



**REPORT – UPDATE**

18 MAY 2017

# REVIEWING ENERGY COSTS FOR SYDNEY DESALINATION PLANT (SDP): UPDATED BENCHMARK PRICE

Report prepared for the Independent Pricing and  
Regulatory Tribunal (IPART)

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# 1. Introduction

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Marsden Jacob Associates (Marsden Jacob) was commissioned by the Independent Pricing and Regulatory Tribunal (IPART) to review the management and purchases by the Sydney Desalination Plant (SDP) of electricity and large-scale generation certificates (LGCs) over the Review Period (2012/13 to 2015/16) and project energy costs for the Outlook Period (2017/18 to 2021/22).

Marsden Jacob undertook this work commencing in October 2016 and for the energy and price outlook used forward curves published on 25<sup>th</sup> November 2016, and Marsden Jacob's outlook of gas costs at that time. Marsden Jacob report is titled "Reviewing Energy Costs for the Sydney Desalination Plant (SDP)" and is dated 17<sup>th</sup> January 2017.

Since that time there have been a numbers of changes in the market, in particular:

- Forward curves have changed significantly with forward swap prices having increased and forward LGC prices having reduced; and
- Gas prices have increased.

In April 2017 IPART requested that Marsden Jacob re-develop the Benchmark Price using the latest forward curves on energy swaps and LGCs, and the most recent outlook on gas prices. Marsden Jacob completed this work using swap and LGC forward curves as published on 4<sup>th</sup> May 2017 and Marsden Jacob's revised outlook on gas costs.

This work was limited to Chapter 7 of that report titled "The Benchmark Price" and Appendix 5 titled LRMC Assumptions.

This report presents the updated tables and descriptions in that chapter through applying the updated assumptions listed above. The descriptions presented in this chapter are limited to the reasons for the changes. Consequently this report should be read in conjunction with the original Marsden Jacob report<sup>1</sup>.

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<sup>1</sup> The public version of this report dated 27 February 2017 is available at this link <https://www.ipart.nsw.gov.au/files/sharedassets/website/shared-files/pricing-reviews-water-services-metro-water-legislative-requirements-investigation-into-pricing-for-sydney-desalination-plant-ptv-ltd-from-1-july-2017/consultant-report-by-marsden-jacob-associates-reviewing-energy-costs-for-sydney-desalination-plant-february-2017.pdf>

## 2. Dollars and Escalation used in this Report

The Marsden Jacob report dated 17<sup>th</sup> January 2017 and this report refers to numbers that are presented in nominal dollars, real 2011/12 dollars, real 1 July 2016 dollars, and real 1 January 2017 dollars. This required conversion of dollars between these various definitions.

The basis of dollars presented in this report is as follows:

- All dollars are real 1 July 2016 Australian dollars unless otherwise specified. This corresponds to the year 2016/17.
- Forward curves of energy and LGC prices are published in nominal dollars and forward prices are presented as published.
- Historical SDP costs were presented to Marsden Jacob in 2011/12 dollars and in nominal dollars. These are presented in these respective dollars.

Since the 17<sup>th</sup> January 2017 report the CPI for the year 2017/18 has been updated to 2.2% from the previous 2.5%. Further the CPI figures have been slightly rounded to those provided by IPART. CPI used in the Review Period and Outlook Period are shown in the table below.

### CPI Assumed in this Report

Financial Year	CPI
2012-13	3%
2013-14	1.50%
2014-15	1%
2015-16	2.20%
2016-17	2.10%
2017-18	2.50%
2018-19	2.50%
2019-20	2.50%
2020-21	2.50%
2021-22	2.50%

### 3. Updated Tables – Executive Summary

The executive summary had three tables that required updating as a result of the updated energy and LGC components of the Benchmark Price. The updated tables are:

- Table ES2 Benchmark Price \$/MWh (1 July 2016 Real Dollars);
- Table ES3 Benchmark Price Component Costs for 2017/18 \$/MWh (1 July 2016 Real Dollars);
- Table ES4 Infigen Contract Price and Benchmark Price (in \$/MWh) for Operating Mode (Real 1 July 2016 Dollars).

These three updated tables are presented below. These should be read in conjunction with the original report.

**Table ES2 Benchmark Price \$/MWh (1 July 2016 Real Dollars)**

	2017/18	2018/19	2019/20	2020/21	2021/22
Full Operation	197.2	161.3	144.1	135.8	132.7
Ramping	202.7	165.5	147.8	139.3	136.1
Shutdown	202.0	165.2	147.6	139.1	136.0
Full Operation: No Over-contracting	197.2	161.2	144.0	135.7	132.6
Ramping: No Over-contracting	197.2	161.3	144.0	135.7	132.7
Shutdown: No Over-contracting	197.9	162.0	144.7	136.4	133.4

**Table ES3 Benchmark Price Component Costs for 2017/18 \$/MWh (1 July 2016 Real Dollars)**

	Full	Ramping	Shutdown	Full No over-cont..	Ramping No over-cont.	Shutdown No over-cont..
Energy	114.70	120.08	118.73	114.62	114.62	114.62
LGC	69.89	69.89	69.89	69.89	69.89	69.89
STC	3.38	3.38	3.38	3.38	3.38	3.38
ESS	1.94	1.94	1.94	1.94	1.94	1.94
Retail margin	5.00	5.00	5.00	5.00	5.00	5.00
Market fees	0.30	0.30	0.30	0.30	0.30	0.30
Metering /data	0.01	0.02	0.73	0.01	0.02	0.73
Ancillary services	0.25	0.25	0.25	0.25	0.25	0.25
Losses	1.77	1.85	1.83	1.77	1.77	1.77
<b>TOTAL</b>	197.23	202.71	202.04	197.16	197.17	197.88

**Table ES4 Infigen Contract Price and Benchmark Price (in \$/MWh) for Operating Mode  
(Real 1 July 2016 Dollars)**

	2017/18	2018/19	2019/20	2020/21	2021/22
Infigen Contract - Operating Mode ***					
Benchmark Price - Full Operation	197.23	161.33	144.06	135.75	132.71
Benchmark Price - Full Operation No over-contracting	197.16	161.24	143.99	135.68	132.64

## 4. Updates - The Benchmark Price

This chapter presents the updated tables and figures that are contained in the Marsden Jacob report titled “Reviewing Energy Costs for the Sydney Desalination Plant (SDP)” and dated 17th January 2017.

The changed tables and figures in order of appearance are as follows:

- Figure 10 NSW Forward Contract Quarterly Swap Prices (Nominal \$);
- Table 12 Forward LGC Prices (\$/LGC) (Nominal \$);
- Table 13 Results of LRMC Modelling (Real 2016 \$);
- Figure 11 Forward, LRMC and Projected Swap Contract Prices (Nominal \$);
- Table 14 Projection of NSW Swap Contract Price \$/MWh (Real 2016 and Nominal \$);
- Table 15 Assessment of the Annual Benchmark Price – Energy (includes losses) (Real 2016 Dollars);
- Figure 12 Forward, LRMC and Projected LGC Prices (Nominal);
- Table 16 LGC Price Projection \$/LGC (Real 2016 and Nominal Dollars);
- Table 19 Benchmark Price for each Operating Mode \$/MWh (Real 2016 Dollars) Updated;
- Table 20 Component Costs of the Benchmark Prices – INCLUDES Over-contracting (Real 2016 dollars);
- Table 21 Component Costs of the Benchmark Prices – EXCLUDES Over-contracting (Real 2016 dollars).

### 4.1 Figure 10

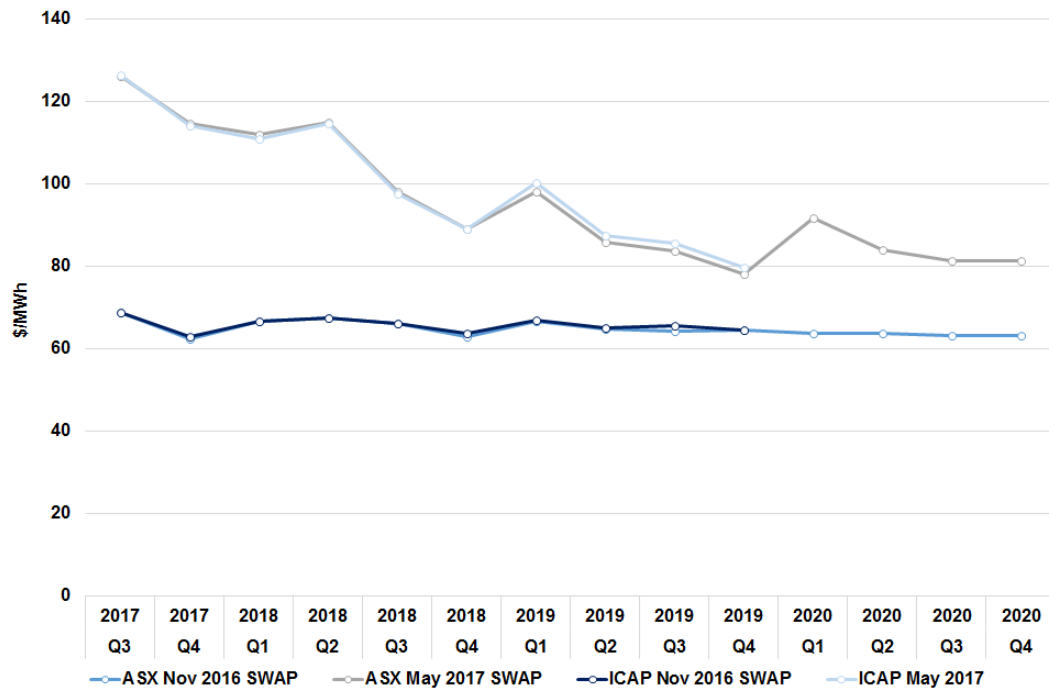
The updated forward energy prices were taken from the following sources for the quarters in the Outlook Period:

- Published by ICAP. on 4 May 2017; and
- Published by ASX on 10 May 2017.

Forward curves from GFI Australia Pty. Ltd. were not available and were not used for the updated outlook.

Figure 10 below shows the forward curves that appeared in the Marsden Jacob report of 17 January 2017 (lower profile) and the updated forward outlook (higher profile).



**Figure 10 NSW Forward Contract Quarterly Swap Prices (Nominal \$)**

## 4.2 Table 12

Table 12 was updated to reflect the updated LGC prices which were taken from the ICAP forward outlook and revaluation prices published on 4 May 2017. The table also shows the previous forward outlook of LGC prices that was taken from that published by GFI Australia Pty. Ltd. on Friday 25 November 2016.

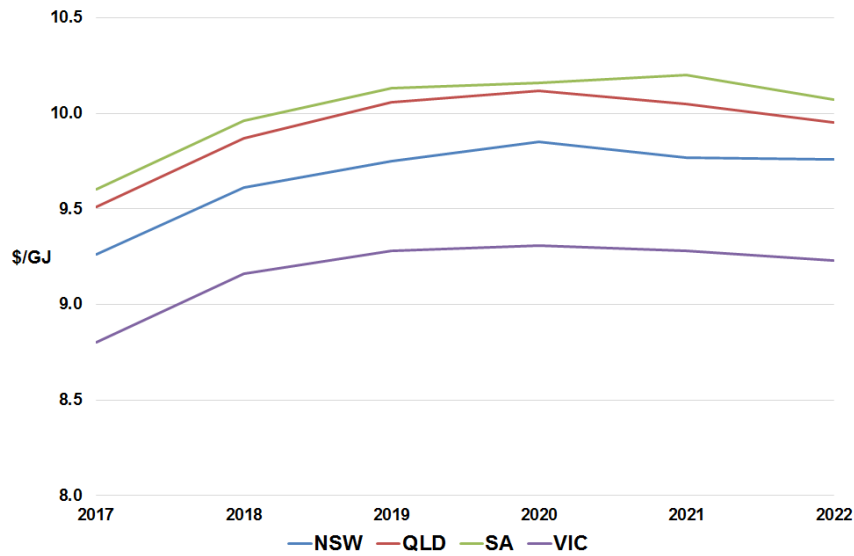
**Table 12 Forward LGC Prices (\$/LGC) (Nominal dollars)**

	2017/18	2018/19	2019/20	2020/21	2021/22
LGC Prices: 4 May 2017	78.1	69.0	62.3	59.8	Not Available
LGC Prices: 25 November 2016	88.5	85.75	83.5	83.5	Not Available

## 4.3 Table 13

The LRMC modelling was updated to reflect an outlook of higher gas costs.

The gas cost assumptions are shown in Figure 20 of Appendix 5 titled “LRMC Modelling Assumptions”. The updated gas costs and updated Table 12 are shown below.

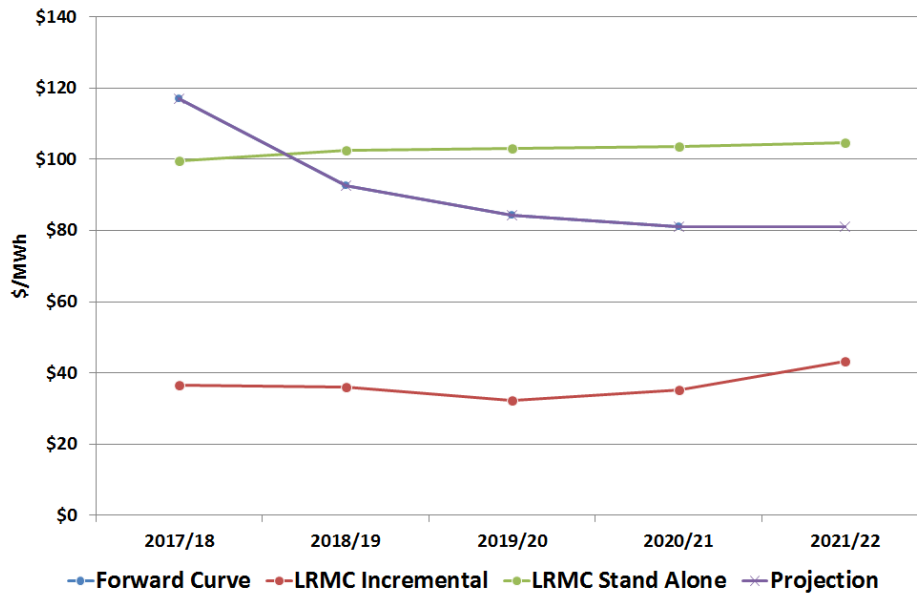
**Figure 1 Australian Wholesale Gas Costs (\$/GJ Delivered) (Real \$)****Table 13 Results of LRMC Modelling (Real 2016 \$)**

	2017/18	2018/19	2019/20	2020/21	2021/22
Incremental					
Energy (\$/MWh)	\$35.71	\$34.33	\$30.00	\$31.87	\$38.35
Capacity (\$/MWh)					
Total Energy (\$/MWh) **	\$35.71	\$34.33	\$30.00	\$31.87	\$38.35
LGC (\$/LGC)	\$80.26	\$82.27	\$82.30	\$80.34	\$78.42
Stand-alone					
Energy (\$/MWh)	\$81.31	\$84.23	\$84.79	\$82.90	\$80.98
Capacity (\$/MWh)	\$12.80	\$12.80	\$12.80	\$12.80	\$12.80
Total Energy (\$/MWh) **	\$94.11	\$97.03	\$97.59	\$95.70	\$93.78
LGC (\$/LGC)	\$66.89	\$68.90	\$70.97	\$73.10	\$75.29

\*\* Based on a flat demand.

#### 4.4 Figure 11 and Table 14

The updated Figure 11 and Table 14 are shown below.

**Figure 11 Forward, LRM and Projected Swap Contract Prices (Nominal \$)****Table 14 Projection of NSW Swap Contract Price \$/MWh (Real 2016 and Nominal \$)**

	2017/18	2018/19	2019/20	2020/21	2021/22
Nominal \$/MWh	117.03	92.73	84.35	81.13	81.13
Real \$/MWh	114.62	88.61	78.63	73.79	71.99

## 4.5 Table 15

The updated Table 15 is shown below.

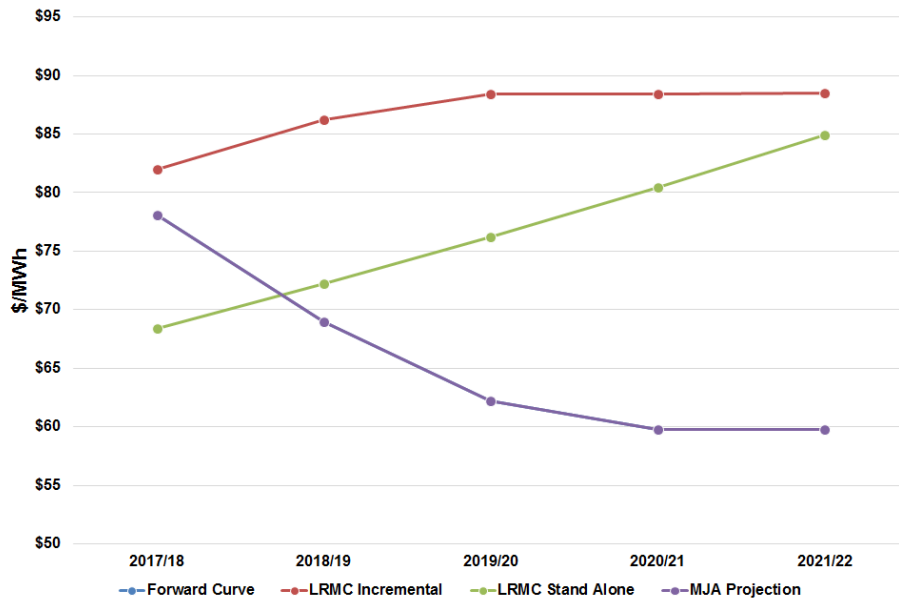
**Table 15 Assessment of the Annual Benchmark Price – Energy (includes losses) (Real 2016 Dollars)**

	2017/18	2018/19	2019/20	2020/21	2021/22
Full Operation	116.46	90.06	79.92	75.00	73.17
Ramp up	121.93	94.26	83.65	78.49	76.58
Ramp down	121.93	94.26	83.65	78.49	76.58
Short-term shutdown	120.56	93.19	82.70	77.61	75.71
Medium-term shutdown	120.56	93.19	82.70	77.61	75.71
Long-term shutdown	120.56	93.19	82.70	77.61	75.71
Water security shutdown	120.56	93.19	82.70	77.61	75.71
Full Operation: No Over-contracting	116.39	89.97	79.85	74.92	73.10
Ramping: No Over-contracting	116.39	89.97	79.85	74.92	73.10
Shutdown: No Over-contracting	116.39	89.97	79.85	74.92	73.10

## 4.6 Figure 12 and Table 16

The updated Figure 12 and Table 16 are shown below.

**Figure 12 Forward, LRMC and Projected LGC Prices (Nominal)**



**Table 16 LGC Price Projection \$/LGC (Real 2016 and Nominal Dollars)**

	2017/18	2018/19	2019/20	2020/21	2021/22
Nominal \$/LGC	78.13	68.95	62.25	59.75	59.75
Real \$/LGC	76.52	65.88	58.03	54.34	53.02

## 4.7 Table 19, Table 20 and Table 21

The updated Table 19, Table 20 and Table 21 are shown below.

**Table 19 Benchmark Price for each Operating Mode \$/MWh (Real 2016 Dollars)**

	2017/18	2018/19	2019/20	2020/21	2021/22
Full Operation	197.2	161.3	144.1	135.8	132.7
Ramping	202.7	165.5	147.8	139.3	136.1
Shutdown	202.0	165.2	147.6	139.1	136.0
Full Operation: No Over-contracting	197.2	161.2	144.0	135.7	132.6
Ramping: No Over-contracting	197.2	161.3	144.0	135.7	132.7
Shutdown: No Over-contracting	197.9	162.0	144.7	136.4	133.4

**Table 20 Component Costs of the Benchmark Prices – INCLUDES Over-contracting  
\$/MWh (Real 2016 dollars)**

**Full Operation**

	2017/18	2018/19	2019/20	2020/21	2021/22
Energy (excluding losses)	114.70	88.69	78.71	73.86	72.06
LGC	69.89	60.41	53.21	49.83	48.61
STC	3.38	3.24	3.24	3.24	3.24
ESS	1.94	2.06	2.13	2.13	2.13
Retail margin	5.00	5.00	5.00	5.00	5.00
Market fees	0.30	0.30	0.30	0.30	0.30
Metering and Data	0.01	0.01	0.01	0.01	0.01
Ancillary Services	0.25	0.25	0.25	0.25	0.25
Losses	1.77	1.37	1.21	1.14	1.11
<b>TOTAL</b>	<b>197.23</b>	<b>161.33</b>	<b>144.06</b>	<b>135.75</b>	<b>132.71</b>

**Ramping**

	2017/18	2018/19	2019/20	2020/21	2021/22
Energy (excluding losses)	120.08	92.83	82.38	77.30	75.42
LGC	69.89	60.41	53.21	49.83	48.61
STC	3.38	3.24	3.24	3.24	3.24
ESS	1.94	2.06	2.13	2.13	2.13
Retail margin	5.00	5.00	5.00	5.00	5.00
Market fees	0.30	0.30	0.30	0.30	0.30
Metering and Data	0.02	0.02	0.02	0.02	0.02
Ancillary Services	0.25	0.25	0.25	0.25	0.25
Losses	1.85	1.43	1.27	1.19	1.16
<b>TOTAL</b>	<b>202.71</b>	<b>165.54</b>	<b>147.80</b>	<b>139.26</b>	<b>136.13</b>

**Water Security Shutdown**

	2017/18	2018/19	2019/20	2020/21	2021/22
Energy (excluding losses)	118.73	91.78	81.45	76.43	74.57
LGC	69.89	60.41	53.21	49.83	48.61
STC	3.38	3.24	3.24	3.24	3.24
ESS	1.94	2.06	2.13	2.13	2.13
Retail margin	5.00	5.00	5.00	5.00	5.00
Market fees	0.30	0.30	0.30	0.30	0.30
Metering and Data	0.73	0.73	0.73	0.73	0.73
Ancillary Services	0.25	0.25	0.25	0.25	0.25
Losses	1.83	1.41	1.25	1.18	1.15
<b>TOTAL</b>	<b>202.04</b>	<b>165.19</b>	<b>147.57</b>	<b>139.09</b>	<b>135.98</b>

**Table 21 Component Costs of the Benchmark Prices – EXCLUDES Over-contracting  
\$/MWh (Real 2016 dollars)**

**Full Operation: No Over-contracting**

	2017/18	2018/19	2019/20	2020/21	2021/22
Energy (excluding losses)	114.62	88.61	78.63	73.79	71.99
LGC	69.89	60.41	53.21	49.83	48.61
STC	3.38	3.24	3.24	3.24	3.24
ESS	1.94	2.06	2.13	2.13	2.13
Retail margin	5.00	5.00	5.00	5.00	5.00
Market fees	0.30	0.30	0.30	0.30	0.30
Metering and Data	0.01	0.01	0.01	0.01	0.01
Ancillary Services	0.25	0.25	0.25	0.25	0.25
Losses	1.77	1.36	1.21	1.14	1.11
<b>TOTAL</b>	<b>197.16</b>	<b>161.24</b>	<b>143.99</b>	<b>135.68</b>	<b>132.64</b>

**Ramping: No Over-contracting**

	2017/18	2018/19	2019/20	2020/21	2021/22
Energy (excluding losses)	114.62	88.61	78.63	73.79	71.99
LGC	69.89	60.41	53.21	49.83	48.61
STC	3.38	3.24	3.24	3.24	3.24
ESS	1.94	2.06	2.13	2.13	2.13
Retail margin	5.00	5.00	5.00	5.00	5.00
Market fees	0.30	0.30	0.30	0.30	0.30
Metering and Data	0.02	0.02	0.02	0.02	0.02
Ancillary Services	0.25	0.25	0.25	0.25	0.25
Losses	1.77	1.36	1.21	1.14	1.11
<b>TOTAL</b>	<b>197.17</b>	<b>161.25</b>	<b>144.00</b>	<b>135.69</b>	<b>132.65</b>

**Shutdown: No Over-contracting**

	2017/18	2018/19	2019/20	2020/21	2021/22
Energy (excluding losses)	114.62	88.61	78.63	73.79	71.99
LGC	69.89	60.41	53.21	49.83	48.61
STC	3.38	3.24	3.24	3.24	3.24
ESS	1.94	2.06	2.13	2.13	2.13
Retail margin	5.00	5.00	5.00	5.00	5.00
Market fees	0.30	0.30	0.30	0.30	0.30
Metering and Data	0.73	0.73	0.73	0.73	0.73
Ancillary Services	0.25	0.25	0.25	0.25	0.25
Losses	1.77	1.36	1.21	1.14	1.11
<b>TOTAL</b>	<b>197.88</b>	<b>161.96</b>	<b>144.71</b>	<b>136.40</b>	<b>133.36</b>

## 5. Explanation for Change in the Benchmark Price

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The updated Benchmark Price reflects the methodology used in its calculation which has it based on the forward market and extrapolated beyond the forward curves in a manner consistent with the profile of LRMC modelled costs.

The introduction to this report noted that the Benchmark Price was updated to reflect the change in the swap and LGC forward prices. The changes in these forward curves are respectively shown in Figure 11 and Table 12 of this report.

The changes in the forward curves are considered by Marsden Jacob to have been due to the following reasons.

### ***Swap Contract Price Outlook***

- The increase in swap contract prices in the early years was the result of the following:
  - NSW (and QLD) had a very hot 2016/17 summer that resulted in many days of extreme demand and associated high spot prices;
  - The availability of gas was lower than had been projected and gas prices higher. This was the result of the six Gladstone LNG trains all operating<sup>2</sup>, lower productivity from a number of coal seam gas fields, and GLNG contracting Moomba and Gippsland gas to supplement its gas supply;
  - A change in the bidding behaviour of a number of generators in the NEM that more reflected the opportunity cost of gas generation rather than coal generation; and
  - The actual closure of Hazelwood Power Station and the actual impact on spot prices.
- The downward sloping swap contract outlook was due to:
  - The outlook of renewable generation development which has been higher than assessed in 2016. The outlook that the LRET target will be met by 2020 is now considered more probable;
  - Gas availability increasing over the period as more gas production in Queensland and possibly the Northern Territory enters the gas market.

### ***LGC Price Outlook***

The reduction in the LGC forward curve has been due to:

- A higher amount of renewable generation projected to enter than in 2016;
- Some parties with LGC liabilities electing to pay the penalty price rather than purchase LGCs; and
- The higher energy prices which reduce the LGC price required for projects to be economic.

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<sup>2</sup> Noting that GLNG has been operating at less than full capacity.