

# Gas balancing in selected European jurisdictions



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## Preparation of this report

This report was prepared by Ben Farrington and David Hunt, and was finalised on 31 March 2014.

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# 1 Introduction

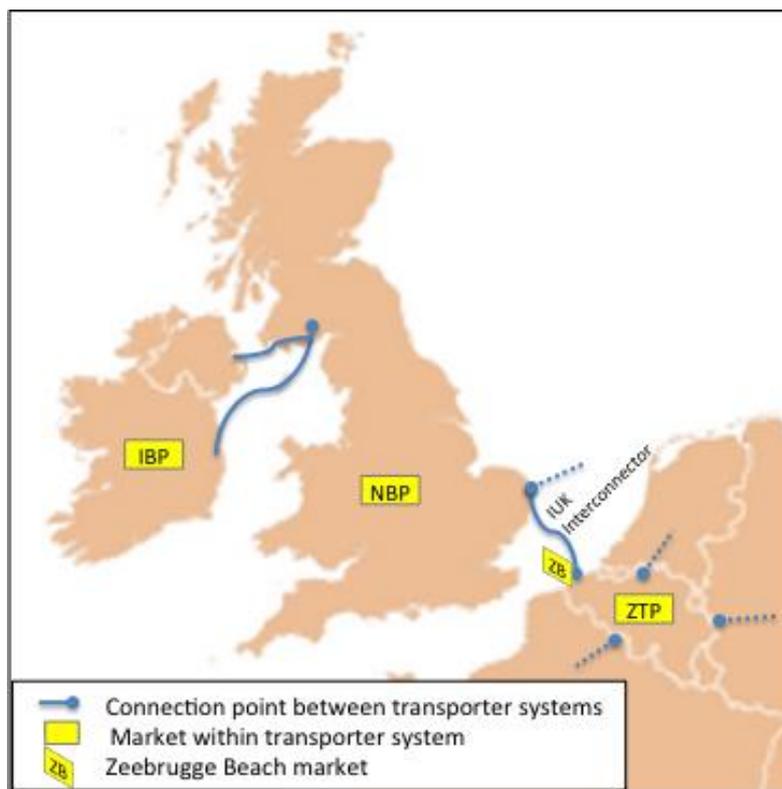
## 1.1 Context and scope of study

This study summarises the commercial arrangements that provide for balancing in four connected gas transmission systems in NW Europe:

- Great Britain – national market;
- Ireland – single gas market for the Republic of Ireland and Northern Ireland;
- Belgium – national market; and
- UK-Belgium sub-sea interconnector – IUK.

Figure 1 provides a schematic of the four systems showing the connection points and the three traded markets that are referenced for balancing. The NBP (National Balancing Point), IBP (Irish Balancing Point) and ZTP (Zeebrugge Trading Point) are located within the GB, Irish and Belgian systems respectively.

**Figure 1: Schematic of gas transmission systems covered in study showing connection points and the spot market referenced for balancing**



Source: Concept

Comparing the four connected systems examined in this report:

- the GB system has many varied sources of supply and flexibility (production; pipeline and LNG imports; and storage). The NBP is the most liquid gas trading hub in Europe with a churn<sup>1</sup> of over 20.
- the Irish system is a smaller market with limited sources of flexibility within Ireland. However, it is well connected to GB and has access to flexibility from the GB market.
- the Belgian system serves the gas market in Belgium and is also a significant transit route for gas flows between Netherlands, France, Germany and GB. It has access to Zeebrugge Beach – a liquid market located outside the Belgian system where LNG, pipeline and Interconnector IUK supplies are landed.
- the Interconnector IUK is one of two interconnectors that join GB market to NW Europe and is capable of flowing in both directions between GB and Belgium.

The details of the balancing arrangements in each system are different and this report aims to provide high level information on:

- What are the incentives on parties to match physical flows to their nominations?
- Are there any distinctions between balancing gas and gas traded on other markets?
- Are balancing agents active in buying/selling balancing gas?
- How are the costs of balancing gas recovered?
- Do imbalance tolerances commonly apply? If so, what is the size of those tolerances?
- Are cash-out quantities based on end of day imbalances, or some other measure?
- How does the transporter manage the cash associated with commercial imbalance?

## 1.2 EU Network Codes – NC BAL

This study describes the balancing arrangements as they operate in March 2014. The EU Network Code on Gas Balancing in Transmission Systems (NC BAL) has now been formally adopted by the European Commission and each transporter in the EU will be required to achieve compliance under the supervision of its local National Regulatory Authority with oversight from ACER (the Agency for the Cooperation of Energy Regulators).

NC BAL was written by ENTSOG (European Network of Transmission System Operators for Gas) and developed for meshed networks. It is a “one size fits all” approach and has been highly influenced by the arrangements in place in GB. It is expected that some changes will be required in all of the jurisdictions, but in this report we do not speculate on the nature or extent of the required changes for each jurisdiction.

## 1.3 Terminology used

**“Gas balancing requires the shipper to balance its inputs to, and offtakes from, the transporter’s gas transmission system.”**

This comparative study attempts to avoid the jargon used in each system – e.g. the the transporter and system names – and instead uses the above generic terms (wherever possible).

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<sup>1</sup> Churn is a measure of the number of times a ‘parcel’ of a commodity is traded and re-traded between its initial sale by the producer and final purchase by the consumer.

The terminology used in this report relating to imbalance needs to be clarified as it has a different meaning in the NZ market which could cause confusion. **Shipper imbalance (and balancing tolerances) refers to the difference between *allocated* inputs and *allocated* offtakes. “Allocated” is the volume for which the shipper will be charged.**

## 2 Great Britain

### 2.1 Balancing arrangements

The Great Britain (GB) gas system operates a daily balancing regime, with nominations and transmission capacity rights providing an end of gas-day expectation of delivery. The National Balancing Point (NBP) is a notional point through which all gas is assumed to flow and the system is therefore 'balanced' at the NBP.

### 2.2 Features

#### *Shipper balancing*

Shippers are required to balance their inputs to, and outputs from, the gas system on a daily basis. The On the Day Commodity Market (OCM) was designed to allow shippers to balance their own supply-demand portfolios and for the transporter to balance the system in aggregate. The OCM provides a screen based anonymous gas trading market in which the shippers can post bids and offers to buy or sell gas at the NBP, or at other physical points on the gas network. At any point in time shippers can see the system average price<sup>2</sup> (SAP) for the gas day.

#### *Transporter balancing*

The transporter has in place agreed operating procedures with the operators of facilities delivering gas into the system which help it to determine what flow these operators believe will enter the system during the next day and are used to inform the way the system is configured and the measures that may be needed to maintain a system balance.

The transporter uses the OCM market as a means of securing or disposing of gas in order to keep the system in balance (OCM includes trades of title, physical and locational products). The transporter is financially incentivised to take efficient system balancing actions and to trade close to the market price for all balancing trades. The bids that the transporter accepts are normally selected based on price. This criterion may be overridden when specific operational requirements need to be met, e.g. to obtain gas quickly or at a particular location. Following a balancing trade the shipper (who is the counterparty to the transporter) is required to arrange for the transaction to be implemented. In the case of a physical or locational trade this includes making a flow renomination. If the shipper fails to do so, it is likely to incur additional scheduling and imbalance charges.

In practice when there is a national requirement for gas, the product traded for transporter balancing is title gas. Locational trades are infrequent and only used to address a local requirement<sup>3</sup>. The trade of title gas between transporter and shipper does not necessarily bring about a change in that shipper's physical flow (though if not it will directly affect that shipper's daily imbalance). However, since the price of the balancing trade changes the cash out price, it has a direct effect to incentivise those

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<sup>2</sup> The system average price, or SAP, is the average of all OCM trades for gas on the day, including shipper-to-shipper and transporter-to-shipper trades.

<sup>3</sup> See Procurement Guideline Report p.26, which shows there were between 150 and 450 OCM title trades (buy and sell) each month in the year 2012/13 and 10 OCM locational trades on 2 days of the year when locational gas was required. See <http://www2.nationalgrid.com/WorkArea/DownloadAsset.aspx?id=16547>

shippers currently in imbalance to re-balance and results in the system as a whole being brought back into balance.

### *Settlement of imbalances*

At the end of each day a balance is calculated for each shipper between aggregate inputs to the system and aggregate outputs from it, taking into account any trades on the OCM. If a shipper has a positive imbalance (they have input too much gas into the system), then the transporter will sell the excess gas on the shipper's behalf and the shipper will receive the system marginal sell price<sup>4</sup>. Conversely, if they have a negative imbalance (they have not input enough gas into the system) then the transporter will buy the shortfall on the shipper's behalf and the shipper will be charged system marginal buy price<sup>5</sup>. Shippers with a positive imbalance are paid for the extra gas, and shippers with a negative imbalance are charged. Shippers are likely to pay more than 'normal' for any balancing gas they buy and receive less than normal for any balancing gas they sell. They therefore effectively pay a charge for being 'out of balance'.

### *Scheduling*

In addition to an imbalance charge, the cash out arrangements include a scheduling charge designed to give shippers an incentive to make accurate input and output nominations. If a shipper's actual inputs or offtakes differ from final nominations, it may be liable to pay scheduling charges on the difference in the end of day quantity between nominations and deliveries at a rate of between 3% and 5% of the SAP price. The scheduling charge can be thought of as a charge for transmission overrun – i.e. the transport rather than commodity component.

### *Recovery of costs*

The transporter remains revenue neutral to shipper cash-outs, as the net total payment is recycled amongst shippers as part of the 'revenue neutrality' mechanism. The aggregate system payments are returned to (or paid by) shippers on the basis of their throughputs (the sum of their inputs and outputs<sup>6</sup>).

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<sup>4</sup> System marginal sell price is the lesser of the SAP less a margin, and the price which is equal to the lowest balancing action taken on the day.

<sup>5</sup> The system marginal buy price is the greater of the SAP plus a margin, and the price equal to the highest balancing action taken on the day.

<sup>6</sup> In GB there is a distinction between gas producers and suppliers. A producer who is going to sell its gas 'wholesale' to a supplier at the NBP is required to set up as a shipper and will pay transportation charges on its flows at input to the NBP. Gas is traded at the NBP and the supplier is responsible for the transportation charges at exit from the NBP.

## 3 Ireland

### 3.1 Balancing arrangements

The Irish system operates a daily balancing regime. On each gas day shippers must at all times ensure that their nominated inputs of gas to the system are equal to their nominated offtakes from the system. Where a shipper's flows (allocations) fail to achieve this balance, the shipper will have a daily imbalance quantity and will have to pay balancing charges.

### 3.2 Features

#### *Shipper balancing*

The Irish Balancing Point (IBP) is a notional point at which shippers can exchange quantities of natural gas within the transmission system. The IBP facilitates the transfer of the beneficial title to gas within the transmission system between two shippers. It does not permit financially settled trading. A shipper holding entry capacity can submit nominations (IBP Sell Nominations) of quantities of gas that it wishes to sell at the IBP. Shippers that hold exit capacity can submit nominations (IBP Buy Nominations) in respect of quantities of gas that it wishes to acquire at the IBP.

A shipper is required to make separate nominations (and renominations) in respect of each entry point and in respect of each offtake. In order for a shipper's nomination (or renomination) to be "valid" it must achieve a zero imbalance. A shipper achieves a zero imbalance position when its entry nominations and its IBP Buy Nomination(s) (in aggregate) match its exit nominations and its IBP Sell Nominations (in aggregate).

A shipper can make an after the day trade up to 7 days after the month end, whereby shippers are permitted to trade their positive imbalance quantity with another shipper's negative imbalance quantity (or vice versa).

#### *Transporter balancing*

The transporter enters into balancing gas contracts following a competitive tender to provide or dispose of quantities of natural gas required to ensure the physical balance of the transmission system on a day. Typically the gas under this contract is supplied from the connected GB market.

#### *Settlement of imbalances*

A shipper's daily imbalance quantity is calculated by reference to its entry allocations, IBP allocations and exit allocations.

Where the quantity of the gas allocated as having been delivered by a shipper to the transmission system on that day is less than the quantity allocated as having been offtaken by that shipper on a day, the shipper pays daily imbalance charges to the transporter. Conversely, where allocations exceed offtakes, the transporter pays daily imbalance charges to the shipper.

Different charges apply in respect of a shipper's imbalances which are less than or equal to the shipper's portfolio tolerance as opposed to those quantities which are in excess of the shipper's portfolio tolerances. There are separate tolerance ranges for each entry point and per type of offtake. In total a shipper's portfolio tolerance is calculated as a sum of the tolerances at each entry point and exit type.

For imbalances within tolerance the prices are related to the Euro equivalent of OCM SAP – the average price for the GB market for that day – plus transportation. For any remaining imbalance above and

beyond the tolerance the prices are related to the OCM system marginal buy price or the OCM system marginal sell price for that day, adjusted for the appropriate cost of transportation between the markets.

#### *Scheduling*

Shippers may be liable for scheduling charges calculated on the basis of the difference between their nominated quantities and their allocated quantities; charges are applied separately to entry points and to exit points. At entry points the shipper is allowed a tolerance of 3% of the entry nomination, above which a scheduling charge is calculated using 5% of the Euro equivalent of the OCM SAP plus transportation. At exit points the tolerance varies depending on type and the same level of price is applied to the resulting differential.

#### *Recovery of costs*

The transporter is cash neutral in respect of balancing gas and balancing charges. Costs are included in a disbursement account and shippers are entitled to a share of the benefit where there is an account excess, and are liable to contribute to any account deficit.

## 4 Belgium

### 4.1 Balancing arrangements

Historically Belgium was divided into three balancing zones<sup>7</sup> but these have now been combined into a single zone for gas balancing. Shippers are responsible for keeping their balance close to zero on a daily basis and intra-day each shipper's cumulative daily imbalance is subject to hourly tolerances.

### 4.2 Features

#### *Shipper balancing*

Shippers may trade title of gas at ZTP notional trading services and/or Zeebrugge Beach physical trading services either through bilateral agreements with third parties, or on an exchange (enabling anonymous trading of gas with clearing services).

Commodity trading is facilitated by Huberator, which develops the necessary notional and physical trading services to enable gas to be transferred between (the more liquid) Zeebrugge Beach market and ZTP. Access to notional trading services offered by Huberator is subject to confirmation by the transporter. The transporter takes the net confirmed trades communicated by Huberator into account for determining the balancing position and indicative forecast balancing position of the shipper in the system.

#### *Transporter balancing*

The balance between entry and exit is monitored on a cumulative basis for all hours of a given gas day via the market balancing position, which is updated on an hourly basis.

Shippers are requested to balance inputs and outputs of natural gas over the period of one gas day, in accordance with the hourly allocation data supplied electronically by the transporter. This includes information about:

- The shipper balancing position;
- The market balancing position;
- The indicative forecast of the shipper balancing position for the remaining hours of the day;
- The indicative forecast of the market balancing position for the remaining hours of the day;
- The market threshold limits; and
- The excess/shortfall settlements for the market and the shipper.

#### *Settlement of imbalances*

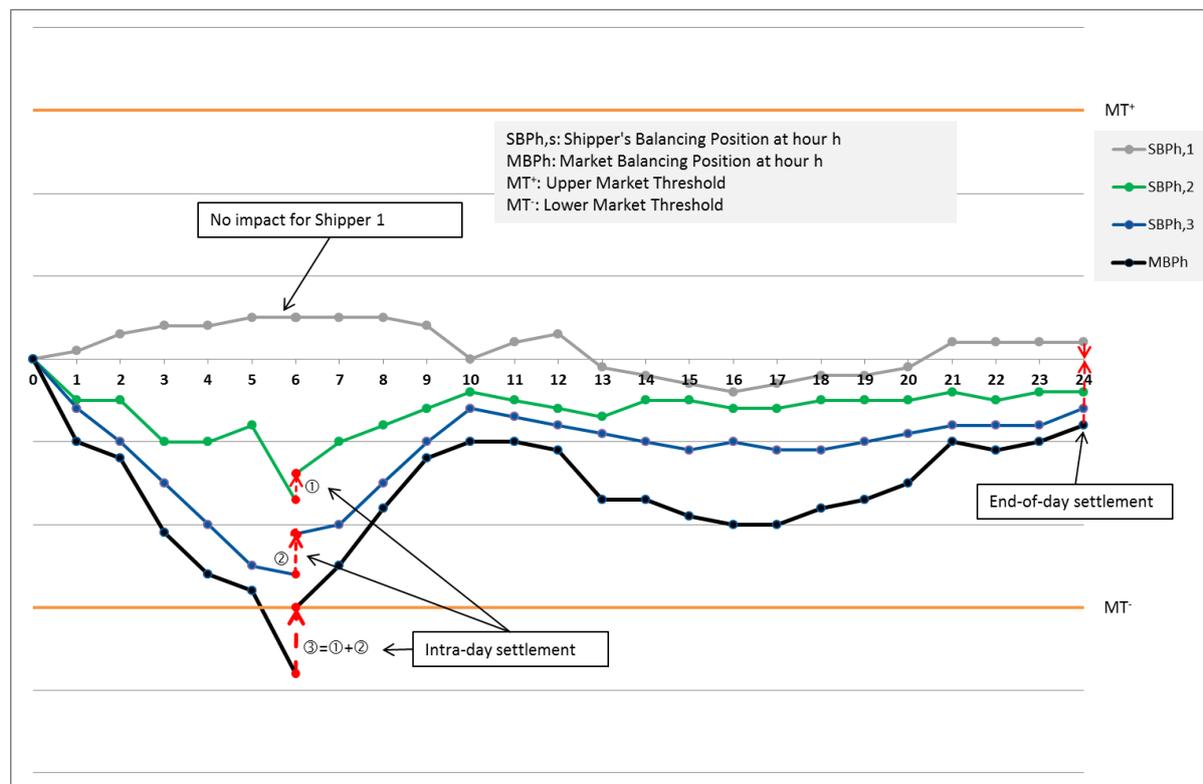
Figure 1 illustrates the hourly position (starting at hour 0) for a day, which includes an intra-day settlement at start of hour 6, and an end of day settlement. The individual shipper balancing position (**SBPh**) shows, for a given shipper and for a given hour, the delta between the sum of its entry allocations and the sum of its exit allocations for all preceding hours of a given gas day, also taking into account the net confirmed title transfers for ZTP. The market balancing position (**MBPh**) shows the delta between the sum of all inputs and the sum of all outputs for all preceding hours of a given gas day for all

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<sup>7</sup> These were the three H-gas (high calorific value gas) zones. Note that there is a separate L-Gas grid which is operated separately and which supplies Dutch L-Gas to the Belgian residential market.

shippers. The market balancing position is therefore equal to the sum of all individual shipper balancing positions.

**Figure 1: Illustration of intra-day and end-of-day settlement – 3 shippers and the total market**



Source: Fluxys

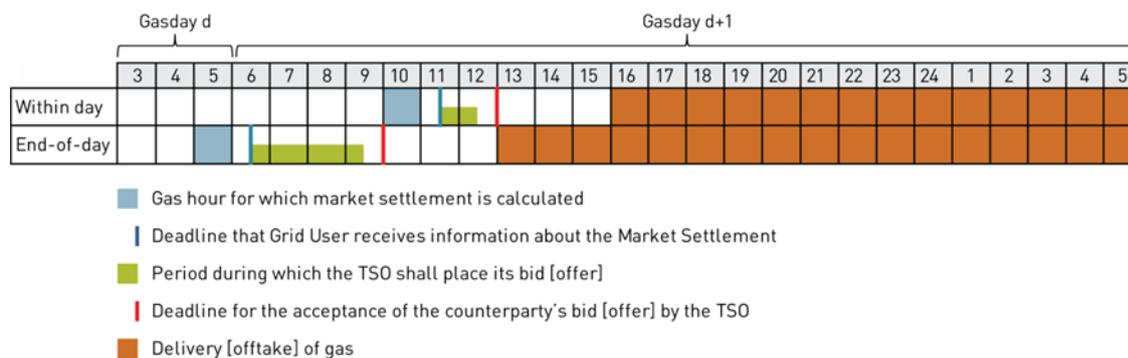
During the gas day, as long as the market balancing position remains within the predefined upper and lower market thresholds MT+ and MT- (thresholds can vary on a seasonal basis), there is no intervention by the transporter to balance the system.

If the market balancing position goes beyond the upper (or lower) market threshold, the transporter intervenes through a sale (or purchase) transaction on the commodity market for the quantity of the market excess (or shortfall) and settles in cash that quantity with the shippers contributing to such imbalance – shippers 2 and 3 in Figure 1 – in proportion of their individual contribution. The transporter will initiate a sell or buy transaction on the ZTP commodity market, for the quantity of the market excess or shortfall respectively. The weighted average prices of these transactions sets the reference price used at that time for refunding or charging shippers who caused the market excess or shortfall, to which a 10% incentive is added.

Each day the balancing position at the end of the last hour of the gas day is settled to zero for each shipper by a settlement in cash. Imbalances up to a tolerance pay the weighted average price of the balancing transactions, with the excess subject to an additional 10% incentive.

The products available for trading on the exchange imply a balance-of-day delivery of the gas to (from) the transporter. Offers (bids) can be placed at all times by shippers on those products. Figure 2 shows the time line for market settlement of balancing trades and for physical delivery of the gas.

**Figure 2: Timeline showing settlement and physical delivery of gas for within-day and end-of-day balancing trades**



Source: Fluxys

Note that the end-of-day settlement for day d, is delivered to the system during the balance of day d+1 starting at 13:00 hours.

Following a balancing trade the shipper (who is the counterparty to the transporter) is required to arrange for the transaction to be implemented. This includes making a flow renomination that is matched with a counterparty in the adjacent system (e.g. matching with a nomination at Zeebrugge Beach) in order to effect the necessary change in the physical flow. If the shipper fails in this regard it may be charged for any balancing costs incurred by the transporter relating to the specific failure.

### Scheduling

There is no mention of scheduling in the transportation arrangements in Belgium – the intra-day settlement based on the cumulative *actual* (rather than nominated) flow would appear to do away with this requirement.

### Recovery of costs

Settlement costs are recharged to the causer at the time of the imbalance. If the final allocations differ from the provisional allocations, this results in a financial settlement between the transporter and the shipper to compensate for the difference between the final and the provisional allocations.

## 5 GB-Belgium interconnector – IUK

### 5.1 Balancing arrangements

Interconnector (UK) IUK connects the daily balancing regime in GB to the hourly arrangements in Belgium. The IUK pipeline is unusual in two respects: shippers have contractual rights to hold inventory in the IUK pipeline; and shippers can nominate to flow in either direction through the pipeline.

### 5.2 Features

#### *Shipper balancing*

Shippers make hourly nominations at each end of the pipeline and hold rights to the pipeline inventory. Shippers have to maintain their individual level of inventory within certain limits, which are apportioned pro-rata to their capacity and flow-related share. Shippers are able to use this variable inventory as a flexibility product, giving them access to a fast-response storage service. The variable inventory also means that shippers do not have to balance their deliveries into, and redeliveries out of the pipeline over a gas day, provided that they are within the limit of their inventory entitlement.

#### *Transporter balancing*

A matching process ensures that the gas transportation requirements of the IUK shippers and shippers in the adjacent transportation systems are agreed prior to the generation of the nomination. After matching, the shipper's nomination is used to calculate an hourly scheduled quantity for each hour. Under normal circumstances, a shipper's hourly scheduled quantities equal the hourly nominations; however, nominations may be constrained if the shipper's nomination would lead to a breach of its inventory entitlement.

The matching-nominations-scheduling process means that individual shippers balances are always kept within their permitted range. A shipper trying to run down or exceed its inventory would be prevented from doing so, as its nominations into and out of the pipeline, taken in combination, would be rejected by the transporter.

#### *Settlement of imbalances*

Does not apply as the scheduled quantity ensures that hourly flows are within limits.

#### *Scheduling*

Does not apply as hourly allocations equal hourly scheduled quantities.

#### *Recovery of costs*

Not applicable as there is no commercial imbalance.

## **6 Overall observations**

### **6.1 Does the balancing price equal the market price?**

In the jurisdictions covered in this report, the balancing price used by the transporter to settle any imbalance in its system is based on the price in the market. Where the market is outside of the transporter's system the price in a connected market is referenced, adjusting for the cost of transportation (e.g. NBP to Ireland).

As a preference, the transporter (or a balancing agent on its behalf) trades the same product that shippers trade with one another for their own balancing (e.g. NBP title in GB and ZTP notional in Belgium), since this product has greatest liquidity. However, there may be instances when the location matters, in which case a distinct product is required (e.g. NBP locational trade).

### **6.2 Summary table**

Table 1 summarises the findings for gas balancing in the four selected European jurisdictions addressing each of the seven areas identified for study.

**Table 1: Summary of findings for gas balancing in selected European jurisdictions**

Note: In comparison to the New Zealand market, “imbalance” in these jurisdictions refers to the difference between *allocated* inputs and *allocated* offtakes (allocations occur intra-day or at end of day for these markets). Similarly, balancing “tolerances” refer to allowances for difference between *allocated* inputs and offtakes.

Question	Great Britain	Ireland	Belgium	Interconnector
<b>What are the incentives on parties to match physical flows to their nominations?</b>	Shippers <i>may</i> be liable to pay scheduling charges on the difference between end-of-day nominations and flows at between 3% and 5% of the SAP <sup>a</sup> price – this may be considered <i>transmission overrun</i> .	Scheduling charges on the difference between nominations and flows apply at entry and at exit points. Tolerances apply; gas flows outside these tolerances are charged at 5% of Euro equivalent OCM SAP + transportation.	Intra-day settlement based on allocated flows.	Not required – nominations are validated through a scheduling process. Hourly allocations are deemed to equal scheduled nominations.
<b>Are there any distinctions between balancing gas and gas traded on other markets?</b>	NBP title gas is traded for balancing at system-wide level (i.e. same product as traded shipper to shipper). There is also ability to trade physical gas for location specific issues – but it is seldom used.	Gas for balancing is typically sourced from the OCM in GB with requirement to deliver physical gas. IBP used for shipper to shipper trading of imbalances within the transmission system.	ZTP market used for balancing gas. Zeebrugge Beach is a liquid physical market and gas can be transferred to ZTP using Huberator services.	N/A
<b>Are balancing agents active in buying/selling balancing gas?<sup>b</sup></b>	The transporter uses OCM market (and can initiate an OCM trade at a physical location if required).	Balancing agent performs trades under contract to transporter.	Transporter uses ZTP market. The shipper who trades the balancing gas with the transporter must re-	N/A. Nominations (inputs and offtakes) restricted such that ‘imbalance’ stays within permitted inventory levels.

			nominate.	
<b>How are the costs of balancing gas recovered?</b>	Shippers are cashed out at the marginal sell/buy price <sup>a</sup> . Shippers are incentivised to balance by receiving less/paying more for their imbalance than they would have for traded gas.	Charges are in tranches – within portfolio tolerance charged at Euro equivalent OCM SAP + transportation. Any imbalances over and above portfolio tolerance are charged OCM marginal buy/sell price + transportation.	Cash settlements are made with shippers in proportion to their contribution to the imbalance (like B2B arrangements in NZ). Charged at the weighted average price of the balancing transactions + 10% incentive.	N/A
<b>Do imbalance tolerances commonly apply? If so, what is the size of these tolerances?</b>	No.	No.	No – cashed out fully at end of day.	Shippers are allowed to carry an imbalance as inventory up to their inventory entitlement.
<b>Are cash-outs quantities based on end of day imbalances, or some other measure?</b>	End of day cash outs only, for a shipper’s full imbalance volume.	End of day cash outs only, for a shipper’s full imbalance volume.	Quantities are a consequence of both balancing actions intra-day, and at end of day.	N/A
<b>How does the transporter manage the cash associated with commercial imbalance?</b>	Transporter is revenue neutral, aggregate payments are returned to (or paid by) shippers/producers on the basis of their inputs and outputs.	Transporter is cash neutral; costs are placed in a disbursement account, paid back/charged to shippers as appropriate.	Costs charged at the time of imbalance (like B2B in NZ); any differences due to reallocations result in a financial settlement between transporter and shipper.	N/A

Footnotes:

- a. System average price (SAP) is the average of all on the day commodity market (OCM) trades. Marginal sell price is the lesser of the SAP less a margin, and the price equal to the lowest balancing action on a day. There is a similar definition for the marginal buy price.
- b. In GB and Belgium the transporter trades directly in the market i.e. performs the role of balancing agent itself.

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