

Gas Network Innovation Competition Full Submission

Project: Real Time Networks

Supplementary Information Relating to Answer to Question 5:

“Are SGN double counting the benefit of leakage reduction that will arise from the repex programme (see app.9 &10 Strood example)”

This document provides further detail relating to the estimation of the reduced leakage benefit in the original full submission.

The leakage associated with a network is driven by many factors including pipe diameter, material, etc. Two of the key factors that influence the modelled leakage of a network are the total length of metallic mains/services and the Average System Operating Pressure (ASP) of the network. Through this project we aim to realise a benefit through the reduction of ASPs.

The % benefit that we were trying to articulate is the percentage reduction of the total leakage from the LP system including mains and services.

This % benefit was wrongly applied to the total leakage for SGN which is made up of multiple factors. The LP system accounts for over 75% of SGNs leakage however the other 25% includes AGI leakage/venting, MP Leakage and Interference (<1%) none of which are effected by a reduction in LP ASPs.

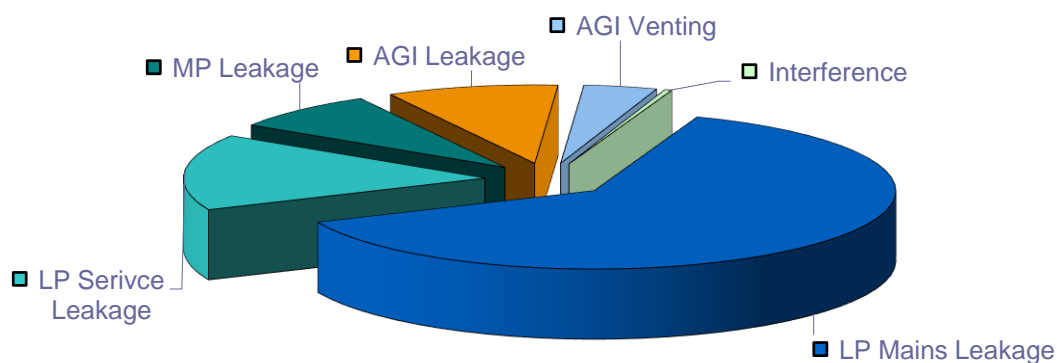


Figure 1: Proportion of leakage sources

This benefit was calculated by applying -0.5mbar to the ASP for each of SGNs networks through the Leakage Reduction Management Model (LRMM). This produced a reduced total LP leakage value.

This assumed a conservative average ASP reduction of 0.5mbar based on analysis of models set to a 15% reduction in the redefined 1:20 peak condition.

Furthermore, the original analysis did not take into account the depreciation of this benefit as the mains replacement program progresses. As the amount of leakage present in the LP system reduces (due to the replacement program), the benefit of lowering the

ASPs will also reduce. The reduction in the benefit resulting from reduced ASPs can be seen in this table:

	Year	Total LP Leakage	Total LP Leakage (ASP-0.5mbar)	Benefit	Total SGN leakage	% Benefit
All SGN Networks	09-10	749.58	736.35	13.23	897.23	1.47
	10-11	715.90	703.34	12.56	864.00	1.45
	11-12	667.96	655.67	12.29	818.08	1.50
	12-13	654.59	642.76	11.82	803.77	1.47
	13-14	627.21	615.65	11.56	794.30	1.46
	14-15	581.70	570.77	10.93	740.60	1.48

Figure 2: Reducing benefit relative to Leakage and ASP (Inclusive of Profiled networks)

The total amount of leakage for SGN is directly linked to the metallic mains replacement program therefore the % benefit remains fairly stable. This will only be the case while the replacement programme continues. We have assumed this will continue in accordance with the Pipeline Safety Regulations as amended (PSR).

In the revised analysis, we also recognise that there is unlikely to be a significant reduction in ASP as a result of this project on systems that are subject to pressure profile control. Profiled systems seek to minimise system pressure through automated communication of pressure at selected low points to adjust pressure at a district source (governor). The analysis suggest that there will be limited benefit to profiled systems therefore any benefit associated with these was removed.

	Year	Total LP Leakage	Total LP Leakage (ASP-0.5mbar)	Benefit	Total SGN leakage	% Benefit
All SGN Networks	14-15	581.70	578.24	3.45	740.60	0.47

Figure 3: Benefit relative to Leakage and ASP (Excluding Profiled networks)

Figure 3 shows a more accurate representation of the benefit resulting from the reduction in ASPs taking into account the removal of any benefit from profiled systems. This benefit will depreciate as metallic mains replacement continues. The above revisions results in a reduced total average benefit for SGN from 1.9% to 0.47% for 2014-15.

In order to forecast the potential benefit this project will have up to 2050 we have also forecasted the amount of leakage and the future combined cost of Gas. The data, calculations and trends have been included in the accompanying spread sheet. We have placed an error margin of $\pm 30\%$ on these predictions due to the many variables and uncertainty around these fields.

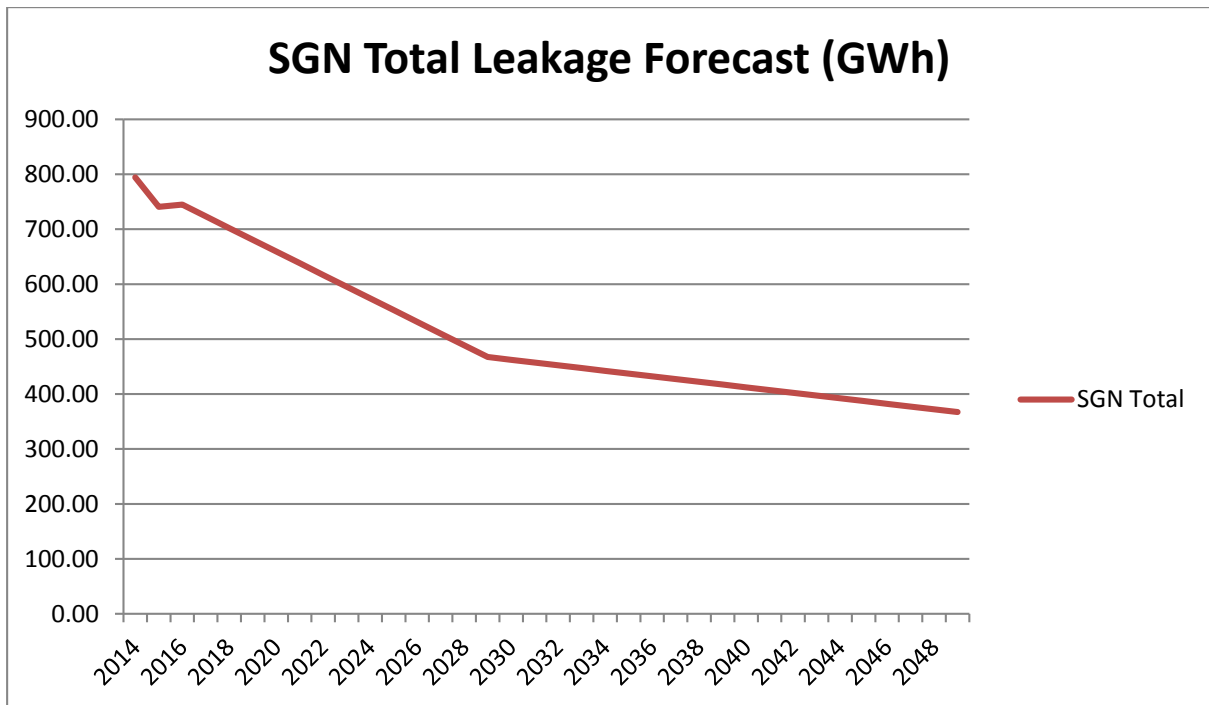


Figure 4: SGNs Leakage Forecast

This leakage forecast is based on SGNs reported forecast leakage out-performance under the RIIIO price control. This trend was then continued to 2030 where a reduced amount of replacement has been assumed resulting in the above prediction of leakage out to 2050.

The rate of benefit depreciation will be directly related to the rate of leakage reduction as both are driven by the mains replacement program. We therefore used the leakage forecast to determine the benefit depreciation curve.

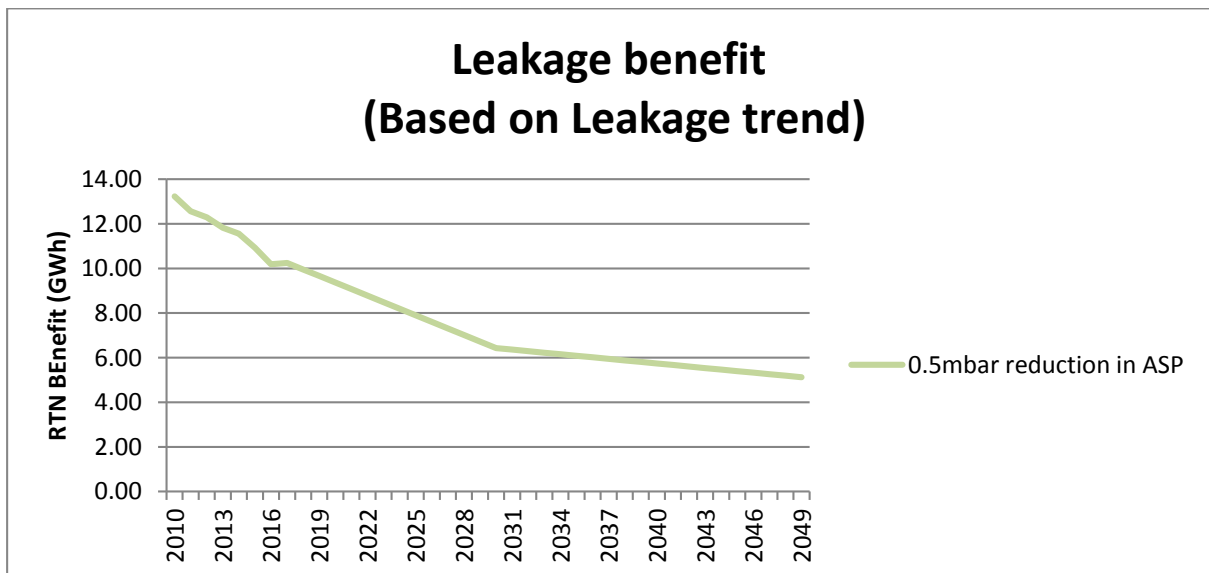


Figure 5: Benefit depreciation due to replacement

The benefit will tend towards zero with total leakage. There will however always be a benefit through the reduction in ASPs as there is a leakage factor associated with PE, therefore, even with a 100% PE LP network there would still be leakage.

Taking into account the above revisions we can provide the more accurate prediction of this benefit below:

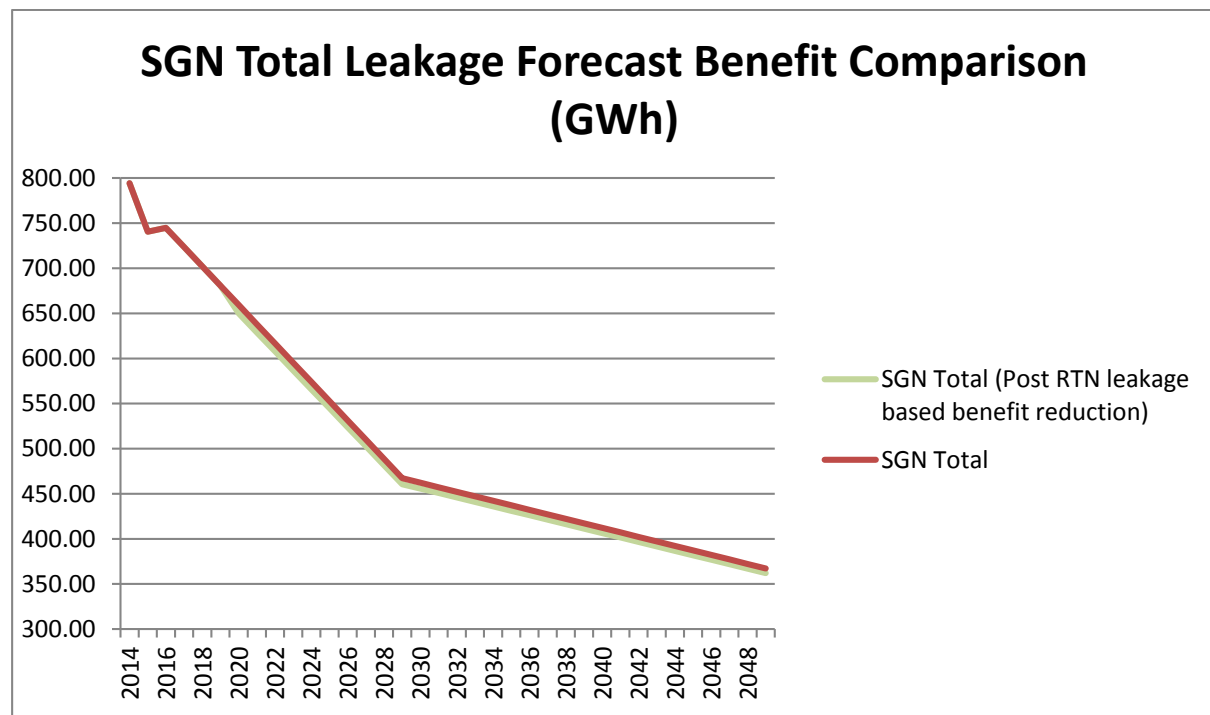


Figure 6: RTN Benefit against leakage curve

The revised table below shows a reduced benefit due to the revised overall % benefit. The financial benefit shows an increase in benefit at 2050. This is because the forecasted cost of gas increases year on year and though the leakage reduction due to reduced ASPs will depreciate, the value of that saving will continue to increase with the cost of gas.

Thank you for pointing out this error and apologies for inconvenience caused. These revisions will be reflected in the resubmission in October.

Key: Method 1 – Leakage Reduction								
Financial benefit (£m)								
Scale	Method	Method Cost	Base Case Cost	Benefit			Notes	
				2020	2030	2050		
Post-trial solution (individual deployment)	Method 1 (Original)	0.068	0.070	0.001	0.001	0.001	± 20%	
	Method 1 (Revised)	0.0697	0.070	0.001	0.001	0.001	± 30%	
Licensee scale If applicable, indicate the number of relevant sites on the Licensees' network.	Method 1 (Original)	11.297	11.516	0.219	0.202	0.232	± 20%	
	Method 1 (Revised)	11.605	11.553	0.052	0.043	0.046	± 30%	
GB rollout scale If applicable, indicate the number of relevant sites on the GB network.	Note: In order to up-scale the benefits realised in the Licensee scale to GB we have used a factor determined by the total metallic lengths of mains by GDN (3.67 of SGNs benefit).							
	Method 1 (Original)	41.461	42.264	0.803	0.741	0.853	± 20%	
	Method 1 (Revised)	42.59	42.4	0.190	0.157	0.171	± 30%	
Carbon and/ or environmental benefit (MtCO2e)								
Scale	Method	Method Cost	Base Case Cost	2020	2030	2050	Notes	
Post-trial solution (individual deployment)	Method 1 (Original)	0.57	0.59	0.01	0.01	0.01	± 20%	
	Method 1 (Revised)	0.58	0.59	0.01	0.01	0.01	± 30%	
Licensee scale If applicable, indicate the number of relevant sites on the Licensees' network.	Method 1 (Original)	123.68	126.08	2.40	1.80	1.58	± 20%	
	Method 1 (Revised)	121.58	122.128	0.548	0.376	0.296	± 30%	
GB rollout scale If applicable, indicate the number of relevant sites on the GB network.	Method 1 (Original)	453.92	462.71	8.79	6.61	5.79	± 20%	
	Method 1 (Revised)	450.22	448.21	2.011	1.38	1.085	± 30%	

