Gas Market Settlement Risk Assessment Dynamic Model Specification

Engage Consulting Limited

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Document Control

Authorities

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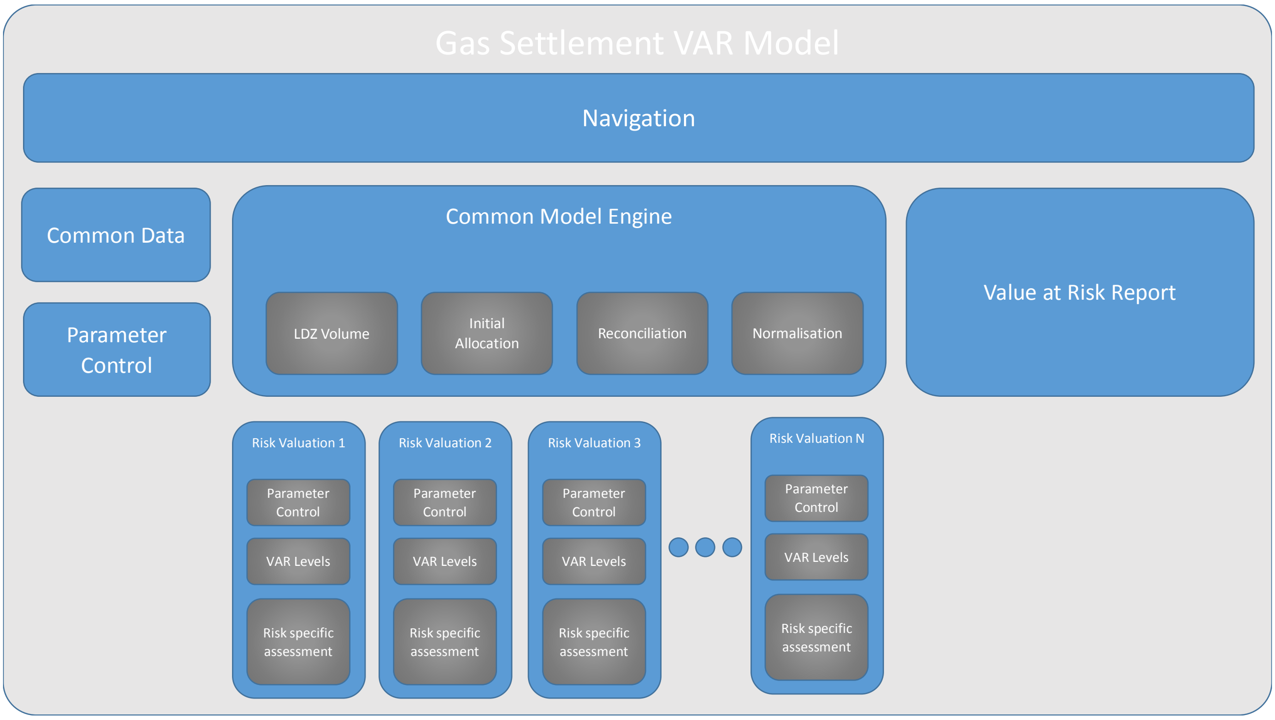
1 Model Architecture

1.1 Background

The scope is to deliver a dynamic model, which can be used to quantify the size of settlement risks and to be used by the Performance Assurance Workgroup (PAW) to assess these risks going forward.

The dynamic model will be built in MS Excel and will be used to evaluate the performance risks identified in the Gas Market Settlement Risk Report Section 1 V0.1. The model will replicate the Nexus gas settlement processes using 7 shippers to simulate the market.

The model architecture is shown in the diagram below. Each model component is described in sections 1.2-1.7. The PAW will be able to update the common data described in section 1.3 to change the characteristics of the market. These changes will then update the potential volume and value at risk.



1.2 Navigation

The navigation section supports the model user to access the different sections of the model. This will include menus for entering static data and other modelling data. It will also allow the user to control which risk area they wish to amend and assess.

1.3 Common Data

The model requires the input of common and static data, for example, a shipper matrix with relative market shares, product categories and corresponding market proportions. Users of the model will be able to amend this data to replicate specific situations for additional assessment of risks. The PAW will be able to agree a set of static data for their own risk assessment.

1.4 Parameter Control

The Parameter Control functionality delivers the risk specific parameters, which are selected dependant on the risk, to be evaluated. The model will be run separately for different risks. The user can select which risk they want to assess and select the required parameters. This means the model does not need to be duplicated for each risk.

1.5 Common Model Engine

The Common Model Engine is the core part of the model. It performs a full simulation of the gas settlement process. It consists of three sub models; LDZ volume, initial allocations and reconciliation. The core model will also provide the information for the Value at Risk Report.

1.5.1 LDZ Volume Model

This section of the model calculates the LDZ volume. It accepts parameters for the level of error in the calculation and produces two sets of LDZ volumes that are then used for other sections of the model. One LDZ volume includes the errors and the other excludes the errors.

The model will use one day's typical LDZ volume in cubic meters and the average of all LDZ forecast CVs to convert this volume to kWh. An approximation of unidentified gas will be obtained from the latest AUGE statement. It will be possible for the PAW to update the LDZ volume, CV and amount of unidentified gas.

1.5.2 Initial Allocation

The Initial Allocation process uses the LDZ volumes and the shipper matrix from the static data to simulate an initial allocation. Two versions are simulated, one including errors and one excluding errors.

The shipper matrix is part of the common data area and models seven shippers. Users of the model can configure these shippers as required. The first three shippers are polluters; these shippers realise the risks and their allocation and reconciliation will have corresponding errors simulated. The risks pollute the other shippers and their allocation and reconciliation where appropriate.The intention is that the model will categorise shippers as follows;

1 – Small Polluter	4 – Small Polluted
2 – Medium Polluter	5 – Medium Polluted
3 – Large Polluter	6 – Large Polluted
7 – Residual Polluted	

Characteristics of the small, medium and large shippers portfolio will be partly determined using the Mod 81 report. An approximation of AMR and smart metering uptake will be used to determine the split between product 2, 3 and 4. The 7th shipper will simulate the remainder of the market, which will insure that the model represents the whole market.

1.5.3 Reconciliation

This section simulates the reconciliation process following individual meter point reconciliation and the redistribution of the energy through unidentified gas reconciliation.

Meter points will be reconciled individually at meter point level monthly and daily usage will be profiled where daily reads are not available. The energy will be redistributed to Shippers' based on an approximation of consumption over the last 12 months. We will use market share data as an approximate value. The model has market share data at the start and end of a model year and uses the average of the two values as the market share; this assumes a linear change from start to end.

The reconciliation output will show the initial allocation and UG values. A table will show the difference between the initial allocation and actual usage following an individual meter point reconciliation. The equal and opposite transaction will be allocated to unallocated gas reconciliation. The reconciliation output will also show the change to UG.

1.6 Value at Risk Report

This section reports the VAR results. This is the difference between the cost incurred between the reference scenario where there are no risks and the scenario where the 95% worst case scenario.

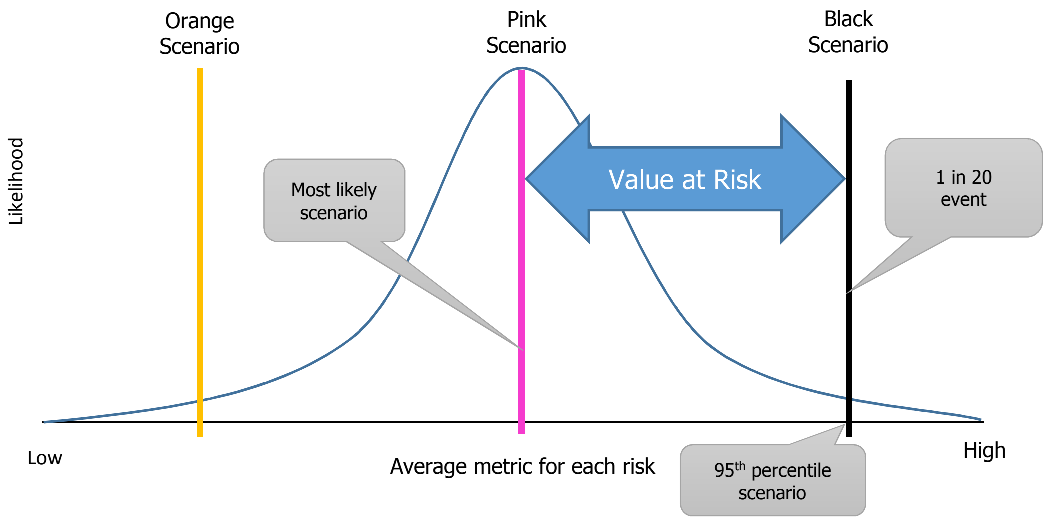
1.7 Risk Valuation

The model repeats this process for each "risk set" being considered. The model considers most risks alone but some risk are interlinked and the model needs to consider such risks together as a set. For example, failures related to meter readings will affect both reconciliation volumes and AQ calculations and therefore these two risks are considered as a set.

2 Method for Performance Risk Assessment

The model aims to show a set of shipper's risk when each error identified in section 2 occurs. This risk manifests as variations to initial allocation, final meter point reconciliation or through the unidentified gas reconciliation adjustment. The initial allocated energy will be matched by trades made by each shipper on the wholesale market. Any subsequent adjustments are uncertain and therefore will be incurred at system average price. The dynamic model will be used to assess each risk. Real data either publically available or provided by Xoserve will be used to assess the severity and likelihood of each risk. This will then be used to create an appropriate error distribution for each risk.

Engage will measure each risk based on the 1 in 20 worst-case scenario. This method will measure the value at risk between the expected scenario and the extreme scenario (but not too extreme) where a shipper or transporters actions pollute fair allocation of settlement volume. For simplicity, we will refer to the expected scenario the "Pink" scenario and our extreme scenario as the "Black" scenario. The black scenario typically represents a one in twenty high market-polluting scenario measured at the 95th percentile mark on the most appropriate probability distribution. The different between the cost in the Pink scenario and the costs in the Black scenario is the value at risk.



In each case, we will understand the allocation volume of the central scenario and the change in volume of the extreme scenario to each of the 7 shippers within the modelled market. The change in volume will be priced at system average cost and will be the cost of the risk.

3 Performance Risk Assessment

Each of the performance risks identified in the analysis, will be assessed using the dynamic model. We will group risks, which affect meter reading, AQ process and reconciliation together to minimise repetition. We will use the model to run scenarios to quantify each set of risks. This quantification of risks will be deliverable three, to be published in the final report in January 2015.

3.1 R1. Identified LDZ Offtake Measurement Errors

Offtake measurement errors create a risk to accurate allocation as any error is initially allocated to NTS shrinkage. When the LDZ throughput is corrected volume adjustments will be picked up through unidentified gas reconciliation. This is a performance risk created by the Distribution Network Operators (DNOs). DNOs have a responsibility to maintain the offtake metering. We will assess the value at risk created by offtake measurement errors.

There are 187 offtake meters and 127 offtake measurement errors have occurred in the last 8 years. We will use the data provided in the measurement error register to determine the probability of an error occurring on any given day for an offtake meter. Only published data will be used, where the size and duration of an offtake error is known. We will use the average length of an error and volume in kWh to determine the appropriate probability distribution.

The 1-20 event will be where the cumulative probability of “X” offtake meter errors is 0.95. This will be used to determine the value at risk. For this risk we will model the impact to unidentified gas and not the corresponding impact to NTS shrinkage.

3.2 R2. LDZ Offtake Measurement Errors that remain undetected

Where an offtake measurement error is not detected then the error will never be corrected. We will extend risk 1 to assess the likelihood and impact of LDZ meter errors remaining undetected. Where an error occurs and remains undetected, the proportion of NTS Shrinkage will remain inaccurate.

3.3 R3. Meter Reading Validation Failure

Post Nexus go-live, there will be two levels of meter read validation, the standard level and the market breaker tolerance. The standard level of meter read validation (inner tolerance) will be a function of the meter point’s SOQ for product 1 and 2, and a function of the AQ for product 3 and 4. Shippers are required to validate meter readings obtained against this inner tolerance. Where a shipper identifies a meter reading that falls outside this tolerance level but considers it correct, the shipper can flag the read as acceptable. Xoserve will apply market breaker validation to readings the shipper has flagged as acceptable. This market breaker validation uses a percentage of the meter point SOQ or AQ as the outer tolerance level.

Validation failure will occur when a comparison of the reading (and advance) against an expected value falls outside the tolerance levels derived from the current AQ and/or SOQ. Two tolerance levels will be applied both with an upper and lower percentages. Alternatively, validation failure occurs when inaccurate reads falling inside the tolerance levels are accepted.

A further level of validation failure will occur when shipper’s validation does not match Xoserve and the market breaker flag is not used correctly. Some meter reads around the market breaker tolerance level may be submitted with a market breaker flag unnecessarily. Others reads maybe submitted incorrectly without a market breaker flag.

We will assess the risk created by validation failure on shippers using the dynamic model. We will assess the value at risk where accurate meter reads are rejected and inaccurate reads are accepted. We will also assess the risk created by the market breaker validation. These type of errors manifest themselves as inaccurate AQs and delayed reconciliations. There is a corresponding impact of late reconciliation on the unidentified gas reconciliation energy.

The probability of meter reads failing each level of validation will be based on data provided by Xoserve for one LDZ and data from the Mod 81 report.

3.4 R4. Failure to Obtain a Meter Reading

We will use the same model parameters as 3.2 to assess the impact of shippers failing to obtain meter reads for an extended period. This will result in aged AQs and incomplete reconciliation periods for sites.

To determine the likelihood and probability we will use data provided by Xoserve for one LDZ. Failure to obtain meter reads will cause aged AQs. We will assess the average difference between aged AQs and the expected consumption but using the total AQ reduction from the Mod 81. We will determine the value at risk to all shippers caused by failure to obtain meter reads by polluting shippers.

3.5 R5. Estimated Reads used for daily read sites

We will use the model to assess the risk of estimated reads being used to settle daily read sites. Daily read estimates for product 1 and 2 are generated to match the consumption 7 days previously. Where there is no consumption history the estimate will be as AQ/365. The use of estimated reads will only materially impact settlement if there is no replacement read within gas flow day+5. A consumption adjustment should be completed if the estimate does not reflect reality.

Shippers should minimise the use of estimates on product 1 and 2. The model will assess the probability and impact of estimated reads being used for daily-metered sites.

Any error caused by estimated meter reads should be corrected using a consumption adjustment. We will assess the impact of a shipper completing consumption adjustments taking a biased approach. Consumption adjustments used to correct the volume of energy allocated to the meter points. These adjustments to settlement volume should be completed without bias.

3.6 R6. Meter Read Submission Frequency for Product 4

We will assess the risk created by infrequent meter read submissions for sites in product 4. The number of meter reads will affect the frequency with which the AQ is recalculated and the number of times the site is individually reconciled. This assessment will include the impact of the aged AQ and reconciliation periods being longer because of infrequent readings.

We will use data provided by Xoserve to determine the inaccuracy of AQs. We will use the average number of days between meter reads and expected difference between AQ and consumption to determine the probability distribution.

3.7 R7. Insufficient Maintenance of the Supply Point Register

Xoserve maintain the supply point register on behalf of large transporters. This contains information about all registered meter points and it is the responsibility of both the transporter and the shipper to ensure that the supply point register has correct details of supply points.

We will assess the risk created due to the supply point register not being accurately maintained. When meter readings are obtained the meter point detail submitted by the shipper must match the supply point register. Where logic checks fail and the read submitted does not match the supply point register the read will not flow through into settlement. This risk will use the same framework as 3.2 to assess the impact.

3.8 R8. Change of Shipper

Where the shipper fails to provide any reading during a change of shipper, the transporter will provide an estimate 16 days following the transfer date. Xoserve cannot accept subsequent meter readings until a meter read has been loaded for the transfer date.

Where a change of shipper is completed using an estimate transfer read, the closed reconciliation period of the previous shipper will end on an estimate and the new reconciliation period will begin on the same estimate. An estimated meter reading could be used because no actual reading was obtained or because the actual transfer read was rejected due to data discrepancies or because it failed validation tolerances due to an incorrect AQ.

We will assess the risk of estimated transfer reads on accurate reconciliation. This risk will principally affect product 4 sites.

The transfer read may not reflect reality and therefore the final allocation of energy to each shipper may be incorrect. Any misallocation in energy will be between the two shippers who have been responsible for the meter point.

We will use the number of change of shipper events and percentage of estimates. We will use the sample data provided by Xoserve to determine the accuracy of the estimates provided and establish probability and impact of inaccurate change of shipper reads.

3.9 R9. Late or Incomplete Check Reads

We will assess the impact of shippers not completing the check reads. Shippers are required to complete check reads for all metering equipment that derives a read. This risk will assess the impact of check reads not being completed within the 12/24-month timescales. Daily metered sites in product 1 and 2 will experience some metering equipment drift if they have a meter that derives a read. The risk of not completing these check reads is that drift and other errors are not identified.

This will include the likelihood of an error occurring and its impact if not identified.

3.10 R10. Shipperless Sites

The UNC Shipperless and Unregistered Sites Workgroup investigate the causes of shipperless and unregistered sites. This workgroup has identified that there are approximately 22,200 shipperless and unregistered sites suspected of taking gas.

All energy consumed by shipperless and unregistered sites will be allocated to the unidentified energy. We will assess the shipper performance risk created as a result of shippers withdrawing from sites which are legitimately consuming gas.

We will use data provided by Xoserve to determine how likely a meter point will be withdrawn from illegitimately and quantify the risk this will have on the remained of the market.

3.11 R11. Theft of Gas

Where theft of gas occurs, the amount of gas consumed will not be accurately identified. Any difference will be allocated to the unidentified gas adjustment. The energy will be allocated evenly across all market segments, which may not reflect the market segment or product category where the theft occurred. We will assess shipper specific impact of theft of gas on wider allocation of gas volume to the market.

We will use data from the AUGE report to establish the probability of an incidence of theft of gas occurring and how much this would affect the market. This data can be updated by the PAW when necessary. We will determine the value at risk due to the theft of gas. Performance targets could be used to incentivise shippers to resolve theft more readily.

3.12 R12. Fair Use of the AQ Correction Process

Where it becomes apparent through a meter read rejection or on acquisition of a site that the AQ is not reflective of true consumption, the shipper should complete an AQ correction. This will ensure that the AQ is updated to reflect true consumption. It is expected that shippers will complete these AQ corrections in an unbiased way.

We will assess the risk of shippers using the AQ correction process in a biased way i.e. only correcting AQ reductions. We will use data from the current Mod 81 report to determine the appropriate probability and severity of a shipper completing the correction process in a biased way.

3.13 R13. Lack of WAR Band calculation for Sites in Product 4

We will assess the risk of not completing a site-specific winter consumption profile on sites in product 3 & 4. Currently a Winter Annual Ratio (WAR) is used to determine a site-specific winter consumption for a monthly read site with an AQ > 293,000kWh. It is calculated as the December to March consumption divided by the AQ. If the meter readings are not available to complete a site specific WAR the default EUC profile is used. Following Nexus go-live product 3 sites will be reconciled monthly so the effect will be minimal.

3.14 R14. Bias approach to retrospective updates

We will assess the risk of shippers not completing retrospective updates in a fair and even way. For the first time following Nexus go-live shippers will be able to retrospectively update information held in the supply point register more freely. We anticipate that shippers will take an unbiased approach to updating this information to ensure the supply point register is accurate. Where retrospective updates have an impact on consumption a reconciliation or a re-reconciliation will be completed. It would be possible for a shipper to use the retrospective updates process only where they are advantaged financially. We will assess the probability and impact of a shipper adopting a biased approach to retrospective updates.

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4 Key Dates

Following agreement at the PAW on 28th October 2014 an early release of the model will be made available for PAW members to review the construction and outcome.

4.1 Model Delivery Dates

13th December 2014	Early draft Model for circulation (not all risks will be completed)
20th December 2014	Draft Model
20th December 2014- 10th January 2015	Review by Ofgem and the PAW