financial contracts in which the buyer of the contract is entitled to receive the difference between two market prices whereas the seller commits to pay the price spread. When the price difference is negative, the flow of money is reversed and goes from the buyer to the seller.

A CfD is a forward contract with reference to the difference of prices between two zones. They are generally listed under the form of futures contracts with daily settlement over the delivery period, i.e. the buyer pays the initial transaction price minus the actual difference between the market prices (multiplied by the contract quantity) and the seller receives the same amount. The market price of a CfD during the trading period reflects the market's prediction of the price difference during the delivery period. The following are some of the main characteristics of CfDs:

- Cash settlement. Traded CfDs products are cash settled financial products. This may attract market participants who are not necessarily interested in physical delivery and possibly increase the market liquidity.
- Continuous trading. In order to allow rapid intra-day position movements and ensure coherence with existing futures market for arbitrage purposes, a continuous trading approach is often retained for the implementation of CfDs.
- Central counterpart. Transactions are anonymous. Immediately following their recording in the clearing system, a central counterpart steps in between the buyer and the seller. Starting then, the central counterpart accepts the risk of default of one of the counterparts, and guarantees the other counterpart that the initial contract terms are respected. With this mechanism, the contracts become perfectly fungible; each of the counter parts has the possibility to undo his deal independently with any other market participants or of course TSOs.

2.3.3 Risk Hedging with CfDs

To create a "perfect" hedge against a situation where the difference in zonal prices may not be equal to zero, a market player located in one price area, who wants to create a "perfect" hedge must proceed by doing the following:

- Hedge the zonal prices of the specified volume by using forward contracts with reference to a fictitious unconstrained price.
- Hedge against the zonal price differential - for the same period and volume - by using CfDs.
- Accomplish physical procurement by trading in the relevant price zones.

As it appears from the above description a market player does not pay a certain amount of money to acquire a CfD. It is the market price of the CfD (expected price difference during the delivery period) that constitute the basis for the market players' business decisions.

2.3.4 CfD strike price determination

Let us consider the purely financial spread hedging contract obligation that may be offered by some financial exchanges[1]. Such spread contract is in fact a CfD whose "strike price" is computed through an offer-demand settlement between the various bids of the bidders. These bidders can be physical actors

[1] EXAA (www.exaa.at) is offering eSPREAD, which are day-ahead futures on the expected price differences between two equal day-ahead products of different European energy market places.

or any potential financial institutions interested in such bet. This "strike price" is by construction cleared before the real spread is revealed by the power exchanges clearing. The actors are then receiving (or, according to their contract, to cover for) the difference between the strike price and the real spread.
If the players did guess rightly the spread, this difference may be null or low, but they have no special insight to guess rightly and therefore there is a risk of non-negligible difference between the strike and the real spread.

2.3.5 Financial Settlement Issues

Once "strike prices" are determined according to section 2.3.4, the respective payments are effected to a neutral Clearing house. In case of negative prices the Clearing house will effectuate respective payments to CfD holders. That is to say price spreads are compensated to and from the Clearing house at the CfD Maturity Date. All of the above payments effectuated by one market participant to the Clearing house will subsequently be transferred to another party. In total all payments effectuated to and from the Clearing house will balance each other out.

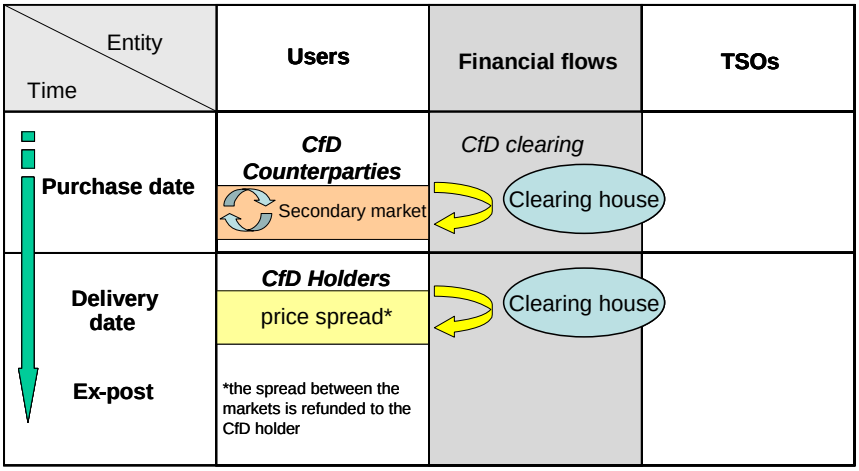

Figure 4. The financial flow cycle of CfDs.

3 An Evaluation from the Market's Perspective

3.1 Implementation requirements

3.1.1 Implementation of PTRs

As outlined in section 2.1.1 the implementation of PTRs requires a minimum of market infrastructure and contractual arrangements. Transmission capacities between two adjacent price zones are allocated explicitly irrespective of their internal market designs. Therefore, no extensive market framework harmonisation of the involved price zones (with regard to e.g. products, gate closures, scheduling etc.) is necessary. However, given market rules and regulations must be considered when explicit auctioning schemes are put in place. The fact that PTRs are widely implemented on most European interconnections gives a clear evidence for the simplicity of their implementation.

3.1.2 Implementation of FTRs

FTRs are only used in case two adjacent day-ahead markets are coordinated with each other, with regard to e.g. products, gate closures and including the simultaneous clearing of those price zones at the maturity date (day-ahead market coupling or market splitting arrangements). In each price zone, prices would apply to every seller and buyer of an organised market such as a spot market operated by a Power Exchange. In case of congestion between zones, energy prices become different depending on the zone, so,

globally, the Power Exchanges linked by an implicit allocation mechanism collect more from buyers than they pay to sellers under a Market Coupling/Splitting scheme. Therefore, the implementation of FTRs requires a market-based scheme with transparent prices plus some kind of congestion income from the "physical" allocation of capacity at the maturity date in order to pay-back the holders of FTRs.
With the exception of Nord Pool and the Italian interconnections (where FTRs support the implementation of the cross-border day-ahead implicit auction system through a market splitting between virtual zones representing neighbouring countries and the adjacent Italian market zone), pure Market Splitting or Coupling schemes or co-ordinated implicit auctions are not yet implemented in Europe which would be a prerequisite for the introduction af FTRs. Such Implicit Auctioning schemes (Market Coupling/Splitting) require a high level of harmonisation of the respective markets arrangements.
FTRs can be described as an equivalent product to the forward PTRs. FTRs are necessary in markets coupled exclusively implicitly in order to incorporate forward energy contracts and financial OTC-cross-border trading and solutions for transmission risk hedging.

3.1.3 Implementation of CfDs

CfDs require a central platform acting as a counterpart for all market participants and a sufficient level of trading liquidity (see section 2.3.1). The products CfDs refer to have to be compatible with each other as otherwise no price spread and subsequently no payouts can be determined. Moving towards more financial oriented products such as CfDs may therefore need additional market requirements and stronger regulatory harmonisation across regions as they are presently given (e.g. day-ahead market coupling or market splitting arrangements). CfDs are completely independent from any physical transmission capacity. Therefore, no congestion management scheme needs to be in place which alleviates the implementation of CfDs. CfDs in the field of transmission risk hedging should, however, also benefit from the implementation of day-ahead market coupling as the sound price differences used can be used as references for such financial contracts.

3.2 Promotion of Market Integration and Liquidity

Regional market integration, fostering market liquidity and regulatory harmonisation are recognised as one of the key challenges to the success of the IEM.

3.2.1 Promotion of Market Integration and Liquidity by PTRs

As PTRs facilitate inter-zonal trades and price hedges they promote market liquidity by enabling market participants to enter new markets.

3.2.2 Promotion of Market Integration and Liquidity by FTRs

In this framework, moving from forward PTRs to FTRs under market coupling conditions could lead to higher market integration, as the coupling of the Power Exchanges requires strong harmonisation. In addition to this, the allocation of 100 % of the available transmission capacities could be optimised day-ahead thanks to the market coupling procedure while FTRs provide the necessary opportunities for transmission risk hedging to market participants.

3.2.3 Promotion of Market Integration and Liquidity by CfDs

CfDs as such can be regarded as a possible alternative to forward transmission rights. As they are completely independent from any congestion management mechanism (see section 2.3.1), they can simply coexist with PTRs or FTRs. However, to facilitate efficient trading of physical electricity the financial markets must appear mature and with sufficient liquidity (see section 2.3.1). While this seems to be the case in the Nordic countries due to the long history of the electricity market, further market infrastructure and development might still be needed in other European regions. In case of less mature financial markets on either side of a trading border forward transmission rights seem to be called for.

3.3 Different Contractual Arrangements between Marketers and TSOs

3.3.1 Contractual Arrangements necessary for PTR acquisition

In addition to complying with the allocation rules, in many but not all implementations market participants interested in the purchase of forward physical transmission rights must comply with the balancing responsibility requirements and scheduling or nomination procedures contracted with the TSOs. In all implementations, those parties exercising the PTR must comply with the balancing responsibility requirements and scheduling or nomination procedures, independently whether they have directly acquired the PTR from the issuing entity or via secondary trading.

3.3.2 Contractual Arrangements necessary for FTR acquisition

When FTRs are available, market participants do not necessarily require entering into balancing responsibility neither scheduling or nomination contracts with the TSO as there is a clear separation between such products and the "physical" notification of trades or schedules. In relation to the nomination process, it is important to note that, with FTRs, the users willing to enter into cross-border financial bilateral contracts will have the obligation to interact with the incumbent Power Exchanges under a market coupling/splitting framework (e.g. with price acceptant bids in the two markets) in order to obtain the implicit transmission right to use the interconnection, exchanging this way energy across interconnections. As FTRs are allocated by the TSOs, market participants will of course be required to contract with the TSOs for the allocation and settlement procedures.

On the contrary, with PTRs, the users will simply have to communicate to the TSOs the use of the PTR instead of the mandatory participation in the market coupling/splitting mechanism, not being in this case the energy traded or notified through the markets but OTC. Therefore, there are differences in the way users have to interact with the TSOs and PXs and the impact of the way of notifying bilateral transactions in the energy traded through the markets under both FTRs and PTRs scheme. Additionally, as explained in [2], day-ahead explicit obligations price-difference bids can be supported in the day-ahead market coupling process.

3.3.3 Contractual Arrangements necessary for CfD acquisition

CfDs for transmission risk hedging can be traded without entering into any kind of contractual relationship with the TSOs.

3.4 Nature of products. Options & Obligations

3.4.1 Nature of Products – PTRs and FTRs

Section 2 has shown that Forward Transmission Rights (both PTRs and FTRs) can be designed as options or as obligations. The allocation of obligations is performed simultaneously for all directions, allowing for optimisation and netting, while at the same time producing different financial flows at the maturity date.

3.4.2 Nature of Products – CfDs

Contracts for differences could be assimilated to the obligation kind of transmission risk hedging products. As an example for this, buying a contract for differences would be identical to the theoretical case of taking part in a simultaneous auction of FTRs obligations where the transmission capacities offered by the TSOs would be equal to zero. The financial institution that organised the Spread CfD has no specific risks other than the credit risk that any Exchange incurs when dealing futures contracts (such risk being usually addressed through margin deposits and other credit insurance). The seller can bid his real marginal cost at no risk with regard to his forward contract with the buyer. The main problem of such hedging financial contract is the availability of reasonable counter party that would take position on a long

term Spread CfD to allow a long-term forward contract. This problem may become more challenging due the uncertainty of the markets correlation due to uncertain ATC ahead of time, a higher uncertainty resulting in a higher risk premium between the "reasonable" expected spread and the contractible strike for Spread CfD. The higher this premium, the less forward contract being economically sounds between A and B players. One may therefore assimilate this divergence from "non-arbitrage markets theory" with the risk premium observable between the forward contracts and the spot price in a single zone.

3.5 Overall Economic Outcome

3.5.1 Economic outcome of FTR and PTR allocations

Under explicit auctioning schemes market participants will set their bids for PTRs based on their estimates of the price difference between two adjacent electricity markets. The same behaviour can be expected of market participants bidding for FTRs under day-ahead implicit auctioning schemes. Furthermore, the underlying products of both FTRs and PTRs are to a large extent comparable (see sections 2.1.2 and 2.2.2). This leads to the conclusion that under the assumption of perfect competition and contestable, transparent and sufficiently flexible electricity markets on either side of a congested bottleneck, the allocation procedures of both PTRs (explicit auctions) and FTRs (explicit auctions also) lead to the same economic outcome in the sense that they result in comparable clearing prices as price signals.

3.5.2 Economic outcome of CfD allocation

CfDs are offered independently from any physical transmission capacity between two price zones (see section 2.3.1). Therefore, their price is determined by the willingness and the opportunity costs of market parties with regard to swapping their risk profiles. As CfDs can, however, be used together with PTRs and FTRs, their price may be influenced by PTR and/or FTR prices.

4 Consequences for the TSOs

As described in section 2.3, TSOs are not involved in the trade of financial hedges. The buying and selling of those pure financial hedges belongs to the market players and other financial institutions or market operators acting as a clearing house and providing the market players with trading systems. The financial institution that organised the Spread CfD has no specific risks other than the credit risk that any Exchange incurs when dealing futures contracts (such risk being usually addressed through margin deposits and other credit insurance). Taking this into consideration this section will focus on the consequences associated to the implementation of the different kinds of forward transmission rights (PTRs and FTRs).

4.1 Forward Transmission Rights and the Roles of the TSOs

The presence of the word "*transmission*" within the term "forward *transmission* rights" and the parallelisms that can be drawn among different kinds of forward transmission rights both suggest that the TSOs may have an important role to play in their design and operational management. While the clear role in the management and allocation of forward Physical Transmission Rights (PTRs) is unanimously known and recognised, this paragraph will address the potential roles for the TSOs concerning Financial Transmission Rights (FTRs).

In the first place, the TSOs should have the responsibility of determining the quantities and the duration of the FTRs (and PTRs, respectively) to be offered. To that end, the TSOs should use the expected availability of the transmission system and offer an amount of FTRs that complies with e.g. the "Simultaneous Feasibility Test", that ensures revenue neutrality at the maturity date in order for the FTRs allocation to be able to deliver sound price signals.

TSOs are today exclusively responsible for the process of determination of capacity and allocating forward physical transmission rights through explicit auctions (directly or with an entity acting on behalf of TSOs). Accordingly, TSOs are likely to continue to manage this process also regarding FTRs since the market-based allocation of FTRs is generally performed by auctioning them explicitly as well. Market based allocation of FTRs would require payment of the FTRs to the TSO at the purchase date and should also be carried out by the TSOs since they would either set up the necessary contracts with the users or a kind of formal agreement with them, in order to define the auction eligibility conditions, allocation rules and settlement conditions. Moreover, the pay-back procedure at the maturity date between the users and the TSOs should also be managed and any other rights and obligations of the user compensations are likely to be included in such formal agreements between users and TSOs. However, special attention should be paid to addressing the new financial, legal and regulatory concerns of having the TSOs involved in the payback procedure, checking their compatibility with national laws and regulatory provisions. Indeed, in some countries, TSOs may face legal challenges, if FTRs were considered as pure financial tools subject to specific financial regulations and duties.

4.2 Risk Management between Market Participants and TSOs. Firmness

The completely firm access to transmission risk hedging - even in cases of disturbances caused by Force Majeure - requested by some market parties (like traders and larger industries) is a risk management issue. The objective of such market parties in this respect is basically to minimise risk management costs. The counterpart for the TSOs is a heavy financial risk linked to the management of possible congestion and the subsequent price difference between areas, a type of risk TSOs could not (and some times are not allowed to…) hedge properly. This risk, subject to regulatory approval, could be transferred to the transmission tariffs. In such a case yet, the financial risk of some market parties is transferred to all consumers, which may appear discriminatory. Unless some new concepts including more incentive based regulation of TSOs are further developed, on the overall, such a long-term firmness obligation for TSOs is likely to be widely sub-optimal from an overall public welfare viewpoint. Emphasis should be put on the global economic effect of different types of solutions.
The firmness of the nominated PTRs can be assimilated to a firm commitment to pay back the FTRs. ETSO hopes that the misleading idea that an infinite number of FTRs could be initially offered (since they are not "physical" but "financial") by the TSOs has being clarified. Such misleading thoughts simply advocate for the TSOs taking part of the risk, distort the market and the price signals and create distributional effects [4]. However, it may be that, during a transitory period, increased market facilitation in the allocation of PTRs and FTRs by the TSOs might be useful for increased liquidity in market development or improvements of confidence in the market. ETSO is of course in favour of such transitory approaches provided that the funding of such measures is efficiently assessed and TSOs be incentivised accordingly.

5 Conclusions

Three transmission risk hedging products that can be offered by TSOs to the market in the field of cross-border trade and congestion management are described in this paper. This paper provides a first evaluation of the different solutions, adopting a markets' perspective.
Under practical aspects, market participants interested in the direct exercise of forward physical transmission rights must comply with the balancing responsibility requirements and scheduling or nomination procedures contracted with the TSOs. However, when FTRs are available, market participants are not necessarily required to enter into balancing responsibility with TSOs (as it is the case with PTRs), since there is a clear separation between such products and the "physical" trades or schedules. As for PTRs, FTRs would be allocated by TSOs and market participants will be required to establish contracts or a kind of formal agreement with the TSOs for the allocation and settlement procedures. Market partici-

pants willing to use CfDs for transmission risk hedging will be able to do so without entering into any kind of contractual relationship with the TSOs.
The implementation of forward physical transmission rights only seems to require a minimum of market infrastructure, harmonisation and contractual arrangements. This is probably the reason for this product to be widely and successfully implemented on most European interconnections. More ambitious and complex concepts, such as Market Splitting or Coupling or co-ordinated implicit auctions, would be the main drivers towards the implementation of market-based Financial Transmission Rights in Europe.

In contrast to PTR and FTR allocations, TSOs are not involved in the trade of CfDs, which are not associated to the congestion income that the TSOs collect. The buying and selling of such financial hedges belongs to the market players and other financial institutions or market operators acting as a clearing house and providing the market players with trading systems.

The completely firm access to transmission risk hedging - even in cases of disturbances caused by Force Majeure - requested by some market parties (like traders and larger industries) is a risk management issue. The objective of such market parties in this respect is basically to minimise risk management costs. The counterpart for the TSOs is a heavy financial risk linked to the management of possible congestion and the subsequent price difference between areas, a type of risk TSOs could not (and some times are not allowed to…) hedge properly. This risk, subject to regulatory approval, could be transferred to the transmission tariffs. In such a case yet, the financial risk of some market parties is transferred to all consumers, which may appear discriminatory. Unless some new concepts including more incentive based regulation of TSOs are further developed, on the overall, such a long-term firmness obligation for TSOs is likely to be widely sub-optimal from an overall public welfare viewpoint. Emphasis should be put on the global economic effect of different types of solutions.

The allocation of PTRs is considered an efficient solution for transmission risk hedging in the European context. Together with the expected benefits deriving from the implementation of market coupling, offering FTRs between organised and liquid day-ahead electricity markets are likely to be a next step in the future, where the TSOs will continue to play a very similar market facilitation role. Where mature electricity physical and financial markets with high liquidity are in place, the market facilitation role from the TSOs might be more questionable. In such cases, pure financial hedges such contracts for differences may appear as an option for transmission risk hedging to be considered, without such an active involvement of the TSOs.

References

[0] ETSO, (June 2002), "Co-ordinated Congestion Management; An ETSO Vision", www.etso-net.org.

[1] ETSO, (April 2004): "Cross-Border Electricity Exchanges in Meshed AC Power Systems", www.etso-net.org.

[2] ETSO-EuroPEX, (September 2004): "FMC-Flow-based Market Coupling, a Joint ETSO-EuroPEX Proposal for Cross-Border Congestion Management and Integration of Electricity Markets in Europe", www.etso-net.org.

[3] Cambridge, (December 2004): "A Review of the Monitoring of Market Power".

[4] ETSO, (April 2005): "An Evaluation of Preventive Countertrade ", www.etso-net.org.

[5] ETSO, (June 2005): " TSOs and the Monitoring of Market Power", www.etso-net.org.

[6] Nord Pool, (November 2003): "Derivatives Trade at Nord Pool's Financial Market", www.nordpool.com.

[7] EFET, (October 2004): "Electricity Transmission Congestion in the IEM: An EFET Vision", www.efet.org.

[8] CRE-CNE Public Consultation, (October 2004): "Preliminary Conclusions of Powernext-OMEL-RTE-REE Joint Task Force", www.cne.es or www.cre.fr.

[9] IFIEC Europe, (March 2005): "Electricity Market Design; Recommendations for a Better Balance of Market Power", www.ifieceurope.org.