Gas Access Arrangement Review
– Adjusting the Meter Replacement Program

APPENDIX 5D

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EXECUTIVE SUMMARY

SP AusNet is required by the Gas Distribution System Code (GDSC) to provide an appropriate metering installation at each supply point (i.e. connection) off the distribution network. SP AusNet is required to periodically maintain these installations (both proactively and reactively), replace meters when their field life has expired and provide periodic metering information to retailers for billing purposes.

The domestic time expired meter replacement program is one of several annual programs conducted by SP AusNet to maintain compliance with its obligations under the GDSC.

SP AusNet has introduced a policy of adjusting the annual meter replacement program to reduce the expected extreme volatility within the replacement program within the 4th regulatory period, most noticeably, more than 60,000 meter replacements required in 2014 and again in 2018.

SP AusNet's strategy is to maintain a domestic meter replacement program with low levels of volatility, ideally between 25,000 to 35,000 meters per annum. Smoothing aims to:

1. **Ensure regulatory compliance is maintained:** The risk of major non-compliance increases with the size of the program due to constraints in labour and meter procurement, and
2. **Improved capital efficiency:** Fluctuations in annual program size results in unfavourable unit rate outcomes resulting from the need to mobilise (and subsequently demobilise) resources to deliver programs.

Under the National Gas Law the resulting "adjusted" program must remain compliant with Rule 79 which outlines the "new capital expenditure criteria" for conforming capital expenditure. In summary, conforming 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 this service.

SP AusNet has completed modelling which compares the present value of the predicted and adjusted replacement programs. Based on this modelling, an estimated financial benefit of $47k is achieved by smoothing the program. This is in addition to other intangible benefits including increased network safety.

1 Document overview

1.1 Purpose

This document provides supporting information and commentary on SP AusNet's Gas Meter Management Strategy (AMS 30-54), including the commercial justification of phasing the time expired replacement of domestic meter types.

The document is for use by:

- Internal staff and senior management; and
- Regulators - Economic, Technical and Safety.

1.2 Document Structure

This document is structured as follows:

- **Regulatory obligations:** Outlines SP AusNet's obligations under the Gas Distribution System Code in respect to metering installations.
- **Conforming capital expenditure:** Outlines the requirements for conforming capital expenditure within the National Gas Law.
- **Predicted time expired replacement program:** Predicted required replacement of domestic meters based on expected results of in-service compliance testing.
- **Program delivery risks:** Identifies and discusses financial and non-financial risks in completing the predicted time expired replacement program.
- **SP AusNet's policy of phased replacement of domestic meters:** Outlines SP AusNet's policy to phase the replacement of its domestic meter fleet by maintaining a replacement program size between 25,000 to 35,000 meters per annum.
- **Commercial justification for phased replacement of domestic meters:** Provides commercial justification for phasing domestic meter replacements, which includes the voluntary replacement of meters before the end of their deemed in-service compliance periods.

1.3 Scope

This paper covers the management of SP AusNet's existing metering fleet, including:

- Strategies to maintain regulatory compliance & consumer safety of existing metering assets, and
- Forecasts of meter replacements to meet the above objectives.

1.4 Relationship with other Management Documents

This paper should be read in conjunction with SP AusNet's Gas Meter Management Strategy (AMS 30-54). The meter management strategy is one of a number of asset management related documents developed by SP AusNet in relation to its Gas Distribution network. See AMS 30-54 for further information.

1.5 Phasing and Financial Disclosure

All programs within this document are defined in calendar years, consistent with the requirements of the Gas Distribution System Code, AMS 30-54, and the reporting requirements of the Australian Energy Regulator (AER)[1].

All financial figures quoted within this document, including all historic and forecasted expenditure - unless otherwise specifically stated - have the following characteristics:

- Real Expenditure / Cost (reference year = 2011);
- Direct Expenditure only (i.e. excludes overheads and finance costs); and
- In units of $1,000 (i.e. $'000).

1.6 References

- AMS 30-54: Gas Meter Management
- 30-4004: Materials Manual - Section 12: Meters
- AS/NZS 4944:2006 - In-service compliance testing of diaphragm meters up to 25m^3/hr.
- DMS 40-16 - Field life extension for industrial and commercial Gas Meters
- Gas Distribution System Code, Version 9
- TS-0501 - Gas Specific Materials and New Technologies Approval Process
- TS-4357 - In-service compliance testing of gas meters

[1] The AER requires notification of the outcomes of in-service compliance testing by 30 September each year. Both in-service compliance testing and meter replacement programs are defined, tracked and reported on a calendar year basis.

2 Regulatory obligations

SP AusNet's metering obligations are primarily defined within sections 5 to 8 of the Gas Distribution System Code (GDSC), Version 9. The code outlines SP AusNet's obligation to provide metering installations, the standard of those installations, testing requirements and the provision of metering data to retailers.

In summary, SP AusNet is required to provide an appropriate (type varies depending on application) metering installation at each supply point (i.e. connection) off the distribution network. SP AusNet is required to periodically maintain these installations, replace meters when their field life has expired and provide periodic metering information to retailers for billing purposes.

To fulfil its obligations, SP AusNet completes a number of annual meter replacement programs, including an annual "Time Expired" meter replacement program to remove meters at the end of the useful life (in-service compliance period).

3 Conforming capital expenditure

The economic regulation of the Gas Distribution industry is subject to a national regulatory framework. The framework is governed by the National Gas Law (NGL), and contained in the National Gas Rules (Rules).

In relation to the former, the key sections are:

Section 23 of the National Gas Law outlines the National Gas Objective:

> *"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."*

Rule 79 of the NGL, which outlines the "New capital expenditure criteria", which in turn underpins the AER's assessment of SP AusNet's proposed capital expenditure. In summary, conforming 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 this service. There is also additional criteria relating to network integrity and safety which all apply when assessing conforming capital expenditure.

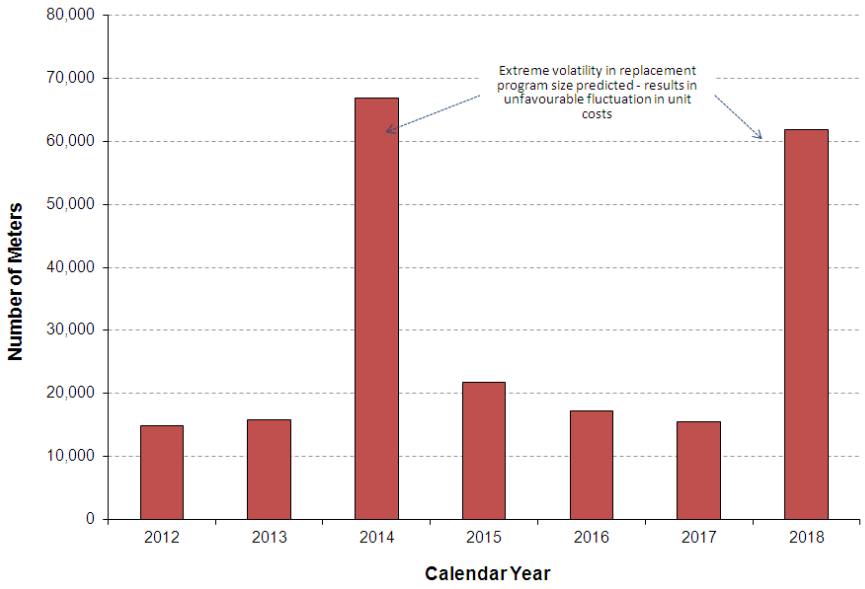
It is SP AusNet's belief that an adjusted (smooth) meter replacement program, i.e. one without extreme volatility in program size, conforms to Rule 79 of the NGL as it provides the lowest cost of maintaining compliance with SP AusNet's obligations under the GDSC.

4 Predicted domestic time-expired replacement program

The size of the annual domestic meter replacement program is heavily influenced by the results of the previous year's in-service compliance testing program. Those meter families that fail to achieve required safety and accuracy benchmarks (as defined within AS/NZS 4944:2006 – In-service compliance testing of diaphragm meters up to 25m^3/hr) are removed from operation the following year. SP AusNet has forecasted (based on past performance) the expected volume of meter replacements required per year to 2018[2].

[2] See Appendix A for assumptions underpinning forecast (Section 8, page 15)

Figure 1: Forecast Meter Replacement Volumes (Predicted) to 2018



Significant spikes in the required meter replacements are predicted for 2014 (≈ 67,000) and again in 2018 (≈ 62,000 meters). Conversely, smaller replacement programs are expected in 2012, 2015, 2016 and 2017. The average replacement program for the period is approximately 30,500 meters per annum.

See Appendix B (Section 9, page 15) for a breakdown of meter families within the predicted replacement program.

Large volatility in program sizes are of concern to SP AusNet as it introduces an additional level of risk to both the delivery and cost of the program.

5 Program delivery risks

SP AusNet considers the impacts of constraints in the supply of labour and materials when determining the most efficient expenditure profile required in meeting meter replacement obligations as set out in the GDSC.

From a labour and material prospective:

- **Materials:** A high proportion of SP AusNet's replacement meters are refurbished and reused within the field. SP AusNet has "-" service providers with the ability to refurbish domestic diaphragm meters. There is a significant cost difference between the "-" providers. The average per unit cost of refurbishment increases for programs that exceed the capacity of the preferred supplier[3]. Once capacity is reached, SP AusNet is forced to utilise (C-I-C) providers for refurbished gas meters and bear a premium for this service[4].
- **Labour:** Under the existing agreement with SP AusNet's primary service provider, favourable per meter replacement rates have been achieved for programs of limited size (i.e. (C-I-C) meters) as labour is shared between the meter replacement programs and other programs required to maintain the gas distribution network. Meter replacement programs of increased size require dedicated resources, which in turn increases per unit cost. For uncharacteristically large programs (i.e. those >40,000 meters), the demand

[3] There is no incentive for the primary service provider to add additional manufacturing capacity to cater for the fluctuations in the demand for refurbished meters as that exposes the provider to the risk of capacity underutilisation (i.e. stranded resources).

[4] It remains economically viable to refurbish meters (as opposed to purchasing new) with the secondary supplier.

for skilled labour outstrips supply, negating any benefit that may have been expected from economies of scale.

In addition to the financial implications, there are many intangible risks borne by SP AusNet (and the customer) resulting from extreme volatility within the time expired replacement program, namely the risk of regulatory non-compliance and the more serious concern of customer safety.

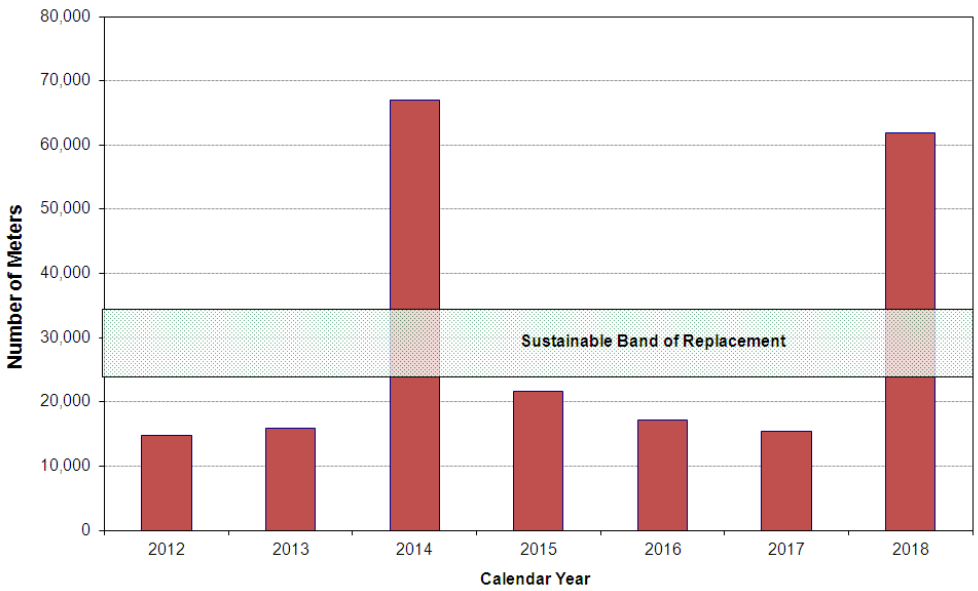
The risk of major non-compliance (i.e. leaving meters from a failed family in the field) increases with the size of the program due to constraints in labour and the procurement of meters (as discussed above). In terms of meter accuracy, this is typically not an issue from a customer prospective as meter accuracy tends to slow over time, which is in the customers favour5. This is not the case from a safety perspective. Within the rules of AS/NZS 4944:2006 (and the GDSC as the predecessor to the AS/NZS 4944:2006) there are two criteria for in-service compliance testing of domestic meters which can result in a meter family failing compliance testing and require removal from the field:

1. Meter accuracy, and
2. Leakage.

If a meter family fails the test for leakage (SP AusNet has failed meter families in the past due to leakage), the integrity of the metering installation is compromised and of heightened concern to SP AusNet with everything practically possible done to ensure their removal.

Based on the risks inherent from a volatile replacement program and a growing metering fleet of approximately 590,000 domestic meters with an average life of approximately 20 years, SP AusNet believes that a sustainable range of meter replacement is in the vicinity of 25,000 to 35,000 meter replacement per annum. This is shown in Figure 2 below.

Figure 2: Sustainable band of replacement



[5] Initial investigations into meter accuracy over time shows that, on average, a standard domestic diaphragm meter will slow over time (i.e. under read throughput).

6 SP AusNet's policy for the phased replacement of domestic meters

SP AusNet's policy to maintain a domestic meter replacement program with low levels of volatility, ideally between 25,000 to 35,000 meters per annum, aim to:

1. **Ensure regulatory compliance is maintained:** The risk of major non-compliance increases with the size of the program due to constraints in labour and procurement of meters, and
2. **Improved capital efficiency:** Fluctuations in annual program size results in unfavourable unit rate outcomes resulting from the need to mobilise (and subsequently demobilise) resources to deliver programs.

Adjustment of the meter replacement program focuses on smoothing the annual volume of meters to be replaced reducing the volatility in program size. Smoothing can only be achieved by bringing forward (i.e. prematurely failing) the replacement of meter families before the end of their deemed useful life.

Rules adopted when adjusting the program include:

- Replacement of meters families can only be brought forward. Delaying the replacement of an assumed failed meter family is not consistent with the requirements of the GDSC.
- No meter family will be retired within its initial in-service compliance period[6].
- Families with a large volume of meters (i.e. >10,000) are targeted for early retirement to reduce the risk of multiple large families requiring replacement in any one year.

Table 1: Premature Failure of Meter Families

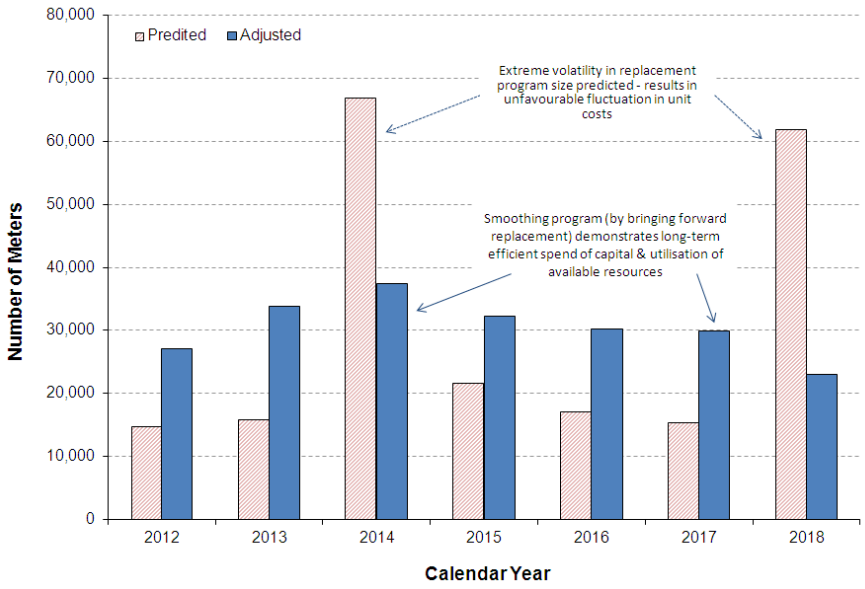
Meter Description	Original Installation Date	Year of Predicted Replacement		Year of Voluntary Replacement	Volume of Meters
(C-I-C)	1993	2014	→	2012	11,550
(C-I-C)	2000 [7]	2015	→	2012	734
(C-I-C)	2002 [7]	2017	→	2012	1
(C-I-C)	1990	2014	→	2013	12.262
(C-I-C)	1994	2014	→	2013	1,326
(C-I-C)	1999	2014	→	2013	4,342
(C-I-C)	1992	2018	→	2015	11,306
(C-I-C)	1991	2018	→	2016	13,073
(C-I-C)	1987	2018	→	2017	14,428

The resulting adjusted program (Blue chart in Figure 3 below) reduces the peak in 2014 from 67,000 (predicted) to 37,000 meters. This figure remains outside the ideal band of 25,000 to 35,000 meters but could not be reduced further due to the aforementioned constraints (i.e. the rules adopted for premature failure of meter families). See Appendix C (Section 10, page 17) for complete list of meters within the adjusted program.

[6] Refer to Section 6.3 as outlined in the Gas Distribution System Code & AS/NSZ 4944. Domestic diaphragm meters have an initial compliance period of 15 years. Refer to footnote 7 for the only exception to this rule

[7] All (C-I-C) meter families will be voluntarily replaced before their initial in-service compliance period have been reached (i.e. 15 years) due to unfavourable testing results conducted after (C-I-C) years on the meter family by another distribution network in Victoria.

Figure 3: Forecast Meter Replacement Volumes (Predicted & Adjusted) to 2018



7 Commercial justification for phased replacement of domestic meters

A requirement of the NGL is the conforming 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 this service.

SP AusNet has modelled the financial implications of adjusting the meter replacement program which demonstrates the smoothed rate of replacement is compliant with rule 79 of the NGL (see section 3, page 7).

The forecasted annual expenditure for both the predicted and adjusted cases (direct $2011, real costs, base condition without the application of labour and material escalators) is summarised in Table 2 below and again in Figure 4 (page 12). A detailed breakdown of expenditure for each program is provided in Appendix D (Section 11, page 19).

Table 2: Forecast capital expenditure (Direct $2011 Real, '000, Base condition[8])

Program		2012	2013	2014	2015	2016	2017	2018
Predicted	Labour – Internal	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)
	Labour – Contractors	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)
	Materials	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)
	TOTAL	$1,474	$1,661	$7,709	$2,258	$1,748	$1,540	$7,139
Adjusted	Labour – Internal	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)
	Labour – Contractors	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)
	Materials	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)
	TOTAL	$2,788	$3,691	$4,016	$3,411	$3,194	$3,157	$2,508

[8] Base expense excludes the application of real labour and material escalation.

Figure 4: Forecast capital expenditure (Direct $2011 Real, '000, Base condition)

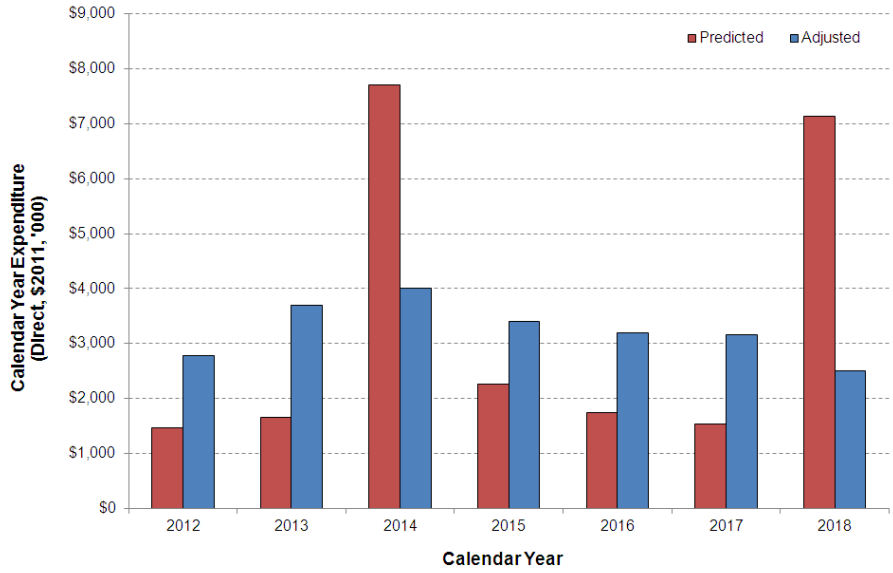


Figure 4 (above) highlights the volatility in required expenditure needed for the time expired replacement program to 2018. The expenditure is amplified in 2014 and 2018 where demand for labour is expected to outstrip supply pushing up unit rates.

By artificially phasing the program, efficient spend is demonstrated by providing the lowest cost of ensuring compliant domestic metering installations, as defined and required by the NGL. The present benefit of smoothing the program (based on forecasts to 2018) is approximately $47k[9] (discounted present value, direct $2011 Real) when compared to the predicted path (i.e. natural) path of meter replacement.

A step by step derivation of the $47k benefit is provided in Appendix E (Section 12, page 20).

In summary, discounting the forecast expenditure (using an assumed real WACC of 6%) yields the total expenditure required for both programs in present value terms. Note that the volume of meters replaced remains the same for both programs.

Table 3: Expenditure Summary Comparison

Program	Direct $2011 (Figure 4 above)	Present Value (Figure 5 & Figure 6 below)	Meters Replaced
Predicted	$23,935	$19,118	213,688 units
Adjusted (Smoothed)	$23,103	$19,071	213,688 units
Difference	($914)	($47)	0

[9] Assumptions adopted in the calculation of financial benefit.

- Capacity for meter refurbishment is (C-I-C) meters from SP AusNet's primary supplier of this service. Excess meters are to be refurbished by (C-I-C) suppliers which charge a premium above supplier 1.
- Labour rates per meter increases (in groups of <(C-I-C), (C-I-C) to (C-I-C) and <(C-I-C)) due to industry constraints in qualified personal.
- No allowance has been made for abnormally large replacement programs from other distribution businesses. Such programs will apply added cost pressures to SP AusNet's replacement programs and increase the risk of major non-compliance.

Figure 5: Forecast expenditure for the Domestic Meter Replacement Program (Present Value)

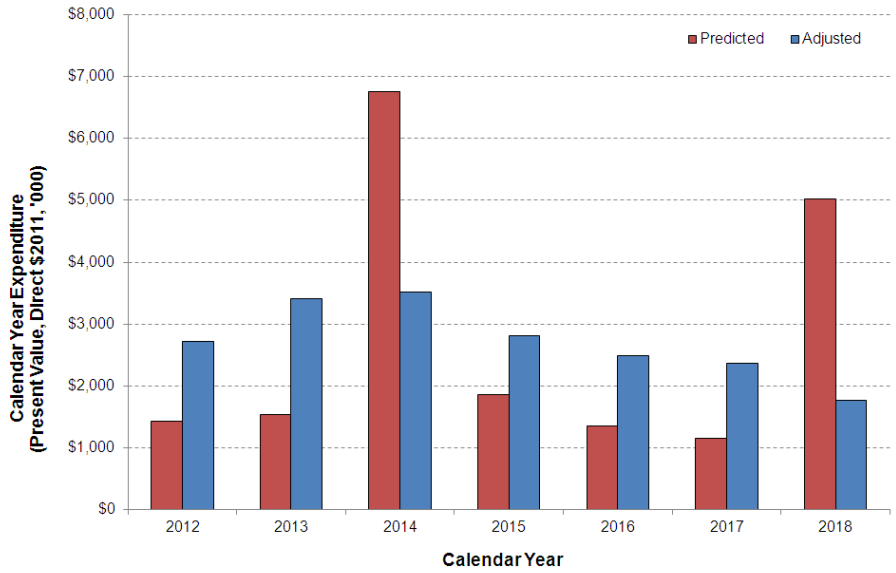
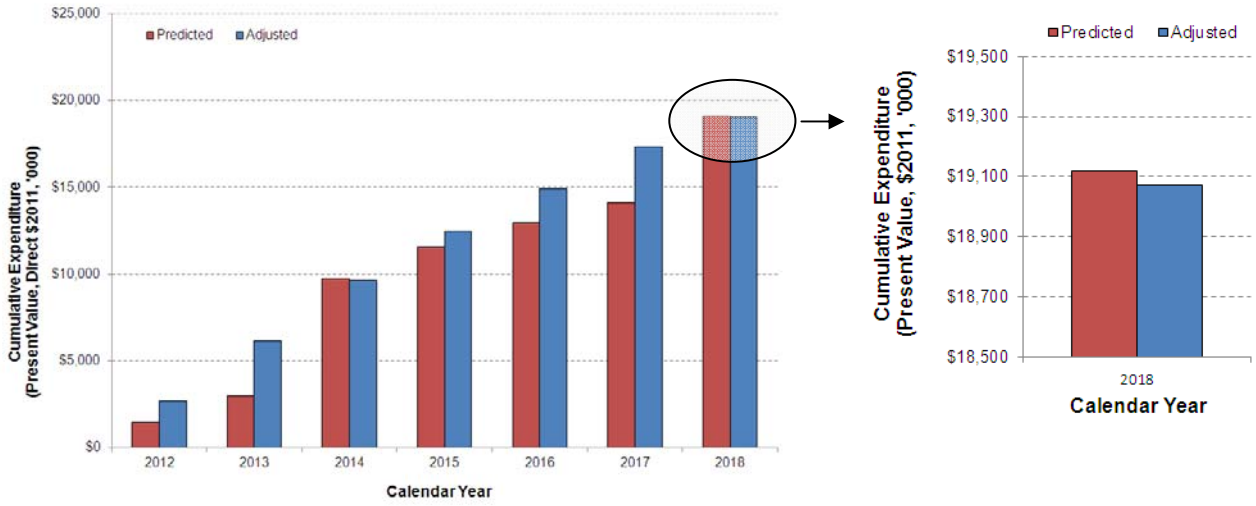


Figure 6 shows the cumulative expenditure (in present value terms) for meter replacement from 2012 to 2018. The $47k saving in capital expenditure, although small, demonstrates that smoothing the replacement program provides the lowest cost of providing this service, hence is compliant with the expenditure criteria within the NGL. Also note that this economic benefit is silent on all other intangible benefits of adjusting the program which would incrementally increase the benefit to the end consumers. These benefits include:

- Improved safety and integrity of metering installations,
- Reduction in the risk of major non-compliance with regulatory obligations, and
- Increased meter accuracy (as meter accuracy will diminish over time).

Figure 6: Cumulative Forecast expenditure for the Domestic Meter Replacement Program



8 Appendix A – Forecasting Assumptions

A summary of forecasting assumptions / rules are contained within Table 4 below. Refer to SP AusNet's Meter Management Strategy (AMS 30-54), Appendix E for further details on forecasting assumptions.

Table 4: Forecasting Assumptions

Extension	Extension Applied to:
5 Years	– "x meter type" meter families tested for the first time
3 Years	– New and Refurbished meters (except " x meter type") tested for the first time – Any meter type who previously gained a 5 year extension
1 Year	– Refurbished meters (except " x meter type") tested for the first time – Any meter type who previously gained a 3 year extension
Failed	– All meter families excluded from in-service compliance testing – Any meter type who previously gained a 1 year extension

9 Appendix B – Breakdown of Predicted Time Expired Program

Year Removed	Meter Description	Original Installation Date	Total Units within Network (20 June 2011)
2012	(C-I-C)	1997	2,930
	(C-I-C)	1997	1,616
	(C-I-C)	1997	381
	(C-I-C)	1997	73
	(C-I-C)	1997	2
	(C-I-C)	1997	56
	(C-I-C)	1993	6,816
	(C-I-C)	1994	2,090
	(C-I-C)	1989	827
2013	(C-I-C)	1998	137
	(C-I-C)	1998	1,637
	(C-I-C)	1998	68
	(C-I-C)	1998	605
	(C-I-C)	1997	8,608
	(C-I-C)	1995	4,802
2014	(C-I-C)	1999	4,342
	(C-I-C)	1999	92
	(C-I-C)	1999	104
	(C-I-C)	1999	177
	(C-I-C)	1999	2
	(C-I-C)	1999	576
	(C-I-C)	1990	12,262
	(C-I-C)	1993	11,550
	(C-I-C)	1994	15,275
	(C-I-C)	1995	18,816
	(C-I-C)	1998	2,413
	(C-I-C)	1994	1,326
2015	(C-I-C)	2000	1,912
	(C-I-C)	2000	76
	(C-I-C)	2000	122
	(C-I-C)	2000	489
	(C-I-C)	2000	734
	(C-I-C)	1996	12,829
	(C-I-C)	1996	1,713

Year Removed	Meter Description	Original Installation Date	Total Units within Network (20 June 2011)
	(C-I-C)	1999	3,814
2016	(C-I-C)	2001	9
	(C-I-C)	2001	1
	(C-I-C)	2001	654
	(C-I-C)	1988	14,016
	(C-I-C)	1997	460
	(C-I-C)	1997	848
	(C-I-C)	2000	1,152
2017	(C-I-C)	2002	18
	(C-I-C)	2002	2
	(C-I-C)	2002	1
	(C-I-C)	2002	1
	(C-I-C)	2002	5
	(C-I-C)	2002	1
	(C-I-C)	2002	1,369
	(C-I-C)	2001	4,217
	(C-I-C)	1998	733
	(C-I-C)	1998	2,191
	(C-I-C)	1998	6,893
2018	(C-I-C)	2003	57
	(C-I-C)	2003	1,699
	(C-I-C)	2003	2,471
	(C-I-C)	2003	10
	(C-I-C)	2003	2
	(C-I-C)	2003	4
	(C-I-C)	2003	6
	(C-I-C)	2002	6,319
	(C-I-C)	1999	1,936
	(C-I-C)	1999	417
	(C-I-C)	1999	9,593
	(C-I-C)	1987	14,482
	(C-I-C)	1991	13,073
	(C-I-C)	1992	11,306
	(C-I-C)	1994	280
	(C-I-C)	1993	190

10 Appendix C – Breakdown of Adjusted Time Expired Program

Year Removed	Meter Description	Original Installation Date	Total Units within Network (20 June 2011)
2012	(C-I-C)	1997	2930
	(C-I-C)	1997	1616
	(C-I-C)	1997	381
	(C-I-C)	1997	73
	(C-I-C)	1997	2
	(C-I-C)	1997	56
	(C-I-C)	1993	6816
	(C-I-C)	1994	2090
	(C-I-C)	1989	827
	(C-I-C)	1999	2
	(C-I-C)	1993	11550
	(C-I-C)	2000	734
	(C-I-C)	2002	1
2013	(C-I-C)	1998	137
	(C-I-C)	1998	1637
	(C-I-C)	1998	68
	(C-I-C)	1998	605
	(C-I-C)	1997	8608
	(C-I-C)	1995	4802
	(C-I-C)	1999	4342
	(C-I-C)	1990	12262
	(C-I-C)	1994	1326
2014	(C-I-C)	1999	92
	(C-I-C)	1999	104
	(C-I-C)	1999	177
	(C-I-C)	1999	576
	(C-I-C)	1994	15275
	(C-I-C)	1995	18816
	(C-I-C)	1998	2413
2015	(C-I-C)	2000	1912
	(C-I-C)	2000	76
	(C-I-C)	2000	122
	(C-I-C)	2000	489
	(C-I-C)	1996	12829

Year Removed	Meter Description	Original Installation Date	Total Units within Network (20 June 2011)
	(C-I-C)	1996	1713
	(C-I-C)	1999	3814
	(C-I-C)	1992	11306
2016	(C-I-C)	2001	9
	(C-I-C)	2001	1
	(C-I-C)	2001	654
	(C-I-C)	1988	14016
	(C-I-C)	1997	460
	(C-I-C)	1997	848
	(C-I-C)	2000	1152
	(C-I-C)	1991	13073
2017	(C-I-C)	2002	18
	(C-I-C)	2002	2
	(C-I-C)	2002	1
	(C-I-C)	2002	1
	(C-I-C)	2002	5
	(C-I-C)	2002	1369
	(C-I-C)	2001	4217
	(C-I-C)	1998	733
	(C-I-C)	1998	2191
	(C-I-C)	1998	6893
	(C-I-C)	1987	14482
2018	(C-I-C)	2003	57
	(C-I-C)	2003	1699
	(C-I-C)	2003	2471
	(C-I-C)	2003	10
	(C-I-C)	2003	2
	(C-I-C)	2003	4
	(C-I-C)	2003	6
	(C-I-C)	2002	6319
	(C-I-C)	1999	1936
	(C-I-C)	1999	417
	(C-I-C)	1999	9593
	(C-I-C)	1994	280
	(C-I-C)	1993	190

11 Appendix D – Expenditure Breakdown

Table 5: Expenditure Breakdown – Predicted Program

Cost Component	2012	2013	2014	2015	2016	2017	2018
Meter Costs							
Refurbished	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)
New	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)
Installation	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)
Miscellaneous Expenses[10]	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)
Total Expenditure ('000)	$1,474	$1,661	$7,709	$2,258	$1,748	$1,540	$7,139
Meters Replaced	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)
Per Meter ($)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)

Table 6: Expenditure Breakdown – Adjusted Program

Cost Component	2012	2013	2014	2015	2016	2017	2018
Meter Costs							
Refurbished	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)
New	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)
Installation	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)
Miscellaneous Expenses[10]	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)
Total Expenditure ('000)	$2,788	$3,691	$4,016	$3,411	$3,194	$3,157	$2,508
Meters Replaced	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)
Per Meter ($)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)

[10] Miscellaneous expenses include meter transportation, warehousing, additional works (i.e. after hours reconnection, regulator replacement etc.) and program management that does not increase or decrease (per capita) with the size of the meter replacement program.

12 Appendix E – Benefit Derivation

Step 1: Calculate expenditure forecasts for both programs in direct $2011 (i.e. base condition)

Table 7: Forecast expenditure – Base forecast

Program		2012	2013	2014	2015	2016	2017	2018
Predicted	Labour – Internal	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)
	Labour – Contractors	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)
	Materials	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)
	TOTAL	$1,474	$1,661	$7,709	$2,258	$1,748	$1,540	$7,139
Adjusted	Labour – Internal	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)
	Labour – Contractors	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)
	Materials	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)
	TOTAL	$2,788	$3,691	$4,016	$3,411	$3,194	$3,157	$2,508

Step 2: Apply real costs escalation for material, internal labour and contractors (external labour).

Table 8: Material and Labour Escalators

Escalator	2012	2013	2014	2015	2016	2017	2018[11]
Labour – Internal	1.50%	2.60%	2.80%	3.10%	3.00%	2.90%	2.90%
Labour – External	2.20%	3.00%	3.10%	2.40%	2.49%	3.30%	3.30%
Materials	(1.66%)	0.58%	0.73%	(0.34%)	(0.24%)	2.99%	2.99%

Sources: BIS Shrapnel and SKM

[11] Assumed 2017 escalation

Table 9: Forecast expenditure – Inclusive of cost escalation

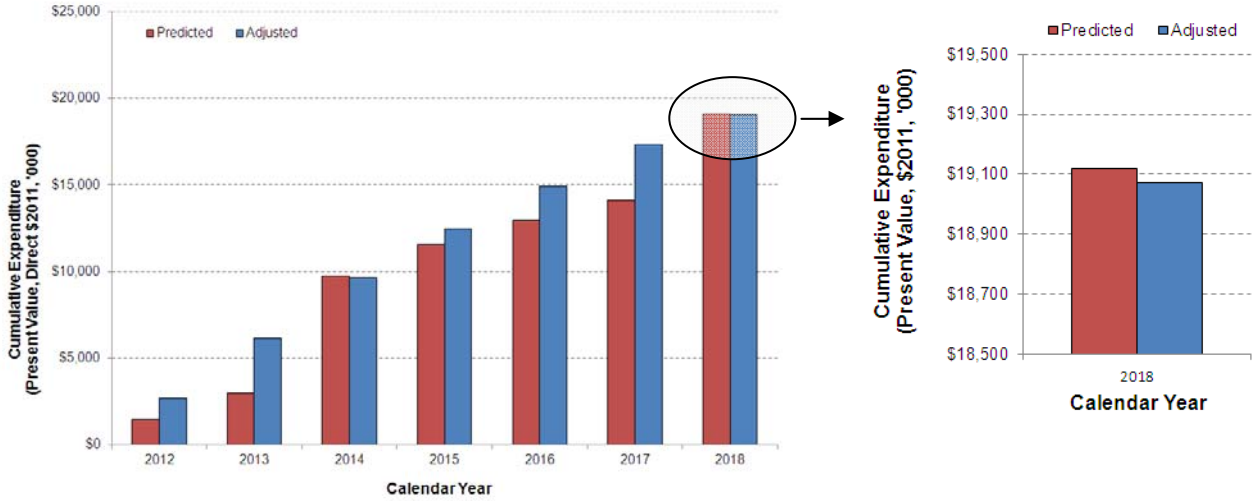
Program		2012	2013	2014	2015	2016	2017	2018
Predicted	Labour – Internal	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)
	Labour – Contractors	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)
	Materials	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)
	TOTAL	$1,476	$1,673	$7,821	$2,281	$1,767	$1,589	$7,329
Adjusted	Labour – Internal	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)
	Labour – Contractors	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)
	Materials	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)
	TOTAL	$2,794	$3,722	$4,075	$3,446	$3,227	$3,250	$2,589

Step 3: Discount expenditure to present value (Assumed Real WACC = 6%).

Table 10: Forecast expenditure – Inclusive of cost escalation

Program	2012 (Year 1)	2013 (Year 2)	2014 (Year 3)	2015 (Year 4)	2016 (Year 5)	2017 (Year 6)	2018 (Year 7)	Total
Predicted	$1,433	$1,533	$6,761	$1,860	$1,359	$1,153	$5,018	$19,118
Adjusted	$2,714	$3,411	$3,522	$2,810	$2,482	$2,359	$1,773	$19,071

Figure 7: Cumulative Forecast expenditure for the Domestic Meter Replacement Program[12]



[12] Repeat of Figure 6 (page 13)