Attachment 5.1

AA3 Capital Expenditure Report

Access Arrangement Information

2 October 2017

Access Arrangement Information (AAI) for the period
1 July 2017 to 30 June 2022

westernpower

AA3 Capital Expenditure Report

Public

2 October 2017

westernpower

EDM#42424433

An appropriate citation for this paper is:

AA3 Capital Expenditure Report

Western Power

363 Wellington Street
Perth WA 6000
GPO Box L921 Perth WA 6842

T: 13 10 87 | Fax: 08 9225 2660
TTY 1800 13 13 51 | TIS 13 14 50

Electricity Networks Corporation
ABN 18 540 492 861

enquiry@westernpower.com.au
westernpower.com.au

Enquiries about this report should be directed to:

AA4 Project Team

Email: AA4@westernpower.com.au

Contents

List of tables

List of figures

1. Introduction

1. This document provides information to support our actual capital expenditure over the third access arrangement period covering 20012/13 to 2016/17 (**AA3**) being rolled into the capital base. This is in accordance with the new facilities investment test (**NFIT**) set out in sections 6.51–6.54 of the Access Code.

2. It includes information on:

    - the actual capital expenditure undertaken for the five years of AA3
    - the outcomes associated with these investments over the period
    - the reasons for variances between what was forecast in the last review and the actual expenditure
    - why we believe the capital expenditure meets the NFIT requirements of the Access Code.

1.1 Key messages

- During the AA3 review, the ERA accepted Western Power's forecast of the new facilities investment for the AA3 regulatory period of $6,162 million as being consistent with the Access Code requirements.
- We propose that $3,792 million of our new facilities investment during the AA3 period be added to the capital base. This reflects:
    - actual new facilities investment of $4,787 million 2012/13 to 2016/17
    - plus $6 million of unforeseen events investment
    - less capital contributions of $1,001 million.
- The actual expenditure undertaken during AA3 is consistent with the Access Code requirements as a result of:
    - efficiently minimising costs through our works optimisation process, our procurement practices and the competitive tendering of work delivered by external parties
    - delivering network management savings through our innovative risk based approach to asset management which reflects industry best practice
    - optimising investment solutions by considering alternative options instead of 'like for like' asset replacement of existing network assets, such as network reconfiguration enabling load transfer
    - strengthening our governance procedures via a number of policies, strategies and frameworks to ensure all investment decisions are prudent and delivered efficiently.
- Our projects and expenditure have also been subject to additional scrutiny as follows:
    - a number of key capital projects have been reviewed and approved by the ERA consistent with section 6.71(b) of the Access Code
    - independent external scrutiny by the Department of Treasury and the Economic and Expenditure Review Committee, who provide access to funding for Western Power's investment program

– EnergySafety review of Western Power's wood pole management program finding that the principal public safety objectives set out in EnergySafety Order 01-2009 have been achieved.

2. AA3 capital expenditure

3. This section compares the capital expenditure forecasts supported by the ERA for the AA3 period with the actual capital expenditure undertaken in that period.

4. All monetary amounts presented in this document are expressed in real 30 June 2017 dollars and apply to 1 July to 30 June regulatory years unless otherwise stated. Note, some tables may not add due to rounding.

5. As required by section 4.5.4 of the ERA's Guidelines for Access Arrangement Information, this section explains the key outcomes of the AA3 capital expenditure program and the reasons for variances from what was forecast in the last review.

2.1 Background to the AA3 regulatory period

6. Western Power's AA3 proposal was developed to achieve three main objectives:

    - **Safety** – address the highest priority public safety risks
    - **Growth & security** – expand the network's capacity to meet growth and connect new customers, and address the network's sub-optimal resilience to widespread outages
    - **Service** – maintain current average service levels, improving service only where it is valued by the customers and efficient to do so.

7. With respect to safety, our AA3 investment proposal focussed on addressing the underlying risk in the Western Power network. The greatest risk to public safety posed by the network is the potential for assets to initiate fires and cause electric shock. Accordingly, Western Power identified four key programs expected to have the greatest effect on reducing the likelihood of major public safety incidents:

    - pole management
    - replacing obsolete overhead customer service connections
    - conductor management
    - bushfire mitigation.

8. The importance of investing in the ageing pole network was further reinforced through the EnergySafety Western Power Order 01-2009, which required Western Power to undertake specific replacement and reinforcement activities with respect to its wood pole asset population. Forecast expenditure on the wood pole management program was almost $1,085 million, or 18 per cent, of total capital investment proposal for AA3.

9. The AA3 investment proposal was also underpinned by high growth forecasts evidenced by:

    - peak demand increasing on average by 147 MW per year over the prior decade
    - record numbers of major load and generator connection applications
    - an estimated 130,000 new distribution customers connecting to the network.

10. The ERA accepted our forecast of the new facilities investment for the AA3 regulatory period of $6,162 million as being consistent with the Access Code requirements. Of this $4, 364 million of forecast capital expenditure in the following categories was subject to the Investment Adjustment Mechanism (**IAM**):

    - growth related investment

- the State Underground Power Program (**SUPP**)
- the Rural Power Improvement Program (**RPIP**)
- wood pole management.

11. Growth related investment, SUPP and RPIP were all subject to the IAM during the AA2 period. The inclusion of wood pole management as an IAM category in AA3 was a requirement of the ERA to recognise the changes in expenditure profile likely to occur during the AA3 period to acquit the EnergySafety wood pole order.

12. With the exception of the number of new connections, the forecast growth that underpinned the AA3 capital expenditure forecast did not materialise. A combination of changing customer preferences (particularly the take up of rooftop solar generation systems), more energy efficient appliances, and WA's economic slowdown meant that system peak demand growth has flattened over the period. This led to lower-than-forecast expenditure, and reprioritisation of the AA3 works program.

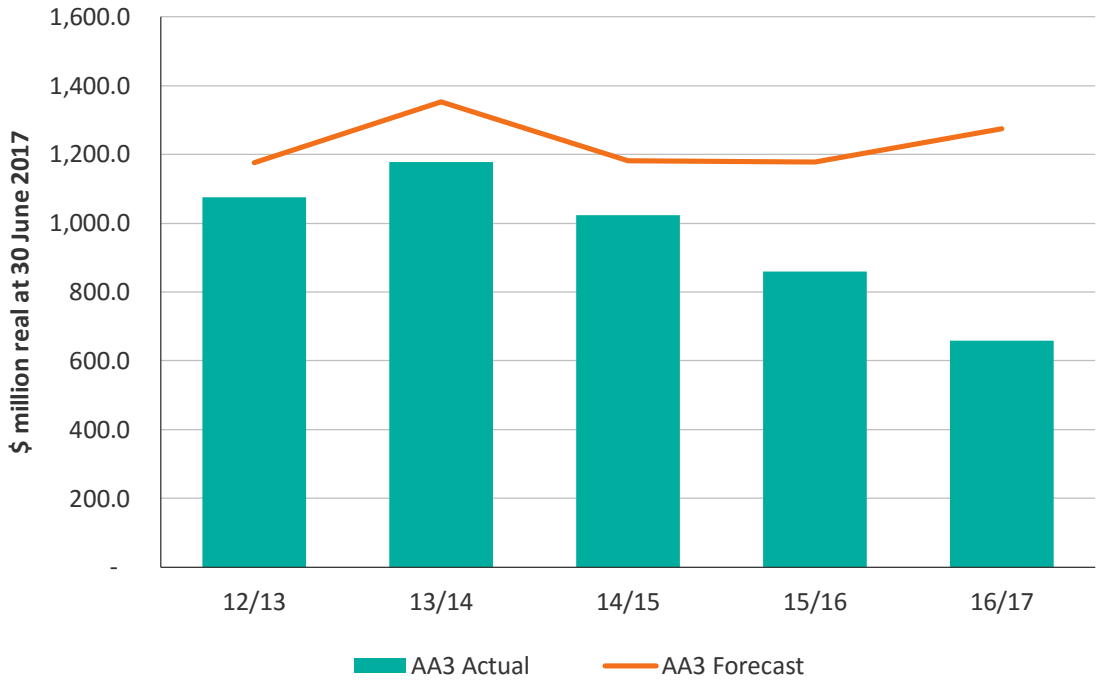
13. The slowdown in growth during the AA3 period provided opportunity to revisit investment plans and focus on asset replacement, developing more sophisticated risk-based asset management techniques. This led to reprioritisation of the works program and optimisation of asset replacement and renewal treatments. As a result, Western Power was able to reduce actual capital expenditure significantly below the AA3 forecast, while still achieving the AA3 network objectives.

14. Further discussion on changes in the WA energy sector is provided in the AAI in Chapter 3: Changes in the Energy Market, while discussion of Western Power's performance during the AA3 period is provided in Chapter 5: Western Power Performance in AA3.

2.2 Actual AA3 capital expenditure

15. Over the AA3 period, Western Power will have invested $4,794 million in capital expenditure compared to a forecast $6,162 million. Figure 2.1 provides a comparison of actual and forecast capital expenditure over the AA3 period.

Figure 2.1: AA3 total capital expenditure – actual compared to forecast



16. Total capital investment for the AA3 period is 22 per cent less than that included in AA3 target revenue and reflects:

    - 48 per cent less transmission capital expenditure than forecast
    - 11 per cent less distribution capital expenditure than forecast
    - 27 per cent less corporate capital expenditure than forecast

17. This lower level of capital investment has been driven by:

    - a slowdown in the growth rate of peak demand following eight-years of reasonably strong growth
    - a reduction in customer-driven work compared to forecast due to weakened economic conditions and a significant slowdown in the growth of the mining sector in Western Australia
    - our innovative risk based approach to asset management based on the likelihood and consequence of individual asset failure. Investment is prioritised to address those assets which are at the highest risk of failure and with the greatest consequence. This innovative approach to asset management reflects industry best practice and has delivered network management savings across a number of capital expenditure categories
    - a refreshed focus on continuous improvement driving the commencement of our Business Transformation Program which has identified a number of process improvements and efficiency initiatives.

18. Further detail about the actual expenditure undertaken during the AA3 period, the outcomes associated with the AA3 capital expenditure program and the reasons for the variances are provided in the following sections.

19. Notably, $1,216 million (or 89%) of the difference between the actual and forecast investment during the AA3 period was in the expenditure categories subject to the IAM. This mechanism ensures that where Western Power does not spend as much as forecast in these expenditure categories, the revenue associated with this amount is returned to customers in the next access arrangement period. Through the IAM we will return $39.5 million (in net present value terms as at 30 June 2017) to customers during the AA4 period.

20. Table 2.1 shows actual capital investment compared to forecast by regulatory category

Table 2.1: AA3 total capital expenditure – major capital projects and programs, $ million real at 30 June 2017

Expenditure category	Forecast	Actual	$ variance	% variance
Distribution				
Asset replacement and renewal	1,749.8	1,810.0	60.2	3.4%
Growth	1,848.0	1,484.3	-363.7	-19.7%
Compliance	443.5	325.5	-118.0	-26.6%
Improvement in service	35.7	24.6	-11.1	-31.1%
Distribution Total	**4,077.0**	**3,644.4**	**-432.6**	**-10.6%**
Transmission				
Asset replacement and renewal	177.0	185.8	8.8	5.0%
Growth	1,372.6	564.1	-808.5	-58.9%
Compliance	140.4	112.4	-28.0	-20.0%
Improvement in service	83.2	60.2	-23.0	-27.6%
Transmission Total	**1,773.2**	**922.5**	**-850.7**	**-48.0%**
Corporate Total	**311.5**	**226.8**	**-84.7**	**-27.2%**
AA3 Total Capital Expenditure	**6,162.0**	**4,793.7**	**-1,369.8**	**-22.2%**

2.3 Outcomes from AA3 capital expenditure program

21. Western Power has delivered a number of significant outcomes over the AA3 period which allowed us to meet service levels and customer expectations for $1,370 million less than originally forecast. The following section describes the outcomes we have achieved for customers over the AA3 period as a result of the capital expenditure program.

2.3.1 Transmission network outcomes

22. During the AA3 period, Western Power invested $564 million in transmission growth projects to expand the capacity of the transmission network to meet growth in demand and connect new customers. This represented 61 per cent of total AA3 transmission capital investment.

23. In particular, over the AA3 period we:

- delivered one of Australia's largest transmission projects - the Mid-West Energy Project. This involved the construction of a 330 kV double circuit transmission line from Perth to Three Springs, enabling the connection of mining projects and electricity generators including wind farms in the Mid-West region
- established a new 330 kV terminal substation at Three Springs to enable future expansion in the North Country region
- connected major customer loads including Karara Mining and Southern Seawater Desalination plant
- connected additional generation capacity including Merredin Power, Kwinana Gas Turbine 2 and 3, Warradargee wind farm, Grasmere wind farm, Denmark Community wind farm and Tesla generation sites
- established the new Medical Centre (132)66/11 kV substation to accommodate increasing demand in the area and create additional feeder capacity to allow for load growth, additional distribution transfer capacity, and connection of new large customers
- completed construction of new 132/22 kV substations at Balcatta and Munday to accommodate increasing demand in the area
- completed Joel Terrace substation conversion from 66 kV to 132 kV to accommodate increasing demand in the area and address ageing assets
- uprated 132 kV lines including Pinjar to Yanchep, Rockingham to Waikiki, Joondalup to Wanneroo and Kojonup to Albany to accommodate increasing demand and address thermal constraints
- installed additional power transformers at Mason Road, Midland Junction, Merredin, Sawyers Valley, Joondalup, Southern River, Marriott Road and Waikiki substations to accommodate increasing demand and create additional feeder capacity to allow for load growth and additional distribution transfer capacity.

24. We also invested $358 million in transmission non-growth activities, which represented the remaining 39 per cent of total transmission capital investment. This investment generally related to maintaining the provision of covered services to existing customers to ensure the ongoing safe and reliable operation of transmission assets. Our AA3 transmission non-growth capital expenditure delivered the following outcomes:

- replaced 2,651 and reinforced 3,186 transmission poles
- replaced failed power transformers at Muja terminal (BTT1, BTT2), Moora (T1), Bunbury Harbour (T3)
- replaced or installed new power transformers at Cannington Terminal, Medical Centre, Narrogin, Joel Terrace, Shenton Park, Margaret River to alleviate capacity constraints, prevent catastrophic failure from poor asset condition and meet noise regulations
- replaced 132kV Merredin transformers with two refurbished transformers (that were removed from Cannington Terminal)
- relocated a transformer from Merredin Terminal to Muja to alleviate system constraints
- purchased two 132kV spare transformers and one 330kV 550MVA spare transformer - one 132kV transformer was installed in Bunbury Harbour (T3)

- undertook substation transformer compliance works (noise mitigation, oil containment, fire prevention) at Gosnells, Morley, and Rockingham substations
- replaced failed and poor condition primary plant assets comprising 163 outdoor circuit breakers, 536 current transformers, 84 voltage transformers, 441 disconnectors and disconnectors with earth switches, 162 surge arresters in zone and terminal substations
- replaced 98 obsolete protection relays in zone and terminal substations
- replaced failed switchboards at West Kalgoorlie Terminal
- replaced/installed switchboards at Morley, Collier, Joel Terrace, Medical Centre, Shenton Park, Southern River, Mason Road, Sawyers Valley, Midland Junction, Waikiki substations to prevent catastrophic failure due to poor asset condition or to alleviate capacity constraints
- installed 330kV shunt reactor in Three Springs Terminal to provide reactive support on line energisation/operation.

2.3.2 Distribution network outcomes

25. During the AA3 period, Western Power invested $1,484 million on distribution growth projects to expand the capacity of the distribution network to meet growth in demand and connect new customers. This represented 41 per cent of the total investment in distribution capital activities.

26. We completed a number of large distribution growth related projects and programs over AA3 including:

- the connection of 129,682 new customers to the distribution network increasing total customers connected by approximately 12% to more than 1.1 million customers
- installed new feeders and reinforced existing feeders at Collier, Cook Street, Midland Junction, Morley, Southern River, Wangara, Wanneroo, Joel Terrace, North Perth, Yokine, Balcatta, Clarkson, Canning Vale, Willetton, Kalamunda, Darlington, Bibra Lake, Durlacher, Bunbury Harbour, Marriott Road and Busselton to increase capacity, reduce feeder peak loading and reduce the risk of long duration outages
- completed conversion of Rivervale and Victoria Park distribution systems from 6.6 kV to 22 kV to address peak loads that were exceeding equipment ratings and insufficient distribution transfer capacity
- completed conversion of Cottesloe and Wembley Downs distribution systems from 6.6 kV to 11 kV to address peak loads that were exceeding equipment ratings and insufficient distribution transfer capacity
- installed isolation transformers at Geraldton, Marriott Road, Capel, Northam, Eneabba, Dongara, Narngulu, York, Goomalling, Beverley, Toodyay, Cunderdin, Tammin, Meckering and South Country areas to improve power quality by addressing load imbalance issues
- replaced 278 overloaded distribution transformers.

27. We invested the remaining 59 per cent or $2,160 million on distribution non-growth activities. Through our AA3 investment on distribution non-growth activities we have:

- replaced 82,114 and reinforced 188,009 distribution poles predominantly in rural areas in accordance with EnergySafety Order (01-2009), improving the safety of our ageing pole network
- replaced 277,730 overhead service connections to reduce the safety risk to the public from electric shocks

- successfully concluded a six year long safety driven program to remove all known streetlight switchwire from the network reducing the safety risk to the public
- completed SUPP projects in:
  - metro locations: Lathlain North and South, Attadale North, Ardross West, Hamilton Hill East, Wilson East, Coolbinia, Shoalwater North, Kalamunda, Melville South, Salter Point, Coolbellup East, Ashfield, Bicton North
  - rural locations: Collie, Pinjarra, Albany, Bunbury, Katanning; and; in conjunction with Horizon Power: Exmouth, Laverton
- installed 145,516 meters for new connections and replaced 179,509 existing meters as part of network maintenance and customer requested services
- replaced 2,283 km of deteriorated overhead lines, reducing the number of unassisted conductor failures
- replaced 3,980 pole top equipment and installed 4,039 LV spreaders in major bushfire risk areas
- commenced Standalone Power Systems (SPS) trial in Ravensthorpe area
- improved supply reliability to Ellenbrook and Henley Brook area following termite damage to cables
- achieved operational efficiencies that have allowed us to address the backlog of power quality works and reduce times for delivering these projects, leading to a reduction in the number of power quality related complaints.

2.3.3 Corporate outcomes

28. In AA3 we invested $226 million in AA3 on corporate support activities including:

- $142 million of ICT investments to improve the effectiveness of key operational processes and work practices, including:
  - field mobility services, which provided a mobile solution to the field workforce for distribution asset maintenance work to support the capture of work status and asset data, enabling real time updates to enterprise systems, which resulted in enhanced data management and process efficiency
  - the Network Risk Management Tool, which extended previous development of an analytics-based approach to providing risk scores for distribution assets, considering both likelihood and consequence of failure, which resulted in better investment decisions and capital management
  - implementation of a holistic inspection and scoping strategy for distribution assets, to combine inspection and scoping of remediation work and the capture of access information in the same visit, and automation of the process for identifying specific assets requiring work
  - enhanced the process for planned work on individual distribution assets by providing a medium-term view (up to two years ahead) to correlate planned work against assets
- $78 million invested in corporate real estate to undertake the following key activities:
  - refurbishment and upgrade of depot facilities in order to comply with legislative requirements and meet the operational needs of the business. Depot projects were:
    - Jandakot depot lay down yard resurfacing project

- Picton depot new pole yard;
- fire services upgrade at Picton and Geraldton;
- environmental remediation and new environmental shed at Balcatta;
- asbestos removal works at Kewdale and Albany depots;
- establish new Jerramungup depot
- refurbishment of Bridgetown and Albany depots

- structural mitigation, façade and lift refurbishment works at Head Office
- rationalisation of depot and facility locations including relocation of Vehicle Maintenance Facility from Perth Airport depot to Kewdale, relocation of functions from Bentley depot to Balcatta and Prinsep Road and subsequent closure of Perth Airport and Bentley leased depots
- construction of a bespoke Pole Break Test Facility to assist in the management of Western Power's pole network. The test facility supports the strategic management of wood poles through a better understanding of how poles degrade with age, which contributes to optimised replacement and reinforcement works

- $6 million of expenditure on work completed in preparation for transition to the national regime under the State Government led Electricity Market Review initiative. This expenditure is covered under the unforeseen events adjustment mechanism and is discussed in more detail in Chapter 10: Annual Revenue Requirement of the AAI.

2.4 AA3 capital expenditure program variances

29. The following section describes the key variances in the actual AA3 capital expenditure program compared with the AA3 investment proposal. This section should be read in conjunction with the confidential AA3 Capital Expenditure Variance Analysis, provided in Attachment 5.2. The AA3 Capital Expenditure Variance Analysis provides detail of AA3 capital expenditure variances by regulatory expenditure category, and provides high level commentary on key projects.

2.4.1 Variances in growth-related capital expenditure

30. The biggest driver of Western Power's less-than-forecast capital expenditure during the AA3 access arrangement period was a lower level of expenditure on growth-related projects.

31. Over AA3, we spent $1,173 million less than forecast on growth-related capital investments (see Table 2.2), accounting for almost 86 per cent of the total variance in total capital expenditure.

Table 2.2: AA3 growth related capital expenditure – actual compared to forecast, $ million real at 30 June 2017

Expenditure category	Forecast	Actual	$ variance	% variance
Distribution				
Capacity expansion	367.6	181.7	-185.9	-50.6%
Customer driven	1,130.4	817.9	-312.5	-27.6%

Gifted assets	350.0	484.6	134.6	38.5%
Distribution Total	**1,848.0**	**1,484.3**	**-363.7**	**-19.7%**
Transmission				
Capacity expansion	1,056.6	487.7	-568.9	-53.8%
Customer driven	316.0	76.4	-239.6	-75.8%
Transmission Total	**1,372.6**	**564.1**	**-808.7**	**-58.9%**
Growth Total	**3,220.6**	**2,048.4**	**-1,172.2**	**-36.4%**

32. The AA3 forecast was underpinned by significant growth estimates evidenced by:

- peak demand increasing on average by 147 MW per year over the prior decade
- record numbers of major load and generator connection applications
- an estimated 130,000 new distribution customers connecting to the network.

33. Over the AA3 period, Western Power saw a slowdown in the growth rate of annual peak demand. Over the five years ending 2014/15, the growth rate slowed to 0.2% following two successive periods of reasonably strong growth – 6.5% over the period 2002/03 – 2006/07 and 2.8% over the period 2006/07 – 2010/11.[1] The slowed growth trend reflects a range of changes in factors, such as:

- changes in technology, which tend toward increasing energy conservation over time
- the continued take-up of self-generation via solar PV
- changing consumer behaviour, driven in part by prices and the economic climate

34. The reduction in growth rate and load forecasts, coupled with a slowdown in economic and population growth, led to a review of the need for proposed network reinforcements. This resulted in a number of capacity expansion projects being postponed and in some cases re-scoped. In addition, the adoption of risk based planning assisted Western Power to implement summer switching and contingency planning to ensure the network is not compromised.

35. Customer work is driven wholly by customer requests and reflects general economic activity, and confidence in the market. The AA3 forecast was based on historical trends, which were influenced by post global financial crisis stimulus and the WA resources boom. The winding down of the resources boom in WA from its peak in 2013, has seen a corresponding reduction in peak volumes in recent years. This, together with a shift in investment away from large commercial customer projects to smaller commercial and residential customer projects, has led to lower levels of capital expenditure than forecast.

36. It is important to recognise that under the investment adjustment mechanism the difference in financing costs between forecast and actual growth-related investment for AA3 ($39.5 million in net present value terms as at 30 June 2017) is returned to customers in the AA4 period (via an adjustment to AA4 target revenue). This ensures customers do not pay for the forecast growth-related capital expenditure that does not occur.

[1] Western Power Annual Planning Report 2015/16, page 18

2.4.2 Variances in non-growth-related capital expenditure

37. Over the AA3 period, Western Power invested $103 million or 4 per cent less than forecast in non-growth capital expenditure (see Table 2.3).

Table 2.3: AA3 non-growth-related capital expenditure – actual compared to forecast, $ million real at 30 June 2017

Expenditure category	Forecast	Actual	$ variance	% variance
Distribution				
Asset replacement	1,749.8	1,810.0	60.2	3.4%
Compliance	443.5	325.5	-118.0	-26.6%
Improvement in service	35.7	24.6	-11.1	-31.1%
Distribution Total	**2,229.0**	**2,160.1**	**-68.9**	**-3.1%**
Transmission				
Asset replacement	177.0	185.7	8.7	4.9%
Compliance	140.4	112.4	-28.0	-20.0%
Improvement in service	83.2	60.2	-23.0	-27.6%
Transmission Total	**400.6**	**358.3**	**-42.3**	**-10.6%**
Non-growth Total	**2,629.6**	**2,518.4**	**-111.2**	**-4.2%**

38. The major programs contributing to this variance are discussed below. Additional detail regarding the reasons for variance by each major project or program of capital expenditure in AA3 is provided in the confidential AA3 Capital Expenditure Variance Analysis, provided in Attachment 5.2.

Asset replacement and renewal

39. During the AA3 period, Western Power invested a total of $67 million more than forecast in asset replacement and renewal. This comprised a 3% variance for distribution asset replacement and renewal and 5% variance on transmission asset replacement and renewal (see Table 2.4).

Table 2.4: AA3 Asset replacement and renewal – actual compared to forecast, $ million real at 30 June 2017

Expenditure category	Forecast	Actual	$ variance	% variance
Distribution				
Asset replacement and renewal	335.9	586.4	250.5	74.6%
Pole Management	1,085.1	1,041.8	-43.3	-4.0%
Metering	171.9	92.9	-79.0	-46.0%

Expenditure category	Forecast	Actual	$ variance	% variance
Smart grid	97.7	-	-97.7	-100.0%
SUPP	59.6	88.9	-29.3	49.2%
Distribution Total	**1,749.8**	**1,810.0**	**58.1**	**3.3%**
Transmission				
Asset replacement and renewal	177.0	185.8	8.7	4.9%
Transmission Total	**177.0**	**185.8**	**8.7**	**4.9%**
Total asset replacement and renewal	**1,926.8**	**1,995.8**	**69.0**	**3.6%**

40. The majority of the increased spend in the distribution asset replacement and renewal category was in the overhead conductor replacement program. This resulted from a significant shift in our strategy to risk-based prioritisation criteria targeting conductor with a high risk and consequence of unassisted failure leading to changes in the work mix compared to that forecast for AA3. Detailed risk analysis of asset information targeted higher risk conductors in population centres and extreme and high bush fire risk zones first, which in turn affected underlying replacement rates. In addition, high voltage aerial bundled cable was included as an at-risk asset, which required replacement with the higher cost Hendrix alternative.

41. Significant expenditure on pole management meant we completed the work required under EnergySafety Order 01-2009 to address urgent safety risks associated with the ageing wood pole network. The Director of Energy Safety stated that EnergySafety is satisfied that Western Power has complied with the Order as at 31 December 2015:

> *"The review found that the principal public safety objectives set out in the Order have been achieved. The Director of Energy Safety therefore is satisfied that Western Power has complied with the Order as at 31 December 2015."*[2]

42. The AA3 forecast for metering included replacement of 280,000 three phase meters that were deemed non-compliant under Electricity (Supply Standards & System Safety) Regulations 2001 (**ESSSSR**). However, the gazettal of the Electricity (Network Safety) Regulations 2015 formally removed the compliance requirements of the ESSSSR. The 2001 regulations required a more onerous accuracy requirement than the Electricity Industry Metering Code and the National Electricity Rules. As a result, Western Power sought to replace the 54,000 meters that were still deemed non-compliant following repeal of the ESSSSR, while the balance of meters were assessed as meeting the accuracy requirements under the Metering Code.

43. The AA3 submission included a proposal to implement smart meters, including associated communications infrastructure and IT systems, leveraging the requirement for replacement of the 280,000 three phase meters that were deemed non-compliant under ESSSSR in place at the time. While the business case to deploy advanced meters showed an overall positive net benefit for the electricity market in WA, given the need to reprioritise capital investment towards safety and reliability, the decision was made in July 2013 to defer the advanced meter deployment. Concurrently, the Minister for Energy announced the Electricity Market Review, which included the exploration of the appropriateness of joining the national regulatory

[2] *ORDER NO. 01-2009 REVIEW OF WESTERN POWER'S COMPLIANCE*, EnergySafety WA - 10 June 2016, p. 4

framework under the National Electricity Rules, which would include the provision of advanced meters as a contestable service.

Improvement in service

44. During the AA3 period, Western Power invested $34 million less than forecast in the improvement in service regulatory category (see Table 2.5).

Table 2.5: AA3 Improvement in service – actual compared to forecast, $ million real at 30 June 2017

Expenditure category	Forecast	Actual	$ variance	% variance
Distribution				
Reliability driven	3.4	6.6	3.1	91.0%
SCADA and communications	32.3	18.0	-14.3	-44.3%
Distribution Total	**35.7**	**24.6**	**-11.2**	**-31.4%**
Transmission				
Reliability driven	-	1.8	1.8	100%
SCADA and communications	83.2	58.4	-24.7	-29.7%
Transmission Total	**83.2**	**60.2**	**-23.0**	**-27.6%**
Total improvements in service	**118.9**	**84.8**	**-34.2**	**-28.8%**

45. Customers have received improved service throughout AA3 across a broad range of service standard benchmarks. We achieved all 17 of our service standard benchmarks in 2014/15 and 2016/17, which include targets for distribution reliability, the number of customer connections, streetlight repair requirements and call centre performance.

46. Expenditure on both distribution and transmission SCADA and communications projects ensured critical works were addressed during the period. However, a number of planned projects were deferred due to resources being redirected to other high priority projects, including business transformation initiatives, and uncertainty surrounding potential changes to the energy market rules as a result of the State Government's EMR initiatives. Additional cost efficiencies were achieved by changes to asset management strategies that extended asset lives into the AA4 period.

Regulatory compliance

47. During the AA3 period, Western Power invested $144 million less than forecast for capital works required to comply with external obligations with respect to the transmission and distribution networks (see Table 2.6).

Table 2.6: AA3 Regulatory compliance – actual compared to forecast, $ million real at 30 June 2017

Expenditure category	Forecast	Actual	$ variance	% variance
Distribution	443.5	325.5	-116.4	-26.2%

Transmission	140.4	112.4	-28.0	-20.0%
Total regulatory compliance	**583.9**	**437.9**	**-144.4**	**-24.7%**

48. The majority of the variance can be explained by the following changes in delivery of regulatory compliance works:

- change in delivery strategy during AA3 resulting in a number of programs which were previously stand-alone programs with targeted asset lists being progressed to a zonal treatment approach, therefore reducing targeted volumes
- clashing conductor risk was traditionally identified by manual methods, but the introduction of new mathematical modelling surveying technology, such as LiDAR, has enabled automation of assessment and remediation of clashing conductor bays
- a heavy commitment of resources was required to be diverted to conduct testing and subsequent asset replacement for a particular model of current transformers which experienced an unexpected failure rate
- reduction in power quality remediation work due to the number of power quality complaints decreasing over the years as a result of earlier years rectification works and the ongoing SUPP.

2.4.3 Variances related to corporate expenditure

49. During the AA3 period, Western Power invested $85 million less than forecast on corporate support capital expenditure (see Table 2.7).

Table 2.7: AA3 Corporate – actual compared to forecast, $ million real at 30 June 2017

Expenditure category	Forecast	Actual	$ variance	% variance
Business support	140.8	84.4	-56.4	-40.1%
IT	170.8	142.5	-28.3	-16.6%
Total corporate	**311.6**	**226.8**	**-84.7**	**-27.2%**

50. The introduction of our Business Transformation Program reinforced a business wide focus on cost minimisation in the business as usual activities. This saw a reduction in spend on maintenance and repairs on our property portfolio pending implementation of the depot modernisation program.

51. In the AA3 period we delivered efficiencies in maintaining ICT infrastructure driven from commercial negotiations with service providers to reduce rates and implementation costs, continuous improvements in project delivery, and improved consolidation reducing infrastructure costs.

52. Significant projects not executed in the period were the implementation of smart meters and a proposed Ellipse upgrade. This enabled funding from these projects to be redirected to Business Transformation Program ICT initiatives to deliver significant business efficiencies in both operating and capital expenditure programs.

3. Consistency with Access Code requirements

53. As outlined in section 2, the ERA has previously accepted forecasts of new facilities investment of $6162 million as being consistent with the new facilities investment test set out in sections 6.51–6.54 of the Access Code.

54. We note that the actual expenditure incurred in AA3 was less than that accepted by the ERA as being consistent with the requirements of the Access Code at the time of its last review.

55. While the ERA formed this view on an ex-ante basis, we are required to demonstrate that the new facilities investment undertaken in AA3 satisfies the NFIT at the time the expenditure was incurred.

56. This section sets out how our actual capital expenditure over the AA3 period is consistent with the Access Code.

3.1 Access Code requirements

57. Western Power is required to include information to support its proposal to add new facilities investment undertaken during the current regulatory period to the regulated asset base (**RAB**).

58. Section 6.51A of the Access Code provides that new facilities investment may be added to the RAB if it passes certain tests namely:

> *6.51A New facilities investment may be added to the capital base if:*
>
> *a) it satisfies the new facilities investment test; or*
>
> *b) the Authority otherwise approves it being added to the capital base if:*
>
> *i. it has been, or is expected to be, the subject of a contribution; and*
>
> *ii. it meets the requirements of section 6.52(a); and*
>
> *iii. the access arrangement contains a mechanism designed to ensure that there is no double recovery of costs as a result of the addition.*

59. Section 6.52 of the Access Code sets out the NFIT, which essentially has two parts which must be met. The first part emphasises the need to efficiently minimise costs:

> *6.52 New facilities investment satisfies the new facilities investment test if:*
>
> *a) the new facilities investment does not exceed the amount that would be invested by a service provider efficiently minimising costs, having regard, without limitation, to:*
>
> *i. whether the new facility exhibits economies of scale or scope and the increments in which capacity can be added; and*
>
> *ii. whether the lowest sustainable cost of providing the covered services forecast to be sold over a reasonable period may require the installation of a new facility with capacity sufficient to meet the forecast sales;*

60. Section 6.52(b) of the Access Code sets out a number of tests so that new facilities investment may only be added to the RAB if:

> *b) one or more of the following conditions is satisfied:*
>
> *i. either:*

A. the anticipated incremental revenue for the new facility is expected to at least recover the new facilities investment; or

B. if a modified test has been approved under section 6.53 and the new facilities investment is below the test application threshold – the modified test is satisfied;

or

ii. the new facility provides a net benefit in the covered network over a reasonable period of time that justifies the approval of higher reference tariffs; or

iii. the new facility is necessary to maintain the safety or reliability of the covered network or its ability to provide contracted covered services.

61. The concepts of 'efficiently minimising costs' and 'good electricity industry practice' are also defined under the Access Code. Efficiently minimising cost is defined as:

> *the service provider incurring no more costs than would be incurred by a prudent service provider, acting efficiently, in accordance with good electricity industry practice, seeking to achieve the lowest sustainable cost of delivering covered services and without reducing service standards below the service standards benchmarks set for each covered service in the access arrangement contract for services.*

62. Good electricity industry practice is defined as:

> *the exercise of that degree of skill, diligence, prudence and foresight that a skilled and experienced person would reasonably and ordinarily exercise under comparable conditions and circumstances consistent with applicable written laws and statutory instruments and applicable recognised codes, standards and guidelines.*

63. In demonstrating how our AA3 capital expenditure is consistent with the requirements of section 6.52(a) we have set out in the following sections the processes we have relied upon to make decisions about the capital expenditure. We have also set out the relevant tests under section 6.52(b) of the Access Code.

64. Western Power considers that our AA3 capital expenditure program is consistent with the NFIT requirements and has been added to the RAB.

65. We further note that section 6.54 of the Access Code requires that in applying the NFIT the ERA:

> *Must have regard to whether the new facilities investment was required by a written law or a statutory instrument.*

3.2 Investment governance

66. The primary goal of the Western Power network is to connect and efficiently and safely deliver electricity to customers. This is achieved by providing reliable and cost effective electrical supply with an unwavering focus on customer, community and workforce safety whilst complying with statutory and regulatory obligations.

67. Our corporate governance framework provides the overarching guidance for the development of policies and frameworks that support Western Power to achieve our corporate objectives and to meet legislative and regulatory obligations.

68. Under the governance framework, there are a range of policies, strategies, frameworks and tools designed to support the capital investment process. There are three main aspects to the investment process, which are:

- identifying the current and future limitations of the network, and possible business improvements, to establish where investment is, or will be, required
- selecting which of the issues that require investment should be addressed
- addressing the chosen network limitations and business improvement opportunities through efficient delivery of selected projects and programs.

69. These policies, strategies and frameworks are supported by broader Western Power governance arrangements, such as the Enterprise Risk Management Framework, which embeds risk management across the business.

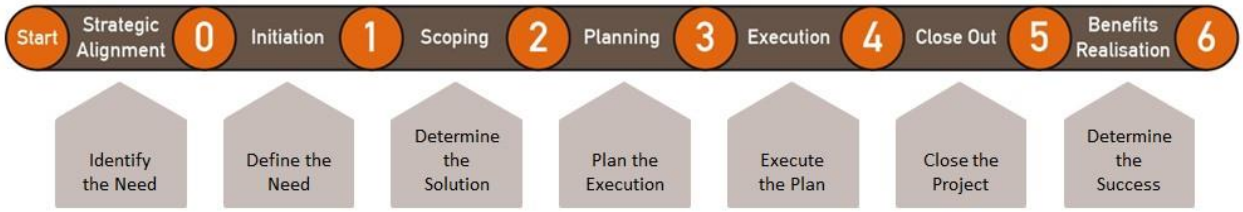
70. The governance framework to support investment decision making, planning and delivery has evolved over time. The changes made have either been in response to internal initiatives, or improvement opportunities identified through external reviews.

71. During AA3, the Work Program Governance Framework (**WPGF**) that was in place during AA2 was improved and updated following a Network Investment Excellence Initiative to improve the calibre of investment governance documentation. The Portfolio Governance Framework (**PGF**) was introduced in 2014, and replaced the WPGF.

72. The PGF established the systems and controls applied to ensure all projects and programs are initiated and delivered in a manner consistent with Western Power's objectives. This includes clarity of roles and accountabilities, accurate and timely information, clear processes and criteria to support decision making, and the opportunity to review and monitor the process and outcomes. The gated approvals process the WPGF established remained, but the approvals process was improved to increase accountability and reduce inefficiencies.

73. Figure 2 below illustrates the lifecycle phases and gates of the PGF:

Figure 2. PGF lifecycle phases and gates



74. Gates are points of control between lifecycle phases. Each gate ensures the decision to proceed to the next phase is controlled and documented. The PGF gates are for the purpose of:

- assessing whether or not to proceed to the next phase, based on business benefits and alignment to corporate objectives
- ensuring investment options and assessments are undertaken at the appropriate time
- providing an opportunity to confirm whether the justification for the project or program to continue remains

- obtaining the required approval to ensure compliance with Delegated Financial Authority (**DFA**) policy
- ensuring appropriate control is applied to manage delivery risk
- ensuring due process, evidence and transparency of decision making throughout the lifecycle of a sub-portfolio's project and/or program.

75. Gates zero to three ensure the project and program options, and required assessments, are completed. This includes the need to confirm capital investments satisfy the new facilities investment test, prior to execution.

76. Gates four to six ensure the completion and performance of projects and programs is reviewed against the business case, lessons learned are identified for continuous improvement, and intended benefits are delivered and validated.

77. We are continually seeking improvement opportunities across our business and recognise investment governance best practice will continue to evolve. We are therefore embedding further investment governance process improvements, which will be in place throughout AA4 to further enhance the investment decision making processes and governance framework.

3.3 Risk based approach to asset management

78. Western Power has developed a risk based approach to asset management, guided by the likelihood and consequence of individual asset failure, where investment is prioritised to address assets which are at the highest risk of failure with the greatest consequence. Assessing the risks associated with network assets is essential for their management, as well as informing asset management strategies, plans for maintenance and renewal activities and prioritising investment.

79. This is consistent with the view of Geoff Brown and Associates Ltd, who provided a Technical Review of Western Power's Proposed Access *Arrangement for 2012-17*, which noted:

> *risk assessments could be better structured and used more effectively as a tool for prioritising expenditure*[3]

80. Western Australian public safety jurisdictional obligations do not require conformance to a set of performance targets such as the number and impact of safety incidences, rather they require enterprises to adopt and implement risk management processes aimed at reducing risk to as low as reasonably practicable (**ALARP**). The ALARP principle is encapsulated in Electricity (Network Safety) Regulations 2015 (WA).

81. Our Network Risk Management Tool (**NRMT**) is a quantitative risk management tool based on Bayesian belief network methodology. It has been integrated into Western Power's asset management systems for distribution and transmission assets to provide a consistent approach to calculating and reporting network asset risks

82. Our NRMT models six consequence categories, these are; fire, electric shock, physical impact, workforce injury, customer supply and environment. These categories were defined based on an understanding of

[3] *Technical Review of Western Power's Proposed Access Arrangement for 2012-17*, Geoff Brown & Associates Ltd, Final (Public Version) – 27 March 2012, p.23

Western Power's historical incidents and were developed to align with business incident reporting and investment criteria.

83. Consequence modelling across different asset models is informed by analysis of historical incidents on the Western Power network (e.g. how many wood pole failures convert to ground fires, electric shock, etc.) The dollar values assigned to consequences within the NRMT are derived from Australian and International studies showing the value that communities place on incidents such as fire, injury and loss of power.

84. The network asset data used to support decisions has been collected over many decades. Although its quality and completeness varies across assets classes due to historical variability in type and method of collection, it is considered adequate for assessing risk and prioritising investment. A sound understanding of the state (or health) of an asset provides insight into its likelihood of failure in the future and along with consideration of the potential consequences of failure, permits an assessment of the risk it poses. We seek to continually improve the quality and completeness of this data through improvements in technology and collection, storage and validation processes.

85. A recent independent review into Western Power's asset management system undertaken by CutlerMertz in 2017, in accordance with a scope defined by the ERA[4], found:

> *Western Power's approach to risk based asset management can be considered effective, particularly as applied to asset maintenance and renewal*[5]

86. Our approach to asset and risk management is maturing continuously to support transparent risk-based prioritisation that is more robust and defensible. To support this, we publish an annual State of the Infrastructure Report to provide stakeholders with information about the performance and state of the Western Power Network. More information on this report and other reports published by Western Power is provided in Section 4.3.

3.4 Efficiently minimising cost

87. In addition to Western Power's risk-based asset management approach, we have efficiently minimised costs through our practices of:

- estimating costs based on most recent information and experience
- optimising our works program by activity type, geography, and operating and capital expenditure
- employing prudent procurement practices and competitively tendering the majority of our capital program

88. We also continue to seek to adopt good electricity industry practice by sharing knowledge and benchmarking ourselves against other electricity network businesses in Australia.

89. Examples of our industry practice benchmarking activities include:

[4] Western Power holds two operating licences issued under the Electricity Industry Act, an Electricity Distribution Licence 1 (**EDL1**) and an Electricity Transmission Licence 2 (**ETL2**). Under section 14(1)(c) of the Act, an obligation is established within the licences (Licence Condition 20.4) where Western Power is required to provide the ERA with a report by an independent expert about the effectiveness of its asset management system every 24 months, or such longer period as determined by the ERA. The current scope period is 1 July 2014 to 30 June 2017.

[5] *2017 Asset Management System Review,* CutlerMertz, July 2017, p. 1

- **ENA work on reliability frameworks and future modular networks**
  Western Power is a member of Energy Networks Australia and actively participates in such areas as the reliability and power quality working group, which seeks to rationalise and standardise performance classifications. This membership also allows us to receive relevant industry insights into future opportunities and challenges presented by emergent technologies
- **ITOMS transmission maintenance practices**
  The ITOMS organisation, to which Western Power subscribes, is a global collection of transmission network service providers who share engineering knowledge on such items as network asset configurations, typical asset service lives, optimum maintenance cycles and comparative costings
- **Delivery cost benchmarking**
  Estimating costs and unit rate data are benchmarked nationally at a frequency of 12 – 18 months. Western Power led a national benchmarking exercise in 2015 focusing on distribution asset cost data. Benchmarking exercises typically follow either a market price survey where utilities are invited to participate and subsequently compared openly and transparently or via simulated national averages / models compiled via an external facilitator.

3.4.1 Network Delivery Strategy

90. Western Power adopts a composite resourcing approach which essentially means that we adopt a blended approach to resourcing, using a mix of three delivery arms for different types of work as appropriate:

- internal resources
- external resources under standard contract
- external resources under a preferred vendor model.

91. The composite resourcing approach is reviewed regularly and optimised to take account of prevailing conditions and any changes to the work program. The key elements of the composite resourcing approach are:

- improving the flexibility and responsiveness of Western Power's cost structure to changes in work volumes
- maintenance and improvement of core competencies
- maintenance of control over high risk delivery areas
- ensuring work undertaken by external resources is competitively tendered.

3.4.2 Prudent procurement practices

92. Western Power adopts a robust and centralised approach to procurement. The centralised procurement function enables Western Power to leverage spend in order to achieve the following:

- gain maximum utilisation and savings
- standardise procurement policies and processes
- facilitate knowledge and resource-sharing
- provide transparency and governance.

93. The procurement policy establishes the principles and practices that govern Western Power's procurement activities for all goods, materials, services and intellectual property assets. The key governing principles are:

- agreements must be established via a competitive process to meet Western Power's requirements and to deliver value for money
- the evaluation, selection and award process is supported by the engagement of relevant subject matter experts to ensure that the goods and services obtained meet Western Power's requirements including compliance with safety, environmental, technical, commercial and qualitative standards.

4. External review

94. Much of our AA3 capital expenditure program has been subject to additional review throughout the AA3 period. This has included reviews undertaken by:

- the ERA to gain regulatory test approval for major augmentations and NFIT pre-approval for a select number of projects and programs
- both the Department of Treasury and the Economic Expenditure Review Committee of Cabinet in relation to capital expenditure included in the State Budget Forward Estimates and requests for further capital funding over the AA3 period

95. These reviews included consideration of the justification, assessment and evaluation of cost of various projects. The extent of these further reviews is discussed in the following sections.

4.1 Reviews by the ERA

96. Network investment is subject to two tests under the Access Code on an ex-ante basis, namely the regulatory test in Chapter 9 and the NFIT under clauses 6.52 to 6.55 of the Access Code. During AA3 we have:

- submitted one regulatory test application, with a second regulatory test application submitted at the end of AA2 for which the majority of the capital costs related to AA3
- submitted one NFIT pre-approval application, with two additional NFIT pre-approvals submitted at the end of AA2 for which the majority of the capital costs related to AA3.

4.1.1 Regulatory test

97. Under chapter 9 of the Access Code, it is mandatory to submit a regulatory test, seeking approval from the ERA for major augmentations on an ex-ante basis. The focus of the regulatory test is on determining whether the chosen option maximises the net benefits of the project to the network.

98. The regulatory test is designed to apply specifically to 'major augmentations' where the value of the project exceeds the nominated threshold ($11.1 million for wholly distribution projects or $33.2 million if the project includes any transmission assets [as at 2012, CPI adjusted annually]). The regulatory test application is completed for major augmentations as part of phase 2 (scoping) of our works program model.

99. During the AA3 period, Western Power submitted a regulatory test application to the ERA for the following project:

- **establishment of a new Shenton Park zone substation** – having regard to Western Power's major augmentation proposal, the ERA determined that *"pursuant to section 9.18 of the Access Code, that the regulatory test as defined in sections 9.3 and 9.4 and applied in accordance with section 9.20 of the Access Code is satisfied"*

100. In addition, at the end of the AA2 period, we submitted a regulatory test application to the ERA for the following project for which the majority of the capital costs related to AA3:

- **Mid-West Energy Project – Southern Section** – having regard to Western Power's major augmentation proposal, the ERA determined that *pursuant to section 9.18 of the Access Code, that the regulatory test as defined in sections 9.3 and 9.4 and applied in accordance with section 9.20 of the Access Code is satisfied*

4.1.2 NFIT pre-approval submissions

101. Section 6.71 (b) of the Access Code provides for Western Power to apply at any time to the ERA to determine whether forecast new facilities investment proposed by the service provider meets the test in section 6.51A.

102. During the AA3 period, Western Power sought pre-approval from the ERA for the following project:

- **132-66/11 kV Medical Centre Zone Substation** (NFIT value $24.4 million) – for works to construct a new 132-66/11 kV Medical Centre zone substation at the Queen Elizabeth II (**QEII**) Medical Centre in Nedlands. In June 2013, the ERA decided *to approve Western Power's new facilities investment application for a 132-66/11 kV Medical Centre Zone Substation up to the value of $24.43 million.*

103. In addition, at the end of the AA2 period, Western Power sought pre-approval from the ERA for the following two projects for which the majority of the capital costs related to AA3:

- **replacement of overhead customer service connections** (Total project value $72.9 million, NFIT value $72.9 million) – to replace the remaining population of potentially un-safe overhead customer service connections to reduce the risk of electric shock to customers. The ERA approved the full NFIT value for the works in May 2011
- **Mid-West Energy Project - Southern Section** (NFIT value $377.8 million) – to provide additional transmission capacity to the Geraldton area by replacing the current transmission line with a 330 kV double circuit transmission line from Neerabup to the Karara mine site and a 330/132 kV transformer at Three Springs to interconnect the existing 132 kV network with the new 330 kV transmission line. On 27 January 2012, the ERA granted Western Power *pre-approval to include $377.8 million (real dollars at 30 June 2010) of capital expenditure in Western Power's capital base – to occur at the point in time when the Mid West Energy Project (Southern Section) is commissioned at 330kV and component network assets are purchased from Karara Mining Limited.*

4.2 Funding assessment by Government

104. The level of investment supported by the ERA for the AA3 period required a greater level of funding than the amount included in the forward estimates of the State Budget.

105. We worked with the Department of Treasury and the Public Utilities Office to establish a process by which we could obtain additional funding through requests to the Economic and Expenditure Review Committee supported by our business cases. In response to the additional process requirements and uncertainty about funding we revised our expenditure forecasts preserving necessary expenditure on public safety and choosing to defer network augmentations and some planned improvements in reliability. To ensure that we were able to balance our expenditure priorities and consequential risks, we sought Government approval for additional funding for our critical capital expenditure program.

106. In 2014, four major business cases were submitted to the Economic and Expenditure Review Committee for approval. Of the business cases submitted, EERC approved an additional $113 million of capital expenditure in State Budget for Western Power's AA3 capital works.

4.3 Western Power Reporting and Transparency

107. Western Power is committed to transparent stakeholder engagement. Accordingly, we publish a number of annual reports regarding our network assets. These report can be found on our website www.westernpower.com.au.

108. Two key reports include the State of the Infrastructure Report and the Annual Planning Report. These are described in more detail below.

4.3.1 State of the Infrastructure Report

109. The primary purpose of Western Power's State of the Infrastructure (**SOTI**) Report is to provide stakeholders with information about the performance and state of the Western Power Network. This supports improvements in the quality and transparency of decision-making by all stakeholders.

110. Western Power first published annual performance and asset data in the SOTI Report format for the year 2011/12, in response to one of the recommendations of the Parliamentary Standing Committee on Public Administration (Report 14 - Unassisted Failure) in January 2012. The SOTI Report is updated and published annually, maintaining a consistent and independently-verifiable approach to the manner in which performance data is sourced, analysed and reported.

111. The SOTI Report covers key transmission and distribution network assets for each reporting period (1 July to 30 June) and provides:

- an overview of the performance of the network with respect to public safety, the environment, supply reliability and power quality over the reporting period
- a forecast of the capacity of the network to supply future demand
- a snapshot of the age profile, condition and risk of key network assets as at 30 June, with a comparison of the same data from previous years, where available.

4.3.2 Annual Planning Report

112. Western Power publishes the Annual Planning Report (**APR**) annually to provide information to electricity market participants and interested members of the broader Western Australian community on the nature and location of the emerging capacity constraints on the Western Power Network.

113. The APR provides an open and transparent view into the factors we consider in addressing network issues to produce timely network and non-network solutions to manage both emerging constraints and meet evolving customer needs. The APR aims to provide a strategic view of the network, illustrating the foundations for the planning and development of the Western Power Network into the future from a whole-of-network perspective.