Multinet Gas Networks

Attachment 9.12

Asset Management Strategy

Final Plan 2023/24 – 2027/28

July 2022

Multinet Gas Networks

Asset Management Strategy

MG-PL-AMS-0001 FY2023 - FY2028, Ver 1.0

Preparation Record

Controlled Copy Register

Version	1
Issue Date	June 2022
Document Number	MG-PL-AMS-0001

Amendment Record

Version	Date	Amended by	Description of Change
1	June 202	Daryl Lee	Issued for use

Originated by

Department	Date
Network Strategy & Performance Team (lead: Troy Praag)	June 2022

Reviewed / Endorsed by

Title	Name	Signature	Date
Head of Asset Development	Mark Cooper		June 2022
Head of Engineering & Materials	Prateek		June 2022
Head of Network Strategy & Planning	Troy Praag		June 2022
Head of Service Delivery	Susie Riali		June 2022
Head of Works Program	Julian Bialecki		June 2022

Approved by

Title	Name	Signature	Date
General Manager – Network Operations	Mark Beech		June 2022

Contents

1. Document Overview

1.1. Purpose

The MGN Asset Management Strategy (AMS) document provides a high-level and long-term view of the safe and efficient operation, management and installation of gas network assets.

The AMS:

- Provides an overview of MGN's assets and operations.
- Defines MGN's Asset Management System.
- Provides the link between corporate plans and how they're implemented in an asset management context.
- Provides context as to the regulatory environment it operates.
- Provides an overview of network and asset specific strategies.

1.2. Scope and Structure

This AMS covers the management of all MGN's assets operating in inner and outer east metropolitan Melbourne, the Yarra Ranges and South Gippsland including all:

- Transmission pipelines, distribution mains and associated easements and access tracks,
- Regulators and regulating stations (including building and civil infrastructure), valves, heaters, filters, vents, syphons and auxiliary assets used in the operation of the distribution and transmission networks from the Victorian Transmission System (VTS) to end consumers,
- Peripheral systems such as corrosion protection, SCADA, metering and communications equipment, and asset management information systems (including asset repositories)
- Related functions and facilities such as spares, maintenance and test equipment, and

This AMS does not cover:

- Specific plant / asset management strategies;
- Expenditure forecasts;
- Specific operational and maintenance management plans; and
- Specific construction management plans.

1.3. Accountability and responsibility

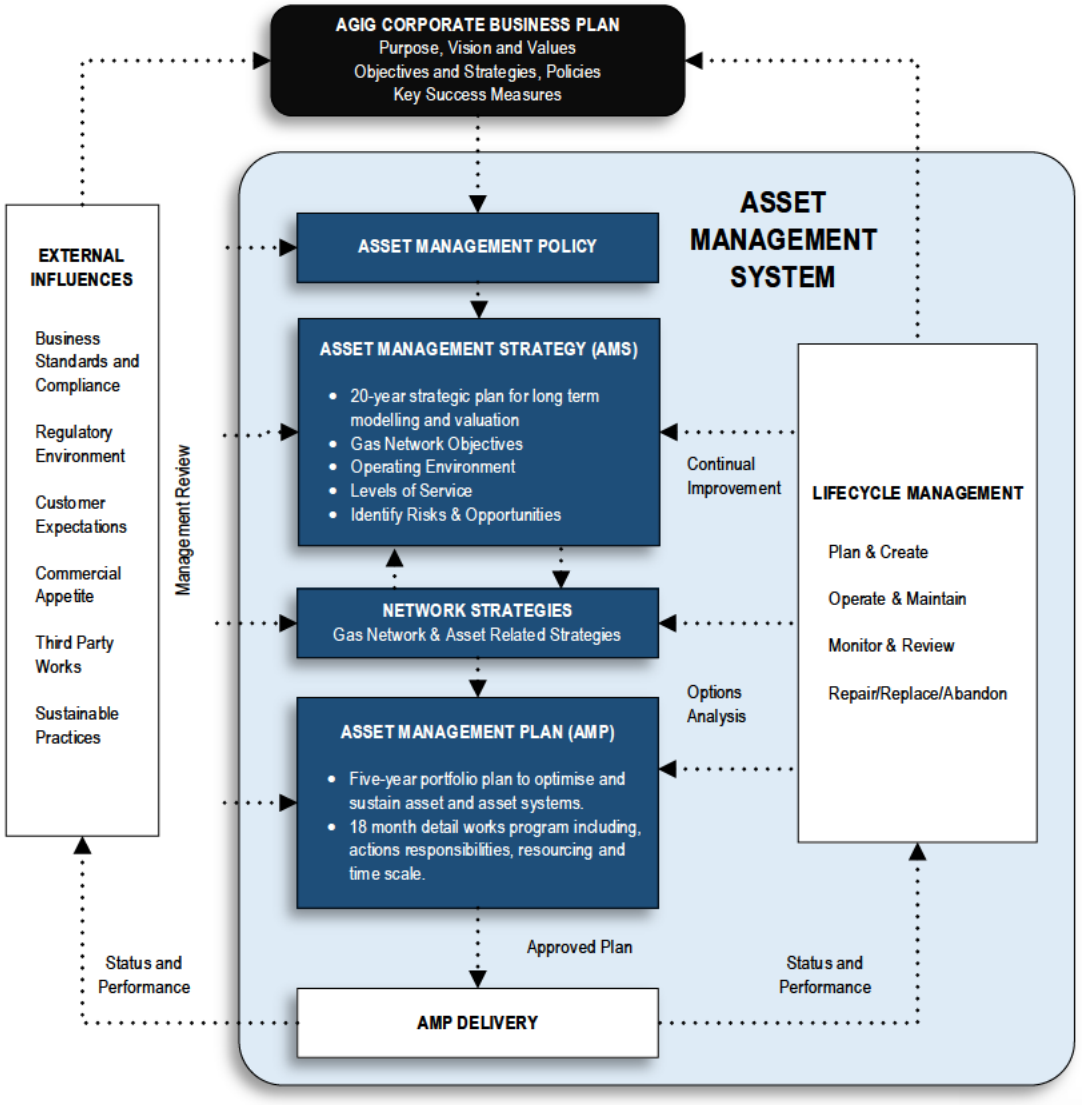
This document has been authorised by the Executive General Manager – Network Operations.

The Head of Strategy and Planning - Distribution, is accountable for this Asset Management Strategy, its communication, implementation, continual development and its on-going authorisation.

1.4. Relationship with other management documents

The AMS is one of several asset management related documents developed and published by MGN in relation to its gas distribution network. As indicated in Figure 1-1, the AMS presents an all-encompassing strategy for the gas distribution network and is supported by numerous, more detailed, network and asset specific strategies and plans.

Figure 1-1: AMS Document Interdependencies



1.5. Publication & Communication

An original approved copy of the current version of this Asset Management Strategy is retained in formal company records at all times. Communication to relevant internal and external stakeholders, service providers and other relevant parties who require knowledge of the Asset Management Strategy is via the following mechanisms:

- Intranet publication,
- Internet publication;
- Standard company briefing processes;
- Training courses; and
- Contractual requirements;

1.6. Time Period

This AMS provides a strategic view of the management of assets for the next Access Arrangement Period (AAP) from financial year FY 2024 to FY 2028. This is a five-year period from 1 July 2023 to 1 July 2028.

1.7. Document Review

The AMS is reviewed and approved at a minimum every five years or when changes are required.

Each review shall include due consideration:

- That the document remains relevant, suitable, consistent and appropriate for the implementation of the Asset Management Policy.
- Of opportunities for continual improvement in terms of Asset Management activities;
- Of opportunities for improvements in the format, communication and implementation of the Asset Management Strategy itself

2. Multinet Gas Networks

2.1. About MGN

MGN distributes gas throughout Melbourne's East and South, covering a distribution area of approximately 1,800 km^2 plus a non-contiguous network in South Gippsland. The network includes over 164 km's of Licensed Transmission Pipeline and approximately 9,650 km's of Distribution Mains, supplying over 715,000 customers (active consumer billing meters) situated throughout the south and east areas of Melbourne, including nine townships in the Yarra Valley and and five South Gippsland towns. Boundaries are generally specified by postcode settings as listed in the MGN Distribution License. Other significant MGN network assets include supply regulator sites, including seven city gate stations which manage the reduction of gas pressure throughout the gas network.

MGN's geographic footprint is surrounded by established regions of supply by other distribution businesses. As a result, MGN'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.

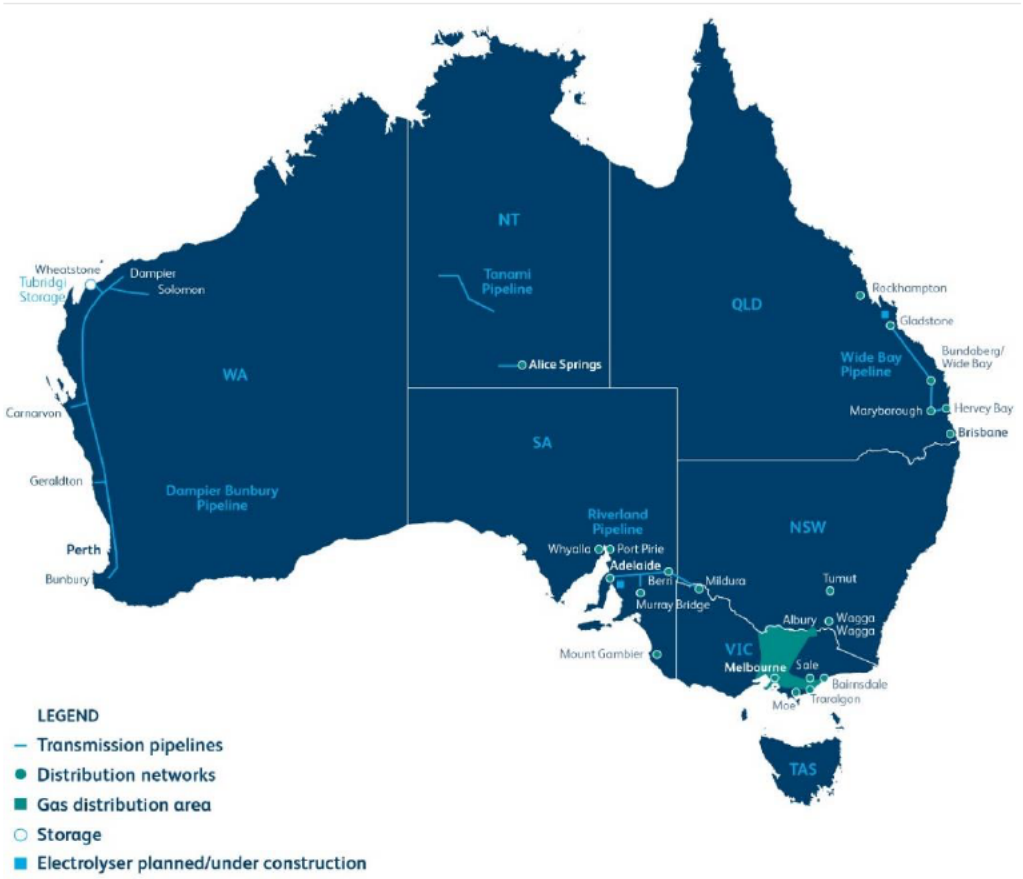
Figure 2-1 Graph of MGN Network Locations

MGN forms part of Australian Gas Infrastructure Group (AGIG) which is one of the largest gas infrastructure businesses in Australia.

The Australian Gas Infrastructure Group (AGIG) came together following the acquisition of the DUET Group by the CK Infrastructure Holdings led consortium, combining the operations of the Dampier Bunbury Pipeline (DBP), Australian Gas Networks (AGN) and Multinet Gas Networks (MGN).

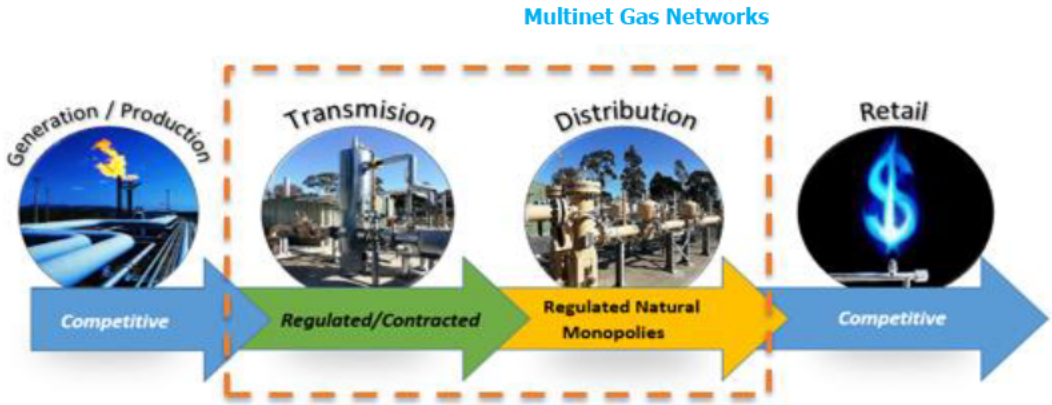
Figure 2-2 summarises AGIG's Operations.

Figure 2-2: AGIG Operations



The Victoria natural gas industry is segmented into four distinct sectors as shown in Figure 2-3. MGN primarily operates as a Gas Distribution company but also contains elements of transmission assets.

Figure 2-3: Gas Operating Markets in Victoria.



2.2. Vision

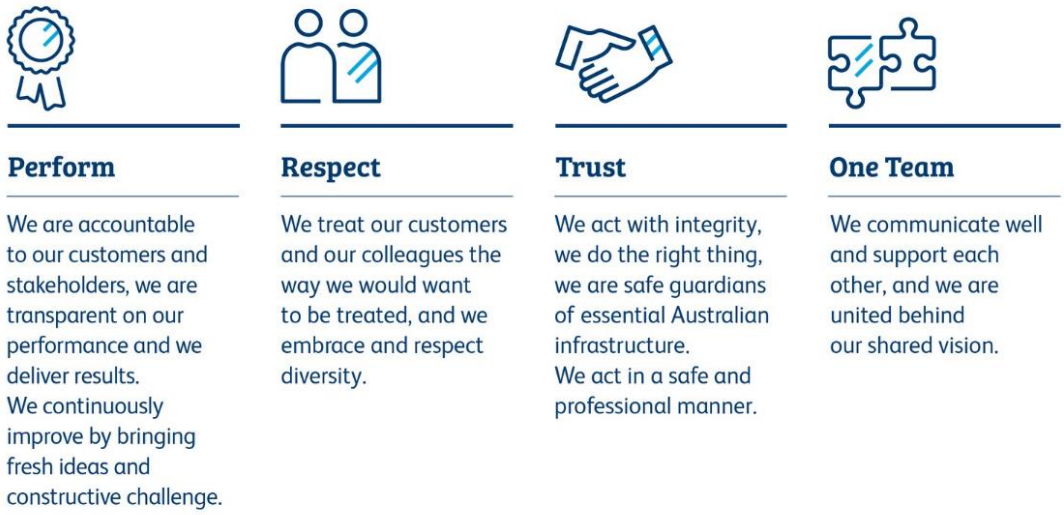
Our vision to be the leading gas infrastructure business in Australia, is shared by all of our networks (outlined in Figure 2-4).

Figure 2-4: AGIG Corporate Objectives

2.3. Values

Corporate values drive the culture at AGIG (including MGN) by determining how employees should behave and make decisions. AGIG's corporate values of "Respect", "Trust", "Perform" and "One Team" are highlighted in Figure 2-5.

Figure 2-5: AGIG (including MGN) Corporate Values



2.4. Key Stakeholders

This AMS is required to address the requirements of key stakeholders that have an interest in the management of MGN's assets.

Table 2-1: Key Stakeholders

Organization or Groups	Role and Requirements
Australian Energy Market Operator (AEMO)	Market and Transmission Systems Operator. As the market operator, provides market settlement data in the Metropolitan Information Bulletin Board (MIBB).
Australian Energy Regulator (AER)	• Regulation of Tariffs for Reference Services • Governing Third Party Access • Requirements to comply with Industry Codes As the economic regulator requires economically efficient operating costs and provides oversight such that network charges are reflective of prudent capital investment and comply with the National Gas Rules (NGR) and National Energy Retail Rules (NERR)
Department of Environment Land Water and Planning (DELWP)	Industry Licencing Requirements (Distribution and Transmission). Provide provision and administration of the transmission pipeline licenses. Requires alignment and compliance with AS 2885.
Energy Safe Victoria (ESV)	Statutory Authority responsible for monitoring Gas Safety. As the technical regulator, they require compliance with legislative and industry standards as they apply to the safe operation of the networks.
Energy & Water Ombudsman of Victoria (EWOV)	Responsible for Consumer Complaints and related issues. Requires prompt response and resolution to end customer complaints
Essential Services Commission (ESC), VIC	Industry Licencing Requirements (Distribution). Regulate MGN's gas distribution operations in Victoria through the provision, administration and enforcement of a licensing regime, which is supported by industry codes that Victoria specific requirements that are in addition to the national regulatory framework.
Plumbing Industry Commission (VIC)	Plumbing standards, ensure that plumbing work is carried out safely and competently, and administer the licensing and registration system for Victorian plumbers.
Gas Retailers & End Users	Users of services provided by the assets. Require provision of a safe, secure and reliable supply of gas at a reasonable cost. Cost of supply should include a high level of service delivery and quick response to gas supply problems and associated issues
Industry Partners	Sharing industry information for best work practises
Land Holders	Landowners on pipeline easements

2.5. Key Corporate Policies

MGN utilises endorsed corporate policies as the guiding principles to be adhered to during all aspects of operating the gas network. Where absent, MGN utilises its own policies. The key business policies are outlined below.

Table 2-2: Key AGIG and MGN policies

Policy	Reference Document
Asset Management	MG-POL-GOV-0004
Engineering Standards	EP-AD-0601
Environment	AGIG-POL-HSE-0002
Health and Safety	AGIG-POL-HSE-001
Information Management	MG-POL-GOV-0007
Network Safety	MG-POL-GOV-0003
Procurement	MG-POL-GOV-0008
Risk Management	AGIG-POL-Risk Management Policy
Quality Assurance for Materials	Quality Assurance for Materials Policy (ET-DD-4149

2.6. Operating Licenses

2.6.1. Gas Distribution License

MGN's distribution system is as defined in its Gas Distribution License as issued by the Essential Services Commission (ESCV) under Section 26 of the Gas Industry Act 2001. MGN's gas distribution license was originally issued by the ESCV on 11 December 1997, and is amended from time to time.

The license has several key compliance conditions including the obligations to:

- Comply with the requirements under the Gas Industry Act 1994;
- Prepare, revise and maintain a Safety Case and have this approved by ESV;
- Comply with customer-related standards and procedures; and
- Comply with other applicable codes, standards, rules and guidelines specified by the Commission.

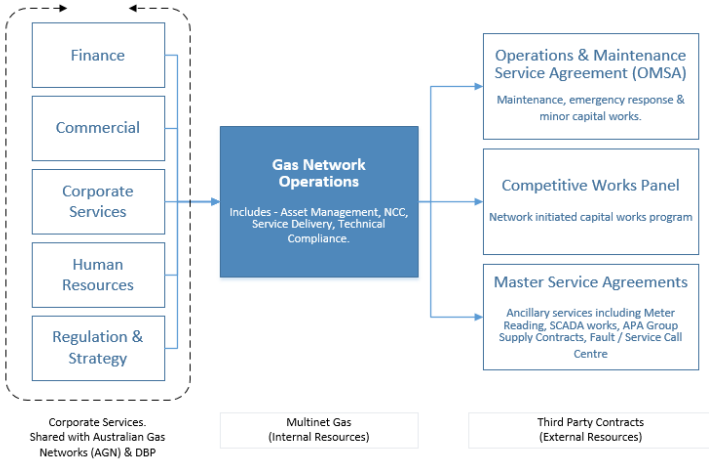
2.6.2. Transmission Pipeline Licences

Transmission pipelines are licensed in accordance with the requirements of the Gas Pipelines Act 2005, administered by DELWP. The individual licences contain details of pipe location and route, length, size, maximum allowable operating pressure and material specification.

2.7. Organisational and Operational Structure

MGN adopts an outsourced delivery model for field operations, capital works and defined specialty works. The figure below summarises MGN's operational structure within the wider AGIG. MGN shares a common executive management team with sister gas companies (including Australian Gas Networks) in Australia.

Figure 2-6: AGIG Operational Structure



Corporate Services for MGN are provided on a "centrally managed, locally distributed" basis. Corporate Services personnel are located within the AGIG offices and provide services to the Network Operations group. MGN maintains in-house asset management, network planning, engineering and contract management functions. These capabilities were insourced in 2013 to provide a more effective management structure to control outsourced services. Recently, further insourcing of GIS and complex connections was completed. The aim is to maintain in-house capability for "mission critical" activities and to outsource works best suited to a competitive market under strong management control.

The scope of this document applies to MGN Operations only.

2.8. Network Composition

2.8.1. Asset summary

MGN's Metropolitan Melbourne network is supplied by Victoria's Principle Transmission System (PTS). South Gippsland is supplied by Bass Gas, which is not considered part of the PTS.

In summary MGN owns and operates over 164 kilometres of licensed transmission pressure pipelines and approximately 9,650 kilometres of distribution mains used to transport gas from the high-pressure transmission network (owned by APA GasNet and Bass Gas) to residential, industrial and commercial gas users. Both transmission pressure and distribution pressure systems contain the relevant equipment and systems required for operation such as pressure regulating facilities, corrosion protection systems and SCADA/Telemetry systems.

Meter and regulator assemblies, which vary based on consumption profile, can range from large industrial or commercial (I&C) units to small domestic units. An assembly is provided at each supply point to the customer from the distribution network.

The table below shows key network assets currently in service on the MGN network:

Table 2-3: Key network assets

Asset	Number / Length	Average age (Years)
Custody Transfer meters (CTM)	20 Units	
APA Group operated	17 units	23
MGN Operated	3 units	13
Transmission Pipelines	164 km	39
Distribution Mains	9,653 km	
High Pressure 2 (HP2)	78 km	56
High Pressure (HP)	7,318 km	30
Medium Pressure (MP)	794 km	46
Low Pressure (LP)	1,463 km	66
Network Connections	719,156 units	
Domestic Meters	702,930 connections	-
Industrial & Commercial Meters	16,226 connections	-
Network Regulating Stations	179 stations	
City Gates	7 stations	15
Field Regulators	104 stations	39
District Regulators	68 stations	39

2.8.2. Operating Pressures and Materials

MGN's transmission pipelines are generally short lengths of 2,800 kPa steel pipelines in suburban areas which connect the MGN distribution network to the Victorian Transmission System (owned by APA Group, operated by AEMO). In the Melbourne metropolitan area, only the rural section of the Lilydale Pipeline (PL 276) operates at a Maximum Allowable Operating Pressure (MAOP) > 2,800 kPa (6,980 kPa).

Other than pipelines which originate from Dandenong Terminal Station (DTS), MGN pipelines are "free flow" in that they are directly connected to APA Group pipelines with no pressure regulation at the interface. There has been one transmission pipeline constructed by MGN in the Melbourne metropolitan area since disaggregation, the Lilydale Pipeline (PL 276), commissioned in 2012. With exception of the Lilydale, all MG metropolitan pipelines were constructed between 1965 and 1984.

Table 2-4 Length of Transmission Pipe by Pressure Range

Transmission Pipelines	Metro Length %	South Gippsland Length %
Operating above 1,050kPa	73	27
Operating below 1,050kPa	5	95

The gas distribution network is composed of three main pressure tiers. The pressure tiers are referred to as Low (LP), Medium (MP), and High (HP) with a fourth minority pressure tier known as 'High Pressure 2' (HP2). This pressure tier accounts for less than <1% of the total distribution network.

Table 2-5 details the operating pressure tiers and associated proportion of length (in %) on the MGN network. Each pressure tier is typically supplied by the one or more preceding tiers through supply regulators. The high pressure (HP) network is supplied by TP or HP2 networks via facilities known as "City Gates". The medium pressure (MP) network is supplied by HP or TP networks via "Field Regulators". Lastly the low pressure (LP) network is supplied by MP, HP or TP networks via District Regulators.

Table 2-5: Length of Mains by Pressure Classification

Pressure	Operating Pressure	Length (%)[1]
Transmission Pressure (TP)	>1050 kPa	2
High Pressure 2 (HP2)[2]	550 to 1050 kPa	1
High Pressure (HP)[3]	140 to 515 kPa	75
Medium Pressure (MP)	35 to 210 kPa	8
Low Pressure (LP)[4]	1.4 to 7 kPa	15

The gas distribution network is composed of four material types referred to as cast iron, poly vinyl chloride (PVC), polyethylene (PE) and steel. Steel is further classified as either unprotected or protected based on either the non-existence or existence of an external protective coating and an active cathodic protection system.

Cast iron was prominent from the inception of the distribution network up until the late 1960's. Steel (both protected and unprotected) was introduced in the early 1950's with minor amounts of protected steel still used today. PVC and PE made their debut in the early 1970's with PVC usage declining in the early 1990's. PE is now the prominent material with over 90% of new mains constructed from polyethylene in the last 10 years. Since its introduction in the early 1970's polyethylene polymers continue to develop with the latest generation polymer (PE100) introduced in late 2014. This latest generation exhibits greater strength, toughness, slow crack growth resistance and resistance to rapid crack propagation over that of previous generations.

Mains material has a major bearing on the MOAP of the network. Table 2-6 details the material types and associated proportion of distribution mains length.

[1] Figure may not add due to rounding

[2] High Pressure 2 is provided as a pressure category in the Gas Distribution Code Schedule 1.

[3] High Pressure 1 has historically been referred to as High Pressure.

[4] Low pressure normal operating maximum is 3.5 kPa as per Multinet Gas Engineering Standard EP-PL-7600.

Table 2-6: Length of Mains by Material Classification

Material	Operating Pressure	Length (%)
Cast Iron (CI)	LP – MP	8.4
Poly Vinyl Chloride (PVC)	LP	4.5
Unprotected Steel (UPS)	LP - HP	3.3
Protected Steel (PS)	LP – TP	32.0
Polyethylene (PE)	LP – HP	51.7

2.8.3. Age and condition

Assets on MGN's network were first installed as early as the 1890's, although it wasn't until the 1950s that network assets started being installed in large numbers. From the late 1960s, the advent of low-cost and abundant natural gas in lieu of manufactured gas accelerated growth. The climate in Victoria is temperate with cool winters that drive heating load. Due to Victoria's climate, relatively inexpensive and available gas supply and heavy marketing efforts through the 1970s and 1980s, residential gas heating penetration is now high.

The major expansion of the gas network that occurred after the introduction of natural gas in the late 1960's was mostly carried out using modern materials with lifespans well beyond the timeframe of this plan. Hence the focus for aged assets is generally in the area of pre-natural gas assets which are in some ways unsuited to natural gas and which are also subject to significant environmental deterioration.

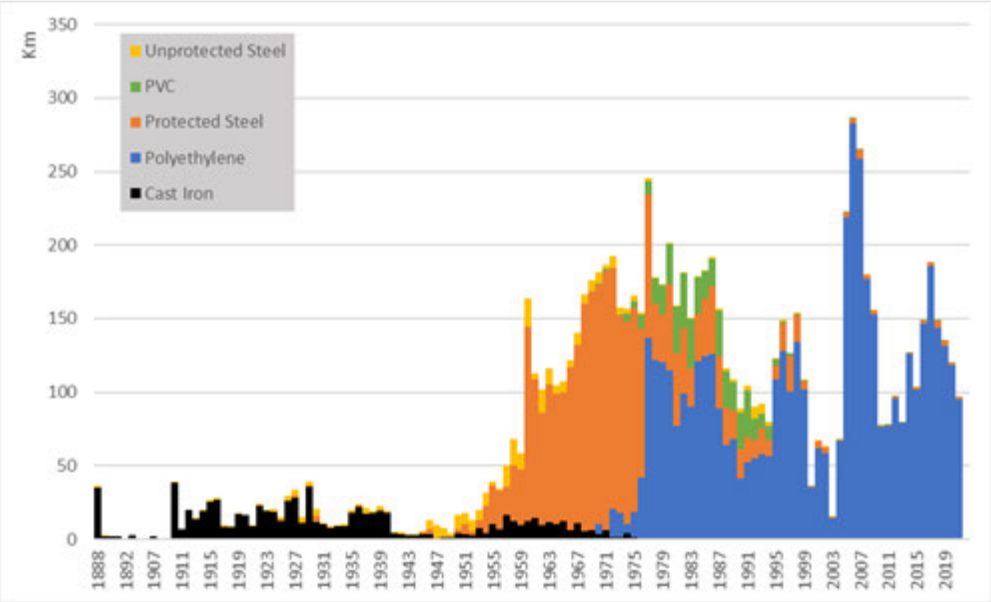
The concept of weighted average age of existing assets is not considered useful because materials such as PE and cathodically protected steel do not generally exhibit a useful life and may be considered to have an indefinite life if well-constructed and maintained.

Replacement programs are therefore focused on particular elements of the network. The major elements of the gas network subject to a rehabilitation requirement over the foreseeable future are the low-pressure network, medium-pressure cast iron or unprotected steel mains and gas meters.

In terms of the low-pressure network, the material types Cast Iron and Unprotected Steel represent the target materials for replacement. The Cast Iron materials exhibit failure modes (brittle fracture or collapse) which can present an OH&S hazard to maintenance crews and the public at large.

Figure 2-7 provides an age profile by mains material type and volume based on year of installation. It provides an overview of when material types were introduced, their period of use and when their usage was phased out. Figure 2-7 shows a gas distribution network spanning 132 years with cast iron mains dating back to the late 1800's. Of note is the age spread of cast iron mains, spanning from 1800's to the early 1970's along with the sporadic use of unprotected steel from the early 1920's to early 1970's.

Figure 2-7: Asset Age Profile by Material Classification



While the primary focus for asset management is focused on aging distribution mains, other core assets are also managed from a life cycle approach coupled with obsolescence of some components and materials.

3. Asset Management At MGN

Asset Management occurs within the context of our Asset Management System (AMSy), which delivers a consistent, collaborative and integrated approach to the management of the asset lifecycle to achieve optimum outcomes and ensure efficiency across the network.

This AMS has been developed as part of the AMSy and provides a summary of the strategies for the main issues pertaining to our gas distribution network assets.

3.1. Asset Management Definition

Asset management is an evolving area of business practice which focusses on the assets (broadly defined) held by an organisation.

The Asset Management Council (Australia) defines asset management as, "The lifecycle management of physical assets to achieve the stated outputs of the enterprise". This definition specifies a focus upon the delivery of a stated capability in which assets play a key role, and in which the business must manage its physical assets commensurate with the business need for that capability. Thus, the definition is concerned with short, medium and long-term considerations from the conception of the asset's need, through its complete operating life, until its disposal phase.

In the MGN context, this means the recognition of the whole lifecycle of all its gas distribution and transmission assets, together with the internal and external factors which influence that lifecycle, and implementation of processes and procedures to:

- Influence and manage asset lifecycles;
- Intervene to prudently and efficiently correct deficiencies;
- Extend asset lives; and
- Replace assets at the end of their lives.

3.2. Asset Management Approach

MGN's asset management approach in the first instance is to ensure a commitment to network safety, and compliance in performance to minimum network standards as required and stipulated in legislation or other statutory or regulatory instruments. Subsequently, the approach is to ensure an optimal balancing of capital and recurrent expenditure, so that maintenance, replacement and augmentation of the gas distribution network, delivers the required level of services at the lowest possible life cycle cost. Gas distribution is capital intensive and so except in the case where outputs are mandated, explicit cost benefit analysis need to be undertaken in order to assess whether the overall economic value of capital expenditure is positive.

As per Section 79 (3) of the National Gas Rules (NGRs), in deciding whether the overall "economic value of capital expenditure is positive", consideration is to be given only to economic value directly accruing to the service provider, gas producers, users and end users". Consistent with this, MGN, in assessing the incremental costs has regard to:

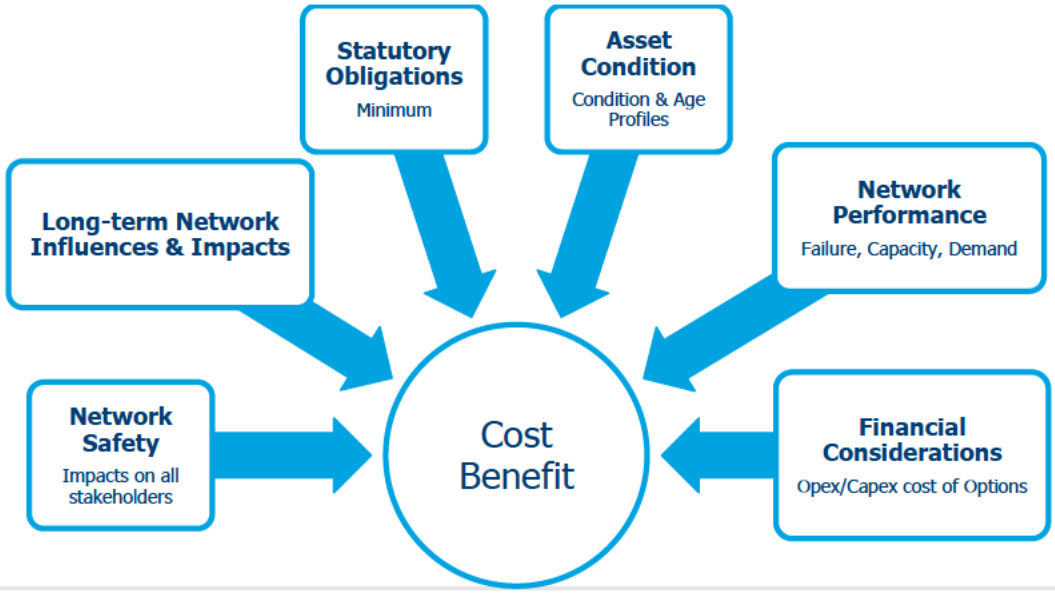
- Direct costs to MGN; PLUS
- Allocation of MGN' capitalised overheads; PLUS
- Imposed costs stemming from the program, which accrue to gas producers, users and end users.

The latter – incremental benefits – has regard to the full societal benefits, which includes:

- Direct benefits to MGN' customers; PLUS
- Additional benefits stemming from the program, which accrue to gas producers, users and end users.

Where the delivery of certain outputs is a function of the external obligations placed upon the business (e.g. legislation stipulating network safety requirements), a different approach is undertaken. Often (but not in every case), we adopt a cost effectiveness (least cost) analysis to ensure that where options exist, the output is delivered at least cost. Delivered benefits are a function of the explicit customer value proposition, or proxy via the adoption of minimum performance standards which are stipulated in legislation or other statutory or regulatory instruments.

Figure 3-1: MGN Cost Benefit Analysis (CBA) Drivers



*Both individual and collective assessment of these drivers are fundamental to the CBA

In MGN's asset management approach, 'Delivered Benefits' are dependent upon efficient works execution through:

- Efficient construction, maintenance and operation of network assets in accordance with the asset strategies, asset management plan and budget
- Ensure effective management of programs (inspections, etc.) and
- Effective capturing, management and diagnosis of asset condition and performance data

3.3. Asset Management System overview

MGN's AMSy and the associated processes are informed by AGIG's Corporate Business Plan/s (vision, purpose, strategies etc.) along with a dynamic assessment of the external business environment. It is a pivotal guide to the development of long-term asset management plans as well as more immediate work programs to ensure the day-to-day performance of the network in all facets.

The key objectives of the AGIG Corporate Business Plan, including delivering for the customer, being a good employer and a sustainable and cost efficient network inform the asset management policy. MGN policies then informs the development of the Asset Management System, starting with the Asset Management Policy which is derived from the outputs of the Corporate Business Plan.

The Asset Management Policy, together with several external and internal influencers generates the key inputs for the Asset Management Strategy, including the Network Strategies, and subsequently the Asset Management Plan. The MGN's asset management approach ensures the optimal expenditure balance.

3.3.1. Asset Management Strategy

The Asset Management Strategy and related lifecycle strategies are derived from the Asset Management Policy, as well as key internal and external inputs.

External influences include:

- Regulatory environment - See section 4 for further details on legislation, technical standards, and regulatory authorities.
- Customer expectations – Include safe delivery of their requirement, no outages and good customer service.
- Commercial appetite – Includes long term vision of networks. See Section 3.6 for further details on asset management drivers.

Internal influences including lifecycle management processes to manage capacity and growth include:

- Performance & Condition Monitoring
- Asset Related failures and incident investigation
- Compliance Evaluation
- System Audit and Improvement actions
- Growth and capacity analyses
- Asset Retirement

3.3.2. Lifecycle Strategies

The AMS forms the basis for the individual strategies applicable to different classes of network assets. The lifecycle strategies detail the lifecycle management of those specific assets as well as providing a 5-year forecast of capital expenditure broken down by project.

The strategies also ensure that projects are justified under AGIG's values and align with MGN's asset management policy and approach. A high-level overview of MGN's asset lifecycle strategies can be found in section 7.

3.3.3. Asset Management Plan

Informed by this AMS and in turn corporate visions, business plans and an assessment of the external business environment, the Asset Management Plan (AMP) is central to the delivery of network services to MGN customers.

It has the following key objectives:

- It provides a high-level summary of projects and programs defined within MGN's suite of asset & network strategies / plans;
- It outlines MGN's planned capital expenditure profile for the forecast period (5-years); and
- It defines the linkage between the overarching AMS and the underpinning asset specific strategies.

Refer to the MGN Asset Management Plan (MG-PL-0005) for further details.

3.4. Asset Management Policy

MGN's asset management policy (MG-POL-GOV-0004) governs MGN's commitment to delivering value through the application of an effective integrated asset management framework to ensure a safe, compliant and cost-effective energy supply to our customers.

Asset management activities must meet business objectives and benefit the current and future needs of all customers, stakeholders and staff by delivering a reliable network service at the least long-term lifecycle cost.

MGN's asset management policy fundamentally summarises our asset management objectives. Developed to align with and support MGN's business purpose, these objectives are:

- Employ good asset management practices to prudently manage and operate the assets over their total life cycle.
- Manage reasonably foreseeable and credible safety risk to as low as reasonably practicable.
- Build our reputation as a trusted company with customers and stakeholders by striving for active industry leadership, agility, reliability, safety and good customer service in light of changing customer and community expectations.
- Meet all legal and regulatory requirements.
- Adhere to the relevant Australian, international and industry standards and any other requirements to which AGIG and MGN subscribes.
- Develop high performance operations by engaging our people and having the right skills and long-term capabilities to meet the needs of the organization.
- Embed continuous improvement and innovation to reduce risk and increase value.
- Monitor and evaluate appropriate metrics to effectively manage the network and customer service performance.

These asset management policies are supported by specific objectives for the gas distribution network, which are detailed in Section 3.5

3.5. Asset Objectives

MGN aligns to six (6) asset objectives which are linked to AGIG's vision and underpin its asset management practices. By achieving these objectives, MGN provides good customer service, remain a good employer and is sustainably cost efficient.

Table 3-1: Asset Objectives

Operate and invest in assets to keep the public and MGN's employees safe	MGN will achieve this by: • Investing in and operating the network in line with the Gas Safety Case, zero harm principle and all laws and relevant industry standards; • Managing known risks to as low as reasonably practicable (ALARP); and • Meeting emergency response Key Performance Indicators (KPIs) (call centre, high priority leaks).
Maintain continuity of supply to MGN's customers	MGN will achieve this by: • Meeting network availability KPIs; • Maintaining operating pressures through monitoring and augmenting MGN's network; and • Addressing leaks in line with MGN's leak management plan.
Improve MGN's customers' service experience in line with their expectations	MGN will do this by: • Maintaining accuracy of metering assets within relevant industry standards; • Delivering valued services to customers at the lowest sustainable price; and • Meeting customer KPIs (reliability/outages, safety, complaints, and overall customer satisfaction).
Balance network performance and costs to deliver affordable services	MGN will do this by: • Optimising overall asset lifecycle management costs; • Maintaining operating efficiency without compromising safety and reliability; • Developing investment plans that consider stakeholder expectations; and • Leveraging people, data and technology to deliver continuous improvement.
Promote gas usage to ensure the networks remain sustainable	MGN will achieve this by: • Connecting new greenfield expansion projects in a timely manner; • Enabling new urban infill connections; • Engaging with key stakeholders to develop adequate network solutions for future supply options; • Increasing long term competitiveness of networks through higher asset utilisation; and • Promoting use of gas.
Embrace innovation and work towards net-zero emissions	MGN will achieve this by: • Considering alternative innovative, sustainable and/or lower long-term cost solutions; • Pursuing research and development opportunities where they facilitate us to meet MGN's vision and objectives; and • Supporting the decarbonisation of MGN's gas supplies and the move to smarter gas networks.

3.6. Asset Management Drivers

This section outlines the major typical drivers influencing asset management decisions, including:

- Legislative and regulatory obligations affecting MGN's distribution network;
- Asset condition and the lifecycle costs (CAPEX and OPEX) associated with different options for delivering outputs to consumers; and
- Growth; and
- Unaccounted for Gas (UAfG)

These requirements are outlined below and play a large part in 5 yearly Access Arrangement Reviews.

3.6.1. Safety

Energy Safe Victoria (ESV) is the independent Victorian statutory authority acting as the technical regulator for the Energy Industry and oversees the safety of employees, contractors, consumers and the general public. The ESV Act 2005 specifies the role and the functions of the ESV, of which their responsibilities relevant to gas distribution networks include:

- Safety of gas supply including transmission and distribution systems;
- Safety of gas installations in industrial, commercial and domestic premises;
- Safety of gas workers by the registration of contractors and the licensing of gas workers on the attainment of an appropriate level of gas safety competency;
- Safety of gas equipment by ensuring it meets minimum required gas safety standards before sale;
- The education of the community and the gas industry on the safe use of gas through a strong and focused awareness campaign;
- Issuing of guidelines for the preparation of gas safety cases and the compliance of gas companies with accepted safety cases;
- Assessing and auditing pipeline safety management plans and environmental plans to determine their adequacy and effectiveness;
- Investigation and analysis of incidents and accidents to identify trends and develop preventative measures; and
- Monitoring and enforcing compliance with the Act and the regulations including (but not limited to) the Gas Safety Act 1997 and the Gas Safety (Safety Case) Regulations 2018.

3.6.2. Asset Security

In line with legislation that has been enacted to counter terrorism or sabotage to critical infrastructure, MGN has also adopted industry standards for asset security. These provisions reflect the increasing priority that the physical security of assets is taking as a critical element of asset management.

3.6.3. Economic

MGN asset management and operational policies are designed to comply with the National Gas Law (NGL).

Economic regulation of a gas distribution business is conducted by the AER, and subject to the national regulatory framework governed by the NGL and contained in the Natural Gas Rules (NGR). Section 23 of the NGL defines the National Gas Objective (NGO) as:

"The objective of this Law is to promote efficient investment in, and efficient operation and use of, natural gas services for the long-term interests of consumers of natural gas with respect to price, quality, safety, reliability and security of supply of natural gas."

The key rules underpinning the economic regulation of the gas distribution industry considered in the development of this AMS include:

Rule 79, which outlines the "New capital expenditure criteria", which in turn underpins the AER's assessment of AusNet Services' proposed capital expenditure requirements. Rule 79 states:

1. Conforming capital expenditure is capital expenditure that conforms with the following criteria:

   (a) the capital expenditure must be such as would be incurred by a prudent service provider acting efficiently, in accordance with accepted good industry practice, to achieve the lowest sustainable cost of providing services;

   (b) the capital expenditure must be justifiable on a ground stated in sub rule (2).

2. Capital expenditure is justifiable if:

   - the overall economic value of the expenditure is positive; or
   - the present value of the expected incremental revenue to be generated as a result of the expenditure exceeds the present value of the capital expenditure; or
   - the capital expenditure is necessary:
     i. to maintain and improve the safety of services; or
     ii. to maintain the integrity of services; or
     iii. to comply with a regulatory obligation or requirement; or
     iv. to maintain the service provider's capacity to meet levels of demand for services existing at the time the capital expenditure is incurred (as distinct from projected demand that is dependent on an expansion of pipeline capacity); or
   - the capital expenditure is an aggregate amount divisible into 2 parts, one referable to incremental services and the other referable to a purpose referred to in paragraph (c), and the former is justifiable under paragraph (b) and the latter under paragraph (c).

3. In deciding whether the overall economic value of capital expenditure is positive, consideration is to be given only to economic value directly accruing to the service provider, gas producers, users and end users.

4. In determining the present value of expected incremental revenue:

   (a) a tariff will be assumed for incremental services based on (or extrapolated from) prevailing reference tariffs or an estimate of the reference tariffs that would have been set for comparable services if those services had been reference services; and

(b) incremental revenue will be taken to be the gross revenue to be derived from the incremental services less incremental operating expenditure for the incremental services; and

(c) a discount rate is to be used equal to the rate of return implicit in the reference tariff.

5. If capital expenditure made during an access arrangement period conforms, in part, with the criteria laid down in this rule, the capital expenditure is, to that extent, to be regarded as conforming capital expenditure.

6. The AER's discretion under this rule is limited.

Rule 91, which outlines the "Criteria governing operating expenditure", which in turn underpins the AER's assessment of MGN's proposed operating expenditure requirements. Rule 91 states:

1. Operating expenditure must be such as would be incurred by a prudent service provider acting efficiently, in accordance with accepted good industry practice, to achieve the lowest sustainable cost of delivering pipeline services.

2. The AER's discretion under this rule is limited.

3.6.4. Operational

MGN is expected to comply to the operating standards outlined in various Acts, Codes, Guides, Standards and Agreements for distribution systems.

MGN monitors network performance as a whole and of individual asset classes. Asset performance data is submitted to the AER (through Regulatory Information Notes – RIN's) and ESV on a quarterly and annual basis as per the *Information Specification – Performance Indicators Requirements for Reporting by Victorian Gas Distribution Companies (ESC & ESV - Jan 2009).*

3.6.5. Environmental

MGN is expected to comply with the various Acts, Standards, Codes and regulatory instruments regarding environmental management in the provision of its network services. A key objective of the AMS is to ensure compliance and the inclusion of sustainable environmental practices in day-to-day asset management decisions we make.

Working with the AMS, MGN's AS/NZS ISO 14001 certified Environmental Management System is the principal tool in field operations to identify environmental risks, develop and implement solutions and monitor the success in controlling such risks and the potential harm/s they might bring to all stakeholders and the surrounding flora and fauna.

3.6.6. Asset Condition

The overall condition of MGN assets have a bearing on risks that might be apparent as assets age and degrade over time. MGN's mains replacement program enables us to mitigate the risk associated with Cast Iron (CI) and unprotected steel (UPS) leaks in a sustainable manner.

Drivers behind asset management decisions include:

- Replacing ageing assets in sensitive Urban Areas
- Abandonment of all Cast Iron mains, regardless of diameter

- Rainfall also remains the biggest contributing factor to the reliability of our network, predominantly in areas of low pressure due to water ingress leading to consumer outages.

3.6.7. Growth

MGN's customer base is dominated by the stable, established residential sector, which makes up more than 95% of MGN's total customers, contributing 70% of network consumption. It's geographic footprint is surrounded by established regions of supply by other distribution businesses. As a result, MGN'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.

MGN has an obligation to maintain and manage the supply of natural gas to its customers, in particular, Schedule 1 of Part A of the GDSC requires MGN to use all reasonable endeavours to maintain sufficient network pressures above targeted levels as per the GDSC.

The network experiences stable demand growth both from new customers and increased loads at individual sites with the onset of high-rise developments. New customers come 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 certain areas.

Demand growth can also take the form of increased usage of natural gas by existing customers. However, this may not be the case as the network primarily caters to residential customers which historically has a declining, per capita usage profile. Despite this, peak demand on the network has shown to be stable, which indicates that the steady growth of the network counteracts to some degree the declining per capita usage.

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

3.7. Unaccounted for Gas

Unaccounted for Gas (UAFG) refers to the difference between the measured quantities of gas entering the gas network (measured by Custody Transfer Meters) and the gas delivered to customers (measured by individual consumer meters). The GDSC sets out UAFG benchmarks, expressed as a percentage of the aggregate quantity of gas injected into the distribution system for each Victorian gas distributor[5]. This is a requirement of the National Gas Rules 2008.3 under Part 19 of the National Gas Rules 2008.

The UAFG benchmarks apply to Class A and Class B customers on the Melbourne metropolitan network (PTS) and South Gippsland (non-PTS) networks.

- Class A customers use more than 250 Terajoules per annum and are typically serviced by the high pressure and transmission networks.
- Class B customers use less than 250 Terajoules per annum and are typically serviced by high, medium and low-pressure networks.

Exceeding the UAFG benchmark comes at a substantive cost in terms of payment to retailers. MGN has a strategy to deal with mitigating this cost. This is further discussed in section 6.7

[5] Schedule 1, Part C of the Gas Distribution System Code. Version 15.

3.8. Workforce Management

The broader gas industry is experiencing a challenging environment for the recruitment of skilled and experienced workers in areas of engineering, management, construction supervision and field operators. This potentially places MGN at a longer term future risk where asset construction and maintenance requirements may need different strategies to maintain the requirements of the industry.

In addition, the coming decades may bring new technologies that will require MGN to develop new understandings, including the ability to interact with the current systems, business models, and rapidly upskill/re-skill existing workforces. Digital and data literacy will become a skill set that will become a necessity for all employees within the business.

3.9. Life-cycle Management of Assets

MGN as adopted four basic phases describing the lifecycle of its assets. These phases are:

1. Plan and Create;
2. Operate and Maintain;
3. Monitor and Review;
4. Repair, Replace, Abdandon

3.9.1. Plan and Create

Planning and creation considers current and future customer growth and load demands, asset performance and service needs, as well as managing risks and secures the necessary approvals for expenditure. It includes the creation or acquisition of new assets to:

- Extend the mains network (either small extensions to connect new domestic customers or large extensions to service new step-out developments such as new estates or extension to unserviced areas);
- Provide new network, metering and SCADA facilities; and
- Augment the existing assets as capacity limitations are reached due to demand growth.

Planning Horizons

We use a rolling 5 to 10-year plan for assets. Year one (1) of the plan represents firm requirements for the next budget year, while subsequent year forecasts are indicative reflecting forecast connections, growth and utilisation rates, network performance and condition.

- Mains replacement planning is based on an assessment of risk, performance and condition/integrity;
- Mains extension analyses, including extending mains to new estates or major industrial customers, is based on cost-benefit modelling using a planning horizon applicable to each case; and
- Major network augmentation projects are evaluated using a horizon consistent with the reliability of forecast information.

Strategy & Planning (Modelling)

Network planning and modelling is driven by MGN's strategies as detailed in this AMS document. It is the first stage of the asset life cycle. Drivers such as network capacity, network reliability, network safety and on some occasions external party requirements drive the planning and modelling activities. Tools such as computer calibrated models, Excel flow modelling, GIS and other various tools are utilised to achieve the planning outcomes sort.

Acquisition

Acquisition involves the specification of asset type, timing, financing, means of procurement, and construction of asset. Typically, this is done within MGN on a project basis or ongoing contractual basis with service providers.

Design

MGN's design approach is driven by legislative requirements and industry standards. Where possible, MGN utilises a standardised design approach according to established design standards – both industry and MGN specific. Non-standard design is undertaken by MGN's Service Providers using experienced designers, but MGN retains the review and approval of the designs.

Materials Procurement

MGN's own standards, policies and frameworks drive the processes for identifying requirements, vendor selection and contract preparation for services and materials supplied directly to MGN. Most procurement activities relating to field services and materials is managed by the primary Service Provider who must satisfy a strict materials approvals process in line with MGN's Quality Assurance standards. Service Providers can only procure approved materials (i.e. in the materials manual), if non-standard materials are required, they must get approval from MGN to use. As part of its HSE systems MGN manages schedules of materials approved for installation on the network, to which all contractors must comply. This ensures that the integrity of the network assets is maintained and controls costs through streamlined stockholdings, minimised approvals investment and simplified design and field service accountability.

Project Lifecycle

MGN's project lifecycle typically consists of 3 stages, namely Initiation, Construction and Commissioning. Each stage consists of other sub-stages of design, planning, approvals, delivery, testing, project management, close-out and documentation. Safety, cost/benefit (constructability, maintainability and operability) and compliance drive the decisions made throughout the project lifecycle.

3.9.2. Operate and Maintain (O&M)

Our approach to network operation and maintenance is detailed in the MGN Gas Safety Case and supporting documents. Operation and Maintenance involves three principal sub-processes:

1. Surveillance & Monitoring.
2. Preventative Maintenance; and
3. Corrective Maintenance.

Maintenance of assets is undertaken to ensure that they continue to fulfil their intended functions (performance levels) within their expected lifetime. Maintenance processes and frequencies take into account:

- Asset type, age, history and risk of failure;
- Location and operating environment;
- Manufacturer's recommendations;
- Condition monitoring;
- Australian Standards requirements; and
- Good industry practice.

Operating Manuals, Procedures, Plans and Technical Instructions describe minimum requirements for the maintenance and condition monitoring of network assets. They detail the frequency and scope of work to be carried out and are used in conjunction with relevant codes of practice and equipment manufacturers' instructions.

Operation & Maintenance practices are audited from time to time by external auditors and ESV. Regional licensed pipelines and networks are regularly audited by MGN, ESV, DPIE, or external consultancy auditors for compliance with the license conditions and AS2885.3 and AS4645 requirements.

Surveillance and Monitoring

The aim of surveillance is for early detection of an issue or failure, to allow for timely dissemination of information for corrective actions to be taken. Monitoring involves the intermittent analysis of routine measurements (e.g., monitoring cathodic protection readings) and observations to detect changes in the environment or status of an asset.

The core requirements of network operations can be found in the GDSC. Amongst others it outlines operational parameters such as the minimum and maximum pressures for network operation.

Preventative Maintenance

Preventative Maintenance (PM) is planned maintenance that prolongs the lifespan of our assets, and equipment. PM is a systemic approach of maintenance activities that are performed routinely and aimed at reducing and preventing failures. Surveillance and condition monitoring play a key role in identifying the PM activities and frequencies.

Corrective Maintenance

Corrective Maintenance (CM) are maintenance activities are performed in order to rectify and repair issues/ failures on our assets. Unlike Preventative Maintenance, CM activities can be planned and/or unplanned and aim at repairing failures.

MGN's preparedness to manage an emergency, including its load management and the reporting of incidents is a key operational life-cycle element. Faults and MGN's response to these events in the context of timeliness, rectification (or replacement), reinstatement etc also make up the O&M element of the asset life-cycle. MGN's approach to faults and emergency response is outlined in its Emergency Management Plan (EMP, MG-PR-001), complimented by its Emergency Response Plan (ERP, GAS-PL-0002) and managed end-to-end through its Emergency Management Team.

3.9.3. Monitor and Review

All gas distribution assets are continually monitored to review their performance and maintain integrity in line with accepted standards of operation.

Performance aspects include the ability to provide the required capacity to meet customer demands for gas, delivered at required flow rates and pressures.

Assets are monitored to highlight existing and emerging issues related to normal aging over time, accelerated aging or new risk issues.

Operational data is collected on a continuous basis, with programs in place to monitor trends and identify emerging issues. Following risk analysis, new or changed operational procedures are implemented, or capital projects/programs generated.

Audit Processes

Auditing ensures that all activities and processes comply with required industry standards. The results of both internal and external auditing are reported to management.

Key internal audits include:

- Supervisor monitoring audits - To ensure field activities are performed in accordance with internal requirements and relevant legislation;
- Verification audits - Conducted by trained quality and safety auditors, under a certified ISO 9001 management system, independent to the operating function. The purpose of these audits is to verify that audits of task related activities provide credible and consistent results;
- Technical facility audits - Performed by trained quality and safety auditors under an ISO 9001 management system, since the level of exposure of the business tends to be greater with critical gas facilities. Findings from these audits are reported to management through detailed reports; and
- HSE Management system audits - provide evidence that the HSE system is effective. These audits are conducted by trained safety auditors and reported to management through reports.

Key external audits include:

- Regulatory audits - Conducted by regulators as a means of ensuring that activities performed conform to legislative requirements. Audit results form an important input to management improvement processes.
- Safety Plan audits – external auditors may be engaged to conduct audits on particular aspects of safety or operating plans.

Review Processes

Formal and informal reviews undertaken throughout the organisation form a vital input into the planning and management processes. The following outline key areas used to assist in planning and management decision making:

- Asset Condition and KPIs - Asset KPIs are the primary measures of asset performance, condition and integrity. These are reviewed on a monthly basis in the MGN monthly report and annually.
- Skills and Competencies - Skills and competencies of staff and contractors are viewed as critical in the effective management of the assets. Activities in the business have been assessed for risk, and where ranked as critical, are managed through a robust method of individual certification. Critical activities may only be performed by operators who can demonstrate their competence to nationally registered assessors and have been issued with an 'authorisation to operate'. These critical skills are reassessed every two years to ensure

competence is maintained and to provide an opportunity to assess the effectiveness of training.

Reporting Processes

Business reporting is largely hierarchical in nature with the key principle of ensuring that the business is meeting its goals and objectives. Reports may be categorised as compliance reports, operational reports, exception reports and financial reports.

MGN's transmission pipelines and distribution networks are included in quarterly and annual regulatory reporting requirements to ESV, ESCV and DEWLP in accordance with the Performance Reporting Guidelines and the Gas Distribution Code. The guideline and Code prescribes various operational reports:

- Major Interruptions;
- Statistical Information;
- Technical Information;
- Key performance indicators;
- Unaccounted for Gas (UAFG); and
- Mains replacement progress.

Quarterly and annual reporting requirements for ESV as required by the Information Specification – Performance Indicators: Requirements for Reporting by Victorian Gas Distribution Companies (January 2009)

Repair

Repairs to assets are necessary when they fail to perform the function for which they were created. This can be due to either part failures, third party intervention or age. Typically, parts failures occur on network facilities and SCADA assets, while repairs are necessary on mains and services as a result of third-party interventions (damage from excavations by others etc) or asset deterioration.

Repair of leaks on mains and services is one of MGN's primary work activities. MGN and the technical regulator (ESV) closely monitors leak occurrence and repair data, including time to respond to leak reports and repair time for leaks.

Replacement

Assets that are approaching the end of their useful service life, have become obsolete, or those that experience accelerated deterioration, are identified for replacement. Where feasible (and safe to do so), refurbishment is considered as an option to extend the asset's useful life. The option to replace or refurbish is typically considered as part of the business case process.

The asset replacement decision is driven by the prudent balance between avoiding future costs of maintenance, current replacement cost, risk, regulatory compliance and levels of service. Where replacement is identified as the prudent option, the asset replacement program takes into account the efficient allocation of resources.

In general, useful service lives vary from:

- 5 to 10 years for SCADA assets, which are particularly sensitive to technical obsolescence;
- 10 to 20 years for domestic and I&C meters; and
- 50 to 60 years for distribution mains and services.

Abandonment

Where an asset has reached the end of its useful life (and cannot be refurbished), it is decommissioned. Like the commissioning process, our decommissioning process is guided by AS/NZS 4645 (for distribution assets) and AS/NZS 2885 (for transmission assets).

4. Regulatory Frameworks

4.1. Legislation

The primary legislation of gas networks in Victoria is the Gas Safety Act 1997. With the Gas Industry Act 2001 establishing the functions of the key Victorian regulatory bodies (Energy Safe Victoria - ESV, Essential Services Commission - ESC, Australian Energy Regulator - AER) and providing the establishment of regulatory instruments, including the gas distribution and retail licenses. The ESC is responsible for licensing participants in the Victorian gas industry.

Key legislation, codes guidelines which apply to MGN are summarised in **Error! Reference source not found.**.

Table 4-1: Legislation & Regulation of Victorian Gas Distribution & Transmission

Legislation & Regulation	
National Gas Law National Gas Rules National Energy Retail Rules (NERR)[6]	Regulation of Victorian Wholesale & Retail Gas Markets Access Arrangement Decisions Govern the sale and supply of energy from retailers and distributors to customers
Gas Industry Act 2001	This Act regulates the Victorian gas industry
Gas Safety Act 1997	Industry Specific Regulatory Framework, Victoria
Gas Safety Regulations	Industry Specific Regulatory Framework Vic
Pipelines Act 2005	Regulatory Framework that applies to transmission pipelines in Victoria
Measurement Act 1960	Legislation for Australia's measurement system that applies to utility meters
Essential Services Commission Act 2001	General Framework for Regulated Industries in Victoria
Gas Distribution System Code (Version 15)	Code governing distribution network in Victoria

4.2. Technical Standards

Two key sets of Australian Standards cover the full life cycle operation of MGN's gas network. They are:

- AS 2885 Pipelines - Gas and Liquid Petroleum suite of standards as applicable to systems operating at a pressure greater than 1050 kPa; and
- AS/ANZ 4645 Gas Distribution Networks suite of standards as applicable to systems operating up to the 1050 kPa threshold.

[6] Only applicable in New South Wales, Queensland, South Australia, Tasmania and the Australian Capital Territory

AS 2885 and AS/NZS 4645 standards are complimented by several other Australian and international standards.

We comply with the various Acts, Standards, Codes and regulatory legislation regarding safety, economic, operational, environmental management, and asset security of the distribution networks (as in Table 4-1 above).

Our Environmental Management System is consistent with expectations detailed within the above and below AS/NZS standards:

- AS/NZS ISO 14001, Environment Management Systems
- AS/NZS 4801, Safety Management Systems

4.3. Regulatory Authorities

The applicable state and national regulator which we work closely with to monitor and discharge our obligations are summarised in Table 4-2.

Table 4-2: Gas Distribution and Transmission Regulators

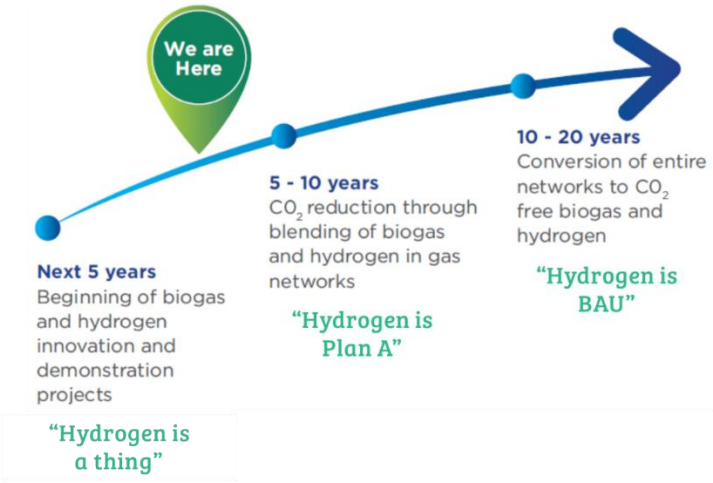
Regulator	Responsibilities
AER	Economic regulation to ensure compliance with National Gas Law and Rules (NGL; NGR)
	Governing Third Party Access
	Monitors, investigates and enforces compliance with national energy legislation and rules
AEMO	Market and Transmission Systems operator
DELWP	Administer transmission pipelines legislation in Vic
ESCV	Industry Licensing requirements (Distribution) Gas Distribution System Code
ESV	Act as the technical regulator for the Energy Industry in Victoria and oversees the safety of employees, contractors, consumers and the general public. Monitoring and enforcing compliance (with but not limited) to the Gas Safety Act 1997 and the Gas Safety (Safety Case) Regulations 2018.

5. Network Adaptation – Renewable Gas

MGN is actively working towards sustainable gas delivery to minimise the effect of greenhouse gas emissions on global warming. Subsequently, in 2017, in conjunction with Australia's five peak gas bodies, the Gas Vision 2050 was developed. This vision outlined a pathway to achieve near zero emissions in the natural gas industry. Hydrogen and bio-methane are proposed as an alternative fuel sources to natural gas. Hydrogen is carbon free and can be blended with natural gas (to reduce carbon emissions), prior to potentially replacing natural gas with 100% hydrogen. Bio-methane is carbon neutral; it utilises the existing energy potential from organic material (such as agricultural waste and sewerage).

Gas Vision 2050 outlines a three phased approach to transition to a lower carbon gas supply system (see Figure 6 below). This included investing in pilot/demonstration plants in the first five years, blending carbon free gas into our networks in years 5-10, before shifting to potential conversion of entire networks. Phase one is currently on track with a number of hydrogen projects initiated across the country. Phase two has commenced ahead of schedule with planning for large scale commercial renewable gas projects.

Figure 2– Gas Vision 2050 Three Phase Approach



The current MGN strategy is covered in the broader AGIG Network Adaptation Strategy-Renewable Gas (AGIG-SP-0001 FY2023 - FY2028) and aims to achieve:

- 100% green hydrogen product available for new subdivisions by 2025
- All distribution networks on a blend up to 10% zero carbon hydrogen by 2030
- All distribution networks to achieve 100% zero carbon gas by 2040 (stretch target) or by 2050 (base target)

This strategy is in line with the Victorian Government's commitment to net zero greenhouse gas emissions by 2050, with emissions reduction targets of 28% - 33% by 2025 and 45% - 50% by 2030[7].

[7] Victoria State Government, Gas Substitution Roadmap Consultation Paper, June 2021.

In order to prepare for the injection of hydrogen at both 10% volume blends and 100% conversion for the MGN network, necessary changes to our asset management practices and processes to ensure hydrogen compatibility is addressed prior to its introduction are required. These are summarized in the table below, and further articulated in the AGIG Network Adaptation Strategy - Renewable Gas (AGIG-SP-0001).

Table 5-1: Network focus areas – Network Adaption Strategy

Focus Area	Commentary
Hazardous Area Equipment	Compared to natural gas, hydrogen and hydrogen blends require a larger minimum hazardous area size in open spaces. Hydrogen will require a change to the equipment group, due to the reduced ignition energy compared to natural gas. This solution involves replacing Cat. II A & B rated equipment with Cat. IIC, hydrogen ready equipment.
Replace Incompatible Parts	Hydrogen can cause embrittlement of some metals, leading to a reduction in tolerance to crack-like defects and an acceleration of fatigue failure. We have identified that components with parts made from copper alloys, most aluminium alloys, and stable austenitic stainless steels are suitable for 10% and 100% hydrogen service. Other metals with poor performance such as cast irons, high strength carbon steels (e.g. chrome-moly), martensitic stainless steels and nickel alloys also may not be compatible with hydrogen.
Weld procedures and hardness testing	A compatibility review found that most of AGIG's pipelines (>1,050kPa) with design factors below .04 and Network steel piping (<1,050kPa) can safely be used to transport hydrogen blends or pure hydrogen. However, existing weld procedures will not be appropriate and must be re-qualified.
Pipeline repair equipment	Further work is required to assess compatibility of transmission pipeline repairs undertaken with Plidco & Smith Clamps and purchase compatible equipment.
Transmission pressure pipeline compatibility assessment	Most of the MGN's transmission pressure pipelines have already been assessed for hydrogen compatibility as part of the Australian Hydrogen Centre (AHC) technical assessment of network compatability. Several pipelines were excluded from these scopes due to their complexity, however, they still require suitable assessment prior to the introduction of hydrogen.
Table Hazardous areas extents	We must conduct a technical review of MGN's Pressure Reduction Sites. This work will require a qualified engineer to review each site and provide recommendations to the business. This activity is to be prioritised as the information will assist in developing forward looking upgrade or replacement asset management plans.

Document updates	MGN must ensure documentation complies with the introduction and operation of a hydrogen blend. For MGN, the following types of documentation have been identified: • pipeline associated documentation, for example the PIMP. • an updated SMS for each affected pipeline; • update procedures; • updates to the Geospatial Information System to indicate blended hydrogen areas.
Further assessment or investigation required	Further assessments are required to ensure the safe and progressive introduction and operation of a hydrogen blend into gas networks. For AGN the following areas have been identified as requiring further assessment: • assess cast iron components currently in use >7kP for use with hydrogen; • perform risk assessments on possible loss of isolation for all components containing nickel alloys, any untested aluminium alloy or elastomers; • review capacity of 150 pressure regulating stations; and • investigate mechanical joint compatibility and performance in the MGN network (<1050kPa).

Refer to MGN's N Renewable Gas Network Adaptation Plan – MGN (MG-SP-0016) for a breakdown of specific programs for the coming AA period.

6. Process and System Strategies

6.1. OHS Management

MGN's vision is to create a generative HSE culture where HSE becomes a way of life. MGN operates on a day to day basis on the following key principles to realise this vision and these key principles and further detail are outlined in the Health and Safety Policy (AGIG-POL-HSE-0001)

6.2. Network Risk Management – Gas Safety Case

MGN recognises risk management as an integral part of its operation and strategic planning and has therefore created an independent Risk Management Policy and Framework. Risk management, including risk evaluation, treatment and documentation, is undertaken in a systematic manner in conformance with AS/NZS 31000. All risk management activity within the organisation is governed by the methodologies outlined in the AGIG Risk Management Policy and Framework.

A major component of MGN's Risk Management procedure is the Gas Safety Case (GSC). The GSC (MG-MN-SC-0001 to 0005) has been prepared to support its operation and provide compliance with State Legislation and applicable Australian and international standards. The GSC represents MGN's assurance to the community of its commitment, concern and attention to issues of safety. It also demonstrates MGN's ability to self-manage safety and comply with regulatory requirements.

Details on the approach to update and frequency of review can be found in the GSC Document.

In addition, MGN has a Network Safety Management Governance Framework in place that monitors and reviews the performance of the GSC and identifies improvements in systems and processes and the content of the GSC.

The GSC comprises of five distinct sections as directed by ESV under the ESV Safety Case Guidance for Gas Companies and Pipeline Licensees.

Table 6-1: Gas Safety Case Components

Section	Overview
Overview/Introduction	Overview and Introduction to the GSC Document and Framework
Facility Description (FD)	The FD gives a detailed summary of the assets and facilities covered by the MGN GSC, with the intention of providing an understanding of the risks and hazards that the assets may face, and to describe what MGN has in place to mitigate these threats to As Low as Reasonably Practicable (ALARP). The Facility Description is Part 2 of the GSC, it provides a full description of the MGN network assets covered by GSC.

Section	Overview
Formal Safety Assessment (FSA)	The core risk assessment underpinning the GSC is commonly referred to as the 'Formal Safety Assessment' which covers the Gas Network Facility (re: The FSA is developed in accordance with the requirements of the Gas Safety (Safety Case) Regulations 2008, and adopts a risk assessment methodology that aligns with the requirements of: • AS/NZS 4645 Gas distribution networks; and • AS 2885 Pipelines – Gas and liquid petroleum. The FSA is Part 3 of the GSC .
Safety Management System (SMSy)	The SMSy forms a core component of the MGN GSC. The SMSy documents the systems and processes MGN employs for the safe operation of the Gas Network with reference to the Formal Safety Assessment (FSA). The MGN SMSy has been developed to meet the: • Safety and Operating Plan (SAOP) requirements of AS/NZS 4645.1; and • Pipeline Management System requirements of AS 2885.3 The SMSy is Part 4 of the GSC and documents the systems and processes MGN employs for the safe operation of the Network.
Compliance	The Gas Network Compliance Framework (GNCF) outlines the systems and processes developed by MGN to operate and maintain the network in line with the requirements of the (SMSy). The GNCF aligns with the corporate compliance process and provides a path for the CNCF to report through to the Board. The GNCF consists of: • Safety Case Governance Framework (Management Review); • Legislative Compliance Management; • Monitoring KPI's; • Checking and Corrective actions (audit); and • Risk Management Review. The GNCF is Part 5 of the GSC and describes how the company's Governance Framework manages safety processes and aligns its methodologies and documentation to regulations and standards.

6.3. Environmental Management

6.3.1. Environment Policy

MGN has developed an Environment Policy (MG-POL-GOV-0006) which sets the environmental strategic direction for the business and establishes the environmental commitments of MGN with respect to its operations, activities, and overall environmental performance. It states the business's vision and principles for environmental management. MGN's vision is to responsibly manage a network and their environmental impacts while delivering the community's energy needs. It also

overarches MGN's Environmental Management System which is a critical tool in ensuring that MGN will comply with legal requirements, community expectations and its own commercial considerations and environmental principles.

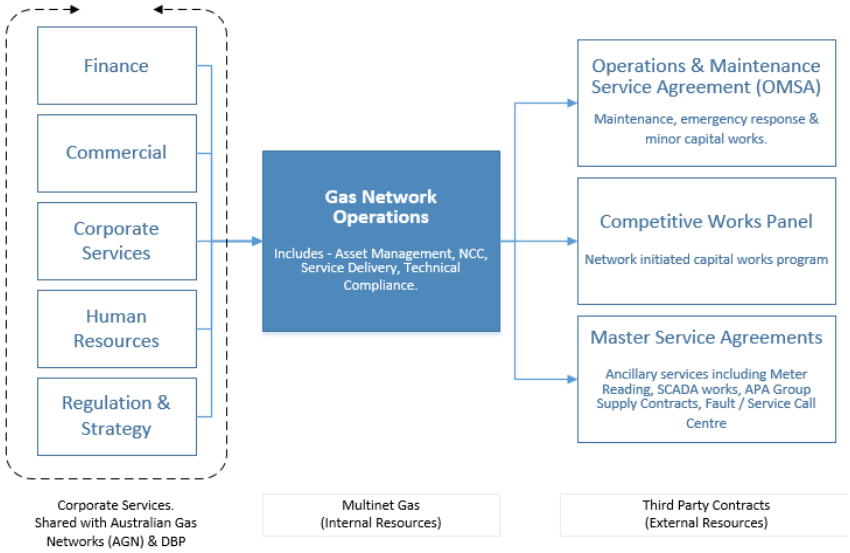
It allows MGN to demonstrate the environmental planning, management and assessment measures that MGN, and its Service Providers will implement in meeting the environmental obligations inherent in its operating license under the Gas Industry Act, 2001 and the Gas Safety Act, 1997.

6.4. Operations

6.4.1. Network operational structure

As previously summarised in Section 2.7, AGIG adopts an outsourced delivery model for field operations, capital works and defined specialty works. The figure below summarises AGIG's network operational structure. AGIG shares a common executive management team with sister gas companies in Australia.

Figure 6-1: Operational model



Corporate Services for MGN are provided on a "centrally managed, locally distributed" basis. Corporate Services personnel are located within the AGIG offices and provide services to the Gas Network Operations group.

6.4.2. Network Management – Continuous Improvement

The operation of MGN's network and its individual assets is a key part of asset management to ensure that 'system performance' targets are achieved, the integrity of the assets is not compromised, and safety and environmental requirements are met.

MGN determines its operational requirements by reference to industry best practice, and by introducing incremental refinements to established programs as a result of accumulated knowledge of the asset base.

An overriding principle is to ensure that operational staff have access to systems that can provide them with relevant information in a format that assists them to make timely and accurate decisions.

The following but not limited to strategies will provide improved operation of the network:

- Continue to develop enhanced network data and information systems to better manage, protect and respond to energy and network demands;
- Maintain and enhance plant operating thresholds and schedules to assist network controllers;
- Outage management system to be integrated with asset management systems and Geographical Information Systems (GIS);
- Continue to develop the use of Field Mobility for data collection, measurement, validation and real-time information transfer;
- Continue to optimise the timing of the planned outages of assets using the maintenance management and network management systems;
- Further development of 'SMART network and metering' techniques;
- Continue to enhance and develop the direct contacting of customers during network pressure issues;
- Regular review of all current operational procedures to ensure they remain relevant with the introduction of new technologies.

6.4.3. Network Maintenance

Routine maintenance is the regular day-to-day operations necessary to keep assets operating safely and reliably. MGN categorises maintenance work in 3 key areas shown in Table 6-2

Table 6-2: Key network maintenance activities

Maintenance	Activities
Surveillance and Monitoring • *early detection of an issue or failure*	Telemetry pressure point and demand customer monitoring
	Cathodic protection Monitoring
	Coating survey
	Leak survey
	Odorant and gas quality monitoring
	Pipeline patrol and inspection
	Special crossing inspections
	Camera inspection
	Inline Inspection (ILI)
Preventative maintenance • *Scheduled maintenance that prolongs the lifespan of assets and equipment*	Cathodic protection maintenance
	Meter maintenance (I&C)
	Network Facility maintenance
	Telemetry System maintenance
	Regulators and Valves maintenance
	Reinforcement at squeeze off points

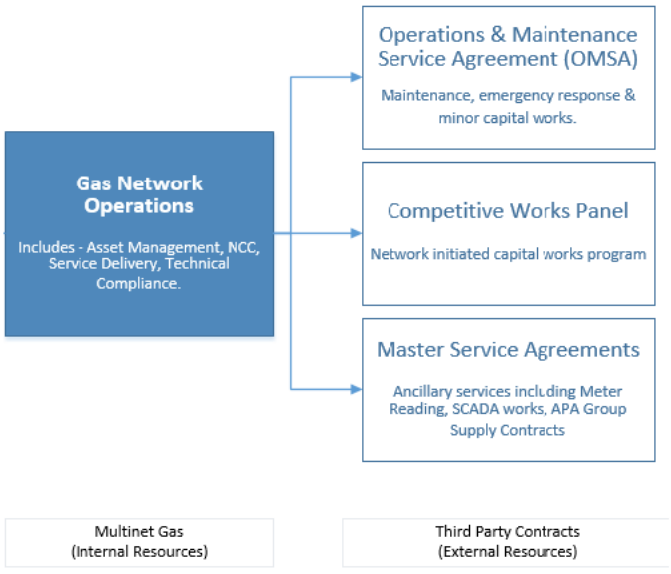
Maintenance	Activities
Corrective Maintenance • *Maintenance to rectify and repair issues/failures.*	Repairing leaks and third party damage
	Repairing cathodic protection system faults
	Repairing pipe coating failures/faults
	Clearing water ingress and other blockages
	Telemetry system faults
	Fault finding on network facility installations
	Resolving meter failures
	Reinforcement at leaking squeeze off points
	Resolving supply issues

6.4.4. Contractor Management

An efficient program balances resource constraint with the needs of the network and customers over an appropriate timeframe. Projects and programs are targeted for completion to deliver the best outcomes for the business and its customers. Drivers for works programming include the timely construction of performance improvement projects to achieve maximum customer value for the initiatives. Programmed asset replacement projects are performed before failure events materialise, and demand projects are completed to ensure that sufficient network capacity is in place to meet forecast loads immediately prior to the critical winter loading period.

Projects are carried out by contractors approved to operate on the MGN network using one of two delivery models namely, via an OMSA contracted service provider or via a project tender to a competitive panel of service providers. However, there are ancillary services that are provided via a direct master and services agreement with other service providers. The structure of the delivery model is shown in Figure 6-2.

Figure 6-2 MGN Delivery model



Operations & Maintenance Service Agreement (OMSA)

The OMSA commenced in 2013 following an open tender to the market where [redacted] and [redacted] were appointed to the southern and northern regions of MGN's network respectively. In 2017, a two-party tender was initiated between [redacted] and [redacted] and the decision was reached to remove [redacted] from the northern region and add [redacted] as a single service provider.

Unitised costs and the volumes of work are negotiated on an annual basis between contract managers and service providers based on historical trends of unitised activities. In an event where a larger and more complex project is awarded, [redacted] is required to provide a Statement of Works based on a P50 confidence level, that is, an estimate whereby 50% of estimates may exceed the P50 estimate. MGN will then review and approve the project scope and price and more detailed project planning and construction will take place supervised by project managers on both the MGN side and the service provider side.

The current contract has been extended to 30 June 2024, with an optional extension to 30 June 2027.

Competitive Works Panel

One of the main drivers of works programming is to package up projects to enable the opportunity to obtain benefits by tendering significant sized projects to be achieved. Among these benefits are:

- Achieving a competitive and cost-effective price for projects;
- Access to additional resources and labour;
- Greater capability to carry out projects on wider areas of the network;

MGN has established a panel of contractors to competitively tender for projects falling within the following work categories:

- Large Diameter Mainlaying
- Mains Replacement
- Transmission Pipeline Works
- Systems Operations
- SCADA
- Cathodic Protection Works

The tender will follow a set of guidelines in which MGN will assess the contractor's capability to provide the works, capacity to provide the works and other criteria essential for operating on the network. Upon project award, the contractor is then contracted via a Master and Services Agreement to carry out the work. The scope of work will typically involve the following activities:

- **Project management,** including the provision and implementation of all cost, schedule and quality management systems suited to the requirements of MGN and the complexity of the works.
- **Materials management,** including the determination of requirements, procurement, warehousing, distribution and quality assurance.
- **Subcontractor management,** including the determination of requirements, procurement, ensuring subcontractor compliance with all laws and MGN requirements, supervision, monitoring and reporting.
- **Health and Safety management,** including the provision of project specific H&S plans where required.

- **Design,** in accordance with MGN requirements, appropriate Australian Standards and legal requirements.
- **Construction,** including preliminary works, testing and commissioning.
- **Stakeholder management,** including the identification of affected parties due to the works, preparation of stakeholder management plans and the management of complaints and customer feedback in consultation with MGN.
- **Customer notifications** of all customers affected by planned outages required by the works.
- **Documentation,** including the completion, compilation and provision of all project documentation (including design, construction, commissioning and as-built documentation).
- **Reporting** in accordance with MGN requirements.

Master and Services Agreements

MGN directly contracts several service providers through master and services agreements to manage and handle several support activities on the network. Some of these activities are shown below, but not limited to:

- [redacted] – managing of meter reads on the network
- [redacted] – management of interval meters on the network
- [redacted] – Provision and support of new radio and communications equipment for network monitoring purposes.

Contractor requirements and training

Contractor requirements

All contractors and personnel operating on the MGN network must be competent and meet the relevant Licensing, Qualifications and Training requirements for field personnel. MGN maintains a Skills & Training Matrix which represents the minimum Qualification, Competency, Re-Assessment/Refresher Training requirements for anyone working on the network. The Competency Matrix is used whenever training is required for existing or new personnel, and all training should be in place prior to work being performed; unless specified by the Network Operator.

The majority of field personnel are employed through service providers who must have in place documented systems that demonstrate the following:

- All legislative requirements are met;
- The workforce is qualified, licensed, competent (according to MG and National standards), and inducted for the tasks being performed;
- Their workforce is licensed and/or trained for the use of plant and equipment they are operating.

Training Delivery

Training described in the MGN skills and training matrix must be current at all times but may lapse in the event of emergency works or unplanned absences. In such an occurrence, the work activities for the related personnel are restricted until such time training is completed.

All National Training Competencies are delivered by a Registered Training Organisation (RTO). All RTOs are required to meet the standards outlined in the Australian Quality Training Framework.

Training not nationally endorsed must be delivered by a person who hold as a minimum a Certificate IV I Workplace Training and Assessment and must be demonstrate competency in the relevant subject matter.

Service Providers must also ensure that any training provider they engage with must be familiar with all such procedures where MGN and Service Provider documents and procedures are utilised.

Training Records

MGN's Work Practice team, which also manages all operational training and competencies programs, maintains all training records, qualifications and competencies in a Training Passport System. Existing operational staff (including those of the Service Provider) are required to have a current training passport – and with the relevant qualifications for the specific role – before they are permitted to work on any of MGN's Gas Network assets or pipelines.

Training Passport records are managed by Work Practices in a Training database which is available on the Gas Network domain with restricted permissions. This database, and other training records details, are backed each night up by the company's IT Infrastructure processes.

6.4.5. Emergency Management

All MGN emergencies and incidents are managed under the guidelines outlined in the MGN Emergency Management Plan (EMP, MG PR 001). Complementing the EMP is the Emergency Response Plan (ERP, GAS-PL-0002) which includes more detail on actions to be taken during an incident or an emergency. Combined, the EMP and ERP represents MGN's commitment to its stakeholders and the community to respond to emergencies promptly and efficiently.

The Plans are designed to:

- Provide a reference guide for MGN's comprehensive approach and methodologies for Emergency Management in alignment with AS 2885, AS/NZS 4645; and
- Display the linkages for MGN and Service Provider staff as a guide to the appropriate responses for unplanned events.

6.5. Capital Growth & Demand Management

The GDSC outlines MGN's obligations for the expansion and operation of its gas distribution network; namely:

- MGN 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; and
- MGN is to maintain and manage the supply of natural gas to its customers by taking all reasonable efforts to maintain network fringe pressures above targeted levels.

Reference is made to MGN's submission for the 2024-28 access arrangement for forecast growth and demand in the next AA period.

6.6. Security

Commonwealth and state governments have imposed legal responsibility on both the owners and operators of critical gas infrastructure and to take all necessary preventative security measures to ensure continuity of supply.

The five main security threats to the gas distribution network are:

- **Safety** – of untrained persons in the vicinity of energy-containing equipment;
- **Malicious** – motivated by revenge, fame, association or challenge;
- **Criminal** – profit driven; includes theft, fraud, sabotage or extortion;
- **Terrorism** – threat or use of force to influence government or public through fear or intimidation[8]; and
- **Accidents or natural disasters** - that breach secure perimeters and/or cause security protections to fail.

The Infrastructure Security Risk Assessment Tool (ISRAT) is used to assess physical security risks and control measures in MGN's installations. The Infrastructure Security Strategy is informed by more than 50 individual assessments, of major sites, and 20 generic assessments for the multiplicity of less significant installations. These assessments are enhanced by a representative sample of physical inspections by qualified and competent Security Risk Management practitioners that validate the ISRAT findings.

MGN's physical security control measures are founded on the following principles:

- Consistent risk identification and quantification;
- Defence in depth – increasing the number and sophistication of control measures commensurate with the degree of intrusion risk;
- Deterrence – measures including signage, lighting, site attendance, law enforcement awareness training (leading to patrol attendance) and more to deflect would-be intruders towards other targets;
- Delay – measures including locks, fences, barbed wire and lighting to increase the time and effort required to successfully intrude;
- Response – Mobile Patrol and Security guarding measures to promptly and appropriately deal with intruders and associated consequences; and
- Contingency planning – measures to promptly recover service and minimise societal impact.

6.7. Unaccounted for Gas

Unaccounted for Gas (UAFG) refers to the difference between the measured quantities of gas entering the network (measured by Custody Transfer Meters) and the gas delivered to customers (measured by individual consumer meters).

GDSC outlines UAFG benchmarks, expressed as a percentage of the aggregate quantities of gas injected into the distribution system[9].

In Victoria, retailers purchase sufficient gas to cover customer consumption and actual UAFG. If actual UAFG is greater than the benchmark, the gas distributor is required to compensate the

[8] A 'terrorist act' is an act or threat intended to advance a political, ideological or religious cause by coercing or intimidating an Australian or foreign government or the public; causing serious harm to people or property, creating a serious risk of health and safety to the public, disrupting trade, critical infrastructure or electronic systems - Criminal Code Act 1995 [Commonwealth].

[9] Schedule 1, Part C of the Gas Distribution System Code. Version 15.

retailers for the UAFG above benchmark. Where actual UAFG is lower than the benchmark, the retailers make reconciliation payments to the distributor.

The GDSC requires MGN to use reasonable endeavors to ensure that UAFG is less than its benchmark. AEMO performs an annual reconciliation between gas distributors and retailers based on whether actual UAFG is over or under the benchmark[10].

UAFG benchmarks apply to Class A and Class B customers supplied from both the Declared Transmission System (DTS) and non-DTS[11] networks.

- Class A customers use more than 250 Terajoules per annum and are typically serviced by the high pressure and transmission networks.
- Class B customers use less than 250 Terajoules per annum and are typically serviced by high, medium, and low-pressure networks.

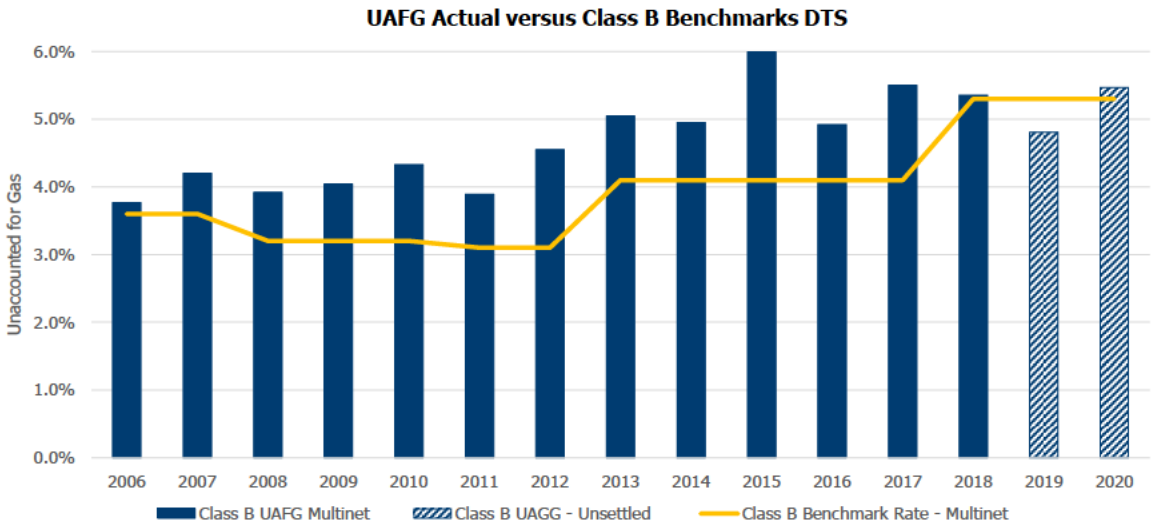
Current (2018 to 2022) UAFG benchmarks are summarised in Table 6-3. Further elaboration regarding UAFG can be found in MGN's UAFG Strategy (MG-SP-0017).

Table 6-3: Unaccounted for Gas benchmarks – 2018-22

DTS Class A	DTS Class B	Non-DTS (Class A &B)
0.3%	5.3%	2%

MGN's historical performance against UAFG benchmarks is shown in Figure 6-3.

Figure 6-3: Network Performance – Class B UAFG Performance



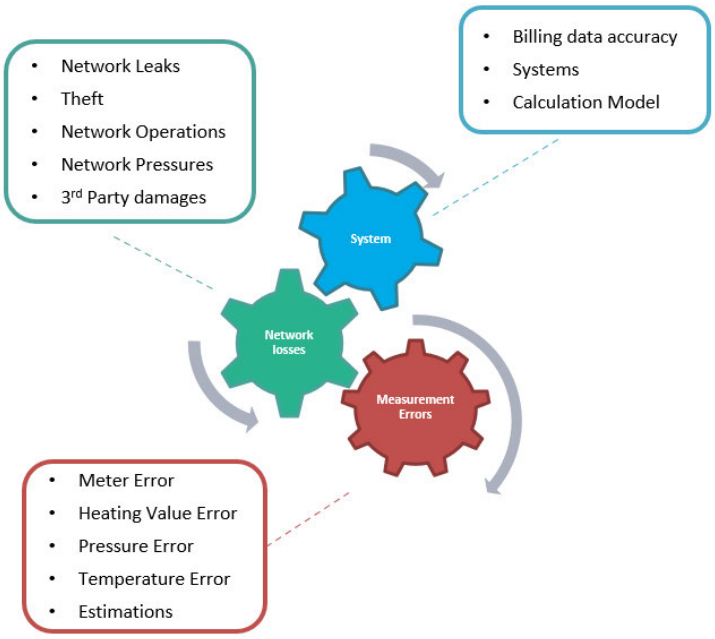
[10] Clause 2.4 of the Gas Distribution System Code, Version 15.

[11] For non-PTS networks, the Gas Distribution System Code sets out a single benchmark value applicable to both Class A and B customers.

6.7.1. Sources

UAFG is composed of a number of contributors which can be roughly categorized as measurement errors, network losses/fugitive emissions, or system errors.

Figure 6-4: UAFG components



Measurement errors are related to metering errors, heating value compensation, gas pressure and temperature correction, etc. While fugitive emissions are those relating to general network leakage (mains, valves, fittings, meters, regulators etc.), leakage due to third party damage, gas consumed during mains commissioning and gas lost from asset abandonment and theft. System errors correspond to billing data accuracy, or calculation model errors.

Specific to mains network leakage, gas losses from the cast iron and un-protected steel are the highest, and as a result are considered a material contributor to UAFG.

6.7.2. Mitigation

The GDSC requires gas distributors to use reasonable endeavours to ensure that UAFG is less than their benchmark. AEMO performs an annual reconciliation between gas distributors and retailers based on whether actual UAFG is over or under the benchmark. Refer to AEMO Document (16-DUAFG) Wholesale Market Distribution UAFG procedures (Victoria) for more information.

MGN's UAFG Strategy (MG-SP-0017) provides an overview of program undertaken to minimize UAFG as low as practicable. Key programs / Strategies include:

- Continuation of the LP Mains Replacement program (all Cast Iron mains decommissioned by 2033);
- Targeted replacement of all remaining MP Cast Iron mains by end 2021;
- Extending the coverage of pressure and temperature correction to all Tariff D customers by 2022; and
- Replacement of all remaining Turbine Custody Transfer Meters (CTM) by end 2019.

7. Asset Life-Cycle Strategies

MGN has a number of comprehensive life-cycle strategies that provide a detailed overview of specific assets and their current and proposed future management. The AMS does not provide detail from each life-cycle strategy, rather provides information on the strategies that exist and their applicable reference.

The key components of each life-cycle strategy include:

- Asset overview
- Current and historical performance
- Capital Requirements
- Operational requirements; and
- Asset specific strategies

Below is a list of the life-cycle strategies that exist that can be refered for additional information.

Table 7-1 – Life Cycle Strategies List

Asset Class	Document Reference
Transmission Pipelines	Transmission Pipeline Strategy (MG-SP-0001) Transmission Pipeline Integrity Plan (MG-PL-AM-0002)
Distribution Mains & Services	Distribution Mains and Services Strategy (MG-SP-0009)
Network Regulators (City Gate, Field and District Regulators)	Supply Regulator Strategy (MG-SP-0003)
Consumer Regulators	Large Consumer Regulator Strategy (MG-SP-0005) Small Consumer Regualtor Strategy (MG-SP-0006)
Gas Pre-Heaters (Regulator Facilities)	MGN Gas Heater Strategy (MG-SP-0015)
Network Valves	Distribution Valve Strategy (MG-SP-0011)
Small & Large Meters	Metering Strategy (MG-SP-0007)
SCADA	SCADA Strategy (MG-SP-0002)
Cathodic Protection Assets	Corrosion Protection Strategy (MG-SP-0013)
Enclosures	Equipment Enclosure Strategy (MG-SP-0014)

Asset Class	Document Reference
Network Strategies / Plans	Network Adaptation Strategy – Renewable Gas (AGIG-SP-0001) Renewable Gas Network Adaptation Plan – MGN (MG-SP-0016). UAFG Strategy (MG-SP-0017). Asset Management Plan (MG-PL-0005) Pipeline Integrity Management Plan (MG-PL-AM-0002) Gas Safety Case (MG-MN-SC-0001 to 0005) Emergency Management Plan (EMP, MG-PR-001) Emergency Response Plan (ERP, GAS-PL-0002)

8. Glossary

TERM	DEFINITION
AA	Access Arrangement
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
AGIG	Australian Gas Infrastructure Group
AGN	Australian Gas Networks Ltd
AMP	Asset Management Plan
AMS	Asset Management Strategy
APA	APT O&M Service Pty Ltd
AS	Australian Standard
Capex	Capital expenditure
CBD	Central business district
CI	Cast Iron
clearSCADA	National SCADA IT platform
CNG	Compressed Natural Gas
CP	Cathodic Protection
CTM	Custody Transfer Meter
DB	Distribution Business
DBP	Dampier to Brumby Pipeline
DCVG	Direct Current Voltage Gradient
DELWP	Department of Environment Land Water and Planning
DTS	Dandenong Terminal Station
ESCV	Essential Services Committee Victoria
EWOV	Energy and Water Ombudsman Victoria
FSA	Formal Safety Assessment
GDSC	Gas Distribution System Code
GIS	Geospatial Information System

TERM	DEFINITION
GSC	Gas Safety Case
HDPE	High Density Polyethylene
HP	High Pressure
HSE	Health Safety and Environment
I&C	Industrial and Commercial (customer)
ICCP	Impressed Current Corrosion Protection
km	Kilometre
kPa	Kilopascal
KPI	Key Performance Indicator
LEL	Lower Explosive Limit
LNG	Liquefied Natural Gas
LP	Low Pressure (MAOP=1.7 kPa)
m^3/hr	Cubic metres per hour
MAOP	Maximum Allowable Operating Pressure
MP	Medium Pressure
NERR	National Energy Retail Rules
NGL	National Gas Law
NGR	National Gas Rules
OEM	Original Equipment Manufacturer
Opex	Operational expenditure
PE	Polyethylene
PIMP	Pipeline Integrity Management Plan
SAP	Enterprise-wide software system
SCADA	Supervisory Control and Data Acquisition
Tariff D	Haulage tariff applied to customers using greater than 10 TJ / annum
Tariff V	Volume based haulage tariff applied to customers using < 10 TJ/annum
TJ	Terajoule
TP	Transmission Pipeline / Transmission Pressure

TERM	DEFINITION
UAFG	Unaccounted For Gas
UPS	Unprotected Steel
VIC	Victoria