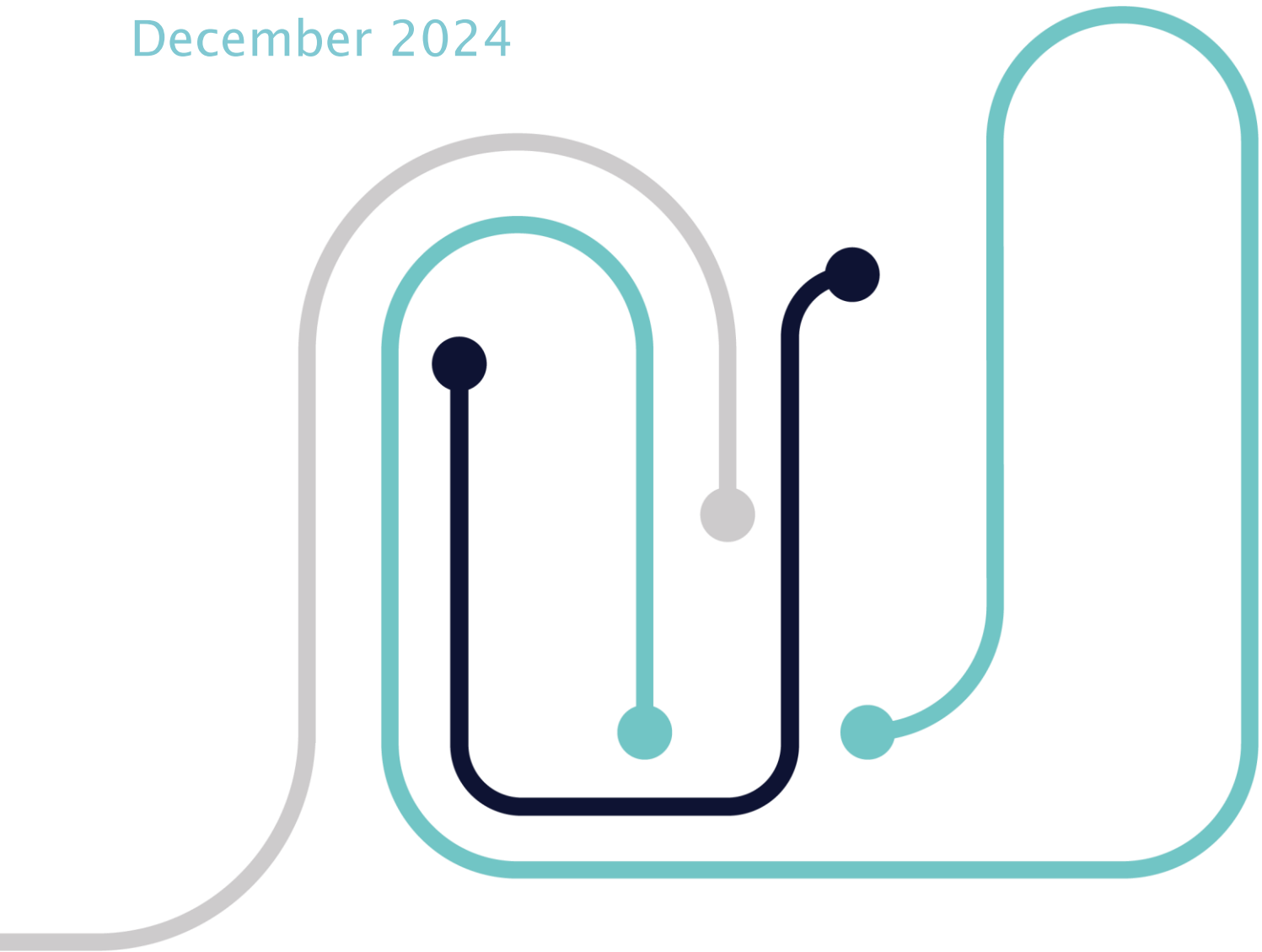
ICS

Wales & West Utilities

Assurance of GD3 Asset Risk Models

Final Report

December 2024



Contents

1 Introduction

1.1 Overview

Following the completion of the cross-GDN Long Term Risk (LTR) project completed in May 2024, several changes were proposed to the existing Network Asset Risk Metric (NARM) asset risk models. These were tested in updated Asset Investment Manager (AIM) models, developed by ICS. A specification was provided to all networks to allow them to make changes to their own models prior to GD3 NARM target setting.

Wales & West Utilities (WWU) have updated their own models in line with the specification and have asked ICS to undertake assurance on the models that have been changed following the LTR project.

The scope of the project is limited to the asset types that were changed through the LTR project, namely:

- Mains
- Governors
- PRS/Offtakes – Pressure Control & Filter
- PRS/Offtakes – Preheating
- PRS/Offtakes – Odorant & Metering

The calculations in the Services and Risers risk models are unchanged and these were not checked.

1.2 ICS Experience

ICS have supported both the Gas Transmission (GT) and Distribution (GDN) sectors with development of the NOMs and NARMs Methodologies. We have recently completed a project to develop a Long Term Risk (LTR) benefit reporting approach on behalf of all GDN companies, including NARM Methodology updates and a Testing and Validation report.

2 Approach

This section discusses the approach taken for validation and how a validation data set was created to compare risk calculations between independently created WWU and ICS model logic.

2.1 Validation Approach

As part of the testing and validation of the changes proposed through the LTR project, ICS created new AIM models and ran asset data sets submitted by all GDNs through this standardised LTR model. This allowed risk values from different networks to be compared using an identical set of calculation rules and model outputs checked using an industry-wide data set. This allowed individual networks to check for and resolve potentially anomalous data inputs.

The process adopted for this GD3 validation project is summarised as follows:

- WWU provided ICS with a copy of the AIM base data, which has been refreshed ready for GD3 LTR analysis and CBA generation.
- WWU modified their risk models to include required calculation and coefficient changes, in line with the new GDN NARM Methodology.
- WWU provided ICS with scenario reports from AIM 3 which shows the risk model calculations used in the models. All risk calculations per model were cross compared.
- ICS imported the WWU data into the ICS-developed LTR AIM models.
- ICS compared the results between the WWU and ICS model outputs and identified any discrepancies.

  - If the AIM and ICS base data and models were identical then the calculated results should also be identical.
  - Any differences were investigated and resolved through workshops between ICS and WWU model experts.
- The comparisons were presented using PowerBI dashboards, which compared the WWU and ICS calculations side-by-side, per asset type and risk node, This was handed over to WWU at project completion. This report only presents a subset of these comparisons, the remainder are available in PowerBI for inspection.

2.2 Creating a Validation Data Set

WWU have updated their LTR risk models and have prepared new asset data reflecting the start position for GD3. ICS created new LTR risk models when validating the updates and improvements made to the GDN NARM Methodology and developed and compared risk valuations assuming different intervention lives, per intervention type.

For this project we used the asset data sets developed by WWU representing the start of GD3. By using the same data set, applied to two different versions of the LTR models, ensures that if risk calculations output from the ICS and WWU models are the same then the model logic contained therein must also be identical. The ICS AIM model used for LTR was agreed to be "the truth" for this validation process.

3 Model Validation

This section describes how the baseline model calculations were tested through comparison of the equivalent WWU and ICS results data sets.

3.1 Sampling

No sampling was carried out. All risk nodes were verified for the in-scope asset types listed in Section 1.1.

3.2 Validation

As summarised in Section 2, sets of risk calculations per risk node from both WWU and ICS AIM were provided in CSV formats, which had been calculated using the same set of asset data for the in-scope asset types. An automated process was developed to bring these into PowerBI and unique references (based on asset reference, year, risk node and scenario name) were used to join the corresponding WWU and ICS risk results and allow direct cross-comparison.

The process was automated to allow new versions of data to be quickly updated in the PowerBI dashboards. This proved useful as several iterations were required to address identified anomalies.

A series of dashboard reports was then developed to directly compare equivalent the WWU and ICS results at key timesteps:

- The start of GD3 (2026/27)
- The end of GD3 (2030/31)
- In 2074/75 (to test the accuracy of long-term deterioration calculations)

Initially each timestep was compared but it quickly became obvious that comparing interim timesteps was superfluous as long as the start (2026/27) and end risk positions (2074/75) were aligned.

4 Findings

Relatively few issues were identified as WWU had used the LTR models developed for the NARM Methodology update to directly update their AIM 3 models, which required minor modifications to

account for differences between different versions of the AIM software (AIM 4 was used by ICS for testing and validating the LTR model changes). The findings and resolutions are summarised in Table 1.

Asset Type	Issue	Resolution
Mains	Some deteriorating risk nodes had start dates misaligned to the asset data (start of GD3). This resulted in excessive deterioration.	Deteriorating risk nodes were changed to a start date of 1st April 2026 and values now match at all timesteps.
	General Emissions values were different at all timesteps. This was due to WWU using an older version of the NARM deterioration rate	General Emissions deterioration was aligned to current version of Methodology and now matches ICS values at all timesteps
Governors	Properties Surrounding Governor calculations were different by a fixed offset value (same for every asset).	Differences in ICS and WWU risk model formulations which meant overall monetised risk values were correct, but this node was different. WWU changed model to align to ICS and problem resolved.
Pressure Control & Filters	Differences in Low Outlet Pressure (LOP) values, but High Outlet Pressure was OK. This impacts on all risk nodes downstream of LOP	A minor logic error was identified. Once resolved, ICS and WWU values matched, and all the downstream risk values also fully align.
Preheating	No issues were identified.	N/A
Odorant & Metering	Condition Grade calculations were incorrect. However, this is a reporting node only and did not impact on downstream risk values	Model configuration issue was identified. Once resolved, ICS and WWU values matched exactly.

Table 1 Identified risk model issues and resolution

Initially, calculated condition grade values did not match as they are used differently in the WWU (AIM3) and ICS (AIM4) versions of the LTR models. The ICS value applies an offset of plus one year to the condition grade calculation as AIM 4 can only refer to previous timesteps when re-using calculations in dependent risk models, which is not possible in AIM 3 (WWU replicate the condition grade calculation in every relevant risk model and do not refer to the condition grade node). The ICS model was adjusted to use the same assumption of "no timestep offset" and risk values now fully align.

Examples of comparisons between ICS and WWU risk valuations are shown below for some of the key risk calculations which drive monetised risk. Monetised risk values (in £R) are deliberately not included as at the time of writing, WWU are aligning to the GD3 Ofgem-provided CBA template service valuations. A PowerBI dashboard has been provided to WWU which shows this comparison for all risk nodes.

4.1 Mains

Examples of post-validation risk node calculations for Mains are shown below.

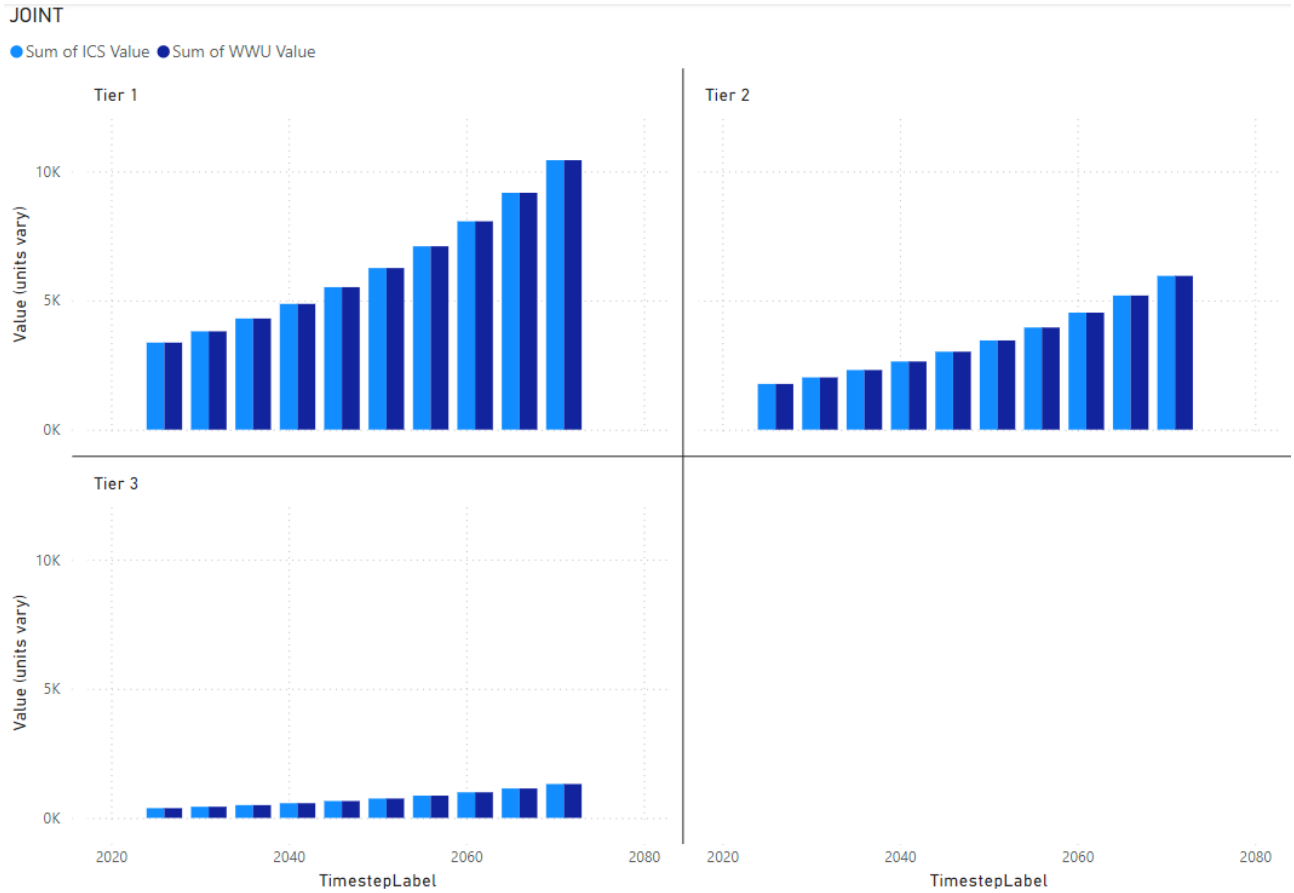


Figure 1 Comparison of modelled (expected) annual joint failures (nr/year)

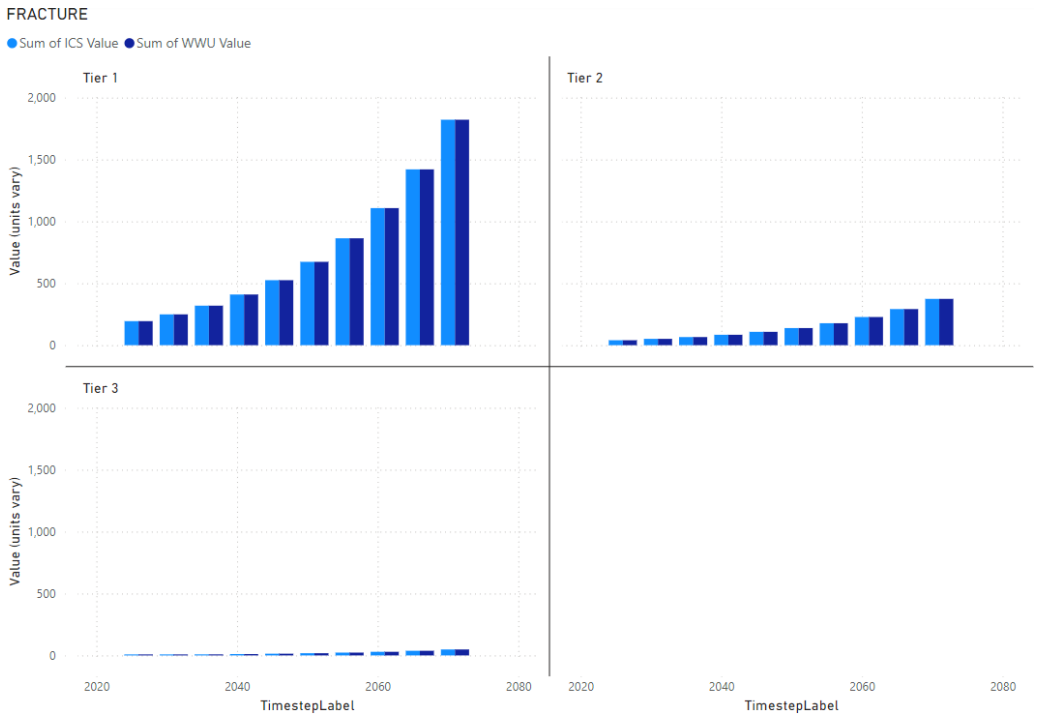


Figure 2 Comparison of modelled (expected) annual fracture failures (nr/year)

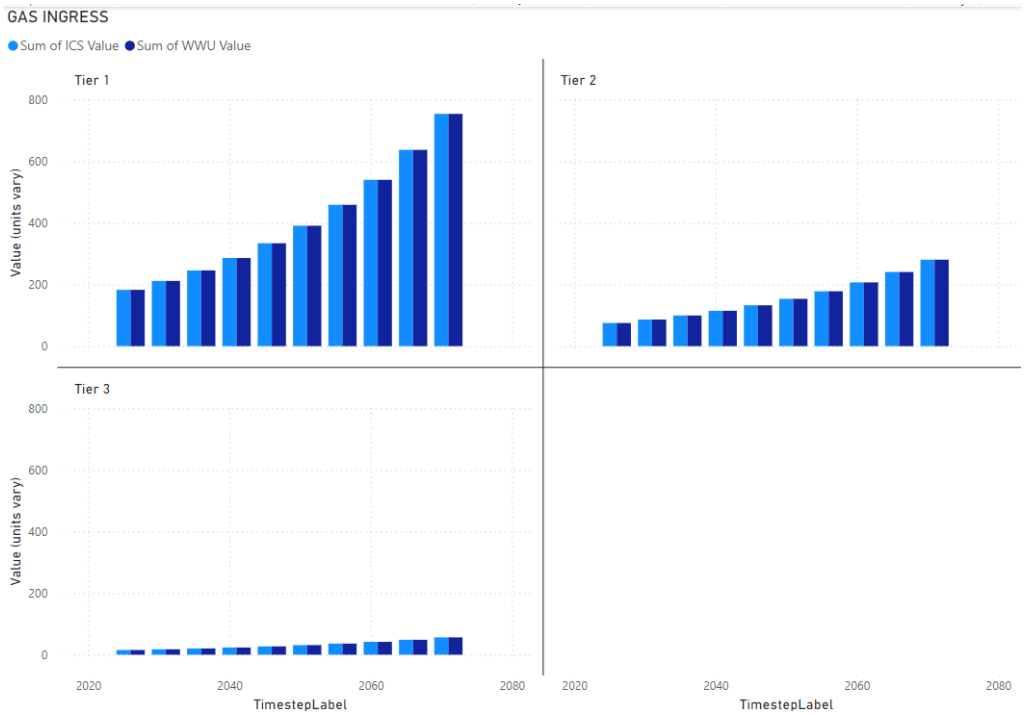


Figure 3 Comparison of modelled (expected) annual gas ingress events (nr/year)

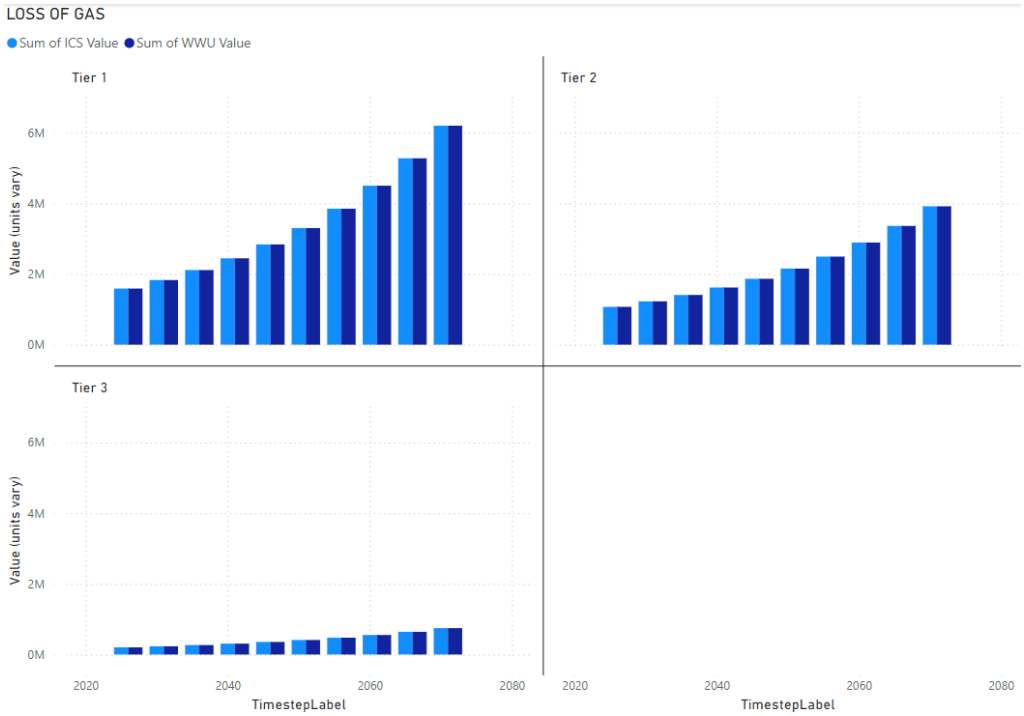


Figure 4 Comparison of modelled (expected) annual gas emissions (m3/year)

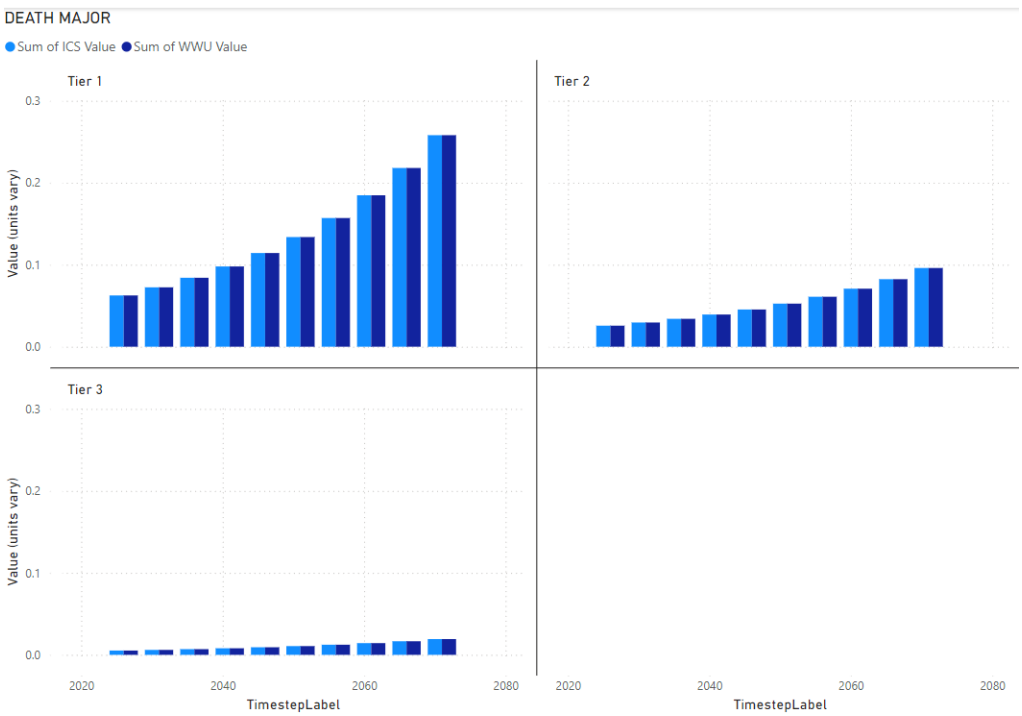


Figure 5 Comparison of modelled (expected) annual deaths or major injuries (m3/year)

4.2 Governors

Examples of post-validation risk node calculations for Governors are shown below.

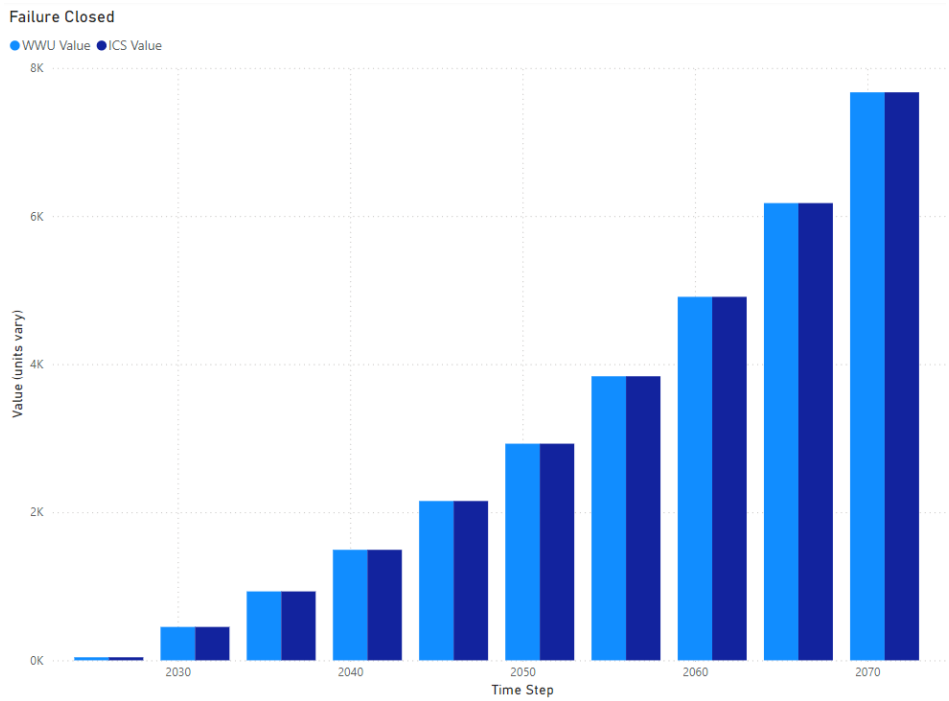


Figure 6 Comparison of modelled (expected) failure closed events (nr/year)

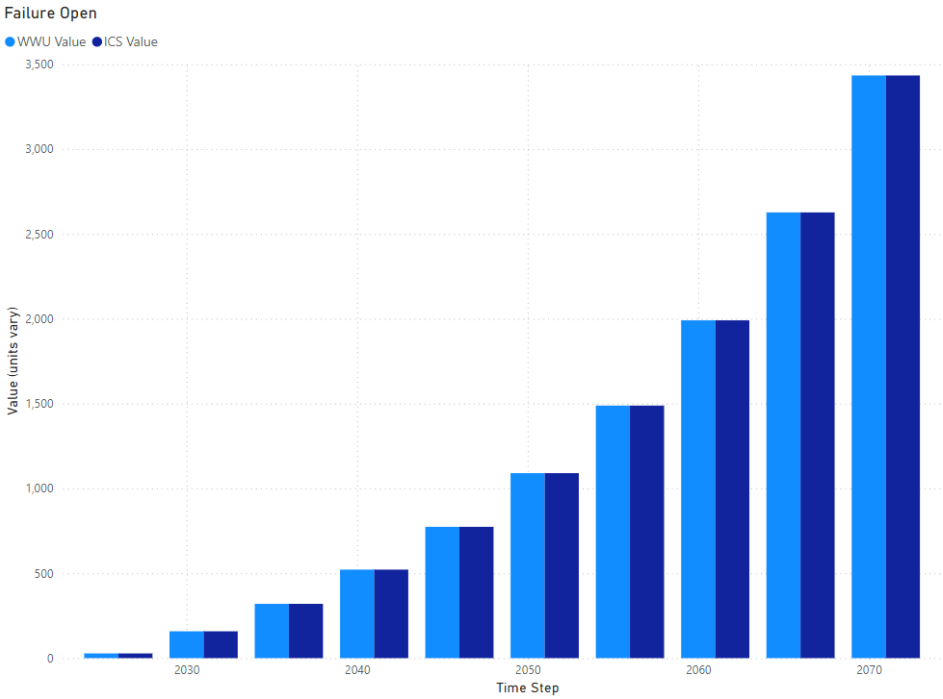


Figure 7 Comparison of modelled (expected) failure open events (nr/year)

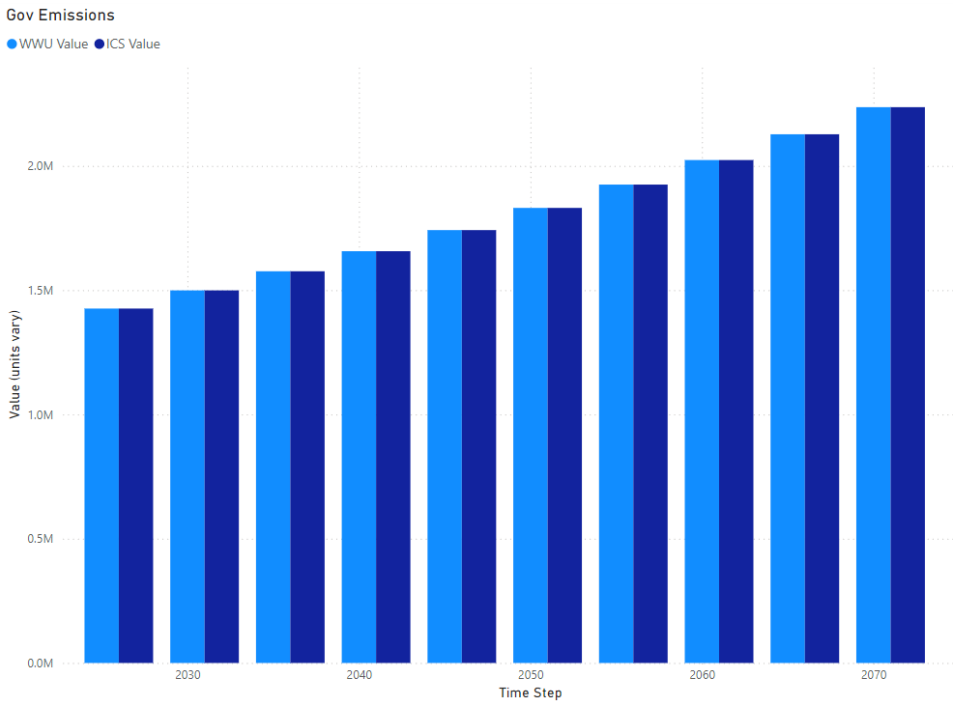


Figure 8 Comparison of modelled (expected) governor gas emissions (m3/year)

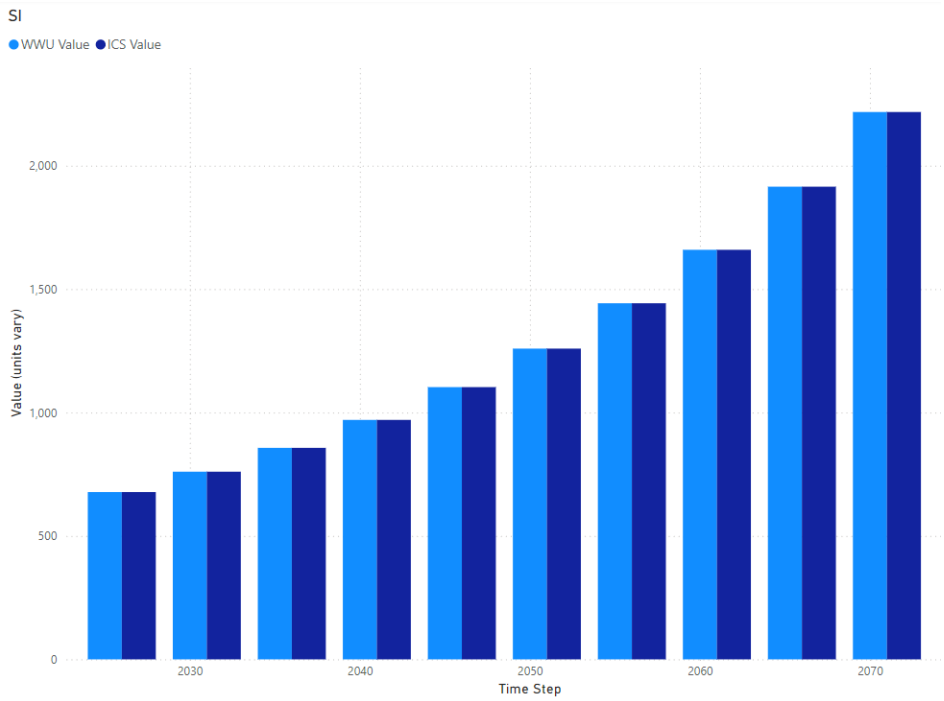


Figure 9 Comparison of modelled (expected) supply interruptions (properties/year)

4.3 Pressure Control

Examples of post-validation risk node calculations for pressure control assets on Offtakes and PRS sites are shown below.

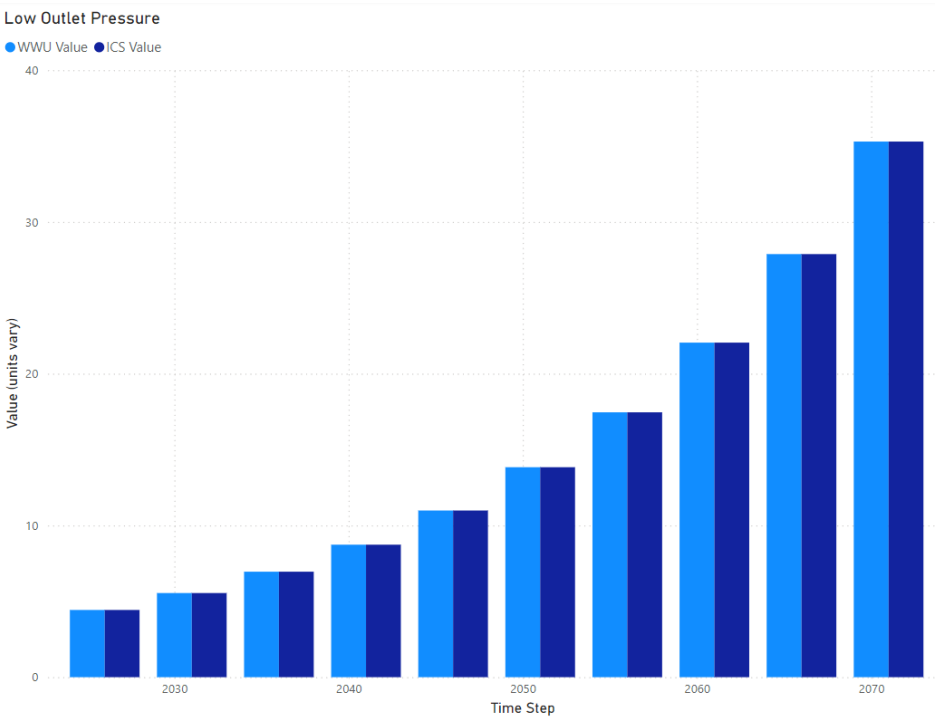


Figure 10 Comparison of modelled (expected) low outlet pressure failures (nr/year)

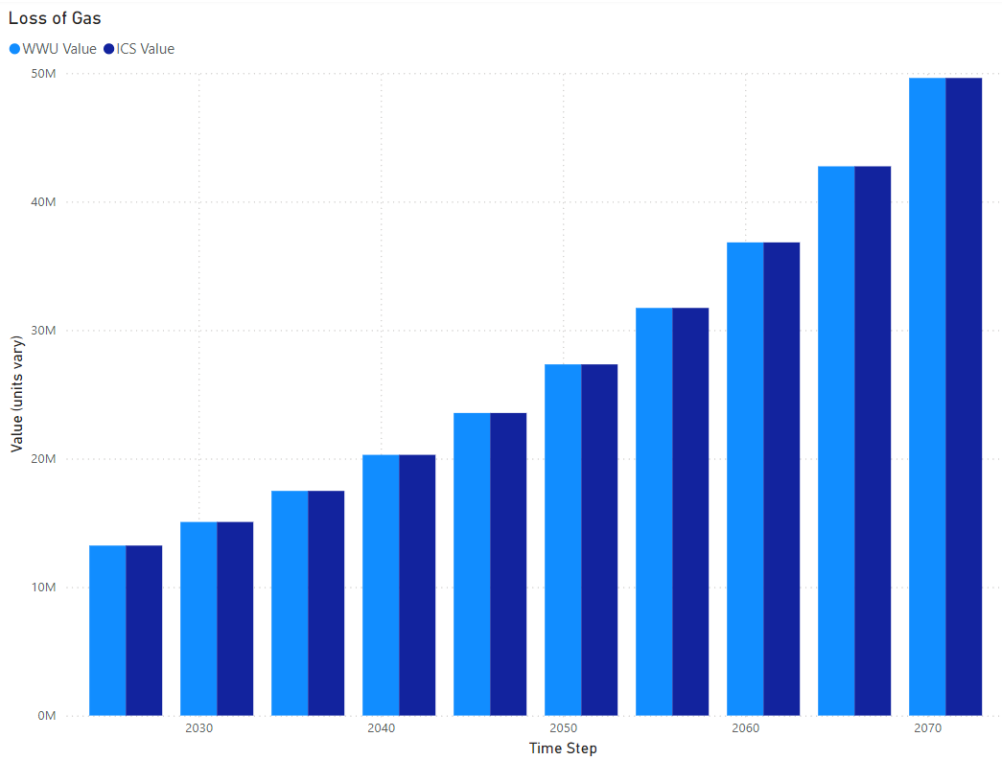


Figure 11 Comparison of modelled (expected) gas emissions associated with pressure control assets (m3/year)

4.4 Filters

Examples of post-validation risk node calculations for filtration assets on Offtakes and PRS sites are shown below.

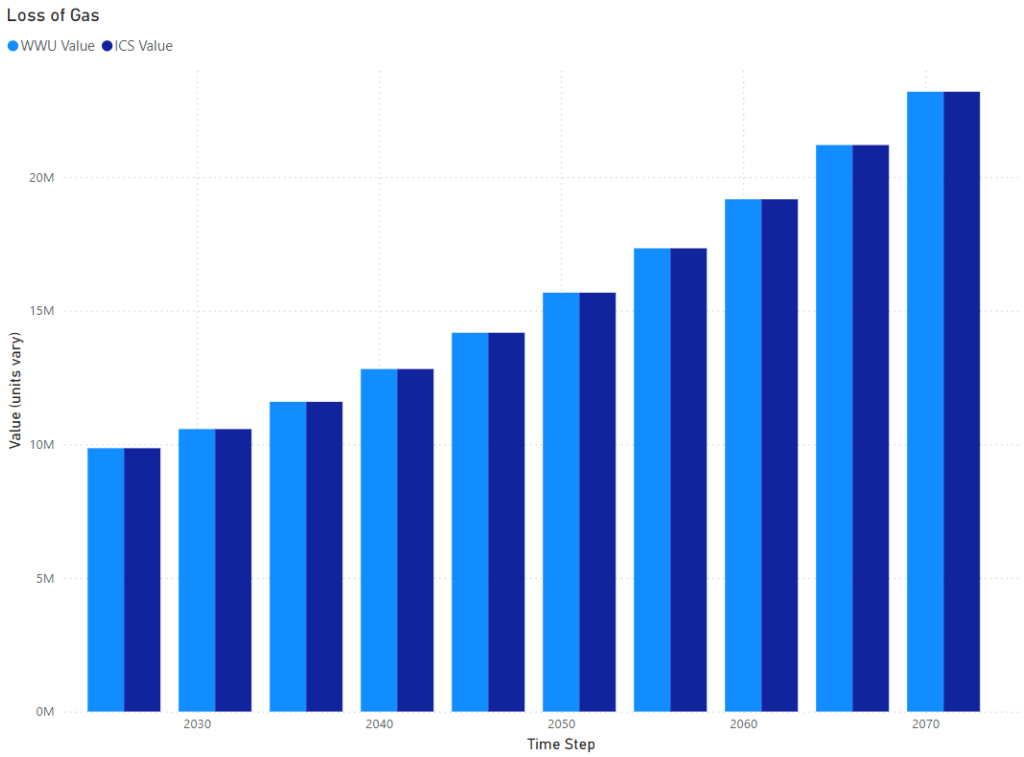


Figure 12 Comparison of modelled (expected) gas emissions associated with filtration assets (m3/year)

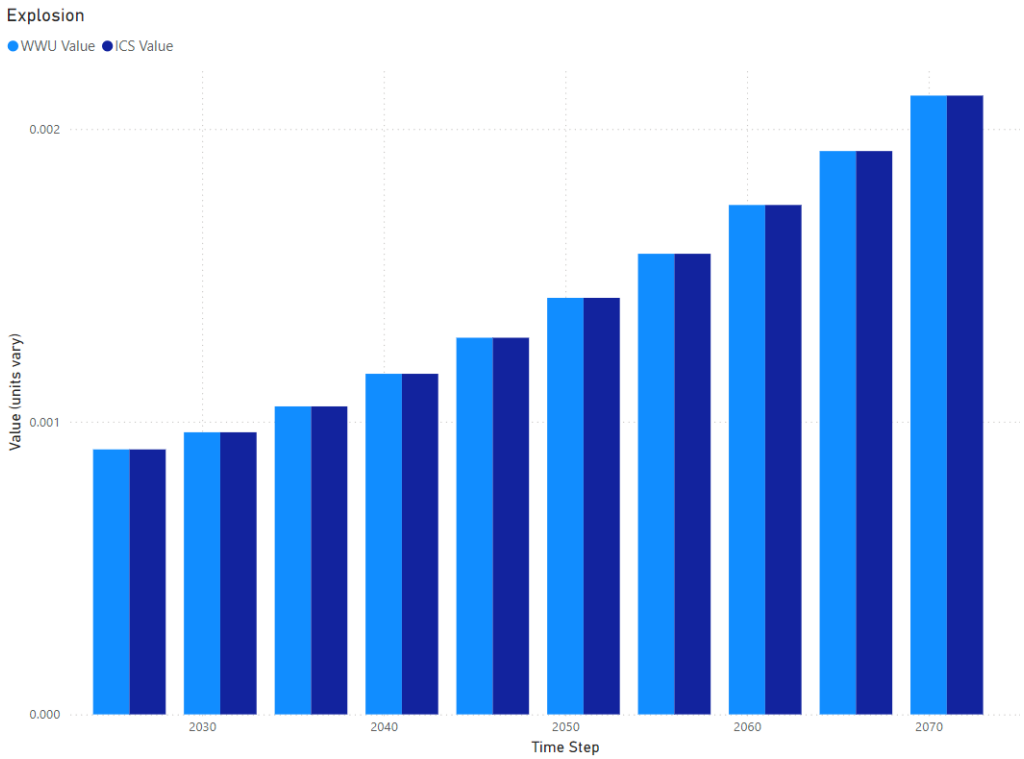


Figure 13 Comparison of modelled (expected) explosions resulting from filter failures (nr/year)..

4.5 Preheaters

Examples of post-validation risk node calculations for preheater assets on Offtakes and PRS sites are shown below.

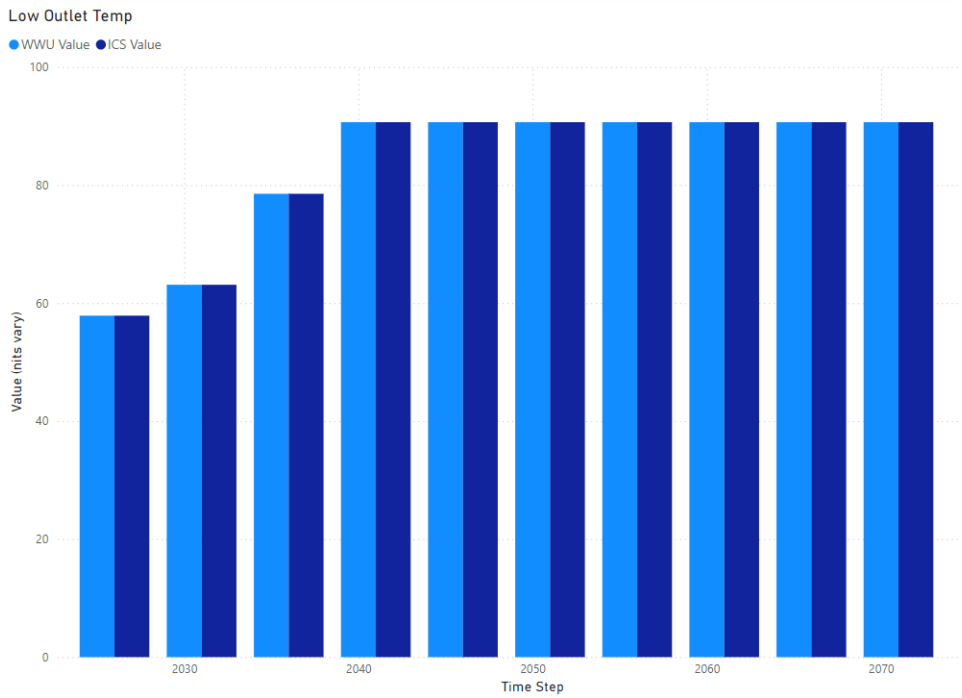


Figure 14 Comparison of modelled (expected) low outlet temperature failures (nr/year).

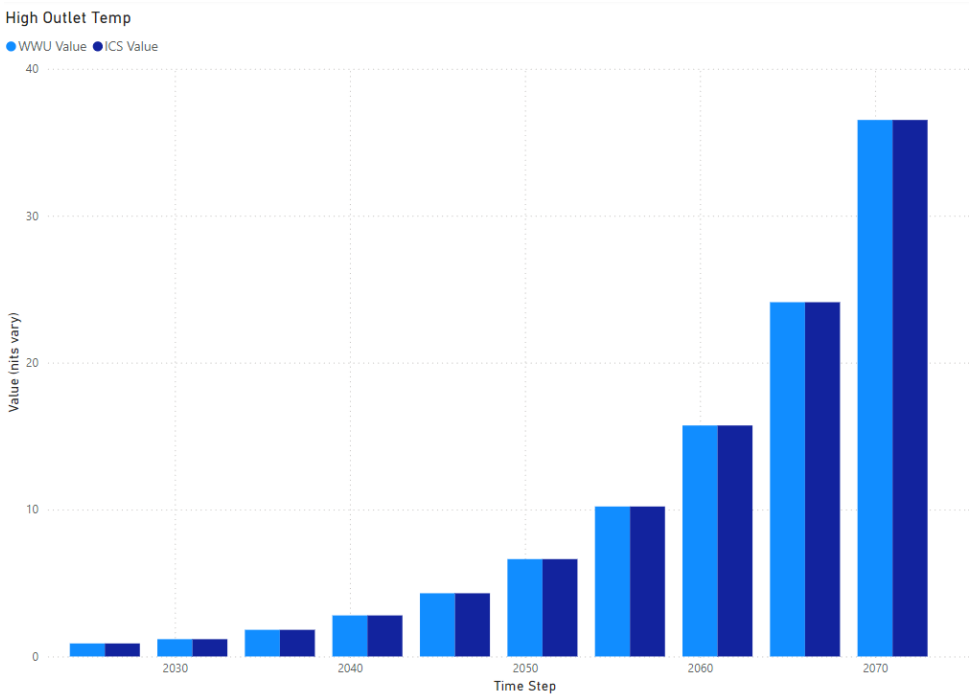


Figure 15 Comparison of modelled (expected) high outlet temperature failures (nr/year).

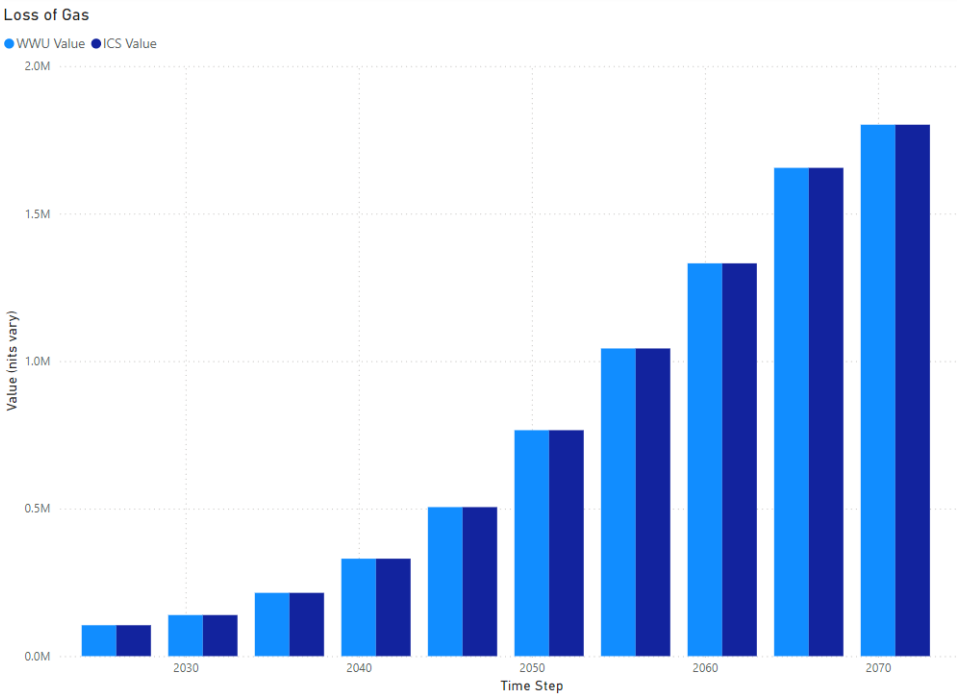


Figure 16 Comparison of modelled (expected) loss of gas from preheating (m3/year).

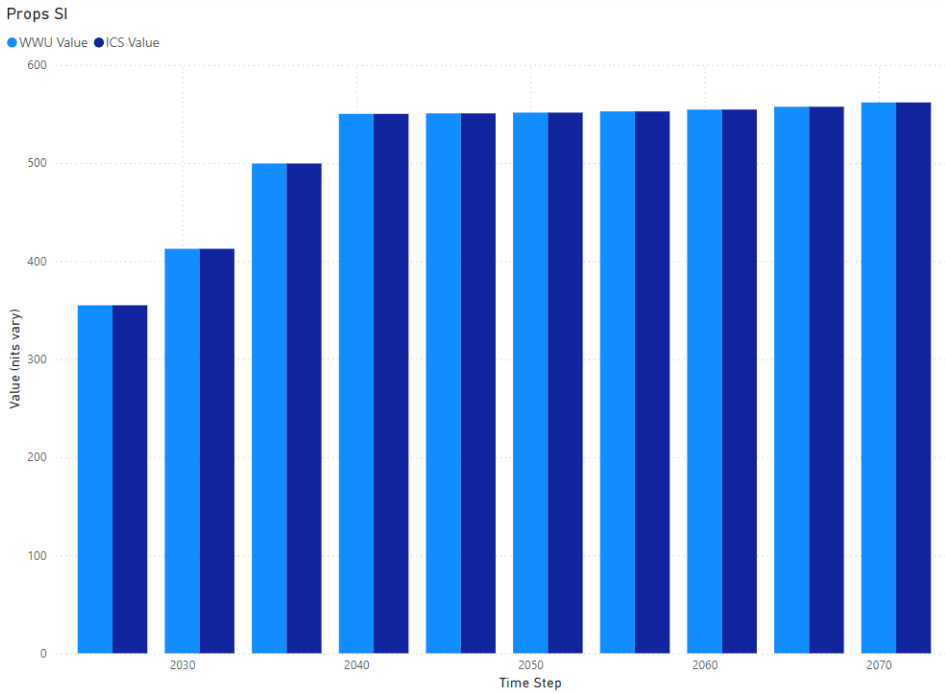


Figure 17 Comparison of modelled (expected) supply interruptions arising from preheater failures (nr/year).

4.6 Odorant

Examples of post-validation risk node calculations for odorant assets on Offtakes and PRS sites are shown below.

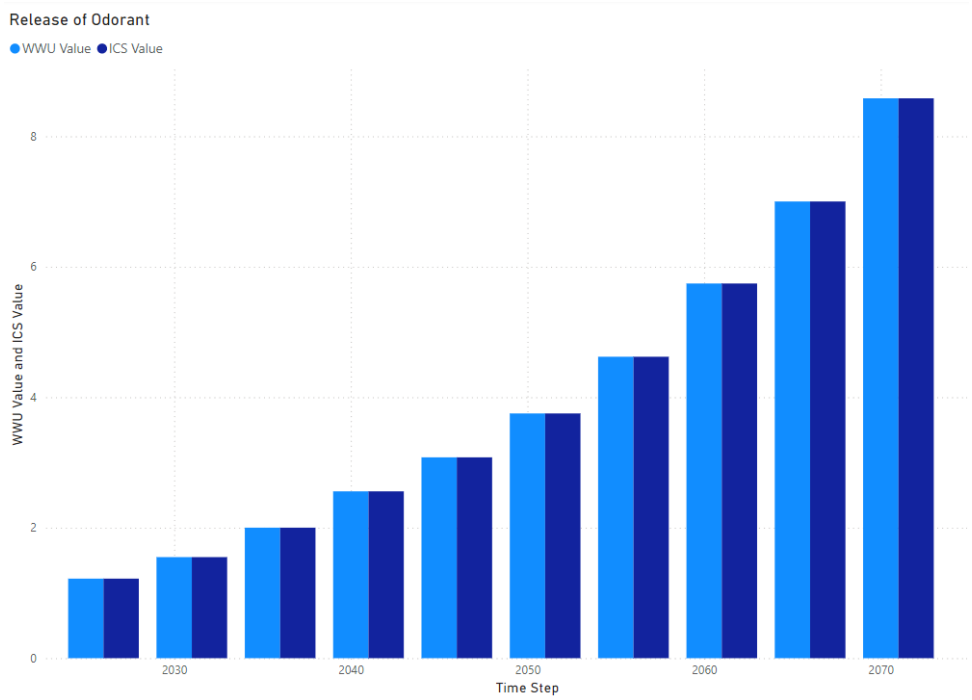


Figure 18 Comparison of modelled (expected) release of odorant events (nr/year).

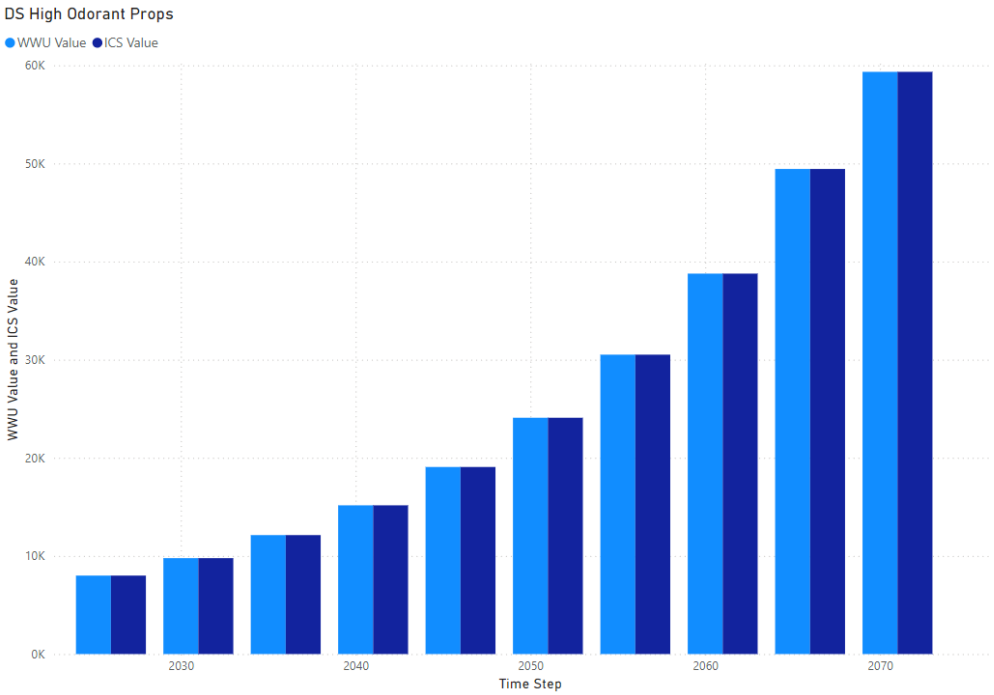


Figure 19 Comparison of modelled (expected) numbers of properties at risk of experiencing high odorant (nr/year).

4.7 Metering

Examples of post-validation risk node calculations for meter assets on Offtakes and PRS sites are shown below.

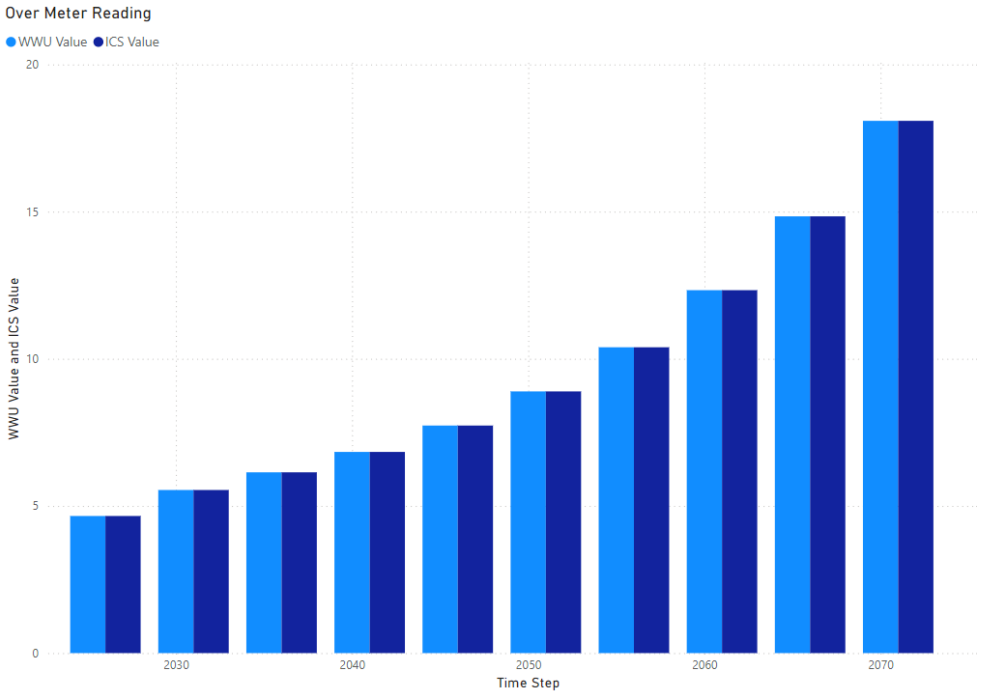


Figure 20 Comparison of modelled (expected) over meter reading events (nr/year).

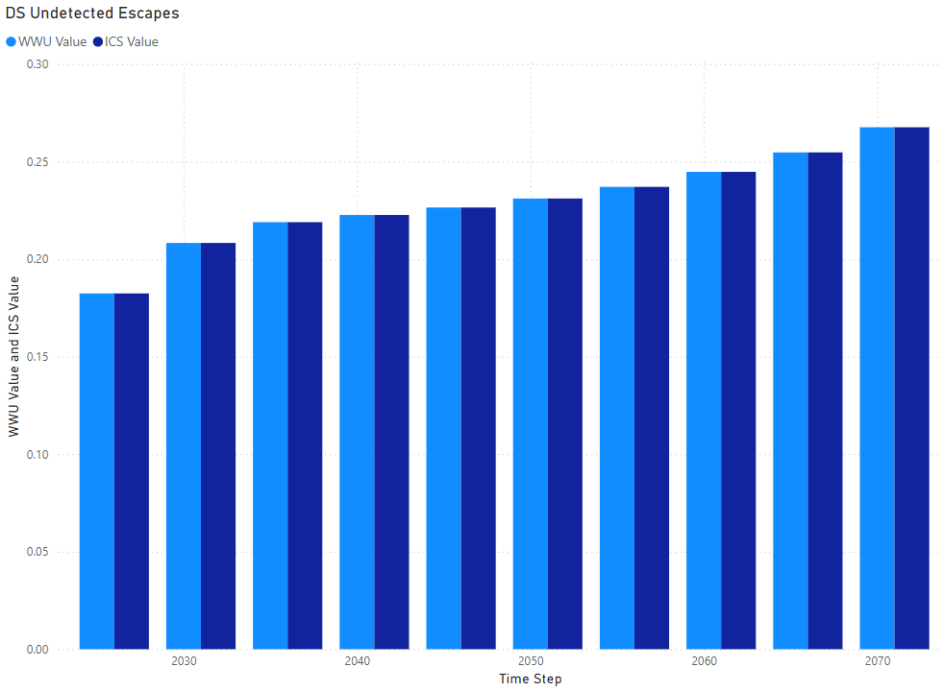


Figure 21 Comparison of modelled (expected) undetected odorant escapes due to metering issues (nr/year).

5 Conclusions

With a few minor exceptions, risk model calculation for all risk nodes were identical between the WWU and ICS versions of the LTR models post-validation. Any identified anomalies were easily explained and resolved This provides confidence that the WWU LTR model will accurately value the benefits of investment in support of RIIO-3 investment decision making and NARM reporting.

6 Assurance

Document Control

Version	Author	Approval	Proof Read
V0.1	Neil Tansley	Tim Young	Kar Yee Dearing
V1.0	Neil Tansley	Tim Young	Kar Yee Dearing

Version History

Version	Date	Issued to
V0.1	25th November 2024	Jamie Crawford / Ben Jones
V1.0	2nd December 2024	Jamie Crawford / Ben Jones

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