Gas Reconciliation Requirements and Procedures

November 2015

GAS INDUSTRY COMPANY LIMITED

About Gas Industry Co.

Gas Industry Co is the gas industry body and co-regulator under the Gas Act. Its role is to:

- develop arrangements, including regulations where appropriate, which improve:
  - the operation of gas markets;
  - access to infrastructure; and
  - consumer outcomes;
- develop these arrangements with the principal objective to ensure that gas is delivered to existing and new customers in a safe, efficient, reliable, fair and environmentally sustainable manner; and
- oversee compliance with, and review such arrangements.

Gas Industry Co is required to have regard to the Government's policy objectives for the gas sector, and to report on the achievement of those objectives and on the state of the New Zealand gas industry.

Gas Industry Co's corporate strategy is to 'optimise the contribution of gas to New Zealand'.

DATE ISSUED:

November 2015

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Executive summary

This report explains how physical flows and commercial transactions in the gas supply chain are reconciled and how the energy quantities used in each commercial transaction are derived. It aims to provide an overview of the arrangements, including the key legislative and commercial documents.

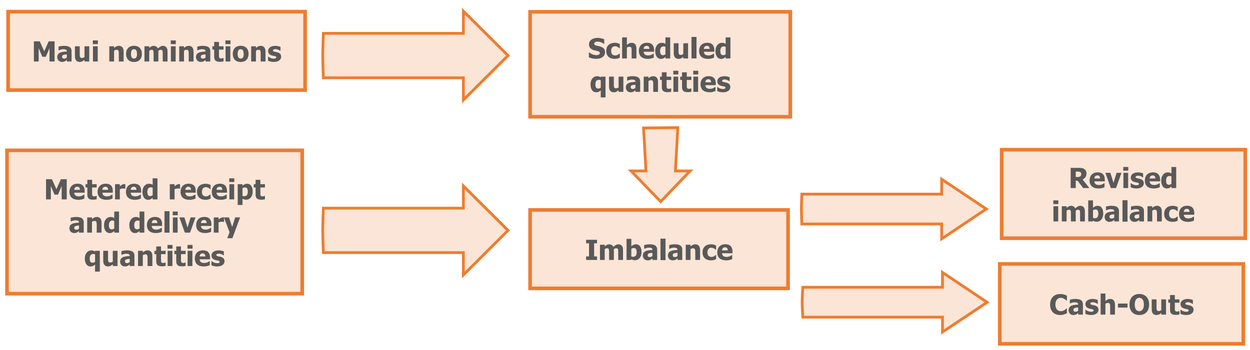
Summary of Maui pipeline reconciliation

The Maui pipeline reconciliation processes are principally governed by the Maui Pipeline Operating Code. The key elements are:

- **Nominations –** determine individual shipper receipts and deliveries at each receipt point and delivery point. A shipper's receipts and deliveries must be balanced. Shipper gas purchases, sales and transmission invoices are all based on nominated quantities.
- **Scheduled quantities –** are the aggregate of all shipper nominations at a particular receipt or delivery point (a 'Welded Point') and establish how much gas each interconnected party (a 'Welded Party') should inject or withdraw each Day.
- **Metered quantities –** are the amounts of gas that actually flowed through each receipt and delivery point each Day.
- **Imbalances –** are the differences between a scheduled quantity and a metered quantity at each receipt point or delivery point i.e. the difference between the gas flow that was scheduled and the gas flow that actually occurred.
- **Cash-Outs –** are purchases or sales of gas between the pipeline owner and each Welded Party to reduce an imbalance at a Welded Point when it exceeds its tolerance.

The process is summarised in the diagram below:

Figure 1 Summary of Maui pipeline reconciliation



Summary of Vector pipeline reconciliation

The Vector pipeline reconciliation processes are principally governed by the Vector Transmission Code. The key elements are:

- **Metered quantities –** the amounts of gas that actually flowed through each receipt and delivery point each Day.

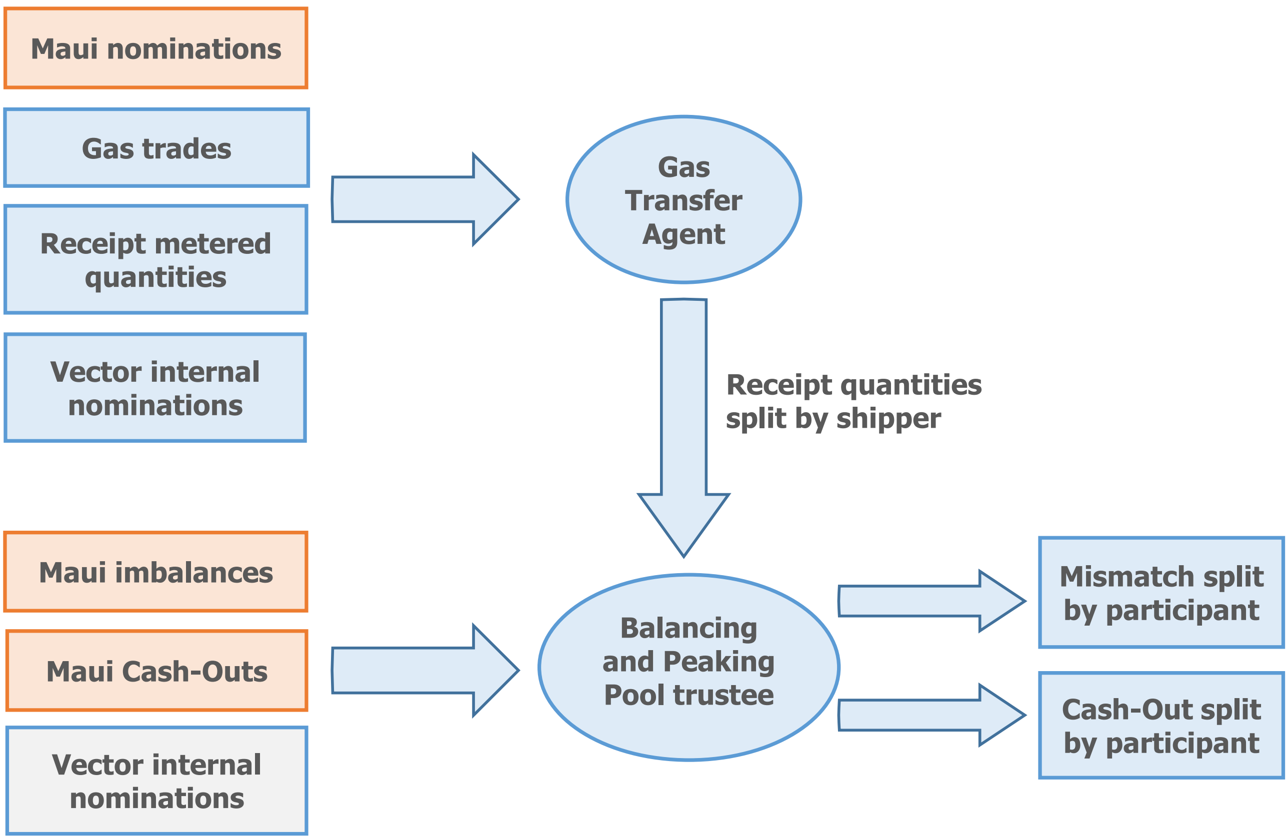
- **Mismatches –** the differences between a shipper's receipts and deliveries each Day.

The Gas Transfer Agent – who performs any calculations and notifications required by a Gas Transfer Agreement. Gas Transfer Agreements specify individual shipper entitlements to gas when it is transferred between shippers at receipt or delivery points.

- **Balancing and Peaking Pool –** an arrangement between Vector and its shippers to allocate amongst themselves any Cash-Out or other charges that Vector receives in its role as a Maui pipeline Welded Party.

By determining each shipper's receipt quantities through the Gas Transfer Agreement calculations, and its delivery quantities through the downstream allocation process (summarised below), Vector calculates shipper mismatches and determines allocations from the Balancing and Peaking Pool. The process is summarised in the diagram below:

Figure 2 Summary of Vector pipeline reconciliation



Summary of downstream allocation

The reconciliation processes on the downstream distribution systems are governed by the Gas (Downstream Reconciliation) Rules 2008 (Reconciliation Rules).

- **Gate injections –** are the metered quantities of gas received at gas gates (i.e. delivery points) from the Vector transmission system and injected into downstream distribution systems (or supplied directly into an end user's facility).
- **Consumption information –** is information about each end user's gas use supplied by its retailer to the allocation agent. Some of this information is actual metered quantities, but initially some of it is estimated.
- **Allocation Agent –** is the service provider appointed by Gas Industry Co in accordance with the Reconciliation Rules, responsible for allocating gate injection quantities among retailers based on the downstream consumption information provided.
- **Allocated gate injections –** are the gate injection quantities supplied to the Allocation Agent by Vector. The Allocation Agent splits these quantities into retailer allocations, which are supplied back to Vector to enable the Balancing and Peaking Pool calculations and the billing of transmission services.

The process is summarised in the diagram below:

Figure 3 Summary of downstream allocation

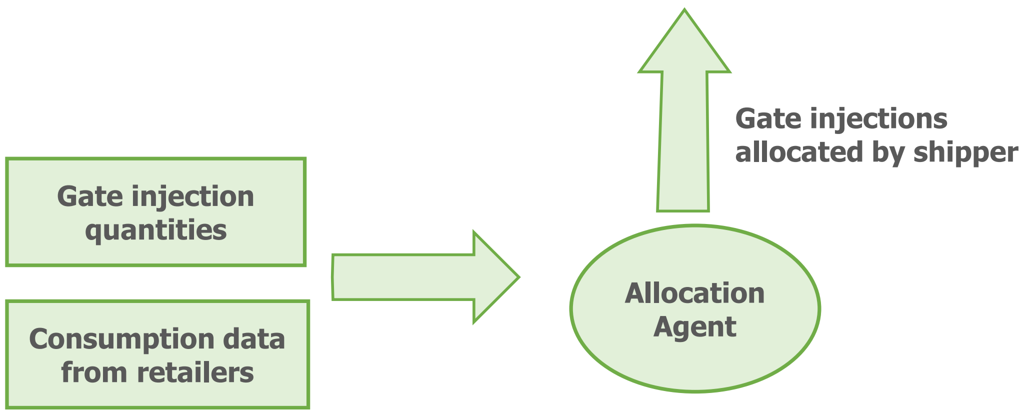
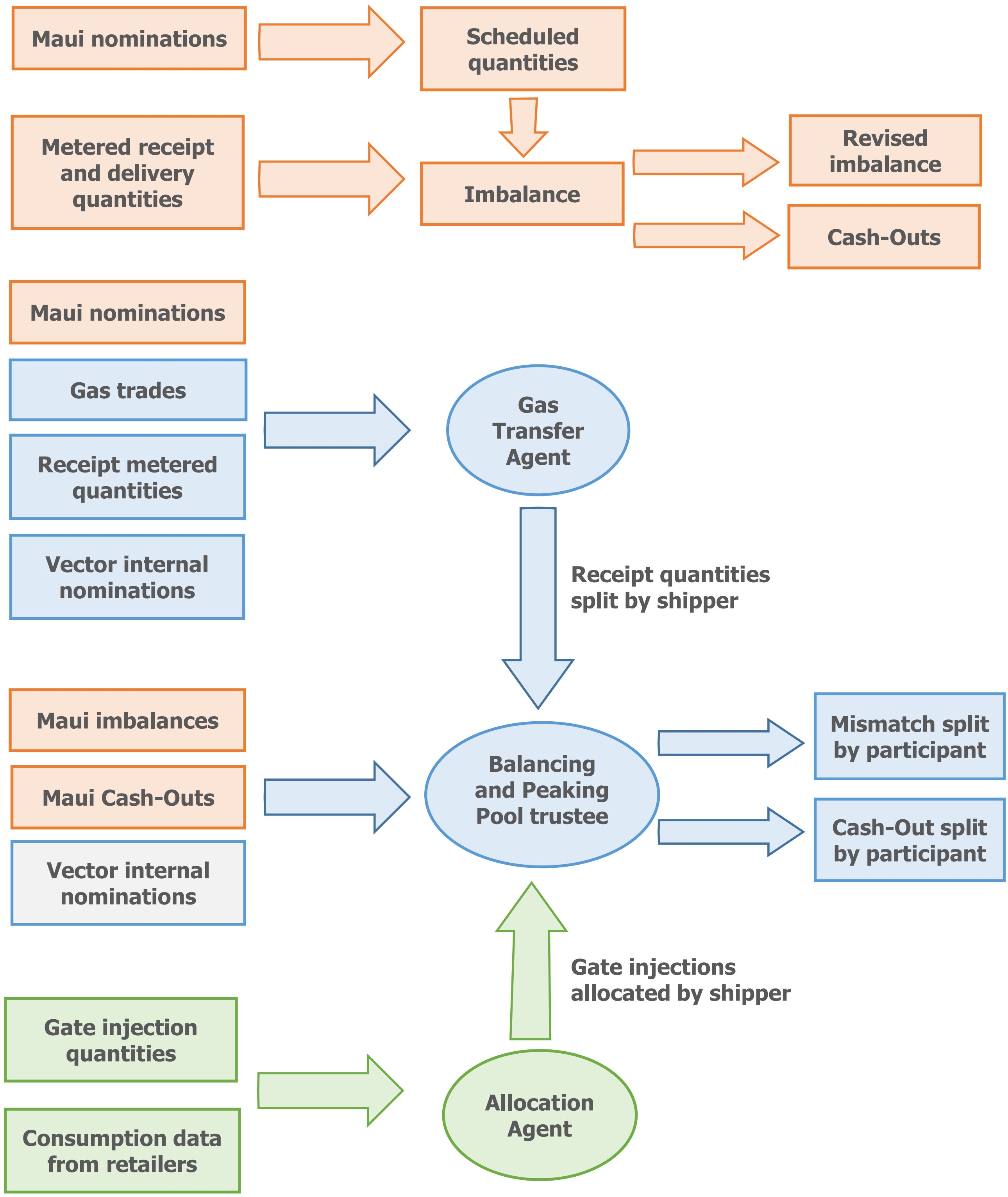


Figure 4 Schematic of all reconciliation processes



Contents

1. Introduction

When gas enters the gas transmission system it commingles with the rest of the gas in that system and flows according to the physical configuration of pipelines and the pattern of gas demand. These physical movements of gas must be matched by commercial arrangements for the purchase, transport and sale of energy, in the form of gas. This report explains how these physical flows and commercial transactions are reconciled and how the energy quantities for each commercial transaction are derived.

The various arrangements for calculating energy quantities have evolved over time to meet the needs of the regulatory and commercial environment. Understanding these is a challenge for new entrants, and even experienced industry participants may not have a comprehensive understanding of them. This report aims to provide an overview of the reconciliation arrangements, including the key legislative and commercial requirements. The common commercial language of the industry is used, and a glossary of common terms is provided at the end of this report. Terms that appear in the glossary are capitalised in this report.

2. Basic concepts

For those unfamiliar with the gas industry, this chapter sets out the basic concepts relevant to reconciliation.

2.1 Industry participants

Participants with a commercial interest in gas reconciliation include:

Producers – who supply gas that is transported through gas transmission pipelines and distribution systems for delivery to end users.

Transmission system owners (TSOs) – who own a transmission system and transport gas on behalf of shippers.

Shippers – who contract with TSOs and distribution network owners to have gas transported through these systems to their customers.

Interconnected parties – who are responsible for the physical transfer of gas into, or out of, a transmission system.

Distribution network owners – who own a distribution network and transport gas on behalf of shippers.

Wholesalers – who supply gas to any person for the purpose of re-supply.

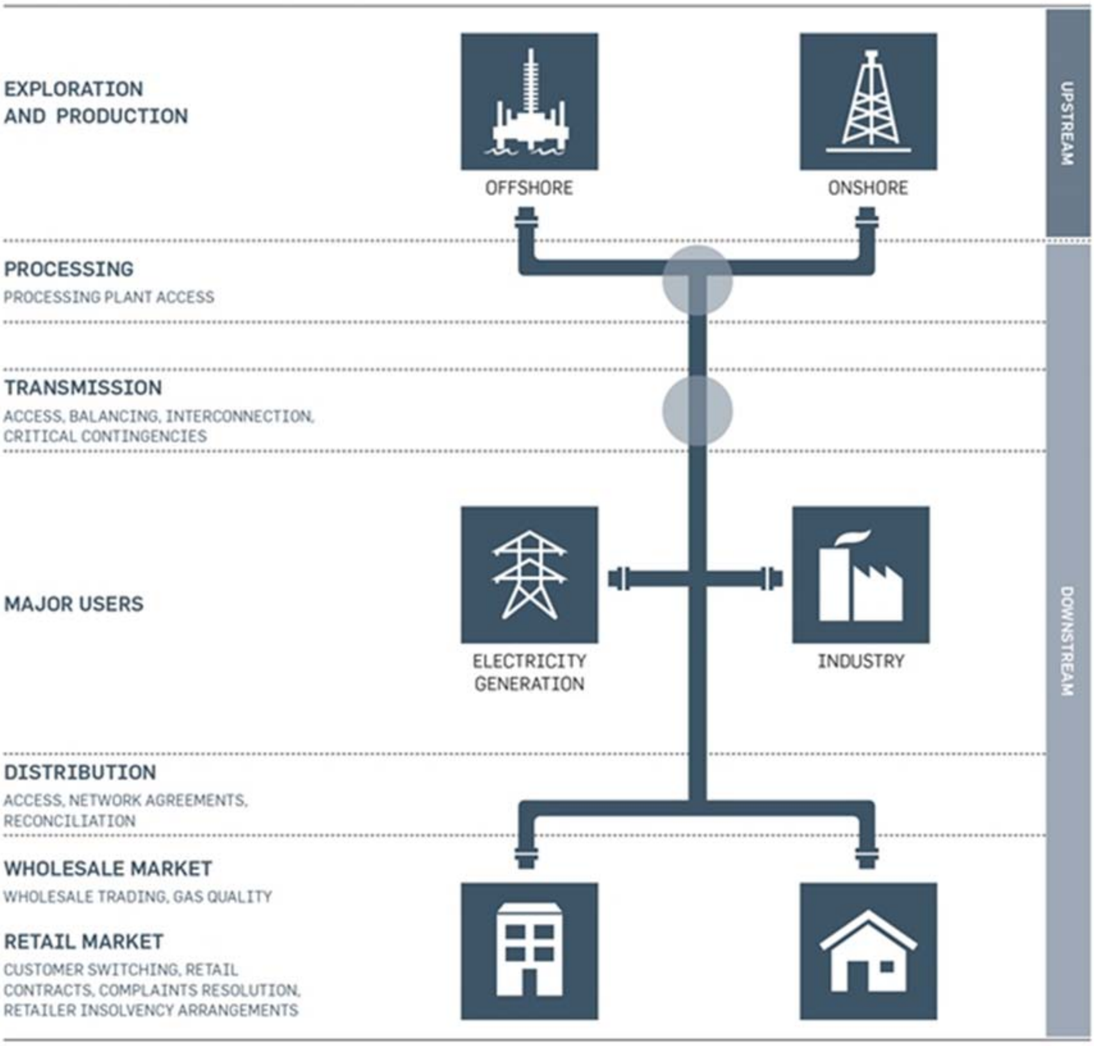
Retailers – who supply gas for any purpose other than for re-supply (in other words, they supply gas to end users).

Meter owners – who own gas meters and associated equipment.

Consumers (or end users) – who are supplied with gas for their own use, including the largest consumers such as power station owners and large chemical processers, down to residential users, as illustrated in Figure 1.

Some companies are involved in several of these roles.

Figure 5 Gas network consumers



2.2 Gas transport system

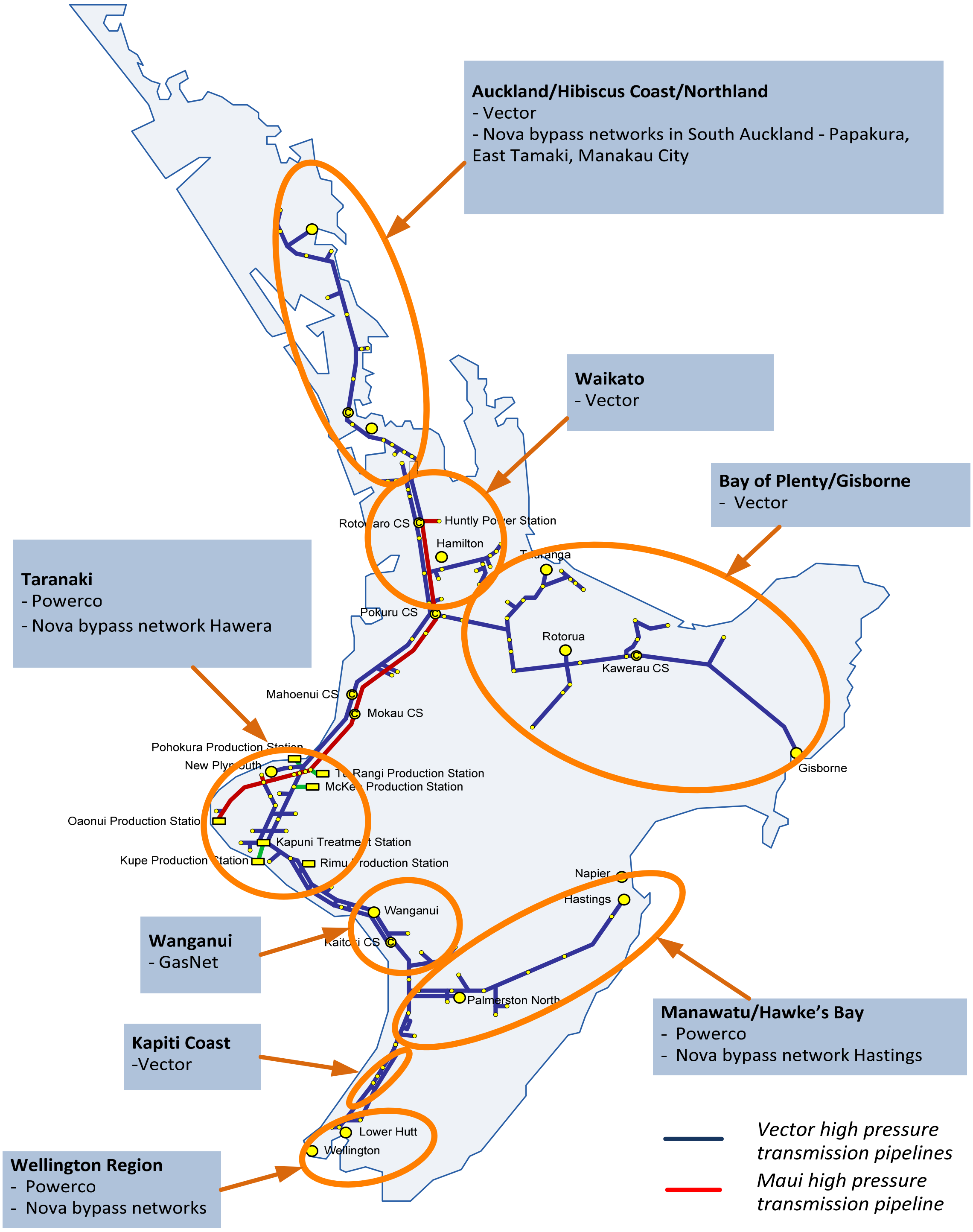
New Zealand's gas transport system consists of two interconnected high pressure transmission systems; the Maui system owned by Maui Development Ltd (MDL) and the Vector system owned by Vector Ltd (Vector). Vector also performs various services under contract to MDL, such as the operation of the Maui pipeline.

The transmission systems supply some major users (such as power stations) directly, as well as supplying multiple distribution networks. The majority of gas users receive gas from one of these distribution networks.

There are three distribution network owners who offer open access to their networks and one (Nova Gas Limited) whose networks are solely for its own use (see figure 6).

New Zealand had 15 gas fields and approximately 264,000 gas users. In 2013 approximately 174 PJs of gas was consumed[1].

Figure 6 New Zealand Gas transmission systems and distribution networks (the network owners operating in each region are listed)



[1] 2014 Energy in New Zealand publication.

2.3 Points of transfer

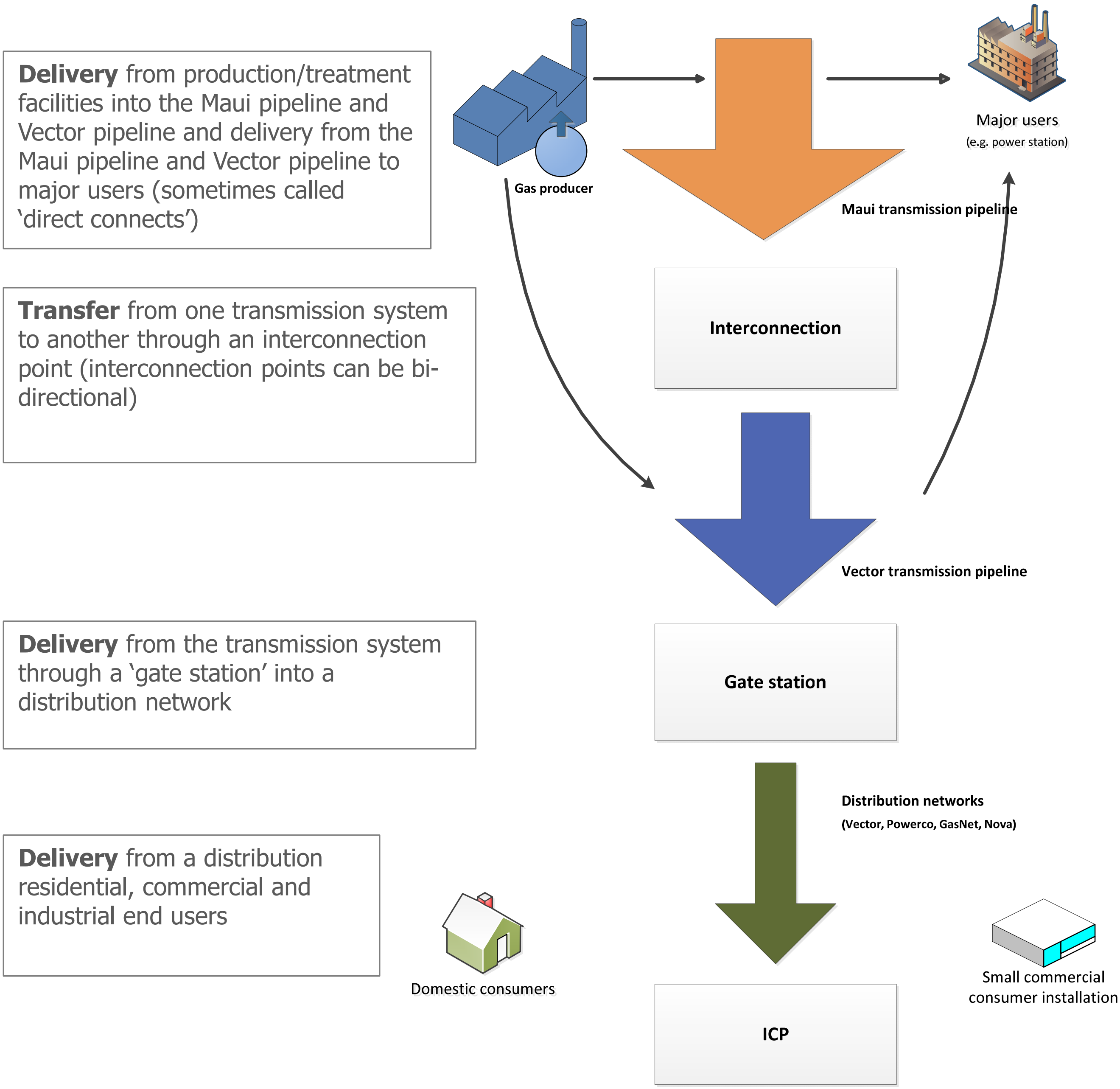
A point of transfer is a location where the ownership or custody of gas changes. Generally these are locations where the gas passes from the assets of one owner to those of another, and/or where one party sells gas to another. For example, at an interconnection point between the Maui and Vector transmission systems a Maui shipper may sell gas to several Vector shippers. Arrangements need to be in place to determine and notify the quantities of gas involved in such transactions.

Gas can also be bought and sold on a trading platform, in which case the change in gas ownership between the trading parties also needs to be determined and notified.

Typical points of transfer are illustrated in Figure 7.

When considering the flows, nominations, imbalances and mismatch across the system, the language used reflects the position of the part of the system under consideration. For example, gas entering the Maui pipeline is a 'receipt' from the perspective of the Maui pipeline, but a 'delivery' from the perspective of the gas producer. Similarly, Maui pipeline 'deliveries' into the Vector transmission system are 'receipts' into that system.

Figure 7 Points of transfer



2.4 Gas measurement systems (GMSs)

Gas is a complex commodity to measure. Gas that enters a transmission system has to be within a gas specification, but that specification allows for a range of acceptable chemical compositions[2]. Gases sourced from different fields are commingled in the transmission system leading to somewhat different 'gas types' depending on the mix of source gasses.

Gas is sold by energy content in gigajoules (GJs), but gas meters generally measure gas volume. Various factors must be applied to convert the actual measured volume into energy. The measurement and conversion into energy are done in various parts of a GMS[3]. A GMS generally[4] includes:

Meter – one or more meters to measure the amount of gas being delivered.

Temperature measurement device – to measure the flowing gas temperature.

Pressure measurement device – to measure the flowing gas pressure.

Gas analyser – to analyse the chemical composition of the gas and calculate its properties, such as its calorific value and specific gravity.

Conversion device – to perform the flow calculations (a conversion device located on-site is generally known as a 'flow computer' or 'corrector', but an office-based billing system may also be a conversion device).

Systems for determining gas composition and properties – these may be gas analysers located on-site where the gas is measured, or may involve the systems for calculating the gas composition and properties of the different mixtures of gas delivered at various locations (there are currently 14 such 'gas types').

Systems for calculating energy from measurement inputs – such systems may be entirely automated (for example in a flow computer at a large metering installation) or be a combination of administrative arrangements and software (as in the arrangements for bringing together all the elements of a residential gas invoice: meter readings, conversion factors for pressure, temperature, altitude and compressibility[5]; and calorific value).

2.5 Validation of measurement data

GMSs are susceptible to instrument inaccuracy and failure and to human error in setting up and applying correction factors. So it is necessary to validate the metering data through various reasonability checks. These may be automated or done manually. For all transmission receipts and

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[2] For further information see the Gas Industry Co document: Gas Quality: Requirements and Procedures.

[3] A gas measurement system is defined in s2(1) of the Gas Act as '…a system for measuring the quantity of any gas or the energy content of any gas, whether by actual measurement or by estimation; and includes any equipment that forms part of, or is ancillary to, any such system'.

[4] Most meters measure gas volume but some measure mass, in which case the conversion to energy can be more direct, and the components of the GMS may be different.

[5] Compressibility adjusts for the deviation of real gas from 'ideal' gas, using information about the chemical composition of the gas provided by gas types

deliveries, Vector currently performs the validation function for both the Maui pipeline and Vector pipelines. The main components of its data validation process are:

- analysis of gas chromatograph information to produce gas types[6];
- conversion of the gas volumes to standard cubic meters, adjusting for temperature, pressure and the application of the compressibility factor (the deviation of real gas from 'ideal' gas) using gas type information;
- energy conversion using calorific value from the relevant gas type for the Day;
- review for missing data (for example due to telemetry failures);
- review of data failing basic reasonability checks such as when the data series 'flat-lines' or falls outside of usual maximum or minimum values; and
- review of operational activity on the pipelines or at the meter stations to identify anything that could make data inaccurate.

Vector will attempt to resolve any anomalies arising during the validation period, correcting data if necessary. However, if there is a data issue that cannot be resolved in that tight timeframe, the data for a particular point may be left as unvalidated until the matter can be resolved.

Even when data have been validated, a later correction may still be necessary. For example, if a piece of the GMS is subsequently tested and found to be inaccurate, it will result in a correction being calculated and applied as specified in the relevant contracts.

The Vector system has a much larger number of delivery points than the Maui pipeline and a much larger diversity of GMSs.

Timing of data availability

The larger transmission system metering stations are connected to the Supervisory Control and Data Acquisition (SCADA) system, which allows for hourly unvalidated data to be transferred to the Maui and Vector Open Access Transmission Information System (OATIS) and be available to stakeholders from the OATIS website within an hour of measurement.

Medium-sized transmission metering stations are not connected to SCADA but have other telemetry systems. These are polled by Vector once a Day after midnight and the unvalidated data for the previous Day are sent to OATIS. This information is available to stakeholders in the early hours of the following morning.

Smaller transmission metering stations have no telemetry. For these, Vector field staff collect data once a month for transfer into OATIS.

[6] Gas types provide the gas composition information required for correct conversion of gas volumes to energy, for each area of the gas network. The information is derived from gas chromatographs at key locations across the transmission system.

Range of data available from downstream GMSs

There is a broad range of measurement equipment downstream from the transmission system, with the level of sophistication varying with the amount of gas flow.

At one extreme, a few of the largest stations have their own gas analysers and flow computers. This means that the volume measurement data have already had pressure, temperature and compressibility conversions applied and have been converted into energy quantities (gigajoules) on-site without the need for any conversion to be applied in an office-based system.

At the other extreme, data from the smallest metering stations are often not be corrected on-site for temperature, pressure, compressibility, or converted into energy units. These sites often do not provide 'time of use' data[7] either, and the meters are generally manually read by a meter reader. In such cases, the conversion of the meter readings into an energy quantity is done entirely in an office-based system.

Large systems with an on-site GMS are rare, whereas small systems without even temperature or pressure measurement devices are very common. There are a variety of types of GMS between these two extremes.

[7] 'Time of use' data refers to information such as meter readings being recorded automatically at set intervals, normally each hour.

3. Legal framework

The reconciliation of the transmission systems follows from the arrangements set out in their respective operating codes; the Maui Pipeline Operating Code (MPOC) and the Vector Transmission Code (VTC). Both systems offer third-party access on posted terms and conditions, but their access regimes are significantly different. The Maui regime is based on deemed flow on nominations, while the Vector regime is based on annual capacity reservations.

The reconciliation of the downstream distribution networks is regulated by the Reconciliation Rules.

All these arrangements sit within a wider legal framework as described in this chapter.

3.1 Legislation

Gas Act 1992

The Gas Act 1992 regulates the supply and use of gas in New Zealand, and s54 allows for gas industry regulations to be made.

The Gas Act can be found here:

http://www.legislation.govt.nz/act/public/1992/0124/latest/DLM285412.html

Gas (Safety and Measurement) Regulations 2010

These regulations detail responsibilities for the safe supply of gas. Within Part 3 of the regulations 'Requirements for all gas distribution systems about measurement of gas', regulation 21 'Gas measurement' requires that gas must be sold by energy content measured by a GMS, and must not exceed stated margins of error.

The regulations can be found here:

http://www.legislation.govt.nz/regulation/public/2010/0076/31.0/DLM2359501.html

Gas Governance (Critical Contingency Management) Regulations 2008

The purpose of these regulations is the effective management of critical gas outages and other security of supply contingencies, without compromising long-term security of supply.

The regulations can be found here:

http://www.legislation.govt.nz/regulation/public/2008/0426/latest/DLM1683495.html

The MPOC and VTC must be read subject to these regulations. Depending on the circumstances, the regulations may dictate how gas flows are reconciled during a critical contingency event. However, these events are rare.

The TSOs reconcile gas flows during a critical contingency event according to their Critical Contingency Management Plans, which are published on the Critical Contingency Operator's website at:

http://www.cco.org.nz

Gas (Downstream Reconciliation) Rules 2008

At locations where gas leaves Vector's transmission system to supply a downstream distribution network, each shipper's gas deliveries are determined by a reconciliation of gas flows on the network. The distribution network reconciliation arrangements are governed by the Reconciliation Rules. The purpose of these rules is to establish a set of uniform processes that will enable the fair, efficient, and reliable allocation and reconciliation of downstream gas quantities. The process is managed by the Allocation Agent, and the goal is to allocate daily gas injections to downstream consumers as accurately and equitably as possible. These rules are explained in some detail in chapter 6.

A copy of the rules is available on the Gas Industry Co website at:

http://gasindustry.co.nz/dmsdocument/4443

3.2 Contracts

Transmission pipeline operating codes

The MPOC and VTC contain the multi-lateral terms of access to the transmission systems that are incorporated into bi-lateral contracts between shippers and the TSOs.

The Maui pipeline was originally dedicated to carrying gas supplied from the Maui field. It became an open access system with the introduction of the MPOC in 2005. Shippers and Welded Parties enter into transmission services agreements (TSAs) and interconnection agreements with MDL that incorporate the terms and conditions of the MPOC.

The current version and all previous versions of the MPOC can be found on the public pages of the Maui OATIS website (MDL IX) at:

https://www.oatis.co.nz/Ngc.Oatis.UI.Web.Internet/Common/OatisLogin.aspx, select the Maui button and then the 'Publications' tab.

The Vector transmission system became open access in 1996, and in 2007 the VTC was introduced. Shippers who transport gas on the system enter into transmission services agreements with Vector that incorporate the terms and conditions of the VTC. (Unlike the MPOC, the VTC does not address arrangements with parties whose assets interconnect with the system.)

The current version and all previous versions of the VTC can be found on the public pages of the Vector OATIS website (Vector IX) at:

https://www.oatis.co.nz/Ngc.Oatis.UI.Web.Internet/Common/OatisLogin.aspx, select the Vector button and then the 'Publications' tab.

OATIS is the main web-based system by which both MDL and Vector transmission companies interact with the pipeline users to operate their open access regimes. Many of the documents referred to in this document can be found on either the Vector or Maui public pages of OATIS.

Gas supply agreements

Upstream gas supply agreements

A gas producer needs to have a gas supply agreement with one or more shippers. Only shippers can transport gas on the open access pipelines. Shippers are normally gas retailers but may also be end users transporting gas on their own behalf. It is also possible for a producer to be a shipper, but this is uncommon.

Table 1 lists the gas producers active in 2013. Gas supply agreements between producers and shippers normally cover such matters as quantity, price, term, and point-of-sale. Most relevant to reconciliation are the contract provisions relating to how gas quantities are determined.

Because the Maui pipeline operates a 'deemed flow on nominations' regime, the quantities of gas purchased under gas sale agreements with points-of-sale on the Maui pipeline are likely to be established by nominations agreed between the producer and the shipper.

Gas producers injecting gas into the Vector system may also contract to sell gas on the basis of agreed nominations, but other arrangements are also possible.

A shipper may also sell gas to one or more other shippers. This commonly occurs at the emsTradepoint market (a commodity exchange that enables the trading of physical gas) or at interconnection points between the Maui and Vector systems.

Table 1 Natural Gas Fields and Producers

Field	Gross Production 2014 (PJs)	Producers	Operator
McKee	2.02	Todd Taranaki 100%	Todd Energy
Mangahewa	22.28	Todd Taranaki 100%	Todd Energy
Maui	51.53	Shell 83.75% OMV 10% Todd Energy 6.25%	Shell Todd
Kupe	28.61	Origin Energy 50% Genesis Energy 31% NZOG 15% Mitsui E+P 4%	Origin Energy
Kapuni	16.47	Shell 50% Todd Energy 50%	Shell Todd Oil Services
Kowhai	5.79	Greymouth 100%	Greymouth
Turangi	7.05	Greymouth 100%	Greymouth
Pohokura	88.45	Shell 48% Todd Energy 26% OMV 26%	Shell
Rimu/Kauri	0.55	Origin Energy 100%	Origin Energy
Cheal	1.06	TAG Oil 100%	Cheal Petroleum
Sidewinder	0.31	TAG Oil 100%	Cheal Petroleum
Other	3.32		

Source: Energy in New Zealand 2015

Downstream gas supply agreements

A retailer (who is generally also a shipper) usually sells gas to an end user on the basis of quantities metered by the GMS at the end user's facility.

Interconnection agreements

Any party wishing to connect assets to the transmission system requires an interconnection agreement (ICA) with the relevant TSO. Both Vector and MDL have interconnection policies and standard ICAs, and both will consider adjustments to these standard terms on a case-by-case basis. Some long-standing Vector interconnections (such as those with interconnected distribution system owners) are established by custom and are not documented in a formal ICA.

Both Vector and MDL have standard interconnection policy documents, application forms and standard ICA terms which can be found on Vector IX and MDL IX respectively.

In relation to reconciliation, ICAs are relevant if they incorporate 'operational balancing' concepts, described in section 4. Basically, they allow for the interconnected party to take responsibility for any imbalance that arises at the interconnection point. All of MDL's ICAs incorporate such arrangements. None of Vector's ICAs do.

Transmission services agreements

Any party wishing to transport gas on the transmission system requires a TSA with the relevant TSO.

Most shippers transport gas on both the Maui pipeline and the Vector pipelines and have a TSA with each TSO. MDL's standard TSA is in schedule 2 of the MPOC. Vector's standard TSA is in schedule 1 of the VTC.

In relation to reconciliation, TSAs specify the basis on which each shipper's transport receipts and transport deliveries are established. For transport on the Maui pipeline, both are established by nominations. For transport on the Vector pipeline, shipper receipts are established by Gas Transfer Agreements, and shipper deliveries by gate station GMSs, allocated according to the Reconciliation Rules where the gate station connects to a distribution network.

Gas Transfer Agreements

The MPOC and VTC each give legal status to the Gas Transfer Code. The introduction to the code describes its purpose:

> This Gas Transfer Code (the 'Code') sets out the framework for calculating and advising the quantities of gas transferred between Parties at a Gas Transfer Point
>
> The Code is binding on transmission pipeline owners and all persons who:
>
> (a) transfer gas at a Gas Transfer Point; or
>
> (b) are physically connected to a Gas Transfer Point: or
>
> (c) are appointed as a Gas Transfer Agent.

The MPOC requires[8] that shippers who trade gas have a Gas Transfer Agreement whose terms comply with the Gas Transfer Code. The VTC has a somewhat broader requirement where all shipper receipts are required to be covered by a Gas Transfer Agreement.[9]

Schedule 6 of the VTC sets out the requirements of a Gas Transfer Agreement. Importantly, it must:

- provide unambiguous mechanisms for determining the quantity of gas transferred by the transferor to the transferee (VTC schedule 6 s1.1(d));
- provide for all information necessary to determine the quantities transferred be provided to the Gas Transfer Agent on the first Day of the week after gas flow (VTC schedule 6 s1.1(f)); and

[8] MPOC s2.14(a)
[9] VTC s2.10

- provide for the Gas Transfer Agent to disclose the transferred quantities to Vector (VTC schedule 6 s1.1(g)).

Supplementary agreements

Supplementary agreements are only relevant to the Vector regime. Any shipper who considers that the standard provisions of the VTC are not appropriate to a specific end user or site may request Vector to offer a supplementary agreement, containing non-standard terms.

The circumstances under which Vector is entitled to enter or amend a supplementary agreement and the standard conditions that may be altered are listed in section 2.7 of the VTC. Vector's policy for entering into supplementary agreements is posted on the Vector IX and details the type of criteria considered.

In relation to reconciliation, a supplementary agreement is only relevant if it specifies that receipts or deliveries are to be determined differently from Vector's standard TSA.

Interruptible contracts

Interruptible contracts are a type of supplementary agreement and are only relevant to the Vector regime. There are 3 types of interruptible product:

1. interruptible shipper contract for use on the Frankley Rd to Kapuni pipeline.
2. interruptible shipper contract for use between Kapuni and Pokuru 2 (the 200 line).
3. interruptible user contract, for use on any part of the Vector transmission system to a specified site or end user.

Vector's Interruptible Capacity Allocation Policy and draft documents for each of its three products are available on the Vector IX.

For transport on Vector's pipeline from Kapuni to Pokuru, only interruptible shipper contracts are available. This is because Vector needs to control the quantity flowed between the South – Kapuni – Frankley Rd (SKF) pipeline system and the Bay of Plenty system via Pokuru 2, since the Bay of Plenty system can be supplied both from this pipeline and from the Maui pipeline. The interruptible shipper contracts operate on a 'deemed flow on nominations' basis.

Network service agreements (aka use of system agreements)

Any party wishing to transport gas on a distribution network requires a network services agreement with the relevant distribution network owner. These contracts address such matters as the provision of information, billing and payment, ICPs covered, and rights of access to consumers' premises.

The distribution system owners bill for the transport services they provide on the basis of each retailer's ICP deliveries. This information is provided monthly. As each retailer obtains more complete and accurate information about its ICP deliveries, that information may also be provided, and wash-ups may apply.

4. Maui transmission reconciliation

The Maui pipeline is New Zealand's largest high pressure transmission pipeline. It runs 307km from the Oaonui Production Station (south of New Plymouth) to the Huntly power station (south of Auckland). The pipeline ranges in diameter from 750mm to 850mm. There are currently six gas production stations interconnected with the pipeline, and in 2014 the pipeline carried 158 PJ[10] of gas.

Two-thirds of the gas carried by the Maui pipeline goes to three major plants directly connected to the pipeline: the Huntly power station (13% of deliveries in 2014) owned by Genesis Energy, and the two methanol plants owned by Methanex (54% in 2014)[11].

The Maui pipeline operates under an open access regime, meaning that its owners permit it to be used on posted terms and conditions by other parties.

The control and risk (including the risk of loss) of gas entering the pipeline is assumed by MDL at receipt points and passes back to shippers when the gas is delivered at delivery points. However, title to the gas remains with the shippers throughout.

The Maui pipeline access regime is specified in the MPOC.

4.1 Deemed flow on nominations and operational balancing

Reconciliation of gas quantities on the Maui pipeline is based on the concept of 'deemed flow on nominations'. This means that a shipper's Approved Nomination at a Welded Point is the amount of gas that is deemed to flow for the purpose of calculating all that shipper's commercial transactions. To the extent that actual flow differs from the deemed flow, the difference – termed Operational Imbalance – is managed by the Welded Party. This concept is central to the operation of the MPOC which defines an Operational Balancing Agreement (OBA) as:

> ***"Operational Balancing Agreement" or "OBA"*** *means a Primary Allocation Agreement which operates by the principles that:*
>
> *(a) a shipper's allocation of Gas at a Welded Point is deemed to be equal to its Approved Nominations at that Welded Point; and*
>
> *(b) any Operational Imbalance is allocated to the Welded Party at the relevant Welded Point; and*
>
> *(c) the Welded Party at each Welded Point seeks to minimise the Running Operational Imbalance at that Welded Point at all times.*

[10] Maui Development Limited, Annual disclosures for the disclosure year ending 31 December 2014, published June 2015. Available at http://mauipipeline.co.nz/wp-content/uploads/2015/06/MDL-Annual-Information-Disclosure-June-2015.pdf
[11] Calculated from Daily Scheduled and Measured Quantities for All Stations reports available on oatis.co.nz.

4.2 Nominations and scheduled quantities

A shipper must submit nominations of its intended receipt and delivery quantities at each Maui pipeline receipt point and delivery point for each Day[12]. The various aspects of nominations are discussed below.

Nomination cycles

The MPOC sets out a series of nomination cycles. Each cycle allows shippers to submit new nominations or amend previous nominations within a set of business rules. These cycles start a week ahead and continue through the actual Day of transmission. Each shipper's nominations must be balanced (meaning that the total of its nominated receipt quantities must equal the total of its nominated delivery quantities each Day), and the shipper can only nominate gas to which it will have title.

Scheduled quantities

Welded Parties are able to view and confirm shipper nominations on OATIS. The aggregate of shipper nominations at each Welded Point must then be approved by MDL. The approved quantity is known as the scheduled quantity and the Welded Party is responsible for flowing that amount of gas through the Welded Point over the Day. If more or less than the scheduled quantity flows, the Welded Party is responsible for the resulting imbalance quantities in accordance with OBA principles.

Final Approved Nominations

The quantities used for reconciliation purposes are the final Approved Nominations for a Day. These are the Approved Nominations after all the nomination cycles have passed (and shippers no longer have an opportunity to alter their nominations), Welded Parties and the pipeline operator have confirmed/approved the nominations and all opportunities for nominations to be curtailed by the pipeline operator have passed. For practical reconciliation purposes, this means that the final Approved Nominations are available at the end of each Day.

The Maui regime allocates gas to shippers based on the final Approved Nominations at each receipt and delivery point. MDL's charges to shippers for transmission service are based on nominations, so the final Approved Nominations are all that is required for MDL to invoice its shippers for transmission service.

Numerical Examples in this document

The principles explained in this document are illustrated using a numerical example with several steps. Step 1 is below and the examples contained throughout the document take the reader through the subsequent steps to illustrate each principle in turn. Any reader wanting to follow this example may find it useful to take an advance look at Appendix B to see the assumptions and diagram of the simplified pipeline system on which the example is based. Appendix B also links together all the example steps presented in this document.

[12] A Day (sometimes called a 'gas Day' or 'transmission Day') is defined by the MPOC as a period of 24 consecutive hours, beginning at 0000 hours (New Zealand standard time).

NUMERICAL EXAMPLE – STEP 1

Let's take a numerical example and follow it through this document. It is a simplified view of the system involving just two shippers (1 and 2) on the Maui pipeline, one Maui receipt point (point A) and three Maui delivery points (one direct delivery to a power station, point B, and two interconnections points with Vector, C and D). The full assumptions for this numerical example and the complete numerical example can be found in Appendix B.

Shipper 1 Maui nominations for 1 December:			
Receipt	**GJs**	**Delivery**	**GJs**
Point A (gas field)	10,000	Point B (power station)	5,000
		Point C (Vector interconnection)	3,000
		Point D (Vector interconnection)	2,000
Total receipts	**10,000**	**Total deliveries**	**10,000**
Shipper 2 Maui nominations for 1 December:			
Receipt	**GJs**	**Delivery**	**GJs**
Point A	3,000	Point B	500
		Point C	1,000
		Point D	1,500
Total receipts	**3,000**	**Total deliveries**	**3,000**
Scheduled quantities 1 December:			
Receipt	**GJs**	**Delivery**	**GJs**
Point A	13,000	Point B	5,500
		Point C	4,000
		Point D	3,500
Total receipts	**13,000**	**Total deliveries**	**13,000**

Note how each shipper's nominations are balanced (i.e. receipts and deliveries equal each other) which means that the scheduled quantities are also balanced, so if all participants follow the schedule for the Day the pipeline will be balanced.

The scheduled quantities are the sum of the Approved Nominations (it has been assumed that the Welded Parties confirmed and MDL approved the shippers' nominated quantities).

Requirement for Gas Transfer Agreements

Although the MPOC requires that shippers only need a Gas Transfer Agreement if they are delivering gas to an interconnection point and trading that gas with other shippers[13], the VTC requires all shippers using an interconnection point to have Gas Transfer Agreements (even where a shipper is simply transferring gas from to itself as a Maui shipper to itself as a Vector shipper)[14].

Gas Transfer Agreements specify how the gas is to be allocated between the shippers. At its simplest, 100% of gas delivered to the interconnection point will be transferred from the Maui shipper to a Vector shipper. But more complex arrangements involving multiple parties also exist.

Displaced gas nominations

A shipper may use a receipt or delivery point for the reverse purpose (i.e. use a point designed as a physical receipt point as if it were a delivery point, or use a physical delivery point as if it were a receipt point). In that case the nominations are referred to as displaced gas nominations and require additional approval from both the MDL operator and the relevant Welded Party for the point being used in reverse. Approval will only be given for amounts that do not result in the requirement for a physical point to flow in the reverse direction (i.e. the displaced nomination must be smaller than the nominations in the usual direction so that the aggregate of the nominations gives a scheduled quantity in the correct physical direction).

Authorised quantity

Under the MPOC a shipper can pay an additional fee for a product called an authorised quantity. Nominations made by a shipper holding an authorised quantity will be given priority in the approval process over nominations that are not covered by an authorised quantity. However, since shippers consider that the Maui pipeline is unlikely to become congested, none has yet requested any authorised quantity.

Curtailment

If there is an event that has detrimentally affected transmission services or depleted the amount of gas in the system to an unacceptable level, the MDL operator may have to take action to curtail nominations. This action can be requested by a Welded Party or initiated by the MDL operator. Curtailment of nominations also results in consequential changes to scheduled quantities for the Day.

Mismatch

On any Day, a shipper’s nominated receipts must equal its nominated deliveries. However, it is possible for a shipper’s receipt and delivery nominations to become mismatched if a Contingency Event has occurred and MDL intervenes to curtail receipt or delivery nominations.

In that situation the MPOC requires the shipper to resolve the Mismatch. The shipper can do this by either trading its Mismatch with another shipper who has an opposite position, or by submitting mismatched nomination(s) in the opposite direction, until the Mismatch has been resolved. If the

[13] MPOC s2.14(a)
[14] VTC s2.9[15] A station with a maximum design flow rate of more than 5,000 scm/hr.

shipper does not correct the Mismatch within the given timeframe, MDL may buy or sell the gas associated with the Mismatch.

Shipper Mismatch is rare and has not occurred at all in recent years. It is explained here for completeness, but is not referred to again in this document.

4.3 Measured receipts and deliveries

A SCADA system continuously monitors GMSs at Large Stations[15] on the Maui pipeline. Although the SCADA system can only be viewed directly by transmission pipeline personnel, gas flow information is transferred from the SCADA system to OATIS every hour, so stakeholders can view gas flows with only a one hour time lag.

Large Station metering data are not validated[16] until the first Business Day after transmission. However, there are typically very few changes between the unvalidated and validated data because of the level of sophistication of the GMSs at Large Stations. These Large Stations typically include gas analysers and flow computers allowing for real time conversion from actual metered quantities to energy without relying on remote office-based systems to perform the calculations.

At Small Stations[17] the metering data are not validated or generally available to stakeholders until after the end of the month.

NUMERICAL EXAMPLE – STEP 2

Let's assume the metering data for 1 December are as below. In the next chapter we will see how this information combines with the scheduled quantities from the section above.

Validated metering quantities for 1 December:

Receipt	**GJs**	**Delivery**	**GJs**
Point A	12,600	Point B	5,700
		Point C	3,900
		Point D	4,326
Total receipts	**12,600**	**Total deliveries**	**13,926**

Notice how the flows in and out of the pipeline were not balanced. On 1 December, the pipeline delivered 1,326 GJs more than it received. On an individual Day the pipeline may be able to manage this difference because the pipeline itself contains a certain amount of gas and a small difference can be tolerated, but this imbalance cannot be too large on a Day and cannot continue every Day.

[15] A station with a maximum design flow rate of more than 5,000 scm/hr.
[16] An explanation of what is involved in data validation is provided in section 2.5 Validation of measurement data
[17] A station with a maximum design flow rate of less than or equal to 5,000 scm/hr

4.4 Imbalance

Under the Maui regime, each Welded Party is responsible for matching physical gas flows to scheduled quantities. If in aggregate there is a positive imbalance on the Maui pipeline, this means that the Maui pipeline is holding more gas than scheduled either because parties injecting gas have injected more than scheduled or parties taking gas off the system have taken less than scheduled (i.e. in aggregate participants have stored gas in the pipeline). Conversely, a negative imbalance on the Maui pipeline means that the pipeline is short of gas.

The difference between the amount of gas measured during a Day at a Welded Point and the Scheduled Quantity is known as the Daily Operational Imbalance. The accumulated Daily Operational Imbalances at a Welded Point is known as the Running Operational Imbalance. Each Welded Party is responsible for using its reasonable endeavours to manage Running Operational Imbalance towards zero over a reasonable period of time[18].

NUMERICAL EXAMPLE – STEP 3

The imbalance quantities are the difference between the scheduled quantities (or aggregated nominations) from STEP 1 and the actual metering flows for the Day from STEP 2. The difference is calculated from the pipeline's perspective so is calculated the opposite way for deliveries compared with receipts.

Imbalance quantities for 1 December:			
Receipt	**GJs**	**Delivery**	**GJs**
Point A (12,600 – 13,000)	-400	Point B (5,500 – 5,700)	-200
		Point C (4,000-3,900)	100
		Point D (3,500 – 4,300)	-826
Total receipts	**-400**	**Total deliveries**	**-926**

On 1 December, the pipeline delivered 1,326 GJs more than it received, so the total of all the Daily Operational Imbalances for the Day is -1,326.

(This example simplifies imbalance by assuming that there was no Running Operational Imbalance carried forward from the previous Day, so their Running Operational Imbalance and Daily Operational Imbalance for the Day as at midnight on 1 December are the same.)

4.5 Cash-Outs

At the end of each Day, where the Running Operational Imbalance at a Welded Point is greater than a permitted tolerance, the excess amount is 'Cashed-Out'. This means that MDL will buy the gas

[18] MPOC s12.9

associated with an excess positive imbalance from the Welded Party or sell the gas associated with an excess negative imbalance to the Welded Party. These transactions are known as Cash-Outs.

Schedule 7 of the MPOC sets out the tolerances that apply.

The mechanism for calculating the price at which Cash-Outs occurs is designed to incentivise parties to manage their imbalances.

The Maui regime also provides for other payments, known as incentive pool debits, for exceeding another tolerance limit for peaking (flowing an excessively high hourly rate), but these are not discussed further here as they do not involve the transfer of gas, which is the focus of this reconciliation paper.

When a Welded Party is Cashed-Out, the party acquiring the gas (MDL or the Welded Party) takes title of the gas from the other party (i.e., there is a physical exchange of gas as well as an exchange of money). The Welded Party's Running Operational Imbalance is adjusted by the amount of the Cash-Out.

NUMERICAL EXAMPLE – STEP 4

Let's assume the MDL operator has granted each point a Running Operational Imbalance Limit of +/-400 and the Running Operational Imbalance brought forward from the previous Day is zero

Running Operational Imbalance exceeding Limit for 1 December			
Receipt	**GJs**	**Delivery**	**GJs**
Point A (-400 is equal to +/-400 tolerance)	0	Point B (-200 is within +/-400 tolerance)	0
		Point C (100 is within +/-400 tolerance)	0
		Point D (-826 plus 400 tolerance)	-426
Total receipts	**0**	**Total deliveries**	**-426**

So the MDL operator cashes out the interconnection delivery point D by 426 GJs. This imbalance represents the pipeline being short of gas so the Welded Party is charged (rather than paid) for the imbalance transfer. If the imbalance Cash-Out price is $8.20/GJ, this means the Cash-Out bill to the Welded Party of point D is 426GJ @ $8.20/GJ = $3,493.20

Point D is an interconnection point with Vector, so Vector transmission is the Welded Party who receives the bill for the Cash-Out from MDL. We will see later how Vector handles the Cash-Out within its regime.

This example assumes the Cash-Out is executed the next Day without any notice.

Running Operational Imbalance carried forward after Cash-Out			
Receipt	**GJs**	**Delivery**	**GJs**
Point A	-400	Point B	-200
		Point C	100
		Point D (-826 Cash-Out 426)	-400
Total receipts	**-400**	**Total deliveries**	**-500**

4.6 Balancing actions

MDL buys and sells gas from time to time to manage the inventory of gas in the pipeline and to fuel its compressors. Such gas can be traded on a trading platform, on MDL's own Balancing Gas Exchange or through bi-lateral contracts.

For a balancing gas transaction, MDL nominates gas as a shipper would, except that its nomination is one-sided (either a receipt to or a delivery from the pipeline). Such a nomination becomes part of the scheduled quantity at a Welded Point.

4.7 Maui pipeline linebalance and UFG

GMSs are not completely accurate, and some operational gas use can go unrecorded. The extent of these imperfections is monitored by performing a 'linebalance' calculation:

Unaccounted-for-gas (UFG) = Total receipts into the pipeline
less total deliveries out of the pipeline
less any increase of gas in the system (or plus any reduction of gas in the system)
less gas used by the transmission system (fuel gas and gas vented)

Because the responsibility for UFG is not allocated to system users, the pipeline owner manages the UFG as part of its overall management of the inventory of gas in the pipeline.

NUMERICAL EXAMPLE – STEP 5

Maui linebalance for 1 December:

Total receipts into the pipeline (from step 2)	12,600
less total deliveries out of the pipeline (from step 2)	13,926
less change in the quantity of gas in the system (new scenario input)	-321
less gas used by transmission system (fuel+vented gas; new scenario input)	80
Unaccounted for Gas (in this example a gain to Maui pipeline)	-1,085

4.8 Small Stations

Some Maui delivery points are designated Small Stations and are subject to less rigorous arrangements than Large Stations. In particular, the GMSs at Small Stations generally do not perform the full calculation from actual metered volume to energy on-site. Validated gas flow information for these delivery points is generally not available until the fourth Business Day of the next calendar month.

Although shippers are still required to make nominations to Small Stations prior to flowing gas, the Welded Party is not required to manage its imbalance on a daily basis. Once the imbalance is known (after validated flows are known), the Welded Party is required to transfer the Running Operational Imbalance, using the imbalance trading process, to a Large Station for which the same Welded Party is responsible and then manage the imbalance at that larger station. Vector is the Welded Party for all of the Small Stations and also for a number of Large Stations, so is well placed to manage the situation. However, this arrangement is a complicating factor in allocating Cash-Out payments through the Balancing and Peaking Pool (as discussed later in the Vector section).

4.9 Metering corrections

From time to time metering data need to be corrected because some of the equipment comprising the GMS is found to be inaccurate. Revised quantities are computed for:

- the period for which the equipment was found to be inaccurate; or
- if that period cannot be determined, half the period since the last test showed the equipment was found to be accurate, providing this half period does not exceed 60 Days.

Part 4 of schedule 1 of the MPOC requires the meter owner to calculate any correction, but in practice it can be the pipeline operator who does so. It is necessary to use the best information available and to make the method of the calculation available.

Once a correction has been calculated, revised metering data are uploaded to OATIS and a notice is posted to communicate the correction to data users. Operational Imbalances and Cash-Outs are amended accordingly.

Since Maui shippers are invoiced for transmission services based on nominations rather than actual gas flows, metering corrections have no invoicing consequences for shippers. However, metered quantities are the basis of Cash-Out transactions. The MPOC suggests the information that can be used and the approach that may be taken for different types of inaccuracies such as:

- where testing has found a meter to be inaccurate, use the uncertainty percentage (i.e. the difference between the output of the device found to be inaccurate against the verification device or calibration standard used in that test) across the normal operating flow range;
- where a meter has failed completely, use data from a meter operating in series or in parallel, or historical data for a corresponding period;

- where a part of the measurement system involved in correcting volumes has failed, e.g. a transducer, such that the volume correction is inaccurate, apply correction factors from periods when the equipment was functioning properly;
- where the gas analyser has failed or become inaccurate, use fall back values as stored in the flow computer unless the values are material and alternative gas composition data are available; and
- where an electronic storage device associated with a meter has failed, use data from an electronic data storage device on a meter operating in series, spread readings from an unaffected accumulating meter over the Days and hours requiring correction using a reasonable flow profile, or use historical data for a corresponding period.

4.10 Summary of Maui regime concepts and reconciliation

- **Deemed flow on nominations and operational balancing –** For the purpose of commercial transactions, Shippers are deemed to have flowed quantities of gas equal to their Approved Nominations. Differences between aggregate Approved Nominations and metered quantities at a Welded Point are the responsibility of the Welded Party.
- **Nominated quantities –** as at the end of the Day, once approved by MDL, nominated quantities become the deemed flow quantities for that shipper. Such Approved Nominations are used in all commercial transactions related to its receipt, transport and delivery of gas.
- **Scheduled quantities –** are the aggregate of all Approved Nominations at a Welded Point and are the target quantity for the Welded Party to flow gas to on the Day.
- **Metered quantities –** once validated by MDL, are used in the calculation of Welded Party imbalance and Cash-Outs.
- **Imbalance –** at a Welded Point is the difference between the validated metered quantity and the scheduled quantity and is the basis for Cash-Outs.
- **Cash-` –** are daily gas purchases or sales between MDL and a Welded Party for an amount of gas equal to its Running Operational Imbalance in excess of the Running Operational Imbalance Limit at the Welded Point.

The requirement for shippers to make balanced nominations, and Welded Parties to flow gas to scheduled quantities or be Cashed-Out, provide the commercial incentives to maintain a balanced pipeline.

5. Vector transmission reconciliation

Vector Gas Limited owns a high pressure gas transmission system made up of a number of pipelines generally radiating outwards from the Maui pipeline. Together these are much longer than the Maui pipeline (2,288km compared to 307km) but with smaller diameters (50-500mm compared to 750-850mm). Gas can flow into Vector's pipelines from the Maui pipeline at a number of interconnection points and a number of gas producers also inject gas directly into the Vector transmission system.

The Vector system supplies major industrial plants, dairy factories, power stations and all of the gas distribution networks across the North Island. These distribution networks supply gas to thousands of homes, businesses and essential services such as hospitals.

Vector operates an open access regime but it is significantly different to the deemed flow on nominations regime on the Maui pipeline. It is based on the forward reservation of annual capacity entitlements and nominations only apply in a few situations[19].

The control and risk (including the risk of loss) of gas entering the system is assumed by Vector at receipt points and passes back to shippers when the gas is delivered at delivery points. However, title to the gas remains with the shippers throughout.

The Vector pipeline access regime is specified in the VTC.

5.1 Capacity reservations

The central feature of Vector's open access regime is the forward reservation of annual blocks of capacity for each 1 October to 30 September year (gas year). A Vector shipper needs to reserve the level of capacity it anticipates using during peak times (its Maximum Daily Quantity or MDQ) for each receipt point to delivery point route it wishes to use. Each reservation gives the shipper an entitlement to ship gas up to the level of MDQ it purchases, for every Day of the coming gas year. If the shipper anticipates that at times some of this reservation will be surplus to its requirements, the VTC allows capacity to be subdivided, transferred (to other delivery points) or traded (with other shippers). This allows the shipper to optimise its capacity portfolio and minimise the cost of transmission.

Shippers with capacity reservations are not generally required to make daily reservations (as required on the Maui pipeline). However, the VTC does allow for Vector to introduce reservations in the future if they are needed[20].

[19] In particular, nominations are required for interruptible contracts and for major end users supplied directly from the transmission system (known as 'direct connect' end users).
[20] VTC s5.1 permits nominations for a point with receipt point or a delivery point Maximum Design Flow Rate of equal to or greater than 1,000 GJ per Day

5.2 Nominations

Transfers of gas from the Maui pipeline into the Vector system

Although nominations are not generally required on Vector pipelines, nominations made on the Maui pipeline at Vector pipeline interconnection points are relevant to Vector's transport arrangements. This is because these Maui pipeline nominations are the basis for determining Vector shipper receipts from the Maui pipeline.

Gas Transfer Agreements specify how gas delivered to an interconnection point between the Maui and Vector pipelines will to be allocated between Vector shippers. At its simplest, 100% of gas delivered to the interconnection point will be transferred from a single Maui shipper to a single Vector shipper. But more complex arrangements involving multiple parties also exist.[21]

In all cases, Vector shippers' receipts are determined by a Gas Transfer Agent in accordance with the prevailing Gas Transfer Agreement(s).[22]

Interruptible shipper contract nominations between pipelines

A shipper wishing to ship gas from the southern (SKF) part of the Vector system to the Bay of Plenty area via Vector's 200 line and the Pokuru 2 interconnection point is required to have an interruptible agreement and to make nominations of the amount of gas it wishes to ship (the pipeline diagram at Figure 9 illustrates the 200 line connection between the SKF and Bay of Plenty systems). The amount the shipper nominates is deemed to be the amount it delivers from the SKF system and receives into the Bay of Plenty system. It is necessary to track movements between these two areas of the Vector transmission system because different parts of the Vector system need to be reconciled separately. This is explained in more detail in the interruptible agreements section of 3.2 Contracts (above) and within the Balancing and Peaking Pool section (below).

These interruptible shipper nominations can be altered prior to or during the Day (subject to a number of business rules). They may also be subject to interruption by Vector. It is the Approved Nomination quantity at the end of the Day that is used for reconciliation.

Vector operates its system to flow the nominated quantities approved under the 200 line interruptible shipper contracts. If the amount of gas flowed does not equal the nominated amount, Vector takes responsibility for the imbalance.

Interruptible nominations for the 200 line are notified to the Gas Transfer Agent who then informs Vector of the ownership of gas that has been delivered from the SKF pipeline and received into the Bay of Plenty pipeline. These quantities enable Vector to determine the contribution of all parties (Vector shippers and Vector itself) to the Maui imbalance in the Balancing and Peaking Pool calculations.

[21] The MPOC requires that shippers only need a Gas Transfer Agreement if they are delivering gas to an interconnection point and trading that gas with other shippers , the VTC requires all shippers using an interconnection point to have Gas Transfer Agreements (even where a shipper is simply transferring gas from to itself as a Maui shipper to itself as a Vector shipper) .
[22] As required by MPOC s2.14(a) and VTC s2.10.

Other Vector nominations

There are other nominations within the Vector regime, but they have no significance for reconciliation.

Nominations are required under interruptible user contracts, but they set a daily entitlement, similar to reserved capacity, rather than determining flowed quantities. Also, large users like power stations can be required to make nominations under the VTC, but these are for information purposes only and have no effect on reconciliation.

Final Approved Nominations

As with nominations on the Maui pipeline, the nominations that matter for reconciliation or invoicing purposes are the final Approved Nominations as at the end of each Day, i.e. after any intra-Day changes and any interruptions by the pipeline operator have occurred.

NUMERICAL EXAMPLE – STEP 6

In our numerical scenario Vector has two pipelines (X and Y) receiving gas from Maui at interconnection points C and D respectively. Pipeline X also receives gas direct from a gas processing plant at receipt point E, it delivers gas to pipeline Y via an internal connection point between pipeline X and Y, and both pipelines deliver gas to two gate stations (X to F and G; Y to H and I). Refer to appendix B for a diagram of the scenario.

Maui delivery nominations become receipts on Vector system for 1 December (from Step 1):		
Receipt from Maui		**GJs**
Point C (into pipeline X)	Shipper 1	3,000
	Shipper 2	1,000
Point D (into pipeline Y)	Shipper 1	2,000
	Shipper 2	1,500

Both of these shippers also make interruptible nominations from pipeline X into pipeline Y through the internal interconnection point J.

(Receipt point E is not on the table as it is gas received directly from a gas producer which under the Vector regime is not nominated.)

Interruptible nomination		**GJs**
Internal interconnection point J (from X into Y)	Shipper 1	600
	Shipper 2	300

In this numerical example there is a third shipper who appears in later steps, but who does not make any Maui or X/Y interconnection nominations at point J.

NUMERICAL EXAMPLE – STEP 7

Let's assume the metering data for 1 December are as below.

Validated metering quantities for 1 December			
Pipeline X			
Receipt	**GJs**	**Delivery**	**GJs**
Point C (from Maui step 2)	3,900	X/Y interconnection point J (to Y)	970
Point E (gas processing plant)	1,650	Point F (distribution network)	1,250
		Point G (distribution network)	3,450
Total receipts	**5,550**	**Total deliveries**	**5,670**
Pipeline Y			
Receipt	**GJs**	**Delivery**	**GJs**
Point D (from Maui step 2)	4,326	Point H (distribution network)	26
X/Y interconnection J (from X)	970	Point I (distribution network)	4,980
Total receipts	**5,296**	**Total deliveries**	**5,006**

5.3 Gas Transfer Agreements

Gas can enter Vector's transmission system from the Maui pipeline via an interconnection point, or from a receipt point fed directly from one or more gas fields through its associated processing plant. Vector needs to know who owns gas entering its system but, unlike MDL, Vector does not have a deemed flow on nominations arrangement. Instead it relies on Gas Transfer Agreements to determine shipper receipts, and on the Reconciliation Rules to determine shipper deliveries. So, while MDL only requires a shipper to have a Gas Transfer Agreement when it is trading gas with other shippers, Vector requires all its shippers to have a Gas Transfer Agreement, even where they are only transferring gas to themselves.

Vector itself has Gas Transfer Agreements to cover any gas it buys for its own use as fuel gas.

Currently Vector performs the Gas Transfer Agent role at all locations, but if all the shippers using a location agree, they may appoint a different Gas Transfer Agent, providing Vector considers the replacement to be suitable.[23]

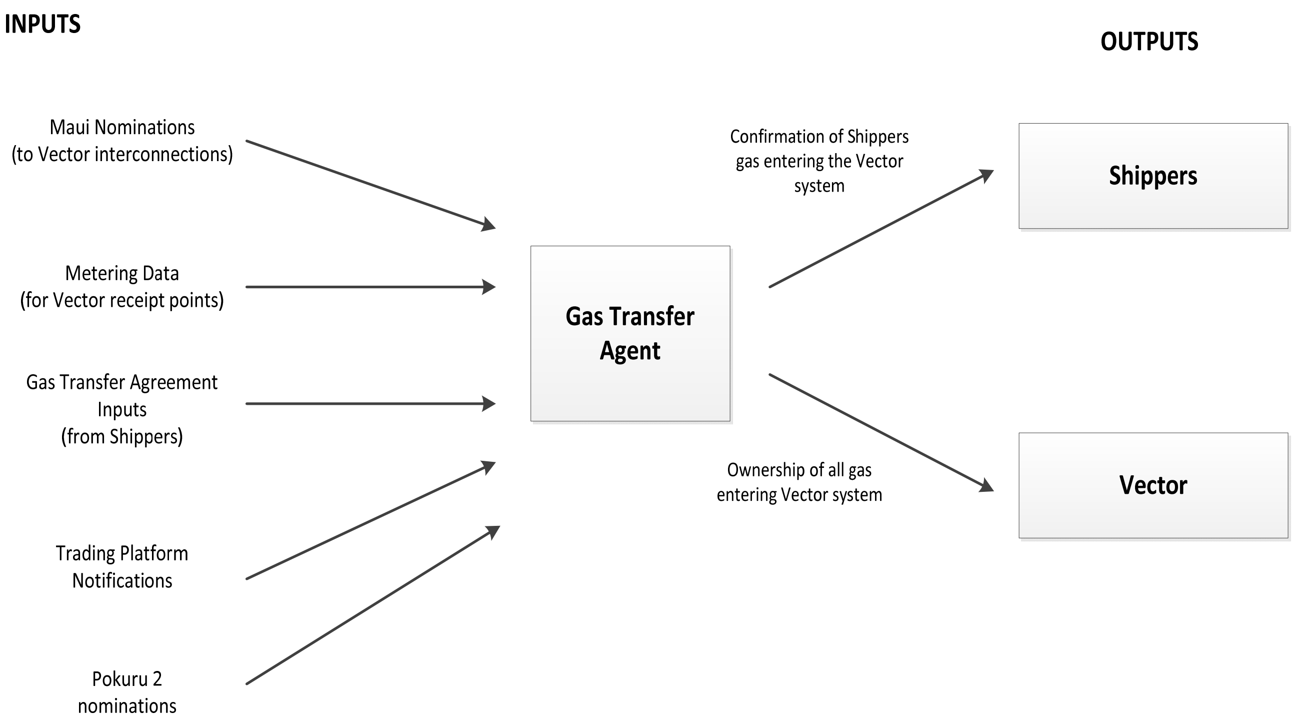
[23] VTC s6.3

To ensure all gas received into the system is accounted for, the Gas Transfer Agent requires input from shippers (specifying how the transferor and transferee quantities are to be calculated), Maui nominations to Vector interconnection points, and metering data from all the receipt points on the Vector system. The interruptible shipper contract nominations for gas to be moved from the SKF to the Bay of Plenty pipeline via the Vector 200 line are also used to identify the gas leaving the SKF pipeline and entering the Bay of Plenty pipeline system.

As well as determining the receipts for the Maui interconnection points and the Vector receipt points, the Gas Transfer Agent also determines the deliveries to Frankley Rd (the only bi-directional interconnection point).

The outcomes of the Gas Transfer Agent process are details of ownership of all the gas that has entered into the Vector system each Day and this output is notified by the Gas Transfer Agent to the relevant shippers and Vector. The process is completed once a week for each Day of the week prior. It supplies important inputs to Vector transmission invoicing and the Balancing and Peaking Pool (BPP) process, which calculates Vector shipper mismatch.

Figure 8 Gas Transfer Agent information flows



NUMERICAL EXAMPLE – STEP 8

Let's assume the following trades occur between shippers for 1 December. Shipper 3 now appears in the scenario for the first time. Shipper 3 doesn't ship gas on the Maui pipeline and doesn't have any gas field entitlements. Instead it buys gas at the Vector interconnection points and also from the shipper with the entitlement to the gas from field E.

Gas Transfer Agent inputs for 1 December:

- Maui nominations to interconnection points
- Metering data for direct receipt points
- At receipt interconnection C ,shipper 1 sells 500 GJ to shipper 3
- At receipt point E ,shipper 2 is entitled to all gas from the field, but sells 1,100 GJ to shipper 3
- At receipt interconnection point D, shipper 2 sells 450 GJ to shipper 3

Pipeline X Gas Transfer Agent outputs			
Receipts			**GJs**
Point C	Shipper 1	Maui nomination 3,000 less 500 sold to shipper 3	2,500
	Shipper 2	As per Maui nominations (none traded)	1,000
	Shipper 3	500 purchased from shipper 1	500
		Total reconciles to Maui nominations	**4,000**
Point E	Shipper 1	No entitlement	0
	Shipper 2	Entitled to all metered flow, sold 1,100 to shipper 3	550
	Shipper 3	Purchased 1,100 from shipper 2	1,100
		Total reconciles to metered flow	**1,650**
Deliveries			
X/Y interconnect J	Shipper 1	As per interruptible nomination	600
	Shipper 2	As per interruptible nomination	300
	Shipper 3	No interruptible nomination	0
		Total reconciles to interruptible nominations	**900**
Pipeline Y Gas Transfer Agent outputs			
Receipt			**GJs**
Point D	Shipper 1	As per Maui nominations (none traded)	2,000
	Shipper 2	Maui nomination 1,500 less 450 sold to shipper 3	1,050
	Shipper 3	450 purchased from shipper 2	450
		Total reconciles to Maui SQ	**3,500**
X/Y interconnect J	Shipper 1	As per interruptible nomination	600
	Shipper 2	As per interruptible nomination	300
	Shipper 3	No interruptible nomination	0
		Total reconciles to interruptible nominations	**900**

5.4 Vector pipeline linebalance and UFG

After the end of each month, when all validated metering data are available, Vector does a linebalance calculation using the same principles as described in the Maui section at section 4.7. However, whereas a single linebalance is sufficient for the whole Maui pipeline, multiple linebalances are done for each discrete section of the Vector system.

Once UFG has been calculated for each section, UFG becomes an input to the BPP calculations, as it is needed to determine Vector's share of the imbalance on the system, and allocation of any Cash-Out.

NUMERICAL EXAMPLE – STEP 9

Vector linebalance for pipeline X for 1 December:

Total receipts into the pipeline (from step 7)	5,550
less total deliveries out of the pipeline (from step 7)	5,670
less change in the quantity of gas in the system (new scenario input)	27
less gas used by the transmission system (fuel+vented gas; new scenario input)	12
Unaccounted for Gas (a gain to pipeline X)	-159

Vector linebalance for pipeline Y for 1 December:

Total receipts into the pipeline (from step 7)	5,296
less total deliveries out of the pipeline (from step 7)	5,006
less change in the quantity of gas in the system (new scenario input)	-193
less gas used by the transmission system (fuel+vented gas;new scenario input)	18
Unaccounted for Gas (a loss to pipeline Y)	465

5.5 Allocation Agent – split deliveries

While shipper receipts into the Vector system are determined by Gas Transfer Agreements, shipper deliveries are determined according to the Reconciliation Rules. Under the rules, the Allocation Agent provides Vector with 'split deliveries'. These are the allocations of the total quantity of gas delivered at each shared delivery point among the shippers who use that point. The basis of the allocation calculations is information provided by shippers on their downstream gas deliveries. No split allocations are required at delivery points used by only one shipper.

Daily deliveries for each month are allocated three times, with the quality of information being provided by retailers to the Allocation Agent improving each time. These allocations are known as the 'initial', 'interim', and 'final' allocations. Relative to the month in which the deliveries were made: the initial allocation is made at the start of the following month, the interim allocation is made 4 months after, and the final allocation 13 months after.

The Gas (Downstream Allocation) Rules are explained in more detail in Chapter 6.

NUMERICAL EXAMPLE – STEP 10

In this step the figures supplied by the Allocation Agent for each shipper are new scenario inputs, but you will see that they reconcile to the metered quantities for each point, as seen at step 7.

Pipeline X Allocation Agent – split deliveries		
Deliveries		**GJs**
Point F	Shipper 1	903
	Shipper 2	347
	Shipper 3	0
	Total reconciles to metered flow (step 7)	**1,250**
Point G	Shipper 1	2,164
	Shipper 2	765
	Shipper 3	521
	Total reconciles to metered flow (step 7)	**3,450**
Pipeline Y Allocation Agent – split deliveries		
Deliveries		**GJs**
Point H	Shipper 1	9
	Shipper 2	11
	Shipper 3	6
	Total reconciles to metered flow (step 7)	**26**
Point I	Shipper 1	1,298
	Shipper 2	3,211
	Shipper 3	471
	Total reconciles to metered flow (step 7)	**4,980**

5.6 Balancing and Peaking Pool

Purpose

The BPP process involves Vector calculating each shipper's mismatch positions and using them as the basis for allocating Cash-Outs and any incentive pool debits received from MDL.

Shipper mismatch is the difference between a shipper's receipts into a Vector pipeline and its deliveries from that pipeline. The extent to which a shipper has taken more gas out of the pipeline than it has put in is its negative mismatch. Likewise if the shipper has taken less gas out of the pipeline than it has put in, the difference will be positive mismatch.

Cash-Outs involve a purchase or sale of gas, initially between MDL and Vector under the terms of the MPOC, and then between Vector and its shippers under the terms of the VTC (in particular, by applying the BPP mechanism[24]).

Incentives pool debits are financial transactions with no associated transfer of gas, but they also occur between MDL and Vector initially and subsequently between Vector and its shippers. Since the incentive pool debits are not part of the reconciliation process, they are not discussed further in this paper.

BPP allocations to shippers

Shippers are required to use all reasonable endeavours to ensure their receipts into a Vector pipeline and deliveries from that pipeline on a given Day match. However, the VTC acknowledges that shippers will have mismatches and should use reasonable endeavours to trend their running mismatch towards zero over a reasonable period of time.[25]

To allocate Cash-Out gas using the BPP, it is necessary to calculate shipper mismatches for each Maui interconnection point, so the Vector system is divided into discrete sections, each fed by a different interconnection point.[26]

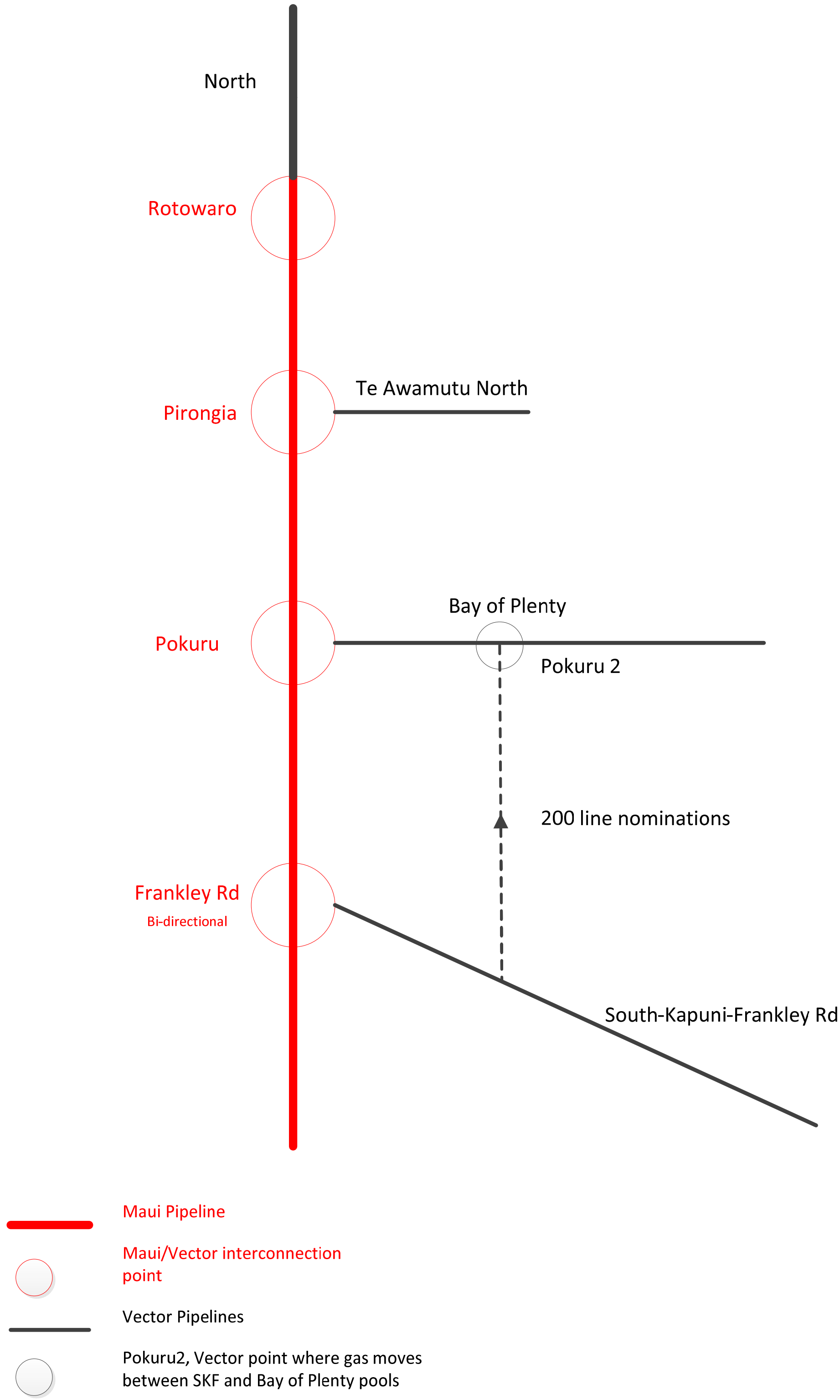
As Vector can move gas from the SKF system to the Bay of Plenty system via its own 200 line, it is also necessary to track these movements using the 200 line interruptible nominations.

24 The BPP also allocates any balancing gas transactions between Vector and non-MDL parties, but in practice Vector currently only sources balancing gas services from MDL.

25 VTC s8.1

26 Vector provides a description of its various pipelines in a document entitled *01 Description of Pipelines* available on the Vector IX.

Figure 9 Balancing and Peaking Pools



A shipper has both a running and a daily mismatch position. Its daily mismatch is the difference between its receipts into the Vector system for the Day (as calculated by the Gas Transfer Agent) and its deliveries for the Day (as provided by the Allocation Agent) or, if it is the sole shipper at a delivery point, the metered quantity at that point. A shipper's running mismatch is its brought forward running mismatch, plus or minus its daily mismatch, plus or minus any Cash-Outs it is allocated under the BPP process.

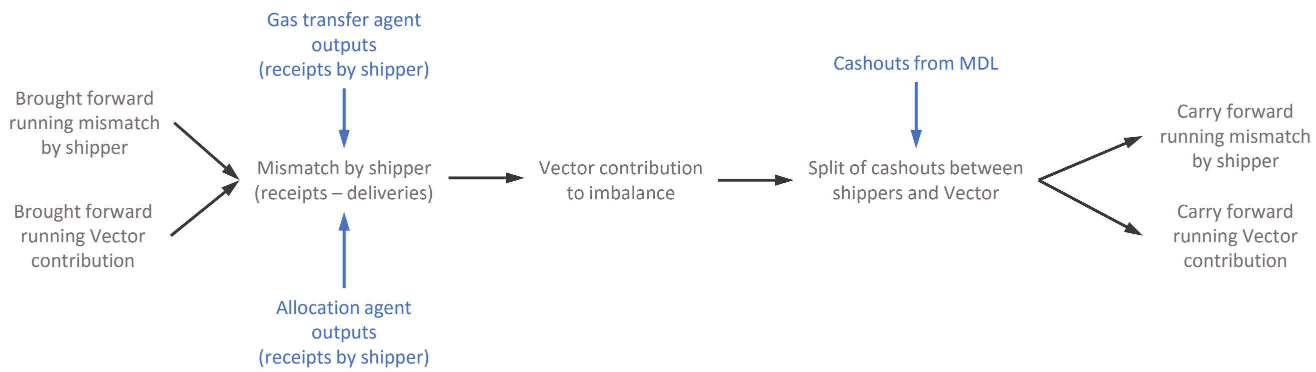
Vector, through its operation of the transmission system, is also a contributor to the imbalance at Maui pipeline interconnection points and can be allocated a portion of Cash-Outs and incentives pool debits. Vector's contribution to any Maui imbalance consists of, for the relevant BPP pool:

- gas purchased by Vector to manage the system, determined as Vector receipt quantities by the Gas Transfer Agent, less actual fuel gas or gas vented within the system;
- UFG; and
- the difference between 200 line nominations and the actual 200 line flow at Pokuru 2[27].

The management of the imbalances at Maui pipeline Small Stations, including the transfer of such imbalances to a Large Station, as described under the previous chapter, is also a component of the BPP process. Each shipper's mismatch is determined at the Small Station and transferred to a Large Station.

The BPP process is executed once a month, after the Allocation Agent has completed its initial allocation and the invoice for Cash-Outs and incentives pool debits is received from MDL. The output from the BPP process is an invoice to each shipper for its share of imbalance Cash-Outs and incentives pool debits, confirmation of each shipper's running mismatch position after adjustment for its share of the Cashed-Out quantities, and Vector's own running position after adjustment for its share of any Cash-Outs. It should be remembered that Cash-Outs can include credits for payments for gas taken by MDL as well as debits for charges for gas MDL had to buy.

Figure 10 Balancing and Peaking Pool process



The values of certain inputs to the BPP calculations can change after the BPP process is complete. For example, values can be altered by metering corrections and/or overwritten by interim/final/special allocations. While such new values are used to update each shipper's running mismatch positions, the amounts invoiced as a result of the original BPP calculations are not revised.

[27] Relevant to the Vector contribution to Maui imbalance in the SKF and Bay of Plenty pools only

NUMERICAL EXAMPLE – STEP 11

This step takes the Gas Transfer Agent output from step 8 and the Allocation Agent outputs from step 10 to calculate the mismatch for each of our 3 shippers.

Pipeline X shipper mismatch		
Shipper 1		**GJs**
Receipts	Point C + Point E (from GTA)	2,500
Deliveries	X/Y interconnect + Point F + Point G (from GTA + AA)	3,667
	Mismatch (receipts – deliveries)	**-1,167**
Shipper 2		
Receipts	Point C + Point E (from GTA)	1,550
Deliveries	X/Y interconnect + Point F + Point G (from GTA + AA)	1,412
	Mismatch (receipts – deliveries)	**138**
Shipper 3		
Receipts	Point C + Point E (from GTA)	1,600
Deliveries	X/Y interconnect + Point F + Point G (from GTA + AA)	521
	Mismatch (receipts – deliveries)	**1,079**
Pipeline Y shipper mismatch		
Shipper 1		
Receipts	Point D + X/Y interconnect (from GTA)	2,600
Deliveries	Point H + Point I (from Allocation Agent)	1,307
	Mismatch (receipts – deliveries)	**1,293**
Shipper 2		
Receipts	Point D + X/Y interconnect (from GTA)	1,350
Deliveries	Point H + Point I (from Allocation Agent)	3,222
	Mismatch (receipts – deliveries)	**-1,872**
Shipper 3		
Receipts	Point D + X/Y interconnect (from GTA)	450
Deliveries	Point H + Point I (from Allocation Agent)	477
	Mismatch (receipts – deliveries)	**-27**

NUMERICAL EXAMPLE – STEP 12

This step calculates the Vector contribution to the imbalance at the Maui interconnection points using information from the linebalances (at step 9) and calculates the difference between nominations and flows at the X/Y internal interconnection point J.

Pipeline X Vector contribution to imbalance	
	GJs
Fuel and vented gas (from linebalance step 9)	-12
UFG (from linebalance step 9)	159
X/Y interconnection J flow/nomination difference (step 6 minus step 7)	-70
	147
Pipeline Y Vector contribution to imbalance	
Fuel and vented gas (from linebalance)	-18
UFG (from linebalance)	-465
X/Y interconnect flow/nomination difference (step 7 minus step 6)	70
	-483

NUMERICAL EXAMPLE – STEP 13

This step takes the Maui Cash-Out at interconnection point D and splits it by shipper using the shipper mismatch (step 11) and Vector contribution (step 12) for pipeline Y.

Pipeline X Cash-Out split		
Not applicable – no Cash-Out at interconnection point C		
Pipeline Y Cash-Out split (Assume Cash-Out price of $8.20/GJ)		
	GJs	**$**
Shipper 1 (no share as +ve mismatch)	Nil	Nil
Shipper 2 (-1,872/-2,382) * Cash-Out	335	$2,745.29
Shipper 3 (-27/-2,382) * Cash-Out	5	$39.60
Vector (-483/-2,382) * Cash-Out	86	$708.32
	426	**$3,493.20**

NUMERICAL EXAMPLE – STEP 14

Now we calculate the carry forward mismatch for each shipper. For pipeline X there was no Cash-Out, but for pipeline Y the running mismatch needs to be revised for each shipper's share of the gas cashed out.

Pipeline X carried forward shipper mismatch/Vector contribution		
		GJs
Shipper 1	Mismatch	-1,167
Shipper 2	Mismatch	138
Shipper 3	Mismatch	1,079
Vector	Contribution to imbalance	147
Pipeline Y shipper mismatch		
Shipper 1	Mismatch	1,293
Shipper 2	Mismatch (-1,872 Cash-Out 335)	-1,537
Shipper 3	Mismatch (-27 Cash-Out 5)	-22
Vector	Contribution to imbalance (-483 Cash-Out 86)	-397

5.7 Metering corrections

As on the Maui pipeline, from time to time metering data for GMSs on the Vector system are found to be inaccurate and need to be corrected. Part 3 of Vector's *04 Metering Requirements* document (posted on Vector IX) deals with correcting for inaccurate metering and is substantially the same as MPOC schedule 1 part 4: Corrections for Inaccurate Metering.

Metering corrections have implications for a number of Vector reconciliation processes. Invoices for transmission services are adjusted for corrections with credits or debits given on subsequent invoices as necessary. Shippers' running mismatch positions are adjusted for metering corrections, but the actual BPP allocation of charges for Cash-Outs and incentives pool debits, as well as the actual debit and credit of Cash-Out gas as allocated by the original month end BPP process, are not revised for subsequent metering corrections.

5.8 Summary of Vector regime concepts and reconciliation

- **Gas transfer quantities** are calculated by the Gas Transfer Agent and determine shipper receipt quantities on the Vector system (and delivery quantities to the Frankley Road bi-directional interconnection point). Maui nominations and Vector interruptible shipper contract nominations on the Kapui to Pokuru pipeline are significant inputs to the Gas Transfer Agent's gas transfer calculations.

- **Metered quantities** are used in the calculation of individual Vector shipper deliveries (once validated by Vector).

- **Allocated quantities** are determined by the Allocation Agent in accordance with the Reconciliation Rules and determine Vector shipper deliveries at shared delivery points by splitting the metered quantities between shippers.
- **Balancing and Peaking Pool (BPP)** is the mechanism for allocating Cash-Outs and any incentive pool debits among Vector shippers and Vector. Vector's contribution to any Maui imbalance arises from UFG, the difference between fuel gas use and purchases, and any difference between actual flows and interruptible shipper contract nominations on the 200 line.

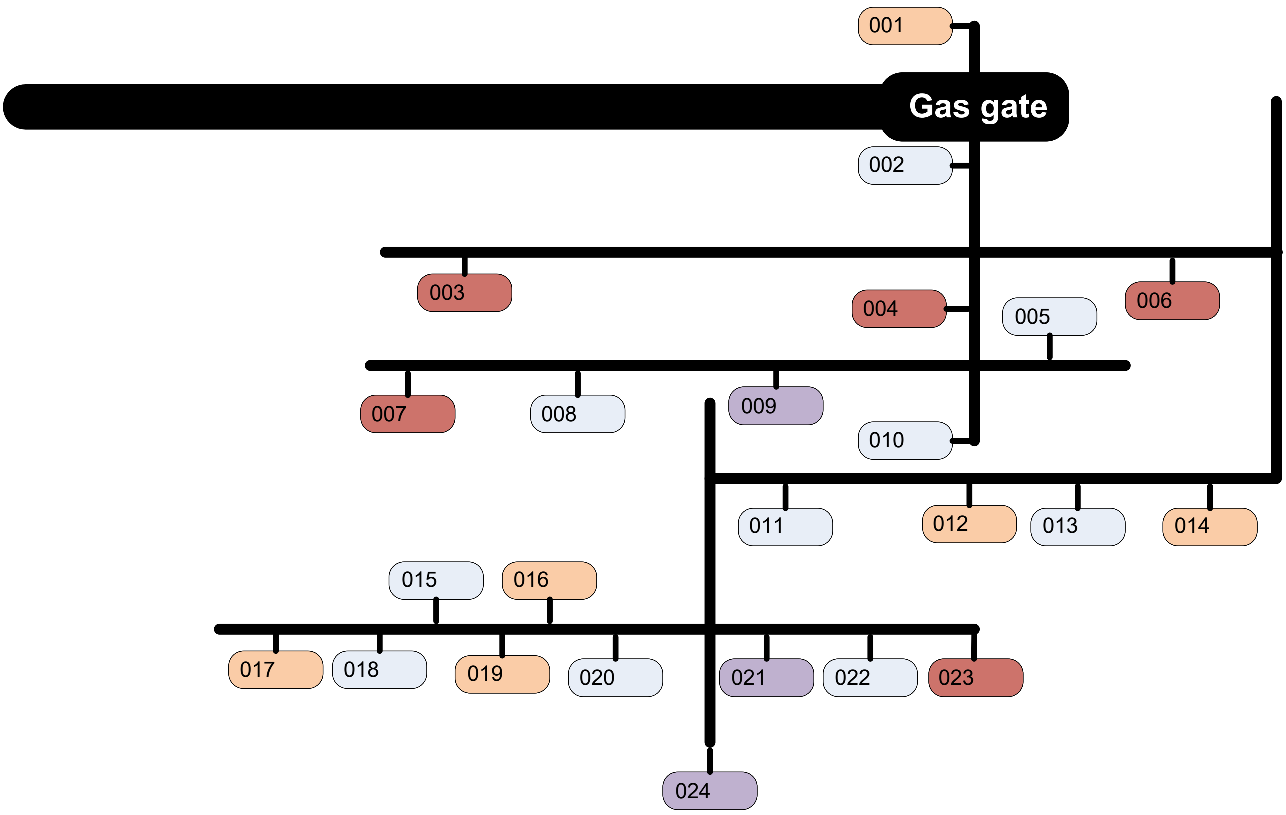
The calculation of Vector shipper receipts by the Gas Transfer Agent and deliveries by the Allocation Agent, coupled with the allocations from the BPP, allows for full reconciliation of the Vector system.

6. Downstream reconciliation

Downstream reconciliation refers to the allocation to gas retailers of quantities of gas delivered from transmission system delivery points into distribution networks. It is a bottom-up system that uses meter readings at customer sites to determine, in aggregate, how much gas the customers of each retailer used, and thus how much gas to allocate to each retailer. The arrangements are prescribed in the Reconciliation Rules. The Allocation Agent is the service provider appointed under the Reconciliation Rules to undertake downstream reconciliation.

The diagram below illustrates a typical situation. The thick black line depicts a transmission pipeline delivering gas to a distribution network through a gas gate. The thin lines represent sections of the distribution system, and the ovals represent gas customers (each with a unique number), who are served by one of four retailers, depicted by different colours. The amount of gas flowing through a gas gate is measured on a daily basis, and the outcome of the reconciliation process is that all of the gas that flows through a gas gate on a day is allocated to the retailers with customers downstream of that gas gate.

Figure 11 Multiple retailers at a gas gate



6.1 The consumption month

Reconciliation and allocation of gas deliveries at each delivery point takes place each calendar month for every Day of the previous month (the consumption month). For each allocation run, the Allocation Agent:

- receives daily delivery quantities for each Day of the consumption month for each delivery point from transmission system owners;
- receives estimated consumption information for the consumption month from retailers; and
- calculates allocated gas quantities for each retailer for each gas gate for each day of the consumption month.[28]

Each consumption month is allocated three times:

- the first, or initial, allocation is performed on the fifth Business Day of the month immediately following the consumption month;
- the second, or interim, allocation is performed on the 11th Business Day in the fourth month following the consumption month; and
- the third, or final allocation, is performed 13 months after the consumption month on the 16th Business Day.

The process of allocation is identical in the initial, interim, and final allocations. However, the consumption quantities provided to the Allocation Agent at each successive stage are more accurate since they are based on additional meter readings. Also, the delivery quantities at each delivery point may be adjusted if any metering errors have been found and corrected for.

The process of reconciliation is complicated by the need to accommodate different consumer metering types (described further in section 6.2), the need for retailers to estimate consumption for the majority of consumers (section 6.3), and the need to calculate and allocate UFG volumes (section 6.4).

6.2 Allocation Groups

There are two basic types of GMS – those that record daily consumption and those that do not – and the data from each are treated differently in the reconciliation process.

Time-of-use meters

There are several hundred customer GMSs that record gas consumption daily. These so-called time-of-use (ToU) meters have either a simple datalogger or a more sophisticated conversion and datalogging device.

[28] For a full description of the information flows and processes, see the Reconciliation Rules. Or, for a more user-oriented description, see the *Gas Allocation User Guide* at the Allocation Agent's website: gasreconciliation.co.nz.

ToU meters are usually only installed at larger sites where their use is mandatory. However, there may be smaller sites with ToU meters either by customer request or because the site used to consume a higher volume.

Because ToU meters are logging data daily, following month-end it is possible to obtain each Day's consumption data for the consumption month. As a result, it is generally the case that the consumption information provided to the Allocation Agent for a ToU site is very accurate and does not vary from initial to interim to final allocations.

Interval meters

Most customer sites have meters that indicate cumulative consumption, similar to a car odometer. This type of meter is read at intervals, and the difference between two successive readings is a measure of how much gas was used during the period but provides no information about how much was used on specific Days. It is rare for meter readings to fall exactly at the end of a calendar month, so retailers have to estimate the proportion of consumption that falls within a given consumption month. In addition, where the last meter reading is before the end of the month, retailers need to estimate consumption for the balance of the consumption month.

Allocation Groups

The Reconciliation Rules capture the difference between GMSs by categorising ICPs into Allocation Groups depending on whether the meter has a ToU facility and telemetry, and by how frequently the meters are read.

The Allocation Groups are:

Allocation Group 1: ICPs that have a ToU meter with telemetry and where gas quantities are recorded daily.

Allocation Group 2: ICPs that have a ToU meter without telemetry and where gas quantities are recorded daily.

Allocation Group 3: ICPs where the daily gas quantities are determined by application of an approved static deemed profile to monthly gas quantities (obtained from monthly meter readings and not estimated).

Allocation Group 4: ICPs where the daily gas quantities are determined by application of the gas gate residual profile to monthly gas quantities (obtained from monthly meter readings and not estimated).

Allocation Group 5: ICPs where the daily gas quantities are determined by application of an approved dynamic deemed profile to monthly gas quantities (obtained from meter readings and not estimated).

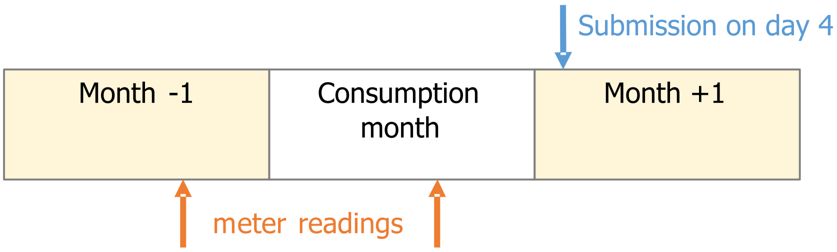
Allocation Group 6: ICPs where the daily gas quantities are determined by application of the gas gate residual profile to monthly gas quantities (obtained from meter readings and not estimated).

6.3 Estimating consumption for non-ToU meters

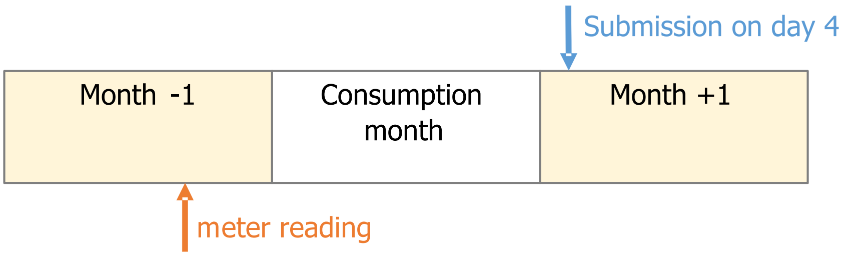
Because the initial allocation is performed soon after month-end, the input data for that allocation are the least accurate of the three allocations. A high proportion of mass market customer meters are either read early in the consumption month or not read in the consumption month at all. For such sites the retailer concerned needs to estimate the missing data.

The following diagrams illustrate the need for retailer estimation:

Figure 12 Need for estimation for initial allocation



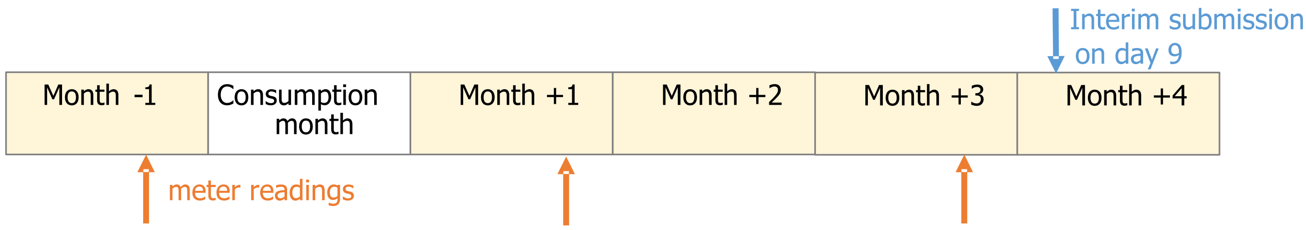
This retailer needs to make two estimates: one for the beginning of the consumption month, based on meter readings, and one for the remainder of the consumption month, generally based on historical usage.



Some retailers read bimonthly and may need to estimate consumption for the entire consumption month.

The quality of the submitted consumption data improves as more meter readings are conducted. At the time of the interim allocation, retailers generally have two or more meter readings that span the consumption month for some 90% of their customer sites. By the time of the final allocation, it is reasonably expected that all retailers have meter readings that span the consumption month for all of their customer sites.

Figure 13 Historical estimates for interim allocation



At the interim allocation, retailers who read monthly and retailers who read bimonthly will have meter readings that span the consumption month for the majority of their customers.

6.4 Distribution system UFG

If all gas is accurately accounted for, the amount of gas that enters a distribution system should equal the amount of gas delivered to consumers connected to that distribution system (assuming no change to the inventory of gas in the system). In practice, however, not all gas is accounted for: GMSs are not completely accurate, they are not read at exactly the same time, and some estimations are necessary. All these factors contribute to there being a difference between the injection and withdrawal information available to the Allocation Agent. The difference is known as UFG.

In brief, the contributors to UFG include:

- Estimation errors: As outlined in the previous section, GMSs without ToU devices are read at different times and with different frequencies. Retailers must estimate the monthly usage of these meters, and those estimates may not be accurate.
- Metering errors: The gas metering standard NZS5259 requires the in-service accuracy of meters to be between 1.5% and 6%, depending on the meter size and design, so the allowable margin of error can contribute to UFG.
- Conversion errors: Gas meters measure gas volume, but reconciliation and customer billing are in energy units. Converting from volume to energy generally involves the application of pressure, temperature and compressibility factors, and calorific value. These rely on measurement of a range of gas characteristics and components (generally metering pressure, metering temperature, % nitrogen, % carbon dioxide, specific gravity and calorific value). These measurements, and the application of the conversion factors, can introduce errors.
- Escaped gas: Small amounts of gas are vented by relief valves and during network maintenance.

UFG can be either positive (i.e., gas is 'lost') or negative (gas is 'created')[29], but it is generally positive. The long-term average amount of UFG in recent years has been about 1% of consumption.

[29] Of course gas is only created in an accounting sense. For example if the delivery meters are 'running slow' relative to the receipt meters it may appear that more gas is entering the system than is leaving.

UFG is allocated to gas retailers in the downstream reconciliation process, as outlined in the next section. Some retailers choose to pass the costs of UFG to their customers explicitly; others incorporate these costs into their overheads.

6.5 The global allocation methodology

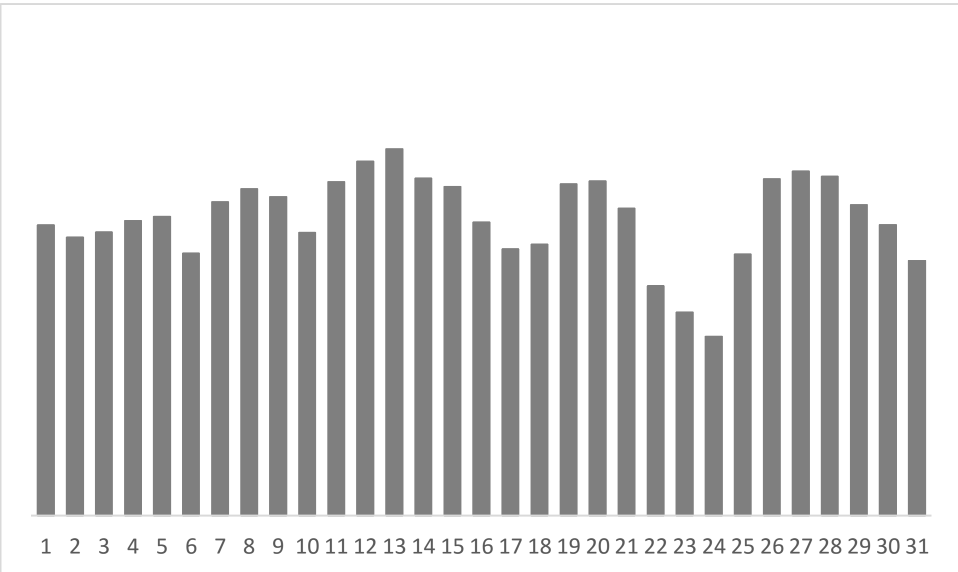
The global allocation methodology is the algorithm at the heart of the reconciliation process. In summary, global allocation apportions gas gate injections to retailers in proportion to their respective consumption submissions. The figures in this section illustrate an example for a gas gate where four retailers operate:

Retailer	Number of ToU customers at gate	Mass market customers at gate?
Blue retailer	3	Yes
Orange retailer	1	No
Green retailer	1	Yes
Yellow retailer	0	Yes

For each allocated gas gate, the Allocation Agent receives three types of data for each allocation:

1. Daily gate injection quantities (all gas quantities are in GJ)

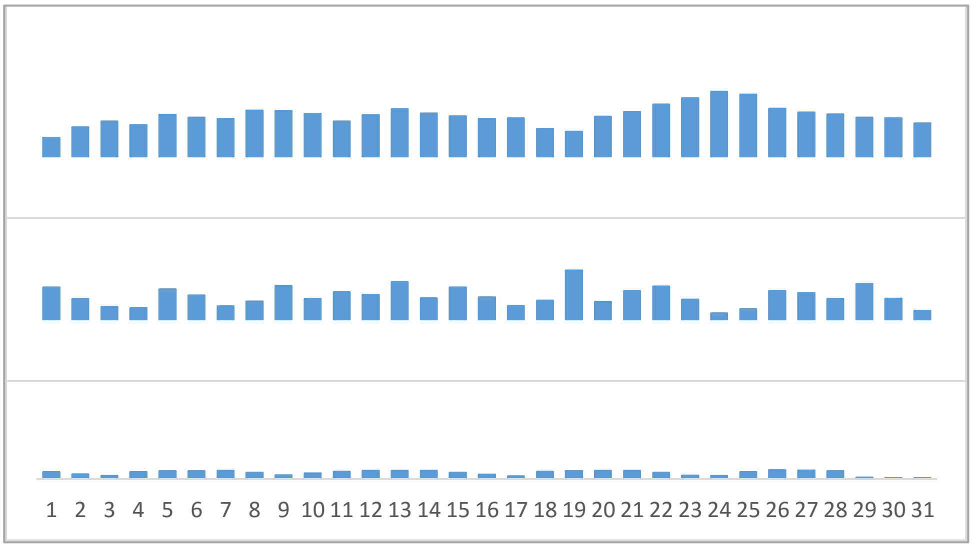
Figure 14 Gate injection quantities



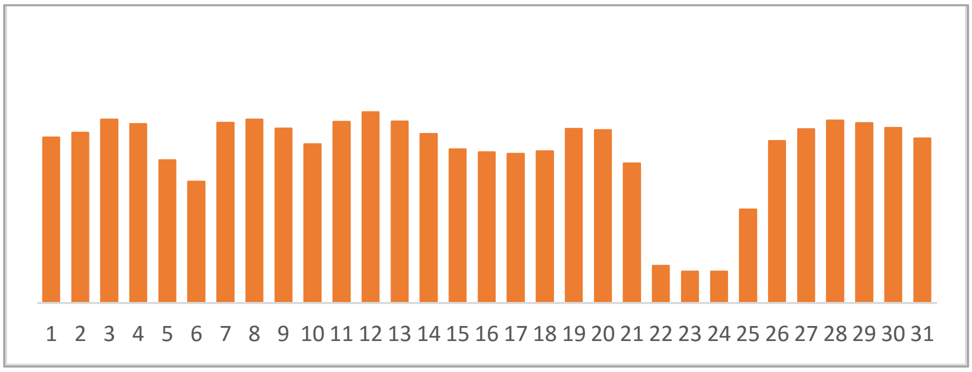
2. Daily consumption information for each ToU customer connected at that gate

Figure 15 ToU consumption information

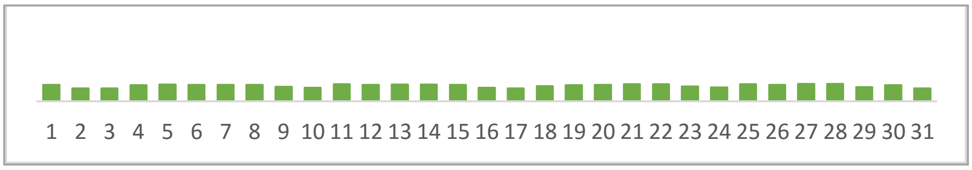
Blue retailer:



Orange retailer:



Green retailer:



3. Monthly consumption estimates for all non-TOU customers (note that these estimates are for total consumption over the month, so do not vary by day of the month)

Figure 16 Non-ToU monthly consumption estimates

Blue retailer:

Green retailer:

Yellow retailer:

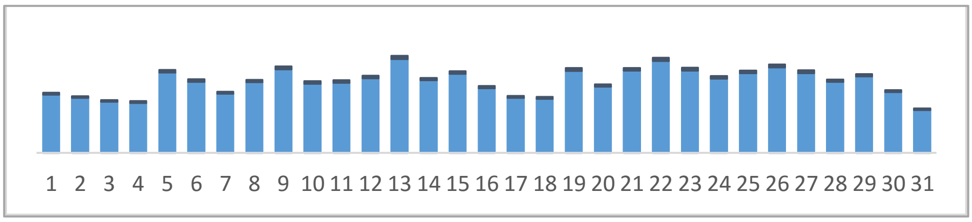
Step 1: Allocate ToU sites a fixed proportion of UFG

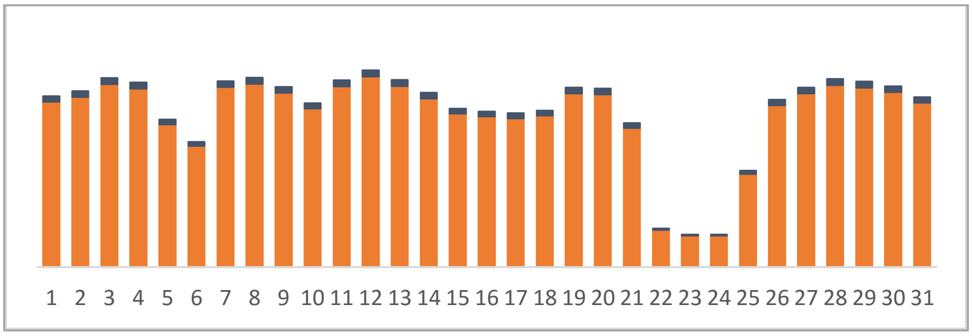
The first step in the allocation process is to allocate volumes to retailers with ToU sites. ToU sites are assigned UFG according to the gas gate annual UFG (AUFG) factor, which is a measure of UFG experienced at that gas gate over the previous year.

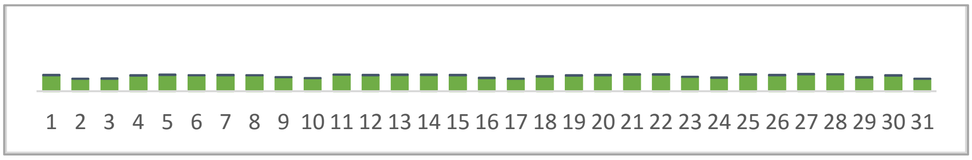
The AUFG factor is calculated as the ratio of gas gate injection data to consumption data, using final and interim allocation data; that is, using the most recent accurate data available. AUFG factors are calculated in July to apply to the gas year that begins in October.

In the allocation process, the Allocation Agent applies the AUFG factor to each Day's ToU deliveries (i.e., for Allocation Groups 1 and 2) submitted by retailers, as shown in dark blue in the charts below.

Figure 17 Allocation of ToU load



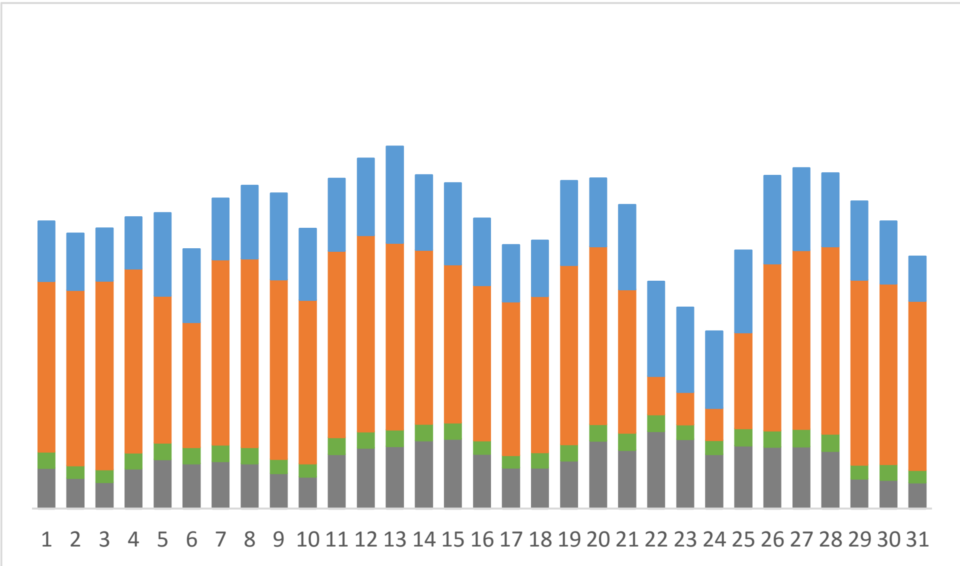




Step two: Apportion monthly UFG to non-ToU sites

For each Day in the consumption month, the Allocation Agent calculates the amount of volume that needs to be allocated to non-ToU sites (i.e., for Allocation Groups 3 to 6) by deducting that Day's ToU allocations (i.e., for Allocation Groups 1 and 2) from that Day's gas gate injection. The resulting set of daily numbers is termed the gas gate residual profile (GGRP).

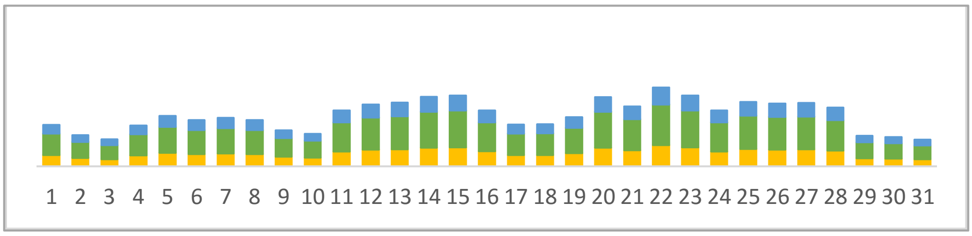
Figure 18 Gas gate residual profile



This chart shows the GGRP (bottom series) in relation to the ToU allocations and the overall gate injection quantities. It is this bottom series that is allocated to the non-ToU customers.

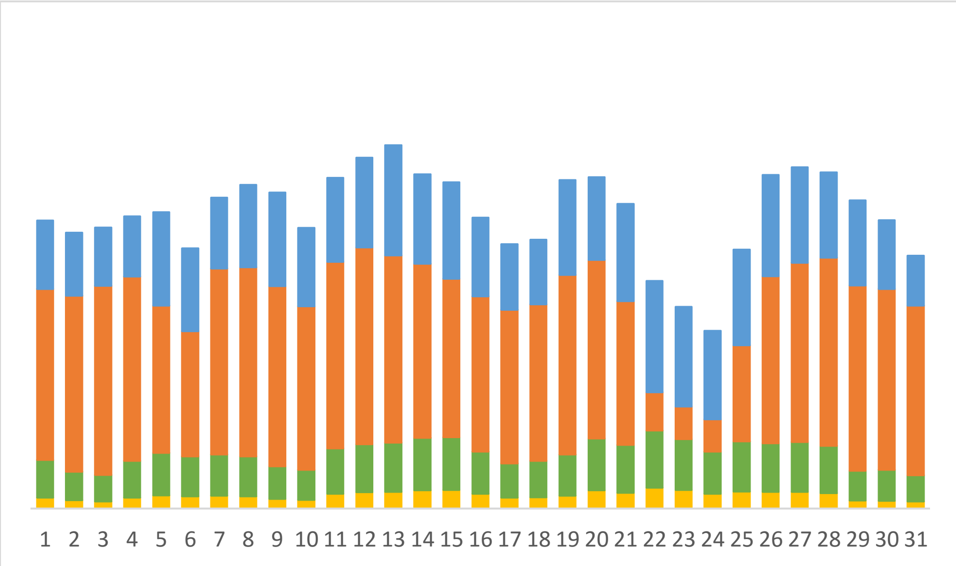
The ratio of the sum of the daily GGRP values to the aggregate of non-ToU submissions for the month yields the monthly UFG factor (MUFG). The MUFG is used to scale retailers' ToU submissions to yield their respective allocations. The daily values of those monthly non-ToU allocations are derived from the ratio of each Day's GGRP value to the sum of GGRP values. In other words, each retailer with non-ToU customers is allocated a share of each Day's residual volume in proportion to its share of non-ToU submissions.

Figure 19 Allocation of non-ToU load



In this way, all of each Day's gas volumes is allocated to the four retailers that trade at that gas gate. The total allocations are depicted below.

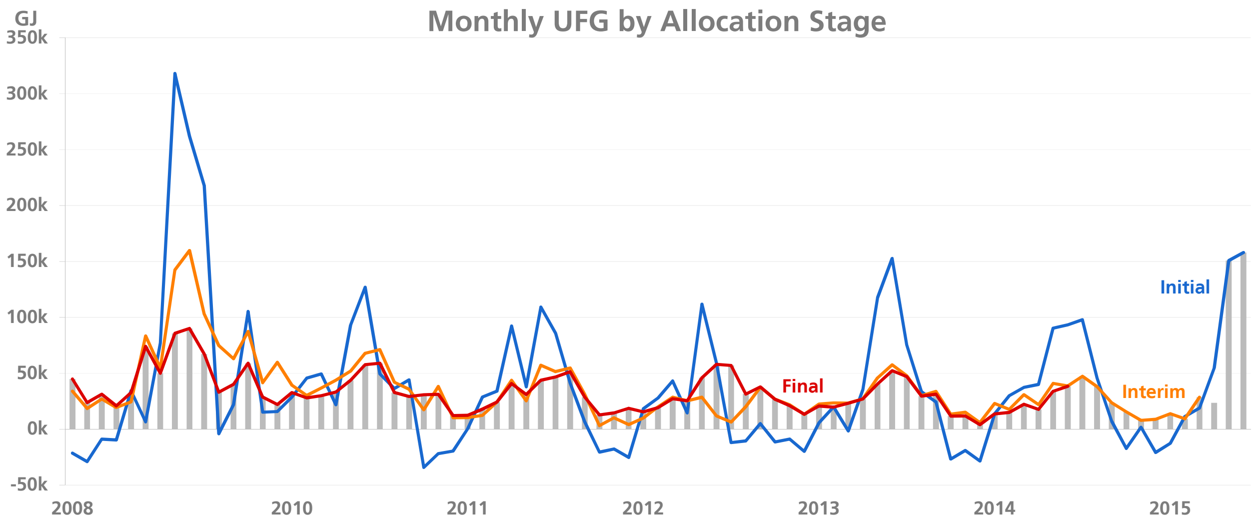
Figure 20 Total allocation



For a given gas gate, the MUFG for the initial allocations generally shows a seasonal pattern with high MUFG leading into winter and low MUFG leading into summer. As the accuracy of retailers' non-ToU submissions improves with successive allocation stages, the MUFG changes accordingly.

The chart below illustrates how UFG across the allocated gas gates changes from season to season and from one allocation stage to the next.

Figure 21 Trends in UFG



6.6 The global 1-month allocation methodology

An alternate allocation method is used for gas gates that have a preponderance of ToU consumption. For these gates, small errors between the gas gate meters and customers' ToU meters can cause unacceptably high volatility in the MUFG experienced by the non-ToU customers connected at those gates. Gates that follow this alternate methodology are determined by their high proportion of ToU load and by the volatility of their MUFG factors; determinations are made once a year for the following gas year.

The global 1-month (G1M) allocation methodology differs from the standard allocation methodology by omitting the use of the AUFG factor. Instead, G1M uses a single scaling factor (for a given gas gate, consumption month, and allocation stage) to calculate the allocations for all customers at the gate. This factor, termed the G1M monthly UFG factor, is derived from the ratio of the aggregate gas gate injection data to the aggregate consumption submissions for both ToU and non-ToU sites.

Otherwise the G1M allocation methodology follows broadly the same process as the global allocation methodology. For this example, Yellow retailer has the only ToU customer at the gate; Yellow, Green, Blue, and Dark Blue all have non-ToU customers.

1. Receive data

Figure 22 Global 1-month gate injection quantities

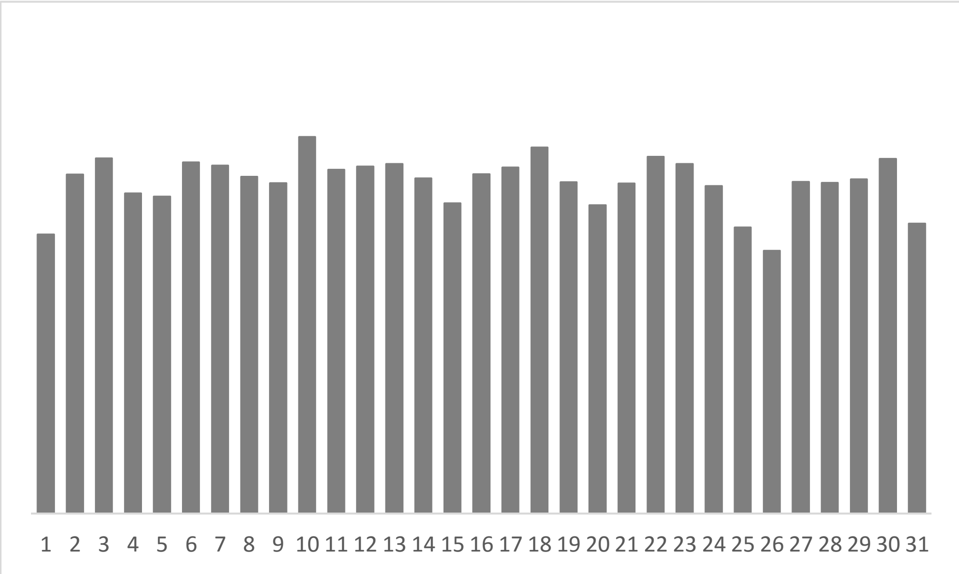


Figure 23 Global 1-month ToU consumption information

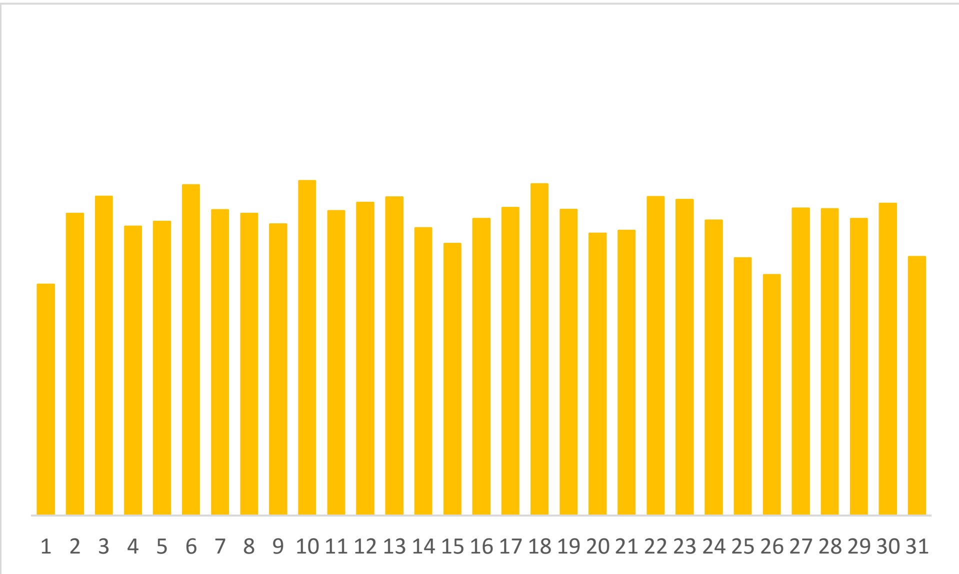
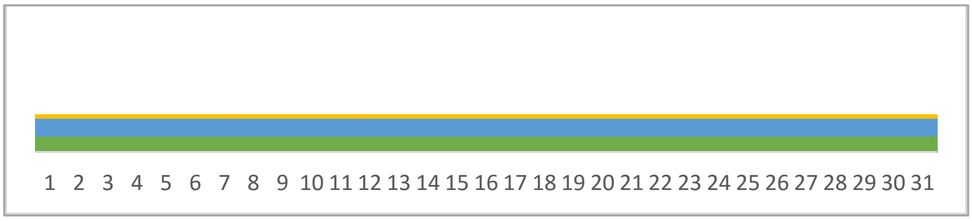


Figure 24 Non-ToU monthly consumption estimates

(Data from all four non-ToU retailers are combined into one chart below.)

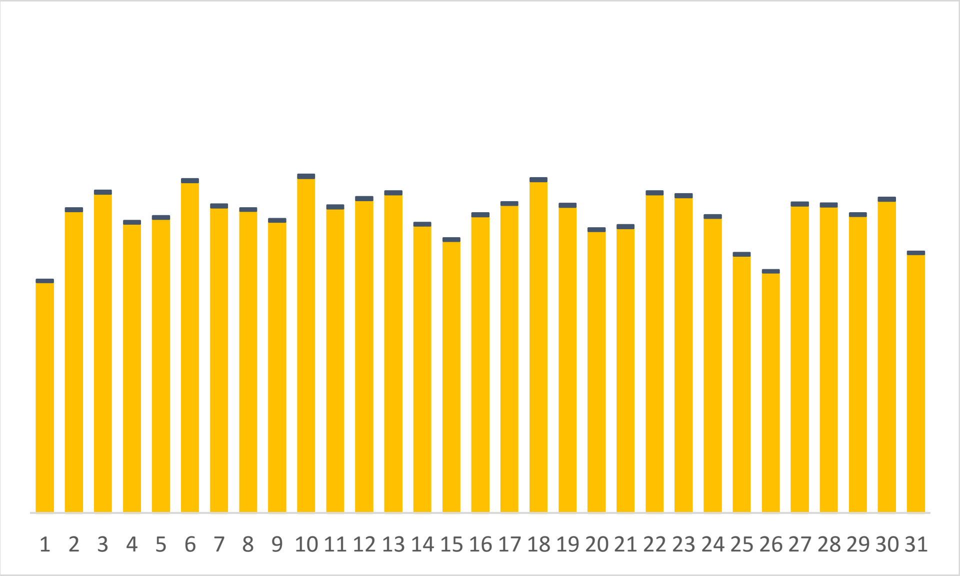


Note that one ToU customer is responsible for the majority of the load at the gas gate – this is one of the criteria for using the G1M methodology.

2. Allocate ToU customers

The G1M UFG factor is derived from the ratio of the sum of the injection information divided by the sum of the consumption information, and this factor is used to allocate the ToU customers:

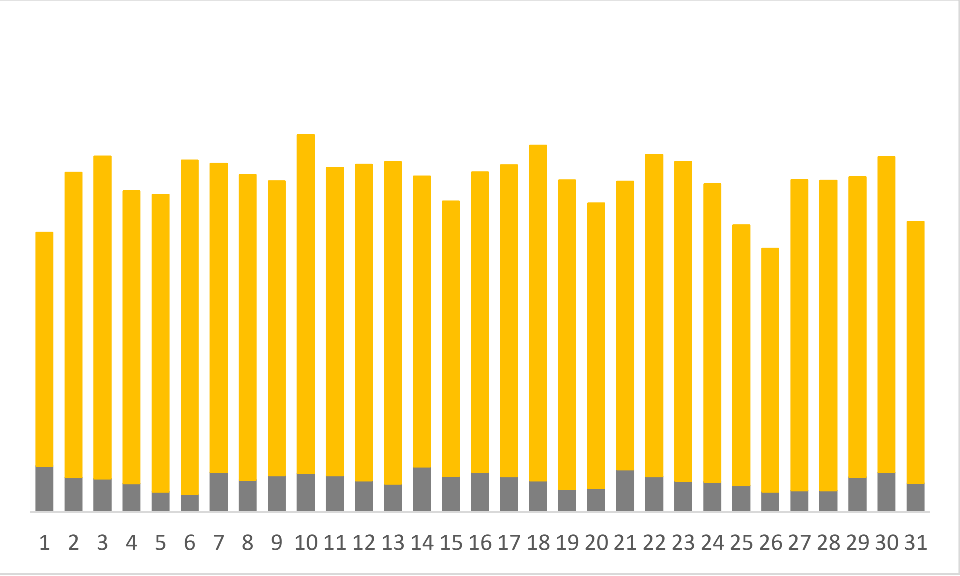
Figure 25 Allocation of ToU load (global 1-month gate)



3. Allocate non-ToU customers

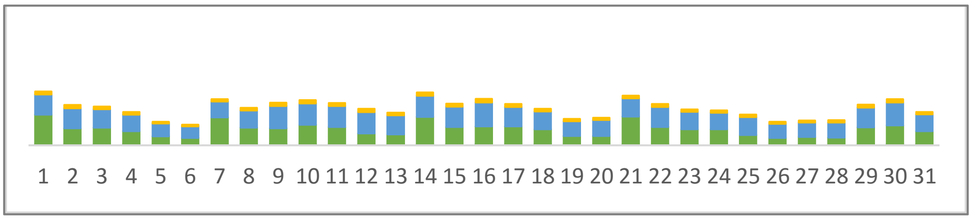
The gas gate residual profile determines how much volume remains on each day to allocate to non-ToU load. In the chart below, it is shown by the dark grey series at the bottom.

Figure 26 Gas gate residual profile (global 1-month gate)



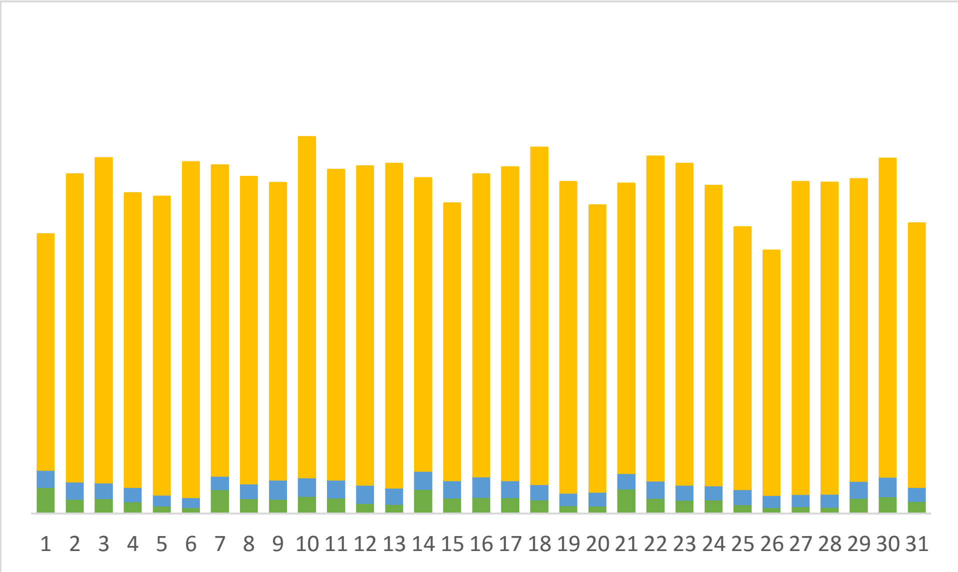
The remaining volumes are allocated to the non-ToU retailers in proportion to the size of their consumption submissions:

Figure 27 Allocation of non-ToU load (global 1-month gate)



The total allocations are shown below.

Figure 28 Total allocation (global 1-month gate)



Exceptions

In some instances, the scaling of ToU submissions by the AUFG factor and rounding errors result in values that exceed one or more Day's injection volume(s) or, alternatively, result in residual gas that has not been allocated on a particular Day. This situation is addressed by proportionately scaling the allocations for that Day.

Missing injection data: where the injection data are missing, the Allocation Agent is required to estimate the missing values.

Missing consumption data: where a retailer has failed to provide the consumption information required under the Reconciliation Rules, the Allocation Agent must estimate the missing consumption information.

The Reconciliation Rules also provide for the allocation results to be recalculated and republished in the event that material errors are identified and can be fixed shortly after the publication of allocation results.

6.7 The Allocation Agent

The Allocation Agent is a service provider appointed under the Reconciliation Rules and is charged with performing the allocation process. EMS was appointed to a five-year term as Allocation Agent, effective 1 January 2014, and the term can be extended by up to 10 additional years.[30]

The Allocation Agent is funded through the Reconciliation Rules. Each year Gas Industry Co is required to estimate the costs payable to the Allocation Agent and the costs that Gas Industry Co will incur that are associated with its obligations under the Reconciliation Rules. Those estimated costs are then recovered from retailers in proportion to their respective shares of allocated volumes. After the end of the year, once the actual costs are known, a wash-up is performed and the differences either collected from, or returned to, retailers.

Allocation system portal

The Allocation Agent maintains the portal through which allocation participants (principally retailers and transmission system owners) supply and receive information. The portal is accessible by the public and monthly allocation files can be downloaded for each allocation stage from www.gasreconciliation.co.nz.

Industry participants who need to access the allocation portal to meet their obligations under the rules can apply for credentials by completing the application form on Gas Industry Co's website, www.gasindustry.co.nz .

6.8 Transparency

Allocation and reconciliation is a zero-sum game: to the extent that any retailer's data submission is incorrect, all retailers' allocations will be adjusted so as to ensure that the aggregate allocations match the gas gate injections. Given that the results from the downstream reconciliation process determine Vector shipper deliveries, and hence transmission fees and allocations of balancing charges, it is important that the allocations are as fair and accurate as reasonably possible and that there be sufficient transparency so as to instil confidence in the results.

To that end, the retailers' monthly allocations, by gas gate, are published at each allocation stage. Aggregate figures provide information for parties to be able to monitor each other's performance and that, in turn, provides an incentive for parties to carefully manage the quality of their submissions to the Allocation Agent. In addition, the following reports are also publicly available from the Allocation Agent portal:

- seasonal adjustment daily shape values;

[30] The service provider agreement with EMS is available on Gas Industry Co's website at http://www.gasindustry.co.nz/work-programmes/downstream-reconciliation/operations/#allocation-agent/

- comparison of billed and submission quantities; and
- annual UFG factors.

6.9 Checks and balances

As well as providing for a reasonable degree of transparency, the Reconciliation Rules include requirements for interrogating customer meters as well as processes that mandate uniform approaches to generating data submissions, sense-checking of retailers' data submissions, and periodic audits of retailers' systems.

Metering obligations

The Reconciliation Rules specify that certain sites are required to have ToU meters installed and set down criteria regarding the frequency with which meters must be interrogated. This is summarised in the following table.

<table>
<tr><th>Annual consumption</th><th>ToU meter required?</th><th>Telemetry?</th><th>Allocation Group</th><th>Meter reading frequency</th></tr>
<tr><td rowspan="2">More than 10,000 GJ</td><td>Yes</td><td>Yes</td><td>1</td><td>Daily</td></tr>
<tr><td>Yes</td><td>No</td><td>2</td><td>Daily</td></tr>
<tr><td>> 250 GJ and ≤ 10,000GJ</td><td>No</td><td>n/a</td><td>4</td><td>Monthly</td></tr>
<tr><td>≤ 250 GJ</td><td>No</td><td>n/a</td><td>6</td><td>See below</td></tr>
</table>

The meter-reading frequency for ICPs in Allocation Group 6 varies depending on each retailer's trade-off between data quality and cost. The Reconciliation Rules provide that retailers must obtain validated register readings:

- at least once every 12 months for sites that the retailer has supplied gas continuously for the previous 12 months (unless exceptional circumstances prevent obtaining a reading); and
- at least once every four months for 90% of sites with non-ToU meters where the retailer has continuously supplied gas over the previous four months.

From the above it can be seen that the four-month requirement means that data for the interim allocation benefit from a minimum 90% of non-ToU sites having meter readings that span the consumption period. Similarly, at the final allocation stage there should be meter readings spanning the consumption month for virtually all non-ToU sites.

Historical and forward estimate processes

As mentioned previously, non-ToU meters are read at intervals and the consumption indicated by successive meter reads needs to be apportioned to the respective consumption months in a rigorous manner. Such estimates are termed historical estimates and the methodology for their calculation is set out in the Reconciliation Rules. In addition, and particularly at the initial allocation, retailers need to estimate consumption for periods and for ICPs that are not covered by a meter reading – these estimates are called future estimates.

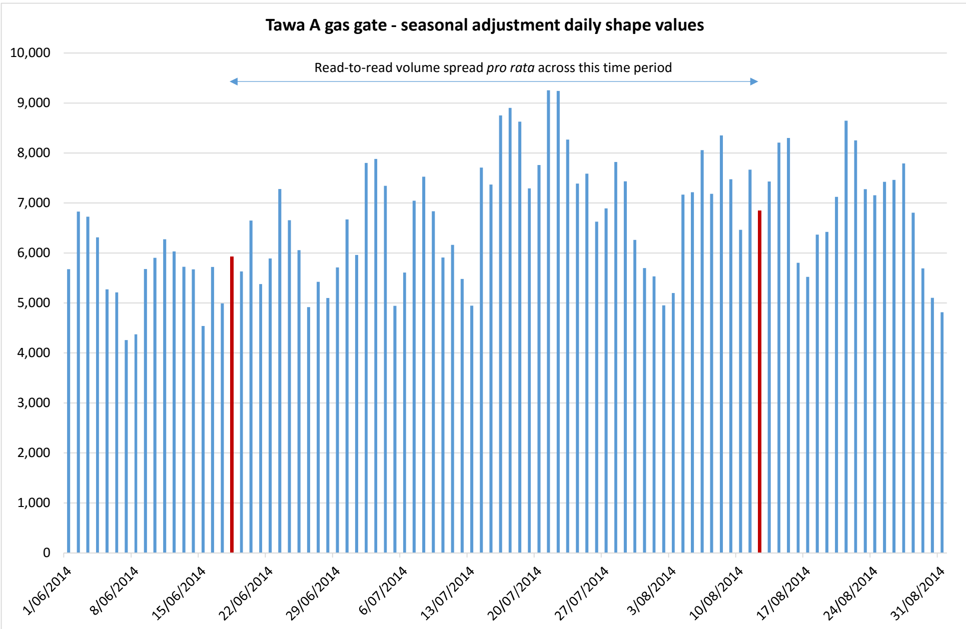
Historical estimate calculation

Key to the creation of historical estimates are the seasonal adjustment daily shape values or SADSV files published by the Allocation Agent. The SADSV file is simply a concatenation of 24 months of GGRP values for each gas gate. The historical estimate algorithm rests on the simplifying assumption that non-ToU sites individually follow the same shape as the SADSV. This methodology provides a uniform way of processing non-ToU data and allocating consumption to the non-ToU segment of the market that, in aggregate, is correct.

When creating a historical estimate for an ICP for a given consumption period, retailers are required to use the SADSV (provided it exists) to define how the read-to-read volume will be apportioned to Days that fall within the consumption month.

The following chart shows the SADSV for the three months of June, July and August 2014. The red bars depict the dates of two meter readings for an ICP and the rule for historical estimates requires that the difference between the two readings, i.e. the consumption from 18 June through 12 August, should be assigned to the consumption periods in proportion to the SADSV for the period covered by the pair of meter readings.

Figure 29 Example SADSV



The table below is a simple worked example. Assuming that the difference between the meter readings, once converted to energy, showed consumption of 127 GJ, the proportion of consumption to be assigned to each of June, July and August are found by summing the SADSV for each of:

June – values from 18 June through 30 June;

July – values from 1 July through 31 July; and

August – values from 1 August through 12 August.

The June figures comprise 20.25% of the total in the read-to-read period which equates to 25.7 GJ being apportioned to June.

Month	Sum of SADSV	Proportion in month	Volume in month
June	77,293.89	20.25%	25.714
July	222,342.01	58.24%	73.968
August	82,116.82	21.51%	27.318
	381,752.72	100.00%	127.000

Forward estimates

Forward estimates are permitted in circumstances where it is not possible to calculate a historical estimate. As outlined earlier, mass market retailers rely heavily on forward estimates in preparing consumption submissions for the initial allocation. Given that retailers must submit data for the initial allocation on the fourth Business Day of the month immediately following the consumption month, there is insufficient time between the end of the consumption month and the submission date to obtain meter readings for all of the non-ToU ICPs.

The method of creating forward estimates is determined according to each retailer's discretion.

Annual reconciliation

As a check on the completeness of retailer consumption submissions, there is a requirement each month for retailers to submit to the Allocation Agent the volumes billed in the previous month. Retailers' billing cycles are not typically aligned with the calendar month, so there is not perfect alignment between the consumption volumes retailers submit to the Allocation Agent and the volumes billed. Still, billed information can serve as a useful check on whether the consumption submissions that the Allocation Agent is receiving are consistent with the volumes that retailers are billing.

The Annual Reconciliation requires the Allocation Agent to calculate and report, by gas gate, a comparison of a retailer's billed volumes over the most recent twelve months with the consumption submissions over an equivalent 12 month period. Over such a lengthy period, the mismatch between the normalised submissions for reconciliation and the billing volumes is muted and the comparison provides a good check on the accuracy and completeness of retailer submissions.

Performance and event audits

The Reconciliation Rules provide for two types of audits:

- performance audits – designed to test a party's ability to comply with the rules; and
- event audits – that are commissioned in response to a particular event in respect of one or more gas gates.

Performance audits

Gas Industry Co is required to arrange periodic performance audits for each allocation participant and the Allocation Agent. Performance audits are aimed at testing three aspects:

- the performance of the party in terms of its compliance with the Reconciliation Rules;
- performance of the systems and processes that the party has put in place to enable compliance with the Reconciliation Rules; and
- where a party is intending to make a change to its systems, processes or procedures that may impact compliance, the audit will consider the impact of those changes.

Event audits

Where an event or issue has arisen in relation to the allocation of gas, Gas Industry Co may elect to commission an event audit. The purpose of an event audit is to identify the cause or causes of the particular issue or event that has arisen. In addition, any allocation participant or the Allocation Agent may request that Gas Industry Co commission an event audit.

Auditor and audit costs

The person (or persons) being audited may recommend one or more auditors for Gas Industry Co's consideration. The auditor is appointed by Gas Industry Co and must be independent of, and not in a position of conflict with, the party or parties to be audited.

The Reconciliation Rules provide that the party (or parties where more than one) who is the subject of the audit shall be required to meet the costs of the audit. For event audits, the costs will either be shared among the parties being audited or be charged to any participant or participants that are shown to have material issues in terms of compliance with the Reconciliation Rules.

Appendix A – Reconciliation Timeline

The reconciliation process begins prior to the transportation of the gas, with the submission of nominations by shippers. It ends 13 months later after the final downstream allocations are available, which leads to the final revision of the shipper running mismatch.

Data type	Timing	Notes
Final Approved Nominations	Midnight on transmission Day	Initially occur prior to transportation of gas Can be adjusted during transmission Day Considered final as at midnight on transmission Day
Final approved scheduled quantities	Midnight on transmission Day	Driven by nominations and first available the week prior to the transmission week. Adjusted prior to and during transmission Day Considered final as at midnight on transmission Day
Unvalidated metering data (via SCADA)	Hourly during the transmission Day	Unvalidated metering data for sites linked to SCADA, sent to OATIS hourly (so available approx. 30 mins after the end of the hour)
Unvalidated metering data (telemetry)	Early morning, Day after transmission	Unvalidated data for a transmission Day are collected during the early hours of the Day following transmission and sent to OATIS
Imbalance	Day after transmission	OATIS calculates imbalance after the end of the transmission Day, using whatever metering data are available. It automatically updates every time metering data are revised.
Validated metering data (SCADA and telemetry sites)	First Business Day after transmission	On the first Business Day after the transmission Day analysts review and validate data from sites attached to SCADA or telemetry
Cash-Outs	Daily	Cash-Outs are considered once a Day. On Business Days the MDL operator waits until after data validation has occurred. On non-Business Days unvalidated data are used. The affected Welded Party is notified immediately a Cash-Out occurs.
Gas Transfer Agent outputs	Weekly, in the week following transmission (usually Wednesday)	Gas Transfer Agent provides outputs within 2 Business Days of the receipt of the inputs

Data type	Timing	Notes
Metering corrections	As soon as available up until midday on 4th Business Day after the end of the transmission month	All Maui metering corrections are uploaded as soon as they are available and are effective immediately in the calculation of imbalance. Cash-Outs are reviewed as necessary. Vector metering corrections made within the month for gas flows that same month are uploaded as soon as available up until midday on the 4th Business Day after the month end. Corrections not available by this cut off will not be uploaded until after the downstream allocation, invoicing and BPP processes have been completed.
Validated Metering data (no telemetry)	Midday of the 4th Business Day after the end of the transmission month	Unvalidated data are usually made available after the month end but earlier than the 4th Business Day
Imbalance at Small Stations	Midday of the 4th Business Day after the end of the transmission month	Under the MPOC this is due by the 5th Business Day, but as the validated metering data need to be with the Allocation Agent by midday on the 4th , in practice the imbalances are available early
Downstream allocation – initial allocation	Midday of the 5th Business Day after the end of the transmission month	
UFG	1st week of the month after the transmission month	The line balances can’t be completed until the validated metering data are available
Balancing and Peaking Pool outputs	Monthly, usually by the 14th Day of the month	BPP cannot commence until all of the inputs are available, the 14th Day of the month is not always possible
Metering corrections not available by midday of 4th Business Day after end of transmission month	After BPP process for transmission month, as available	The upload of Vector metering correction for a transmission month resumes once the month-end processes of allocation, invoicing and BPP have been completed. Effective for Vector running shipper Mismatch from the 1st Day of the month in which they are uploaded.
Downstream allocation – interim allocation	4 months after transmission month, around the 11th Business Day	
Revised running shipper mismatch	4 months after transmission month, after the interim allocation	The revised running shipper Mismatches are effective from the 1st Day of the month after they are processed
Downstream allocation – final allocation	13 months after transmission month, around the 16th Business Day	

Data type	Timing	Notes
Revised running shipper mismatch	13 months after transmission month, after final allocation	The revised running shipper Mismatches are effective from the 1st Day of the month after they are processed

Appendix B – Numerical Example

Simplified system for the purposes of the numerical example

Maui pipeline has one receipt point (A) and 3 delivery points. 1 delivery point goes direct to a large consumer (B) and 2 delivery points are interconnections with Vector (C+D)

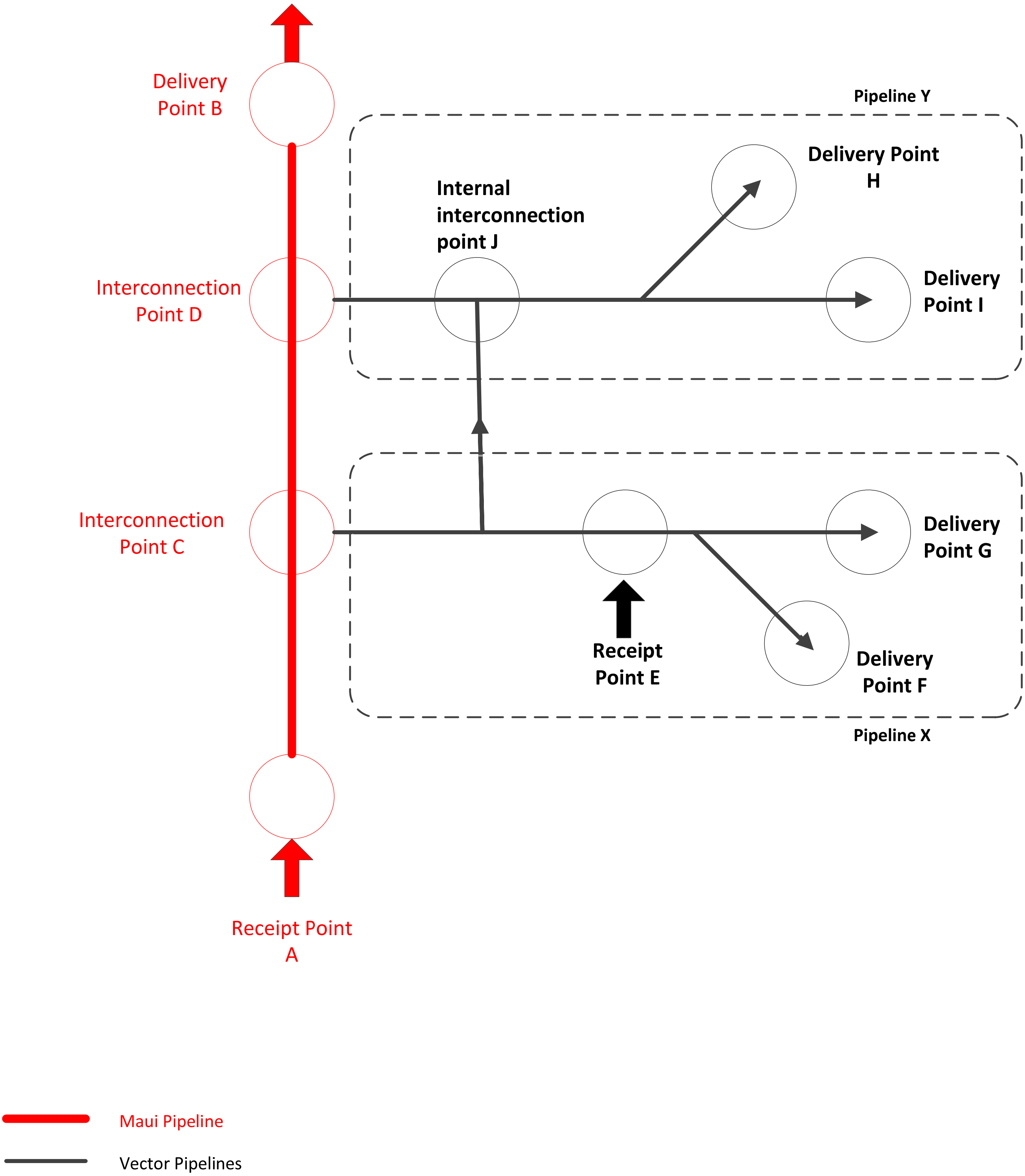
The Vector system has only 2 pipelines:

- pipeline X receives gas from Maui via the interconnection point C, it receives gas direct from a gas field at receipt point E, it can deliver gas to the other Vector pipeline via the internal interconnection point and it has two delivery points F and G.
- pipeline Y receives gas from Maui via the interconnection point D, it receives gas from pipeline X via the internal interconnection point J, it can deliver gas to the other Vector pipeline via the internal interconnection point and it has two delivery points H and I.

Other assumptions/simplifications

1. No bi-directional point
2. No Maui shipper Mismatch
3. No Maui Running Operational Imbalance position brought forward from prior to the start of the example
4. No Vector running mismatch position brought forward from prior to the start of the example
5. No balancing action taken by MDL or Vector
6. No Maui curtailments or Vector interruptions
7. No time allowed for resolution of Maui imbalance (Cash-Out of imbalance in excess of tolerance performed immediately after transmission Day)
8. Final metering data, Gas Transfer Agent and Allocation Agent outputs available immediately without further adjustment
9. No Small Stations on this simplified example system

Simplified pipeline system for numerical example



Transmission Day 1 December 2015

b/f imbalance =0 for all points so imbalance for 1 Dec is also running imbalance as at midnight 1 Dec

Maui regime

			STEP 1	STEP 2	STEP 3		STEP 4				STEP 5	
			Nominations TOTAL = SQ	Metering data	Imbalance for 1 Dec	Imbalance tolerance set by MDL operator	imbalance outside tolerance	Cashout GJs	Cashout $8.20/gj	c/f imbalance	linebalance	
Receipt	Point A	Shipper 1	10000									
		Shipper 2	3000									
		TOTAL	13000	12600	-400	-400	0	0		-400	12600	
Delivery	Point B	Shipper 1	5000									
	(to power station)	Shipper 2	500									
		TOTAL	5500	5700	-200	-400	0	0		-200		
	Point C	Shipper 1	3000									
	(to Vector)	Shipper 2	1000									
		TOTAL	4000	3900	100	400	0	0		100		
	Point D	Shipper 1	2000									
	(to Vector)	Shipper 2	1500									
		TOTAL	3500	4326	-826	-400	-426	426	$3,493.20	-400	13926	
											-321	change in qty of gas in system
											80	fuel and vented gas
Maui pipeline affect			0	-1326	-1326					-900	-1085	UFG gain
			BALANCED	DEFICIT	DEFICIT							

Nomination inputs	
Metering data inputs	
Other inputs	
Calculations	

b/f mismatch is 0 for all shippers/pipelines and Vector so mismatch for the day is also running mismatch

Vector regime

				STEP 6	STEP 7		STEP 8	STEP 9	STEP 10	STEP 11 mismatch			STEP 12
				Nominations	Metering data	GTA inputs	GTA output	Linebalance	Allocation Agent	Shipper 1	Shipper 2	Shipper 3	Vector contribution
PIPELINE X													
Receipt	Interconnection	Point C	Shipper 1	3000		500 sold to shp 3	2500		N/A	2500			
	(gas from Maui)		Shipper 2	1000		none traded	1000		N/A		1000		
			Shipper 3	N/A		500 bought from shp 1	500		N/A			500	
			TOTAL	4000	3900		4000		N/A				
	Direct gas field	Point E	Shipper 1	N/A		N/A	0		N/A	0			
			Shipper 2	N/A		title to all gas, sells 1100 to shp 3	550		N/A		550		
			Shipper 3	N/A		buys 1100 from shp 2	1100		N/A			1100	
			TOTAL	N/A	1650		1650	5550	N/A				
Delivery	Internal transfer	Point J	Shipper 1	600			600		N/A	600			
			Shipper 2	300			300		N/A		300		
			Shipper 3	0			0		N/A			0	
			TOTAL	900	970		900		N/A				
	To distribution	Point F	Shipper 1	N/A			N/A		903	903			
			Shipper 2	N/A			N/A		347		347		
			Shipper 3	N/A			N/A		0			0	
			TOTAL	N/A	1250		N/A		1250				
	To distribution	Point G	Shipper 1	N/A			N/A		2164	2164			
			Shipper 2	N/A			N/A		765		765		
			Shipper 3	N/A			N/A		521			521	
			TOTAL	N/A	3450		N/A	5670	3450				
						change in qty of gas in system		27					
						fuel and vented gas		12					-12
						UFG		-159	Gain	-1167	138	1079	159
										Point J flow/nomination difference			-70
													147

STEP 13 cashout split	STEP 14 c/f mismatch
No cashout on X	
shipper 1	-1167
shipper 2	138
shipper 3	1079
Vector contribu	147

				STEP 6	STEP 7		STEP 8	STEP 9	STEP 10	STEP 11 mismatch			STEP 12
				Nominations	Metering data	GTA inputs	GTA output	Linebalance	Allocation Agent	Shipper 1	Shipper 2	Shipper 3	Vector contribution
PIPELINE Y													
Receipt	Interconnection	Point D	Shipper 1	2000		none traded	2000		N/A	2000			
	(gas from Maui)		Shipper 2	1500		450 sold to shp 3	1050		N/A		1050		
			Shipper 3	N/A		450 bought from shp 2	450		N/A			450	
			TOTAL	3500	4326		3500		N/A				
	Internal transfer	Point J	Shipper 1	600			600		N/A	600			
			Shipper 2	300			300		N/A		300		
			Shipper 3	0			0		N/A			0	
			TOTAL	900	970		900	5296	N/A				
Delivery	To distribution	Point H	Shipper 1	N/A			N/A		9	9			
			Shipper 2	N/A			N/A		11		11		
			Shipper 3	N/A			N/A		6			6	
			TOTAL	N/A	26		N/A		26				
	To distribution	Point I	Shipper 1	N/A			N/A		1298	1298			
			Shipper 2	N/A			N/A		3211		3211		
			Shipper 3	N/A			N/A		471			471	
			TOTAL	N/A	4980		N/A	5006	4980				
						change in qty of gas in system		-193					
						fuel and vented gas		18					-18
						UFG		465	Loss	1293	-1872	-27	-465
										Point J flow/nomination difference			70
													-483

		GJs	$	c/f mismatch
Cashout		426	$3,493.20	
+ve position				
Shipper 1	1293	0	$0.00	1293
-ve position				
Shipper 2	-1872	335	$2,745.29	-1537
Shipper 3	-27	5	$39.60	-22
Vector	-483	86	$708.32	-397
	-2382	426	$3,493.20	-1956

Appendix C – Governance of this document

Gas Industry Co wishes this document to accurately reflect the views of industry participants on what the requirements for gas reconciliation are and how they are managed. It is also necessary to provide arrangements that allow any participant to propose changes, to have that proposal considered and for a new version of the document to be issued if required. These arrangements are described in this Appendix.

Proposing changes

Any person may propose a change to this document by writing to Gas Industry Co describing the proposed change and the reasons why the person believes it is worth making.

Processing proposed changes

On receiving a request to change the document, Gas Industry Co will discuss it with the proposer and seek comment from industry experts before making any changes.

Issuing a revised document

Gas Industry Co will decide whether the document should be changed or not but, regardless of its decision, it will maintain a register of all proposed changes together with a summary of any issues arising. When reissued, the document will be given a revision number and a table of revisions will be included in the document.

Glossary

Allocation Agent	The service provider appointed by Gas Industry Co in accordance with Reconciliation Rules r 7.1
Allocation Group	A defined term in the Reconciliation Rules distinguishing six groupings of meter/data logger/telemetry combination.
Approved Nomination	A defined term in the MPOC meaning a shipper's nomination for a Day at a Welded Point that has been approved by MDL
Balancing and Peaking Pool (BPP)	A mechanism set out in the VTC for allocating balancing gas among Vector and its shippers.
Cash-Out	A term used in the MPOC to refer to a transaction involving the purchase of a Welded Party's gas where its Running Operational Imbalance at a Welded Point exceeds a tolerance amount
Contingency Event	An event or circumstance that has detrimentally affected transmission services or depleted the amount of gas in the Maui pipeline to an unacceptable level, such that the Maui operator has decided to take action under the MPOC
Business Day	A term used in the Reconciliation Rules to mean any day of the week except Saturday, or Sunday, or a statutory holiday, or any other day determined by Gas Industry Co.
Day	A defined term in the MPOC and VTC meaning a period of 24 consecutive hours, beginning at 0000 hours (New Zealand standard time). Sometimes referred to as a 'gas Day' or 'transmission Day'.
Daily Operational Imbalance (DOI)	A term used in the MPOC meaning the difference between the measured flow and the scheduled quantity on a Day.
Gas Transfer Agent	The person who performs the calculations prescribed in a Gas Transfer Agreement.
Gas Transfer Agreement	The MPOC requires that, where a shipper trades gas at a Welded Point, the parties to the trade must have a valid and binding Gas Transfer Agreement whose terms comply with the Gas Transfer Code. However, the VTC has a broader requirement – that any

	shipper transferring gas into its system has a Gas Transfer Agreement (even where it is simply transferring gas to itself). VTC schedule 6 sets out the requirements for Gas Transfer Agreements.
Gas Transfer Code	An industry code setting out arrangements for determining the quantities of gas transferred between shippers.
Large Station	A defined term in the MPOC essentially referring to a stations with a maximum design flow rate of more than 5,000 scm/hr. Large Stations are listed in schedule 8 of the MPOC.
ICP	An installation control point, being the point at which a consumer installation is deemed to have gas supplied.
Mismatch	A defined term in the MPOC meaning the difference between the sum of a shipper's Approved Nominations at receipt points on a Day and the sum of that shipper's Approved Nominations at delivery points on that Day.
Open Access Transmission Information System (OATIS)	The web based system by which the gas transmission businesses of MDL and Vector interact with the pipeline users to operate their open access regimes. Many of the documents referred to in this document can be found on either the Vector public pages of OATIS known as the Vector Information Exchange (Vector IX) or the MDL public pages known as the Maui Information Exchange (Maui IX).
Operational Balancing Agreement or OBA	A defined term in the MPOC meaning an arrangement where each shipper is allocated quantities equal to their Approved Nominations and any imbalance at a Welded Point is managed by the Welded Party.
Points of Transfer	Where gas moves from one system to another, including from gas producer to transmission system; from transmission system to a major user or distribution network (gate station) or from distribution system to end user (ICP)
Running Operational Imbalance (ROI)	A defined term in the MPOC meaning the cumulative imbalance at a Welded Point.
Running Operational Imbalance Limit	A defined term in the MPOC meaning the GJ and % tolerances on Running Operational Imbalances beyond which automatic Cash-Outs occur (the limits are set out in schedule 7 of the MPOC).

Small Station	A defined term in the MPOC essentially referring to a stations with a maximum design flow rate of less than or equal to 5,000 scm/hr. Small Stations are listed in schedule 8 of the MPOC.
Time of Use (ToU)	Refers to GMSs that record the gas quantities that have passed during fixed time intervals, such as every hour or every Day. These quantities are recorded on a data logging device.
Unaccounted-for Gas (UFG)	A residual quantity of gas unaccounted for after all measured quantities of gas entering, leaving and stored is a system are accounted for.
Welded Party	A defined term in the MPOC meaning the owner of assets that are physically connected to the Maui pipeline at a Welded Point.