PLAN

MDL REPLACEMENT PLAN

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INTERNAL

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DOCUMENT HISTORY

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1 INTRODUCTION

1.1 PURPOSE

The purpose of the document is to specify the background for the MDL Replacement programs.

This plan serves as the foundation for the "Connection and Metering Forecasting Methodology", which forecasts volumes and, together with cost calculations, determines the capital and operating forecasts (and budgets) for the gas metering asset replacement programs.

This document forms part of the 'Plan' suite of documents under the Jemena Asset Management System and aligns to the requirements of the JGN Measurement Asset Class Strategy.

1.2 SCOPE

This document describes the plan and methodology to identify the number of end of life remote reading hardware required to be replaced for the various remote reading solutions as listed below. The scheduling of meter replacements may be varied to manage deliverability risk, minimise the cost of the replacement and ensure compliance with regulatory obligations.

1. Planned replacement programs, including:
    a. Trial of New Remote Reading Technology for residential and small I&C meters
    b. End of Life Replacement of Meter Data Loggers (MDL) in Medium Density High Rise Buildings;
    c. Planned Replacement of MDL Batteries
2. Defective replacement programs, including:
    a. Replacement of Defective Meter Data Logger (MDL) in Medium Density High Rise Buildings;

1.3 OBJECTIVE

The Jemena Gas Networks (JGN) metering program ensures the metrological performance of metering remote reading solutions by:

1. Compliance – Ensuring accurate and appropriate metering to meet regulatory requirements.
2. Customer Satisfaction – Proactively replacing remote reading hardware before failure reduces estimated billing and meets the AEMO requirement of no more than two estimated reads per year.
3. UAG Minimisation – Enhancing metering accuracy and timely readings to minimise contributions to unaccounted for gas (UAG).

Additionally, the metering remote reading solutions guarantee that customers receive meter reading services as stipulated under Jemena Gas Network's (JGN's) Transportation Reference Service (reference service), as outlined in the box below.

The Transportation Reference Service[1] *is a service for:*

(i) *…*

(ii) *meter related services including:*

a. *…*

b. *meter reading and associated data activities as appropriate for the required capacity and meter reading frequency, but does not include Ancillary Reference Services.*

1.4 REGULATIONS AND STANDARDS

JGN undertakes meter replacement based upon the following regulation and standards:

- National Measurement Act 1960 (sections 18GD and 18GE)
- NSW Gas Supply (Consumer Safety) Regulation 2012
- NSW Department of Fair Trading Guidelines

[1] Source: Page 15 of JGN's *Reference Service Proposal for the July 2025- June 2030 Regulatory Period*, accessible on the AER website.

2 BACKGROUND

2.1 WHAT IS A METER DATA LOGGER?

A Meter Data Logger (MDL) is a remote device utilized in medium-density and high-rise developments, designed to collect and temporarily store gas and hot water meter consumption readings for customers in individual apartments. The data collected by the MDL is transmitted daily to the IoT Device Management Platform “Cumulocity” via an NB-IoT gateway and Narrow Band telecommunication service. On the scheduled read day or a special read required, Jemena’s Data Integration Platform, webMethods, retrieves the data from Cumulocity, processes it, and transfers it to SAP for customer billing. Because of their remote reading capabilities, MDLs are deployed in locations where manual meter reading is impractical.

JGN currently has approximately 17,000 MDLs in operation, collecting data for 440,000 gas and hot water meters, typically installed within customer units or gas meter rooms. These MDLs are powered by a 240V power supply and feature a backup internal battery, which can sustain MDL operations for up to 15 days in the event of a main power outage.

The existing MDL system uses:

- A 32 channel data logger, which is hard wired to the meters in apartments, and
- Multiple data loggers are hard wired to a NB-IoT Gateways which operate on narrow band telecommunication service.

See Figure 1 for a typical MDL installation in a high rise building apartment.

Figure 1: A typical MDL installation

MDL system offers several benefits to customers, including:

- **Compatibility**: The MDL system is compatible with most meter models currently used by Jemena, eliminating the need for significant meter changes.

- **Convenient Meter Reading**: Customers do not require meter access for scheduled or special reads, facilitating easier billing processes.

- **Daily Monitoring**: MDLs provide daily read monitoring, enabling early detection of failures and allowing for more targeted corrective maintenance.

2.2 MAJOR RISK OF CURRENT MDL SYSTEM

2.2.1 VENDOR RISK

In 2015 Jemena introduced a volume boundary tariff in response to the emergence of centralised energy service providers (CESP) offering gas and hot water services within the NSW market. This has led to a dramatic decrease in MDL installations even though the total number of high-rise dwellings built and connected to gas continues to increase. From July 2020, Jemena has proposed to remove individual submetering in new high-rise buildings from product offering which would reduce the number of MDLs purchased furthermore. See in Figure 2 the new MDL installations has dramatically decreased since 2019.

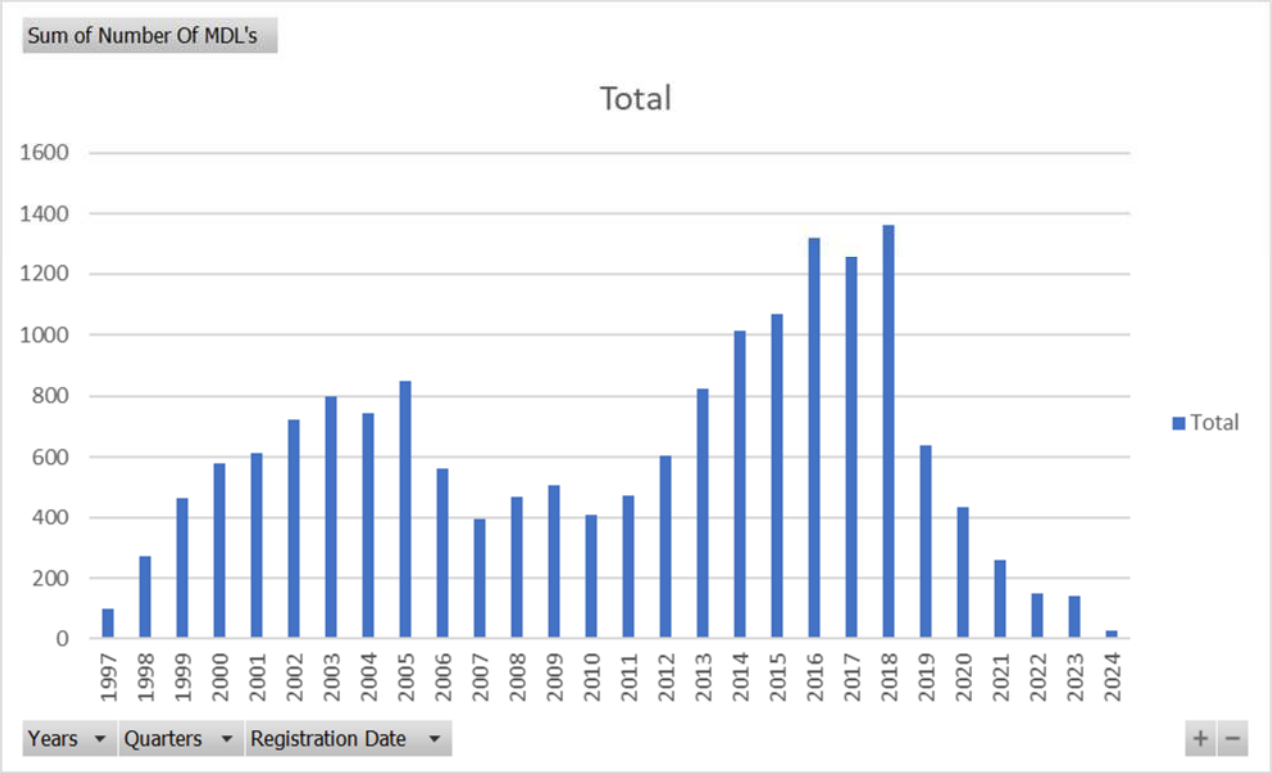

Figure 2: New MDL installations by year

The current supplier of MDLs, Epitomy, has been assessed as posing an unacceptable vendor risk due to their limited product knowledge, small business size, and reliance on Jemena as their primary client with no other known clientele. Given the reduced orders driven by demand and Jemena being their sole customer, the risk is assessed as 'HIGH' that Epitomy may not remain a viable business. This would significantly impact Jemena's ability to replace defective MDLs or install new ones.

2.3 STRATEGY REVIEW

To sustain Jemena's remote reading capability and reduce the risk associated with relying on a single supplier for MDL hardware, we need an alternative vendor and MDL sourcing strategy. This will ensure a smooth transition from the current Epitomy MDLs and help minimize vendor-related risks. The proposed pathway and transition to the new strategy is shown in Figure 3 below.

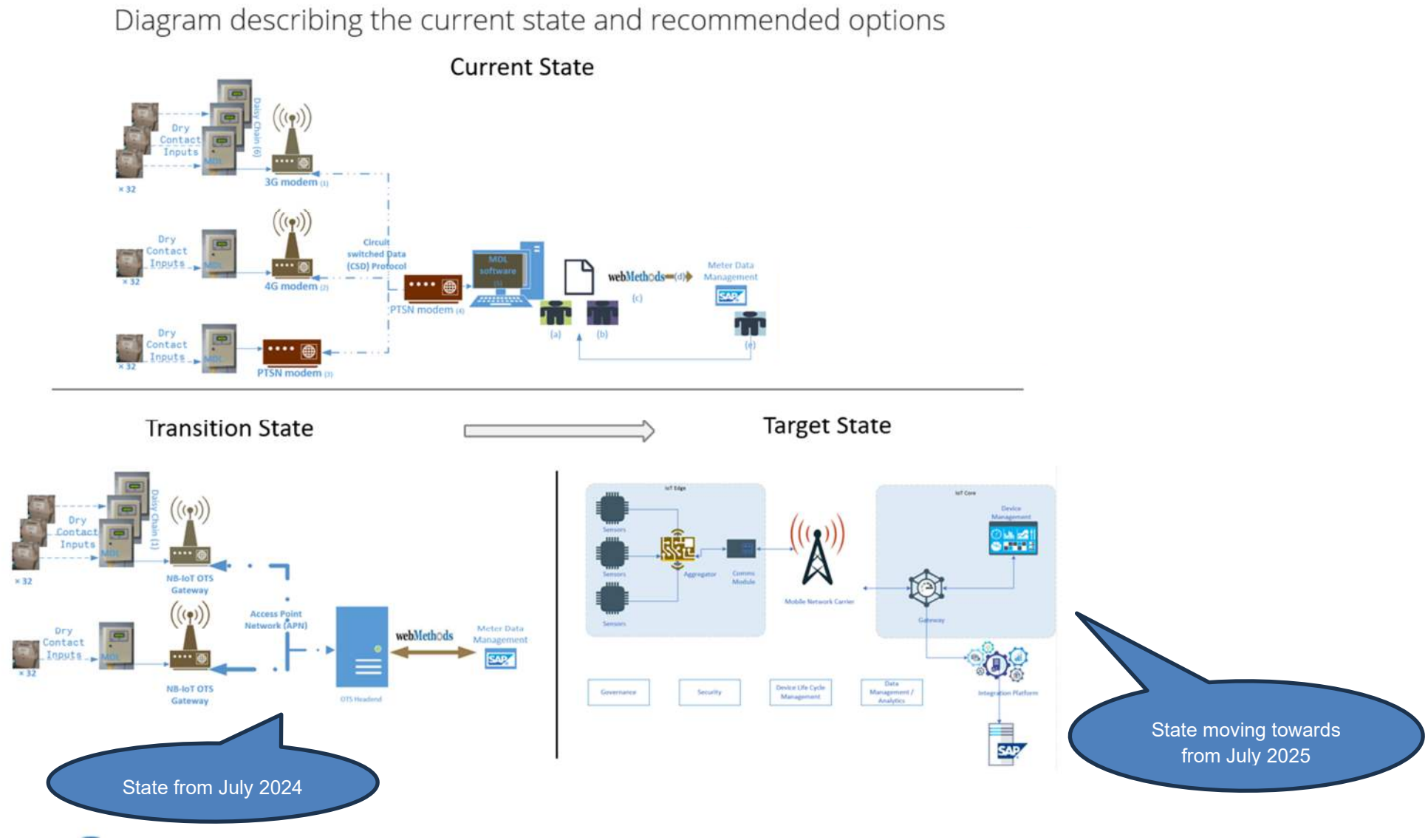

Figure 3: Architecture of MDL Solution in current state and recommended target state

As part of the transition state, a trial project is planned for 2024 & 2025 to test new remote reading technologies for residential and small I&C meters, aiming to find a strategic replacement for the existing MDL system to mitigate the vendor risk mentioned in section 2.2.1. Further details of the trial project are given in section 2.4.2 below.

2.4 CURRENT PROGRAMS (TRANSITION PHASE)

2.4.1 MDL GATEWAY REPLACEMENT PROGRAM

The current MDL supplied by Epitomy and the technology was first developed over 20 years ago. Since then, the data logger has undergone a range of developments and improvements. The logger has been installed in medium density and high rise developments to record gas and hot water consumption of customers in individual apartments. Epitomy's MDLs are linked to a bespoke platform also operated by Epitomy, which has reached end of life and is unsupported.

The MDLs use the circuit switching data (CSD) protocol to transmit data. The 3G and 4G cellular modems utilise CSD over the 3G frequencies to allow communications with the MDLs. Telstra has confirmed the shutdown of CSD in June 2024, meaning this method of communication is no longer viable. This will result in high costs to manually read or estimate consumption, delayed revenue and regulatory breaches.

From late 2022, Jemena started using NB-IoT gateways to manage the obsolescence of 3G networks and CSD in Jun 2024. Meantime, an IoT platform (Cumulocity) was introduced in the same project to replace the unsupported backend from Epitomy. With the success of this project, it maintains the continuous operation of the current MDL solution which buys more time for the business seeking an appropriate strategic replacement solution for the end of life MDL hardware.

The total number of MDLs in JGN is 17,000 and data from the MDLs is transmitted by 5,000 modems/gateways. With the MDL Gateway Replacement project currently in progress, all the current modems will be replaced with NB-IoT gateways and the backend meter data management platform will be replaced with a IoT Data Management Platform (Cumulocity).

2.4.2 TRIAL OF NEW REMOTE READING TECHNOLOGY FOR RESIDENTIAL AND SMALL I&C METERS

To reduce the single vendor risk discussed in Section 2.2.1, this project will carry out a market scan and conduct trials for cutting-edge remote reading solutions appropriate for residential gas diaphragm meters, small industrial and commercial gas meters, and residential hot water meters. These meter types are predominantly installed in medium-density high-rise buildings and are currently read using the MDL solution. We plan to test the shortlisted solutions on approximately 500 meters across one or two high-rise buildings. Insights gained from this trial will enable the business to identify an optimal strategic replacement for the MDL, which will serve as the rollout solution for the program outlined in Section 3.

3 2026-2030 MDL PROGRAMS

3.1 END OF LIFE REPLACEMENT OF MDL

MDL solution collects gas and hot water meters' reading data in the medium density high rise building to a central data backend platform. There are over 440,000 residential gas/hot water meters and small I&C meters installed in the high rise buildings to provide gas supply to the customers. This program is consistent with the asset class strategy to ensure the reliability of JGN's remote reading solution for accurate billing of residential customers and to reduce estimated meter readings.

JGN has three potential options with respect to this program:

Option	Description	Cost	Risk	Level of Service Impact	
1	**Operate to failure.**	**N/A** Not-compliant	**Extreme** Based upon non-compliance	**High** Based upon customers with no actual measurement for a period of time	Rejected on the basis that it does not meet the objectives, such that it is not compliant with Regulatory requirements nor in the interests of customers.
2	**Replace all MDL with RF technology and develop a central data collection backend platform.** Although compliance with Regulatory requirements, this option is not in the best interests of customers.	**High** RF technology solution is a relatively high unit cost solution.	**Low** Based on the learning from the RF solution rolled out.	**High** Achieve the target of leveraging the remote meter reads but it is an expansive solution.	RF technology remote reading solution is an alternative solution rolled out to the existing meters installation in the high rise buildings without the capability to lay the new wiring.
3	**Replace on failure.** Replace the failed MDL with alternative remote reading solution and integrated to the existing backend platform such as Cumulocity or Manufacturer's Application Interface integrated to Webmethods (Jemena's existing data process platform). In this option, we will only address the replacement on the failed MDL.	**Low** Focussed program	**Moderate** - Remote reading capacity of existing MDL solution will be maintained. This program will only replace the failed MDLs and reinstate the remote reading. - If the replacement solution utilizes the manufacturer's application interface instead of Cumulocity, the ongoing management costs for maintaining two systems will be	**Low** Maintain the remote reading capacity for the meters in the high rise building.	This is the **RECOMMENDED** option adopted by JGN. MDLs are only replaced once they have failed.

			higher than managing a single system. This consideration will be factored in once the trial project is completed before the program begins.		

3.2 PLANNED REPLACEMENT OF MDL BATTERIES

The MDL is mainly powered by a 240 Volt AC power supply, which also powers the gateways. The MDL has a backup battery, which keeps the MDL operating, collecting and storing meter reading data for 15 days, when the 240Volt power supply is lost. When operating, the backup battery does not power the gateways. Therefore, the communications with the MDL will be lost when the 240Volt power is disconnected.

MDL battery life is specified by the manufacture as 5 years. Hence batteries are replaced every 4.5 years to ensure the MDL continue to collect meter readings when 240 Volt power interruptions occur. This eliminates the need to manually read, estimate consumption and ensures compliance with regulatory requirement of meter readings. In addition, it also eliminates the need of realignment of the MDL with the connected meters.

JGN has identified three potential options with respect to this program:

Option	Description	Cost	Risk	Level of Service Impact	
1	**Do Nothing. Leave the battery as it is without any replacement.**	**High** There is no capital cost for replacing the batteries but there will be a high realignment service cost to restore the synchronization between the MDL and the meters.	**High** Based upon non-compliance	**High** Based upon customers with no measurement for period of time	Rejected on the basis that it does not meet the objectives, such that it is not compliant with Regulatory requirements nor in the interests of customers.
2	**Operate to failure.** Await loss the data in the backend platform due to main power interruption to require battery replacement.	**High** Only replace batteries as they fail. But will encounter with a high realignment service cost.	**High** Based upon non-compliance	**High** Based upon customers with no measurement for period of time	Rejected on the basis that it does not meet the objectives, such that it is not compliant with Regulatory requirements nor in the interests of customers.
3	**Replace the batteries on schedule at 4.5 years.** Apply specific processes to the management of meters that are identified as difficult to access.	**Moderate** Focussed program and avoid unnecessary realignment service cost.	**Low** Replace the batteries before it becomes flat.	**Low** Maintained to collect the meter's reading data when there is a main power interruption.	This is the **RECOMMENDED** option adopted by JGN. It ensures continuous meter reading collection during a main power interruption and reduces the need for realignment services to restore synchronization between the MDL and the meters.

3.3 REPLACEMENT OF DEFECTIVE MDL

Failure to replace a defective MDL will result in billing estimation and potentially Regulatory non-compliance for the obligation to deliver the actual reads to the customers. In addition, the billing estimation results in inaccurate measurement impacting upon unaccounted for gas (UAG) and providing customers with incorrect bills.

Faulty MDLs are replaced or repaired on a “run to failure” strategy. Repair of MDLs is usually achieved by the replacement of a faulty circuit board, with an upgraded version. This solution costs one-third the cost of whole MDL replacement, is the most economical and preferred option.

Defective MDL replacement programs are forecasted based on a four year historical average spend.

JGN has identified two potential options with respect to this program:

Option	Description	Cost	Risk	Level of Service Impact	
1	**Do nothing.** Leave failed MDL as it is.	**N/A** Not-compliant	**High** Based upon non-compliance	**High** Based upon customers with no accurate bills for a period of time.	Rejected on the basis that does not meet the objectives, such that it is not compliant with Regulatory requirements nor in the interests of customers.
2	**Repair MDLs as they fail**	**Low** Focussed program and only fix when they fail.	**Low** Focussed program	**Low** Maintain the same service level delivered to customers	This is the **RECOMMENDED** option adopted by JGN. It maintains the operation and service level of MDL.

3.4 SUMMARY OF COSTS

The following table summarises the costs per year for the three programs related to the MDL assets.:

RY2026 – 2030 MDL Replacement programs cost summary ($2023 real value)						
Program name	**RY26**	**RY27**	**RY28**	**RY29**	**RY30**	**Total**
End of Life Replacement of Meter Data Logger Batteries	943,800	1,076,900	1,086,300	1,007,600	925,600	**5,040,200**
End of Life Replacement of Residential and Small I&C Meter Remote Reading Technology (R)	145,632	320,791	216,943	216,943	222,325	**1,122,634**
Replacement of Defective Meter Data Loggers	606,171	606,171	606,171	606,171	606,171	**3,030,855**

4 REFERENCES

Document Number	Document name
GAS-1799-SP-GM-007	Jemena Policy on Field Failure Measurement and Reporting of Metering Assets JGN
GAS-1799-SP-GM-008	Metering Equipment Maintenance and Service Life
GAS-1799-PA-GM-001	JGN Measurement Asset Class Strategy 2023
	National Measurement Act 1960 (sections 18GD and 18GE)
	NSW Gas Supply (Consumer Safety) Regulation 2012
	NSW Department of Fair Trading Guidelines

5 TERMS AND DEFINITIONS

Term	Definition
JGN	Jemena Gas Network
MDL	Meter Data Logger
I&C	Industrial & Commercial
RF	Radio Frequency