

# Monetised Risk

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## Abstract

Ofgem have concerns that the way networks are currently reporting Asset Health and Criticality does not enable risk trading and comparative analysis. They instructed the four networks to work together to find a way to assess and compare both between networks and also between asset groups. The concept of monetised risk was born.

Event tree analysis has been used to identify every possible failure that can occur on each of the major asset groups. Each model is then populated with probabilities and consequence data, resulting in a monetised risk for every potential failure mode and outcome of the models. These can be identified for individual assets, groups of assets or the entire population. The long term goal is to be able to risk trade between asset groups.

Not only do the data inputs and outputs need to be agreed upon, but the deterioration and probability of failure model methods need to be agreed on between networks. This has been a massive undertaking and involved huge manpower to even get close to completing the Innovation Funded project on time.

To report using this new method for July 2016 is a tall order. Internal data collection, probability of failure models and intervention methods need to be identified for our own assets. I am coordinating a team of engineers to produce a baseline monetised risk of Wales & West's networks.

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# 1 Background

In 2013, the regulator, Ofgem, introduced a new method of Price control called RIIO (Revenue = Innovation + Incentives + Outputs) GD1 (Gas Distribution 1). One of the aspects of this was the requirement to report on health and criticality indices. Once all of the gas distribution networks (GDNs) had reported for the first time, Ofgem realised that they couldn't compare the health of the networks between regions. A consultation process began to develop a consistent methodology.

To lead the process, the GDNs created the Safety and Reliability Working Group (SRWG). This is made up of Asset Strategy Managers from each of the GDNs and a few technical experts providing support. The primary responsibility of the group is for a common methodology to report network output measures or NOMs for short.

In September 2014, the suggestion of Monetised Risk was raised as the Electricity industry was discussing the concept. In December 2014, "The Manual" was due to be submitted outlining how Health, Criticality and Risk were going to be calculated. It was submitted in three parts. Parts 1 and 2 were catalogues of failure rates and consequences and part three was Monetised Risk.

This was a long and arduous process but finally all parties agreed that Monetised Risk was the way forward.

## 1.1 Asset Groups

Previously, table 7.3 of the Regulatory Reporting Pack (RRP) was the table for Health and Criticality Indices. It took 49 asset groups and outlined each in a 4x5 matrix of Health versus Criticality.

Criticality Index	HI1	HI2	HI3	HI4	HI5
Low	0	0	0	0	0
Medium	0	0	0	0	0
High	0	0	0	0	0
Very High	0	0	0	0	0

Of those 49 Asset groups, 19 were considered to be significant and account for approximately 90% of budgeted expenditure over the RIIO period. These were then further condensed into six individual models.

New Category	Old Category
Distribution Mains	Iron, PE, Steel, Other
Services	Services
Governors	District, I&C, Service Governors
LTS Pipelines	OLI1, OLI4
Risers	Risers
Offtakes/PRIs	Offtake/PRS Filters
	Offtake/PRS Pre-heating
	Offtake/PRS slamshut/regulators
	Odourisation
	Metering
6	19

## 2 Building Models

Monetised Risk was part of the proposal using DNV GL who in turn employed ICS Consulting to build the models. This used a risk tree approach which outlined every potential failure mode of each component of each asset group.

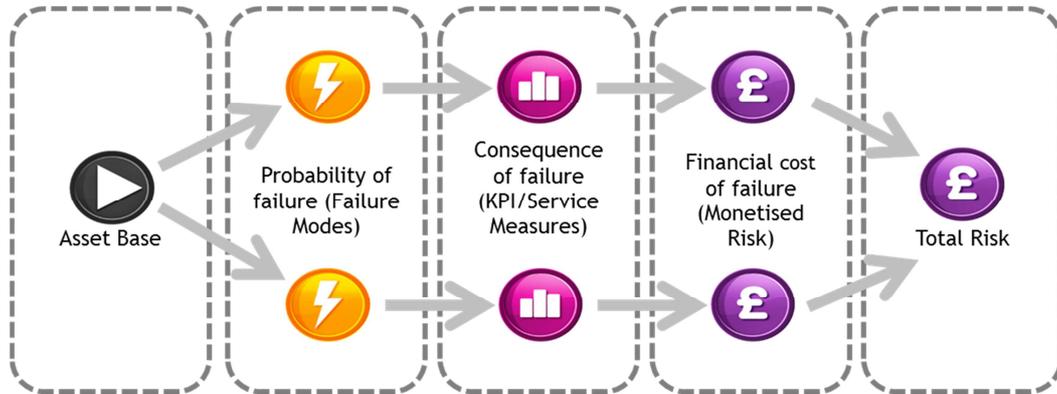


Figure 1: Broad Monetised Risk Map Process

The first step was to get asset experts from all GDNs in a room together to create and debate a risk map. The aim was to outline all of the potential failure modes to save rework down the line. The SRWG always got final sign off for each risk map to ensure all GDNs were considered in the model.

### 2.1 AIM model

Asset Investment Manager (AIM) is a specialist software tool that enables risk maps to be built and easily adjusted for various outcomes to be reached.

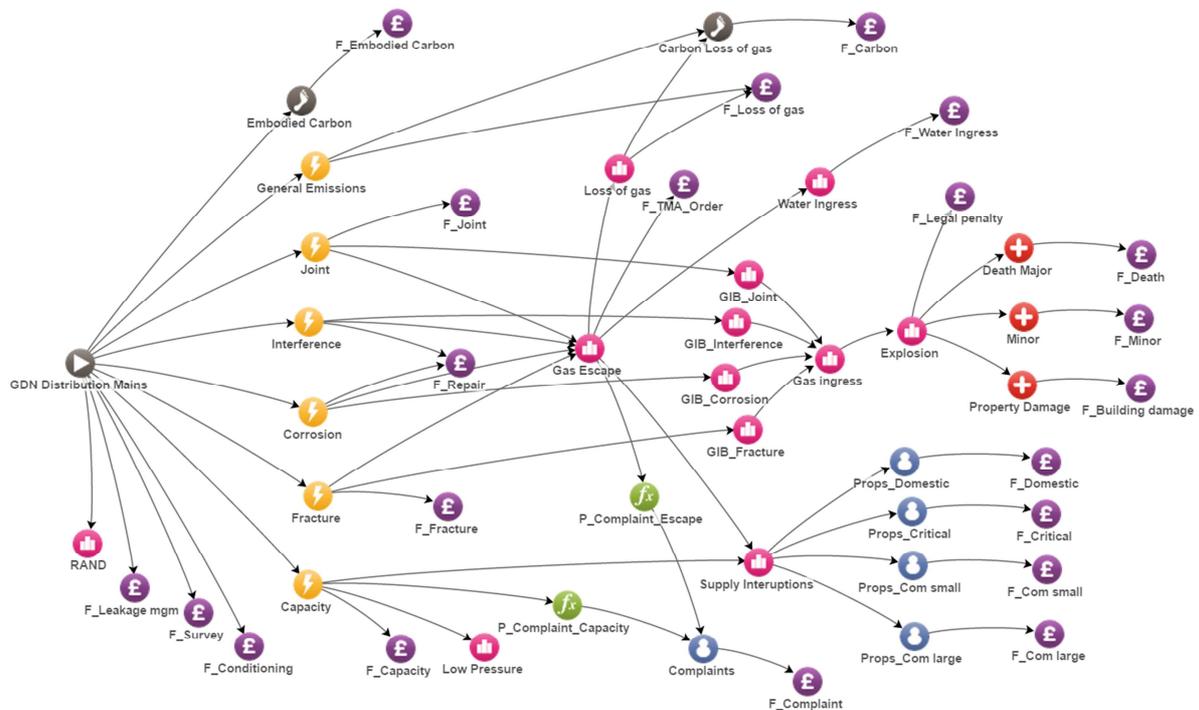


Figure 2: AIM model for Distribution Mains

## 2.2 Base Data

A base dataset was provided by the lead GDN on that asset group. Once the Aim model was signed off, this was locked down. This then became the basis for other GDNs to begin population of their own datasets.

## 2.3 Model details

These came from multiple sources. Between the four GDNs, there were often multiple sources for equations to build in to the models. A lot of them were directly from national standards. Where further work had been undertaken by the networks, details were combined to incorporate this information.

Some of these were confidential reports for the GDNs by various consultancies which involved many discussions on Intellectual Property. In some cases, only ICS were allowed to view these reports in full. In the case of LTS Pipelines, DNV GL were employed to undertake a piece of work on consequence of failure of an explosion from a pipeline.

Where consequence data had not been formally modelled, data elicitation was done through a survey approach of experienced field staff. This was particularly useful for the PRI/Offtakes model where failures occur so rarely that providing a consequence of failure value was particularly difficult. The survey data was combined and fits established for the missing data in the models.

## 2.4 Excel Model

Excel models were then built using the AIM risk tree, model details (equations etc.) and the same base data table. The purpose of this was to prevent dependence on the specialist AIM software to be able to run the models.

## 2.5 Documentation

Ofgem wanted to approve each step to ensure that the team was achieving what it set out to achieve. In September, Ofgem received the first iteration of the methodology with the appendix outlining the precise steps undertaken to deliver the Distribution Mains and Services models. This was approved in December after public consultation. On 31<sup>st</sup> March 2016, a complete methodology document with appendices for each model was issued to Ofgem. Upon completion, this was a 200+ page document prepared in part by all of the parties involved in the project.

# 3 Implementation

To this point, the project was mainly focussed on delivery of the models so DNV GL managed this. The next stage of the project was the implementation phase so the responsibility belongs to the SRWG. I took ownership of this on their behalf. This is because of my unique position in having technical understanding whilst also being in a position to maintain the strategic aims of the project

## 3.1 Implementation Budget

To minimise the external costs as each network is populating their own models, we collaborated our questions etc. These were discussed weekly in a teleconference with the technical people from each network. Queries that cannot be answered in this forum were raised to the SRWG as a whole. Those

that couldn't be answered were sent to DNV GL/ICS on a weekly basis. This means that only legitimate questions were raised outside of the SRWG and ultimately minimised the implementation costs. I am the point of contact between the GDNs and DNV GL on this to ensure momentum to reach July deadlines.

## **3.2 Internal Delivery**

As per a condition in our Gas Transporters Licence, the models need to be populated by each GDN for the July Disclosure Reporting. Within Wales & West Utilities, my role has been to deliver these models in time for this deadline. This has involved a specialist team of asset experts to gather data, populate models and run scenarios.

There is a team of twelve people including asset managers, asset experts and data analysts. Weekly meetings were held to ensure progress against the programme. This was a continually changing timeframe with one fixed deadline of 31 July. The NOMs programme lagged behind and the final model was nearly two months late being delivered, i.e. late May. This introduced another level of complexity internally as to what was Model Development and what was Implementation. However, once internal audit dates were fixed, these time frames couldn't be altered anymore. The pressure came on and it all needed to be done so these lines blurred and the models were issued. Once issued, all updates become part of the implementation phase.

## **4 Next Steps**

### **4.1 July Disclosure**

All of the GDNs are frantically populating Regulatory Reporting Pack (RRP) tables for July submission. The 2016 submission needs to incorporate the new Table 7.3 which all parties have agreed upon. The new table incorporates multiple values for each of the asset categories. The major update from the previous table is that there is a monetised risk value for now and the end of the regulatory control period. The latter of these has then been split further into with and without intervention risk of each asset group.

### **4.2 Ofgem Feedback**

After the March 16 methodology submission and the reported tables in July 16, Ofgem will supply feedback in September 2016. This will lead into a validation phase until March 17 when all changes need to be in a final methodology. This will involve comparing between networks, comparing between asset groups and all round model queries.

### **4.3 Validation**

Validation will occur upon completion and population of all models. This will not be done until post July submissions and September feedback from Ofgem. This will be an exercise between the networks within SRWG and most likely, some input from ICS and/or DNV GL.

This will be an SRWG responsibility to see if Scotland's LTS pipelines can be compared with WWU's services and National Grid's governors. If this is possible then the project is complete. In the far more likely scenario, there will be model updates, coefficient changes, calculation queries, and no doubt user-friendliness and aesthetic updates.

Methodology documentation will then need to be updated with these adjustments. Ofgem are expecting this to be complete by March 2017 ready for July 2017 submissions.

#### **4.4 RIIO-GD2**

Come next Regulatory period, Ofgem are expecting the networks to be using monetised risk as justification for expenditure. Levels of maintenance and intervention work will be forecasted and reported as removal of monetised risk. This will allow risk trading and comparative analysis between asset groups and between Gas Distribution Networks. There will need to be culture changes within organisations towards a risk-based approach, i.e. a low probability, high consequence event may be prioritised over a high probability low consequence event purely on monetised risk; Watch this space!

## **5 References**

All diagrams were taken from the approved methodology as at 31<sup>st</sup> March 2016. This is available from Ofgem's website at <https://www.ofgem.gov.uk/publications-and-updates/gas-network-output-measures-methodology-consultation>