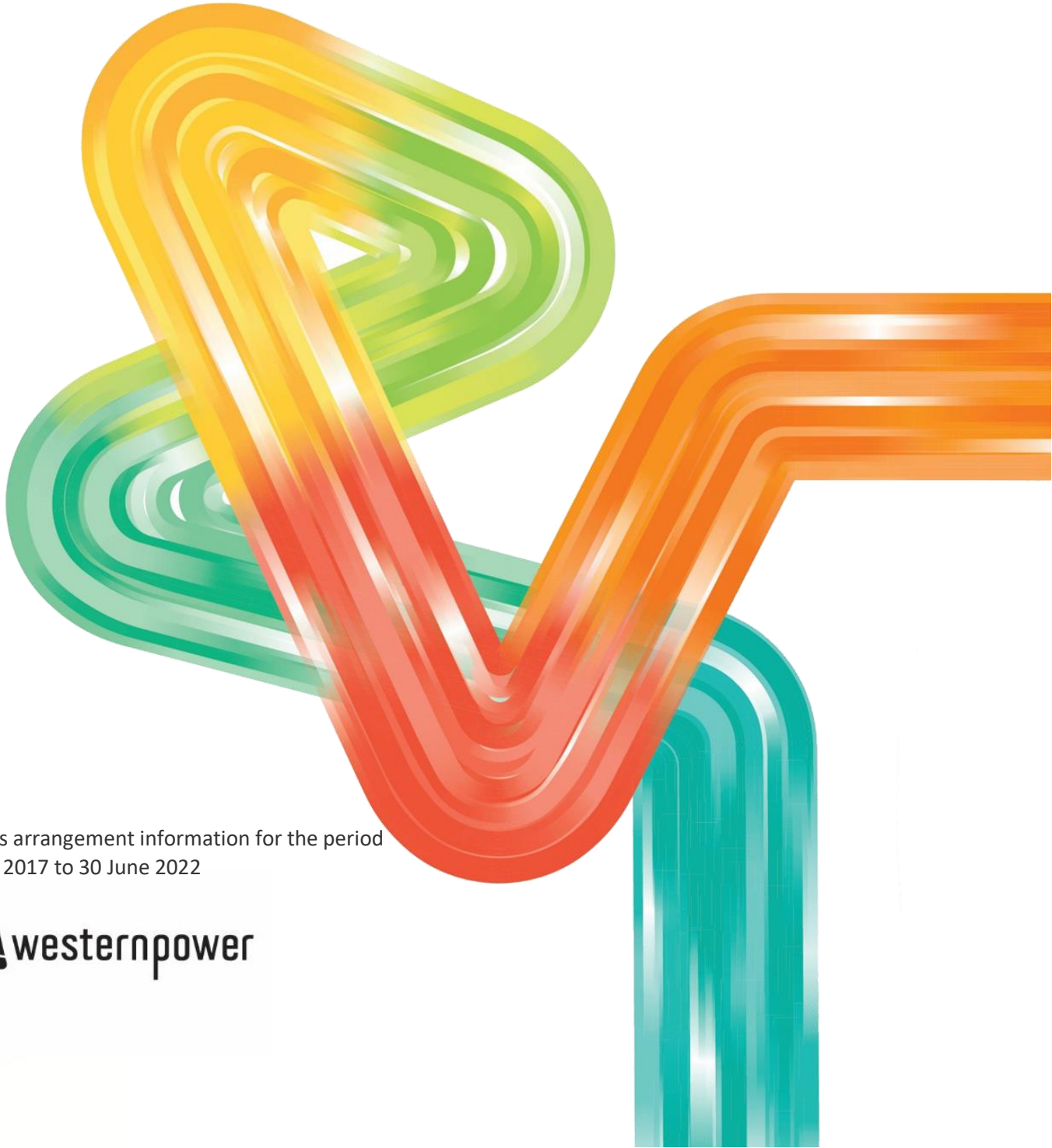
Attachment 6.2

Advanced Metering Infrastructure (AMI) Revised Information

Revised proposed access arrangement information

14 June 2018



Access arrangement information for the period
1 July 2017 to 30 June 2022

westernpower

An appropriate citation for this paper is:

Attachment 6.2

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1. Introduction

1. The purpose of this report is to provide further detail regarding Western Power's revised Advanced Metering Infrastructure (AMI) program in response to the ERA's AA4 Draft Decision published on 2 May 2018.

1.1 Summary of Western Power's Response

2. In the ERA's AA4 Draft Decision, the ERA acknowledges that expenditure to install advanced meters is reasonably likely to meet the requirements of the new facilities test however they require further information regarding the anticipated net benefits associated with Western Power's proposed communications network. The ERA states:

> *The ERA considers installing modern electronic devices with enhanced capabilities in new properties and when replacing old meters is consistent with good electricity industry practice and, therefore, is consistent with the new facilities investment test. However, expenditure for the communications network would need to be supported by a corresponding benefit to consumers to meet the requirements of the new facilities investment test.*[1]

3. In addition, the ERA listed concerns regarding specific benefits included in Western Power's cost benefit assessment of the AMI program.

4. Western Power considers the AMI program to be one of the most important programs of work to be delivered during AA4. Feedback from our customer engagement program indicated that customers support adoption of new technology and would support the installation of advanced meters where it is efficient to do so. Advanced meters are now routinely deployed by utilities around the world, and research indicates that the benefits across the electricity value chain outweigh the costs of deployment over the meter's life.

5. The IT and communications infrastructure are essential components of the AMI program if customers are to realise the full benefits. Without the installation of these components the advanced meters installed by Western Power will not be advanced. The ERA's technical adviser GHD notes "*A key aspect of SCADA and communications investment is in 'last mile telecommunications', which allows automation and remote control, and data capture from across the distribution network. Improved last mile communications are critical for the implementation of advanced metering and the efficient connection and management of emerging technologies such as microgrids and battery storage systems. The use of advanced meters will be a significant enabling technology for a range of Demand Management /Non-network initiatives in the future.*"[2]

6. Western Power is committed to delivering the AMI program during AA4 and has progressed to selecting preferred suppliers for both the advanced meters and the provision of hardware and software for establishment of radio mesh communication infrastructure.

7. Delivered in full, AMI will enable safer and more efficient metering services, timely and reliable data to enhance the customer experience, improve understanding of end user behaviours to facilitate external and internal new business opportunities that utilise the grid and assist to reduce the cost of asset management.

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1 Paragraphs 450 - 451, Draft Decision on Proposed Revisions to the Access Arrangement for the Western Power Network, ERA, May 2018

2 GHD report Technical review of Western Power proposed AA4 Access Arrangement, page 110

8. Western Power has addressed each of the concerns raised by the ERA in their AA4 Draft Decision in the following sections of this report:

   - Section 2 – Expenditures – reconciling the internal information provided by Western Power in support of the AA4 Initial Proposal and this response to the AA4 Draft Decision;
   - Section 3 – Benefits – addressing the ERA's, and their consultant GHD's, concerns regarding specific benefits included in Western Power's cost benefit assessment;
   - Section 4 – Net Present Value – demonstrating that Western Power's approved Change Control position presents a positive Net Present Value of the cost benefit assessment;
   - Section 5 – Sensitivity Analysis – information regarding the cost benefit assessment sensitivity analysis undertaken for Western Power's Board in February 2017.

9. The ERA concludes in the AA4 Draft Decision that *"as Western Power has not been able to demonstrate a positive net benefit, the proposed expenditure on the communication infrastructure is not reasonably likely to meet the requirements of the new facilities investment test.*[3]

10. Western Power considers that the evidence provided in this report, as supported by the approved Change Control position, demonstrates a positive net benefit for the AMI program under a range of scenarios tested.

11. Accordingly, Western Power considers that the forecast expenditure on the AMI program, including the deployment of advanced meters and the associated IT and communications infrastructure, is reasonably likely to satisfy the requirements of the new facilities investment test and should therefore be included in the forecast capital base.

[3] Paragraph 458, Draft Decision on Proposed Revisions to the Access Arrangement for the Western Power Network, ERA, May 2018

2. Expenditure

12. In the AA4 Draft Decision, the ERA notes *there were some inconsistencies in data across the information provided by Western Power on its advanced metering business case which made analysis difficult.*[4]

13. Western Power acknowledges there were some inconsistencies in the data provided to the ERA and GHD. This was due to the time period of the initial AA4 proposal and the internal Business Case and related Board Approvals not aligning, and a difference in the presentation of dollars in internal business cases and the AA4 proposal.

14. The AMI Business Case (BC) approved by the Board in December 2016 was based on the first three year period of advanced meter deployment. The BC was provided as a confidential attachment to the ERA on 2 October 2017. The BC was supported by a Cost Benefits Analysis Model (BC CBA) which was provided to GHD on 22 November 2017 as a confidential attachment in response to question GHD014.

15. The expenditure included in Western Power's AA4 proposal however, included the first five year period of advanced meter deployment to align with Western Power's fourth access arrangement period. The AA4 proposal therefore reflected a further 2 years of meter deployment that were not included in the BC.

16. In addition the presentation of expenditure in Western Power's AMI BC is in nominal dollars and includes an allocation of indirect costs, however the AA4 proposal is presented in real 2016/17 dollars and excludes indirect costs.

17. Table 2.1 provides a reconciliation of the expenditure between the BC and the AA4 proposal.

Table 2.1 AMI Business Case reconciled with AA4 AMI proposal

Expenditure Category $ million	AMI Business Case (3 years nominal inc indirects)	AMI BC adjusted to 5 year period (nominal inc indirects)	AA4 Proposal (5 years real exc indirects)
Meters	94.7	178.7	137.3
IT	23.7	23.7	15.1
SCADA	26.1	26.1	25.1
TOTAL	**144.5**	**228.7**	**177.5**
Meter Volumes	198,009	355,493	355,493

18. Following the submission of Western Power's AA4 proposal in October 2017, Western Power presented a Change Control (CC) to the Board in February 2018 which included updated expenditure and updated benefits, supported by an updated Cost Benefits Analysis Model (CC CBA).

[4] Paragraph 455, Draft Decision on Proposed Revisions to the Access Arrangement for the Western Power Network, ERA, May 2018

19. The CC included updated costs for solution design and service delivery following a competitive tender process for both the advanced capable meters and the communications infrastructure and associated communication assets:

- [redacted] preferred meter supplier;
- [redacted] as the preferred vendor to provide the Network Management Systems (NMS) and Network Interface Cards (NICs) for the meters to enable the mesh communication solution.

20. The CC scope has been increased to five years to align with the AA4 period.

21. Table 2.2 provides a reconciliation of the expenditure between the approved CC and Western Power's revised proposal in response to the AA4 Draft Decision (AA4 DDR).

Table 2.2 AMI CC reconciled with AA4 Revised Proposal (AA4 DDR)

Expenditure Category $ million	CC (5 years nominal inc indirects)	CC (5 years real exc indirects)	AA4 DDR (5 years real exc indirects)
Meters	178.4	137.3	130.7
IT	39.5	34.4	34.4
SCADA	28.4	27.2	27.2
TOTAL	**246.3**	**198.9**	**192.3**
Opex	13.4	n/a	nil
TOTAL	**259.7**	**198.9**	**192.3**
Meter Volumes	355,493	355,493	331,925

22. Western Power's response to the AA4 Draft Decision is based on the approved CC, with adjustments to reflect the lower volume of 331,925 meters as per footnote 50 in the Draft Decision:

> *On 27 April 2018, the ERA's technical consultant, GHD, advised it had amended its forecast of new meters to be installed to 331,925. The amendment increases forecast capital expenditure by approximately $25 million. Due to time constraints, the draft decision has not been updated to include this adjustment. However, the ERA has calculated the effect on target revenue to be $4.9 million, which is less than 0.1 per cent of total target revenue. This adjustment will be included in the final decision.*[5]

23. Western Power is accepting the ERA's adjustment to meter volumes as proposed in footnote 50 (refer to Section 6.3 of Western Power's Response to the Draft Decision).

[5] Footnote 50, Draft Decision on Proposed Revisions to the Access Arrangement for the Western Power Network, ERA, May 2018

3. Benefits

24. Western Power considers the CC CBA which supports the CC approved in February 2018 to be the relevant basis for consideration of the cost benefit assessment of the AMI program. The CC CBA reflects:

- the updated expenditure in the CC;
- an internal and external review of the CC CBA benefits based on updated information; and
- meter volumes of 355,493.

25. In order to undertake an appropriate comparison between the BC CBA, CC CBA and GHD view of the benefits Western Power has also provided a Restated BC CBA position (Restated BC CBA). Modelling adjustments made to the Restated BC CBA model were undertaken to correct some inconsistencies within the BC CBA with regard to inflation and discount rates and to appropriately allocate indirect costs and contingencies across many categories in place of a separate line item for indirect costs and contingencies.

26. A comparison of the benefits between BC CBA, Restated BC CBA, CC CBA and GHD's view is provided in Table 3.1 below. A summary of the full list of benefits included in the cost benefit analysis is provided in Appendix A of this report.

Table 3.1 AMI Benefits

Benefit Category $ million	BC CBA	Restated BC CBA	CC CBA	GHD View
Deferred augmentation - time of use network tariffs	28.1	46.1	42.1	18.0
Deferred augmentation – Power Factor correction	20.7	34.0	7.6	10.0
Overhead Service Condition Monitoring	78.6	80.2	14.7	53.6
Admin Support - Call Centre	10.3	16.7	13.8	5.1
Reduced technical losses	39.5	41.1	9.0	26.0
Avoidance of SCADA/Comms costs plus incremental revenue	14.1	22.6	18.4	0.0
Other benefits	171.1	130.5	130.3	
Total	**362.4**	**371.2**	**235.9**	

27. In the AA4 Draft Decision, the ERA made the following statements with respect to specific benefits:

> *Specific benefits identified as being overstated are:*
>
> *- the level of savings from deferred network investment and power correction factors attributable to advanced metering data;*
>
> *- the timing of savings from service connection monitoring as these require the communications to be operational so should only be taken into account from the date it is assumed the data becomes available;*
>
> *- the reductions in call centre costs and voltage balancing are high compared with data from advanced metering rollouts conducted elsewhere; and*

- a benefit from avoided communication system costs for unregulated services should not have been included as a benefit to be covered by regulated investment.[6]

28. Western Power has considered each of these points in turn in the below sections.

3.1 Level of savings from deferred network investment and power correction factors

Table 3.2 Comparison of Benefits

Benefit Category $ million	BC CBA	Restated BC CBA	CC CBA	GHD View
Deferred augmentation - time of use network tariffs	28.1	46.1	42.1	18
Deferred augmentation – Power Factor correction	20.7	34.0	7.6	10

3.1.1 Deferred augmentation – time of use tariffs

29. GHD considers the calculation for deferred peak demand reduction due to time-of-use (TOU) tariffs is reasonable compared with other rollout examples, however they query Western Power's assumption of the take-up rate increasing to 100% take-up of TOU tariff by the end of the program.

30. Western Power has applied a conservative assumption to gradually increase the take-up of TOU tariffs from 25% to 100% over the course of the 15 year modelling period. The model does not recognise any benefits from take-up of TOU tariffs until year five of the modelling period with the 100% take-up rate referred to by GHD occurring in the final year of the 15 year modelling period.

31. Western Power's model also adjusts downwards the benefits associated from a 100% take-up of TOU, and other related input assumptions, by a conservative 50% to allow for the risk of less than a 100% take-up of TOU at the end of the 15 year modelling period.

32. Western Power considers a shift from opt-in to 100% take up of TOU or an equivalent "efficient" tariff could reasonably occur over the course of the 15 year modelling period given the continued focus on energy reform in Western Australia.

33. From a model sensitivity perspective, if Western Power were to apply GHD's more conservative assumption of $18 million of benefits, noting that this number was derived from a $10 million reduction to Western Power's BC CBA estimate of $28 million and not the equivalent Restated BC CBA estimate of $46 million, the program would still be in a net positive position. A sensitivity analysis of GHD's position has been undertaken in Section 5 of this report.

3.1.2 Deferred augmentation – power factor correction

34. GHD reduced the power factor correction benefit to approximately one half of Western Power's BC CBA analysis. In the CC CBA position, Western Power has changed the approach to the calculation of this benefit and now estimates a benefit of $7.6 million reflecting deferred network augmentation from the use of batteries to improve grid utilisation and information from downstream AMI meters.

35. Western Power's adjusted CC CBA benefit is therefore below GHD's initial assessment. A sensitivity analysis of GHD's position has been undertaken in Section 5 of this report.

[6] Paragraph 457, Draft Decision on Proposed Revisions to the Access Arrangement for the Western Power Network, ERA, May 2018

3.2 Timing of savings from service connection monitoring

Table 3.3 Comparison of Benefits

Benefit Category $ million	BC CBA	Restated BC CBA	CC CBA	GHD View
Overhead Service Condition Monitoring	78.6	80.2	14.7	53.6

36. GHD considers the benefits delivered from the ability of advance meters to monitor the condition of the overhead service connection should be deferred by 3 years thereby reducing their assessment of Western Power's proposed benefits by 32% to approximately $54 million.

37. Western Power has updated the value of this benefit in the CC CBA model to reflect a more conservative view of lower volumes and capital being deferred rather than avoided.

38. Western Power still considers that AMI is the most efficient solution for a change in overhead service connection monitoring. Western Power's updated benefit value is based on avoided field operating expenditure and deferral of capex replacement as a result of the benefits delivered from remote monitoring of overhead service connections. The benefit calculation has been aligned to approximately one third of the overhead service connections monitoring program which overlaps with the location of planned AMI deployed meters.

39. Western Power has not attributed a financial benefit to the significant safety benefits of reducing the potential of electric shocks from AMI power quality monitoring.

40. Western Power's adjusted CC CBA benefit is approximately $39 million below GHD's initial assessment. A sensitivity analysis of GHD's position has been undertaken in Section 5 of this report.

3.3 Reductions in call centre costs and voltage balancing

Table 3.4 Comparison of Benefits

Benefit Category $ million	BC CBA	Restated BC CBA	CC CBA	GHD View
Admin Support - Call Centre	10.3	16.7	13.8	5.1
Reduced technical losses	39.5	41.1	9.0	26.0

3.3.1 Admin Support - Call Centre

41. GHD considers that a reduction in call centre costs is an acknowledged benefit of an advanced meter program however they consider Western Power's assumed rate is higher than the levels assumed in other rollouts they reviewed from around the world (Ameren Illinois and BC Hydro).

42. Western Power considers the assumptions underpinning the calculation of this benefit are already conservative, including:

- The model caps the impact of advance meters on call reductions at 30%. Western Power considers this cap to be conservative in the later years of the model considering the increasing number of advanced meters to be deployed by the end of the 15 year modelling period. Western Power notes that in the June 2015 report by the Institute of Communication & Computer Systems of the National Technical University of Athens *Study on cost benefit analysis*

of Smart Metering Systems in EU Member States a number of countries (eg. Belgium, Hungary, Germany) cited benefits from call centre savings of between 30% - 50%.

- The average number of incoming calls per year is kept constant and not adjusted upwards for any increase in customer numbers across the 15 year period.

43. From a model sensitivity perspective, if Western Power were to apply GHD's more conservative assumption of $5.1 million of benefits, noting that this number was derived from a 50% reduction to Western Power's BC CBA estimate of $10.3 million, not the Restated BC CBA estimate of $16.7 million, the program would still be in a net positive position. A sensitivity analysis of GHD's position has been undertaken in Section 5 of this report.

3.3.2 Reduced technical losses (voltage balance)

44. GHD acknowledge that benefits associated with reducing technical losses have been included in advanced meter rollouts internationally, however they believe Western Power's reduction assumption is too high.

45. Western Power has updated the value of this benefit in the CC CBA model to reflect a more conservative view of the following parameters:

- The BC CBA model used a starting level of technical losses of 4.3% and compared this to an expected improved level of technical losses associated with advanced meters of 3.44%. Western Power has adjusted upwards the expected improved level of technical losses to 4.03% to reflect more recent information. This reduces the assumed savings in losses from 20.7% to 6.3%. Per GHD's review, they considered a savings in losses of 13.5% to be reasonable.
- Western Power also adjusted the calculation to apply the Short Term Energy Market (STEM) energy price of 0.06 $/kWh in place of the network price of 0.08 $/kWh.

46. After adjusting for the above factors, Western Power's adjusted CC CBA benefit is below GHD's initial assessment. A sensitivity analysis of GHD's position has been undertaken in Section 5 of this report.

3.4 Benefits from avoided communication system costs

Table 3.5 Comparison of Benefits

Benefit Category $ million	BC CBA	Restated BC CBA	CC CBA	GHD View
Avoidance of SCADA/Comms costs plus incremental revenue	14.1	22.6	18.4	0.0

47. GHD considers that benefits arising from unregulated revenue should not be included in the AMI business case. Western Power agrees with this view and accordingly has not included any benefits arising from potential unregulated revenue streams.

48. The benefits assumed by Western Power have been derived from the avoided costs associated with SCADA and communications equipment related to the covered network (approximately 57% of the benefit) and potential incremental regulated revenue to be derived from third party access to the communications infrastructure (approximately 43% of the benefit).

49. From a model sensitivity perspective, if Western Power were to apply GHD's more conservative assumption of nil benefits the program would still be in a net positive position. A sensitivity analysis of GHD's position has been undertaken in Section 5 of this report.

4. Net Present Value

50. In the AA4 Draft Decision, the ERA stated the following with respect to net present value (NPV) *after reviewing the material provided by Western Power and taking account of advice from GHD, the ERA considers the benefits have been overstated and the net present value is actually negative.*[7]

51. Table 4.1 summarises the costs, benefits and resulting NPV of the initial BC CBA model position and the updated CC CBA model.

Table 4.1 Cost Benefit Analysis NPV Comparison

Cost Benefit Analysis NPV $ million	BC CBA	CC CBA
Benefits	362.4	235.9
Incremental Costs	271.0	167.3
TOTAL NPV	**91.5**	**68.6**

52. The CC CBA reflects a decrease in the original cost benefit assessment from $91.5 million (as per the BC CBA and the AA4 initial proposal), to $68.6 million (as per the CC CBA).

53. This revised NPV position of $68.6 million forms the basis of our evidence that the AMI program delivers a positive net benefit as described in the information included in this attachment.

54. The movement in benefits has been discussed in part in Section 3.

55. The movement in costs is attributable to:

- revised SCADA & Communications and IT capital expenditure following the competitive tender process for both meters and communications infrastructure and assets (discussed in Section 2 above);
- inclusion of expected annual operating expenditure for the associated SCADA & Communications and IT systems (note: Western Power's initial AA4 proposal and revised AA4 proposal do not include operating cost step changes associated with the AMI program);
- a $101.2 million reduction in incremental meter cost.

56. In terms of calculating net benefit a cost benefit analysis model should only assess the *incremental* costs of deploying the AMI program. However, following further internal review of the model, Western Power noted that the meter costing model supporting the BC CBA undervalued the business as usual (BAU) metering activity costs, thereby overstating the incremental cost associated with the meter deployment program.

57. Relative to actual BAU metering activity the BC CBA model had a significantly higher incremental meter cost of [redacted] per meter and assumed that meters deployed would be on a constant 60:40 single phase meter to three phase meter ratio.

58. A more detailed meter cost schedule was developed for the CC CBA and reflected the annual profile of single phase and three phase meter deployment of new meters, retailer initiated replacement meters and Western Power initiated replacement meters. The incremental costs for meters therefore reflects the increase in costs of single phase basic meters to single phase AMI capable meters (approximately [redacted] per meter) and the NICs (approximately [redacted] per meter) to be installed in both the single phase and three phase meters. Western Power is already deploying

[7] Paragraph 456, Draft Decision on Proposed Revisions to the Access Arrangement for the Western Power Network, ERA, May 2018

three phase AMI capable meters as BAU. The outworking of the updated model calculates an incremental cost above BAU metering activity of on average [redacted] per meter.

59. Western Power has undertaken a competitive tender for the deployment of advanced meters and the results of that competitive tender have been reflected in the calculation of the incremental cost.

60. The difference between the BC CBA incremental meter cost of [redacted] per meter and the CC CBA of [redacted] per meter is in the order of [redacted] per meter. Based on the rollout volumes of approximately 1.1 million meters and the ratio mix of single phase meters to three phase meters, this represented a significant reduction to incremental cost. Accordingly, this reduced the NPV of incremental metering costs from $153.5 million to $52.3 million – a cost reduction of $101.2 million in NPV terms.

5. Cost Benefit Analysis Sensitivity

61. In the AA4 Draft Decision, the ERA stated that *the information provided did not include sensitivity analysis of costs and benefits which should have been undertaken, particularly given the uncertainty of the benefits.*[8]

62. A sensitivity analysis was undertake on the CC CBA and provided to the Board in February 2018 to support the Board's decision making.

63. Western Power considers the risk of the NPV of net benefits falling below $0 and impacting on Western Power's financial returns is low for the following reasons:

- Western Power considers the assumptions used to calculate the NPV of net benefits are conservative
- The NPV of Net Benefits of $68.6 million includes an NPV of $12.7 million related to contingency cost estimates
- Should the $12.7 million contingency be utilised, the following unfavourable movements would be required for the NPV of net benefits to fall below $0:
  - an unfavourable movement in Total Gross Benefits of 30%
  - an unfavourable movement in Total Incremental Costs of 40%
- Total Incremental Costs cover 4 areas, with the largest area (metering deployment at 31% of Total Incremental Costs) representing the lowest risk
- Total Gross Benefits are diversified over a portfolio of 21 benefit items
- Of the benefits identified, 75% are considered to be under Western Power's control to achieve
- The loss of no single individual benefit category will cause the NPV of net benefits to fall below $0.

64. Western Power tested the sensitivities for the individual benefit and cost categories included in the CC CBA. The sensitivity analysis demonstrated that no unfavourable movement in an individual benefit item would decrease total benefits by more than 30% and considered it unlikely that any individual cost item would increase total program costs by more than 40%.

65. Western Power has also undertaken a sensitivity analysis on the benefit adjustments as calculated by GHD. Applying a sensitivity analysis to reflect only GHD's more conservative view of the benefits tested as part of the initial review, and described in Section 3 above, the NPV calculation would still present a positive net benefit. Western Power considers it would also be appropriate in a sensitivity analysis to reflect the positive differences in the benefit adjustments where GHD's assessments are higher than Western Power's CC CBA position. Adjusting for all the net differences between GHD's assessment and Western Power's CC CBA would result in a positive net benefit of $75.7 million, shown in Table 5.1 below:

Table 5.1 Cost Benefit Analysis GHD Sensitivities (positive and negative adjustments)

Cost Benefit Analysis NPV $ million	$
CC CBA Model NPV	**68.6**
Adjusted for net differences between CC CBA and GHD view of Benefits:	
- Deferred augmentation - time of use network tariffs (WP $42.1 million; GHD $18 million)	(24.1)

[8] Paragraph 455, Draft Decision on Proposed Revisions to the Access Arrangement for the Western Power Network, ERA, May 2018

Cost Benefit Analysis NPV $ million	$
- Deferred augmentation – Power Factor correction (WP $7.6 million; GHD $10 million)	2.4
- Overhead Service Condition Monitoring (WP $14.7 million; GHD $53.6 million)	38.9
- Admin Support - Call Centre (WP $13.8 million; GHD $5.1 million)	(8.7)
- Reduced technical losses (WP $9 million; GHD $26 million)	17.0
- Avoidance of SCADA/Comms costs plus incremental revenue (WP $18.4 million; GHD nil	(18.4)
NPV adjusted for all GHD's benefit adjustments	**75.7**

66. Western Power has also modelled the impact of the ERA's draft decision lower meter volume for new growth meters (per Footnote 50) and the draft decision (DD) nominal pre-tax weighted average cost of capital (WACC) of 6.66%.

67. The impact of lower volumes drives both a reduction in benefits and a reduction in advanced meter deployment costs. The net impact is a $4.2 million lower NPV from the CC CBA position of $68.6 million. The impact of a higher WACC of 6.66% nominal pre-tax relative to the CC CBA (6.53% nominal pre-tax) is to further reduce the NPV by $1.6 million to $62.8 million. Refer Table 5.2 below.

Table 5.2 Draft Decision Sensitivities

Cost Benefit Analysis NPV $ million	CC CBA	DD Impact
Benefits	235.9	225.3
Costs	167.3	162.5
TOTAL NPV	**68.6**	**62.8**

5.1 Potential Additional Benefits

68. Western Power also notes that GHD supports the view that additional benefits across the supply chain from generation to consumers could also be considered in establishing the NPV of the AMI program.

5.1.1 Supply chain benefits

69. Western Power has not included a financial value for the range of benefits that can accrue to other users of the covered network (i.e. generators and retailers) in our CC CBA model. Accordingly, Western Power has not undertaken any detailed review of these benefits but notes the review undertaken by GHD included a comparative of other utilities that had included these benefit types. In particular Amaren Illinois and BC Hydro as tabled below.

Table 5.3 Supply Chain Benefits – International Utilities

Benefit	Ameren Illinois	BC Hydro
Other net benefits	USD $695M[9]	Can $330M[10]
Conversion[11]	0.75	0.98

[9] Table 16 Ameren Illinois Advanced Metering Infrastructure Cost/Benefit Analysis
[10] Table 1 BC Hydro Smart Metering and Infrastructure Program Business Case
[11] GHD report Technical review of Western Power proposed AA4 Access Arrangement Note 70 page 119

Benefit	Ameren Illinois	BC Hydro
AUD Total	$927M	$337M
No of customers/meter points	780,419	1,800,000

70. In addition, the following benefits were explicitly referenced by the GHD report:[12]

Table 5.4 Supply Chain Benefits – International Utilities AUD per meter

AUD $ / meter	BC Hydro	UK AMI
Consumer Benefits AUD per meter	116	230
Generation benefits AUD per meter	174	106
Benefit per meter (PV)	290	336

71. Western Power will deploy approximately 1.1 million advanced meters over the evaluation period. Applying the BC hydro benefit per meter rate would equate to additional NPV of benefits of $319 million. Adopting a conservative view of 50% would still provide a further $160 million to the CC CBA NPV.

72. Western Power notes that a Deloitte review[13] into the Victorian advanced meter rollout program highlighted $617 million of NPV benefits generated from innovative tariffs and demand management from the AMI Program 2012-28 analysis. Applying conservative assumptions to remove 50% of the benefit considered to be generation only benefits and based on a 2.8 million meter rollout, this would assume a benefit of around $127 per meter. This would equate to an NPV benefit of $140 million for Western Power's approximate 1.1 million meters. Applying a further 50% conservative reduction would suggest $70 million of additional net benefits that are not included in Western Power's CC CBA NPV.

5.1.2 Benefits beyond the 15 year CBA evaluation period

73. Western Power's CC CBA model is for a finite period of 15 years. The model therefore includes the full costs associated with the rollout of all the meters but does not reflect the full value of benefits associated with the meters rolled out in the latter part of the 15 year period. For example, in the last 5 years of the model, there are circa 415,000 advanced meters deployed for which the benefits will be realised for a number of years post the final year of the model. Western Power considers a conservative view of these net benefits (after adjusting for associated ongoing costs) could be an additional positive net benefit of circa $30 million.

74. Western Power has not included these potential benefits from the supply chain or extending the life of the model, however based on the sensitivity analysis undertaken and giving consideration to these additional potential benefits, Western Power considers that the approved Change Control position for AMI remains NPV positive under all scenarios tested.

75. In the AA4 Draft Decision, the ERA states *as Western Power has not been able to demonstrate a positive net benefit, the proposed expenditure on the communication infrastructure is not reasonably likely to meet the requirements of the new facilities investment test.*[14]

[12] GHD report Technical review of Western Power proposed AA4 Access Arrangement Table 30 page 119

[13] Deloitte paper: Advanced Metering Infrastructure Cost Benefit Analysis Final report 2 August 2011, Table 5.8 (http://www.smartmeters.vic.gov.au/about-smart-meters/reports-and-consultations/advanced-metering-infrastructure-cost-benefit-analysis)

[14] Paragraph 458, Draft Decision on Proposed Revisions to the Access Arrangement for the Western Power Network, ERA, May 2018

76. Western Power therefore considers that the evidence provided in this report supports forecast expenditure on the AMI program, including the deployment of advanced meters and the associated IT and communications infrastructure, is reasonably likely to satisfy the requirements of the new facilities investment test and should be included in the forecast capital base.

Appendix A

AMI Change Control

A.1 List of Benefits Supporting AMI Change Control

Table A.1.1 provides a summary of the benefits included in the BC CBA, Restated BC CBA and CC CBA.

As discussed in the body of the report, Western Power considers the CC CBA approved in February 2017 to be the relevant basis for consideration of the cost benefit assessment of the AMI program.

In order to undertake an appropriate comparison between the BC CBA and CC CBA Western Power has provided a Restated BC CBA position. The Restated BC CBA provides an updated position in relation to:

- inconsistencies in the BC CBA model construction where benefits were included in real dollars, costs were included in nominal dollars and discounting was performed using a real discount rate of 4.33% pre-tax. This was corrected by assessing all cost and benefit values in nominal dollars using a 2.5% inflation factor and discounting at the AA3 pre-tax WACC of 6.53%. All individual line items, including costs and benefits, were impacted by this change. These adjustments resulted in the NPV of total benefits tabled below increasing by $8.8 million from $362.4 million to $371.2 million
- the BC CBA model included a separate category for indirect costs and contingency. The Restated BC CBA model was adjusted to appropriately allocate the indirect cost and contingency back to the specific benefit category. The line items impacted by the re-allocations are shaded in grey in the Restated BC CBA column.

Making the adjustments noted above enables a more accurate comparison of the movements between the original BC CBA and the approved CC CBA.

In development of the Change Control an internal and external review of the CC CBA benefits was undertaken based on updated information. As a result of the review, the NPV of total benefits underpinning the CC CBA decreased by $135.3 million to $235.9 million (from $371.2 million per the Restated BC CBA).

Table A.1.1 Reconciling Initial AA4 Submission / Business Case and Change Control benefits

Benefit Category NPV $M	BC CBA	Restated BC CBA	CC CBA	Impact	Explanation of movement	Justification of benefits
Deferred augmentation - time of use network tariffs	28.1	46.1	42.1	(4.0)	Impact of deferred start to AMI rollout to Sept 2018	Sliding take-up of TOU tariffs from 25% to 100% in the last year of the 15 year modelling period. Recognition of benefits delayed until year five of the model.
Avoided cost of network reconfiguration	25.2	21.7	0	(21.7)	Benefit removed	
Deferred augmentation – Power Factor correction	20.7	34.0	7.6	(26.4)	Change in approach to benefit calculation	Power factor correction now reflects deferred network augmentation from use of batteries to improve grid utilisation and information from downstream AMI meters.
Power Quality	2.5	4.1	6.9	2.8	Revised forecast of BAU power quality investigations	Based on forecast number of power quality investigations, hours per investigation and avoided level of investigations.

Benefit Category NPV $M	BC CBA	Restated BC CBA	CC CBA	Impact	Explanation of movement	Justification of benefits
Overhead Service Condition Monitoring (OHSC)	78.6	80.2	14.7	(65.5)	Reduction in volumes and capex now deferred rather than avoided	AMI is the proposed solution for change in OHSC monitoring. Benefit is based on avoided field opex and deferral of capex replacement. Volumes based on target pre-2010 wedge clamp connections - population (circa 130,000 meters). Benefit is aligned to the approx one third of the connections monitoring which overlap with AMI deployed meters.
Admin Support (Call Centre)	10.3	16.7	13.8	(2.9)	Impact of deferred start to AMI rollout to Sept 2018	Reduced call volumes relating to customer notified faults and the time (average 10 min) to resolve the call at hourly rate. Benefits based on overseas studies.
Client Outage Compensation	0.5	0.8	0.5	(0.3)	Removed indirect cost allocation from payment	Based on international studies benefit assumes a 2% reduction in customers eligible for outage compensation payments.
Scheduled meter reads	15.9	25.9	18.7	(7.2)	Impact of deferred start to AMI rollout to Sept 2018	Benefit calculated as difference between a standard read cost and AMI at 6 reads per year. Annual inefficiency factor of 4% to reflect impact of increase in AMI meters on planned reads.
Special reads	9.5	15.5	27.7	12.2	Impact of deferred start to AMI rollout to Sept 2018 plus avoided cost for interval read for 30,000 meters over AA4	Based on pricing of interval reads associated with 30,000 meters over AA4. Pricing reflects obtaining interval data on cycle and off cycle and meter reconfigure costs. Benefit of BAU special reads set at 19% of installed AMI meters at per read saving of $10.
De-energisation	2.8	4.6	3.8	(0.8)	Impact of deferred start to AMI rollout to Sept 2018	Benefit based on 1.9% of AMI installed meters at a net saving of $30 per service.
Re-energisation	2.8	4.6	3.8	(0.8)	Impact of deferred start to AMI rollout to Sept 2018	Benefit based on 1.9% of AMI installed meters at a net saving of $30 per service.
Reconfigure costs	2.3	3.7	3.0	(0.7)	Impact of deferred start to AMI rollout to Sept 2018	Benefit based on 1.5% of AMI installed meters at a net saving of $30 per service.

Benefit Category NPV $M	BC CBA	Restated BC CBA	CC CBA	Impact	Explanation of movement	Justification of benefits
Billing Systems Savings	8.3	13.3	11.8	(1.5)	Impact of deferred start to AMI rollout to Sept 2018	Current ICT incurs $3.3M opex and $1.0M capex annual billing spend. The proposed AMI billing solution will reduce opex to $2.88M and capex to $0.5M.
Reduced energy theft	17.2	17.9	35.2	17.3	Changed calculation to reflect benefit that accrues to retailer	Savings based on energy demand, with a reduced theft rate from 0.75% to 0.385% at a tariff rate of 15.5 c/kwh. (Delta between residential tariff 26.5c/kwh and network tariff 11 c/kwh) and rollout of advanced meters.
Avoidance of SCADA/Comms costs plus incremental revenue	14.1	22.6	18.4	(4.2)	Impact of deferred start to AMI rollout to Sept 2018	$0.6M of incremental revenue will be made from 3rd party access to comms infrastructure. Annual savings on planned spend to 2032 have been identified (capex $0.51M and Opex $0.45M).
Reduced technical losses	39.5	41.1	9.0	(32.1)	Reduced the technical loss % and applied at STEM energy price not network price	Savings based on energy demand, loss factor moving from 4.3% to 4.03%, and a STEM energy price of 6c/kwh.
Avoidance of unnecessary attendance	1.3	1.6	1.7	0.1	Impact of deferred start to AMI rollout to Sept 2018	Savings based on average volume of unnecessary callouts, time taken to resolve the callout, crew hourly rate and advanced meter impact.
Faster fault detection	11.2	11.6	11.9	0.3	Reduction in value of customer reliability offset by an increase in energy intensity per customer	Savings based on annual fault call volumes, number of customers impacted, time saved by advanced meters notification of a fault and % of advanced meter rollout. Time saved is converted to MWhs using customer energy intensity and converted to $ using value of customer reliability.
Nested fault identification	5.0	5.2	5.3	0.1	Reduction in value of customer reliability offset by an increase in energy intensity per customer	Savings based on faults requiring a revisit, number of customers impacted, additional time lost before power restore and % of advanced meter rollout. The time saved is converted to MWhs using customer energy intensity and converted to $ using value of customer reliability.
Indirect Costs	29.8	0	0	0	Allocated back to line items and rate reduced	

Benefit Category NPV $M	BC CBA	Restated BC CBA	CC CBA	Impact	Explanation of movement	Justification of benefits
Contingency	36.8	0	0	0	Allocated back to line items and rate reduced	
TOTAL	**362.4**	**371.2**	**235.9**	**(135.3)**		