Review of the Market Operator (OCM) Provision

Draft Review group report:

1. The purpose of this review group report is:
    1.1. to provide a brief background on the drivers behind completing the review;
    1.2. to summarise the customer and stakeholder views expressed in both bilateral and review group discussions to date;
    1.3. to outline the scenarios which have been developed and considered by the Review Group, considering the costs and benefits of each; and
    1.4. to express the consensus view of the Review Group on the options (if any) to be considered further.

Background

2. National Grid Gas Transmission (NGG) Gas Transporter licence (Special Condition 8B and Standard Special Condition A11) requires NGG to appoint an operator of the independent market for balancing. In making the appointment NGG must comply with certain requirements. These requirements will be satisfied if the person appointed is either:
    2.1. recognised by the Financial Services Authority (now Financial Conduct Authority) under the Financial Services and Markets Act 2000 as an investment exchange or;
    2.2. designated by the Authority.
3. In addition, as NGG is required to operate efficiently and economically, and as the OCM is used as part of NGG's Shrinkage Manager and Residual Balancer roles, NGG is required to demonstrate that the market operator and market systems it uses for those services are themselves efficient, economic and facilitate competition between shippers and between suppliers.
4. Since the introduction of the OCM in 1999, the service has been provided by the same body, albeit under a number of different legal entities, most recently the operator designated by the Authority has been Endex Gas Spot Ltd. During the latter part of 2012 the ownership of the market platform changed. As part of this process NGG worked with the new company and Ofgem to reaffirm the parties' ability to deliver a service in line with NGG's licence obligations. This process was completed on 1 February 2013 following designation of Endex as the market operator by the Authority and signature of a new service provision contract between NGG and Endex.
5. In March 2015 an additional gas spot market exchange launched a NBP "Title" product, comparable to the "Title" product which forms a part of the existing OCM provision.
6. Between October 1999 and March 2015 there had been no direct competitor to the OCM market outside of office hours and therefore, the emergence of this new player has the potential to change the dynamic in the Title market by attracting trade volume away from the OCM. In their role as Residual Balancer NGG are only permitted to use the OCM to balance the system, except under specific emergency arrangements. Therefore any

trade movement away from the OCM has the potential to increase the probability of there being insufficient volume available at an efficient and economic price for NGG to take action.

7. Given this change in the gas spot market, on the 12th June 2015 Ofgem published an open letter[1] encouraging NGG to explore the gas market operator (OCM) arrangements (as set out in Annex D1 of the UNC and Standard Special Condition A11 paragraph 22 of its Gas Transporter Licence) in consultation with any interested parties within the industry.
8. In order to gain a comprehensive understanding of industry views on this topic NGG have held in excess of 25 bilateral meetings with interested customers and stakeholders. In September, NGG raised a UNC Request Proposal (0555R) to create a UNC Review Group, to consider the issues raised in Ofgem's letter.
9. This paper is primarily focussed on capturing the discussions, recommendations and consensus view to date of the bilateral discussions and the 0555R Review Group members.

Scope of Review Group 0555R

10. During the first Review Group meeting NGG outlined the scope defined in the 0555R Request proposal. This was confirmed by the Review Group as being whether:
    - 10.1. the current OCM market operator arrangements are still fit for purpose for the medium to long term as well as today;
    - 10.2. changes to the market operator arrangements could facilitate further competition and thus have net benefits to consumers, taking into account potential costs of changes to the arrangements; and
    - 10.3. there were any potential implications of multiple trading exchanges on system operation and balancing and the materiality of any risks identified.

Summary of key themes emerging from the initial stakeholder feedback

11. From the initial bilateral discussions held with interested parties a number of key themes emerged and were summarised for the Review Group as:
    - 11.1. Market liquidity
    - 11.2. Real time publication of cash-out prices
    - 11.3. Trading costs
    - 11.4. Certainty around the exchange where the Residual Balancer is active.

Assessment via risk analysis

12. Building on the key themes identified above, NGG developed corresponding risk statements to understand how material each of the issues was and how they could be mitigated. The risk assessment definitions agreed by the 0555R Review Group can be seen in Appendix 1:

[1] https://www.ofgem.gov.uk/publications-and-updates/letter-national-grid-gas-market-operator-arrangements

13. The risk statements, the initial Strawman scoring (developed by NGG in line with their assessment of stakeholder views shared during bilateral discussions) and then amended Review Group scorings are detailed in Figure 1 below;

Key to Figure 1:

Initial Strawman scoring		Amended scoring post stakeholder review		Material Impact	

Figure 1:

Issue	Impacted Area	Risk statement There is a risk that…….	Impact	Likelihood	Total Risk score
Market Liquidity	Volume	(R1a) Trade volume splits between the balancing exchange and another alternative exchange leading to insufficient market depth (Bids/Offers) for NG to be able to demonstrate it is taking “economic” residual balancing actions	4	2	8
			2	1	2
	Price / Money	(R1b) Trade volume splits between the balancing exchange and another alternative exchange, which results in NGG taking less economical balancing actions to attract volume back to the balancing exchange. As a result cash-out prices do not reflect wider market conditions on the day	4	2	8
			2	1	2
	Volume	(R2a) Trade volume splits between the balancing exchange and another alternative exchange leading to insufficient market depth (Bids/Offers) for market participants who only have access to the one exchange to balance their position	1	2	2
			1	1	1
Trading costs	Money	(R2b) Trade volume splits between alternative out of hours trading venues incentivising market participants to have access to more than one venue to maintain access to the same level of liquidity increasing the market entry costs of market participants	1	2	2
			1	1	1
Real time cash out prices	Price / Money	(R3a) A change to the market structure adversely impacts the frequency within which clearing prices are published: As a consequence there is a risk that on a **Difficult Day** shippers price in an increased risk margin into market offers, in turn leading to higher market clearing volatility due to the publication delay	4	4	16
			3	4	12
		(R3b) A change to the market structure adversely impacts the frequency within which clearing prices are published: As a consequence there is a risk that on	4	4	16

		an **Average Day** shippers price in an increased risk margin into market offers, in turn leading to higher market clearing volatility due to the publication delay	2	4	8
Level playing field	Money	(R4) A change to the market structure risks market providers cherry picking between products (Title, Physical and Locational) that they are willing to provide, potentially leading to the less economic provision of required balancing products	New risk added during discussions within the initial Review Group meeting Assumptions changed therefore no longer deemed a risk		

14. The numeric scoring included in Figure 1 shows how the consensus view from the Review Group on each risk resulted in them all being reduced in materiality from the initial strawman assessment, with the highest score being deemed 12 out of a potential maximum score of 25. The risk matrix (Figure 2) is shown on page 6, the score of 12 correlates to ‘reduce’ on the risk matrix.

15. Further information detailing how the Review Group reached the final total risk scores is provided below;

15.1. <u>Risk 1a&b</u>

15.1.1. The assessment of Risks 1a&b includes the assumption that as a result of the Shippers and Traders having access to multiple exchanges, volume may fluctuate between those exchanges. Under current arrangements, under normal circumstances the Residual Balancer is restricted to balancing on only one exchange. Therefore if trade volume moves away from that balancing exchange the Residual Balancer may not have access to the relocated volume to take appropriate action to encourage the market to balance the gas network. The Review Group consensus was that despite the introduction of competing exchanges in the NBP 24/7 spot market there has yet to be any movement in trade volume away from the current balancing exchange, therefore the likelihood scoring should be amended down to ‘ rare -1’. The Review Group also discussed the impact score. This score was also ultimately amended downwards to reflect the consensus of the group. Discussions determined that should this situation occur then any arbitrage opportunity would quickly be closed by market participants and that volume would return to the balancing exchange to aid the balancing of the network. NGG therefore updated the analysis in light of these discussions and to calculate a revised annual impact cost. The analysis resulted in the score being reduced down to a ‘2 – Minor’.

15.1.2. The analysis referred to in 15.1.1 was focussed on the impact on the magnitude of the Balancing Neutrality pot of the Residual Balancer actions in a less “liquid” market. The assumption being that a less liquid market will result in a wider differential between the average price of trades and the marginal set by NGG. Additional detail on the analysis can be found within Appendix 2.

15.2 Risk 2a&b

15.2.1 Risks 2a&b assume that not all industry participants will sign up to multiple "out of hour's" exchanges to balance their portfolio and as a result there may be instances where there isn't sufficient volume on the one exchange they are active on to enact their trades. As with R1a&b the Review Group agreed that the likelihood should be amended to 'rare' due to the limited movement which has taken place to date between the alternative exchanges. An impact score of 'insignificant' was agreed based on stakeholder feedback which highlighted that the majority of users would sign up to multiple exchanges to ensure they got the best prices available. As a result the financial impact would only capture a small number of stakeholders that chose not to do so. The Review Group also agreed that this would be a short term risk for exchange users who were able to sign up to alternative exchanges relatively quickly if this risk materialised.

15.3 Risk 3a&b

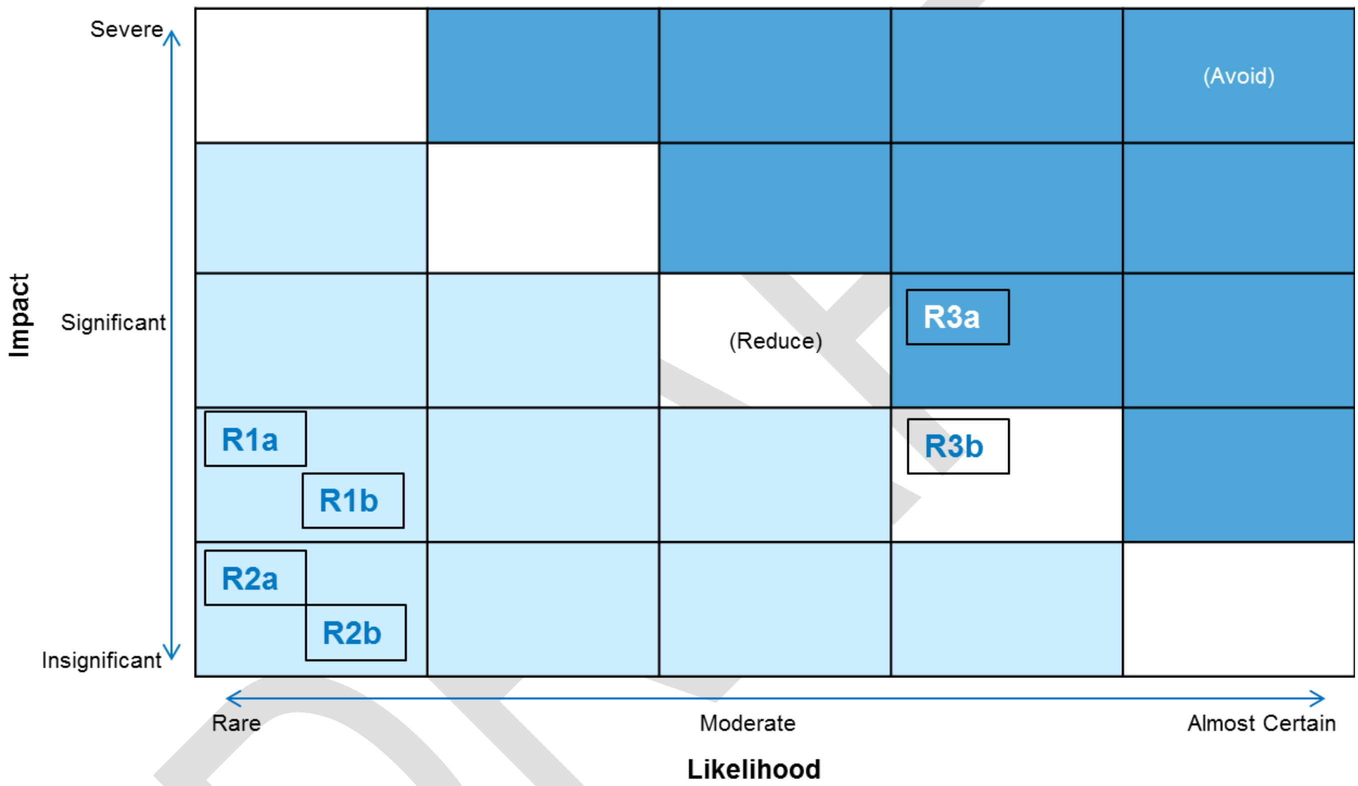
15.3.1 Risks 3a&b assume that the market structure has changed to allow for multiple market operators / exchanges to be used by the Residual Balancer, and as a result the System Clearing contract (cash-out prices) now needs to encompass trades from multiple exchanges. Under current arrangements cash-out prices are calculated and published in close to real time. The Review Group felt that due to the added complexity and additional steps that would be required as a result of moving to a multiple market set up it would be very challenging to maintain the publication of cash-out prices in the same timeframe, in an economic and efficient manner. On these grounds some stakeholders within the Review Group agreed that any delay to the publication of cash-out prices has the potential to lead to the inclusion of additional risk premiums in Market Offers, especially on a difficult day, if prices in the market were changing quickly. For this reason, risk 3 was spilt into two parts to reflect the impact of a difficult day (a) and an average day (b). The Review Group consensus was that the likelihood of the frequency of the publications score should be increased to 'likely - 4' on both parts of the risk statement due to the reasons outlined above. It was agreed that the impact of this additional risk being built into Market Offers was higher on a difficult day than on an average day, therefore the impact scores reflect this, scoring 'significant – 3' on a difficult day and 'minor – 2' on an average day.

15.4 Risk 4

15.4.1 Risk 4 was raised by a Review Group member in the first meeting. The risk outlined that if the industry agreed to move to a multiple market model but didn't enforce all providers of a balancing exchange to adhere to all of the requirements pertaining to Market operators outlined in UNC, then the industry risked creating an "un-level playing field". In discussing this risk however, the Review Group also recognised that in a multiple market model it wouldn't be efficient or economic to have multiple exchanges providing markets which have historically been rarely used and therefore decided to discount this as a risk and instead include it as a potential option where it could be given further detailed consideration (Scenario 3a&b).

16. The revised total risk scores highlight that risks 3a&b were deemed the most material by the Review Group. As a result the future scenarios to be discussed should consider ways to mitigate or reduce these key risks. Risks 1a, 1b, 2a, 2b all scored two or below. The Review group agreed that as outlined in the risk matrix these risks are non-material due to their rare likelihood and less significant impact scores. The risk matrix highlighting the final total risk scores is provided below in Figure 2;

Figure 2:



Emerging Scenarios

17. In considering mitigating actions to the identified risks, the Review Group identified a number of potential future market operator scenarios. These scenarios fell under two broad market models;

17.1. Single Market Operator Model
17.2. Multiple Market Operator Model

18. Article 10 of the EU Balancing Code[2] makes provision for either single or multiple market arrangements and doesn't specify a preference for either.

19. The GB regime currently operates under a single market operator model. This is where the Title, Physical and Locational markets are facilitated by a single provider on a single

[2] EU Balancing Code

exchange, and this exchange is the only applicable platform which NGG can use for residual balancing purposes. A multiple market operator model would allow a number of providers to facilitate market exchanges which could then be used by NGG for residual balancing purposes and therefore be included in the calculation of cash-out prices.

20. The scenarios identified by the Review Group consider the single and multiple market operator models. The scenarios are outlined below:

Scenario 1: Maintain the current arrangements (the ‘do nothing’ option);

Scenario 2: Maintain a single market operator model, but introduce a fixed term retendering / benchmarking exercise of the market provision;

Scenario 3a: Introduce a multiple market model, where all “cash-out relevant” exchanges provide all three markets (Locational, Physical and Title); and

Scenario 3b: Introduce a multiple Title market model, supplemented with one sole provider of the Locational and Physical markets, which would be subject to a fixed term retendering / benchmarking exercise.

21. From the scenarios outlined above scenarios 1 and 3a were ruled out by the Review Group during the second meeting held on 27th November, further information on the rationale for this is detailed below:

21.1. Scenario 1 - Maintain the current arrangements: this scenario would allow ICE Endex to continue its role as the OCM Market Operator without any additional market test, or market benchmarking process being scheduled. The Review Group consensus was that continuing with the current arrangements would not be appropriate due to the introduction of new competition in the 24/7 spot market which, if recognised may create an additional benefit to market participants. As a result the Review Group consensus was that there may be benefit in having the ability to periodically assess the services provided as the GB regime continues to evolve. On these grounds Scenario 1 was not considered any further and was discounted as a potential option.

21.2. Scenario 3a - Introduce a multiple market model: this scenario is where all relevant exchanges are required to provide all three markets (Locational, Physical and Title) on a level playing field basis. The ‘Title’ market currently accounts for ~ 99% of the trades which take place on the OCM. The ‘Physical’ and ‘Locational’ markets are used infrequently, mainly for system constraint management purposes but are also required for emergency arrangements as outlined in Section Q of the UNC. However these two products do not contribute significant financial value for the market operator. Therefore, the Review Group considered that when the Physical and Locational markets are required for system balancing purposes having liquidity concentrated on one exchange platform would be to the benefit of the market, mainly to ensure appropriate volumes are available to the Residual Balancer to complete its remit, but also to provide market arrangement clarity and a more efficient provision to the market.

On these grounds and paying particular attention to the potential costs vs the benefits of providing multiple Physical and Locational markets, which are rarely used, the Review Group consensus was that no further work should be undertaken on this scenario and it was discounted as a potential option.

22. Subsequently, the Review Group recognised that two remaining options were worthy of further work and consideration, these being Scenario 2 and Scenario 3b as previously outlined in paragraph 20.

Cost-Benefit analysis of remaining scenarios

23. Following the consensus decision to discount scenarios 1 and 3a, the Review Group recognised that there would be merit in carrying out further analysis on the remaining scenarios to gain a better understanding of their relative high level costs and benefits.

24. <u>Scenario 2 - Maintain a single market operator model, but introduce a fixed term retendering / benchmarking exercise</u>

24.1. **Description**

24.1.1. Scenario 2 maintains the current single market operator model but introduces a fixed term retendering / benchmarking exercise. This ensures that any potential competitors to the existing market provider have a regular opportunity to offer their services on a fair and equal basis, whilst allowing the GB market to ensure that the service offered remains competitive.

24.2. **Risks**

24.2.1. Risks 1a&b (as previously described in Figure 1) summarise the concerns expressed by stakeholders in relation to maintaining the existing single market operator model. This predominately focuses on the risk of liquidity splitting between competing exchanges, whilst NGG as Residual Balancer are restricted to operating on only one exchange market. The Review Group considered that, based on the experience and data gained since March 2015, this risk has a low likelihood of materialising in the short to medium term.

24.3. **Stakeholder feedback**

24.3.1. To be completed after review group discussions

24.4. **Benefits**

24.4.1. Through discussing the risks and issues outlined in Figure 1 the Review Group identified a number of potential benefits of maintaining a single market operator model together with the introduction of a fixed term market testing / benchmarking process. These included:

- Additional competitive pressures in the 24/7 spot market introduced by regularly reviewing the provision of the market operator service. The Review Group consensus was that this may continue to encourage the existing and prospective providers of a balancing exchange to be innovative, maintain efficient and economic charges and to ensure they provide an adequate level of customer service.

- Liquidity concentration on one exchange therefore providing the Residual Balancer with a wider market view on one platform
- Single point and efficient provision of the three markets required under the Uniform Network Code (UNC) (Title, Physical & Locational).
- Continued support for future UNC developments e.g. Demand Side Response.
- Lowest "cost of change" option as a result of maintaining the current processes and systems which are already established to support the single market operator model.

24.5. **Costs**

24.5.1. Due to maintaining the current status quo with a single market operator model the additional costs introduced by this scenario would be limited to the costs associated with market testing at regular intervals e.g. this could be every five years.

25. <u>Scenario 3b - Introduce a multiple Title market model, with one sole provider of the Locational and Physical markets subject to fixed term retendering or market benchmarking exercise.</u>

25.1. **Description**

25.1.1. Scenario 3b introduces a multiple Title market model, whilst maintaining one sole provider for the Locational and Physical markets with a fixed term market retendering or market benchmarking exercise. This enables there to be competition within the provision of Title markets where ~99% of trades take place and thus is where the majority of the financial value is for potential market providers to compete for. Whilst ensuring that there is appropriate efficient and economic provision of the Locational and Physical markets.

25.2. **Risks**

25.2.1. The Review Group identified that the biggest risk of moving to a multiple market model is on maintaining the publication of close to real time cash-out calculations. Currently system clearing prices (or cash-out) are calculated and published in close to real time, this means that every time a new trade takes place the calculation is run and a new cash-out price is published for the market to view on the OCM exchange platform. If a multiple market model is adopted it may introduce a delay to the publication of cash-out prices, or, to enable the timeliness to remain, it may require changes to I.T systems which are deemed to be uneconomic. There was a broad consensus from the Review Group that maintaining the near real time publication of cash-out prices was very important, and that the introduction of a delay would be a detrimental step from the current arrangements. The consensus view was that any delay in publication may result in a change in user behaviour, leading them to factor in additional risk premiums to market offers, albeit this may only be on more challenging days.

25.2.2. The Review Group also highlighted a concern that should the provision of the Locational and Physical products be separated from the Title product then there was a risk that there may be no one willing to provide the Locational and Physical product platform.

25.3. Stakeholder feedback

To be completed after review group discussions

25.4. Benefits

25.4.1. As outlined in the Ofgem open letter, the introduction of further competition in the 24/7 gas spot market has the potential to bring about a number of additional benefits for consumers. Some of the benefits recognised by the Review Group were:

- The introduction of additional exchanges that are already operating in other EU markets may lead to additional players participating in the GB regime, therefore increasing the amount of liquidity available in the market. When discussed within the review group meetings there was limited agreement that this would lead to an increase in liquidity, due to the NBP market already being one of the most liquid hubs in the EU regime.
- Operating in a multiple market model has the potential to remove the risks of liquidity splitting between alternative exchanges platforms as outlined in risks 1a, 1b and 2a, ensuring that NGG as Residual Balancer and users of both exchanges have access to the appropriate amount of volume to balance their portfolios.

25.4.2. Within the second Review Group meeting some parties also highlighted perceived cost savings for the industry of a change to a multiple market setup. These cost savings are particularly in relation to a reduction in transaction fees as a result of competitive pressures and further investment in innovation.

25.4.3. As a result NGG has been compiling some analysis to understand these potential cost savings, the results generated rely on a number of assumptions which are detailed below:

25.4.3.1. Transaction fee savings assumptions:

- The baseline for current transaction fees have been taken from the PEGAS presentation discussed in the Review Group meeting on 27th November.[3]

[3] http://www.gasgovernance.co.uk/sites/default/files/PEGAS%20response%20to%20risk%20statement%20assessment%20of%20National%20Grid%20(for%20information%20only).pdf

- The OCM and PEGAS trade volumes used to generate fees and savings are from October 2014 to September 2015:
    - Volume is split 10% in office hours and 90% out of hours reflecting perception of current behaviour;
    - The current volume split is 99% on the OCM exchange to 1% on the PEGAS exchange; and
    - All weekend volume is classed as “out of hours”.
- The benefit scenarios are based upon volumes moving between exchanges, this has a similar affect to competition causing reductions in trade fees.
- The scenarios used are 10%, 20% or 50% movement from the baseline level.

25.4.3.2. Results - Transaction fee savings results:

- The table below shows the baseline estimate for the revenue created from Transaction fees associated with trades enacted on the OCM in the period of October 2014 to September 2015. It then shows the reduction in fees if volume moved across onto the current alternative platform. This is a proxy for a reduction in fees.

Volume movement	Cost	Saving vs Baseline
Baseline	£ 333,532	
10%	£ 309,967	£ 23,565
20%	£ 292,837	£ 40,696
50%	£ 241,446	£ 92,086

25.5. **Costs**

25.5.1. The perceived cost savings referred to in paragraph 25.4.2 were queried by a number of Review Group members who believe that the total costs to the industry would increase rather than reduce as a result of a move to a multiple market model, due to market participants needing to subscribe to multiple exchanges rather than just choosing one. As a result NGG were asked to consider the potential costs of a change to the market set up, paying attention to the costs of a change to the calculation and publication of real time cash-out prices and also the costs to the industry from operating on multiple exchange platforms.

25.5.2. The cost estimates produced in response to this request are high level costs and haven’t been subject to detailed analysis at this stage. More detailed work would need to be carried out should it be needed as part of any future UNC Modification Proposal development resulting from this review.

25.5.3. The analysis completed relies on a number of assumptions which are detailed below:

25.5.3.1. UKLink and Invoicing changes assumptions include:

- File process changes to allow for the trade data to be received and processed from multiple sources;
- Market operator invoice, trade elements of the Energy Balancing Invoice. Credit management services for Market operator will not currently support multiple operators; and
- End of Day cash-out calculation, system rules required in a multiple setup e.g. rules required to be used in the absence of files on any given day from one or more of the relevant exchanges.

25.5.3.2. Cash-out prices calculation assumptions for NG:

- Trade data will transfer from all approved balancing exchanges to National Grid (or Xoserve) for collation and subsequent calculation of system clearing prices which will subsequently communicated back to all exchanges for onward publication;
- There will be a dedicated point to point solution with a guaranteed defined response time. The gateway will be located on the NG network with a dedicated point for any recognised exchange to effectively place the data following each trade, this will facilitate the calculation of cash-out prices;
- There will be approximately 100 - 200 trades per day (reflecting current behaviour);
- A 24/7 service will be required (minus the current UKLink housekeeping window);
- Calculation and data flows will happen as near to real time as possible (the aim is to deliver the prices back to the market exchanges within single digit seconds);
- There will be a cross site high availability production and a non-production system solution, to allows for a “Fix on Fail” and development split across two sites, this will ensure there is the appropriate level of resilience;
    - High availability covers ensuring the service is always available and always maintains the data within it, this will be covered by having a multiple instances;
    - Utilising existing I.T Network infrastructure from an NG perspective.
- Ongoing costs assumed to be approximately 15% of the implementation costs; and
- UKLink changes will be required to allow for;
    - End of Day processes including multiple Market Operator files from multiple sources;
    - Energy Balancing Invoicing and Credit management processes.

25.5.3.3. Cash-out prices calculation assumptions for Exchanges:

- There will be other costs associated to each appointed exchange including:

- Implementation of the “Point to Point” solution to allow guaranteed defined timely communications with NGG, both to transfer data to and receive from;
- Resilience via a diverse route; and
- Ongoing costs of such networks tend to be 40-50% of the implementation costs.

25.5.3.4. Cash-out prices calculations resulting from Multiple exchanges total cost summary:

Required Changes (Multiple)	Cost Estimate
UKLink End of Day changes (including Multiple cash-out files and invoicing)	Between £500k and £590k
Real time cash-out calculation - NGG	Approximately £500k
Ongoing Real time cash-out cost - NGG	Approximately £75k
Systems and network capability costs - Exchanges	unknown

25.5.3.5. Multiple membership fees assumptions:

- The Industry users who have already subscribed to more than one exchange are excluded from these costs. This is because this is not deemed as an addition as the costs are already being incurred;
- PEGAS’ Membership fee is based upon the 'Welcome package' rates detailed in the 27th November Presentation[4];
- The cost of providing the Locational and Physical markets is already embedded into the membership fees offered by ICE currently, therefore utilising those costs in the analysis account for an approximation of the provision of those markets;
- There are currently 71 OCM members, 35 of these are also PEGAS members;
  - The scenarios used to assess the potential additional costs associated to a multiple market arrangement range from 50% of the difference in members to all members (an additional 36) signing up to both exchanges.
- Trading Gateway allows a user to aggregate the order books of multiple exchanges into one. These costs are estimated to be in the range of £5k to £15k per annum per member. Detailed cost information is not available to NGG; however NGG believe this to be a conservative estimate.

25.5.3.6. Multiple membership fees total cost results:

- The estimated potential additional annual costs to industry of having membership on an additional exchange are detailed below, the costs

[4] http://www.gasgovernance.co.uk/sites/default/files/PEGAS%20response%20to%20risk%20statement%20assessment%20of%20National%20Grid%20(for%20information%20only).pdf

range from £262,800 - £885,600 based on current workings and the assumptions outlined above.

	% of additional members	
	50%	100%
Additional membership fees	£ 172,800	£ 345,600
Additional Techinal fees estimate	£ 90,000	£ 540,000
Total Additional cost estimate	£ 262,800	£ 885,600

Summary

The table below shows a summary of the total potential costs and benefits from the analysis completed by NGG to date on scenarios 3b, which has been outlined in more detail above:

Areas of costs (£)	Low case	High case
Estimated IT System implementation costs - Real time cash-out (1)	500,000	500,000
Estimated IT System ongoing costs	75,000	75,000
Estimated End of Day process system changes	500,000	590,000
Potential additional costs of market access	262,800	885,600
Potential Competition impact on transaction costs	- 92,086	- 23,565
Estimated Total	**1,245,714**	**2,027,035**

Appendix 1 – Risk Assessment definitions:

Impact		Financial Definitions (Time Period: Year)
5	Severe	Over £5 Million
4	Major	£1 Million - £5 Million
3	Significant	£500,000 - £1 Million
2	Minor	£100,000 - £500,000
1	Insignificant	Less than £100,000

Likelihood		Definition
5	Almost Certain	90% or greater chance of occurrence
4	Likely	65% up to 90% chance of occurrence
3	Moderate	35% up to 65% chance of occurrence
2	Unlikely	10% up to 35% chance of occurrence
1	Rare	<10% chance of occurrence

Appendix 2 – Analysis Summary:

As part of the assessment of the impact and materiality of the risks, NGG carried out analysis which focussed on assessing the impact on the magnitude of the Balancing Neutrality pot of the Residual Balancer actions in a less "liquid" market. The assumption being that a less liquid market will result in a wider differential between the average price of trades and the marginal set by NGG. The analysis was conducted using the period October 2014 to September 2015.

Within the analysis a number of factors were taken into account;

- Historically the number of days which the Residual Balancer takes action, both buy and sell for the period, which can be seen in the table below:

Period	NG trade days	NG trade days as %	% Buy days	% Sell Days
q414	45	49%	38%	11%
q115	34	38%	26%	11%
q215	30	33%	16%	16%
q315	27	29%	23%	7%

During the first Review Group analysis was discussed, this analysis made broad assumptions of a uniform effect on price differentials between markets and this was challenged by the Review Group members. As a result NGG updated the analysis and introduced a curve of impact, recognising that every day wouldn't be the same and extreme price effect days are likely to be minimal in number. The table below shows the price impacts and their relative probabilities used in the updated analysis presented in WG2 leading Risks 1a and b being reduced in impact and likelihood.

Price impact (p/th)	Probability (%)
0.1	50
0.25	25
0.5	20
1	4
2	1

e impact on Balancing Neutrality was created using the imbalance data in the period. The results of this analysis can be seen in the chart below, the chart shows that the overall impact on Balancing Neutrality cash-flow totals approximately £250k for residual balancing Buy trades and approximately £110k for residual balancing Sell trades across period. It also shows the magnitude of the impact of each price step described in above.