

# Multinet Gas Asset Management CY2017 - CY2022



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# Capital Growth Plan

CY2017 – CY2022

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## Executive Summary

This document outlines Multinet's Capital Growth Plan for its Gas Distribution Network. It covers both:

- Customer Initiated Capital - Work requested of Multinet from third parties, e.g. network connections; and
- Network Augmentation - Capital programs to ensure the security of supply and maintenance of fringe pressures in accordance with code requirements.

The Gas Distribution System Codes outlines Multinet's obligations for the expansion and operation of its gas distribution network; namely:

- Multinet must, upon request and within specified time periods, connect a customer to the distribution network if it complies with regulatory requirements and on fair and reasonable terms<sup>1</sup>; and
- Multinet is to maintain and manage the supply of natural gas to its customers by taking all reasonable efforts to maintain network pressures above targeted levels – 140 kPa for High Pressure networks<sup>2</sup>.

The Capital Growth Plan outlines Multinet's approach to fulfilling its obligations under the Code and includes capital forecasts for:

- New customer connections to the network;
- Large recoverable works initiated by third parties;
- Customer contributions from works performed; and
- Network augmentation; including mains reinforcement and regulating station capacity upgrades.

Table 0-1 provides the financial summary of the capex which is to be incurred in the calendar year period 2017 to 2022. Table 0-1 includes a breakdown of direct, overheads and labour escalators for the purpose of reconciliation with that of the overview documentations which support our forthcoming Access Arrangement submission (2018-22).

**Table 0-1: Summary of Capital Expenditure (\$'000)**

Program	CY2017	CY2018	CY2019	CY2020	CY2021	CY2022
Customer Connections	\$22,057	\$22,617	\$21,639	\$20,842	\$21,250	\$21,777
Large Recoverable Works	\$5,901	\$5,901	\$5,901	\$5,901	\$5,901	\$5,901
Augmentation	\$4,511	\$4,090	\$5,754	\$3,503	\$1,648	\$1,210
<b>Total Direct Expenditure</b>	<b>\$32,469</b>	<b>\$32,608</b>	<b>\$33,293</b>	<b>\$30,245</b>	<b>\$28,799</b>	<b>\$28,888</b>
Overhead	\$1,948	\$1,956	\$1,998	\$1,815	\$1,728	\$1,733
<b>Subtotal</b>	<b>\$34,417</b>	<b>\$34,565</b>	<b>\$35,291</b>	<b>\$32,059</b>	<b>\$30,526</b>	<b>\$30,621</b>
Real cost escalation	-	\$204	\$186	\$239	\$331	\$380
<b>Total Expenditure</b>	<b>\$34,417</b>	<b>\$34,768</b>	<b>\$35,477</b>	<b>\$32,298</b>	<b>\$30,858</b>	<b>\$31,001</b>

<sup>1</sup> Paraphrased from the Gas Distribution System Code (Version 11).

<sup>2</sup> Refer to Schedule 1, Part A of the Gas Distribution System Code (Version 11).

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# 1. Document Overview

## 1.1. Purpose

This document articulates Multinet Gas' (MG) approach to managing the organic growth of its Gas Distribution Network through:

- The connection of new customers to the network; and
- Augmentation of the network to ensure reliability of supply to all network users.

It has the following objectives:

- Articulate the key areas of focus in relation to asset management, risk, investment, cost and service standard outcomes for network growth activities; and
- Show alignment of asset management practices with Gas Network Objectives.

The document is intended for use by:

- MG staff (and it's contractors); and
- Regulators – Technical, Safety and Economic.

## 1.2. Scope

The Gas Capital Growth Plan documents the Capital Expenditure (capex) requirements for network growth (i.e. new customer connections) and augmentation.

This plan includes forecasts for:

- Network reinforcement to cater for peak load growth of new and existing consumers;
- Regulator capacity upgrades for connection assets at supply points;
- Customer initiated capex including new connections;
- Customer initiated small and large recoverable works; and
- Customer contributions from network connections and recoverable works.

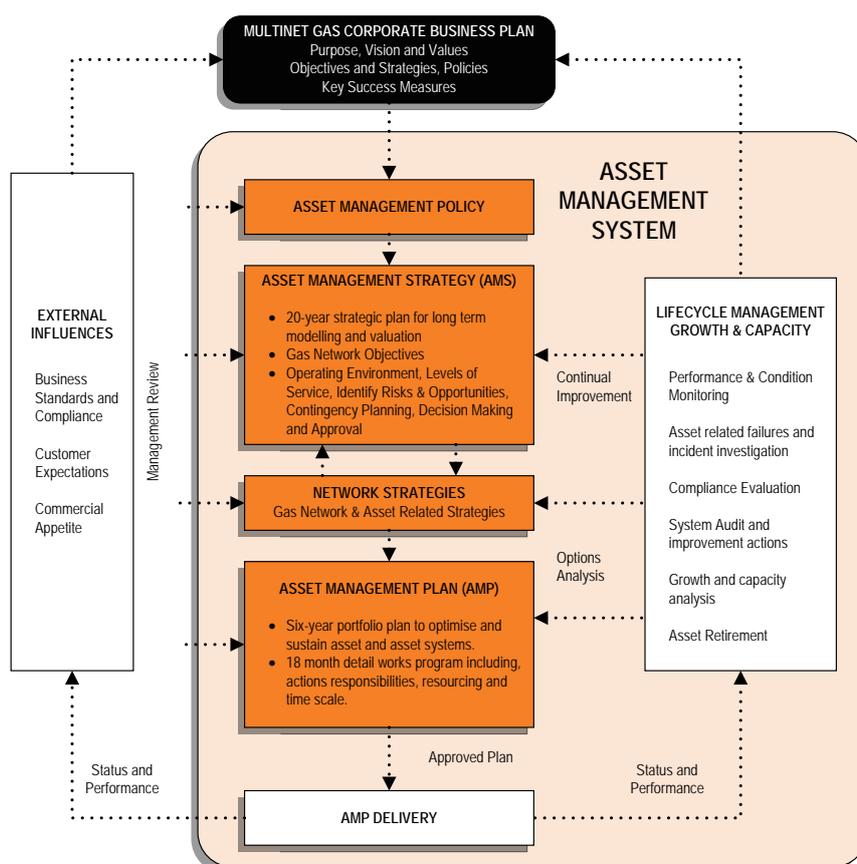
The plans does not cover:

- Proactive and reactive mains replacements – Refer to Distribution Mains Strategy (MG-SP-0009).

### 1.3. Relationship with other key Asset Management documents

The Capital Growth Plan is one of a number of key asset management documents developed and published by MG in relation to its gas network. As indicated in Figure 1-1, Network Strategies - including the Capital Growth Plan - informs both the Asset Management Strategy (AMS) and Asset Management Plan (AMP) of the programs needed to achieve the long-term objectives of the gas distribution network.

**Figure 1-1: Asset Management Framework**



### 1.4. Phasing and Financial Disclosure

All programs are defined in calendar years consistent with reporting requirements of the Australian Energy Regulator (AER) and where applicable the Gas Distribution System Code (GDSC) Version 11.

Where required for conversion to financial year, dollars and volumes can be estimated using a 50:50 expenditure split.

All financial figures quoted within this document - unless otherwise specifically stated - have the following characteristics:

- Real Expenditure / Cost (reference year = 2017);
- Direct Expenditure only (i.e. excludes overheads and finance costs);
- In units of \$1,000 (i.e. '000); and
- All years are denoted in Calendar Year format.

Total values shown in tables and referred to in the text of this document may not reconcile due to rounding.

Conversion factors used in the escalation of historic expenditure to real 2017 equivalent expenditure is provided in Table 1-1. Cumulative conversion factors have been provided by the Multinet Gas Regulatory Department.

**Table 1-1: CPI Conversion Factors**

	2012	2013	2014	2015	2016	2017
CPI Index - \$2017	1.09619	1.07465	1.05192	1.02819	1.01296	1.00000

## 1.5. Data Sources

The following data sources have been drawn upon in development of the Capital Growth Plan

- Multinet Gas Annual Tariff Report 2016;
- Independent Estimates Report – Augmentation & Mains Replacement Projects (Advisian);
- National Institute of Economic and Industry Research (NIEIR) – NIEIR postcode projections;
- APA Metering Strategy 2015 Multinet Gas Meter Sites; and
- GIS/GE Smallworld.

## 1.6. References

Regulations governing the obligations of Distribution companies to provide gas transportation services and therefore impact on the Gas Capital Growth Plan are the:

- Access Arrangements (Multinet Gas Pty Ltd);
- Distribution Licence;
- Gas Distribution System Code Version 11;
- Gas Safety Act 1997;
- Gas Pipelines Act 2005;
- National Gas Law; and
- National Gas Rules.

Other references include

- Multinet Gas Field Regulator Capacity Analysis;
- Multinet Gas Customer Contributions Policy July 2014; and
- Multinet Gas Planning Reports – Refer to Section 5.6.1 for details.

## 1.7. Document Review

This document shall be reviewed every two (2) years or earlier if required. The next review is due on or before 31 December 2018.

## 2. Network Overview

Multinet Gas is the largest distributor (by connection base) of natural gas in Victoria, distributing to over 690,000 customers throughout Melbourne's inner, outer-eastern and south-eastern suburbs. MG also has two regional based networks that currently cover nine townships in the Yarra Valley located in outer eastern metropolitan Melbourne and five townships in South Gippsland Victoria.

MG owns 175 kilometres of licensed transmission pressure pipelines and 9,959 kilometres of distribution mains used to transport gas from the high-pressure transmission network (owned by APA GasNet and BassGas) to residential, industrial and commercial gas users.

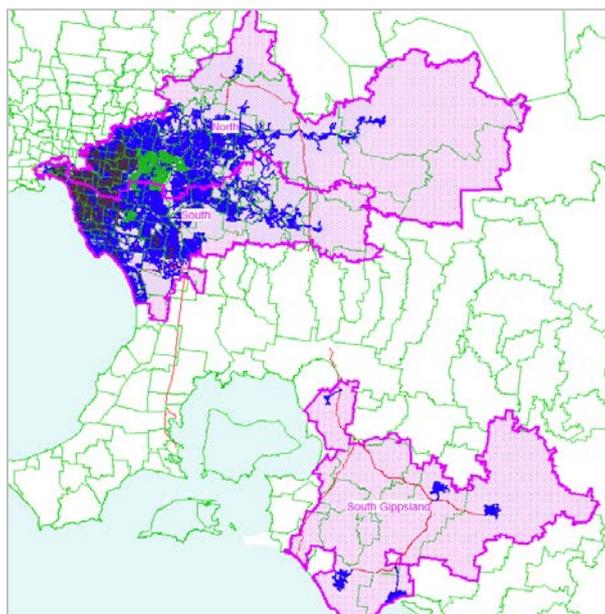
**Figure 2-1: Multinet Gas' Distribution Area**



MG's geographic footprint is surrounded by established regions of supply by other distribution businesses. As a result, MG's main corridors of geographic growth are from the greenfield regions in South Gippsland and Yarra Ranges through the expansion of high pressure distribution mains in each area.

The network experiences stable demand growth from the perspective of additional load from new customers. Demand growth, from new customers, comes in the form of development of infill regions. Customer connection activity is strongly correlated with the level of economic activity and, in particular, building and infrastructure developments. Increasing numbers of high rise developments increase the number of new customers (and load) within a certain areas. As such, for capacity reasons, this promotes the growth of high pressure regions of the network in order to cope with this demand. Figure 2-2 shows the current distribution of high pressure (Blue), medium pressure (Green), and low pressure (Black) systems in the network. It can be seen that the high pressure system dominates the network footprint which caters for the increase in demand over the years.

**Figure 2-2: Multinet Gas' Distribution Networks**



Demand growth may also take the form of increased usage of natural gas by existing customers. MG's network primarily caters to residential customers which has a declining, per capita usage profile. However, there is enough evidence showing that peak demand on the network has been stable, if not increasing which can have many influences.

Industrial and Commercial (I&C) sites are typically high usage customers, but due to the minor proportion of them on the MG network, they do not contribute very significantly to demand growth via increased usage.

## 2.1. Functional Requirements of the Network

MG is a Gas Distribution company. It transports gas for Retail companies, delivering the gas to domestic, industrial and commercial consumers after receiving the gas from upstream transmission companies at Custody Transfer Meters (CTMs).

Consumers receive their gas from a gas network. MG has fifty four (54) network areas that combine to form the MG network, supplying more than 690,000 customers. Network assets used to transport the gas includes transmission pipelines and distribution mains (operating at various pressures), field and district regulators, service pipes, service regulators, billing meters, control systems and associated equipment. These assets are planned to have sufficient capacity to transport during peak loads, which currently occur in winter in the MG supply area.

Growth in demand occurs due to increasing loads of existing consumers and additional loads of new consumers. Therefore new assets are continually required to ensure the distribution network has sufficient capacity to transport the total load and to extend the existing network to distribute gas to new locations. Many capital projects are implemented each year with the objective of fulfilling the requirement of:

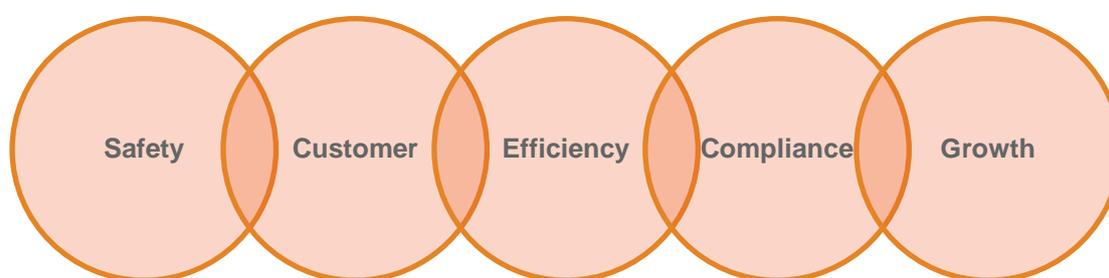
- having sufficient capacity to transport its peak load;
- have capacity to supply the peak hour load that occurs for a probability of 1-in-2 year when operating at normal pressures;
- ensuring Transmission Systems have capacity to supply the peak hour load that occurs in a 1-in-20 year;
- ensuring services including service regulators and meters are planned to have capacity to supply the customers maximum instantaneous load (diversified load).

## 3. Asset Management Drivers

### 3.1. Network Objectives

Multinet Gas has established five (5) network objectives that govern how the network is operated and maintained. This is reflected mostly in regulatory obligations and in some cases prudent and responsible behaviour, justifiable on economic grounds. Achievement of these objectives ensures the sustainable and reliable operation of the gas distribution network.

Figure 3-1: Gas Network Objectives



The alignment between network objectives and the Capital Growth Strategy is detailed below.

#### 3.1.1. Safety – Achieve Zero Harm, while maintaining current levels of network safety

This document does not directly address the safety component of the network objectives as no lifecycle management activities are required. Capital expenditure in this document is purely directed at the upgrade of existing assets or installation of new assets.

#### 3.1.2. Customer – Effortless Customer Experience

This document aims to achieve a high level of customer satisfaction and experience by continually improving reliability of gas supply to the customer. The forecasting of customer connections, contributions and peak demand network augmentations allows us to better plan for network capacity to avoid any unforeseen circumstances that would affect customer satisfaction.

#### 3.1.3. Efficiency – Sustainable and prudent network investment

This document aims to concisely outline the capex work programs from 2017 out until 2022, which coincides with the 2018 to 2022 access arrangement period. These programs intend to provide our shareholders with a sustainable return on their investment while working within regulatory allowances, technical compliance and safety standards. The works planned are subject to economic evaluation to ensure the best economic outcome for the gas consumers. Furthermore, the timing of the works are planned prior to the winter in which forecast load exceeds network capacity.

#### 3.1.4. Compliance – Maintain regulatory and technical compliance

MG aims to comply with the regulations governing gas distribution companies. Regulations that have an impact in the Capital Growth Plan and therefore require compliance are outlined in Section 1.6, p.8.

### **3.1.5. Growth – Seek opportunities for new growth**

This document aims to deliver additional network capacity via reinforcement and supply regulator upgrades. This allows MG to meet and adapt to a changing industry landscape. MG intends to encourage the uptake of natural gas via marketing and increase its understanding of the customer. Furthermore, this document analyses the growth of MG's residential and industrial and commercial customers through external growth forecasts and experts.

### **3.2. Performance Measures**

Multinet Gas has a number of key performance measures that align with the corporate and gas network objectives. Targets are reviewed and benchmarked annually. Measures are typically reported monthly based as actual, target and variance along with the annual target as a year to date cumulative actual and variance.

- SAIFI (System Average Interruption Frequency Index) – measured as a cumulative target of 16.2 interruptions per thousand end users;
- USAIDI (System Average Interruption Duration Index) - has a regulatory target of 5 minutes per consumer per annum; and
- Customers with >3 unplanned interruptions per annum – measured as a cumulative target of 300 customer per annum.

## 4. Customer Initiated Capital

### 4.1. Introduction

Customer initiated capital – as the name suggests – is work conducted on the network by MG (including service providers) at the request of a third party. Customer initiated capital includes:

- New customer connections (Section 4.2); and
- Recoverable works (Section 4.3).

It does not include the suite of Ancillary Reference and Non-reference services offered by MG through its Access Arrangement.

A forecast of customer contributions resulting from customer initiated capital projects is provided in Section 4.4.

### 4.2. Customer Connections

#### 4.2.1. Overview

Customer connection capex is required to establish new connections to the network. This includes the installation of new mains, the gas service pipe from the main to the meter, and the meter itself.

As of 31 December 2015, MG had 690,975 active connections to the distribution network, broken down to:

- 675,018 Tariff V residential connections (97.7% of all connections);
- 15,680 Tariff V Industrial & Commercial connections (2.3%);
- 14 Tariff L connections (0.002%); and
- 263 Tariff D connections (0.04%).

Each year, MG spends in the vicinity of \$21M to \$23M (Direct) connecting circa 9,000 residential and circa 450 I&C customers to the network. This equates to a relatively slow net growth of 0.5% when abolishment is taken into consideration.

#### 4.2.2. Regulatory Obligations

MG has a regulatory obligation to offer to connect customers to its gas distribution system, which arises under its Gas Distribution Licence and the Gas Distribution System Code as mentioned under Compliance in the Network Objectives. In summary, MG must, upon request and within specified time periods, connect a customer to the distribution network if it complies with regulatory requirements and on fair and reasonable terms<sup>3</sup>. The code also specifies the minimum standards for connection and disconnection of customers to the distribution network

#### 4.2.3. Connection Types

MG has three reference tariffs covering all connections to the network – Tariff V, Tariff D and Tariff L.

- **Tariff V Connections**

Tariff V applies to customers using less than 10,000 Giga Joules (GJ) a year and less than 10 GJ Maximum Hourly Quantity (MHQ). Within Tariff V there are two classifications: Residential and Non-Residential. Any

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<sup>3</sup> Paraphrased from the Gas Distribution System Code (Version 11).

new customer eligible for Tariff V is assigned their appropriate residential or non-residential classification by their Retailer.

Tariff V customers are charged a fixed daily charge and a price per GJ which decreases with increased usage. Both Residential and Non Residential Tariff V customers have seasonal usage charges (\$/GJ) for Off Peak (November-April incl.), Shoulder (May & October) and Peak (June-September incl. periods).

Tariff V connections are subject to an Economic Feasibility Test (EFT) as set out in the Extension and Expansions Policy detailed in section 5.5 of Part A of Multinet Gas's Access Arrangement<sup>4</sup>. In simplistic terms, the EFT compares the forecast future revenue created from a new connection (discounted to present value) against the cost of connection. An upfront contribution is payable by the connecting customer if forecast revenues (in PV terms) are below the cost of connection – up to the cost of connection.

- **Tariff D Connections**

Tariff D applies to customers using greater than 10,000 GJ a year or more than 10 GJ MHQ. Customers are charged based on their MHQ measured in GJ per hour applied across two usage blocks.

Connection of a Tariff D Distribution Supply Point are provided as a non-Reference Service, with fair and reasonable costs of connection for dedicated assets charged to the connecting customer as an upfront contribution.

- **Tariff L Connections**

Tariff L is open to customers who consume more than 1,000 GJ per annum or less than 10,000 GJ per annum and have an MHQ demand of less than 10 GJ per hour.

Tariff L is a mixture of the Tariff V and D tariff structures. Tariff L has no fixed charge; however it contains seasonal stepped usage charges and two demand charges. There are currently two usage blocks for Tariff L customers:

Tariff L contains seasonal charges (as with Tariff V) and also Demand Charges (as with Tariff D).

As with Tariff D, connection of a Tariff L Distribution Supply Point are provided as a non-Reference Service, with fair and reasonable costs of connection for dedicated assets charged to the connecting customer as an upfront contribution.

A summary of Connection Tariffs is provided in Table 4-1.

**Table 4-1: Customer Connection Types**

Tariff Type	Connection Type			Customer Contribution?
	Residential	Commercial	Industrial	
Tariff V	✓	✓	✓	Based on EFT
Tariff D	-	✓	✓	Connection Assets: 100% Contribution Shared Assets: EFT
Tariff L	-	✓	✓	Connection Assets: 100% Contribution Shared Assets: EFT

<sup>4</sup> Gas Access Arrangement Review 2013-2017 Part A – Principal Arrangements

#### 4.2.4. Historical Performance

Connections are initiated by, and carried out at the request of, customers.

Customer connection activity is strongly correlated with the level of economic activity and, in particular, building and infrastructure developments. Most Residential and I&C Connections capex is therefore based on econometric drivers. The timing and level of customer connection projects are largely outside of MG's control.

Customer connections involve establishing new connections or modifying or extending the existing distribution system to accommodate new customers' demand.

Customer connections are undertaken in accordance with the Gas Distribution System Code on a least cost technically acceptable basis.

In the majority of circumstances (Tariff V), customer connections are delivered through a series of "unitised job", rather than as a single project. These unitised jobs are undertaken by one of MG's contracted service providers, Comdain and ZNX, or a sub-contractor acting on their behalf. The exception to this is for connection of very large customers (Tariff D and L) where a project may be established to track and bundle expenditure items.

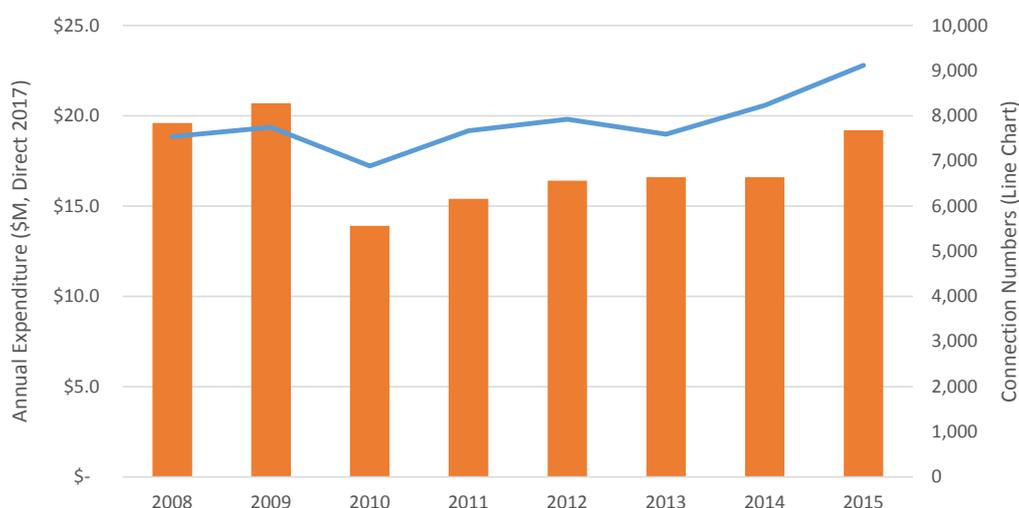
A summary of actual expenditure, by Tariff, is provided.

##### **Tariff V – Residential Connections**

Residential connections (Tariff V) contributes 80% - 90% of customer connection capex in any one year. In 2015, \$18.1M (Direct) was spent on connecting 9,115 new residential customers. The unit rate of approx. \$2,000 per connection has been flat (with slight annual variation) since 2010. The decline from 2008 to 2010 is attributed to capex allocated to the South Gippsland Project which was approaching its tail end.

An increasing trend in gross connection is seen since 2010 as shown in Figure 4-1.

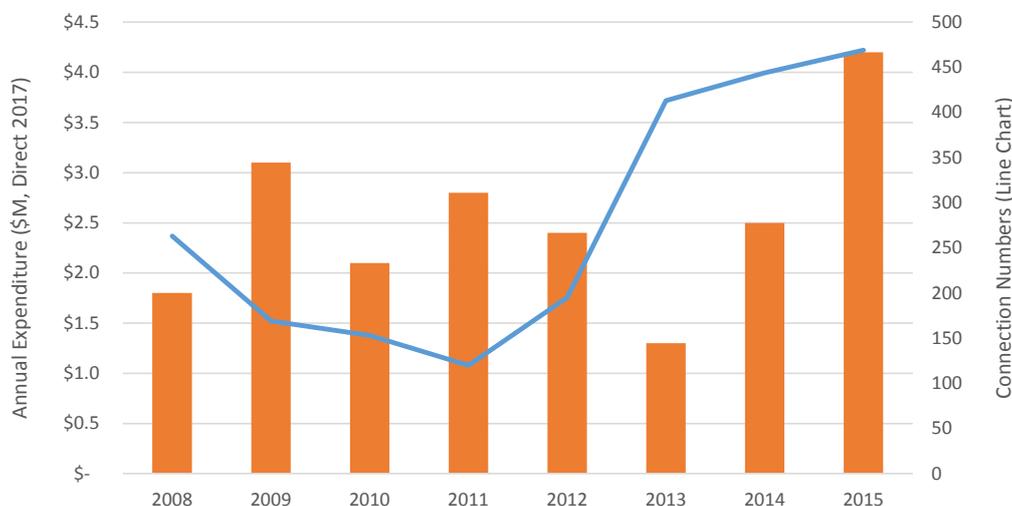
**Figure 4-1: Tariff V - Residential Connections & Expenditure – 2008 to 2015**



##### **Tariff V – Industrial & Commercial Connections**

Since 2013, MG has connected 400 to 450 new I&C customers per annum as shown in Figure 4-2. Unit rates, when compared to residential connections, is heavily influenced by the mix of work in any given year, resulting in annual variations in unit rates. Relatively small variations in the number of large units significantly impacts annual costs. In 2015, the unit rate for I&C connections was \$8,955.

**Figure 4-2: Tariff V - Industrial & Commercial Connections & Expenditure – 2008 to 2015**



### **Tariff D – Industrial & Commercial Connections**

MG’s annual expenditure for Tariff D connections has been consistent at approximately \$500k p.a. since 2013. Given the low volume and unique natural of Tariff D commercial and industrial connections, Tariff D capex is forecast with reference to historical spend (Refer to Section 4.2.6, p.16).

#### **4.2.5. Business Drivers and Strategic Alignment**

Connecting new customers is reflected in MG’s network objectives through:

- **Customer:** By forecasting customer connections and growth, MG can plan for reinforcement projects to ensure a reliable supply to the customer;
- **Growth:** The continuous addition of the customers to the network is the prime driver behind growth of the network. In forecasting volumes and expenditure, MG is better placed to analyse their position on the market and strategise on how to maximise growth; and
- **Compliance:** As mentioned before, MG has a regulatory obligation to offer to connect customers to its gas distribution system, which arises under its Gas Distribution Licence and the Gas Distribution System Code. MG must, upon request and within specified time periods, connect a customer to the distribution network if it complies with regulatory requirements and on fair and reasonable terms.

#### **4.2.6. Works Program**

MG’s capex forecast for customer connections is summarised in Table 4-2 and profiled in Figure 4-3 and aligns with the connections types outlined in Section 4.2.3 (p. 13).

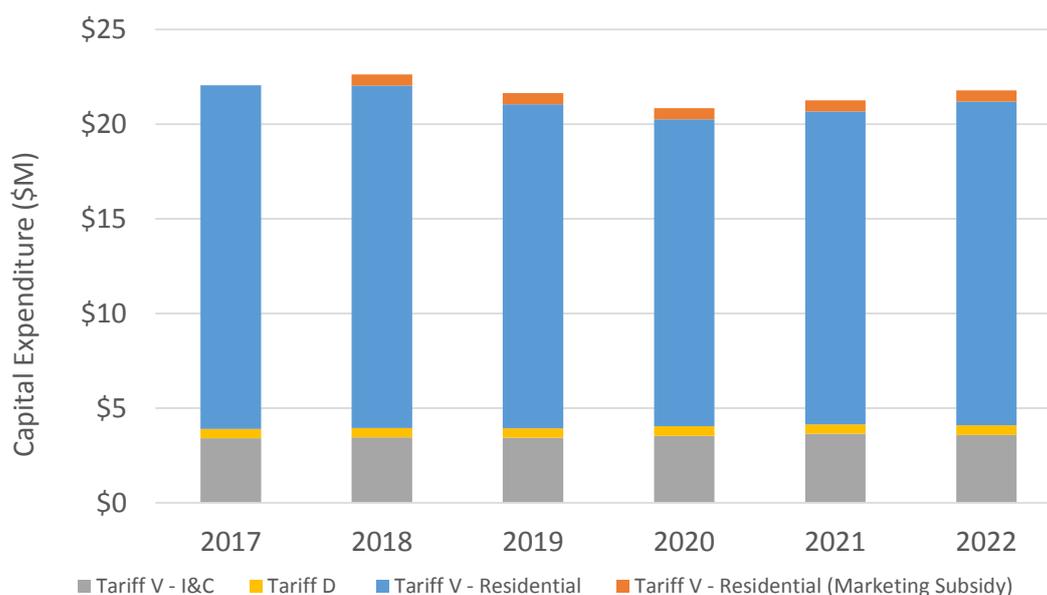
An average of \$21.7M per annum is forecast for customer connections (both Residential and I&C) over the period 2017 – 2022. This peaks in 2018 at \$22.6M but is expected to ease (slightly) with \$20.8M forecast for 2020. Annual variations in expenditure is driven by the forecast of Residential (Tariff V) connections – I&C connection forecast remains stable.

A breakdown of each Connection Type is provided in section (A) through (D).

**Table 4-2: Customer Connections – Expenditure Summary**

Program / Connection Type	2017	2018	2019	2020	2021	2022
Tariff V – Residential Connections	\$18,146	\$18,071	\$17,106	\$16,204	\$16,511	\$17,099
Tariff V – Residential Connections (Marketing Subsidy)	-	\$588	\$588	\$588	\$588	\$588
Tariff V – Industrial & Commercial Connections	\$3,409	\$3,455	\$3,442	\$3,547	\$3,648	\$3,587
Tariff D – Industrial & Commercial Connections	\$502	\$502	\$502	\$502	\$502	\$502
<b>Total Direct Expenditure</b>	<b>\$22,057</b>	<b>\$22,617</b>	<b>\$21,639</b>	<b>\$20,842</b>	<b>\$21,250</b>	<b>\$21,777</b>

**Figure 4-3: Customer Connection – Expenditure Summary**



### **Forecasting Approach**

Two approaches have been adopted to forecast customer connection capex.

#### ***(1) Unitised job forecasts – For Tariff V connections***

The connection of Tariff V customers is done through a series of “unitised jobs”, rather than by delivering a single consolidated project. Each customer connection therefore comprises a series of unitised jobs.

The forecast of Tariff V connection is derived by forecasting the volume of unitised jobs (Activity Codes) over the forecast period with reference to growth indices. Contracted unit rates are applied to forecast volumes to derive total expenditure forecasts.

Using this approach the forecast volume of connections (for domestic and I&C) is inferred by the volume of new meter connections to the network each year.

Refer to the Appendix (Section 6.2, p.35) for further details on this forecasting approach.

(2) *Historical average expenditure – For Tariff D connections*

Given the low volume and unique nature of Tariff D connections expenditure forecasts are based on the three year average expenditure (in real terms) for this category of connections.

**(A) Tariff V – Residential Connections**

MG's forecast for Tariff V – Residential Connections is provided in Table 4-3.

Tariff V Residential connections contribute greater than 80% of MG's forecast for connection capex. Annual variation in expenditure is caused by forecast fluctuations in connection volumes.

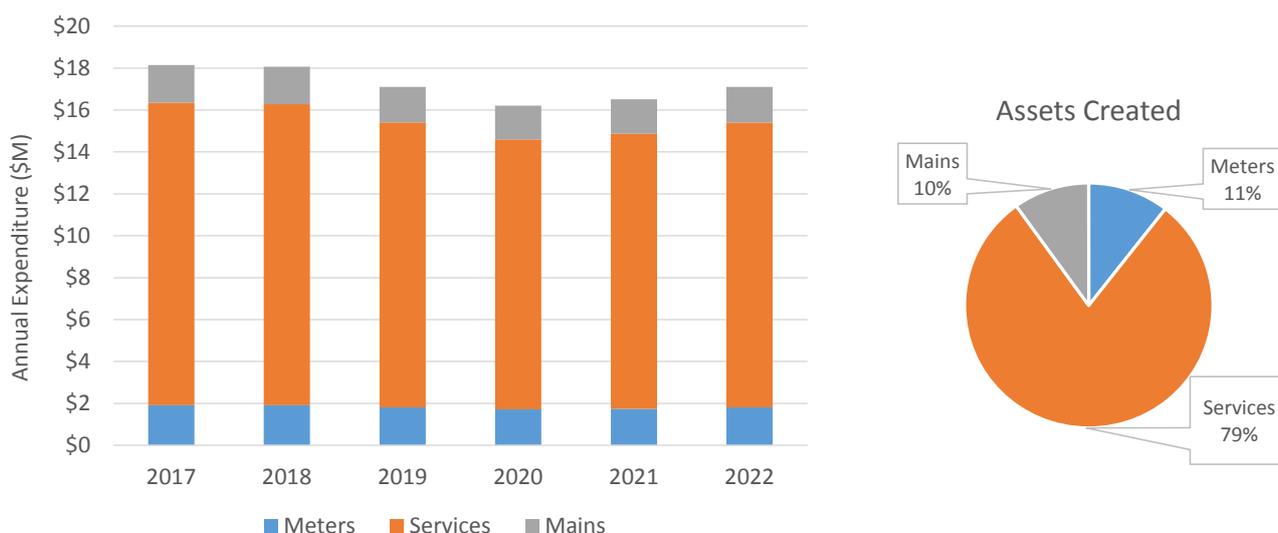
**Table 4-3: Customer Connections - Tariff V - Residential**

		2017	2018	2019	2020	2021	2022
Tariff V – Residential Connections	Connections	8,669	8,633	8,173	7,741	7,888	8,169
	\$ / Connection	\$2,093	\$2,093	\$2,093	\$2,093	\$2,093	\$2,093
Total Direct Expenditure		<b>\$18,146</b>	<b>\$18,071</b>	<b>\$17,106</b>	<b>\$16,204</b>	<b>\$16,511</b>	<b>\$17,099</b>

The consolidated unit rate for per residential connection is approx. \$2,093 – stable for the period. Almost 80% of this cost is driven from the installation of a new service (dedicated asset); with the remaining split equally between meter costs (dedicated asset, 11%) and a per connection share cost of the distribution main (10%) in the street.

The expenditure profile and asset segregation (Mains, Services & Meters) for residential connections is summarised in Figure 4-4.

**Figure 4-4: Tariff V Residential Connections – Assets Created**



### **(B) Tariff V – Residential Connections (from Marketing Subsidy)**

MG is proposing to introduce a Marketing Subsidy from 2018 to encourage the uptake and use of natural gas by new and existing customers.

The marketing subsidy is expected to result in 281 additional connections to the network per annum from 2018 – as shown in Table 4-4. This equates to 1,405 additional connection (above baseline) over the 2018 to 2022 Access Arrangement period (2018-22).

The Marketing Subsidy will have no impact on I&C connection volumes.

**Table 4-4: Marketing Subsidy Impact – Gross Residential Connections**

Program	2017	2018	2019	2020	2021	2022
Tariff V – Residential Connections	8,669	8,633	8,173	7,741	7,888	8,169
Tariff V – Residential Connections (with Marketing Allowance)	-	8,914	8,454	8,022	8,169	8,450
Marketing Subsidy impact (Difference)	-	281	281	281	281	281

The impact of the marketing subsidy on of capital forecast has been calculated by applying the implied unit rate per residential connection as derived from the unitised jobs forecast by the additional forecast of connections (281 per annum).

**Table 4-5: Marketing Subsidy Impact – Residential Connection Expenditure**

		2017	2018	2019	2020	2021	2022
Tariff V – Residential Connections	Connections	-	281	281	281	281	281
	\$ / Connection	-	\$2,093	\$2,093	\$2,093	\$2,093	\$2,093
Total Direct Expenditure			<b>\$588</b>	<b>\$588</b>	<b>\$588</b>	<b>\$588</b>	<b>\$588</b>

### **(C) Tariff V – Industrial & Commercial Connections**

MG's forecast for Tariff V – Industrial & Commercial Connections is provided in Table 4-6.

Tariff V I&C connections contributes approx. 16% of MG's forecast for connection capex. Annual variation in expenditure is caused by forecast fluctuations in connection volumes, although this is relatively stable for the period.

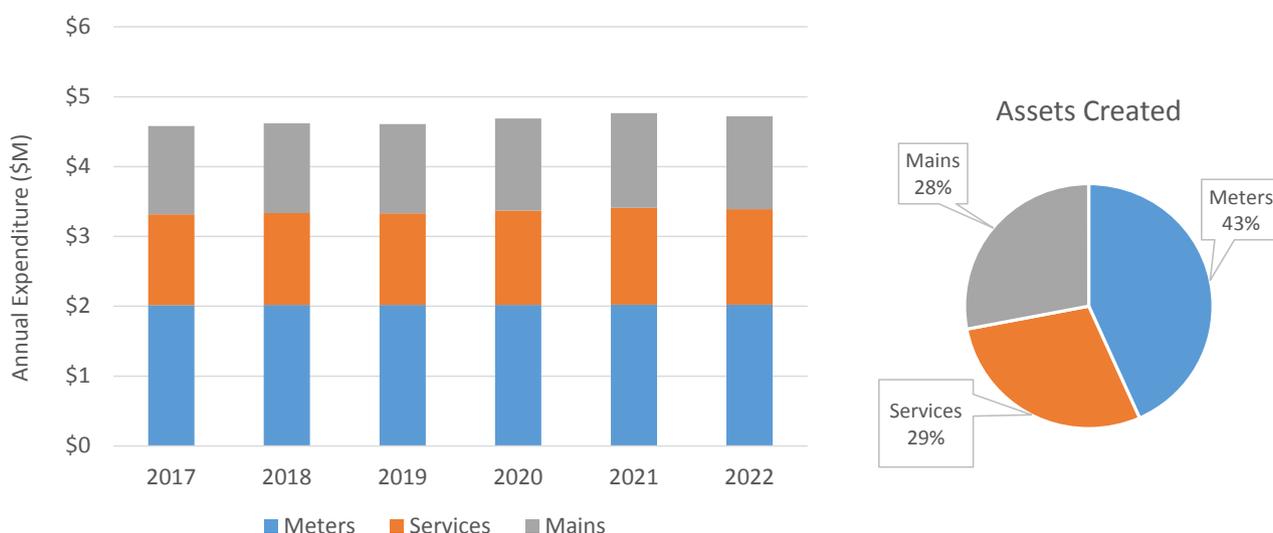
**Table 4-6: Tariff V – I&C Connection Expenditure Forecast**

		2017	2018	2019	2020	2021	2022
Tariff V – Residential Connections	Connections	414	420	418	431	443	436
	\$ / Connection	\$8,234	\$8,227	\$8,234	\$8,229	\$8,236	\$8,228
Total Direct Expenditure (\$'000)		<b>\$3,409</b>	<b>\$3,455</b>	<b>\$3,442</b>	<b>\$3,547</b>	<b>\$3,648</b>	<b>\$3,587</b>

The expenditure profile and asset segregation (Mains, Services & Meters) for Tariff V – Industrial & Commercial connections is summaries in Figure 4-5. Unlike Residential connections (where 80% of the unit rate is driven by

Service costs), the unit rate for I&C connections is spread more equally across the three asset classes with Meters contributing – on average - 43% of the unit rate.

**Figure 4-5: Customer Connections - Tariff V I&C Connections**



**(D) Tariff D – Industrial & Commercial Connections**

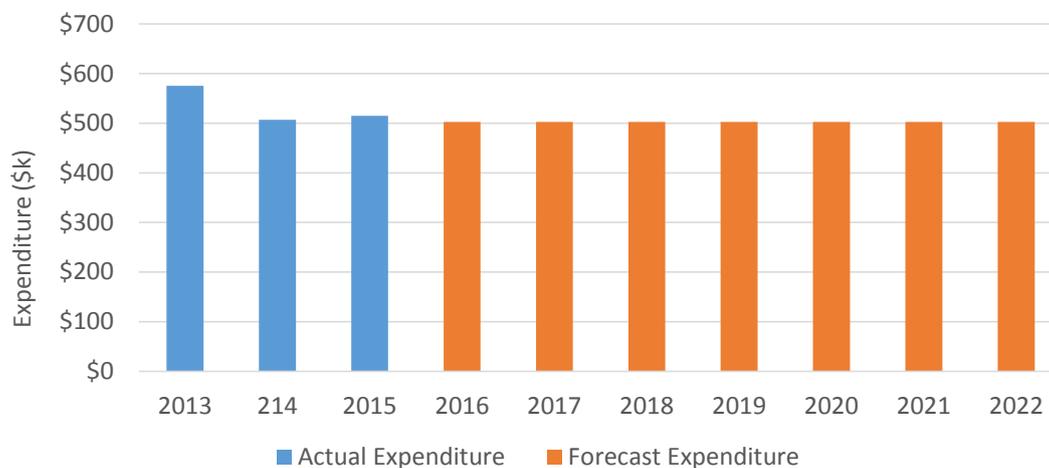
Given the low volume and unique nature of Tariff D industrial and commercial connections, Tariff D capex is forecast with reference to historical spend.

A constant \$0.5M p.a. is forecast for the period, as shown in Table 4-7 and profiled in Figure 4-6.

**Table 4-7: Tariff D – I&C Connection Expenditure Forecast**

		2017	2018	2019	2020	2021	2022
Tariff D– I&C Connections	Expenditure	\$502	\$502	\$502	\$502	\$502	\$502

**Figure 4-6: Customer Connections – Tariff D**



### 4.3. Recoverable Works

#### 4.3.1. Overview

Recoverable works relate to the relocation of assets undertaken at the request of a customer or some other third party. Recoverable works, broadly split between large (>\$100k) and small (<\$100k) typically have the objective of maintaining the existing level of service of the affected asset.

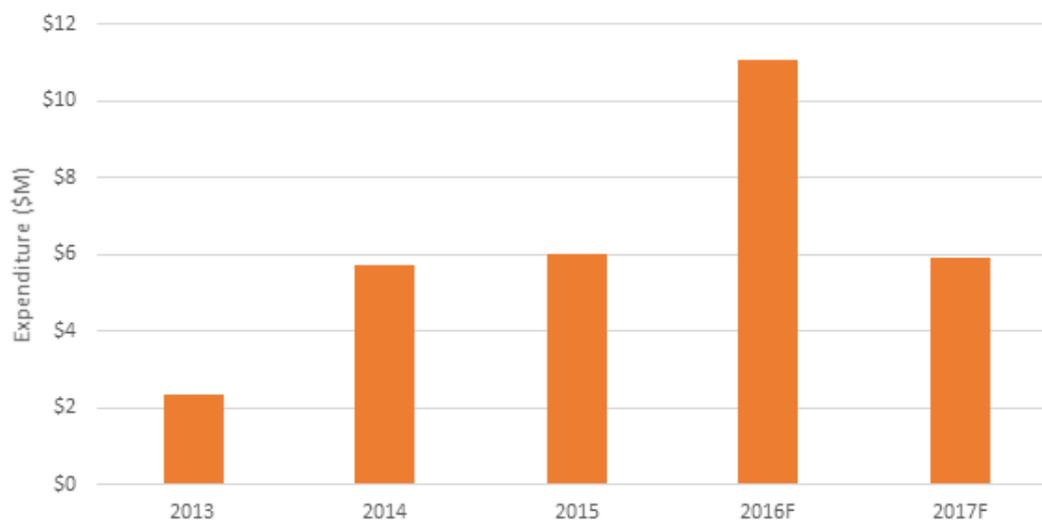
The costs of such works are recovered (partially or in full) from the third party who requests them, not through reference tariffs.

Expenditure can vary significantly from year to year. Recoverable works can originate from many sources including government initiatives, utilities, developers, industry, commercial and domestic customers and councils.

#### 4.3.2. Historical Performance

Figure 4-7 summarises the historical expenditure in calendar year resulting from recoverable works. The figure displays recoverable works expenditure as a whole though it covers a broad range of projects loosely categorised into small recoverable works and large recoverable works. The increased expenditure in 2016 is due to increased activity in rail crossing removals. Forecasts for both 2016 and 2017 were determined on the basis of identified works and finalised contractual agreements with third parties.

**Figure 4-7: Recoverable Works Expenditure**



### 4.3.3. Business Drivers and Strategic Alignment

Due to the varied nature of the assets associated with recoverable works, the drivers for expenditure are in alignment with all of MG's objectives, with particular emphasis on "Customer" as we aim to provide a reasonable cost and efficient service to the requesting 3<sup>rd</sup> party.

- **Safety:** The works carried out for the customer or third party need to be carried out within safety regulations and standards while providing a safe environment for the needs of the customer/third party;
- **Customer:** Recoverable works are undertaken at the request of customers. Customer contribution is based on the least cost technically acceptable price;
- **Efficiency:** Works of this nature are not considered business as usual works and may impact productivity;
- **Growth:** There is potential for collaboration with third parties in devising new methods in achieving a solution.
- **Compliance:** MG has a requirement to undertake recoverable works as part of its Distribution Licence. All works are carried out such that the asset remains compliant to its relevant standard/regulation.

### 4.3.4. Works Program

Table 4-8 summarised MG's forecast for Recoverable Works for the forecast period. MG's forecast is based on the average actual expenditure incurred for this works category in 2014 and 2015. Expenditure beyond 2014 does not reflect the current economic environment as there are an increasing volume of road and rail infrastructure work.

**Table 4-8: Capital Forecast - Recoverable Works**

Program	2017	2018	2019	2020	2021	2022
Recoverable works	\$5,901	\$5,901	\$5,901	\$5,901	\$5,901	\$5,901
Total Direct Expenditure	<b>\$5,901</b>	<b>\$5,901</b>	<b>\$5,901</b>	<b>\$5,901</b>	<b>\$5,901</b>	<b>\$5,901</b>

## 4.4. Customer Contributions

### 4.4.1. Overview

Some customer connections and recoverable works are funded (in whole or part) directly by customers who request them. The quantity of contribution is dependent on the connection type and the required works to be performed. All customer contributions are “cash” contributions and MG does not receive contributions in the form of gifted assets as no other party builds assets and gifts them to operate and maintain.

All Customer Contributions are calculated in accordance with MG’s “Gas Customer Contributions Policy”. This policy is developed in accordance with the Gas Distribution System Code.

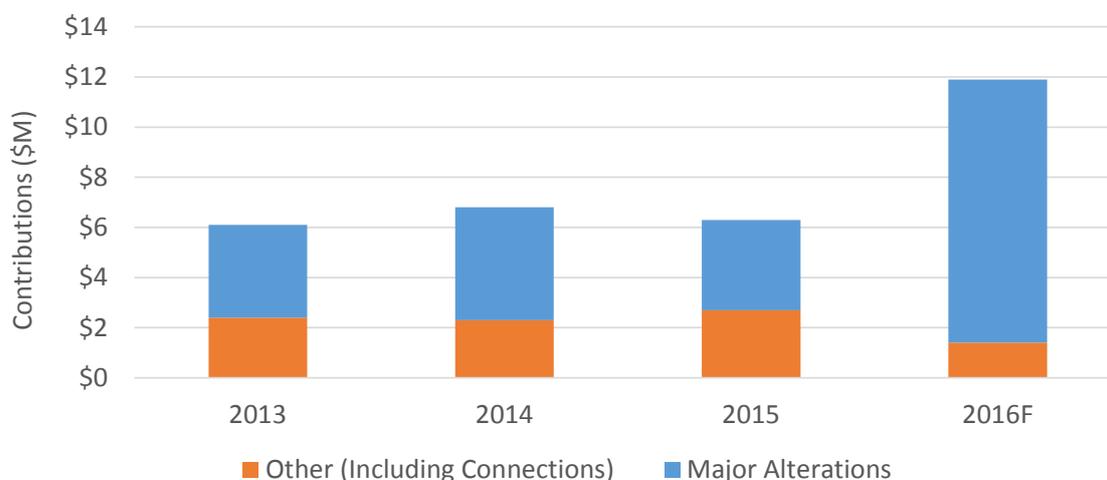
For **Tariff V connections**, MG receives contributions from customers where there exists a capital shortfall on the EFT.

For **Tariff D connections**; **Tariff L connections** and **recoverable works**, the requesting party contributes 100% of the cost associated with all dedicated connection assets. Shared assets are subject to the EFT.

### 4.4.2. Historical Performance

Figure 4-8 summarises the received customer contributions from large recoverable works and connections from 2013 to 2016 (forecast). The increased proportion of contributions from Large Recoverable works is driven by the increased activity in road and rail infrastructure work (LXRA, MMRA, etc.) impacting MG’s assets in the distribution area.

**Figure 4-8: Customer Contributions – Historical Performance**



### 4.4.3. Contribution Forecast

MG's forecast for customer contributions is summarised in Table 4-9.

Customer contributes from new customer connections is expected to be \$2M p.a. over the forecast period. Contributions from Major Alterations is forecast at \$14M in 2017, but declines to \$7M p.a. (the average from 2013-17) from 2018.

**Table 4-9: Customer Contributions**

	2017	2018	2019	2020	2021	2022
Major Alterations	\$13,700	\$7,100	\$7,100	\$7,100	\$7,100	\$7,100
Other (Including Connections)	\$1,500	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000
Total Direct Expenditure	<b>\$15,000</b>	<b>\$9,100</b>	<b>\$9,100</b>	<b>\$9,100</b>	<b>\$9,100</b>	<b>\$9,100</b>

## 5. Network Augmentation

MG has an obligation to maintain and manage the supply of natural gas to its customers. This obligation is found in the regulatory instruments governing the operation of the Gas Distribution network and is aligned the MG's Gas Network Objectives.

Models that forecast gas consumption are used to identify the need for future network augmentation to ensure the security of supply and maintenance of fringe pressures in accordance with code requirements.

MG' Augmentation capex comprises:

- **Network Reinforcement** – the installation of new gas mains to reinforce areas of poor supply;
- **Network Regulator Capacity Upgrades** – the upgrading of regulating stations to allow for increased throughput of a station; and
- **New Network Regulating Stations** – the construction of new network supply points to allow for additional feeds to our networks.

MG's forecast for network augmentation is contained in Section 5.7 (p.30).

### 5.1. Regulatory Obligations

MG has an obligation to maintain and manage the supply of natural gas to its customers in accordance with the Gas Safety Case (which complies with the *Gas Safety Act 1997* and the *Gas Safety Regulations 2008*) and the Gas Distribution System Code.

In particular, Schedule 1 of Part A of the GDSC requires MG to use all reasonable endeavours to maintain sufficient network pressures above the targeted levels detailed in Table 5-1.

**Table 5-1: Minimum network pressures required under the Gas Distribution System Code**

Network Pressure	Minimum Obligated Pressure (kPa)
Low Pressure	1.4
Medium Pressure	15
High Pressure	140
High Pressure 2	600

### 5.2. Planning Objectives

Fifty four (54) individual gas network areas combine to form MG's Gas Distribution network. Each network has the over-riding objective to provide sufficient capacity to transport gas during peak periods. Networks are designed with sufficient capacity (when operating at normal pressures) to maintain supply to all customers during a peak demand event with a probability of occurring once every two years. All identified augmentation is completed prior to the winter in which the forecast load is forecast to exceed the network capacity.

By contrast, transmission systems are typically designed to have capacity to supply the peak hour load that occurs for a probability of once in 20 years.

### 5.2.1. Mains Replacement

In the long term, MG plans for all Low Pressure (LP) networks to be upgraded to High Pressure (HP) standard. All new mains and services are constructed to HP standard where practical and economic, even though these mains and services may continue to be operated at LP for some time before their pressure is increased. The preferred method for increasing the capacity of LP and Medium Pressure (MP) networks is by upgrading part or all of a network to HP. Augmentation of LP and MP networks is therefore generally avoided, though in some cases upgrading to HP is not an economically viable option due to distances to the existing HP network.

Where there is an overlap in the planning of assets required for growth purposes, and assets required for replacement purposes, then growth assets take precedence. Planning for growth is not compromised to any significant degree by proactive asset replacement.

Refer to Multinet Gas' Distribution Mains Strategy (MG-SP-0009) & Distribution Services Strategy (MG-SP-0010) for details on MG's mains and services replacement strategies.

### 5.3. Business Drivers and Strategic Alignment

The need for network augmentation is reflected in MG's network objectives through:

- **Customer:** Augmentation projects are designed to ensure a continuous and reliable supply of natural gas in the network. This in turn ensures that customers do not experience a gas outage as a result of poor pressure supply within the network; and
- **Compliance:** MG is required by the Gas Distribution System Code to maintain minimum pressures in the network. Augmentation projects aim to maintain these minimum pressures through winter testing and planning for works prior to the winter where forecast loads are expected to exceed network capacity.

### 5.4. Planning Methodology

MG's distribution network is continually changing due to residential growth and industrial and commercial development. MG continually monitors the performance of its networks and applies calibrated computer simulated models to predict future performance, subject to growth and demand forecasts. Models are based on 1-in-2 winters' peak day (also known as a 14.21<sup>5</sup> Effective Degree Day (EDD)). This standard is based on the system coincident peak day with a 50% probability of exceeding this value in any given year.

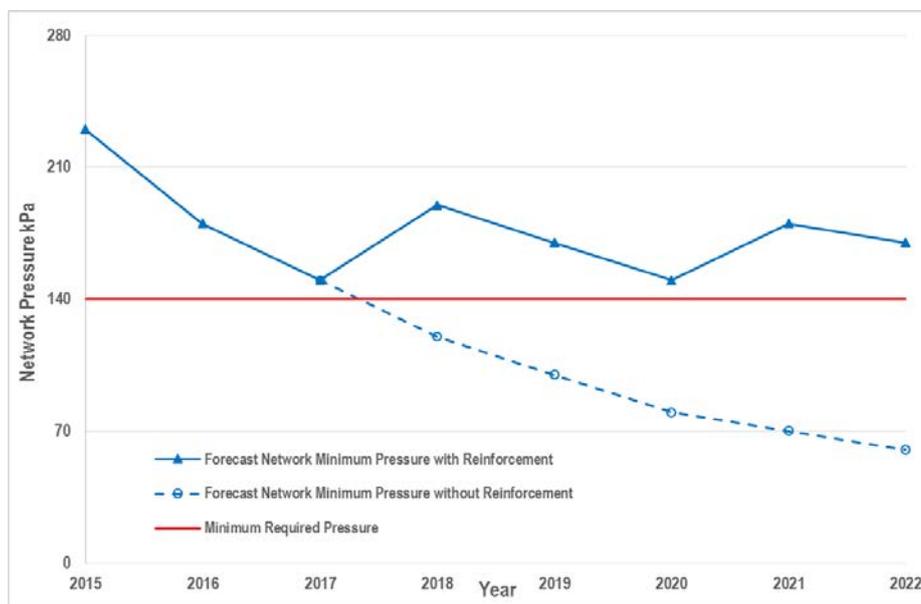
MG's Network Planning group identifies necessary augmentation by simulating forecast growth and demand, which in turn determines the appropriate timing of individual projects. Augmentation projects are scoped and delivered prior to the winter in which the load is forecast to exceed network capacity, ensuring MG remains compliant with its obligations under the GDSC.

Figure 5-1 provides an example of a typical network analysis that highlights the benefits of augmentation, in terms of minimum network pressures. In the figure, if augmentation was not completed in 2017 minimum network pressures would continue to deteriorate potentially resulting in customer outages during times of peak demand.

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<sup>5</sup> AEMO 2012 Review of The Weather Standards For Gas Forecasting

**Figure 5-1: Example of resulting network pressures with and without identified augmentation**



### 5.4.1. Synergi Gas Software

MG employees use Synergi Gas for Computational Fluid Dynamic (CFD) modelling of the gas network. Most models are “steady state” (in line with industry practice) but “transient” modelling does occur (where required) for Transmission pipelines where line pack becomes material.

### 5.4.2. Winter Testing Program

A major input to Network Planning (and identification of required augmentation) is the winter testing program. This is a detailed pressure monitoring program that is conducted at selected locations across the network during peak load conditions. Winter testing data is analysed and used to ensure the accuracy of network models. Gas pressures at the fringe of the network are projected forward by reference to current recorded pressures and forecast load growth. This process is used to identify network augmentation requirements to ensure that network fringe pressures remain above required minimum levels even in peak load conditions. Network models are validated periodically, or as required, including following a major augmentation project on the network.

### 5.4.3. Effective Degree Day (EDD)

The EDD is extensively used in Victoria and is based on research of the impact of weather on Victorian residential gas demand. It is used extensively in the winter testing program (see above) to allow for calibration of network models to replicate scenarios of high network demand.

EDD is a composite measure of weather coldness and incorporates the effect of temperature, wind, sunshine and time of the year.

**Figure 5-2: Effective Degree Day Calculation**

$$EDD = 18 - T + [(0.038)(DD)(Avg. Wind)] - [1.8(Sunshine Hours)] + 2Cos\left[2\pi\left(\frac{day - 200}{365}\right)\right]$$


The diagram illustrates the components of the Effective Degree Day (EDD) calculation formula. Brackets below the formula group terms into four categories:

- Temperature Effect:**  $18 - T$
- Wind Chill Factor:**  $[(0.038)(DD)(Avg. Wind)]$
- Warming effect of Sunshine:**  $- [1.8(Sunshine Hours)]$
- Seasonal factor:**  $+ 2Cos\left[2\pi\left(\frac{day - 200}{365}\right)\right]$

DD = Degree day =  $18 - T$ .

T = average of 8 three-hourly Melbourne temperature readings. Times dependent on the variation of EDD formula used.

EDD = 0 if the calculated value is negative.

The EDD value will be higher as the temperature gets colder. Eighteen (18) degrees Celsius represents the threshold temperature for residential heating.

An EDD of 14.21<sup>6</sup> currently represents a 1-in-2 winter peak day of which MG uses to model network performance. This coincides with a peak day with a 50% probability of exceeding this value in any given year.

## 5.5. Demand Forecasting

MG uses a forecast of peak hour gas loads in each year (based on a weather probability of 1-in-2 years) as the basis for determining required network Augmentation. Peak loads are estimated using historical trends, knowledge of system load changes and forecast data from earlier year projections. This forecast is sense checked against the latest forecast peak day loads by the National Institute for Economic and Industry Research (NIEIR) using econometric modelling for different economic growth rate scenarios and prudently revised in the light of current economic circumstances.

The NIEIR forecast data and report are based on an econometric model from which growth rates in consumer numbers and energy consumption were produced for low, medium and high economic growth scenarios, for Tariff V residential, Tariff V industrial/commercial and Tariff D consumer classes. These growth rates were applied by NIEIR to the standardised actual data to produce the forecast customer numbers and maximum daily and hourly consumption for each year in the forecast period.

## 5.6. Forecast Augmentation Projects

The need for network augmentation is identified by the Network Planning department and is the outcome of extensive modelling activities which identifies the need and timing of each project. Projects are proposed after completion of capacity, risk and economic assessments.

Augmentation comprises:

- **Network Reinforcement** – the installation of new gas mains to reinforce areas of poor supply;
- **Network Regulator capacity upgrades** – the upgrading of regulating stations to allow for increased throughput of a station; and
- **New Network Regulating stations** – the construction of new network supply points to allow for additional feeds to our networks.

The options available to MG's Network Planning department to elevate network constraints (through network augmentation) is dependent on the asset class or group of assets identified as constrained.

<sup>6</sup> AEMO 2012 Review of The Weather Standards For Gas Forecasting

**Table 5-2: Summary of Potential Augmentation Strategies**

Asset Class	Options / Potential Augmentation
Pipelines	<p>Identified system constrains are elevated through:</p> <ul style="list-style-type: none"> <li>- High pressure augmentation to redistribute load</li> <li>- Introduction of an additional supply source</li> <li>- Increase in Operating Pressure (when possible)</li> <li>- Re-segregation of networks to transfer load</li> <li>- Transmission system augmentation if there is no realistic alternative</li> </ul>
Custody Transfer Meters	<p>MG receives gas from APA Group through sixteen (16) Custody Transfer Stations owned by APA Group, fifteen managed by AEMO and one managed through an agreement between MG and BOC Gases. MG also, in the past, received gas from Australian Gas Networks (AGN) through a Custody Transfer Station at Templestowe that is owned by MG. BassGas delivers gas to South Gippsland Towns via two custody transfer stations owned and maintained by MG. The cost for increasing the capacity of these stations, if required, is paid by MG. Planning objectives are:</p> <ul style="list-style-type: none"> <li>- To upgrade Custody Transfer Meters as required in the year prior to exceeding 100% of their design capacity. It is to be noted that sonic nozzle flow restrictors that protect the Custody Transfer meters of the turbine variety from overloading are rated at 120% design capacity of the CTM's for short duration high flows.</li> <li>- To progressively upgrade Custody Transfer Stations, to maintain sufficient surplus capacity to provide back feed capability under network emergency or unusual operating conditions. Priorities for this are determined by risk assessments.</li> </ul>
Network Regulating Stations	<p>Regulating Stations are used to transfer gas from transmission pipelines to distribution networks; or from higher pressure distribution networks to lower pressure distribution networks, at a controlled outlet pressure. Planning objectives are:</p> <ul style="list-style-type: none"> <li>- To minimise regulator upgrades by eliminating bottlenecks at the inlets to network regulators</li> <li>- To progressively upgrade critical regulator stations by ensuring that each regulator run<sup>7</sup> has sufficient capacity to supply the percentage of peak network load apportioned to it, so that security of supply is maintained. Critical stations are those which are expected to be operational for many years, and not made superfluous by mains upgrading. Priorities for this are determined by risk assessments.</li> <li>- To progressively eliminate non critical regulator stations supplying low and medium pressure networks, by upgrading these networks to operate at high pressure</li> </ul>
Distribution Mains	<p>There are four types of distribution network that are subject to Growth Plan functional and regulatory requirements; low, medium and high pressure and high pressure 2 networks. Each pressure type includes many individual networks separated from each other for geographical, control or security reasons. Each of these must have adequate capacity, <u>and</u> must have:</p> <ul style="list-style-type: none"> <li>- Effective monitoring / control by maintaining integrity of network boundaries, and Network Isolation Valves where interconnections to adjacent networks do exist</li> <li>- If justified by a risk assessment, network interconnections which include normally closed Network Isolation Valves, so that alternative gas supply can be provided if needed during an emergency or during planned works</li> </ul> <p>When network capacity becomes insufficient options considered are:</p> <ul style="list-style-type: none"> <li>- <i>Low / medium pressure networks</i> <ul style="list-style-type: none"> <li>• Low / medium pressure network augmentation</li> <li>• Increase in low / medium pressure supply pressures</li> <li>• Low / medium pressure to high pressure upgrading</li> </ul> </li> </ul> <p>For growth planning the upgrading option is assumed, as historically this option gives the best economic result</p> <ul style="list-style-type: none"> <li>- <i>High pressure / high pressure 2 networks</i> <ul style="list-style-type: none"> <li>• High pressure / high pressure 2 augmentation</li> <li>• Introduction of an additional source of gas supply</li> <li>• Re-segregation of networks to transfer load</li> <li>• Network isolation</li> </ul> </li> </ul>

<sup>7</sup> Note: Most network regulating stations have two regulating runs. Depending on its operational set-up, the stand-by leg offers full station redundancy,

Asset Class	Options / Potential Augmentation
Network Monitoring / Control	New or enhanced SCADA systems are used to improve monitoring and control of the performance of individual networks within established boundaries. Refer to SCADA strategy MG-SP-0002 for additional information.

### 5.6.1. Network Performance Reports

A key outcome of MG’s annual winter testing program is the creation of “Network Performance Reports”. Each report contains an overview network performance and required network augmentation to 2022.

Five (5) Network performance reports have been developed for the forecast period:

- MG-PR-2016-05 Yarra Glen High Pressure (H24);
- MG-PR-2016-03 Oakleigh High Pressure (H29);
- MG-PR-2016-04 South Melbourne High Pressure (H07);
- MG-PR-2016-02 Korumburra High Pressure (SG2/SG4/SG5); and
- MG-PR-2016-01 Eastern High Pressure (H01/H02/H24/H48).

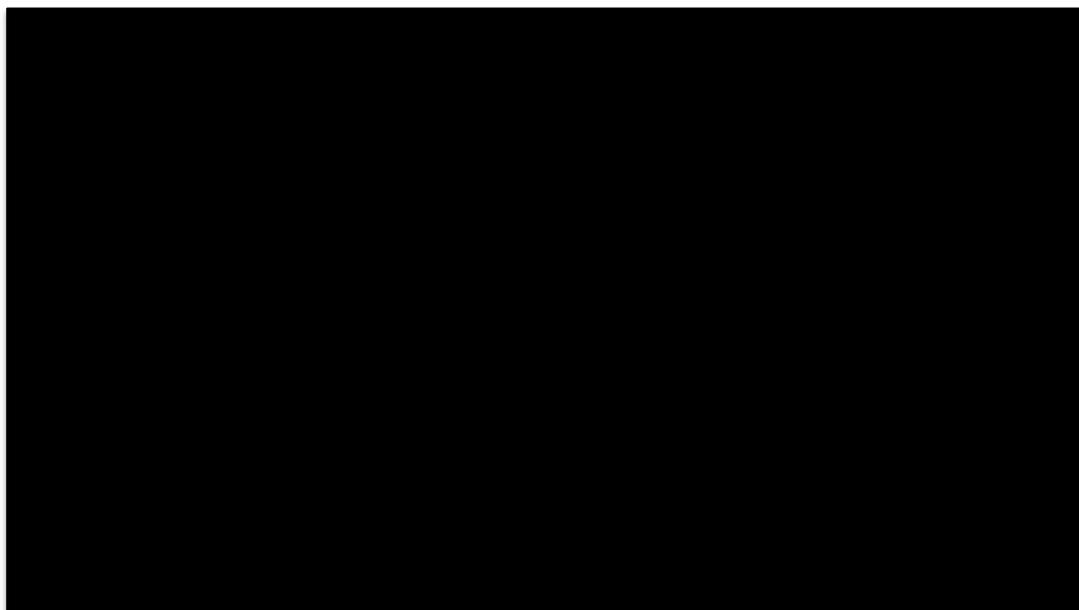
### 5.7. Works Program

MG’s forecast for network augmentation is summarised in Table 5-3 and profiled in Figure 5-3. In total, \$20.9M of augmentation is forecast to 2022, with 80% applying to network reinforcement activities.

**Table 5-3: Augmentation – Expenditure Summary**

Ref	Program	2017	2018	2019	2020	2021	2022
5.7.2	Network Reinforcement	■	■	■	■	■	■
5.7.3	Supply Regulator Capacity Upgrades	■	■	■	■	■	■
5.7.4	New Supply Regulators	■	■	■	■	■	■
<b>Total Direct Expenditure</b>		<b>\$4,511</b>	<b>\$4,090</b>	<b>\$5,754</b>	<b>\$3,503</b>	<b>\$1,648</b>	<b>\$1,210</b>

**Figure 5-3: Augmentation – Expenditure Summary**



A breakdown of projects within each program is provided in Sections 5.7.2 to 5.7.4. Refer to the Appendix (Section 6.3, p.37) for a breakdown of forecast expenditure by Network Performance Report.

### **5.7.1. Project Expenditure Estimation**

MG adopts two methods to determine augmentation project costs - depending on the nature of the project.

#### **1. Independent Estimator – Network Reinforcement**

For all network reinforcement projects MG engaged an independent estimator – Advisian – due to the unique nature of each project. Advisian was provided scopes for each project for the forthcoming access arrangement period from which they prepare a bottom-up estimate for each project.

Advisian’s construction estimates were developed using ‘first principle’ estimation techniques, industry benchmark rates and current market knowledge.

Refer to Advisian’s Independent Estimate Report for further details<sup>8</sup>.

#### **2. Historical Unit Rates – New or upgrade of network regulating facilities**

When possible, MG uses actual costs from historical projects as a benchmark where comparable work exists. This approach has been for costing all new regulating stations and the capacity upgrade of existing stations.

### **5.7.2. Network Reinforcement**

Network reinforcement involves the installation of new gas mains to reinforce or back-feed areas of poor supply.

MG’ forecast for network reinforcement is dominated by a single project in Oakleigh HP – scheduled to begin in 2017. The reinforcement will see 6.7 kilometers of 300NB Steel mains interconnecting a new field regulator (refer to Table 5-6) to the Oakleigh HP network. Total project cost is expected to be [REDACTED].

Table 5-4 provides an overview of all reinforcement projects within the forecast period. Refer to the corresponding Network Performance Report for additional details of each project.

<sup>8</sup> Independent Estimates Report – Augmentation and Mains Replacement, Advisian, 4 November 2016.

**Table 5-4: Network Reinforcement**

Project Name	Network	Network ID	2017	2018	2019	2020	2021	2022	Performance Report
Glenview Road, Yarra Glen	Yarra Glen	H24	■	■	■	■	■	■	Yarra Glen
Lorimer Street, Dockland	South Melbourne	H07	■	■	■	■	■	■	South Melbourne
Clancys Road, Korumburra	Korumburra	SGT	■	■	■	■	■	■	Korumburra
Sherbrooke Road, Sassafra	Olinda South	H48	■	■	■	■	■	■	Eastern
Old Coach Road, Kalorama	Olinda North	H24	■	■	■	■	■	■	Eastern
Selkirk Avenue, Knox	Knox HP	H02	■	■	■	■	■	■	Eastern
Ringwood Augmentation	Ringwood	H01	■	■	■	■	■	■	Eastern
Oakleigh Augmentation	Oakleigh	H29	■	■	■	■	■	■	Oakleigh
<b>Total Direct Expenditure</b>			■	■	■	■	■	■	

### 5.7.3. Supply Regulator Capacity Upgrades

Seven field regulators within the Eastern HP system have reached their capacity and will require upgrading in the forecast period (five within the 2018-22 Access Arrangement Period). Excessive gas flow rates through three stations<sup>9</sup> has increased the scope of these capacity upgrades to include new supply offtakes which increases the cost of each project. In total ■■■ will be spent on capacity upgrades from 2017 to 2019.

Table 5-5 provides an overview of the supply regulator capacity upgrades in forecast period. Refer to the Eastern HP Network Performance Report for additional details.

<sup>9</sup> Modelled flow rates (above 80 m/s) are well in excess of 36m/s planning standard "MG Field Regulator Capacity Analysis" by OGP

**Table 5-5: Supply Regulator Capacity Upgrades**

Project Name	Regulator #	2017	2018	2019	2020	2021	2022	Performance Report
Vermont (MP upgrade to HP - Stage 1) - original P2-064	P4-294	■	■	■	■	■	■	Eastern
Vermont (HP upgrade - Stage 2)	P3-002	■	■	■	■	■	■	Eastern
High Street (Knox)	P4-067	■	■	■	■	■	■	Eastern
Lincoln Road (Olinda Nth)	P4-120	■	■	■	■	■	■	Eastern
Blaxland Drive (Knox)	P4-250	■	■	■	■	■	■	Eastern
Glenfern (Olinda South)	P4-182	■	■	■	■	■	■	Eastern
Azalea Court (Ringwood)	P4-256	■	■	■	■	■	■	Eastern
<b>Total Direct Expenditure</b>		■	■	■	■	■	■	

#### 5.7.4. New Supply Regulators

New supply regulating stations are rare on the MG metropolitan network. A single new regulator is required in the forecast period (in 2020) to support the larger network reinforcement of the Oakleigh HP network (Refer to Section 5.7.2, p.31).

**Table 5-6: New Supply Regulators**

Project Name	Required Capacity	2017	2018	2019	2020	2021	2022	Performance Report
Princess Hwy, Oakleigh	30,000 Sm <sup>3</sup> /hr	■	■	■	■	■	■	Oakleigh
<b>Total Direct Expenditure</b>		■	■	■	■	■	■	-

## 6. Appendix

### 6.1. Glossary & Definitions

Term	Meaning
ACIF	Australian Construction Industry Forum
AER	Australian Energy Regulator
AMP	Asset Management Plan
AMS	Asset Management Strategy
Ancillary Reference Service (ARS)	Standard services offered by Multinet Gas at fixed charges
Connection Assets	Dedicated assets required for connection. Includes gas service and metering assets.
EFT	Economic Feasibility Test
GIS	Geographic Information System
GJ	Giga Joule, 1 Giga Joule = 1,000,000 Joules
HP	High Pressure - Pressure Range: 140 to 515 kPa
HP2	High Pressure 2 - Pressure Range: 600 to 1,050 kPa
I&C	Industrial and Commercial
kPa	Kilopascals
LP	Low Pressure - Pressure Range: 1.4 to 7 kPa
MG	Multinet Gas
MHQ	Maximum Hourly Quantity
MP	Medium Pressure - Pressure Range: 15 to 210 kPa
Non-reference Service	Non-standard services offered by Multinet Gas provided at fair and reasonable cost.
OMSA	Operational and Management Services Agreement
SCADA	Supervisory Control And Data Acquisition
Shared Assets	Shared network assets – for example, Mains in the street
Tariff D	Tariff D applies to customers using greater than 10,000 GJ a year or more than 10 GJ MHQ.
Tariff L	Tariff L is open to customers who consume more than 1,000 GJ per annum or less than 10,000 GJ per annum and have an MHQ demand of less than 10 GJ per hour.
Tariff V	Applies to customers using less than 10,000 GJ a year and less than 10 GJ MHQ. Within Tariff V there are two classifications: Residential and Non-Residential
TP	Transmission Pressure - Pressure Range: Above 1,050 kPa

## 6.2. Customer Connections – Tariff V Forecasting Approach

The connection of Tariff V customers is done through a series of “unitised jobs”, rather than by delivering a single consolidated project. Each customer connection therefore comprises a series of unitised jobs.

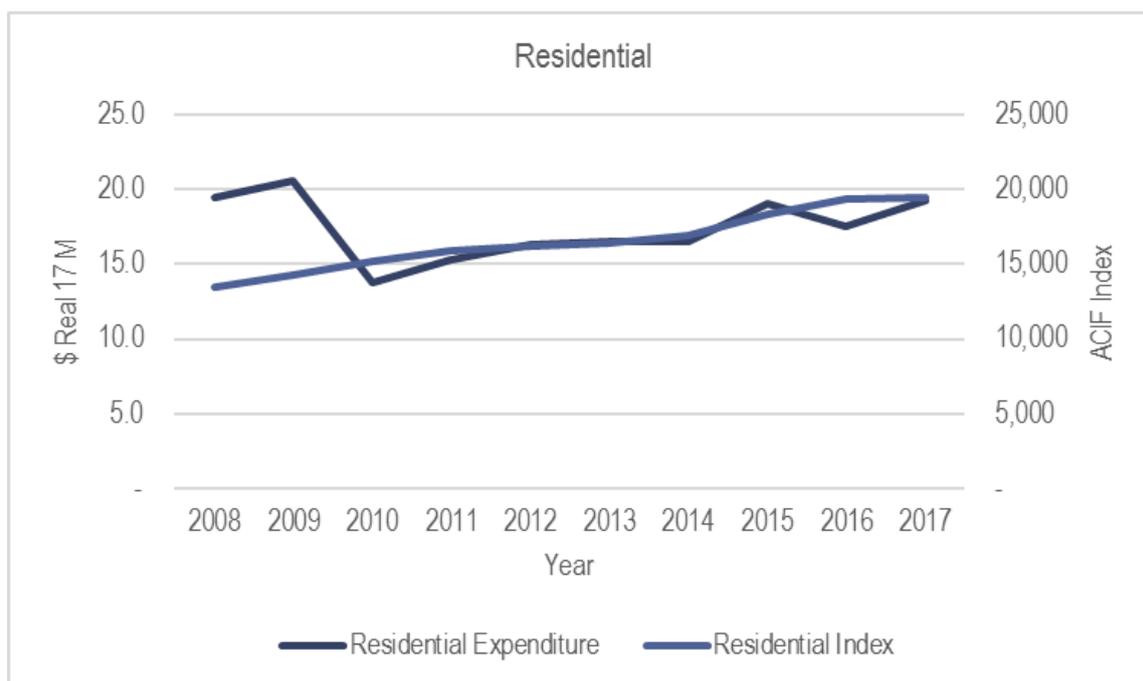
The forecast of Tariff V connection is derived by forecasting the volume of unitised jobs (Activity Codes) over the forecast period with reference to growth indices. Contracted unit rates are applied to forecast volumes to derive total expenditure forecasts.

### **Forecast of Unitised Jobs**

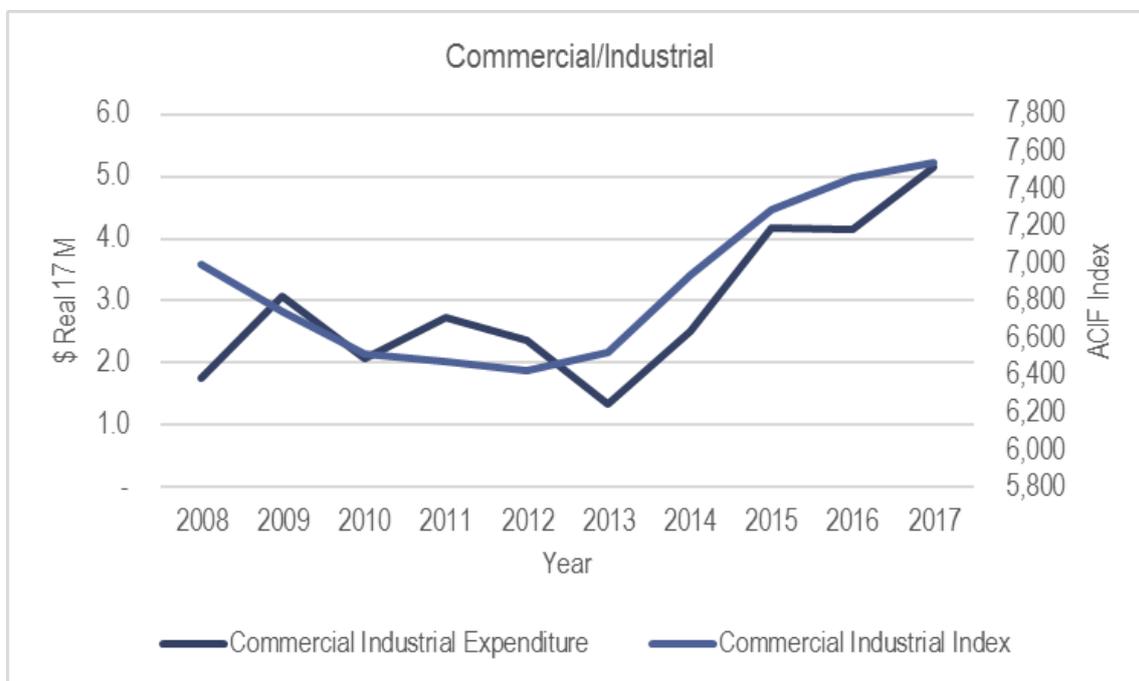
The forecast of unitised job volumes is based on the number of unitised jobs that have been undertaken over the last two to three years (depending on data availability) for each Activity Code and apply growth indices to forecast the number of projects for each Activity Code over the forecast period.

Growth is applied to each Activity Code based on indices that are prepared annually by the Australian Construction Industry Forum (ACIF). The ACIF Melbourne forecast provides an economic/industry growth forecast for Residential and Industrial / Commercial activity which has a strong correlation to MG’s historic expenditure on customer connections. Refer to Figure 6-1 and Figure 6-2.

**Figure 6-1: Relationship between ACIF index and Residential Connections capex**



**Figure 6-2: Relationship between ACIF index and I&C Connections capex**



Unitised jobs have lives of less than 12 months. This means that, for the purposes of forecasting our annual Residential and I&C Connections capex, there is not a need to be concerned with the lifecycle of undertaking unitised jobs, such as:

- When they commence within a year;
- The profile of expenditure incurred over the course of a year; and
- The status of incomplete unitised jobs at the end of a year.

**Unit Rates**

Multinet Gas' standardised unit rates for each unitised job are sourced from our current OMSAs with our Service Providers. These rates are the best we have available for developing our capex forecasts given that they are market-tested through the establishment of the OMSAs under competitive arrangements.

## 6.3. Planning Criteria

### Operating and Minimum Network Pressures

In accordance with the Gas Distribution System Code the ‘System Minimum Pressures’ to be maintained in the gas networks are as shown in Table 6-1:

Network supply (operating) pressures are set to their scheduled ‘Normal Maximum Operating Pressures’. These are typically as follows for the various pressure categories:

**Table 6-1: Operating & Minimum Network Pressures**

Pressure Tier	Operating Pressure	Minimum Network Pressure
Low Pressure:	2.5 kPa	1.4 kPa
Medium Pressure:	60 kPa	15 kPa
High Pressure	450 kPa	140 kPa
“Sub- Trans”, HP2	840 kPa	600 kPa
Transmission	2,760 kPa	1,050 kPa

Statistically days colder than those corresponding to a 1-in-2 day will occur. The corresponding level of gas load is met by utilising a ‘failsafe setting’ function on SCADA controlled regulators.

When a network is known to be near full capacity utilisation for a 1-in-2 day simulation, it is recommended the failsafe pressure settings be manually adjusted in the field above the ‘Normal Maximum Operating Pressure’ values, typically to 470 kPa or 490 kPa. This is done ahead of the ‘gas winter period’ beginning in early May and extending to mid-September.

The reasons for frugal use of operating pressures above ‘Normal Maximum Operating Pressures’ are:

- Reduced escape severity;
- Reduced Unaccounted for Gas (UAFG);
- Pressure Rating of gas main stop off equipment; and
- Finite pressure range for over-pressurisation equipment settings (e.g. Slam- shut panel activation at 560 kPa).

Non SCADA controlled networks are recommended to have operating pressures that can support the coldness level corresponding to a 1-in-2 Day. On a colder day pressures below ‘System Minimum Pressures’ are expected to occur in localised areas with very infrequent and negligible supply consequences arising in a domestic area. These areas are subsequently identified as areas where it may be reasonable, when weather forecasts suggest a colder than 1-in-2 day may occur, to have the neighbouring regulators’ operating pressure temporarily raised.

More specific considerations relating to downstream infrastructure spare capacity are employed in non-domestic areas to gauge whether a colder than 1-in-2 day capacity availability should be permanently available.

## 6.4. Augmentation by Network Performance Report

A summary of MG's augmentation program by Network Performance Report is provided in Table 6-2.

**Table 6-2: Augmentation Forecast by Performance Report**

Performance Report	2017	2018	2019	2020	2021	2022
Oakleigh High Pressure	■	■	■	■	■	■
South Melbourne High Pressure	■	■	■	■	■	■
Yarra Glen High Pressure	■	■	■	■	■	■
Korumburra High Pressure	■	■	■	■	■	■
Eastern High Pressure	■	■	■	■	■	■
<b>Total Direct Expenditure</b>	<b>\$4,511</b>	<b>\$4,090</b>	<b>\$5,754</b>	<b>\$3,503</b>	<b>\$1,648</b>	<b>\$1,210</b>

Refer to individual Network Performance Reports for project breakdowns.

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