national gas transmission

UAGCVS Report

MAY 2024

Executive Summary

This report provides a review of National Gas Transmission (NGT) Unaccounted for Gas (UAG) management since April 2013, the start of the RIIO-T1 price control, with particular emphasis on 1st October 2023 to 31st March 2024 inclusive, the period since the publication of the November 2023 UAGCVS report.

This report also contains our Calorific Value Shrinkage (CVS) statement with an overview of its possible causes. The publication of this report discharges NGT obligations under the Gas Transporter Licence Part J of Special Condition 5.6 (System operator external incentives, revenues and costs) – requirement to undertake work to investigate the causes of UAG and CVS.

The total assessed pre reconciled UAG quantity for the 1st of October 2023 to 31st March 2024 period is greater than the previous six-month period, which is expected when compared to the summer months. Monthly assessed pre reconciled UAG is greater than the long-term average (April 2013 to April 2024) for 3 of the last 6 months. Although higher UAG aligns to historical winter throughput trends, this last winter has seen lower UAG than the last 4 winter periods.

NGT continue to improve its understanding of the causes of UAG using data visualisation tools and investigative projects.

CV Shrinkage has decreased when compared to the same period in the previous year. CV Capping has continued to be witnessed in NE LDZ, which makes up 51% of the annual total.

Continued support from meter owners has enabled NGT to obtain and review meter validation information for NTS entry and exit facilities. This data is being used to support the identification of causes of UAG, to enhance NGT's ability to detect meter error and to inform the preparation of future meter witnessing programmes.

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Unaccounted for Gas & Calorific Value Shrinkage Report – May 2024

Introduction

This report provides a review of National Gas Transmission's (NGT) UAG and CVS management.

The report provides information on assessed UAG quantities since April 2013, the start of the RIIO-T1 price control, with particular emphasis on 1st October 2023 to 31st March 2024 inclusive, the period since the publication of the November 2023 UAG report. It describes NGT's endeavours to undertake projects for the purposes of investigating the causes of UAG and CVS.

UAG, CVS and OUG (Own Use Gas) are the three components of NTS Shrinkage. Further information on the components of NTS Shrinkage can be found via the following link:

NGT - UAG Management

To compliment this report, NGT also provides a range of UAG related data including:

- previous UAG reports and UAGCVS reports.
- daily data on the components of NTS Shrinkage.

which are available on the National Gas Transmission website via the above link.
For additional information on the components of Shrinkage, please refer to the following link:

NGT - Shrinkage

The publication of this report and associated backing data discharges NGT's obligations under the Gas Transporter Licence Part J of Special Condition 5.6 (System operator external incentives, revenues, and costs) - Requirement to undertake work to investigate the causes of UAG and CVS. Part J of Special Licence Condition 5.6 – requirement to undertake work to investigate the causes of UAG and CVS which is detailed in Appendix I of the report.

If you have any feedback or questions on this document, please contact NGT's Meter Assurance team via the following email address: meterassurance@nationalgrid.com.
From the 7th of May this e mail address changes to meterassurance@nationalgas.com

The Meter Assurance Team is part of the Energy Balancing team within NGT and are responsible for investigating the causes of and reporting upon UAG and CVS.

National Transmission System Unaccounted for Gas Trends

This section of the report provides information on assessed UAG quantities since April 2013, with particular emphasis on the period 1st October 2023 to 31st March 2024.

Unless stated otherwise, all UAG values are Pre-Reconciliation UAG. Pre-Reconciliation UAG is the value which is recorded after entry and exit closeout. This data shows the position prior to any reconciliations taking place.

Formula Years 2013/14 to 2023/24

Figure 1 provides the annual assessed UAG, OUG and CVS quantities for Formula Years 2013/14 to 2023/24. A Formula Year refers to the period from 1st April to 31st March of the following year.

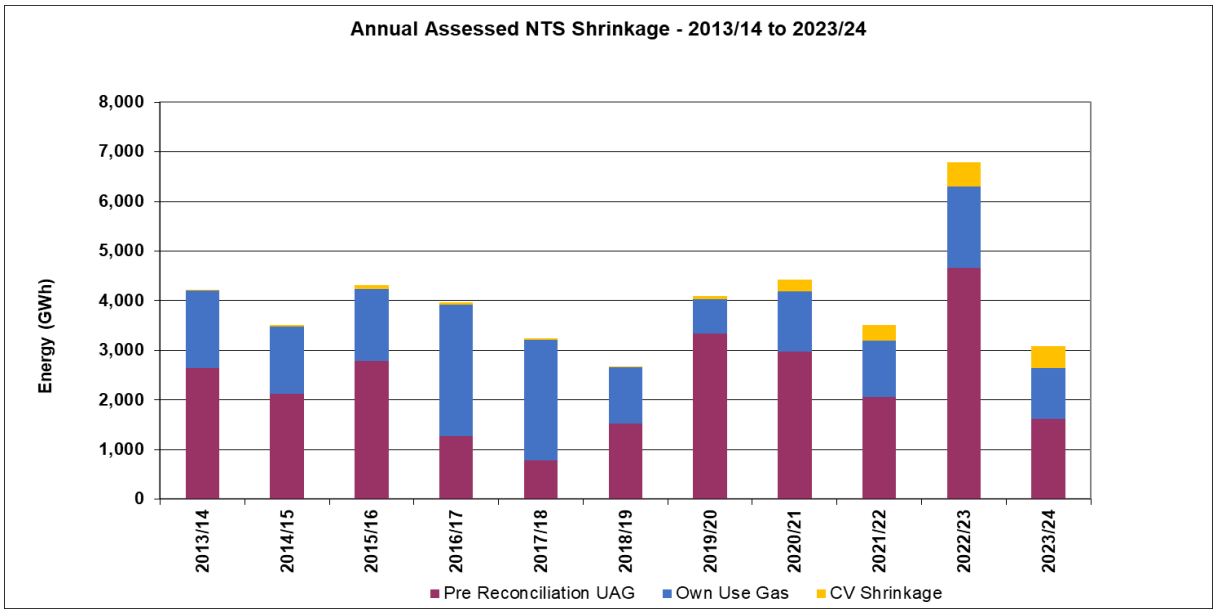

Figure 1: Annual Assessed NTS Shrinkage – 2013/14 to 2023/24

Figure 1 demonstrates that for Formula Year 2023/24, NTS Shrinkage is lower than the previous two years. As previously reported, a Distribution Network meter error at Thornton Curtis Offtake (EA LDZ), under registered by 838 GWh, impacting UAG in 2022/23. The error was reconciled last summer. UAG is currently the predominant Shrinkage component, making up around 52% of NTS Shrinkage, OUG makes up 34% and CVS 14%. CVS became more prominent over the last few years and the potential causes of this are detailed later in the report.

Figure 2 provides the winter period assessed UAG, OUG and CVS comprising of October to March data for each Formula Year.

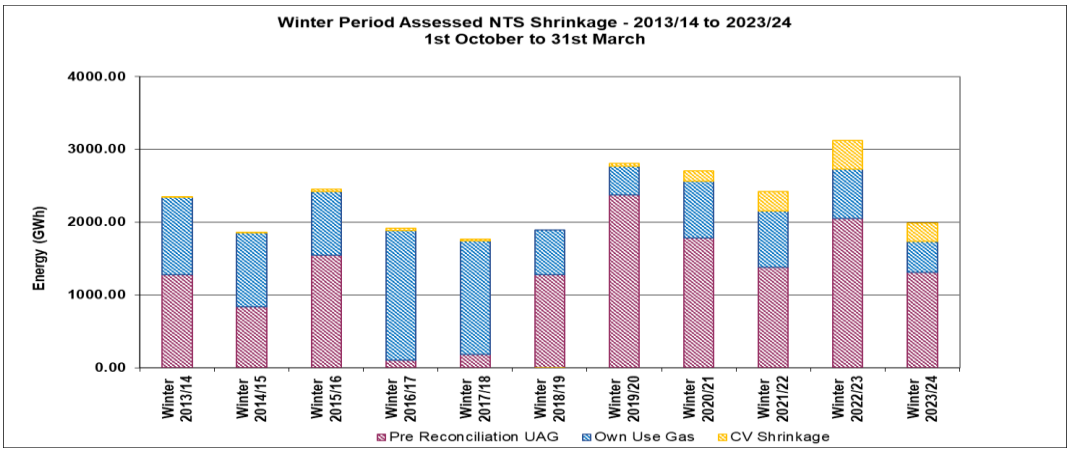

Figure 2: Winter Period Assessed NTS Shrinkage – 2013/14 to 2023/24

Figure 2 demonstrates that NTS Shrinkage throughout this winter period (October to March) has been lower than any other period going back to 2018/19, although the period 2022/23 includes the large Thornton Curtis error. UAG has also decreased when compared to the previous winter periods going back to 2018/19. OUG has also reduced and is lower than any other winter period going back to 2019/20.

There have been fewer high UAG days this winter, which included 37 instances that exceeded the ±20 GWh tolerance, whereas 55 were observed last winter period. UAG accounts for 66% of Shrinkage over the winter, with OUG 21% & CV Shrinkage 13%.

In aggregate CVS, OUG & UAG have decreased by 36% when compared to the last winter period.

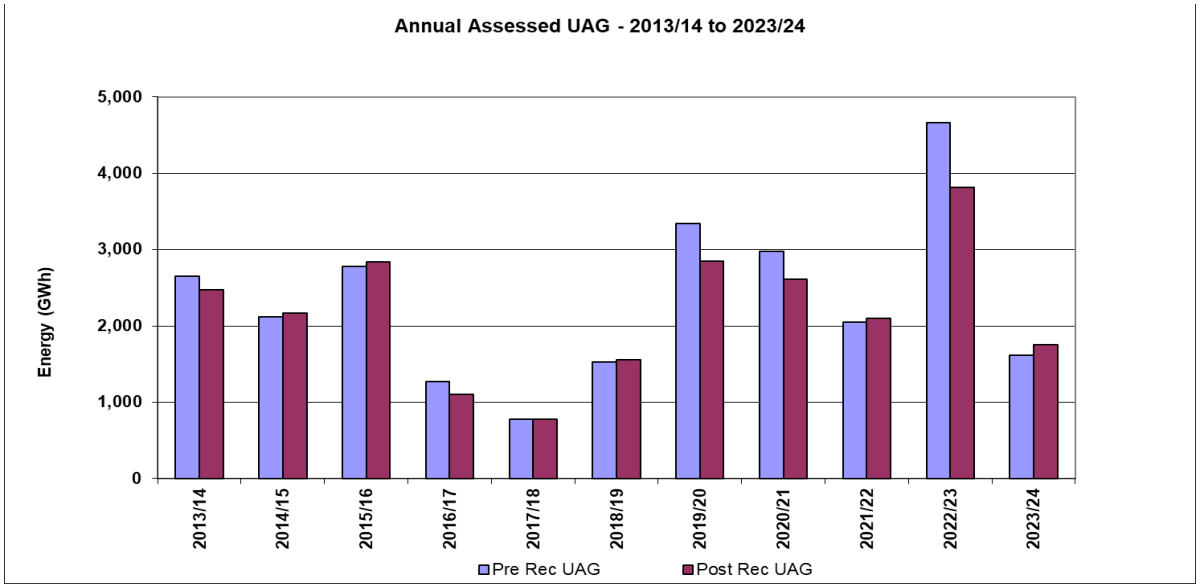

Figure 3: Annual Assessed UAG – 2013/14 to 2023/24

Figure 3 represents both pre reconciliation and post reconciliation annual assessed UAG quantities for Formula Years 2013/14 to 2023/24. Pre reconciliation UAG is calculated using the energy measurements reported in the Gemini commercial system at closeout for the NTS entry and exit points. If a meter or data error is identified outside of entry and exit closeout for one of these points, the correct values are determined.

Post reconciliation UAG is then calculated using the corrected values. Reconciliations impacting this year, have slightly increased UAG. Further information on reconciliation is provided under section 'UAG Management Activities' of this report.

Table 1 provides the annual and daily average assessed UAG quantities for Formula Years 2013/14 to 2023/24. The table also provides the annual assessed UAG quantities as a percentage of annual NTS Throughput.

UAG	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24
Assessed Level (GWh)	2,648	2,121	2,782	1,272	783	1,528	3,342	2,972	2,051	4,659	1,607
Assessed Daily Average (GWh/d)	7.25	5.81	7.60	3.48	2.14	4.19	9.13	8.14	5.62	12.76	4.39
Percentage of NTS Throughput	0.30	0.24	0.30	0.13	0.08	0.17	0.36	0.32	0.23	0.45	0.19

Table 1: Annual Statistical performance of UAG - 2013/14 to 2023/24

The values provided in Table 1 indicate that annual assessed UAG, assessed daily average UAG and percentage of annual throughput in 2023/24 are the lowest witnessed since 2018/19.

Figure 4 below shows the total monthly assessed UAG from April 2013 to March 2024. It also provides the average monthly assessed UAG for this Formula Year (133.90 GWh) represented as the horizonal black line, together with the long-term average assessed UAG for the entire period (195.19 GWh) depicted as a horizontal red line.

With exception to 2022/23, where there was a large meter error identified and higher throughput due to increased supplies to Europe, UAG is again following patterns of lower UAG in summer months.

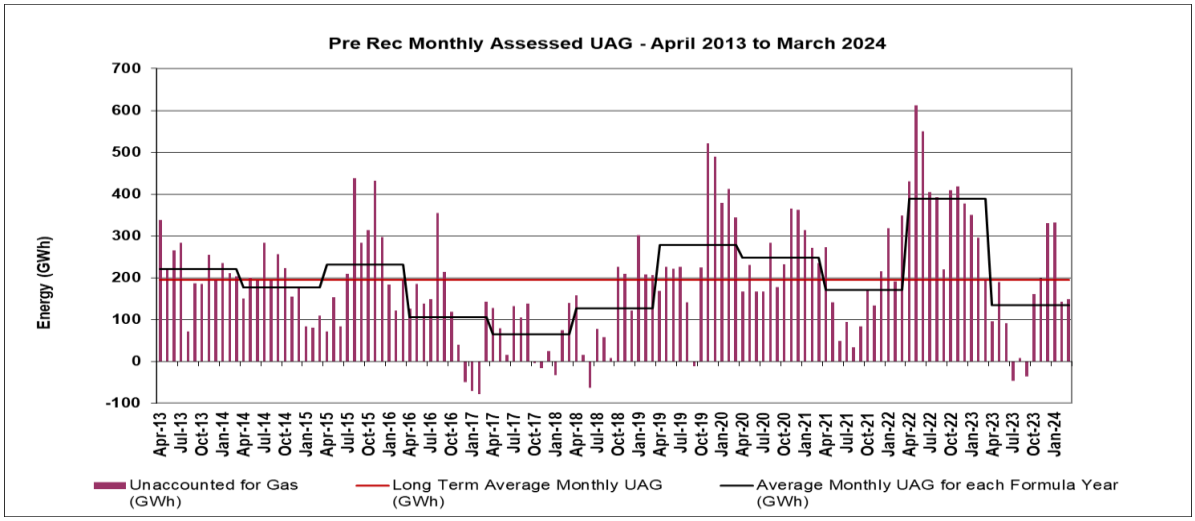

Figure 4: Monthly Assessed UAG - April 2013 to March 2024

Throughout 2023/24, only 3 of the 12 months are above the Long Term Monthly Average UAG.

Figure 5 provides the total monthly assessed UAG between October 2023 and March 2024, compared with the equivalent months within 2022/23.

UAG over the 2023/24 winter period equates to 1313 GWh, which is 734 GWh (36%) lower than the 2022/23 Winter period.

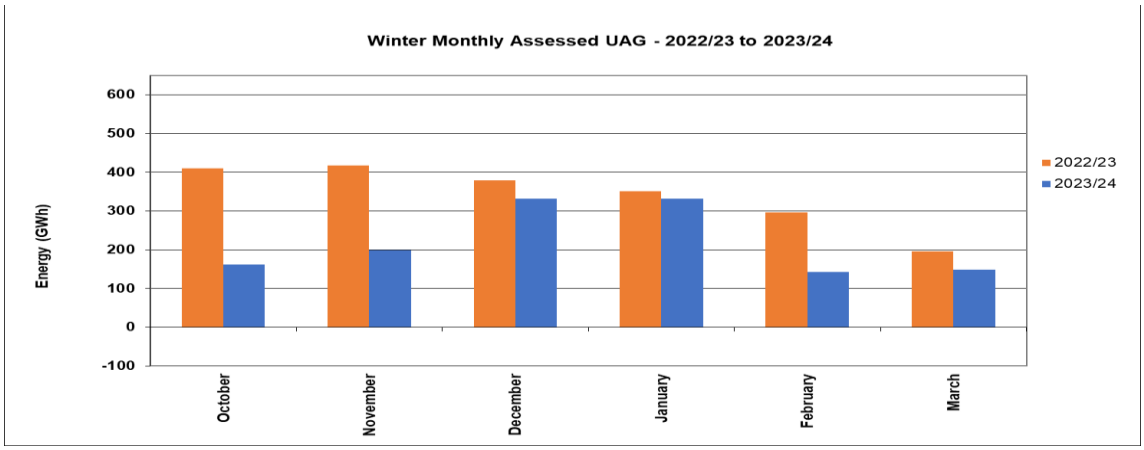

Figure 5: Winter Monthly Assessed UAG – October to March 2022/23 and October to March 2023/24

As seen in Figure 5 during the last six months, the total monthly assessed UAG varied from 142.32 GWh to 331.64 GWh, with a monthly average of 218.86 GWh. These values are lower when compared to the same months in the previous year. During October 2022 to March 2023, total monthly assessed UAG varied from 195.89 GWh to 418.01 GWh with a higher monthly average of 341.26 GWh.

Figure 6 shows the daily assessed UAG values for the period between October 2023 and March 2024 and indicates that UAG has been outside ± 20 GWh for 5% of that time. Volatility between days has been observed and is depicted by a fluctuation of positive and negative UAG throughout the period, creating a near net zero effect to the early part of the rolling average.

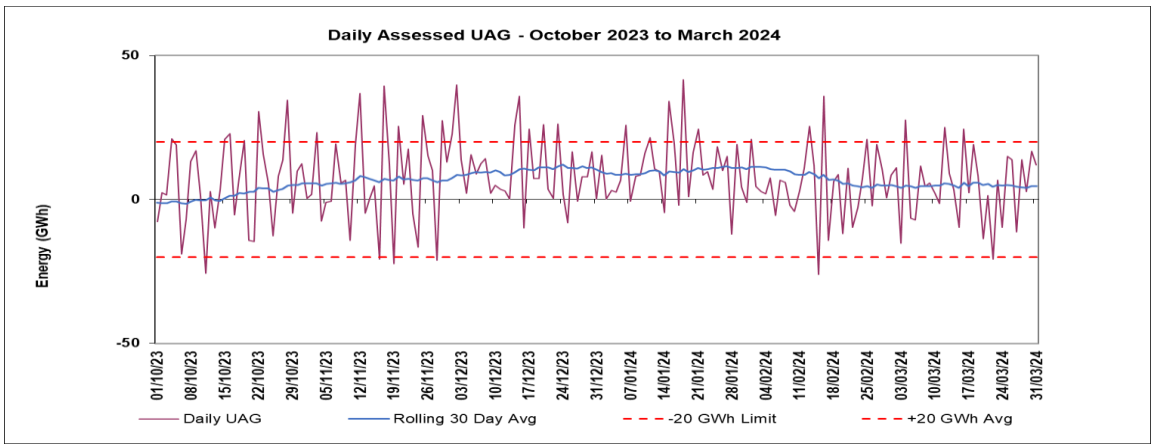

Figure 6: Winter Daily Assessed UAG – October 2023 to March 2024

NGT reviews and investigates the assessed UAG values on a daily basis, paying particular attention to any values that exceed ±20 GWh, shown. as red dashed lines in the above figure. During the period of October 2023 to March 2024 there were 37 days when daily assessed UAG exceeded ± 20 GWh, 18 days less than the same period in 2022/23.

All high UAG days have been investigated for this period, although the causation has not yet been identified.

Figure 7 outlines the demand breakdown with UAG overlaid for the period between April 2020 to March 2024. Interconnector Export volumes have decreased by 50% when compared to the last 6 months (April to September 2023), there has also been a 56% decrease in export flows when compared to the 2022/23 Winter period. LDZ Offtakes continue to display a seasonal pattern throughout, whereas Power Station demand demonstrates a more consistent annual offtake.

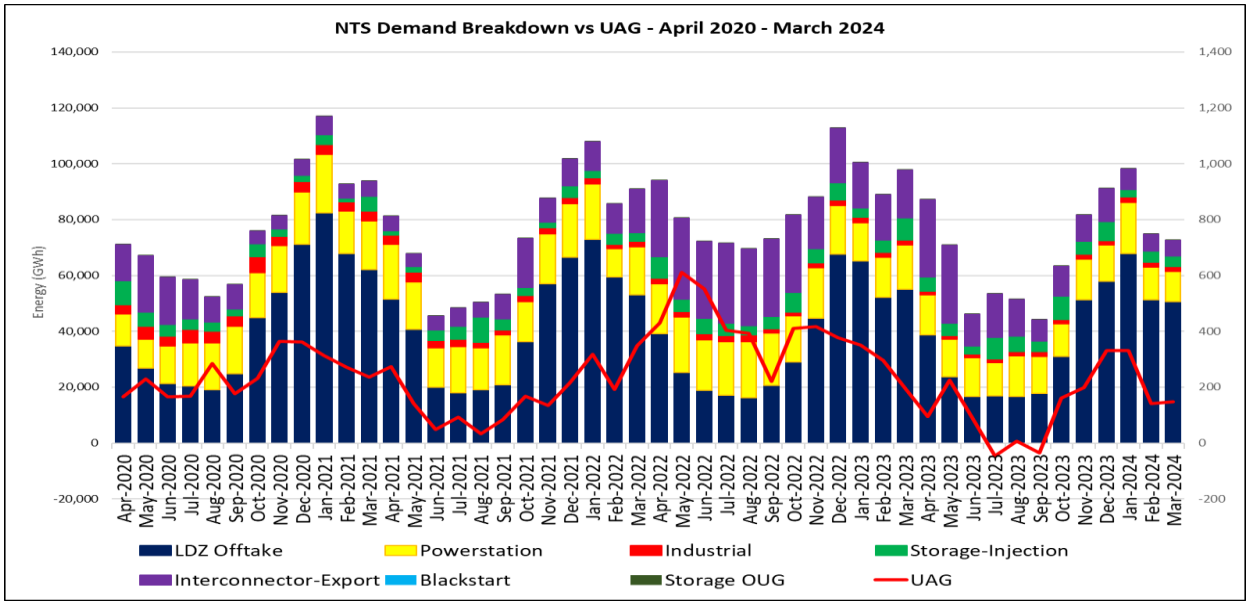

Figure 7: NTS Demand Breakdown – April 2020 to March 2024

Figure 8 below demonstrates a decrease in monthly Interconnector Export volumes across the winter months when compared to the previous year.

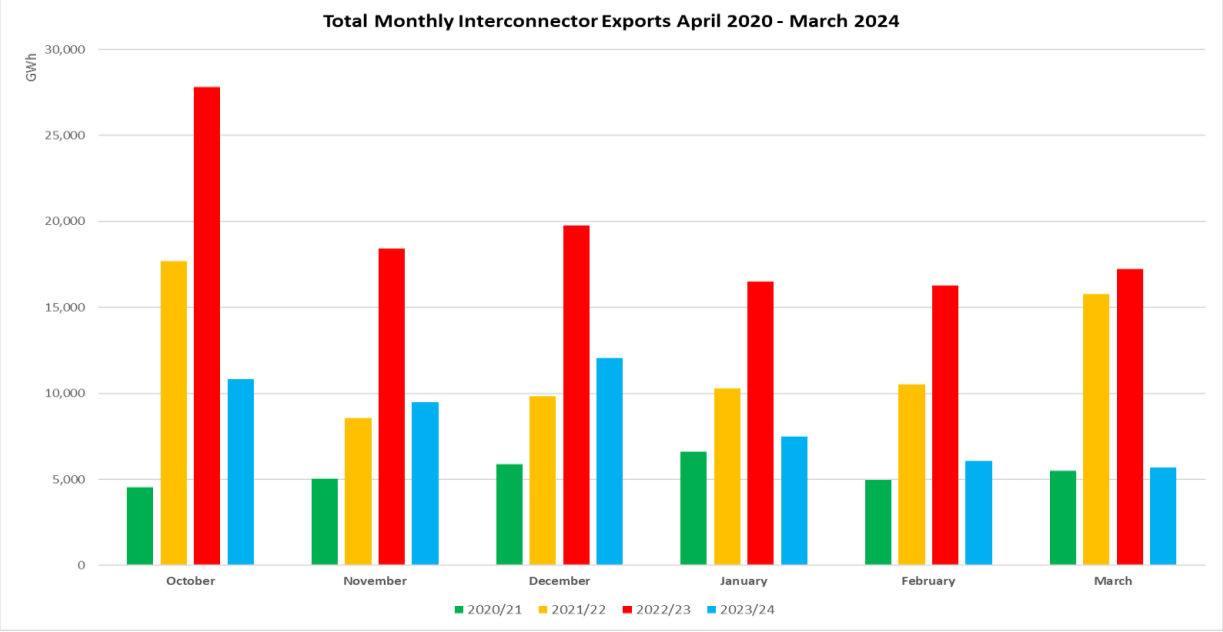

Figure 8: Interconnector Export - April 2020 to March 2024

Figure 9 illustrates that Entry Terminals and LNG deliveries have continued with the previously seen seasonal patterns although increased LNG and Terminal flows were witnessed over the 2022 summer period which aligns to the increased exports to Europe through the interconnectors.

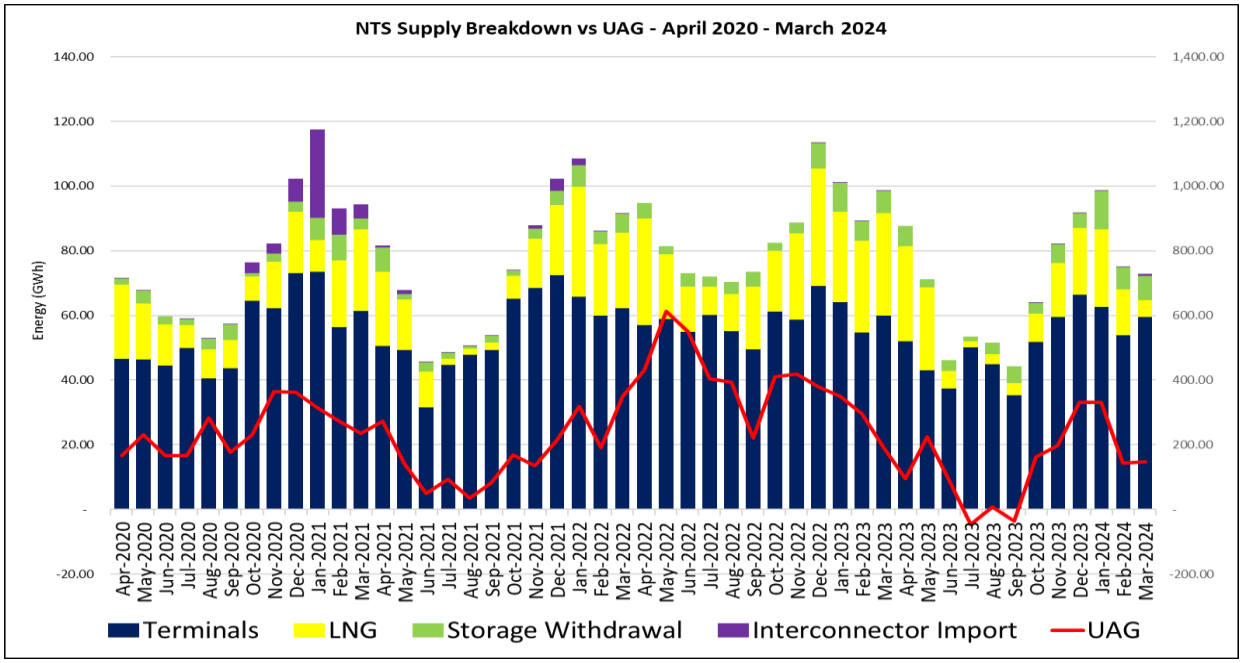

Figure 9: NTS Supply Breakdown – April 2020 to March 2024

Figure 10 provides the total LNG breakdown including South Hook and Dragon from Milford Haven in South Wales and both Isle of Grain Terminals in the South-East.

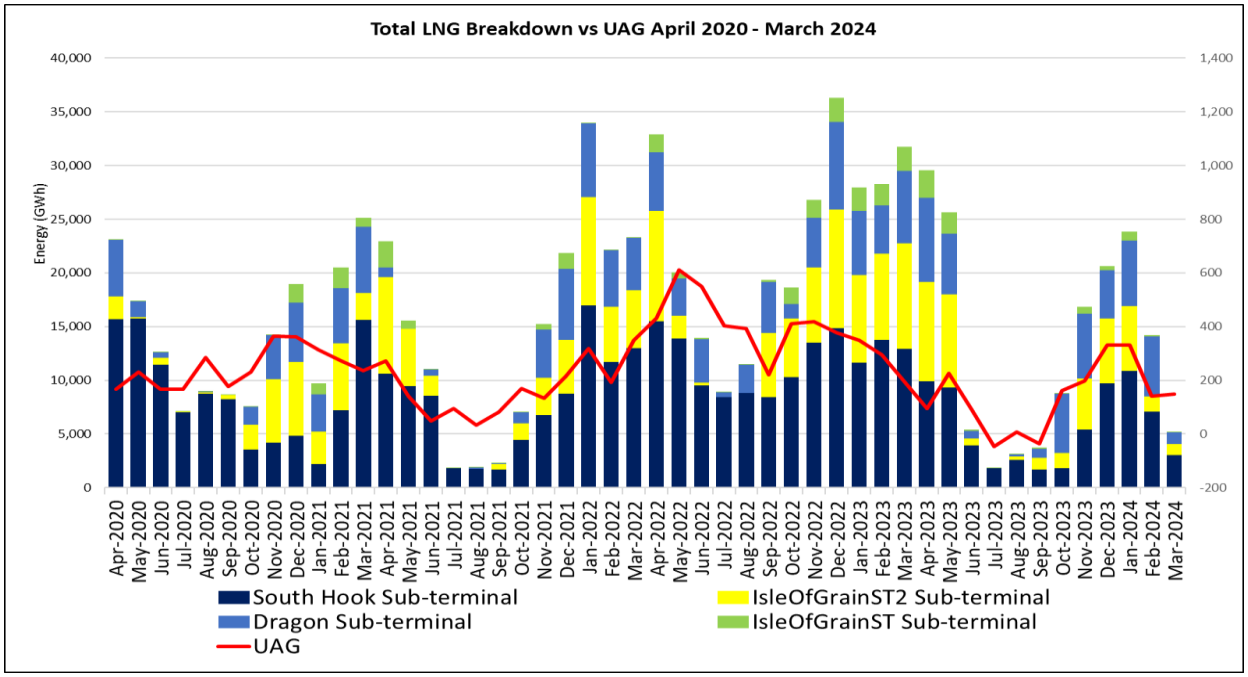

Figure 10: Total LNG Breakdown – April 2020 to March 2024

As previously reported, UAG had increased and decreased with LNG flows but there has been no evidence to support that LNG flows are directly influencing this UAG behaviour.

Figure 11 below compares the total monthly LNG Imports since April 2020 over the winter months and highlights the flow patterns that have been observed.

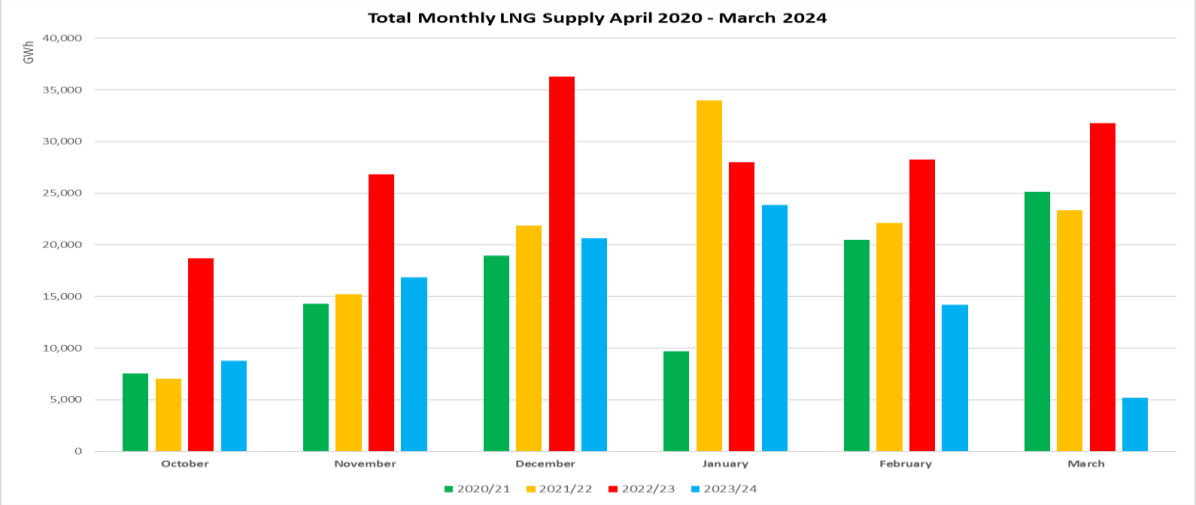

Figure 11: LNG Supply – April 2020 to March 2024

Figure 11 highlights that December 2022 saw the greatest levels of LNG delivered onto the NTS and March 2024 has witnessed the least.

Figure 12 displays the monthly net Interconnector position for BBL, Interconnector (UK) and Moffat over the period between April 2020 and March 2024. The positive values on the graph show the monthly net position being Interconnector gas imports and the negative values show the monthly net position value being Interconnector gas exports. This graph demonstrates that UAG doesn't typically follow a pattern to total net Interconnector activity, although Formula Year 2022/23, did show some reversed correlation to Net Interconnector throughput. Investigations so far have been inconclusive.

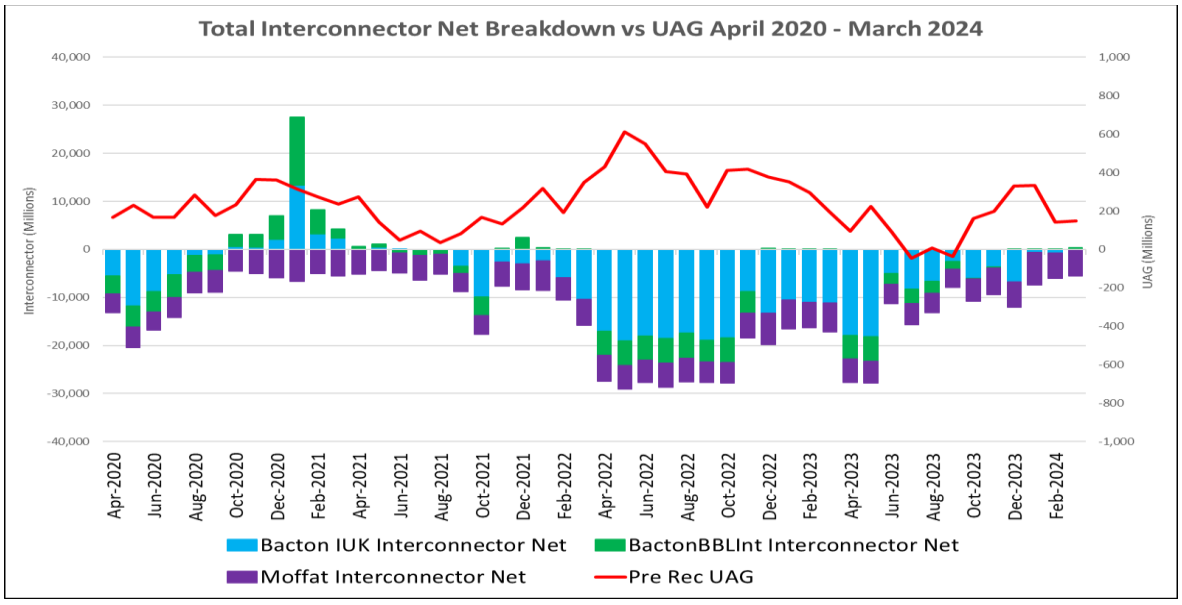

Figure 12: Net Interconnector – April 2020 to March 2024

Formula Year 2023/24

This section of the report provides data on assessed UAG levels for the April 2023 to March 2024 period. This is the first opportunity for NGT to provide commentary on the full Formula Year.

2023/24	UAG	OUG	CVS	Total
Annual Assessed Levels (GWh)	1,607	1,040	443	3,090
Percentage of NTS Shrinkage	52.0	33.7	14.3	100

Table 2: Actual Assessed Levels for UAG, OUG and CVS – 2023/24

Table 2 provides the annual assessed levels of UAG, OUG and CVS for Formula year 2023/24. The table confirms that UAG was the predominant component of NTS Shrinkage which continues the trend seen in recent years.

Annual Assessed UAG has decreased from the previous year by 66%.

The decrease in UAG has been mainly attributed to a decrease in annual throughput and a significant known meter error that was detected in 2022/23 causing higher UAG. UAG exceeded +20 GWh on 58 days throughout 2023/24, whereas 127 days exceeded this tolerance in 2022/23. Additionally, 132 days saw negative UAG in 2023/24, whereas there were 73 days with negative UAG in 2022/23.

NGT have also observed a 10% decrease in CVS compared to 2022/23 and a decrease of 37% in annual assessed OUG.

Figure 13 below provides the total monthly assessed UAG for April 2023 to March 2024 compared to the equivalent months in 2022/23. During 2023/24, the total monthly assessed UAG varied from -46.86 GWh to +331.64 GWh with a monthly average of 133.90 GWh.

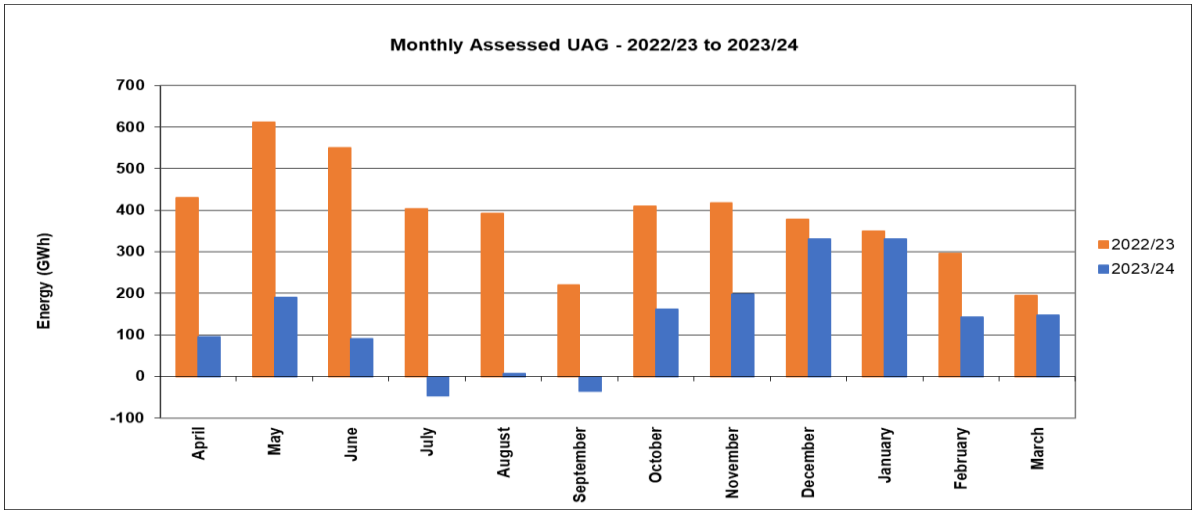

Figure 13: Monthly Assessed UAG 2022/23 to 2023/24

Figure 14 below provides the daily assessed UAG values between April 2023 and March 2024. Daily variability has continued to be observed with UAG varying from -31.83 GWh to +41.45 GWh and a daily average of 4.39 GWh, which is around a third of the daily average over the previous year.

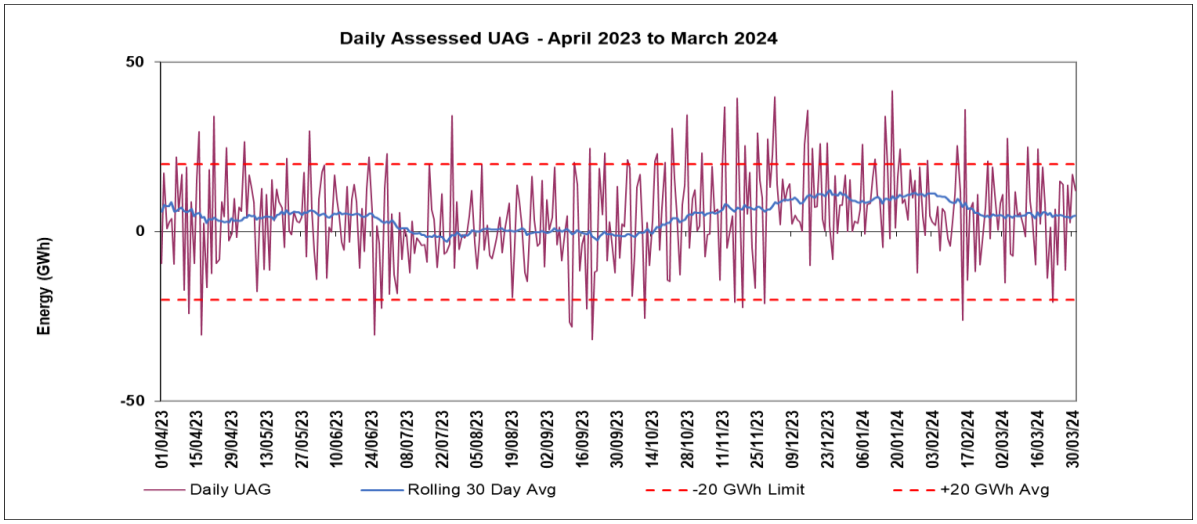

Figure 14: Daily UAG April 2023 to March 2024

The blue line represents the rolling 30-day average, and the ± 20 GWh quantities are shown as red dashed lines. An increase in daily UAG and variability during the winter months can be observed with the rolling 30-day average increasing throughout November to February. The period between 25th November to 17th February displays a higher Rolling 30 Day Average, this increase is because there were very few instances of negative UAG over that period, although positive UAG wasn't spiking any higher to the surrounding days. Trend analysis that has been carried out over this formula year and is detailed in the UAG Projects section of this report.

During 2023/24 16% of the days exceeded ± 20 GWh (69 occurrences fewer than the previous year). 36% of days within the period were negative, which is 59 days greater than last year.

As described previously in this report, NGT reviews and investigates the assessed UAG on a daily basis, paying particular attention to any values that exceed ±20 GWh. The Energy Balancing Team collaborate with stakeholders across NGT to investigate UAG trends, developing analytics and improved understanding of UAG. UAG trends are a series of consistent patterns of UAG and are investigated through projects featured within this report.

UAG Management Activities

This section of the UAG report describes the various activities and initiatives that NGT has been undertaking or is planning to undertake to investigate the causes of UAG.

Meter Validation Report Reviews

Meter owners are obliged to undertake meter validations for each of their metering installations on at least an annual basis to confirm that the metering equipment is measuring correctly. The results of these tests are documented within a meter validation report and provided to NGT as soon as possible after the completion of the validation.

The validation reports provide essential information that allows NGT to assess the asset health and accuracy of the metering connected to its network. This enables a better understanding of the impact that meter error will have on assessed UAG.

For Formula Year 2023/24, NGT has received meter validation reports for 184 NTS entry and exit facilities, these reports are for meter validations that have taken place between April 2023 and March 2024.

From the reviewed meter validation reports, NGT have raised queries where necessary with the relevant meter owners, to confirm if any instruments that tested outside of tolerance could have introduced measurement error, thus impacting assessed UAG levels.

The Meter Assurance team will continue to work with NTS asset owners to review the Meter Validation Reports and close out any open actions that have arisen from the 2023/24 review period. The data provided and results recorded are used to develop the meter witnessing programme.

During meter validation tests, each measurement system undertakes simulated pressures, temperature and gas composition to carry out the required tests, which entails disconnecting or overwriting physical instruments, wires and software. There is a risk that meter error could be introduced through these activities. NGT is continuing to investigate the potential to identify assessed UAG when meter validations are known to be taking place.

NGT is focussing on validation tests that have the potential to cause measurement error, to gain a better understanding of different calibration equipment and different tolerances. The asset owners are assisting with our queries associated to these tests.

Meter Witnessing

The purpose of witnessing the validations is to gain assurance that the measurement equipment within the metering installation continues to measure the gas delivered to or taken from the NTS without bias and within the agreed measurement uncertainties.

Witnessing involves NGT personnel attending metering installations throughout the UK during meter validations to observe and document the testing taking place. Over this formula year, there haven't been any sites that met our site selection criteria, therefore NGT have not witnessed any meter validations, but we continue to engage with NTS connected asset owners to arrange future visits in due course.

Reconciliation

NGT has an obligation to reconcile NTS related meter and data errors on behalf of the shipping community.

Over the last six months, since the publication of the November 2023 UAGCVS Report, NGT has adjusted 306.13 GWh in absolute energy terms via the reconciliation process. This comprises of 32 instances of reconciliation at individual NTS entry and exit facilities, each instance comprising of one or more days of reconciliation for a total of 1,239 gas days. Most of these reconciliations have been in Formula Year 2023/24; however, reconciliations have also been processed for 2020/21, 2021/22 and 2022/23.

From April 2023 to March 2024, NGT have adjusted 69 instances of reconciliation, equating to 1,310.32 GWh in absolute energy terms.

Figure 15 provides the annual reconciliation quantities, in absolute energy terms, for 2013/14 to 2023/24. The orange portion of the bars indicate the reconciliation quantities processed since the publication of the November 2023 UAG report.

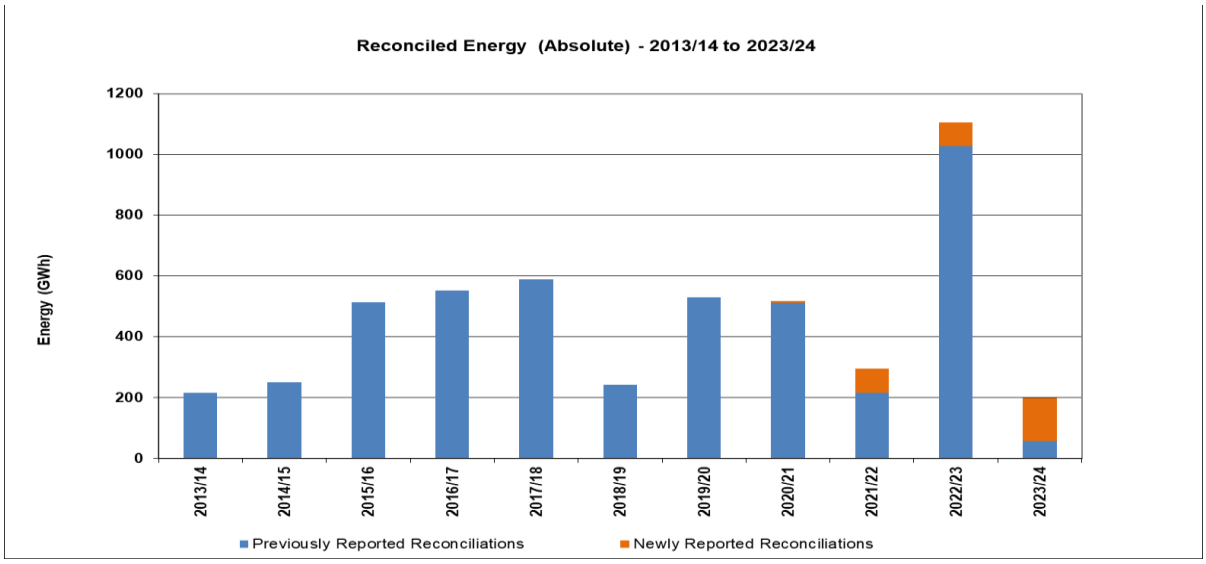

Figure 15: Reconciled Energy (absolute) – 2013/14 to 2023/24

Of the 32 instances of reconciliation processed, 17 related to meter error and 15 related to data error.

Table 3 shows instances of measurement error that have been reconciled since the November 2023 report and the total absolute energy (GWh) that has been adjusted in each formula year.

Formula Year	2020/21	2021/22	2022/23	2023/24
No. Instances	3	4	7	18
Total Absolute GWh Reconciled	6.4	79.18	77.75	142.80

Table 3: Reconciliations

Figure 16 below shows absolute reconciled energy against Assessed UAG and reconciled energy as a percentage of UAG. Reconciliation on average, is around 15% of UAG, except for Formula years 2016/17 and 2017/18.

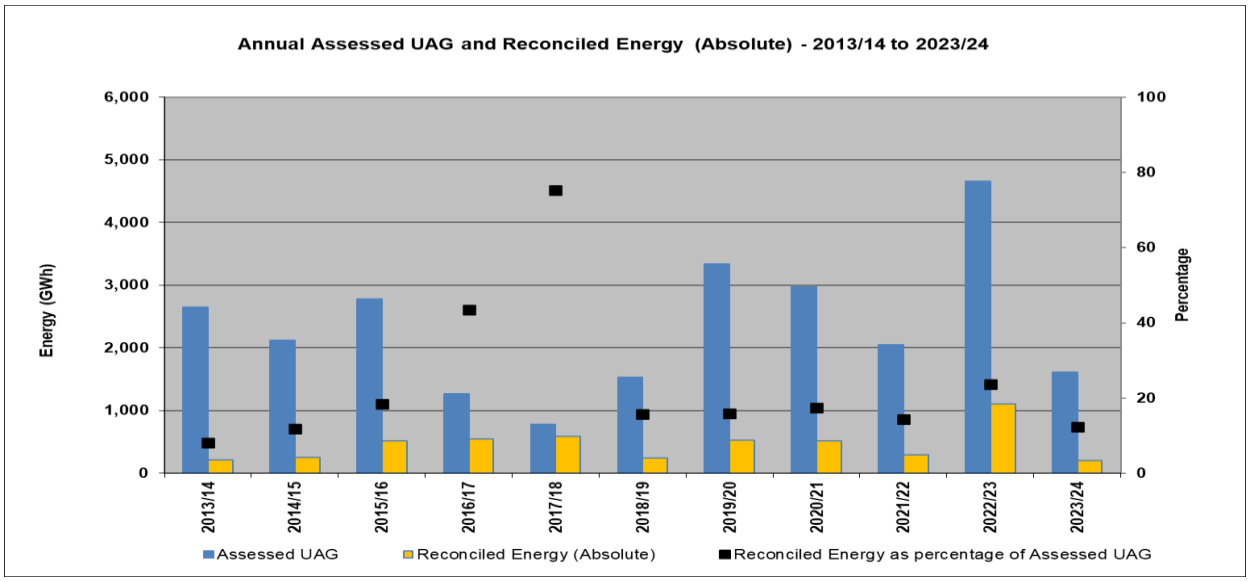

Figure 16: Annual Assessed UAG & Reconciled Energy (Absolute) – 2013/14 to 2023/24

Figure 17 shows Post Reconciliation UAG, which is UAG with any reconciled values included. Reconciliation can make UAG increase, decrease, or remain the same if there is a netting effect. The impact of the 21 instances of reconciliation that have impacted gas days within 2023/24, has made UAG increase slightly from 1,607 GWh to 1,756 GWh, although the previous year reduced significantly from 4,659 GWh to 3,810 GWh.

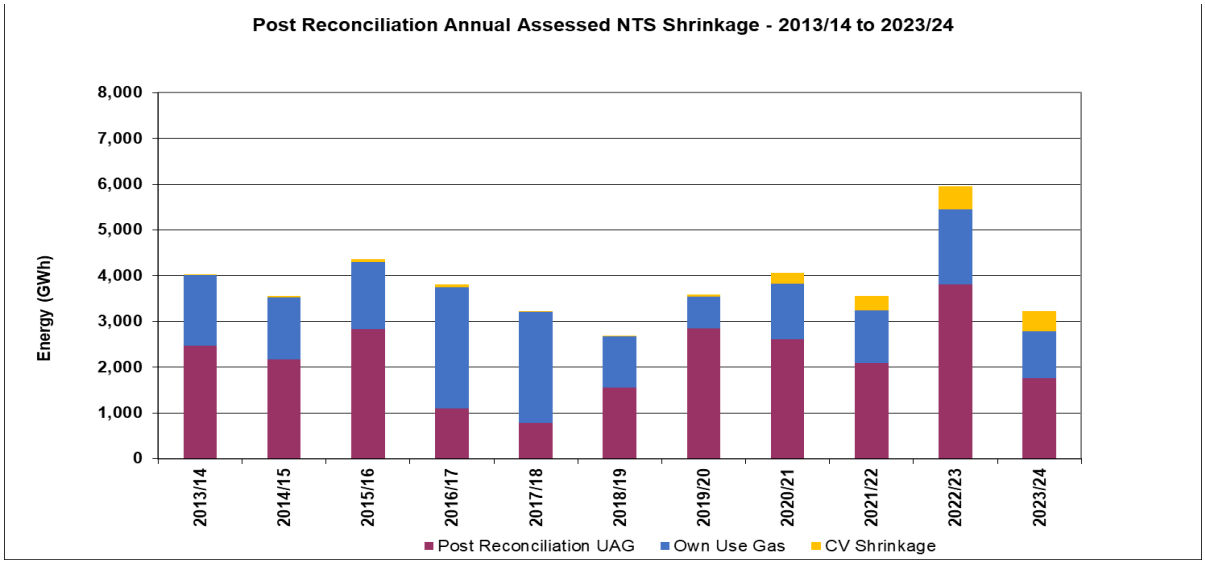

Figure 17: Post Reconciliation Annual Assessed NTS Shrinkage – 2013/14 to 2023/24

NGT progresses its validation of end of day measurements to help address data quality challenges experienced during the pre-closeout period. One initiative that automates the handling of Sub Terminal and Storage data into our systems and reducing the opportunity for manual input errors to occur is steadily increasing. Further Sub Terminals and Storage sites are being onboarded to this system later in the year. So far 16 sites are automated, NGT hopes that this can be rolled out to all NTS entry sites in the near future.

NGT is continuing to process meter and data error reconciliations which will be included in future reports.

UAG Investigation

NGT manage projects to investigate the causes of UAG. These projects include historical and future UAG patterns or trends.

NGT's continued ambition is to better understand end to end data flows to identify and mitigate systematic data error, automate and validate all data points and build the tools to identify the sources of UAG.

Since the publication of the November 2023 UAGCVS Report, various projects have been undertaken to investigate current trends in UAG. These investigations have helped to understand and ensure assurance in our data. By carrying out site elimination checks using flow profiles across all sites, we were able to rule out obvious outliers.

The higher UAG period from November 2023 to January 2024 has some element of the effects of higher UAG throughout a winter period, and as mentioned previously in the report, this period witnessed very few negative UAG days which increased the UAG averages. However, UAG as a percentage of throughput in December and January increased to approximately 0.35% over two of those months, hence the requirement to investigate further.
Trend analysis has been carried out over the last 6 months that investigated any duplicate DN Offtake energy throughout the whole 12 months and a deep dive into Rough Terminal and Storage flows as their flow profiles showed some similarities to UAG patterns and UAG behaviour at certain levels of demand. So far, this analysis has been inconclusive and further investigations are required.

Projects specifically looking at the period of high UAG have been carried out since the November 2023 UAGCVS report, which are additional to the projects scoped in Table 3 below.

Flow Profiling:
Flow profiles for sites where flows have differed to other data sources (such as site notifications, shipper nominations and telemetry) have been analysed. This process has highlighted sites where telemetry differs daily to actual flows, although, for the sites that were highlighted as outliers, telemetry was not used for billing purposes in those instances.
Rough Terminal and Storage (as a total flow) has displayed correlation to UAG for periods of the formula year, further analysis is required to draw a conclusion and will be detailed in future reports.

Offtake Demand Patterns v Total Demand:
NTS Demand at varying levels has been compared to Offtake Demand at LDZ offtake and Site level to examine any potential patterns over the last Formula Year. Further analysis is required to provide assurance to data sources and deeper dives may be required to pinpoint any particular LDZ offtake or site. The outcome of this investigation will feature in the next report.

Resource in the data science arena has been limited due to other projects, however, new projects to improve the Meter Validation and UAG processes have now been started and are in the initial stages with our IT system architects.
The innovation project to create an analytical tool that can detect the causation of UAG is in the very early stages of discussions to establish a service provider.

A new data platform has also been developed (due to be rolled out this year), that will enable access to raw data that has not been accessible before. This data will aid the success of the above projects.

Table 4 below provides an overview of the UAG projects and initiatives NGT have planned over this Formula Year (2023/24). Other 'mini projects' (listed above) have also been undertaken that focus on the higher UAG trend.

Project / Initiative	Target Completion Date	UAG / CVS	OUTCOME
Enhancements to UAG Causality detection models	Future Project	UAG	**Started**: NGT are funding an innovation project to create a tool to detect causes of UAG – this is in the early stages with procurement
Calculate UAG zonally across the NTS	Potential future project	UAG	**On Hold**: The possibilities of this have been discussed with Network modellers. Due to the amount of new data points required to do this, it would be out of scope for this reporting period. Cost benefit analysis will steer this as a future project.
Review of ± 20 GWh baseline tolerances	Future Project	UAG	**On Hold**: The current trend in UAG has been adequately captured within the current baseline. This will roll over into the following period, especially if the current behaviour changes or settles.
LNG Gas Temperature – impact of temperature cooling as it leaves the Terminal. Scope would also include NTS compressors	Potential future project	UAG	**Ongoing**: This requires network modelling and expert determination to determine if there are impacts on volume within the Network.
Improvement to SCADA data calculations	2023/24 Project	UAG	**Complete:** Changes have been made to SCADA that allow for more accurate calculations of Energy when CVs blip to 35 MJ/m3
Duplicate LDZ Offtake data.	Extended 2024/25 Project	UAG	**Ongoing:** The duplicate LDZ Offtake volume occurs when the files from the Distribution Network have failed for an LDZ and a new file hasn't been received into Correla. Gemini will apply the last good day as a default. The duplicated days do not appear to have caused high UAG spikes, but the data is incorrect, and a solution is required to ensure the DN files are received and accepted on time. (Extended as further discussions are required between DN & Correla to agree a solution).
Improvement of data visualisation tools to assess site profiles against UAG behaviour.	Extended 2024/25 Project	UAG	**Ongoing:** Incorporate new data sets from the new data platform into our current data visualisation tools. (Extended due to a delay in the release of the new data platform)
Improvement of CV Shrinkage data from Correla	2023/24 Project	CVS	**Closed:** A change request has enabled NG to access CV Shrinkage and capping data daily which will allow for NG to communicate with relevant parties in a timely manner with the aim of reducing CV Capping where possible. (There is further work as part of Gemini Sustain+ to automate this process)
Flow Profiling	2023/24 Project	UAG	**Complete:** See the detailed comments on previous page
Top 60 Sites	2023/24 Project	UAG	**Complete:** No outliers were detected
Offtake v Total Demand	2023/24 Project	UAG	**Ongoing:** See the detailed comments on previous page
Linepack Drift v UAG	2024/25 Project	UAG	**Not Started: Revisit linepack drift data and analyse against UAG.**

Table 4: Project initiatives for Formula Year 2023/24

The projects that are scoped in Table 4 will be scheduled in the coming months dependent on resource and data availability.

All closed out projects can be viewed in previous UAGCVS reports.

CVS Statement & Investigation

Calorific Value Shrinkage (CVS) is gas which cannot be billed due to the application of Gas (Calculation of Thermal Energy) Regulations 1996 (amended 1997) and is the Local Distribution Zone (LDZ) energy difference between measured and billed Calorific Value (CV).

The regulations outline that the daily CV average for a given charging area is calculated by summing the product of the CV and volume for all supply inputs and dividing by the total volume of gas entering the charging area.

The maximum daily CV average for a charging area permitted by the regulations is equal to 1.0 MJ/m³ above the lowest measured daily CV of the supply inputs into that charging area, meaning if for any given day an input into a charging area has a CV outside of this range, a capped CV (lowest CV + 1MJ/m³) will be applied to the whole region for billing purposes. This is to protect customers who may live near this supply of lower quality of gas and prevent them overpaying for the gas they are receiving.

To calculate CVS, NGT deduct the value that is used to bill downstream shippers based on the principles detailed above, from what was measured leaving the NTS by Ofgem approved equipment.

CVS occurs every day for all charging areas with more than one supply input into the region, this usually equates to small quantities if capping hasn't occurred and is a result of the charging area CV being rounded to one decimal place following its calculation. With CV capping being the major contributing factor to CVS, UNC Offtake Arrangement Document Section F 2.2 details that all parties cooperate with the view to avoid or minimise the amount of CVS each day.

With that in mind, if capping is caused by an NTS to LDZ offtake, NGT will investigate, and where possible, seek to minimise or avoid capping and will provide guidance to the Distribution Network Operator (DNO) to alter patterns of flow through the offtakes or alternatively look at solutions to alter flows within the NTS to improve the blending of gases. If the capping is caused by a non-NTS connected asset that inputs gas into the LDZ, the DNO's may investigate the source.

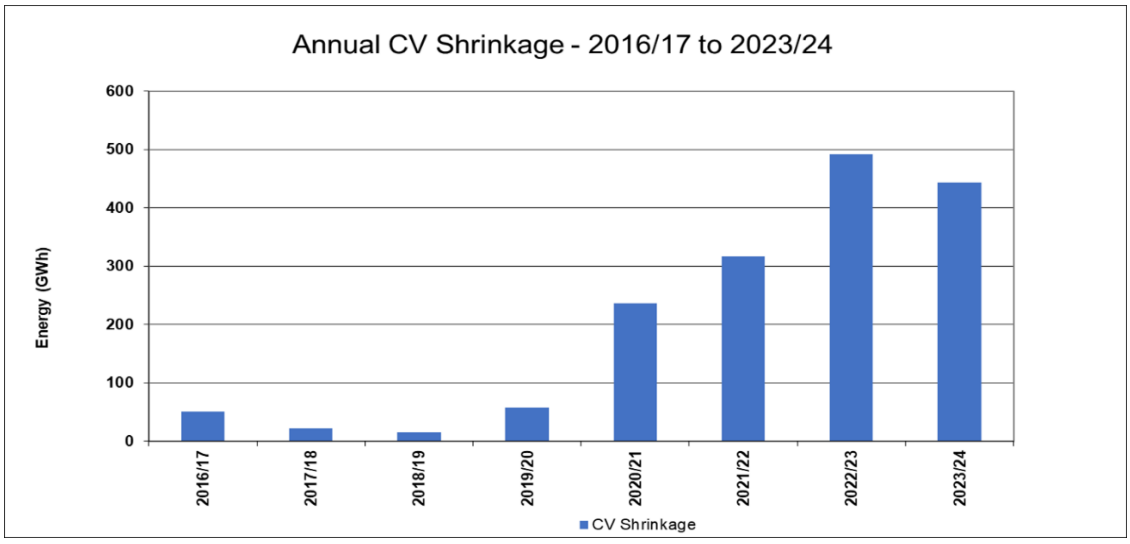

Figure 18 - Annual CV Shrinkage 2016/17 to 2023/24

Figure 18 provides a view of CV Shrinkage between 2016/17 and 2023/24. CV Shrinkage in 2023/24 is 10% lower compared to the previous year.

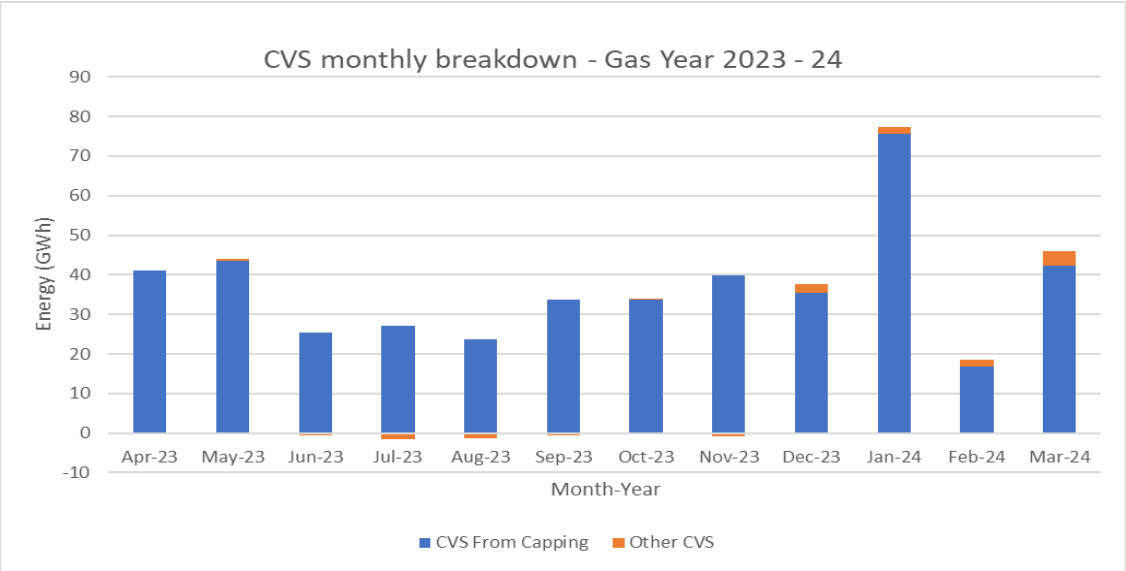

Figure 19 - CVS Monthly Breakdown 2023/24

Figure 19 provides a monthly breakdown of CV Shrinkage for 2023/24. This shows the proportion of CVS due to CV Capping detailed (in blue) and the remainder of other CVS (in orange), which can be either positive or negative when not caused by CV capping. This is due to the rounding of the LDZ CVS to 1 decimal place, as previously mentioned.

Throughout the last twelve months, CV capping has equated to 437.98 GWh with capping occurring in 12 of the 13 LDZs (EA, EM, NE, NO, NT, NW, SC, SE, SO, SW, WM and WS). Higher volumes of capping have been witnessed throughout January, this occurred mainly in NW LDZ due to Lupton Offtake site CV being low for several days, the impact can be seen in Table 4.

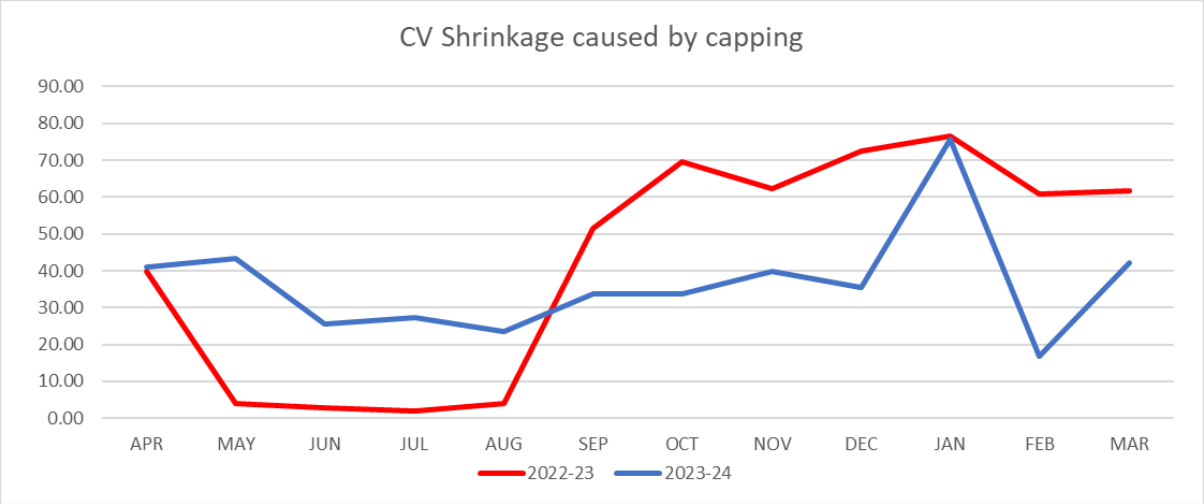

Figure 20 CV Shrinkage caused by capping 2022/23 v 2023/24

Figure 20 shows that CV Shrinkage caused by capping in 2023/24 is trending higher from April to August compared to the same months in the previous year but lower from September to March.

CV capping for April to September 2023 had 337 instances of CV capping, whereas October 2023 to March 2024 saw 259 instances. Of the 259 instances this winter period, 43% of total capped energy was seen in NE LDZ.

Month	CVS caused by Capping (GWh)													Total
	EA	EM	NE	NO	NT	NW	SC	SE	SO	SW	WM	WN	WS	
Apr-23	0.00	1.88	31.72	5.59	0.00	0.00	0.62	0.00	0.00	0.00	1.18	0.00	0.00	40.98
May-23	0.00	3.48	34.71	4.32	0.00	0.00	0.55	0.00	0.00	0.00	0.40	0.00	0.00	43.45
Jun-23	1.11	0.69	16.25	0.82	2.93	0.00	0.00	0.00	0.34	0.00	3.29	0.00	0.00	25.45
Jul-23	1.57	4.41	10.69	0.00	0.00	0.00	3.18	0.00	0.00	7.36	0.00	0.00	0.00	27.21
Aug-23	0.04	1.53	9.74	4.46	0.00	2.58	0.00	0.00	0.00	4.19	1.05	0.00	0.00	23.59
Sep-23	2.84	6.00	7.98	4.65	0.00	0.00	0.00	0.20	0.12	2.02	8.40	0.00	1.49	33.70
Oct-23	0.00	0.00	20.84	6.38	0.18	3.69	0.00	0.00	0.00	0.69	1.92	0.00	0.00	33.70
Nov-23	0.00	0.80	23.08	8.79	0.27	3.84	0.00	0.00	0.00	0.00	3.08	0.00	0.00	39.86
Dec-23	0.00	0.00	25.09	0.00	0.00	3.60	5.19	0.00	0.00	1.66	0.00	0.00	0.00	35.53
Jan-24	5.17	0.00	26.74	2.35	0.00	40.97	0.00	0.00	0.00	0.00	0.35	0.00	0.00	75.58
Feb-24	0.00	0.00	5.12	7.41	0.00	0.74	0.00	0.00	0.00	0.00	3.46	0.00	0.00	16.73
Mar-24	11.16	0.46	11.34	4.23	0.00	2.49	0.33	0.00	0.00	0.00	12.17	0.00	0.00	42.19
Summer 22/23	0.30	2.78	49.34	13.91	0.23	6.32	23.67	0.00	0.00	6.45	0.78	0.00	0.00	103.79
Summer 23/24	5.56	17.99	111.09	19.83	2.93	2.58	4.35	0.20	0.46	13.57	14.32	0.00	1.49	194.38
Winter 22/23	0.00	25.70	263.33	27.55	0.00	4.91	67.45	3.95	0.43	1.49	8.43	0.00	0.00	403.24
Winter 23/24	16.33	1.26	112.22	29.15	0.45	55.33	5.52	0.00	0.00	2.34	20.99	0.00	0.00	243.60

Table 5: CVS Caused by capping (GWh)

Table 5 shows CV Shrinkage caused by capping and like last year, capping is most prevalent in the NE LDZ equating to 223 GWh. When compared to the previous year, CVS in the NE has decreased by 29% and equates to 51% of the total CVS caused by capping.

Capping in the NE LDZ is mainly due to greater supplies of gas entering the region from the Teesside and Easington terminals. The gas entering the network at Teesside is typically a higher CV, where Easington typically has a lower CV. Due to the location of Paull Offtakes, which feeds gas into EM LDZ, along with the network configuration in that area, blending of the higher and lower CV gases cannot be achieved before it reaches that Offtake facility. Therefore, there is often a disparity within the CV's entering that LDZ, causing CV capping to occur.

Of the 338 days between April 23 and March 24 that capped in the NE LDZ, 297 of those days were due to Paull Offtake receiving a lower CV to the remainder of the other NE Offtakes.

Similarly, differences in CV values entering NO LDZ from St Fergus and Teesside terminals can impact CV capping although this year, capping has also been caused by bio methane site CV's within the LDZ. CV capping was also seen in EM, NO, NW, SW & WM LDZ's, made up of Bio Methane sites and NTS to LDZ Offtakes in those areas, such as Lupton Offtake.

Conclusion

The total assessed pre reconciled UAG quantity for the 1st of October 2023 to 31st March 2024 period is greater than the previous six-month period, which is expected when compared to the summer months. Monthly assessed pre reconciled UAG is greater than the long-term average (April 2013 to April 2024) for 3 of the last 6 months. Although higher UAG aligns to historical winter throughput trends, this last winter has seen lower UAG than the last 4 winter periods.

NGT continue to improve its understanding of the causes of UAG using data visualisation tools and investigative projects.

CV Shrinkage has decreased when compared to the previous year. CV Capping has continued to be witnessed in several LDZs with NE LDZ, making up 51% of the annual total.

Continued support from meter owners has enabled NGT to obtain and review meter validation information for NTS entry and exit facilities. This data is being used to support the identification of causes of UAG, to enhance NGT's ability to detect meter error and to inform the preparation of future meter witnessing programmes.

Appendix I - National Gas Plc (NTS) Gas Transporter Licence Special Condition Part J 5.6

Part J: Requirement to undertake work to investigate the causes of UAG and CVS

5.6.53 The licensee must use reasonable endeavours to undertake UAG Projects and compile a CVS Statement for the purposes of investigating the causes of UAG and CVS for each Regulatory Year.

5.6.54 The licensee must, unless the Authority otherwise directs, publish the UAGCVS Reports and provide a copy to the Authority by 1 May and 1 November in each Regulatory Year for the preceding six month period ending on 31 March and 30 September respectively.

5.6.55 The licensee must outline in the UAGCVS Report:

(a) the UAG Projects the licensee has undertaken in the previous period;

(b) the UAG Projects the licensee proposes to undertake in the next period and its views on whether, and if so how, the findings of the UAG Projects may be taken forward in order to reduce the volume of UAG;

(c) the reasons why any UAG Projects that the licensee proposed to undertake have not been undertaken during the Regulatory Year;

(d) a CVS Statement outlining the work conducted during the previous period to investigate CVS, and explaining the licensee's understanding of the causes of CVS; (e) any additional activities and inspections undertaken by the licensee to improve metering calibration and accuracy;

(f) a summary of any relevant discussions concerning UAG or CVS at industry fora and with interested parties on a one-to-one basis; and

(g) any data or information related to UAG or CVS that the Authority may reasonably request.

5.6.56 During the period of 28 days beginning with the date of publication of a UAGCVS Report the licensee must, unless the Authority otherwise consents, publish on its website all the relevant data referred to in the UAGCVS Report.

Interpretation and definitions UAG

is unaccounted for gas and means the amount of gas (GWh) that remains unaccounted for after the Entry Close-out Date following the assessment of NTS Shrinkage performed in accordance with the Uniform Network Code. **UAG Projects** means the projects currently undertaken by the licensee including:

(a) the witnessing by the licensee of the validation of Measurement Equipment at NTS System Entry Points or Supply Meter Installations at NTS Exit Points; and

(b) investigation and analysis of data in order to seek to identify causes of UAG.

UAGCVS Report

means a report required under Part J of Special Condition 5.6 (System operator external incentives, revenues and costs).

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