Review of Responses to the AER's Preliminary View on Amendments to its Final Determination

Prepared by ENERGEIA for the Australian Energy Regulator

January 2013

1 Executive Summary

The Australian Energy Regulator (AER) issued its Preliminary View on the matters referred to it by the Australian Competition Tribunal (the Tribunal) in August 2012, which allowed $11.7 million of SP AusNet's (SPA's) claimed $107.2 million in switching costs.[1] SPA provided its submission in response to the AER's preliminary view on 14 September 2012, which referenced a newly commissioned cost-benefit assessment of WiMax and mesh based solutions, estimate of prudent 2012-15 expenditure and switching costs.

SPA's consultants, DNV KEMA (KEMA), concluded that WiMax would have been $8.2 million less than mesh over a 15 year time horizon, including switching costs of $56.8 million in present value terms.[2] Altogether, KEMA found switching to mesh from 28 February 2011 would have resulted in a loss of $48.6 million in present value terms compared to continuing with SPA's WiMax based approach.

The AER engaged Energeia in October 2012 to update our estimates of the relative lifetime costs of mesh and WiMax solutions as at 28 February 2011, prudent expenditure over the 2012-15 period, and the switching costs involved in light of new information received since our August 2012 report was issued.

Scope and Approach

The scope of Energeia's review focused on the following sources of new information:

- SP AusNet's submission in response (Response) to the AER's Preliminary View on Amendments pursuant to the Australian Competition Tribunal's Orders (Preliminary View); and
- SP AusNet's responses to questions posed by the AER between the issuing of its Preliminary View and its Revised Final Determination.

Although Energeia reviewed all materials received, we focused our attention on new information we considered to have the most impact based on the following criteria:

- **Materiality** – The materiality of information was assessed based on its potential dollar value impact on our estimate of the level of prudent expenditure over the 2012-15 period.
- **Relevance** – The relevance of information was assessed in terms of whether and how it related to the facts or reasoning Energeia relied upon in reaching its conclusions.
- **Reliability** – The reliability of information was assessed in terms of whether it could be independently verified, and the overall level of substantiation.

Where this material provided us with cause to change our views regarding SPA's prudent telecommunications expenditure over the 2012-2015 period, we have done so.

Review Outcomes

As shown in Figure 1, Energeia's updated analysis continues to show a strong commercial rationale for a reasonable business to have switched to a mesh solution in the circumstances.

Our estimate of the lifetime cost of a mesh solution has fallen from $201.1 to $190.9 million, while our estimate of the lifetime costs of staying with WiMax has increased, rising from $318.6 to $320.8 million. This

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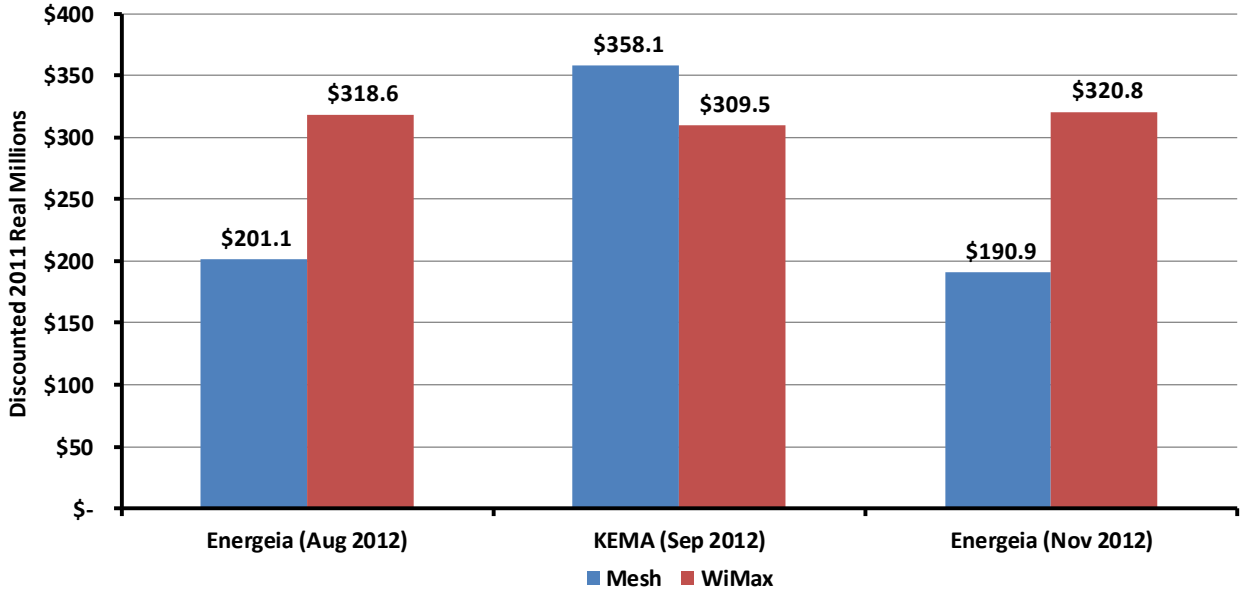
[1] *Preliminary View, Advanced Metering Infrastructure Review, SPI Electricity Pty Ltd, 2012–15 Budget and Charges Applications, Amendments Pursuant to the Australian Competition Tribunal's Orders*, AER, August 2012.

[2] *SP AusNet, Assessment of AMI Communication Options,* DNV KEMA, 14 September 2012.

widens our overall estimate of the savings SPA could have realised if it had switched to mesh from 28 February 2011 from $117.5 to $129.9 million in discounted present value terms.

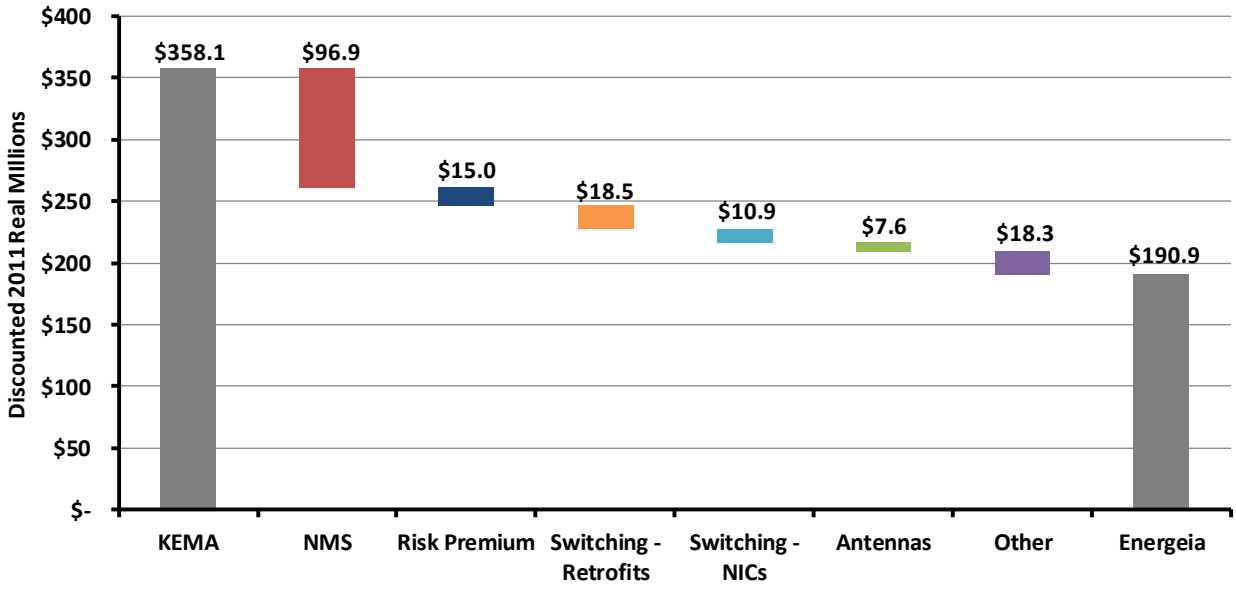
Figure 1 – Comparison of WiMax and Mesh Solution Lifetime Cost Estimates (2011-2025)



Source: KEMA, Energeia

Although Energeia and KEMA are $178.5 million apart in our quantitative assessments, $167.2 million of this variation is due to differences in our respective estimates of mesh solution costs. Energeia's review of KEMA's mesh estimate found that $148.9 million or 89% of the variation in our mesh estimates is being driven by a few key assumptions regarding Network Management System (NMS) costs, procurement practices, antenna requirements, mesh Network Interface Card (NIC) related switching costs and the pricing of risk. The discreet impacts of each are quantified in Figure 2.

Figure 2 – Key Variations in KEMA's Lifetime Mesh Cost Estimate Relative to Energeia's (2011-2025)



Source: KEMA, Energeia

Based on our revised analysis, Energeia's maintains its conclusion that the lifetime costs of switching to a mesh communications solution represents the commercial standard against which SPA's submitted costs should be assessed under the revised OIC.

Energeia re-estimated prudent costs over the 2012-2015 period given the revisions to our estimate of lifetime mesh solution costs and the mesh switching timeline (detailed below), including switching costs. Figure 3 presents a comparison of Energeia's revised estimate of prudent costs, its August 2012 estimate and SPA's revised estimate based on KEMA's report.[3]

Figure 3 – Comparison of Mesh Solution Related Expenditure Estimates (2012-2015)

Energeia (August 2012)		
MeshSolution Expenditure (2011 $M Real)		**2012-2015**
Total CAPEX	**$**	**91.8**
AMI CAPEX	**$**	**84.3**
NICs	$	46.9
Antennas	$	2.3
Network + Backhaul	$	23.4
Risk Premium	$	-
Switching - NICs	$	6.1
Switching - Antennas	$	0.3
Switching - NIC Retrofit	$	5.4
Switching - Remediation	$	-
Switching - Inventory	$	-
IT CAPEX	**$**	**7.5**
NMS	$	3.7
MDMS	$	3.9
Risk Premium	$	-
Total OPEX	**$**	**31.9**
AMI OPEX	**$**	**18.0**
Backhaul Communications	$	12.6
Communications Operations	$	5.5
IT OPEX	**$**	**13.9**
NMS	$	6.5
MDMS	$	7.4
Switching - IT	$	-
Switching - PM and Metering	$	-

Energeia (January 2013)		
MeshSolution Expenditure (2011 $M Real)		**2012-2015**
Total CAPEX	**$**	**64.4**
AMI CAPEX	**$**	**56.8**
NICs	$	31.3
Antennas	$	1.9
Network + Backhaul	$	23.4
Risk Premium	$	-
Switching - NICs	$	-
Switching - Antennas	$	-
Switching - NIC Retrofit	$	-
Switching - Remediation	$	0.3
Switching - Inventory	$	-
IT CAPEX	**$**	**7.5**
NMS	$	3.7
MDMS	$	3.8
Risk Premium	$	-
Total OPEX	**$**	**25.2**
AMI OPEX	**$**	**11.5**
Backhaul Communications	$	5.9
Communications Operations	$	5.6
IT OPEX	**$**	**13.7**
NMS	$	6.3
MDMS	$	7.4
Switching - IT	$	-
Switching - PM and Metering	$	-

KEMA (September 2012)		
MeshSolution Expenditure (2011 $M Real)		**2012-2015**
Total CAPEX	**$**	**175.3**
AMI CAPEX	**$**	**155.3**
NICs	$	41.0
Antennas	$	9.0
Network + Backhaul	$	46.0
Risk Premium	$	6.8
Switching - NICs	$	26.9
Switching - Antennas	$	2.8
Switching - NIC Retrofit	$	22.5
Switching - Remediation	$	0.3
Switching - Inventory	$	-
IT CAPEX	**$**	**20.0**
NMS	$	12.9
MDMS	$	6.5
Risk Premium	$	0.7
Total OPEX	**$**	**65.7**
AMI OPEX	**$**	**12.9**
Backhaul Communications	$	7.0
Communications Operations	$	5.9
IT OPEX	**$**	**52.8**
NMS	$	39.7
MDMS	$	6.5
Switching - IT	$	1.2
Switching - PM and Metering	$	5.5

Notes: *KEMA's risk premium has been separately identified and their WiMax inventory adjustment included as a mesh switching cost.*

Source: KEMA, Energeia

The main changes to Energeia's 2012-2015 prudent cost estimate since our August 2012 report have been based on newly acquired information regarding SPA's contingency plans for switching to mesh[4], SPA's apparent NIC retrofitting costs and monthly volumes, NIC inventory, and the mesh antenna requirements and installation costs of comparable Victorian DNSPs. Together, these have triggered a change in our switching timeline and a $27.4 million decrease in our estimated capex over the period.

Energeia's revised prudent expenditure estimate is $111.0 million lower in capex and $40.5 million lower in opex than KEMA's equivalent calculations, which amounts to $151.5 million less overall. The wide variation between our 2012-2015 estimates is largely due to the same factors responsible for the variation in our 2011-2025 estimates.

[3] SPA did not provide a 2012-2015 mesh estimate so Energeia developed one based on KEMA's analysis.

[4] *Contingency Planning Paper*, [redacted] 24 September 2009.

Switching Costs

Energeia reassessed its estimate of switching costs as a result of new information related to SPA's contingency plans for switching to mesh, SPA's apparent NIC retrofit costs and monthly volumes, SPA's communications NIC installation practices, SPA's WiMax tower locations, and the mesh antenna requirements of comparable Victorian DNSPs.

Together, changes to our estimates of switching costs have increased our lifetime estimate by around $3.9 million, but have reduced our 2012-2015 estimate by $11.4 million, as shown in Figure 4. The main drivers of the increase are the inclusion of inventory costs and our acceptance of SPA's rollout profile. The discovery of SPA's apparent daily NIC retrofit installation rate and internal mesh switching contingency timeline are the key developments that now lead us to assume all NIC retrofits would have occurred in 2011 rather than 2012.

Figure 4 – Key Variations in Energeia's Revised Switching Cost Estimates

Lifetime Switching Cost Reconcilliation (January 2013)							
Mesh Switching Costs (Discounted 2011 $M Real)	2011-2025 Aug-12	2011-2025 Jan-13	2011-2025 Variation	2011-2025 KEMA	2011-2025 Jan-13	2011-2025 Variation
Total	**$ 15.2**	**$ 19.1**	**$ 3.9**	**$ 59.9**	**$ 19.1**	**-$ 40.8**
NICs	$ 5.6	$ 9.5	$ 3.9	$ 20.4	$ 9.5	-$ 10.9
Antennas	$ 0.4	$ 0.5	$ 0.1	$ 2.4	$ 0.5	-$ 2.0
Retrofits	$ 5.0	$ 1.3	-$ 3.7	$ 19.8	$ 1.3	-$ 18.5
Risk Premium	$ -	$ -	$ -	$ 2.3	$ -	-$ 2.3
Break and Remediation	$ 4.2	$ 3.7	-$ 0.5	$ 3.7	$ 3.7	$ 0.0
Inventory	$ -	$ 4.1	$ 4.1	$ 3.2	$ 4.1	$ 1.0
IT	$ -	$ -	$ -	$ 2.2	$ -	-$ 2.2
PM and Metering	$ -	$ -	$ -	$ 6.0	$ -	-$ 6.0

2012-2015 Switching Cost Reconcilliation (January 2013)							
Mesh Switching Costs (2011 $M Real)	2012-2015 Aug-12	2012-2015 Jan-13	2012-2015 Variation	2012-2015 KEMA	2012-2015 Jan-13	2012-2015 Variation
Total	**$ 11.7**	**$ 0.3**	**-$ 11.4**	**$ 65.9**	**$ 0.3**	**-$ 65.6**
NICs	$ 6.1	$ -	-$ 6.1	$ 26.9	$ -	-$ 26.9
Antennas	$ 0.3	$ -	-$ 0.3	$ 2.8	$ -	-$ 2.8
Retrofits	$ 5.4	$ -	-$ 5.4	$ 22.5	$ -	-$ 22.5
Risk Premium	$ -	$ -	$ -	$ 6.8	$ -	-$ 6.8
Break and Remediation	$ -	$ 0.3	$ 0.3	$ 0.3	$ 0.3	$ -
Inventory	$ -	$ -	$ -	$ -	$ -	$ -
IT	$ -	$ -	$ -	$ 1.2	$ -	-$ 1.2
PM and Metering	$ -	$ -	$ -	$ 5.5	$ -	-$ 5.5

Source: KEMA, Energeia

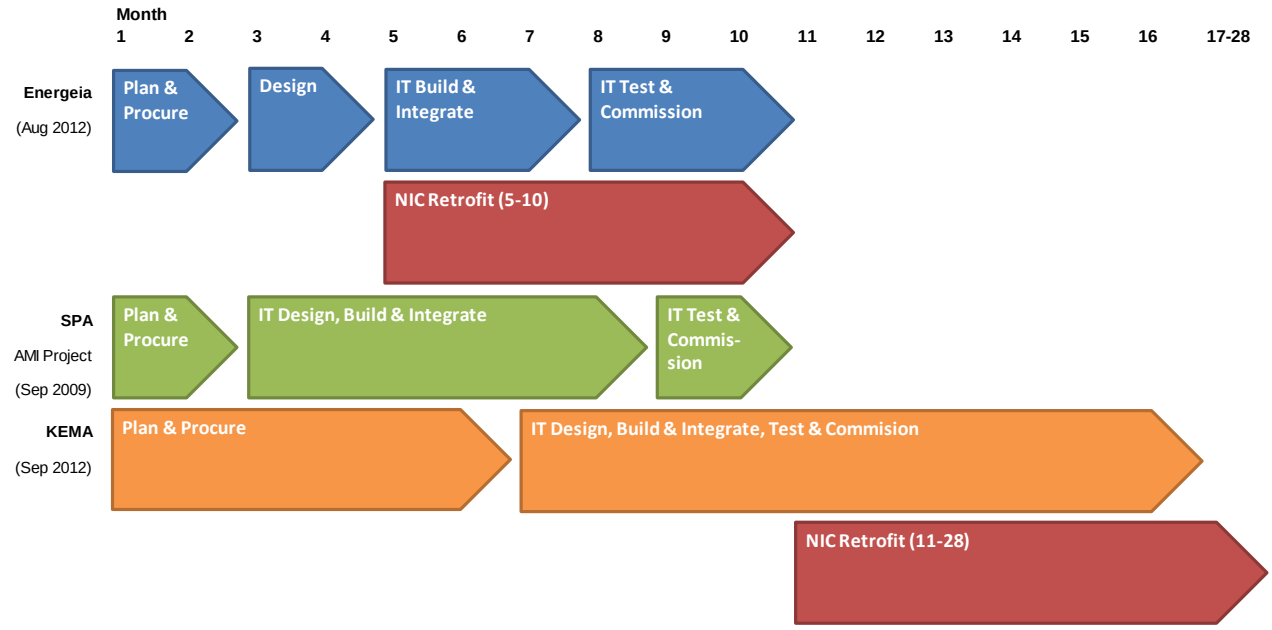
Inventory write-offs, the other significant changes to our lifetime switching cost estimate, is partially offset by a 72% reduction in the estimated price of a mesh NIC retrofit due to the discovery of new information regarding SPA's apparent WiMax NIC retrofit costs. Minor changes to antenna costs and network remediation costs are due to new Victorian DNSP sourced information regarding likely antenna requirements and pricing, and KEMA provided information regarding actual network remediation costs.

Energeia's revised lifetime switching cost estimate is $40.8 million lower than KEMA's.[5] Most of the variation between our estimates is driven by KEMA's assumed timeline and cost of NIC retrofits. Energeia's NIC retrofit costs are $18.5 million lower than KEMA's due mainly to 153,091 fewer assumed retrofits, and an 72% lower estimated cost per installation. Energeia's timeframe assumes that all mesh NICs are retrofitted in 2011 at a total cost of $11.3 million for NICs, antennas and retrofit costs in 2011 real terms.

[5] *SP AusNet, Assessment of AMI Communication Options,* DNV KEMA, 14 September 2012, page 41.

Energeia's timeline assumes mesh NICs are installed from July 2011, compared to KEMA's assumption of January 2012. Our timeframe reflects the approach shown in Figure 5, based on our view that a reasonable business would have directly negotiated with the only credible mesh supplier as part of the cost assessment process. While KEMA assumes a full competitive tender would be required, our view is consistent with SPA's own mesh switching plans at the time.[6]

Figure 5 – Energeia, SPA [redacted] and KEMA Mesh Switching Timelines



Source: SPA, KEMA, Energeia

Energeia's lower cost per mesh NIC retrofit is based on our analysis of SPA's apparent WiMax NIC retrofit costs. KEMA's estimate is nearly ten times higher based on their bottom-up estimate of the time required, which they view as requiring up to two and a half times more effort than a WiMax NIC retrofit. Energeia's review found KEMA had not substantiated the additional effort required for a mesh NIC, and our own investigation found the two types of retrofits to have a virtually identical cost profile.

KEMA's lifetime switching cost reflects a $15 million risk premium based on their application of the Black Scholes option pricing formula for equities to all mesh NIC, network and NMS related capex.[7] Energeia has rejected KEMA's estimate on the basis that KEMA's approach has not been adopted by any other utility in the world and does not account for the risk mitigation options adopted by the other Victorian DNSPs.

KEMA's lifetime switching costs include additional $6 million in project management and metering opex due to the 18 month extension of time they assume is required to convert them to mesh functionality relative to Energeia's timeline. Energeia's review of the time required to convert all WiMax meters to mesh found that this could be achieved by the end of 2011 based on the number of retrofits required and the number of retrofits SPA's service provider had completed in the past.[8]

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[6] *Contingency Planning Paper*, [redacted] 24 September 2009.

[7] Value based on a pro-rata application of the risk premium to the 2012-15 period expenditure.

[8] As reported in SPA's [redacted].

KEMA's lifetime switching costs include additional IT costs of $2.2 million. Energeia's review could not substantiate these costs, and our own estimates include integration costs as part of the NMS and Meter Data Management System (MDMS) implementation costs.

Although KEMA have not provided a specific estimate of switching costs over the 2012-2015 period, we have estimated them using KEMA provided values. Energeia note that the variation in our respective estimates of switching costs over the 2012-2015 period are due to the same drivers already explained above.

2011 Budget Impacts

Energeia assessed the budget impact of its switching timeline to determine whether there would be any negative financial consequences in the 2009-2011 budget period, and how that might affect a reasonable commercial business in the circumstances.[9] This involved comparing SPA's approved 2011 WiMax budget against our estimate of a 2011 mesh budget including switching costs for the relevant cost categories.

Figure 6 – Switching Impact Assessment (2011)

2011 Switching Cost Reconcilliation			
Mesh Switching Option vs WiMax (2011 $M Real)	**2011 Mesh**	**2011 WiMax**	**Variation**
Total CAPEX	**$ 44.2**	**$ 54.3**	**-$ 10.1**
AMI CAPEX	**$ 42.4**	**$ 47.9**	**-$ 5.5**
NICs	$ [redacted]	$ [redacted]	-$ 14.9
Antennas	$ [redacted]	$ [redacted]	-$ 4.7
Network + Backhaul	$ [redacted]	$ [redacted]	-$ 4.6
Switching - NICs	$ [redacted]	$ -	$ -
Switching - Antennas	$ [redacted]	$ -	$ -
Switching - NIC Retrofit	$ [redacted]	$ [redacted]	$ 1.2
Break + Remediation	$ [redacted]	$ -	$ 3.4
Inventory	$ [redacted]	$ -	$ 4.1
IT CAPEX	**$ 1.7**	**$ 6.4**	**-$ 4.7**
NMS	$ [redacted]	$ [redacted]	-$ 0.8
MDMS	$ [redacted]	$ [redacted]	-$ 3.9
Total OPEX	**$ 4.1**	**$ 6.4**	**-$ 2.3**
AMI OPEX	**$ 1.6**	**$ 0.7**	**$ 0.9**
Backhaul Communications	$ [redacted]	$ -	$ 0.3
Communications Operations	$ [redacted]	$ [redacted]	$ 0.6
IT OPEX	**$ 2.5**	**$ 5.7**	**-$ 3.2**
NMS	$ [redacted]	$ [redacted]	-$ 3.2
MDMS	$ [redacted]	$ [redacted]	$ 0.0
Total Expenditure	**$ 48.2**	**$ 60.6**	**-$ 12.4**

Note: *Antenna capex estimated from meter volumes.*

Source: Energeia, SPA

As presented in Figure 6, our analysis shows that our assumed mesh switching timeline to achieve the 31 December 2011 target would have resulted in SPA saving $12.4 million in expenditure relative to staying with WiMax. In other words, the significantly lower cost of the mesh solution deployment costs more than offset the switching costs involved in 2011.

Energeia therefore concludes that there is no financial basis for a reasonable commercial business in the circumstances to have delayed switching costs to 2012 to avoid over-expenditure in 2011 relative to the approved budget. Even in the case of over expenditure, Clause 5F of the revised OIC in force at the time of the decision would have allowed SPA to have submitted a revised budget application for the difference.

[9] This analysis is consistent with SPA's qualitative assessment framework.

Table of Contents

2 Disclaimer

While all due care has been taken in the preparation of this report, in reaching its conclusions Energeia has relied upon information and guidance from the AER, information provided by Victorian DNSPs and publically available information. To the extent these reliances have been made, Energeia does not guarantee nor warrant the accuracy of this report. Furthermore, neither Energeia nor its Directors or employees will accept liability for any losses related to this report arising from these reliances. While this report may be made available to the public, no third party should use or rely on the report for any purpose.

For further information, please contact:

Energeia Pty Ltd
L20 Tower 2
201 Sussex St
Sydney NSW 2000
T: +61 (0)2 9006 1550 F: +61 (0)2 9006 1000
E: info@energeia.com.au W: www.energeia.com.au

3 Practice Note CM7 Declaration

Energeia has been provided with a copy of the Practice Note CM 7: Expert Witnesses in Proceedings in the Federal Court of Australia Federal Court Guideline issued by PA Keane, Chief Justice on 1st August 2011. The authors of this report have read, understood and complied with the Expert Witness Guidelines.

Energeia has made all the inquiries that we believe are desirable and appropriate and no matters of significance that Energeia regard as relevant have, to Energeia's knowledge, been withheld from the report.

Signature

29 / 01/ 2013
Date

4 Background

The Victorian Government announced the rollout of AMI for all customers consuming less than 160MWh per annum in 2006. The Government subsequently decided that electricity distributors would be given an exclusive mandate to roll out the meters.

The regulatory arrangements relating to the rollout are set out in an August 2007 OIC made under sections 15A and 46D of the Electricity Industry Act 2000, and an amending order made on 25 November 2008 (revised OIC). The revised OIC sets out the regulator's role and is the primary regulatory instrument which guides the determination of revenue and prices for metering services.

The AER made a Final Determination on the DNSPs' AMI 2012-2015 budgets on 31 October 2011 under the revised OIC, which SPA appealed on 30 November 2011 to the Tribunal pursuant to Section 29(2) of the National Electricity (Victoria) Act 2005 (Vic).

In its decision issued on 26 April 2012, the Tribunal ordered that the AER's Final Determination of SPA's 2012-2015 budget be set aside to allow it to be revised to reflect the agreed changes to foreign exchange costs, reconsideration of the meter supply expenditure, and the agreed changes to the labour costs.

In its reasons for decision, the Tribunal decided that the AER had made a material error of fact in determining $72.2 million of SPA's proposed WiMax expenditure was not prudent without first determining the level of prudent expenditure under the revised OIC.[10] Key issues that would need to be addressed as part of the determination of prudent costs included (among other things) the cost of switching, including those due to any delays involved.

The AER engaged Energeia in June 2012 to advise on the prudency of SPA's proposed expenditure on its WiMax based telecommunications solution as part of its AMI solution required under the revised OIC.

Specifically, the AER sought expert advice regarding whether SPA's proposal to incur WiMax related expenditure over the 2012-2015 budget period represented a substantial departure from the commercial standard that a reasonable business would exercise in the circumstances.

Energeia provided its advice to the AER on 9 August 2012 in its report entitled *Review of SP AusNet's WiMax Related Expenditure*. In its advice, Energeia found the prudent level of expenditure over the 2012-15 period to be $137.8 million in capex and $85.5 million in opex, based on Energeia's estimate of the reasonable cost of switching to a mesh based telecommunications solution from 28 February 2011.

The AER issued its preliminary view on the matters referred to it by the Tribunal in August 2012, which allowed $11.7 million of SPA's claimed $107.2 million in switching costs. SPA provided its submission in response to the AER's preliminary view on 14 September 2012, which referenced a newly commissioned cost-benefit assessment of WiMax vs. mesh and associated estimate of prudent 2012-15 expenditure.

SPA's consultant's report concluded that WiMax would have been $8.2 million less than mesh over a 15 year time horizon, which included switching costs of $56.8 million in present value terms. Altogether, the consultant found switching to mesh from 28 February 2011 would have resulted in a loss of $48.6 million in present value terms compared to continuing with SPA's WiMax based approach.

The AER engaged Energeia in October 2012 to review the information provided by SPA in its response to the AER's preliminary view, and to provide an update regarding our estimate of prudent expenditure over the 2012-15 period under the OIC.

The results of our review and updated advice to the AER are contained in this report.

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[10] Appeal by SPI Electricity Pty Ltd [2012] AComT 11, page 30.

5 Scope and Approach

This report responds to the AER's request for advice regarding the level of prudent telecommunications expenditure by SPA over the 2012-15 period under the revised OIC in light of new information provided since our August 2012 report was issued, such as:

- SP AusNet's submission in response (Response) to the AER's Preliminary View on Amendments pursuant to the Australian Competition Tribunal's Orders (Preliminary View); and
- SP AusNet's responses to questions posed by the AER between the issuing of its Preliminary View and its Revised Final Determination.

Our approach to focusing our efforts, benchmarking and determining switching costs is outlined in the following sections.

5.1 Consideration of New Information

Although Energeia reviewed all materials received, we focused our attention on new information we considered to have the most impact based on the following criteria:

- **Materiality** – The materiality of information was assessed based on its potential dollar value impact on our estimate of the level of prudent expenditure over the 2012-15 period.
- **Relevance** – The relevance of information was assessed in terms of whether and how it related to the facts or reasoning Energeia relied upon in reaching its conclusions.
- **Reliability** – The reliability of information was assessed in terms of whether it could be independently verified, and the overall level of substantiation.

Where this material provided us with cause to change our views regarding SPA's prudent telecommunications expenditure over the 2012-2015 period, we have done so.

5.2 Use of Benchmarks

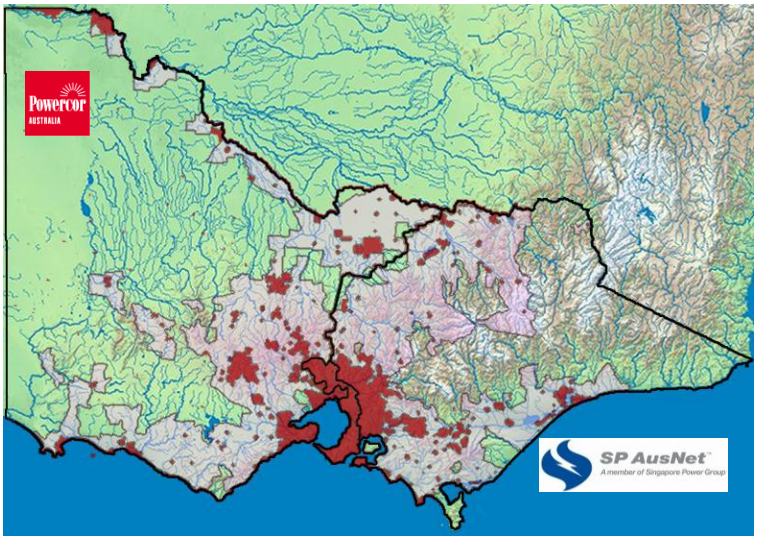
In developing our estimates of prudent expenditure, Energeia has relied upon benchmarking as a valid approach to estimating reasonable costs. Our view is that the validity of a given benchmark is a function of its relevance and robustness. When assessing the validity of a benchmark, Energeia therefore considers the relevance of the specific benchmark to the targeted estimate, and the robustness of the benchmark itself.

For example, our estimate of reasonable NMS capex costs is based on the benchmark of Jemena's IT costs, which we view as being highly relevant due to the common performance requirements and shared service provider. Our view is that Jemena's estimate is relatively robust due to the rigorous estimation process involved in the lead-up to the AMI budget submissions, and the significant resources expended to develop accurate estimates. Theirs is not a top-down, back-of-the-envelope or rule-of-thumb estimate.

Powercor is used as a cost benchmark for SPA in a number of estimates including external mesh antennas volumes and the ratio of network access points to meters. In both cases, the key issue relevant to the benchmark is whether the cost drivers are similar between the two networks. Our investigation of the key cost drivers found that they included customer density, radio frequency, clutter such as buildings, forest and mountains, and the use of metal meter boxes. Figure 7 illustrates the relative densities and elevation between the two networks and shows that only a small fraction of SPA's customers live in the relatively mountainous area.[11]

[11] Dark and light red shading indicate >10 or 1-10 customers per square kilometre, respectively.

Figure 7 – Powercor and SPA Customer Densities and Landmass Topographies



Source: Geoscience Australia and ABS Census (2001)

While most of our benchmarks are based on the costs incurred by other Victorian DNSP's, some also include benchmarks from North American utilities where our review has found these to be valid. In these cases, relevance has been defined with respect to the estimate involved, e.g. the relative performance of various mesh vendors' technology in terms of access points per meter, or the time required to switch over to mesh from an alternative technology in the case of Pacific Gas and Electric Company (PG&E).

KEMA and SPA both use benchmarking to estimate various costs where a direct estimate has not been developed, for example through a procurement process. Energeia's review of the validity of these benchmarks has been hampered by a lack of transparency in the sources of the benchmarks themselves.

KEMA's benchmarks are for the most part based on North American experience, which account for most of their referenced sites.[12] They have provided the deployments in the aggregate but have refused to provide specific information which would have allowed Energeia to assess each of their benchmarks on their own specific merits. Unfortunately, without the knowledge of the specific sources being used, Energeia cannot readily assess the validity of a given benchmark based estimate.

Examples of significant differences existing between KEMA's referenced North American and other international AMI deployments and SPA's circumstances requiring careful consideration include:

- Interval data periods in North America for mass market customers range from 15 minutes in Texas to 60 minutes in California, which represent a 50%-200% range relative to SPA's circumstance.
- Many of the utilities in North America referenced by KEMA are vertically integrated, which may increase or decrease their costs relative to SPA, depending on the specific circumstances.
- The size of North American utilities referenced by KEMA range from 87,000[13] to over 9.4 million[14], and would therefore experience significantly different economies of scale relative to SPA.

[12] *SP AusNet, Assessment of AMI Communication Options,* DNV KEMA, 14 September 2012, pages 9-10.

[13] *City of Glendale Water and Power AMI Smart Grid Initiative*, US Department of Energy, 14 June 2012, page 1.

- Not all of KEMA referenced projects had been completed by 28 February 2011, and it is therefore important to be able to assess whether the specific information could have been known at the time.[15]

In such cases, Energeia has striven to identify an alternative benchmark from publically available sources, or private sources provided to SPA under confidentiality. Where our transparently sourced and developed benchmark differs from the estimate KEMA has provided on the basis of an unspecified benchmark, we have in most cases adopted the former due to our relatively greater confidence in its relevance and robustness.

SPA provided a report by spatial information technology consultants we-do-IT that provided a comparative analysis of the variation in terrain roughness between Powercor and SPA.[16] The authors of the report conclude that the report demonstrates that SPA has:

- Three times more properties in a "rugged" or "highly rugged" environment
- Twice the number of properties in "difficult" serviceability areas

Energeia were not provided with the underlying dataset, but undertook a high level review of the report's stated analytical approach, assumptions, inputs and results. Our review found that the definition of terrain, property density and serviceability categories, and their relationship with communications network cost drivers to be unsubstantiated. The relevance of these metrics for the purpose of communications network cost benchmarking could therefore not be established.

Figure 8 – Comparison of Powercor and SPA "Serviceability"

	SP AUSNET								POWERCOR							
	Property Density (sq Km^2)								Property Density (sq Km^2)							
Terrain Roughness	1 - 5	6 - 10	11 - 50	51 - 100	100 - 500	> 500	Total	%	1 - 5	6 - 10	11 - 50	51 - 100	100 - 500	> 500	Total	%
Flat	15161	5177	10863	7853	41783	126646	207483	26.7	57294	13251	38611	15504	99289	240223	464172	54.1
Slightly rugged	20822	10432	28288	19278	111584	260560	450964	57.9	30246	12040	34260	17764	89785	167113	351208	40.9
Rugged	18001	6855	12693	6724	35459	18474	98206	12.6	7028	2994	4927	3563	10324	8790	37626	4.4
Highly Rugged	6769	1708	3052	2083	5949	2079	21640	2.8	1291	400	898	322	2112	0	5023	0.6
Total	60753	24172	54896	35938	194775	407759	778293		95859	28685	78696	37153	201510	416126	858029	
%	7.8	3.1	7.1	4.6	25.0	52.4			11.2	3.3	9.2	4.3	23.5	48.5		

Source: we-do-IT

The reported results are shown in Figure 8. Energeia's review concluded that the comparison was fundamentally flawed due to an arbitrarily weighted, incomplete assessment of two key network cost drivers. For example, customer density is a critical network cost driver, which affects PowerCor more, yet it was not given the same weight as ruggedness. Other key clutter factors, e.g. buildings, were excluded from the analysis despite playing a key role in KEMA's mesh design costing model for urban networks.

[14] http://www.silverspringnet.com/newsevents/pr-pge-072908.html#.ULGq8IcsnZF, last accessed 25 November 2012.

[15] *SP AusNet, Assessment of AMI Communication Options,* DNV KEMA, 14 September 2012, page 10.

[16] SP AusNet, PowerCor Region Terrain Comparison Report, Project Report, we-do-IT, 16 January 2013

6 Outcomes

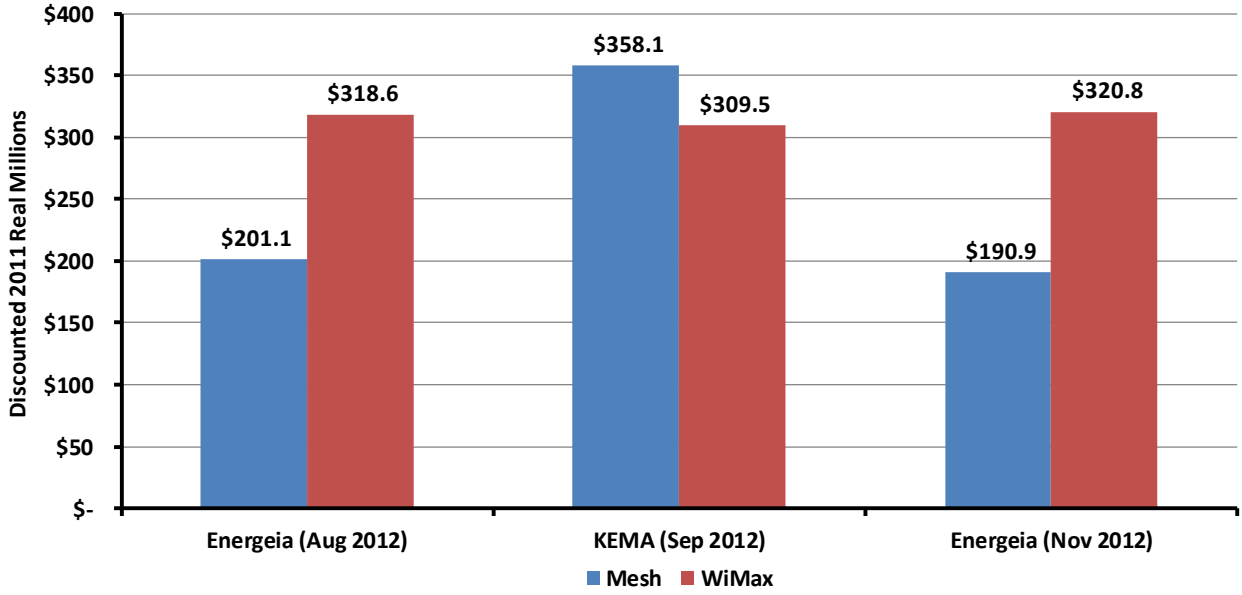
6.1 Commercial Standard

In our August 2012 report, Energeia assessed the costs and benefits (the business case) for SPA to switch to mesh as at 28 February 2011 over a fifteen year timeframe as the appropriate commercial standard a reasonable business would apply in the circumstances as required under the OIC. We found that switching to mesh would save SPA and its customers $117.5 million in discounted 2011 dollars (PV).[17]

Our review of the qualitative factors that a reasonable business in the circumstances would consider found them to be consistent with and reinforcing of our quantitative assessment.

Following the AER's release of its Preliminary View in August 2012, SPA produced a Response submission on 14 September, which contained a new analysis by KEMA of the costs and benefits of SPA switching to mesh as at 28 February 2011 over a 15 year timeframe.[18,19] KEMA's modelling found switching to mesh would increase lifetime costs by $48.6 million, driven by $58.6 million in estimated switching costs.

Figure 9 – Comparison of WiMax and Mesh Solution Lifetime Cost Estimates (2011-2025)



Source: KEMA, Energeia

[17] All values in this section are in discounted 2011 real dollars unless otherwise stated.

[18] *Preliminary View, Advanced metering infrastructure review, SPI Electricity Pty Ltd, 2012–15 budget and charges applications, Amendments pursuant to the Australian Competition Tribunal's Orders,* Australian Energy Regulator, August 2012.

[19] *Advanced Metering Infrastructure, 2012-15 Budget and Charges Application, SP AusNet's Submission in response to AER's Preliminary View on Amendments pursuant to the Australian Competition Tribunal's Orders*, SP AusNet, 14 September 2012.

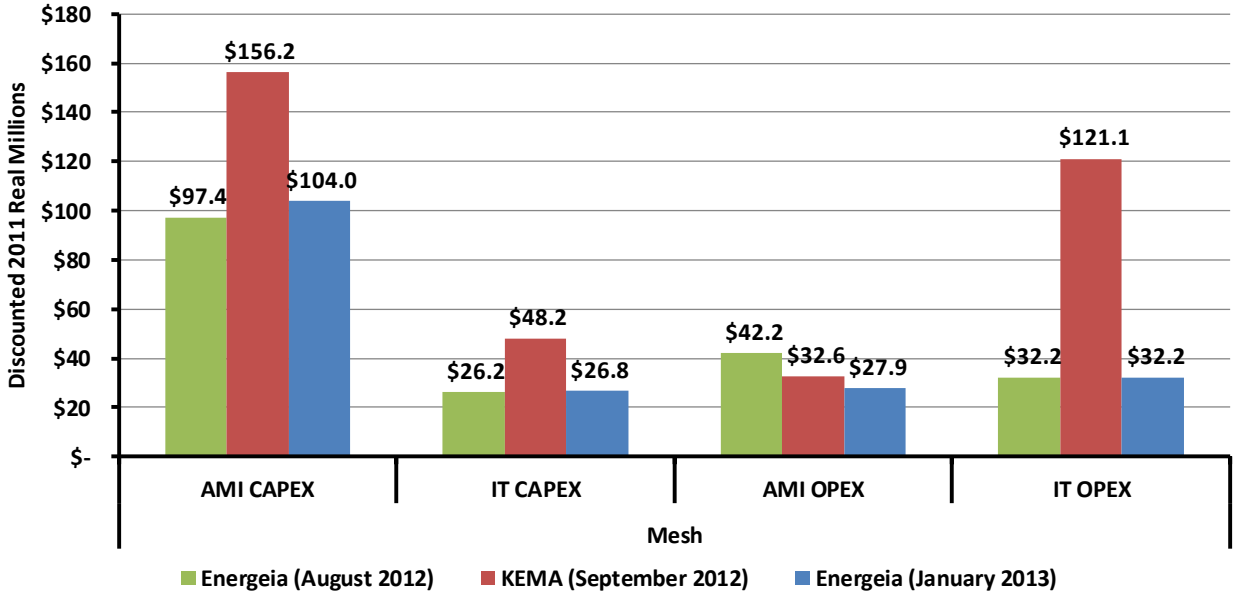
Energeia reconsidered its August 2012 quantitative assessment in light of:

- the new information contained in SPA's Response submission;
- the answers SPA provided in response to questions from Energeia and the AER; and
- our own investigation of the issues.

Based on the outcomes of this process, Energeia has revised its view of the commercial case for SPA to have switched to a mesh telecommunications solution as at 28 February 2011. As shown in Figure 9, our updated analysis continues to show a strong quantitative and qualitative rationale for a reasonable commercial business to have switched to mesh in the circumstances.

Our estimate of the lifetime cost of a mesh solution has fallen from $201.1 to $190.9 million, while our estimate of the lifetime costs of staying with WiMax has increased, rising from $318.6 to $320.8 million. This widens our overall estimate of the savings SPA could have realised if it had switched to mesh from 28 February 2011 from $117.5 to $129.9 million in discounted present value terms.

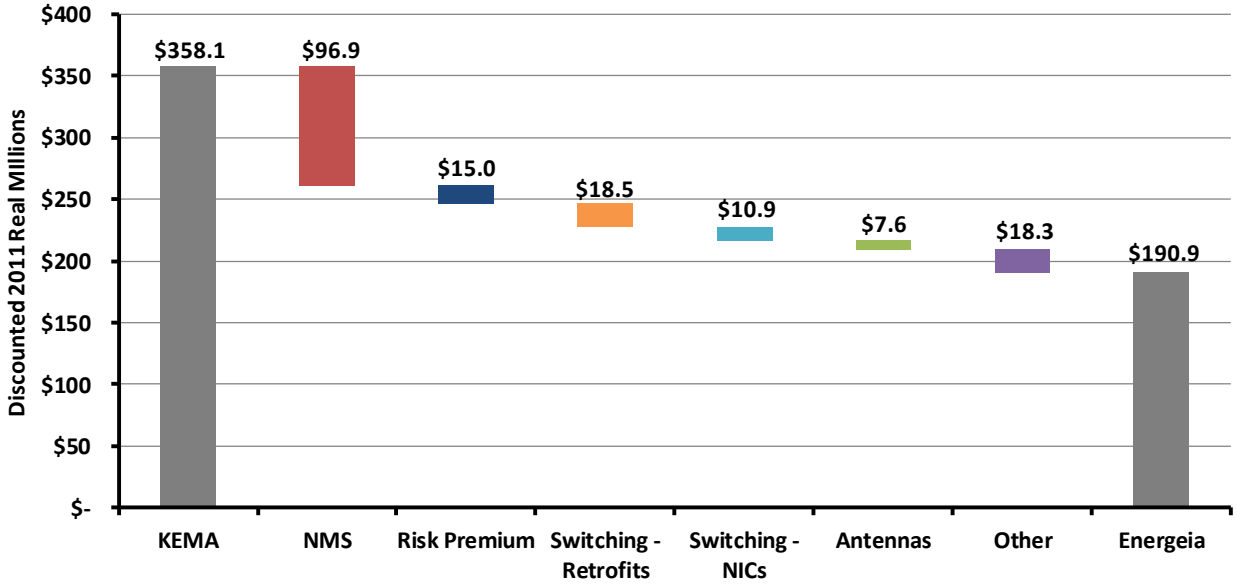
Figure 10 – Comparison of Mesh Network Solution Lifetime Cost Estimates by Component (2011-2025)



Source: KEMA, Energeia

Although Energeia and KEMA are $178.5 million apart in our quantitative assessments, $167.2 million of this variation is due to differences in our respective estimates of mesh solution costs. As shown in Figure 10, most of the difference in KEMA's mesh estimate is in IT opex, which is $88.9 million above Energeia's, followed by AMI capex and IT capex at $52.2 million and $21.4 million higher, respectively. KEMA's AMI opex is $4.7 million higher than Energeia's own estimate.

Figure 11 – Key Variations in KEMA's Lifetime Mesh Cost Estimate Relative to Energeia's (2011-2025)



Source: KEMA, Energeia

Energeia's review of KEMA's mesh estimate found that $148.9 million or 89% of the variation is being driven by a few key assumptions regarding Network Management System (NMS) costs, procurement practices, antenna requirements, mesh Network Interface Card (NIC) retrofit costs and the pricing of risk, the discreet impacts of which are quantified in Figure 10 and summarised below:

- **NMS Costs** – KEMA uses a meter number driven pricing model to estimate NMS costs. Energeia's review found KEMA's estimates to be materially higher than benchmarks established by CitiPower, Powercor and Jemena. For example, KEMA estimates NMS support labour opex to be $14.3M in 2014, implying a headcount of approximately 100 personnel, which is significantly higher than the 5 estimated by CitiPower and Powercor.[20] KEMA provide no specific evidence supporting its approach.

  Energeia has therefore concluded that incurring KEMA's $96.2 million higher capex and opex would represent a substantial departure from the commercial standard as established by the rest of the Victorian DNSPs. Accordingly, we have instead kept the approach originally adopted by SPA based on Jemena's NMS costs, as they share a common IT service provider.[21]

- **Risk Premium** – KEMA applies a $15 million risk premium to the mesh but not the WiMax solution using a Black Scholes formula applied to what they view as comparable equities. Energeia's review found KEMA's approach ignores the significant risks related to one of its key solution vendors and represents a substantial departure from the commercial standard established in Victoria.

  Energeia's view is that the appropriate commercial standard would consider only the cost of residual risk following a risk review and implementation of the most appropriate risk mitigation strategies. No other business priced in a higher risk premium for mesh, and in our view the residual risk of the WiMax solution would be relatively greater for SPA due its higher likelihood of occurrence.

[20] Based on an independent labour rate analysis of average MDM IT labour rates and AMI Comms Control headcount by Deloitte for Citipower / Powercor titled – "Cost Model for AER determination response"

[21] www.eb-services.com.au, last accessed 16 November 2012

- **NIC Retrofitting / Replacement** – KEMA assumes installing a mesh NIC will take 45-75 minutes or 1.5-2.5 times longer than retrofitting a WiMax NIC, based on its largely overseas experience and review of SPA procedures. KEMA assumes NIC commissioning alone takes 15 minutes, compared to SPA's own procedure, which says NIC commissioning should take less than 60 seconds.[22] They further assume a WiMax NIC retrofit costs $[redacted] per site based on SPA's claimed actual costs.

  Energeia's review has found the only material difference between retrofitting a WiMax NIC and replacing a mesh NIC to be changing out the antenna in the 10% of mesh sites that require one. Our review has found that the time required to detach the antenna and replace the cable is likely to be offset by the earthing, access hole and cable fasteners already being in place. For the 90% of mesh sites that do not require an antenna, we estimate this will save at least 4 minutes in avoided antenna installation time on average relative to WiMax.

  SPA have not substantiated their historical NIC retrofit costs, and newly acquired contract information appears to show costs being around $[redacted] per installation.[23] Energeia have therefore assumed $[redacted] per mesh NIC retrofit due to the lack of credible alternatives.

- **Procurement** – According to KEMA, a full, five month procurement exercise would be appropriate to ensure competitive pricing and OIC compliance. However, Energeia's review found this approach contradicts SPA's proposed mesh switching contingency plan [redacted] which assumed direct negotiation with Silver Springs Networks.

  Energeia also notes that:

  - a six month procurement would needlessly increase deployment costs by $12.8 million in the absence of a credible mesh networking competitor.[24,25]; and
  - SPA has an established internal process for not undertaking a tender based procurement process known as a 'Waiver of Competition'.[26]

  Energeia's view that the commercial standard where competition is limited and significant time pressure exists is consistent with the approach and timeframes assumed by SPA's mesh switching contingency plan [redacted]

  We have therefore concluded that incurring the costs associated with KEMA's approach would represent a substantial departure from the commercial standard, and have maintained our original position of a negotiated contract commencing at the time of the re-assessment.

- **Antennas** – KEMA's antenna estimate is based on the assumption that all meters in metal meter boxes will require an antenna, and that 70% of SPA's meters are in metal meter boxes.[27] Energeia's review of KEMA's estimate found each of the following key assumptions were unsubstantiated:

  - every metal meter box will require an antenna;

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[22] *Manage Meter Comms Failures in Field, Work Instructions Report (Draft)*, SPA, 15 July 2010, page 22.

[23] [redacted], SPA, 3 May 2010.

[24] [redacted] *Contingency Planning Paper*, SPA, 24 September 2009.

[25] Estimate includes NIC retrofit capex and IT, project management and meter reading opex.

[26] [redacted] SPA, 3 May 2010, page 6.

[27] *SP AusNet, Assessment of AMI Communication Options,* 14 September 2012, KEMA, page 42.

- 70% estimate is based on a valid statistical sampling technique; and
- SPA's use of metal meter boxes is materially different to other Victorian DNSPs.

Energeia's review of the other Victorian DNSPs found that none assumed more than 10% of antennas for their mesh deployments as at 28 February 2011.[28] We understand that the other DNSPs were not assuming an antenna on a large proportion of their metal meter box installations.

Energeia have therefore concluded that KEMA's higher costs due to a higher assumed proportion of external antennas is unlikely to be incurred. We have revised our position down to 10% based on the highest of the industry benchmarks available at the time of the review.

Based on our revised analysis summarised in this section and detailed in Sections 6.3 and 6.4, Energeia's revised view is that the lifetime costs of switching to a mesh communications solution represents the commercial standard against which SPA's submitted costs for 2012-15 should be assessed under the revised OIC.

6.2 Prudent Costs

The AER is required to approve SPA's budget under Clause 5C.2 of the revised OIC unless it establishes that the costs are outside of scope or not prudent. Costs are deemed to be prudent under Clause 5C.3 of the revised OIC unless the AER establishes that:

- they have not been competitively tendered; or
- are unlikely to be incurred; or
- incurring them represents a substantial departure from the commercial standard that a reasonable business would exercise in the circumstances.

Based on our analysis demonstrating that switching to a mesh solution would save SPA's customers over $129.9 million relative to pursuing its WiMax strategy, Energeia has found that:

- mesh communications solution costs represents the commercial standard a reasonable business would exercise in the circumstances due to its substantially lower cost and risk profile; and
- incurring SPA's proposed WiMax related expenditure represents a substantial departure from the commercial standard, giving weight to the fundamental matters referenced in 5I.8 of the revised OIC.

Importantly, Energeia's analysis of the commercial standard includes the costs of switching, which would be a fundamental matter to be considered under Clause 5I.8.

Under Clause 5C.8, where the AER rejects the proposed budget and determines the approved budget, it must not remove more than the expenditure it has established under Clause 5C.2 as being not prudent.

In our August 2012 report, Energeia calculated the prudent costs for the 2012-2015 period under the revised OIC as being $123.6 million in capex and $74.4 million in opex based on the commercial standard represented by the mesh solution cost profile.[29]

Energeia has reconsidered its estimate of prudent costs over the 2012-2015 period given revisions to our estimate of lifetime mesh solution costs, including switching costs. Figure 12 presents a comparison of

[28] *Powercor Meter & Comms Capex.xls, Powercor, 26 August 2011, Contract Unit Costs tab.*

[29] All values in this section are in 2011 real dollars unless otherwise stated.

Energeia's revised estimate of prudent costs, its August 2012 estimate and SPA's revised estimate based on KEMA's report.[30]

Figure 12 – Comparison of Mesh Solution Related Expenditure Estimates (2012-2015)

Energeia (August 2012)		
MeshSolution Expenditure (2011 $M Real)		**2012-2015**
Total CAPEX	**$**	**91.8**
AMI CAPEX	**$**	**84.3**
NICs	$	46.9
Antennas	$	2.3
Network + Backhaul	$	23.4
Risk Premium	$	-
Switching - NICs	$	6.1
Switching - Antennas	$	0.3
Switching - NIC Retrofit	$	5.4
Switching - Remediation	$	-
Switching - Inventory	$	-
IT CAPEX	**$**	**7.5**
NMS	$	3.7
MDMS	$	3.9
Risk Premium	$	-
Total OPEX	**$**	**31.9**
AMI OPEX	**$**	**18.0**
Backhaul Communications	$	12.6
Communications Operations	$	5.5
IT OPEX	**$**	**13.9**
NMS	$	6.5
MDMS	$	7.4
Switching - IT	$	-
Switching - PM and Metering	$	-

Energeia (January 2013)		
MeshSolution Expenditure (2011 $M Real)		**2012-2015**
Total CAPEX	**$**	**64.4**
AMI CAPEX	**$**	**56.8**
NICs	$	31.3
Antennas	$	1.9
Network + Backhaul	$	23.4
Risk Premium	$	-
Switching - NICs	$	-
Switching - Antennas	$	-
Switching - NIC Retrofit	$	-
Switching - Remediation	$	0.3
Switching - Inventory	$	-
IT CAPEX	**$**	**7.5**
NMS	$	3.7
MDMS	$	3.8
Risk Premium	$	-
Total OPEX	**$**	**25.2**
AMI OPEX	**$**	**11.5**
Backhaul Communications	$	5.9
Communications Operations	$	5.6
IT OPEX	**$**	**13.7**
NMS	$	6.3
MDMS	$	7.4
Switching - IT	$	-
Switching - PM and Metering	$	-

KEMA (September 2012)		
MeshSolution Expenditure (2011 $M Real)		**2012-2015**
Total CAPEX	**$**	**175.3**
AMI CAPEX	**$**	**155.3**
NICs	$	41.0
Antennas	$	9.0
Network + Backhaul	$	46.0
Risk Premium	$	6.8
Switching - NICs	$	26.9
Switching - Antennas	$	2.8
Switching - NIC Retrofit	$	22.5
Switching - Remediation	$	0.3
Switching - Inventory	$	-
IT CAPEX	**$**	**20.0**
NMS	$	12.9
MDMS	$	6.5
Risk Premium	$	0.7
Total OPEX	**$**	**65.7**
AMI OPEX	**$**	**12.9**
Backhaul Communications	$	7.0
Communications Operations	$	5.9
IT OPEX	**$**	**52.8**
NMS	$	39.7
MDMS	$	6.5
Switching - IT	$	1.2
Switching - PM and Metering	$	5.5

Notes: *KEMA's risk premium has been separately identified and their WiMax inventory adjustment included as a mesh switching cost.*

Source: KEMA, Energeia

The main changes to Energeia's 2012-2015 prudent cost estimate since our August 2012 report have been based on newly acquired information regarding SPA's contingency plans for switching to mesh[31], SPA's apparent NIC retrofitting costs and monthly volumes, NIC inventory and the antenna requirements of comparable Victorian DNSPs. Together, these have triggered a change in our switching timeline and a $27.4 million decrease in our estimated capex over the period.

Energeia's revised prudent expenditure estimate is $111.0 million lower in capex and $40.5 million lower in opex than KEMA's equivalent calculations, which amounts to $151.5 million less overall. The wide variation between our 2012-2015 estimates is largely due to the same factors responsible for the variation in our 2011-2025 estimates.

6.2.1 Switching Costs

Energeia reassessed its estimate of switching costs as a result of new information related to SPA's contingency plans for switching to mesh, SPA's apparent NIC retrofit costs and monthly volumes, SPA's communications NIC installation practices, SPA's WiMax tower locations, and the mesh antenna requirements of comparable Victorian DNSPs.

[30] SPA did not provide a 2012-2015 mesh estimate so Energeia developed one based on KEMA's analysis.

[31] *Contingency Planning Paper*, SPA [redacted] 24 September 2009.

Together, changes to our estimates of switching costs have increased our lifetime estimate by around $3.9 million, but have reduced our 2012-2015 estimate by $11.4 million, as shown in Figure 12. The main drivers of the increase are the inclusion of inventory costs and our acceptance of SPA's rollout profile. The discovery of SPA's apparent daily NIC retrofit installation rate and internal mesh switching contingency timeline are the key developments that now lead us to assume all NIC retrofits would have occurred in 2011 rather than 2012.

Figure 13 – Key Variations in Energeia's Revised Switching Cost Estimates

Lifetime Switching Cost Reconcilliation (January 2013)						
Mesh Switching Costs (Discounted 2011 $M Real)	2011-2025			2011-2025		
	Aug-12	Jan-13	Variation	KEMA	Jan-13	Variation
Total	**$ 15.2**	**$ 19.1**	**$ 3.9**	**$ 59.9**	**$ 19.1**	**-$ 40.8**
NICs	$ 5.6	$ 9.5	$ 3.9	$ 20.4	$ 9.5	-$ 10.9
Antennas	$ 0.4	$ 0.5	$ 0.1	$ 2.4	$ 0.5	-$ 2.0
Retrofits	$ 5.0	$ 1.3	-$ 3.7	$ 19.8	$ 1.3	-$ 18.5
Risk Premium	$ -	$ -	$ -	$ 2.3	$ -	-$ 2.3
Break and Remediation	$ 4.2	$ 3.7	-$ 0.5	$ 3.7	$ 3.7	$ 0.0
Inventory	$ -	$ 4.1	$ 4.1	$ 3.2	$ 4.1	$ 1.0
IT	$ -	$ -	$ -	$ 2.2	$ -	-$ 2.2
PM and Metering	$ -	$ -	$ -	$ 6.0	$ -	-$ 6.0

2012-2015 Switching Cost Reconcilliation (January 2013)						
Mesh Switching Costs (2011 $M Real)	2012-2015			2012-2015		
	Aug-12	Jan-13	Variation	KEMA	Jan-13	Variation
Total	**$ 11.7**	**$ 0.3**	**-$ 11.4**	**$ 65.9**	**$ 0.3**	**-$ 65.6**
NICs	$ 6.1	$ -	-$ 6.1	$ 26.9	$ -	-$ 26.9
Antennas	$ 0.3	$ -	-$ 0.3	$ 2.8	$ -	-$ 2.8
Retrofits	$ 5.4	$ -	-$ 5.4	$ 22.5	$ -	-$ 22.5
Risk Premium	$ -	$ -	$ -	$ 6.8	$ -	-$ 6.8
Break and Remediation	$ -	$ 0.3	$ 0.3	$ 0.3	$ 0.3	$ -
Inventory	$ -	$ -	$ -	$ -	$ -	$ -
IT	$ -	$ -	$ -	$ 1.2	$ -	-$ 1.2
PM and Metering	$ -	$ -	$ -	$ 5.5	$ -	-$ 5.5

Source: KEMA, Energeia

Inventory write-offs, the other significant changes to our lifetime switching cost estimate, is offset by a 72% reduction in the estimated price of a mesh NIC retrofit due to the discovery of new information regarding SPA's apparent WiMax NIC retrofit costs. Minor changes to antenna costs and network remediation costs are due to new Victorian DNSP sourced information regarding likely antenna requirements and pricing, and KEMA provided information regarding actual network remediation costs.

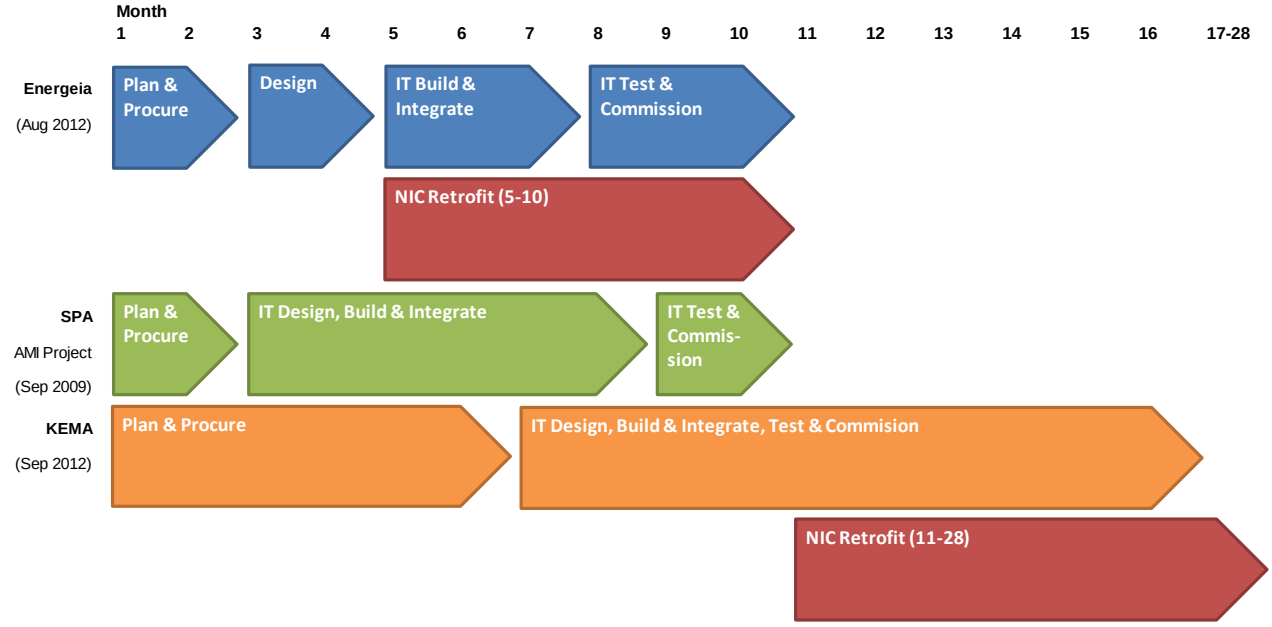
Energeia's revised lifetime switching cost estimate is $40.8 million lower than KEMA's.[32] Most of the variation between our estimates is driven by KEMA's assumed timeline and the cost of NIC retrofits. Energeia's NIC retrofit costs are $18.5 million lower than KEMA's due mainly to 153,091 fewer assumed retrofits, and an 72% lower estimated cost per installation. Energeia's timeframe assumes that all mesh NICs are retrofitted in 2011 at a total cost of $11.3 million for NICs, antennas and retrofit costs in 2011 real terms.

Energeia's timeline assumes mesh NICs are installed from July 2011, compared to KEMA's assumption of January 2012. Our timeframe reflects the approach shown in Figure 14, based on our view that a reasonable business would have directly negotiated with the only credible mesh supplier as part of the cost assessment

[32] *SP AusNet, Assessment of AMI Communication Options,* DNV KEMA, 14 September 2012, page 41.

process. While KEMA assumes a full competitive tender would be required, our view is consistent with SPA's own mesh switching plans at the time.[33]

Figure 14 – Energeia, SPA [redacted] and KEMA Mesh Switching Timelines



Source: SPA, KEMA, Energeia

Energeia's lower cost per mesh NIC retrofit is based on our analysis of SPA's apparent NIC retrofit costs. KEMA's estimate is nearly ten times higher based on their bottom-up estimate of the time required, which they view as requiring up to three times more effort than a WiMax NIC retrofit. Energeia's review found KEMA had not substantiated the additional effort required for a mesh NIC, and our own investigation found the two types of retrofits to have a virtually identical cost profile.

KEMA's lifetime switching cost reflects a $15 million risk premium based on their application of the Black Scholes option pricing formula for equities to all mesh NIC, network and NMS related capex.[34] Energeia has rejected KEMA's estimate on the basis that KEMA's approach has not been adopted by any other utility in the world and did not account for the risk mitigation options adopted by the other Victorian DNSPs.

KEMA's lifetime switching costs include additional $6 million in project management and metering opex due to the 18 month extension of time they assume is required to convert them to mesh functionality relative to Energeia's timeline. Energeia's review of the time required to convert all WiMax meters to mesh found that this could be achieved by the end of 2011 based on the number of retrofits required and the number of retrofits SPA's service provider had completed in the past.[35]

KEMA's lifetime switching costs include additional IT costs of $2.2 million. Energeia's review could not substantiate these costs, and our own estimates include integration costs as part of the NMS and Meter Data Management System (MDMS) implementation costs. The use of a new integration technology by Victorian

[33] *Contingency Planning Paper*, SPA [redacted] 24 September 2009.

[34] Value based on a pro-rata application of the risk premium to the 2012-15 period expenditure.

[35] As reported in SPA's [redacted]

utilities means that new systems such as NMS and MDMS only have to integrate to a common 'Enterprise Services Bus' and the information is automatically re-routed to upstream systems.

Although KEMA have not provided a specific estimate of switching costs over the 2012-2015 period, we have estimated them using KEMA provided values. Energeia note that the variation in our respective estimates of switching costs over the 2012-2015 period are due to the same drivers already explained above.

6.2.2 2011 Budget Impacts

Energeia assessed the budget impact of its switching timeline to determine whether there would be any negative financial consequences in the 2009-2011 budget period, and how that might affect a reasonable commercial business in the circumstances.[36] This involved comparing SPA's approved 2011 WiMax budget against our estimate of a 2011 mesh budget including switching costs for the relevant cost categories.

Figure 15 – Switching Impact Assessment (2011)

2011 Switching Cost Reconcilliation			
Mesh Switching Option vs WiMax (2011 $M Real)	**2011 Mesh**	**2011 WiMax**	**Variation**
Total CAPEX	**$ 44.2**	**$ 54.3**	**-$ 10.1**
AMI CAPEX	**$ 42.4**	**$ 47.9**	**-$ 5.5**
NICs	$ [redacted]	$ [redacted]	-$ 14.9
Antennas	$ [redacted]	$ [redacted]	-$ 4.7
Network + Backhaul	$ [redacted]	$ [redacted]	-$ 4.6
Switching - NICs	$ [redacted]	$ -	$ -
Switching - Antennas	$ [redacted]	$ -	$ -
Switching - NIC Retrofit	$ [redacted]	$ [redacted]	$ 1.2
Break + Remediation	$ [redacted]	$ -	$ 3.4
Inventory	$ [redacted]	$ -	$ 4.1
IT CAPEX	**$ 1.7**	**$ 6.4**	**-$ 4.7**
NMS	$ [redacted]	$ [redacted]	-$ 0.8
MDMS	$ [redacted]	$ [redacted]	-$ 3.9
Total OPEX	**$ 4.1**	**$ 6.4**	**-$ 2.3**
AMI OPEX	**$ 1.6**	**$ 0.7**	**$ 0.9**
Backhaul Communications	$ [redacted]	$ -	$ 0.3
Communications Operations	$ [redacted]	$ [redacted]	$ 0.6
IT OPEX	**$ 2.5**	**$ 5.7**	**-$ 3.2**
NMS	$ [redacted]	$ [redacted]	-$ 3.2
MDMS	$ [redacted]	$ [redacted]	$ 0.0
Total Expenditure	**$ 48.2**	**$ 60.6**	**-$ 12.4**

Note: *Antenna capex estimated from meter volumes.*

Source: KEMA, Energeia

As presented in Figure 15, our analysis shows that our assumed mesh switching timeline to achieve the 31 December 2011 target would have resulted in SPA saving $12.4 million in expenditure relative to staying with WiMax. In other words, the significantly lower cost of the mesh solution deployment costs more than offset the switching costs involved in 2011.

Energeia therefore concludes that there is no financial basis for a reasonable commercial business in the circumstances to have delayed switching costs to 2012 to avoid over-expenditure in 2011 relative to the approved budget. Even in the case of over expenditure, Clause 5F of the revised OIC in force at the time of the decision would have allowed SPA to have submitted a revised budget application for the difference.

[36] This analysis is consistent with SPA's qualitative assessment framework.

6.3 WiMax Solution Costs

Energeia's revised quantitative assessment of the lifetime cost of WiMax compared with our previous estimate and that of KEMA is given in Figure 16. Our estimate of capex has increased from $208.5 to $210.4 million and remains well above KEMA's estimate at $186.7 million.[37] Our estimate of opex has increased from $110.1 million to $110.4 million compared to KEMA's estimate of $122.8 million.

Figure 16 – Comparison of Energeia and KEMA WiMax Communications Cost Assessments (2011-2025)

Energeia (August 2012)		
WiMax Solution Expenditure (Discounted 2011 $M Real)		2011-2025
Total CAPEX	**$**	**208.5**
AMI CAPEX	**$**	**166.8**
NICs	$	91.1
Antennas	$	7.4
Network + Backhaul	$	68.0
IT CAPEX	**$**	**41.7**
NMS	$	16.2
MDMS	$	25.5
Total OPEX	**$**	**110.1**
AMI OPEX	**$**	**27.5**
Backhaul Communications	$	-
Communications Operations	$	27.5
IT OPEX	**$**	**82.6**
NMS	$	67.5
MDMS	$	15.0

Energeia (January 2013)		
WiMax Solution Expenditure (Discounted 2011 $M Real)		2011-2025
Total CAPEX	**$**	**210.4**
AMI CAPEX	**$**	**181.2**
NICs	$	98.1
Antennas	$	18.2
Network + Backhaul	$	64.9
IT CAPEX	**$**	**29.3**
NMS	$	13.4
MDMS	$	15.9
Total OPEX	**$**	**110.4**
AMI OPEX	**$**	**79.4**
Backhaul Communications	$	29.4
Communications Operations	$	50.0
IT OPEX	**$**	**31.0**
NMS	$	16.6
MDMS	$	14.4

KEMA (September 2012)		
WiMax Solution Expenditure (Discounted 2011 $M Real)		2011-2025
Total CAPEX	**$**	**186.7**
AMI CAPEX	**$**	**155.7**
NICs	$	78.9
Antennas	$	20.1
Network + Backhaul	$	56.8
IT CAPEX	**$**	**31.0**
NMS	$	13.3
MDMS	$	17.7
Total OPEX	**$**	**122.8**
AMI OPEX	**$**	**88.8**
Backhaul Communications	$	28.4
Communications Operations	$	60.4
IT OPEX	**$**	**33.9**
NMS	$	19.0
MDMS	$	15.0

Notes: *KEMA's NIC and antenna capex values exclude the WiMAX inventory adjustment. This is treated as a mesh switching cost.*

Source: KEMA, Energeia

The following sections report on the results of our detailed reconsideration of WiMax solution costs following our review of SPA's Response submission and our own independent investigation.

6.3.1 WiMax Capex

Increases in our estimates of lifetime NIC ($7 million higher) and antenna ($10.8 million higher) capex are partially offset by a $9.6 million reduction to our estimated of MDMS capex.

NIC capex have increased due to the inclusion of the ZigBee chip costs and removal of the volume discount post rollout. Antenna capex has increased due to the inclusion of antenna installation costs. Our MDMS capex estimate has been reduced due to our acceptance of KEMA's argument[38] that a reasonable commercial business would assume that future MDMS replacement costs in the 2019-2020 period would be the same under either a WiMax or mesh scenario.

Our revised AMI capex estimate is $25.5 million above KEMA's due to significant differences in our respective views of WiMax network coverage and network growth.

6.3.1.1 WiMax NIC cost

Energeia has accepted the WiMax NIC cost used by KEMA based on the volume discounted contract price offered by GE. This figure includes the cost of the ZigBee chip to support the required Home Area Network (HAN) functionality, which had been previously excluded from our assumed WiMax NIC price. Consistent

[37] Energeia note discrepancies between KEMA's report and its spreadsheet for NIC and antenna capex.

[38] *SP AusNet, Assessment of AMI Communication Options,* DNV KEMA, 14 September 2012, page 37.

with our approach to mesh NIC costs, Energeia has assumed that the price in 2016 is adjusted for inflation and the loss of the volume discount available at the time of the bulk purchase for the rollout.

The net impact of the changes in our assumptions regarding ZigBee chip costs, volume discounts and WiMax coverage have increased our WiMax NIC estimate to $98.1, which is $7 million higher than the $91.1 million we estimated previously.

6.3.1.2 WiMax Antenna Installation Costs

SPA's Subsequent and Reconsidered submissions are silent on antenna installation costs. KEMA raises antenna installation costs for the first time, assuming $[redacted] based on SPA provided estimates.[39] SPA refers to antenna installation costs for the first time in its Response submission, but appears to include it as part of the WiMax NIC retrofit price of $[redacted] per site first put forward in the Reconsidered submission worksheets.

Energeia's investigation into antenna installation costs found that the contract unit rates provided by SPA applied to only one of their two main installers, and that this was for $[redacted] We were unable to determine that these costs had been previously included in SPA's antenna prices.

Energeia's WiMax cost estimate had previously relied upon SPA's antenna costs, which we assumed to include the cost of installation or that these costs were already included in the meter installation costs. Based on the findings of our investigation, Energeia has added the cost of SPA's installation contract price to the price of WiMax antennas, increasing WiMax antenna capex by $6.5 million.

6.3.1.3 WiMax Coverage

In its Subsequent Budget of 28 February 2011 SPA assumed WiMax would provide 85% coverage of its meter population – with the balance met by the more costly 3G solution.[40] KEMA's report increase the assumed WiMax coverage performance to a 90%, which reduces KEMA's NIC capex estimate relative to our own by $19.2 million in present value terms. Fewer relatively high cost 3G NICs are needed under KEMA's scenario to address WiMax coverage gaps.

KEMA references "SPA's estimate" in their Subsequent Budget Application lodged 28 February 2011 as the basis for the 89.4% assumption.[41] Energeia note this position is contrary to SPA's own assessment of WiMax coverage submitted in their Reconsidered Budget, which assumed 85% coverage, nor is it consistent with the actual numbers submitted in the referenced report.[42]

Energeia's investigation found that SPA did indeed foreshadow that 90% WiMax coverage appeared possible using higher cost WiMax solution variants such as micro-cells and repeaters. However, the possibility is framed as a preliminary estimate, and SPA's primary communications network radio plan at the time of the submission remained at 85%.[43]

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[39] *SP AusNet, Assessment of AMI Communication Options,* DNV KEMA, 14 September 2012, Appendix A, page 2.

[40] *Advanced Metering Infrastructure, AMI Subsequent Budget & Charges Application*, SPA, 28 February 2011, page 56.

[41] *SP AusNet, Assessment of AMI Communication Options,* 14 September 2012, KEMA, page 34.

[42] *2012-15 Budget and Charges Application, Appeal by SPI Electricity Pty Ltd [2012] ACompT 11 - Reconsideration Submission*, SPA, 5 June 2012, page 20.

[43] *Advanced Metering Infrastructure, AMI Subsequent Budget & Charges Application*, SPA, 28 February 2011, page 56.

In Energeia's opinion, a reasonable business would not have changed its plan until it has robust information regarding the actual solutions to be deployed and their cost effectiveness. The additional hardware required for the variants would increase the cost of these points, and would need to be justified against the alternative cost of a 3G based approach.

Energeia's August 2012 view of 80% WiMax coverage was based on the actual meter numbers in the AER's Final Determination. While ensuring the total numbers are reasonable, this approach resulted in a substantially different annual deployment profile and technology mix due to changes in SPA's own plans post 28 February 2011. Energeia has therefore revised our WiMax coverage estimate and annual installation numbers up to the end of the rollout in 2013 to reflect SPA's 28 February 2011 submission.

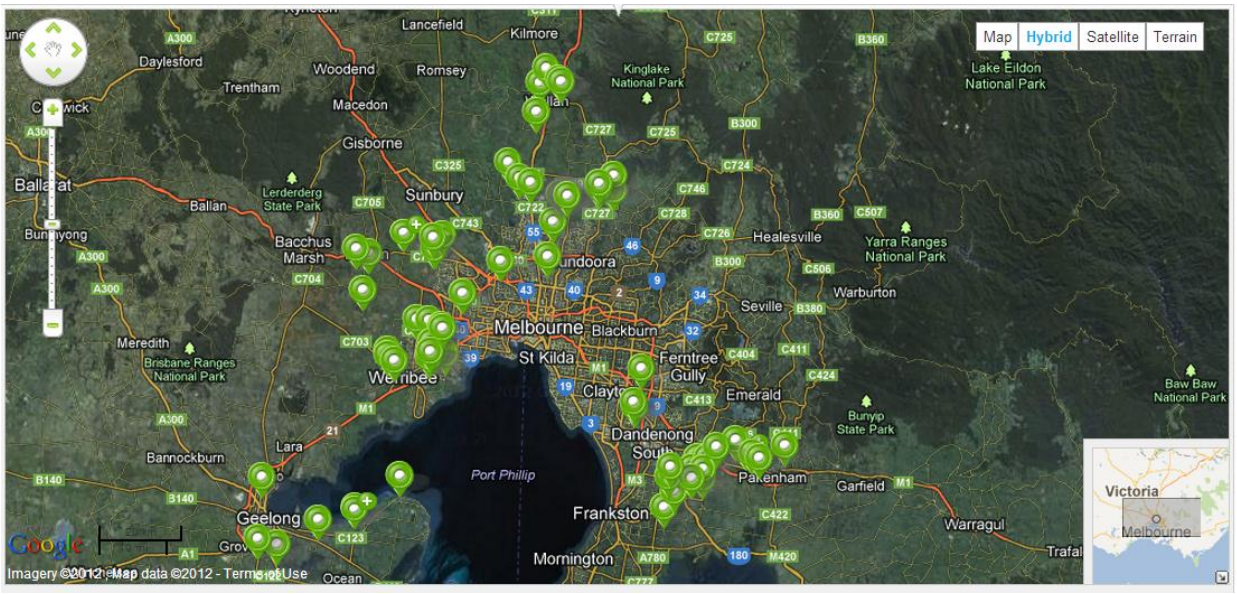
Regarding the 6,000 meters that SPA identified as lying outside of their primary and secondary solution coverage area, Energeia has not factored these into its cost estimate for WiMax or mesh[44] Our view is that these hard to reach locations are likely to be in SPA's most mountainous terrain, which would be hostile to all terrestrial, radio frequency based telecommunications solutions including 3G.

Based on our review of the facts related to the claimed increase in WiMax coverage, Energeia has increased its coverage assumption for WiMax from 80% to 85%. This reduces our WiMax NIX capex by around $4.2 million relative to our previous estimate.

6.3.1.4 WiMax Network Development

In the absence of information underpinning SPA's own estimate of ongoing WiMax network investment, Energeia assumed that the ratio of initial to ongoing investment in SPA's WiMax network would be similar to the ratio of Powercor's initial to ongoing mesh network investment. We adopted this benchmark based approach due to our view that network growth for either technology would be mainly driven by greenfield land development at the fringes of existing population centres as shown in Figure 16.

Figure 17 – Map of Victoria's Current Residential Land Developments

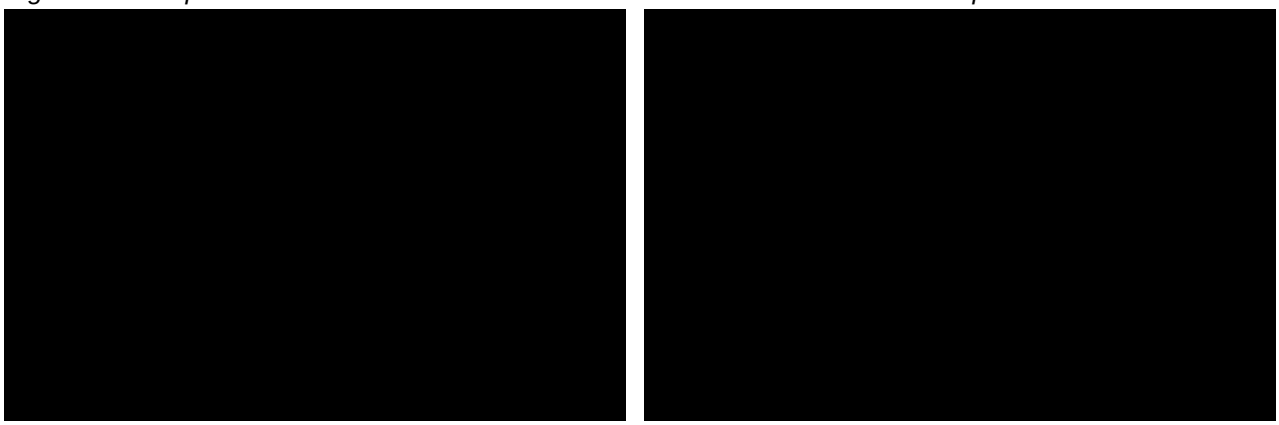


Source: www.realestate.com.au, last accessed 3 November 2012.

[44] *SP AusNet 2012 – 2015 AMI Budget and Charges Application Submission response to AER questions of 11 April 2011*, SPA, 11 April 2011, page 2.

KEMA's WiMax capex estimate assumed that the existing network would absorb "some growth" in customer numbers over the next 15 years, based on where the 89 towers were planned to be deployed.[45] They accepted SPA's undocumented estimate that one tower would be needed every second year, which represents an average annual growth rate of approximately 0.5% and $7.5 million less capex in present value terms than Energeia's August 2012 estimate.

Figure 18 – Map of Planned WiMax Towers near Current Residential Land Developments



Doreen Corridor **South Eastern Corridor**

Source: SPA, Google, www.realestate.com.au, last accessed 3 November 2012.

SPA provided pictures of planned WiMax tower sites in the Doreen and South East Growth Corridors to support their position that the towers are well placed to serve these areas, which are displayed against the current crop of (blue icon) residential estates in Figure 17.[46] It can be seen, assuming a generous 7-10 km WiMax radio coverage radius, that not all of these existing developments are likely to be covered – let alone new developments growing at 1.4% per year over the next 15 years. This coverage radius is generous because it is based on the radio propagation model assumed for the Telstra 3G network.[47] This operates at 850 MHz, which would experiences greater signal propagation than a WiMax network operating at 2.3 GHz.

In the course of examining the case for KEMA's estimated WiMax network BaU capex from 2015, Energeia identified that the previous approach is likely to be overstated as it leads to an annual growth rate of around 2.5%, nearly twice that of SPA's underlying population growth. We have therefore reset our own estimate for WiMax and Mesh network BaU capex growth to be consistent with the AER's approved customer population growth rate of 1.4% in 2015.[48]

6.3.1.5 WiMax MDMS Replacement

Energeia's review of KEMA's $7.8 million lower MDMS estimate has found that it ignores SPA's actual and planned MDMS expenditure, and instead relies upon a claimed but unspecified industry benchmark cost of

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[45] *SP AusNet, Assessment of AMI Communication Options,* 14 September 2012, KEMA, page 36.

[46] *Advanced Metering Infrastructure, 2012-15 Budget and Charges Application, SP AusNet's Submission in response to AER's Preliminary View on Amendments pursuant to the Australian Competition Tribunal's Orders, Annexure 9,* SPA, 14 September 2012.

[47] *SP AusNet Public Mobile Coverage Analysis*, Gibson Quai Consulting, August 2011, page 4.

[48] *Final Determination, Victorian Advanced Metering Infrastructure Review, 2012–15 Budget and Charges Applications*, AER, October 2011, page 22.

$17 million incurred over the 2019-20 period. The benchmark cost is said to include training, hardware, software, integration, O&M and facilities costs.[49]

KEMA argue that the MDMS costs should be the same regardless of the telecommunications solution adopted because the system integrates with other systems using increasingly standardised interfaces over a Services Oriented Architecture (SOA) IT services bus. They also argue that SPA's MDMS costs may be higher because they are unable to share their IT costs as all the other DNSPs have done.

Energeia's position has always been that the MDMS costs should be the same in the circumstances regardless of NMS and telecommunications technology. We also agree that SPA's actual MDMS costs are materially higher than prudent costs as established by the industry benchmark of the other Victorian DNSP's. Energeia address KEMA and SPA's claim of IT cost sharing in Section 6.4.1.7.

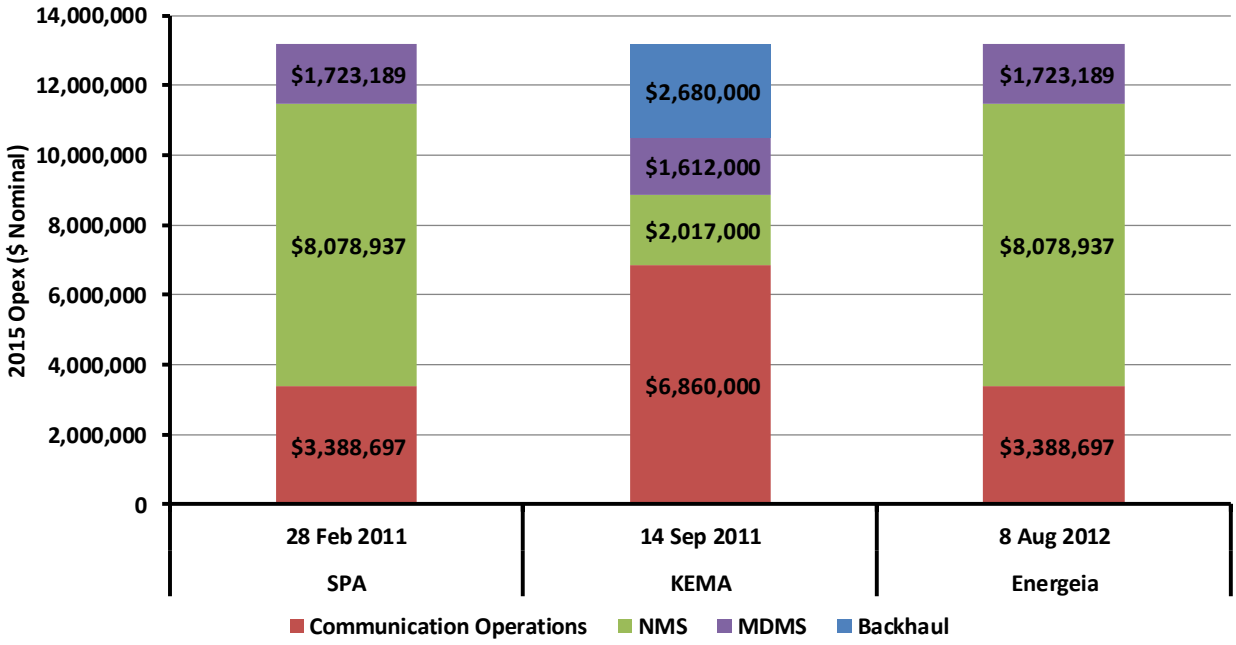
While we are maintaining our view that Jemena is the appropriate benchmark in the circumstances for estimating the future MDMS replacement capex (i.e. $11.4 million in nominal dollars), we have accepted the argument that these costs should be the same regardless of the telecommunications solution approach adopted. This reduces our present value estimate of MDMS solution capex under WiMax by $9.6 million.

Energeia note that the change in our view does not impact our estimate of prudent costs over the 2012-2015 period because MDMS replacement capex only occurs over the 2019-2020 period.

6.3.2 WiMax Opex

In its Response Budget, SPA made a number of changes in the categorisation of costs, which they reconcile against the estimates included in their Reconsidered Budget for 2012-15. While we have concerns about the need to make such significant changes at this stage, we have accepted them on the basis that they are purely cosmetic. Based on our comparison of SPA's opex re-categorisation presented in Figure 19, Energeia have found that the total quantum does not appear to have materially changed over the 2012-2015 period.

Figure 19 – Comparison of SPA Reconsidered and Response Submission Opex Estimates (2012-2015)



Source: SPA, KEMA, Energeia

[49] *SP AusNet, Assessment of AMI Communication Options*, DNV KEMA, 14 September 2012, page 37.

Based on our review of KEMA's bottom-up estimate WiMax opex, we have increased our own estimate from $110.1 to $110.4 million. This is mainly due to an increase in our estimate of network backhaul and operations costs to account for additional fixed equipment and field labour costs, respectively, and despite a $7.5 million reduction in our assumed backhaul charges from improved WiMax coverage.

Energeia's revised WiMax opex estimate is $12.4 million lower than KEMA's, largely due to the impact of differences in our views regarding the reasonable level of personnel and training required to operate and maintain a WiMax network.

6.3.2.1 Communications Backhaul

KEMA's backhaul estimate of $28.4 million includes $6.9 million in fixed MPLS, radio licenses, a 3G VPN cost and $21.5 million in variable 3G communications costs. KEMA's 3G backhaul costs are driven by its assumed WiMax coverage and an annual rate of $[redacted] per meter based on Telstra budget pricing.[50]

Energeia's review of KEMA's costs found that the original 3G service opex may be incorrectly calculated due to SPA's apparent inclusion of a $[redacted] setup fee in its 3G opex cost on an ongoing basis.[51] Adjusting KEMA's estimate to reflect 85% WiMax coverage and accounting for the set-up fee error by removing it after the first year results in a revised estimate of $29.4 million.

6.3.2.2 Communications Operations

KEMA's Communications Operations expenditure estimate of $60.4 million includes costs for spectrum, vehicles, site leases, sundries, vendor maintenance, training and SPA labour costs.

Energeia's review and investigation of reasonable communications operations costs found that KEMA's estimate averaged around 15 FTEs per year assuming KEMA's average field resource labour cost. This is substantially higher than Energeia's estimate of around 4 FTEs based on the bottom-up, average fault and repair time driven resourcing model detailed in Section 6.4.2.2. Our model is based on Powercor benchmarks for communication faults at the meter, a primary driver of communications operations costs.

In the absence of any explanation or substantiation of their estimate, Energeia has also estimated SPA's proposed training budget includes $7,000 of training per person per quarter, compared to what Energeia considers to be a more reasonable allowance of $3,000 per person per quarter to cover one training course, travel and accommodation.

Based on the results of our review, Energeia developed a revised Communications Operations opex estimate of $50.0 million, which is $10.4 million lower than KEMA's.

6.3.2.3 NMS and MDMS Operations

KEMA's NMS operations budget of $19.0 million includes costs for software maintenance, SPA software support labour, SPA 24/7 labour and training. KEMA's MDMS budget of $15.0 million is comprised of software maintenance and software support labour costs.

Energeia estimates that KEMA's WiMax NMS and MDMS operations budgets represent an average of 6 FTEs per system based on an industry benchmark blended average IT application support FTE cost of $140,000.[52] No documentation has been provided to support SPA's NMS or MDMS resourcing assumptions,

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[50] *Annexure 2 - KEMA model.xlsm*, KEMA, cell h109, tab TRKS.

[51] Email from John Dynan (Telstra) to Paul Tatkovic (SPA), sent 29 November 2010.

[52] *Advanced Metering Infrastructure, Amended Submitted Budget and Charges Application 2012-15, Annexure 4 - Deloitte Model.xlsx*, Powercor, 26 August 2011.

which KEMA claim are based on industry benchmarks, but the inputs to the model are labelled as though they have been supplied by SPA.[53]

Energeia's review has found KEMA's benchmarks are higher than available CitiPower and Powercor benchmarks and include 24/7 support of the NMS. In our view and those of the other DNSPs as evidenced by their assumed level of support, 24/7 support is unnecessary to meet mandated performance standards.[54] Also as recently as March 2011, internal SPA documents suggest SPA's AMI budget reflected an assumption of business hours support only.[55]

KEMA's NMS budget also contains $6,000 of training per quarter per FTE, which was not supported by evidence from the NMS or MDMS vendor, position descriptions, company policies or industry standards that show this level of training expense is reasonable. In the absence of any evidence or explanation for this level of cost, Energeia has rejected this estimate and used its own estimate of $3,000 per person per quarter.

Based on the outcomes of our review and investigation, Energeia has developed revised estimates of NMS and MDMS opex that:

- excludes 24/7 support labour for the NMS;
- assumes $12,000 per year per FTE for training; and
- reflects Energeia's bottom-up NMS and MDMS resourcing model detailed in Section 6.4.2.3.

Our revised NMS estimate is $16.6 million and our MDMS estimate is $14.4 million, which are $2.4 million and $0.6 million lower than KEMA's, respectively.

6.4 Mesh Solution Costs

Energeia's revised quantitative assessment of the lifetime cost of mesh compared with our previous estimate and that of KEMA is given in Figure 20. Our estimate of capex has risen from $123.6 to $130.8 million but remains well below KEMA's $204.4 million estimate.[56] Our estimate of opex has decreased from $74.4 million to $60.1 million and is now less than half KEMA's estimate of $153.7 million.

[53] *Annexure 2 - KEMA model.xlsm*, KEMA, cell h109, tab SP AusNet Opex Costs.

[54] *Advanced Metering Infrastructure, Amended Submitted Budget and Charges Application 2012-15, Annexure 4 - Deloitte Model.xlsx*, Powercor, 26 August 2011, O-2.2 ACC exp 12-15 tab.

[55] [redacted] SPA, 28 March 2011, page 6.

[56] Energeia notes discrepancies between KEMA's report and its spreadsheet for NIC and antenna capex.

Figure 20 – Comparison of Energeia and KEMA Mesh Network Lifetime Cost Assessments

Energeia (August 2012)		
MeshSolution Expenditure (Discounted 2011 $M Real)		**2011-2025**
Total CAPEX	**$**	**123.6**
AMI CAPEX	**$**	**97.4**
NICs	$	40.7
Antennas	$	3.1
Network + Backhaul	$	38.5
Risk Premium	$	-
Switching - NICs	$	5.6
Switching - Antennas	$	0.4
Switching - NIC Retrofit	$	5.0
Switching - Remediation	$	4.2
Switching - Inventory	$	-
IT CAPEX	**$**	**26.2**
NMS	$	12.7
MDMS	$	13.6
Risk Premium	$	-
Total OPEX	**$**	**74.4**
AMI OPEX	**$**	**42.2**
Backhaul Communications	$	26.3
Communications Operations	$	15.9
IT OPEX	**$**	**32.2**
NMS	$	15.5
MDMS	$	16.6
Switching - IT	$	-
Switching - Metering and PM	$	-

Energeia (January 2013)		
MeshSolution Expenditure (Discounted 2011 $M Real)		**2011-2025**
Total CAPEX	**$**	**130.8**
AMI CAPEX	**$**	**104.0**
NICs	$	43.9
Antennas	$	2.5
Network + Backhaul	$	38.5
Risk Premium	$	-
Switching - NICs	$	9.5
Switching - Antennas	$	0.5
Switching - NIC Retrofit	$	1.3
Switching - Remediation	$	3.7
Switching - Inventory	$	4.1
IT CAPEX	**$**	**26.8**
NMS	$	13.0
MDMS	$	13.8
Risk Premium	$	-
Total OPEX	**$**	**60.1**
AMI OPEX	**$**	**27.9**
Backhaul Communications	$	14.5
Communications Operations	$	13.4
IT OPEX	**$**	**32.2**
NMS	$	15.5
MDMS	$	16.6
Switching - IT	$	-
Switching - Metering and PM	$	-

KEMA (September 2012)		
MeshSolution Expenditure (Discounted 2011 $M Real)		**2011-2025**
Total CAPEX	**$**	**204.4**
AMI CAPEX	**$**	**156.2**
NICs	$	42.6
Antennas	$	10.1
Network + Backhaul	$	42.0
Risk Premium	$	11.9
Switching - NICs	$	20.4
Switching - Antennas	$	2.4
Switching - NIC Retrofit	$	19.8
Switching - Remediation	$	3.7
Switching - Inventory	$	3.2
IT CAPEX	**$**	**48.2**
NMS	$	27.4
MDMS	$	17.7
Risk Premium	$	3.1
Total OPEX	**$**	**153.7**
AMI OPEX	**$**	**32.6**
Backhaul Communications	$	17.4
Communications Operations	$	15.1
IT OPEX	**$**	**121.1**
NMS	$	98.0
MDMS	$	15.0
Switching - IT	$	2.2
Switching - Metering and PM	$	6.0

Notes: *KEMA's risk premium has been separately identified and their WiMax inventory adjustment included as a mesh switching cost.*

Source: KEMA, Energeia

The following sections report on the results of our detailed reconsideration of mesh solution costs following our review of SPA's Response submission and our own independent investigation.

6.4.1 Capital Expenditure

Energeia have increased our mesh capex estimate by $7.2 million relative to our August 2012 report, which is mainly due to:

- adopting SPA's 28 February 2011 meter installation profile;
- including inventory switching costs; and
- reducing our antenna costs to align with Victorian benchmarks.

Our revised AMI capex estimate is $52.2 million lower than KEMA's due to significant differences in our respective views on the incidence of external antennas, the nature and pricing of vendor and technology risk (risk premium), the cost and incidence of retrofitting NICs and the cost of a mesh NMS.

6.4.1.1 Risk Premium

KEMA applies a $15 million risk premium exclusively to the mesh solution using a Black Scholes put option pricing formula applied to what they view as comparable equity benchmarks.

Energeia's review and investigation into KEMA's methodology has found:

- it is unsubstantiated as a valid and accepted risk pricing approach for AMI investments;
- ignores the significant risks related to one of its key solution vendors; and
- represents a substantial departure from the commercial standard established in Victoria.

Energeia requested KEMA identify the number of comparable utilities that have adopted their BS based risk pricing methodology as part of their AMI business case. While noting that risk management is a factor in procurement, and that Black Scholes was specified by regulators in North America (they do not mention that this is typically for mark-to-market purposes related to financial instruments), KEMA could not identify a single example of where their proposed approach had been applied by a utility in a similar fashion.[57]

Energeia's own investigation of publically available AMI business cases in Victoria has not identified a single case of applying this methodology.[58]

In our view, the appropriate and Victorian industry standard approach to assessing the relative cost of risk in the circumstances would be to conduct a risk review and implement risk mitigation strategies. Assuming both suppliers agreed to absorb the cost of mitigating identified risks, for example through liquidated damage clauses in their contracts backed up by financial guarantees from reputable companies, then the two options would be roughly comparable in terms of the main quantifiable risk exposures.

Energeia's investigation into the relevant commercial standard for risk management found that Victorian DNSPs had generally implemented some but not necessarily all of the following risk mitigation strategies:

- using modular meters to enable low cost NIC replacement,
- holding proprietary software code in escrow to ensure it could be brought in-house if necessary,
- using standards based integration architecture such as SOA to facilitate IT system replacement,
- liquidated damage clauses in contracts in case of non-performance, and
- financial guarantees from reputable companies in case of illiquidity.

Even though the risks could in the main be mitigated, Energeia's view is that a prudent company would take care to avoid selecting a solution or vendor that was likely to fail. This would shield them from being exposed to unidentified and unquantified risks, including to its reputation. Energeia therefore examined the relative risk of pursuing WiMax or switching to the leading mesh solution as at 28 February 2011.

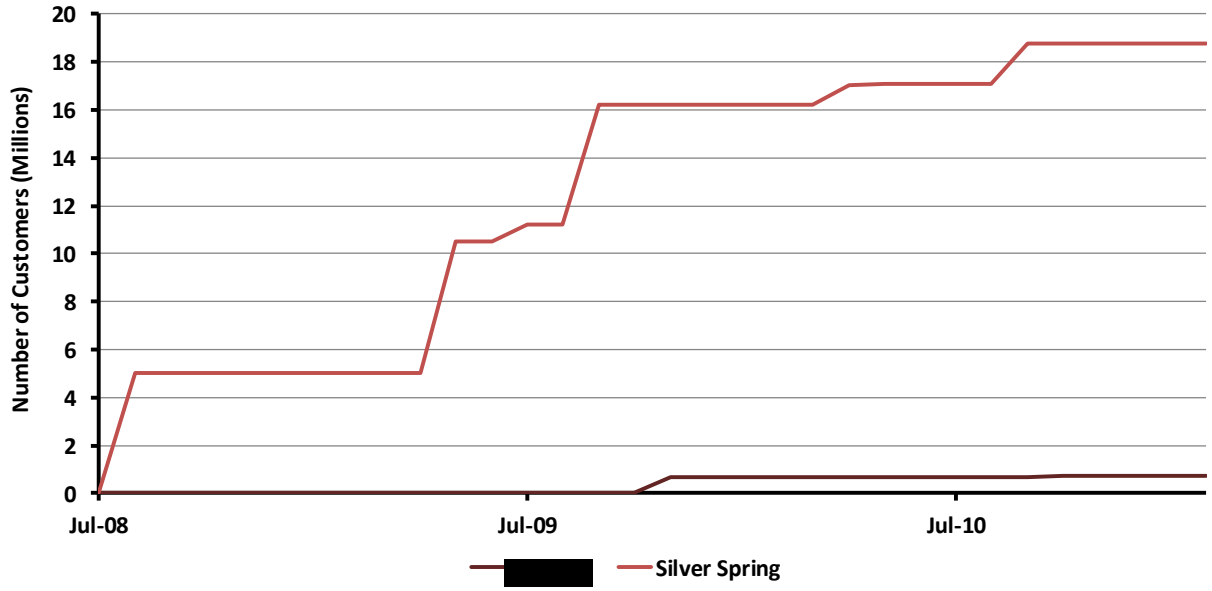
Our review found Silver Springs Networks (SSN) had been successfully delivering its mesh solution to Jemena, UED, Powercor and CitiPower in Victoria, and had already delivered similar hardware and software to millions of end points in California. Mesh as a technology had become the dominant AMI communications solution across North America. By comparison, Energeia has been unable to confirm any AMI deployment [redacted] for [redacted] WiMax [redacted] since 2009 as shown in Figure 21.[59]

[57] SP AusNet Supplementary Response to AER Information Request 7 of 8 October 2012 (including DNV KEMA Response), 7 November 2012, Pg 14

[58] See Appendix 3 for a complete listing of business cases examined for their risk premium methodologies.

[59] See Appendix 4 for a complete listing of sources from our investigation of vendor contract awards.

Figure 21 – Global Comparison of Meters Served by SSN and [redacted] as at 28 February 2011



Source: [redacted] Silver Spring Networks, Energeia

Energeia have therefore concluded that the mesh solution would have the lower residual risk premium due to its relatively lower expected likelihood of failure. We have therefore not accepted KEMA's 17% risk premium for mesh capex, but nor have we applied a risk premium to WiMax as SPA could source WiMax components from multiple vendors. Energeia also notes SPA contracted its WiMax IT solution through GE, and would therefore have legal recourse to a credible company for breach of performance.

6.4.1.2 Mesh Deployment Timeline

SPA's Response Submission outlines a new mesh switching timeline based on KEMA's report, which appears to require 16 months before the mesh solution network can be activated and a further 18 months to complete retrofitting mesh NICs in the field. Compared to its Reconsidered Submission timeline, SPA's revised view extends procurement by 2 months, brings the IT solution forward by 12 months, and accelerates the overall transition to mesh by 12 months.

Energeia's original 10 month timeline to switch to mesh was based on the experience of our personnel deploying hundreds of thousands of first generation interval meters, PG&E's publically available mesh switching timeline, and the reported JEN and UED mesh deployment timelines at the time.

Our 10 month timeline includes all steps required to implement the switch-over to mesh for all meters planned to be installed by the end of 2011. This includes changes to IT systems, deployment of a mesh backbone and retrofitting of already deployed meters. It does not include the rollout of mesh enabled smart meters to all remaining sites. This would occur under a business-as-usual approach from January 2012.

Overall, Energeia's review has found an 18 month difference between the end of Energeia's switching timeline and that of KEMA's. Energeia's analysis of KEMA's timeline has found the key differences with our timeline are mainly due to their assumed:

- 5 month, full procurement exercise plus 1 month for contract award (4 months extra),
- IT design, build, integrate, test and commissioning time (2 months extra),
- unexplained NIC retrofit receipt and staging period (2 months extra), and
- unsubstantiated number of NICs retrofitted per month (10 months extra).

These differences are discussed in the following sections.

Despite it being 18 months shorter than the KEMA and SPA proposed timeline to switch to mesh, we maintain our view that it is the approach that a reasonable commercial business would adopt in the circumstances. This conclusion is based on our detailed review of new information made available to us voluntarily and under compulsory order, the experience of our personnel deploying smart meters, and our own independent investigation.

Planning and Procurement

According to KEMA, a six month procurement exercise would be required to ensure competitive pricing and OIC compliance. This includes the month KEMA has allowed for contract award.

The key findings from Energeia's review and investigation of these claims are:

- SPA's [redacted] contingency plans to switch from WiMax to mesh assume direct negotiation with SSN and a one month contracting timeframe post the decision to switch;
- SPA has an established internal process for not undertaking a tender based procurement process known as a 'Waiver of Competition'; and
- There were no credible competitors to SSN for a mesh solution as at 28 February 2011;

Each of these findings is detailed in the following paragraphs.

SPA's Mesh Switching Contingency Timeline Assumptions

Energeia review of materials provided by SPA following the AER's issuance of a compulsory order found SPA had assumed SSN's mesh solution and a one month timeframe for contract negotiation in its switch-to-mesh contingency plan [redacted] on 24 September 2009.[60]

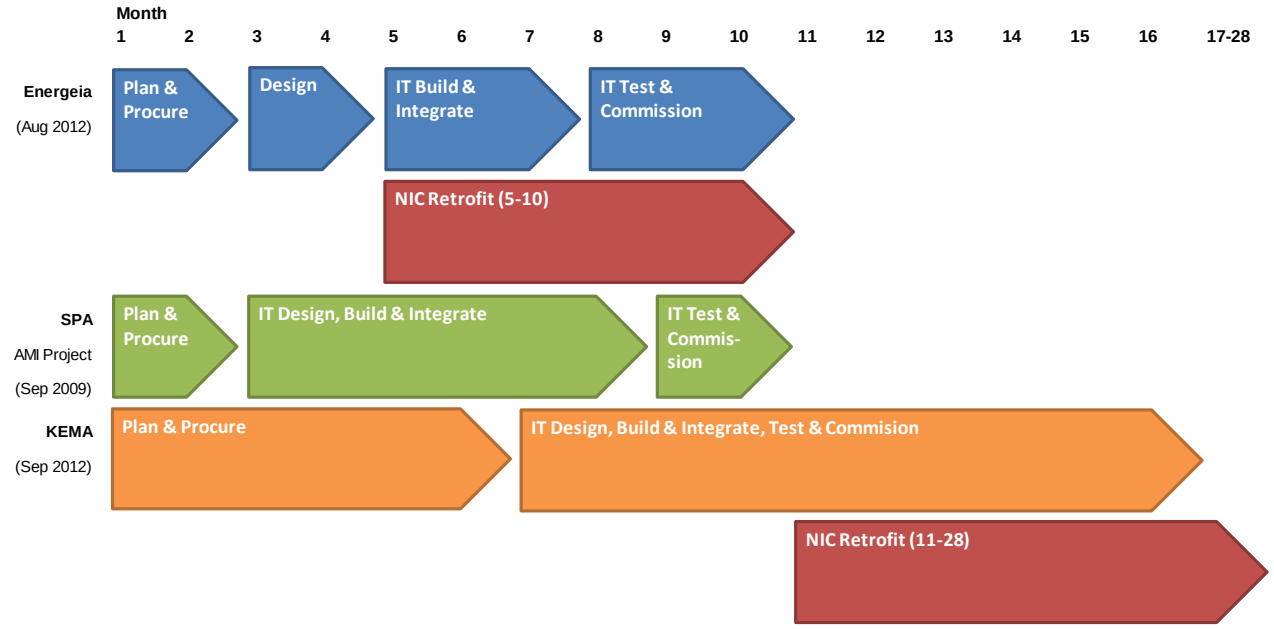
The [redacted] switch-to-mesh plan was one of three main options [redacted] for a contingency plan in case the preferred WiMax solution failed to meet the 30 June 2010 target for 5% Remotely Read Interval Meters (RRIMs). It outlines a 10 month, step-by-step process for cutting over to a mesh solution once the decision to switch has been made.[61]

The other two plans focused on switching WiMax [redacted] vendors [redacted] or requesting an extension from the regulator. The [redacted] ultimately recommended managing vendor delivery risks and continuing discussion with Jemena and SSN regarding mesh.

[60] *Contingency Planning Paper*, SPA [redacted] 24 September 2009.

[61] [redacted], SPA, 24 September 2009, page 4.

Figure 22 – Comparison of Energeia and SPA [redacted] Mesh Switching Timelines



Source: SPA, KEMA, Energeia

Although we have only become aware of it as part of this process, Energeia notes that our August 2012 assumed timeframes and approach are nearly identical to the actual approach adopted by SPA's [redacted] in the very similar circumstances of planning a mesh switch-over to achieve the next OIC target in a relatively short timeframe. The tight alignment of the two approaches and timelines is displayed in Figure 22.

SPA's [redacted] Procurement Process

Direct negotiation with suppliers is good industry procurement practice under certain circumstances which include limited competition and time pressure.[62] SPA's [redacted] for retrofitting NICs demonstrates that SPA had already established an internal process for not undertaking a tender in specific qualifying circumstances under their [redacted] [63]

Although SPA and KEMA both argue that a full tender is required to ensure competitive pricing, Energeia's view is that the Victorian DNSP benchmarks for solution pricing and the credible threat of going to tender would ensure that SSN agreed to at least the same benchmark prices provided to other Victorian DNSPs.

Credible Alternatives to SSN

Our investigation into the mesh network market found that SSN's solution requires significantly fewer APs than any of their competitors (see Figure 22), which gives them a significant cost advantage that may explain why they were selected by all Victorian DNSPs other than SPA.[64] This cost advantage would be compounded

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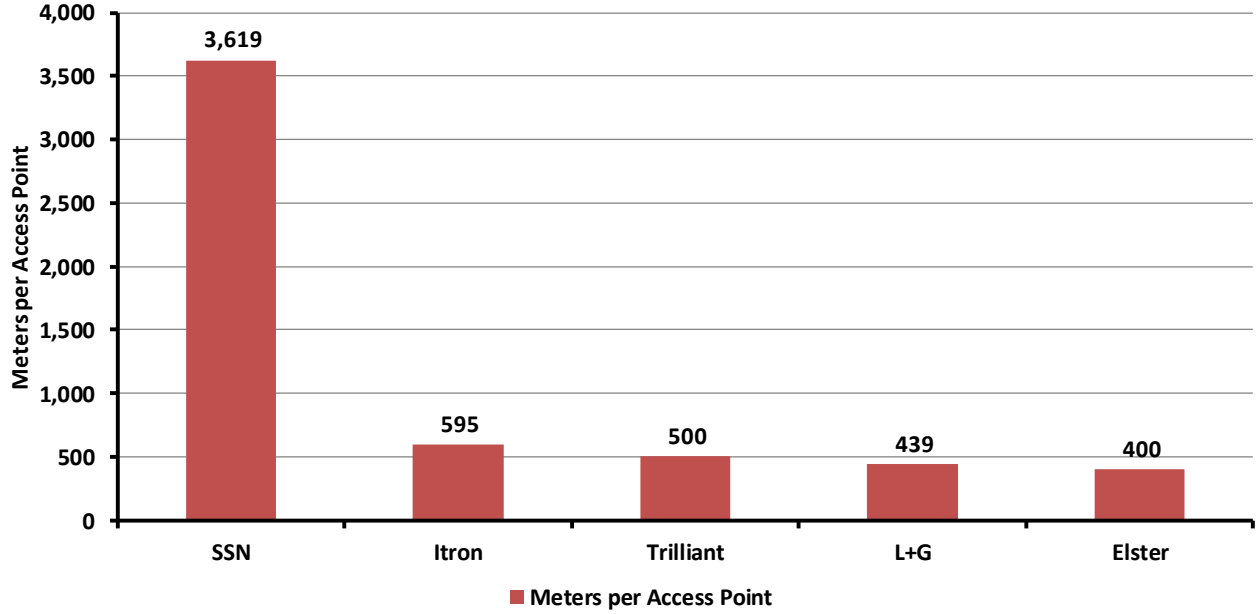
[62] www.finance.gov.au/procurement/procurement-policy-and-guidance/commonwealth-procurement-rules/cprs-additional-rules-for-procurements.html#conditions, last accessed 18 October 2012

[63] [redacted], SPA, 3 May 2010 page 6.

[64] See Appendix 2 for a complete listing of sources from our investigation of mesh technology performance.

in SPA's circumstances, where any competitor would face the additional cost and delays associated with obtaining Australian compliance and integrating their technology with SPA's metering solution.

Figure 23 – Comparison of Mesh Network Solution Cost Drivers



Source: Energeia

IT Design, Build, Test and Commissioning

The KEMA and SPA timelines appear to assume a 10 month IT system development, testing and commissioning process before their initial launch in July 2012. It is not made clear in their report when KEMA has assumed IT development starts. Energeia has therefore assumed IT development commences in September 2011 following contract award in August 2011, resulting in 10 months of elapsed time.

KEMA provides very little detail regarding its time budgeting for IT design, build, testing and commissioning. They do state that they have assumed that the IT systems already deployed could be readily adapted to the new AMI systems (except for the NMS).[65] Most of the required effort appears to be directed at implementing two NMS systems, one for meters communicating via mesh and a separate one for those using 3G.

Energeia's own 8 month timeline has adopted the mesh IT development timeframes estimated from the only known example of mesh switching (PG&E), which we covered in our August 2012 report. This estimate is supported by the reported mesh IT development timeframes by Jemena and UED, which were also covered in our previous report. Since then, we have identified a virtually identical IT development timeline in SPA's own mesh switching contingency plans.[66]

[65] *SP AusNet, Assessment of AMI Communication Options,* 14 September 2012, KEMA, page 20.

[66] [redacted], SPA, 24 September 2009, page 4.

Receipt and Staging Delay

KEMA assumes one month of receipt and staging for deployment of meters with mesh NICs already installed, but take a further month before they assume NIC retrofits are deployed. The additional 1 or 2 months for staging (depending on whether it is a retrofit or not) in the timeline increase switching costs due to:

- the assumed deployment of 14,300 additional meters without a mesh NIC in them[67], and
- the month of additional metering and project management opex due to the delay in retrofitting.

Energeia's own timeline reflects typical industry practice of obtaining sample meters in advance of the main order to use in the staging process. This allows the project to make the necessary arrangements to begin installing meters upon their arrival and without a one to two month delay and the resulting higher costs. Energeia notes that SPA's own mesh contingency timeline assumes receipt of sample meters one month before the main order arrives.[68]

Annual Meter Installation Profile

The KEMA timeline uses SPA's planned deployment profile as at 28 February 2011, which Energeia originally rejected on the basis that it varied from the AER's Final Determination (FD). Energeia's further investigation of this issue has found that the FD reflects a change in meter deployment profile made subsequent to 28 February 2011.[69]

Energeia have therefore accepted SPA's original meter rollout profile, adjusting it post 2013 to reflect the customer growth and meter-to-customer assumptions approved by the AER.[70]

Monthly NIC Retrofit Profile

KEMA's NIC retrofit profile is based on a presumed 18 month program[71], which drives $3.5 million in additional manual meter reading related opex. No explanation is given for the 18 month presumption, which amounts to roughly 12,200 NIC retrofits per month. This rate is about half the 30,000 per month installation rate SPA achieved during a previous WiMax NIC retrofit project.[72]

Energeia's review of NIC retrofitting has found that a reasonable business in the circumstance would plan to ramp up to 30,000 retrofits per month over two months once NIC stock begins to arrive from 1 Jul 2011 to achieve the 1 January 2012 performance target and to minimise manual meter reading opex. Our assumption of a slowdown in meter installations until mesh NICs are available is consistent with KEMA's approach (adjusted for differences in procurement assumptions) to minimise the number of meters requiring a retrofit.

Energeia's installation and retrofit profile assumes two different labour pools are available to provide the resourcing required achieving the targeted rate of monthly installations. We believe this assumption is valid due to SPA's previous use of two different labour pools as confirmed by SPA in their 1 November 2012

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[67] *SP AusNet, Assessment of AMI Communication Options,* 14 September 2012, KEMA, page 23.

[68] [redacted], SPA, 24 September 2009, page 3.

[69] *Final Determination, Victorian Advanced Metering Infrastructure Review, 2012–15 Budget and Charges Applications*, AER, October 2011, page 21.

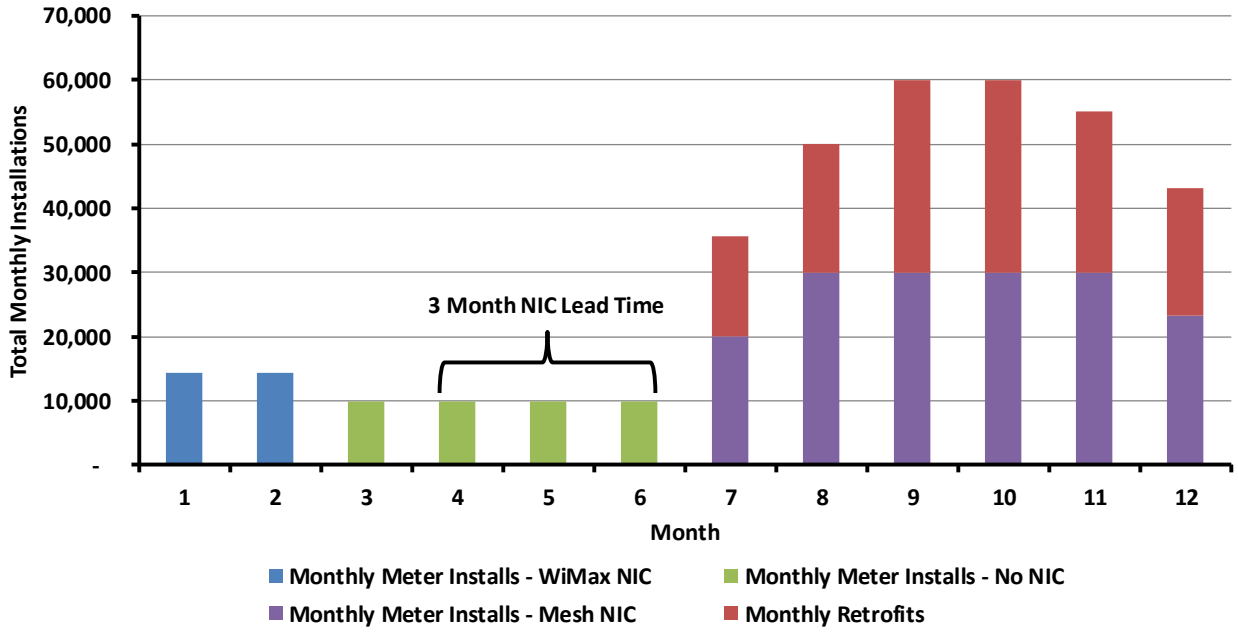
[70] Ibid page 21.

[71] *SP AusNet, Assessment of AMI Communication Options*, DNV KEMA, 14 September 2012, pages 22-23.

[72] As reported in SPA's [redacted]

response.[73] Energeia notes SPA's unsubstantiated claim that this second labour pool was unsatisfactory. We would have expected to see evidence of this in the project reporting, for example.

Figure 24 – Monthly Meter Installation and Retrofit Profile (2011)



Source: Energeia

Assuming one month to finalise contractual terms, and 3 months to receive NIC modules[74], Energeia has developed the month-by-month estimate of reasonable meter and retrofit installations in 2011 shown in Figure 24. Based on our review and investigation of SPA's revised timeline assumptions, Energeia has moved NIC retrofitting costs forward into 2011 when the activity is now estimated to occur.

6.4.1.3 Network Interface Cards

SPA's Response budget for mesh NIC capex is $42.6 million, which is $2 million higher than our August 2012 estimate. The difference is mainly due to their assumption of 6.5% of meters requiring a relatively expensive 3G solution compared to our assumption of 3% of meters based on Powercor's estimate.

Energeia notes that SPA provided a late submission on mesh NIC pricing to the public consultation on the AER's preliminary view. However, we reviewed the material and do not consider that it provided any new and relevant information with respect to the mesh NIC pricing.

Our review of SPA's NIC capex estimates has found that they are based on mesh coverage and NIC pricing assumptions that are inconsistent with comparable benchmarks available at the time, e.g. JEN for pricing and Powercor for coverage. SPA's NIC pricing are also inconsistent with pricing provided to it by SSN in 2011, which is within AUD $2 per NIC of Energeia's assumed prices based on JEN contract costs.[75]

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[73] *Advanced Metering Infrastructure, 2012-15 Budget and Charges Application, SP AusNet Supplementary Response to AER Information Request 7 of 8, October 2012*, SPA, 1 November 2012, page 6.

[74] This is consistent with KEMA's assumption for NIC module delivery.

[75] This is after 28 February 2011, but the pricing could be expected to have been the same then.

Energeia's detailed consideration of mesh network coverage is addressed in Section 6.4.1.5 and our review of mesh NIC pricing can be found in our August 2012 report.

Our mesh NIC capex estimate has increased by $3.2 million relative to our August 2012 report due to:

- adoption of SPA's 28 February 2011 meter installation profile; and
- changes to our switching timeline assumptions.

Our reasoning for using SPA's 28 February 2011 meter installation profile and the revisions to our switching timeline are both detailed is Section 6.4.1.2.

6.4.1.4 Antennas

SPA have budgeted $10.1 million for antenna expenditure in its Response Submission based on advice from KEMA that mesh NICs would require external antennas 70% of the time, a significant increase from the AER and Energeia accepted 50% estimate in their Reconsidered Submission.[76] SPA and KEMA have retained SPA's assumption that the unit price of mesh antennas would be the same as for WiMax.

Energeia's review of KEMA's estimate found each of the following key assumptions to be unsubstantiated:

- every metal meter box will require an antenna;
- 70% estimate is based on a valid statistical sampling technique; and
- SPA's use of metal meter boxes is materially different to other Victorian DNSPs.

Energeia's investigation of other Victorian DNSPs found that Powercor and Jemena had assumed 5-10% of sites would require an external antenna, and that the costs of these antennas were materially different to SPA's estimate with the standard antenna being significantly higher cost and the extended antenna being marginally lower cost for mesh.[77,78] Powercor's unit prices also appear to include installation.

Based on our review and investigation, Energeia have revised its estimate of antenna cost from $3.1 million to $2.5 million, which reflects an adjustment of our assumed incidence from 50% to 10%, as well as an adjustment in our pricing from SPA's WiMax antenna rates to Powercor's mesh specific antenna rates and mix of antenna types (i.e. standard vs. high gain).[79]

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[76] *Comparative Cost of Mesh Solution -050612.xls*, SPA, 6 June 2012, Meter Cost of Switching tab, cell F14

[77] *Powercor Meter & Comms Capex.xls*, Powercor, created 9 August 2011, Contract Unit Costs tab.

[78] *Final Determination, Victorian Advanced Metering Infrastructure Review, 2012–15 Budget and Charges Applications*, AER, October 2011, pages 84-85.

[79] *Powercor Meter & Comms Capex.xls*, Powercor, created 9 August 2011, Contract Unit Costs tab.

6.4.1.5 Network and Backhaul

SPA's revised mesh network and backhaul capex estimate is $42.0 million, which is $2.0 million higher than their previous $40 million Powercor based estimate, and $3.5 million higher than Energeia's own pro-rata adjusted Powercor based estimate of $38.5 million. SPA's revised estimate is based on KEMA's "high level" mesh network design.

KEMA's high level network design purports to apply common radio propagation and fading models for urban, rural and suburban environments to SPA's network area. This is then used to drive their own mesh network model whose output is an estimate of Access Points (APs) per meter for each environment. They then use an unspecified benchmark of 10 relays per access point to complete their estimate. Mesh coverage and antenna requirements are then separately estimated.

Energeia's review of KEMA's documented high level mesh network design assumptions, inputs, methods and outputs has found it is:

- unable to be independently verified ;
- relies on incorrect bandwidth assumptions and biased modelling adjustments; and
- is inconsistent with key mesh network performance benchmarks including meter to access point ratios and network coverage.

The basis for each of our findings is detailed in the following sections.

No Independent Verification

Energeia was not able to review KEMA's model as it was not provided upon request on the basis of being proprietary. This is despite KEMA's claim that it utilises common, industry standard radio planning methods, inputs and assumptions. Energeia's review has therefore had to rely on the quality of KEMA's documentation, which we found to be incomplete.

Incorrect Bandwidth Assumptions

KEMA's 1,639 byte (compressed) per meter read assumption is 2-4 times higher than publically available sources displayed in Figure 25 that include L+G's Australian interval meters.[80][81,82,83] This assumption is used to determine the networks required bandwidth and is a key dimensioning variable and cost driver.

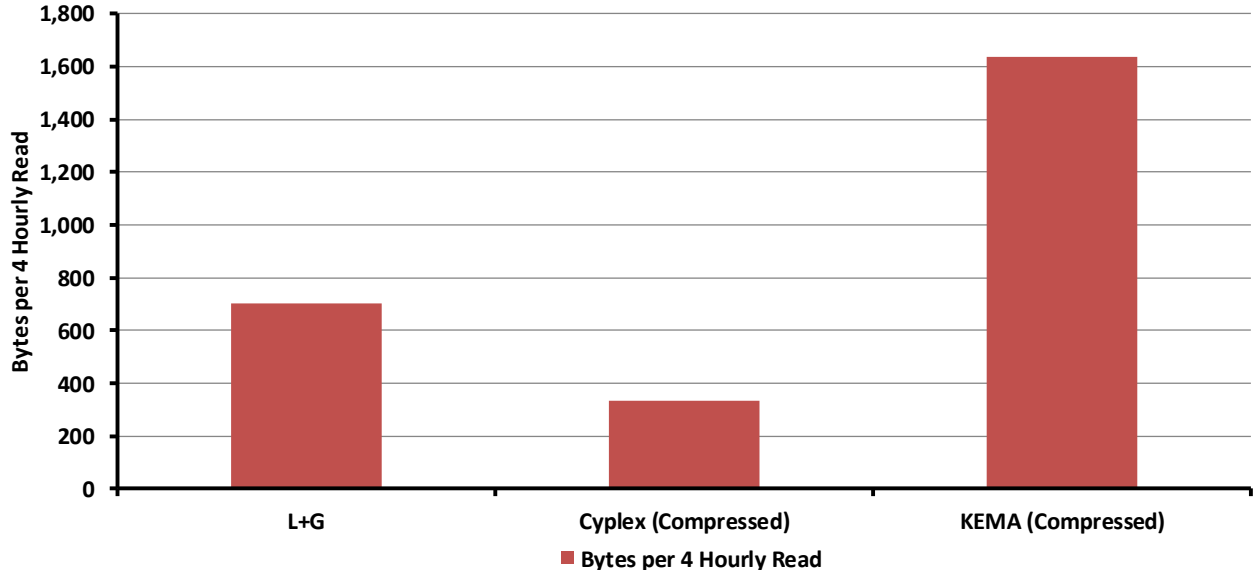
[80] *SP AusNet, Assessment of AMI Communication Options*, DNV KEMA, 14 September 2012, pages 65-67.

[81] *Model EM1000, Single Phase Interval Meter (Brochure),* L+G, 16 September 2008, page 2.

[82] Energeia has assumed L+G is using an effective baud rate of 38kbps.

[83] www.cyplex.com.au/index.php?option=com_content&task=view&id=12&Itemid=28, last accessed 3 November 2012.

Figure 25 – Estimated Meter Reading Bandwidth Requirement Estimates



Source: L+G, Cyplex, KEMA, Energeia

Energeia notes that KEMA appears to assume the transfer of an entire day's meter readings over four hours, but industry practice is to send readings on a rolling 4 hour basis.[84] Correcting for this error would reduce the bandwidth requirement 50%-75% and materially lower network design cost due to fewer access points.

KEMA's provided information in response to Energeia's question to help clarify this issue did not shed any light on the exact assumptions they were making, and whether they were consistent with industry standard meter reading practice and the typical data payload for the assumed meter reading interval.

Biased Modelling Adjustments

Energeia's review has found that KEMA appear to have inappropriately adjusted for some of the Hata model assumptions that are invalid in the case of a mesh network, i.e. tower height and proximity.

The Hata model is valid for towers 20-1,000 meters in height transmitting 1-10km from a base station. KEMA have assumed a negative 20 dB adjustment for the lower height, but do not appear to have accounted for the positive impact of higher average urban (220 meter) and suburban (440-620 meter) customer densities.

The impact of not accounting for the higher average radio densities of a mesh network than those assumed in the standard Hata model would be to underestimate the signal strength between mesh meters and drive down the number of meters per access point – the key cost driver in a mesh network.

Energeia notes that KEMA's mesh network modelling results in a much lower number of mesh Access Points (APs) per meter than Victorian benchmarks, and that this effect is most pronounced in the relatively high customer density urban and suburban network areas (see Figure 26).

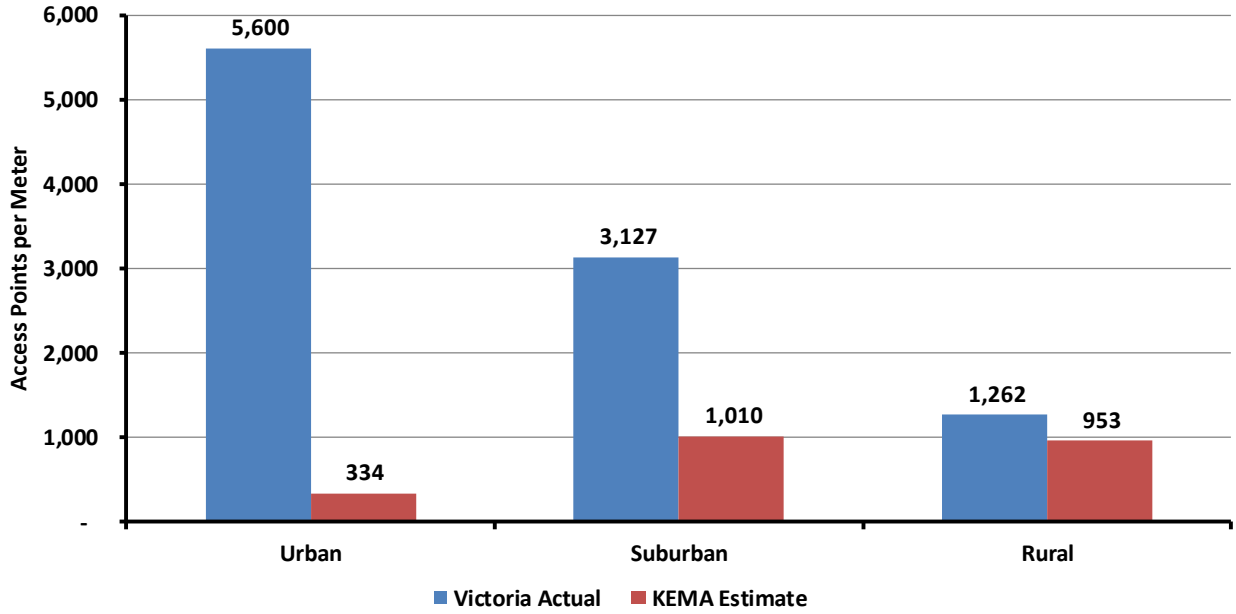
[84] *RF Mesh Systems for Smart Metering: System Architecture and Performance*, L+G, 16 August 2010, page 381.

Inconsistent with Comparable Benchmarks

Although we can't be certain without access to the model, it appears that the combination of KEMA's overestimated bandwidth requirements and inconsistent modelling adjustments are the main drivers of the wide disparity between their modelling results and Victorian benchmarks (see Figure 25).[85]

No explanation is given by SPA or KEMA as to why KEMA's estimates of meters per access point are less than 10% of CitiPower's own estimate for its mostly urban environment, or less than one third of UED and Jemena's estimates for their largely suburban network areas.

Figure 26 – Actual vs Modelled Access Points per Meter by Network Topology



Source: KEMA, CitiPower, PowerCor, Jemena, UED

In Energeia's view, a reasonable commercial business in the circumstance would not rely on the results of any model where it deviated significantly from comparable benchmarks. This is particularly true of a 'black-box' model such as the one KEMA has used. Energeia's review has found that KEMA's model's performance varies significantly relative to comparable real-world experience in Victoria. Energeia therefore conclude that a reasonable commercial business would not have relied upon KEMA's model as the basis for estimating mesh network costs or coverage.

Energeia has therefore not modified our estimate of mesh network and backhaul costs, which have been based on Powercor's estimate, adjusted for differences in Powercor's customer numbers in 2015.

6.4.1.6 NIC Retrofit Costs

SPA's Response Budget for mesh NIC retrofitting costs total $19.8 million. This is $14.8 higher than Energeia's August 2012 estimate but nearly the same as their Reconsidered Budget. SPA's original budget was based on their own analysis, while their current budget is based on KEMA's analysis.

SPA's revised estimate relies on KEMA's advice that installing a mesh NIC in the field requires "additional steps" that would increase the time required by 50% compared to installing a WiMax NIC.[86] This additional

[85] CitiPower and Powercor are used as a proxy for urban and rural, respectively. Jemena and UED are used as a proxy for suburban.

step brings SPA's revised estimate to within 7% of their previous retrofit estimate, which was developed before they were able to rely on KEMA's advice.

In our August 2012 report Energeia reviewed the key differences between installing or replacing a mesh or WiMax NIC in the field. We found there to be no material difference in the process or time involved on site. In the course of investigating NIC retrofit costs, Energeia has also found new information that suggests SPA had previously retrofit WiMax NICs for 72% less than the retrofit price SPA now claims.

Mesh NIC Retrofit and Replacement Steps

The "additional steps" KEMA identifies for a mesh NIC retrofit into an empty meter are listed as network integration, testing, confirmation and firmware upgrades to the meter. These are estimated to require 15 minutes more than a WiMax NIC retrofit into an empty meter.[87] No explanation is provided as to how these steps differ from the WiMax case, which also requires each of these NIC commissioning steps.

KEMA's 15 minutes of "extra steps" involve the upgrading of the meter firmware to enable communication with the new NIC type and the mesh network's discovery, authentication and registration of the NIC on the network. No detailed explanation or timing is given for each of these steps. Instead, the whole lot is estimated by KEMA to take 15 minutes without any supporting documentation.

Energeia's investigation of each of these issues, summarised in the following paragraphs, has re-confirmed our August 2012 view that retrofitting or replacing a mesh NIC is unlikely to be materially different to retrofitting a WiMax NIC in the circumstances:

- Firmware upgrade likely to be required in both mesh and WiMax (no impact)
- Network discovery and registration is required in both mesh and WiMax (no impact)
- Antenna installation estimated to take around the same time in 10% of total sites
- No antenna needed estimated to save around 4 minutes in 90% of replacement sites
- No antenna needed estimated to save around 5 minutes in 90% of retrofit sites
- Fewer mesh antenna installations expected to save around 4 minutes in 90% of sites

Vendors claim firmware should be able to be updated over the air, but Energeia's experience is that site visits are often required.[88] This would be the case for WiMax and mesh NICs in the circumstances, as the WiMax meters would have been deployed before the WiMax enabled firmware could have been loaded. Uploading new firmware to a meter is done through the optical port at high speed and takes less than 1 minute. No evidence has been provided to support the assumption that mesh would take longer than WiMax.

Network discovery, authentication and registration typically takes a matter of seconds as the NIC powers on and cycles through the channels to determine viable AP links.[89] SPA's own communications procedure states

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[86] *Advanced Metering Infrastructure, 2012-15 Budget and Charges Application, SP AusNet's Submission in response to AER's Preliminary View on Amendments pursuant to the Australian Competition Tribunal's Orders, Annexure 5,* SPA, 14 September 2012, page 1.

[87] Ibid page 1.

[88] *Product Data Sheet, Communications Module for Electricity Meters,* SSN, 2 July 2012, page 1.

[89] *RF Mesh Systems for Smart Metering: System Architecture and Performance*, L+G, 16 August 2010.

that this step should take no longer than 60 seconds.[90] No evidence has been provided by SPA or KEMA to support the assumption that mesh would take longer than WiMax.

KEMA advises that replacing WiMax NICs with mesh NICs would take an additional 30 minutes due to the need to "reverse the steps", resulting in a total 75 minutes onsite.[91] Energeia notes that KEMA has estimated 30 minutes based on their assumption of labour rates, which are significantly higher than Energeia's for reasons explained in the following section. Correcting for this brings the KEMA estimate closer to Energeia's, with the main difference being any incremental minutes required for the mesh replacement scenario.

Energeia's review of KEMA's 'additional steps' has found replacing or removing the antenna to be the only steps that would be incremental to the WiMax NIC retrofit base case. SPA's metering communications work procedure indicates that WiMax NIC retrofits include installation of the antenna, which would have occurred 100% of the time. [92] Energeia's review has found that only 10% of mesh sites would require an antenna, meaning an antenna would only need to be replaced at 10% of sites. The other 90% of sites would only need the antenna removed, and only if it would otherwise impede safe access to the meter box.

Assuming a new antenna installation takes around 5 minutes on average, this implies mesh NIC replacements should save up to 4 minutes relative to WiMax NIC retrofits, due to 90% fewer antenna installations. Energeia estimates that less than 1 minute of this overall savings would be offset by rectifying the 90% of WiMax antenna and cabling in situations where they would otherwise impede safe access to the meter or meter board. This amounts to a relative mesh savings of 3 minutes for 90% of sites.

KEMA's estimate assumes that a new cable and mounting hole would be required for the mesh antenna at 70% of sites, which would require removing the old cable and plugging the old hole. Energeia's investigation found that the existing cable fasteners and mounting hole could be used for mesh antennas as both telecommunications solutions use standard cable fasteners and 16-19mm mounting holes.

Energeia's review of the time required to replace a mesh NIC in the 10% of sites requiring an antenna has found it on balance to be the same as retrofitting a WiMax NIC. We estimate that having the cable fasteners and mounting hole already installed would save 1-2 minutes of the 5 minute average installation time for a WiMax NIC antenna installation into an empty meter. We estimate that this savings would be offset by the 1-2 minutes required to remove the WiMax antenna and cable and to restring the mesh antenna cable through the cable fasteners and mounting hole.

WiMax NIC Retrofitting Costs

Energeia's review of NIC retrofitting costs was unable to substantiate SP AusNet's submitted WiMax NIC retrofit cost. Our review of materials supplied by SPA in support of their estimate found that:

- the purchase orders were unsigned,
- did not include unit pricing for NIC retrofitting; and
- did not relate to the NIC retrofits completed as at 28 February 2011.

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[90] *Manage Meter Comms Failures in Field, Work Instructions Report (Draft)*, SPA, 15 July 2010, page 22.

[91] *Advanced Metering Infrastructure, 2012-15 Budget and Charges Application, SP AusNet's Submission in response to AER's Preliminary View on Amendments pursuant to the Australian Competition Tribunal's Orders, Annexure 5,* SPA, 14 September 2012, page 2

[92] *Response to Follow-up to Information Request 7 of 25 October 2012*, SP AusNet, 1 November 2012, pages 3-4.

Energeia's review has found that materials provided by SPA following the AER's issuance of a compulsory order indicate SPA's NIC retrofit costs have been 72% lower than previously claimed.[93] This is based on the total retrofit project value and number of installations.

Based on the outcomes of our review and investigation, Energeia have rejected SPA's and KEMA's estimates of materially higher mesh NIC retrofit costs. Instead, we have updated our estimate of mesh NIC retrofit costs from $[redacted] to $[redacted] per retrofit based on newly acquired information regarding SPA's apparent WiMax NIC retrofit costs. This is the primary driver of our $3.7 million reduction in NIC retrofit capex.

6.4.1.7 Mesh NMS Costs

SPA's Response Budget assumes an NMS capex cost of $27.4 million in present value terms, which is $14.7 million higher than Energeia's Jemena-derived, August 2012 estimate of $12.7 million. Energeia notes that SPA's new estimate is significantly higher than the $20.1 million estimate contained in their Reconsidered Submission, although the latter figure only included capex up to 2015. Energeia notes that SPA's previous estimate was also based on Jemena's IT costs, an assumption they have now moved away from.

SPA cites KEMA as the basis of their estimate, and KEMA in turn cite typical but unspecified utility costs as the basis for their own estimates.[94] The relevance of KEMA's benchmark to SPA's circumstances is therefore uncertain, as is its robustness.

Energeia's review and investigation of KEMA's cost modelling approach and results has found them to be:

- unsubstantiated and materially higher than all other Victorian industry estimates;
- 30% higher than the actual pricing offered to SPA by SSN; and
- based on an inappropriate variable cost model given the largely fixed costs involved.

Each of our findings is detailed in the following sections.

Unsubstantiated Benchmark

KEMA's cost assumptions are not referenced to any specific mesh network implementations, rather they are stated as being "typical". Given the significant role this benchmark plays in KEMA's overall mesh cost effectiveness, Energeia would have expected the use of benchmark to be thoroughly supported.

Energeia's research has found that most overseas mesh implementations completed or nearly completed as at 28 February 2011 would be found in Ontario, California and Texas. We were unable to locate discreet estimates of NMS build costs other than for Victoria, and were therefore unable to test KEMA's claim of their unreferenced estimates being typical for a comparable business in the circumstances.

Materially Higher than Actual Tendered Pricing

Energeia reviewed the actual NMS licensing and setup prices offered by SSN to SPA for its mesh NMS and found them to be 30% lower than KEMA's assumed costs.[95] Energeia recognise that these prices were part of documentation received by SPA in late 2011. We nevertheless believe they are relevant because they represent the pricing that would have been made available to SPA had it requested it during its review.

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[93] *Communication Module Retrofit for the AMI Program To Establish a Period Order Contract (POC), Order Approval Request*, SPA Expenditure Approval Committee, 3 May 2010.

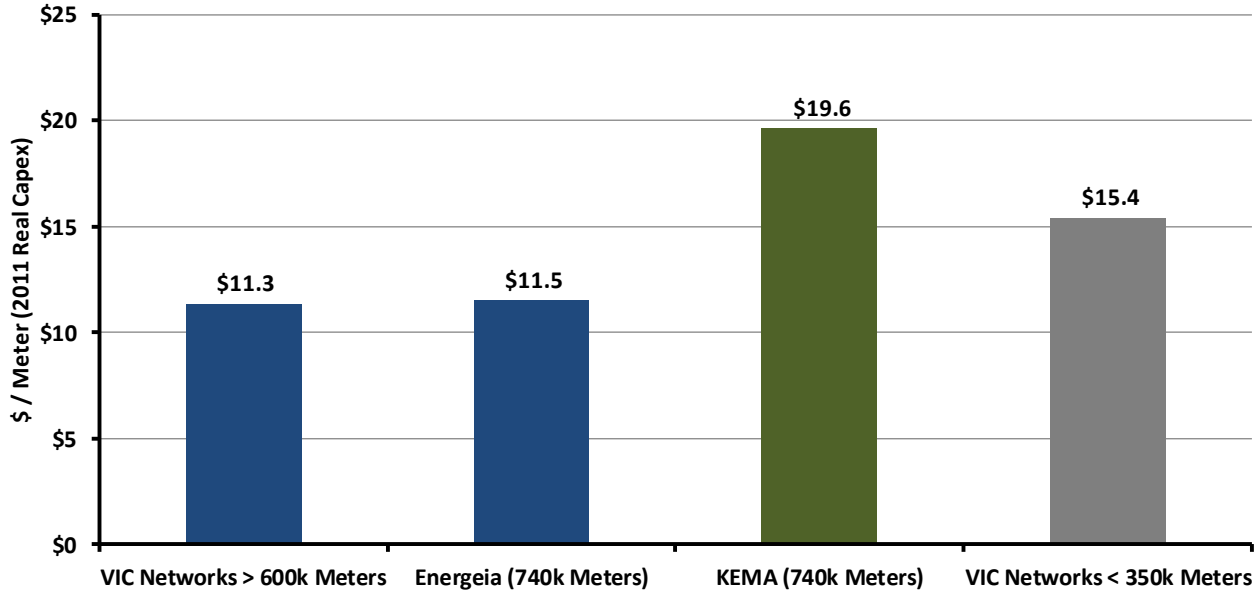
[94] *SP AusNet, Assessment of AMI Communication Options*, DNV KEMA, 14 September 2012, page 31.

[95] *5.2 Schedule 18 - Pricing Schedule.xlsx*, SSN, September 2011, MMS costing tab.

Inconsistent with Comparable Benchmarks

Figure 27 compares KEMA's unspecified SPA benchmark against large and small Victorian DNSPs. These values reflect Victorian implementation cost estimates to 2015, adjusted on a pro-rata meter basis.

Figure 27 – Normalised KEMA, Energeia and Victorian NMS Capex Estimates (2009-2015)



Source: KEMA, CitiPower, PowerCor, Jemena, UED

The analysis presented in Figure 26 reveals the significant role of fixed costs on per meter costs, with smaller network per meter costs 50% higher than larger networks. If costs were truly variable, meter costs per customer would be comparable regardless of the number of meters. It also reveals KEMA's benchmark is nearly double that of the larger Victorian networks which would include SPA.

Despite SPA using them for this purpose in their Reconsidered Submission, SPA and KEMA claim in the Response Submission that using Jemena as a comparable IT benchmark is inappropriate because their cost sharing arrangements enable a lower cost structure than SPA would be able to achieve.[96,97]

Energeia's investigation into these claims has found the Jemena and SPA shared a common IT service provider on 28 February 2011, owned by SPA. According to its website displayed in Figure 26, EBS was setup in October 2008 to provide a shared IT service across Jemena and SPA.[98] According to internal SPA documents, EBS is the primary IT service provider for their AMI program.[99]

Energeia has therefore concluded that a reasonable business in the circumstances would assume IT capex costs comparable to Jemena on the basis of a shared solution. Vendor software licensing arrangements means that Jemena's NMS licensing costs should be adjusted on a pro-rata basis to account for SPA's larger

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[96] *Advanced Metering Infrastructure, 2012-15 Budget and Charges Application, SP AusNet's Submission in response to AER's Preliminary View on Amendments pursuant to the Australian Competition Tribunal's Orders, Annexure 5,* SPA, 14 September 2012, page 17.

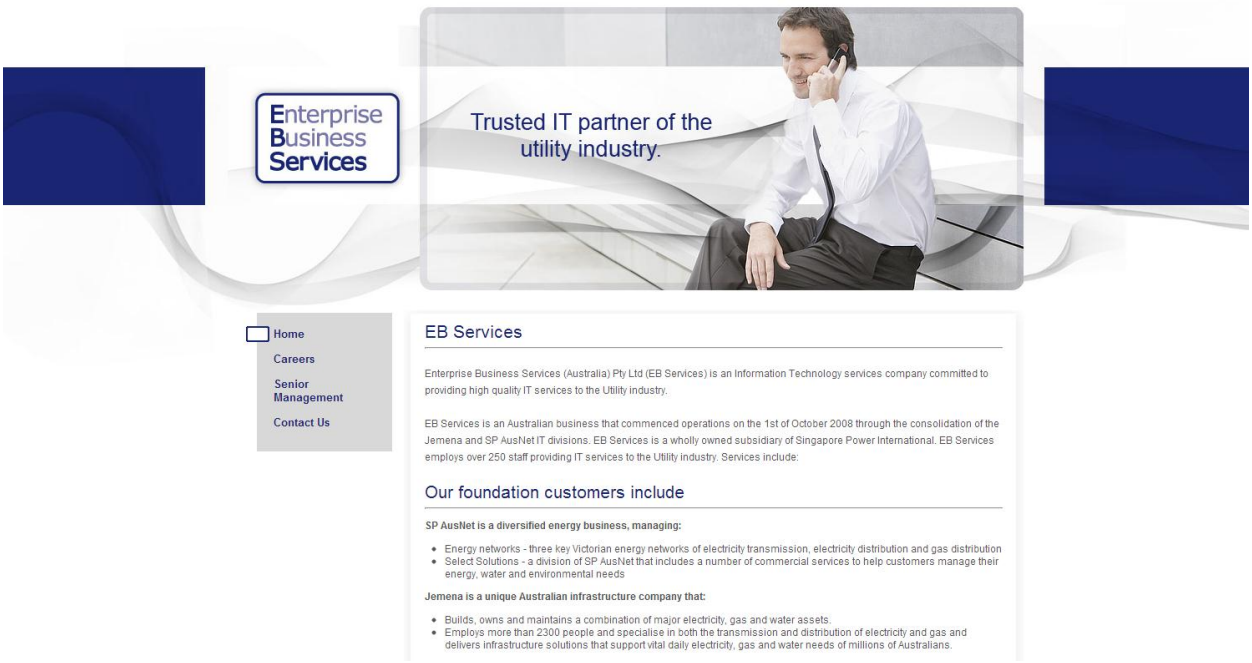
[97] *SP AusNet, Assessment of AMI Communication Options*, DNV KEMA, 14 September 2012, page 37.

[98] www.eb-services.com.au, last accessed 16 November 2012.

[99] [redacted] SPA, 22 March 2011, page 9.

network. It is important to note that this approach results in a cost estimate that is consistent with the other, large DNSPs in Victoria shown in Figure 27.

Figure 28 – Website of SPA's Shared Internal IT Service Provider with Jemena



Source: www.eb-services.com.au

Based on the results of our review and investigation, Energeia's view is that our previous estimate based on Jemena's total estimated IT costs remains sound and possibly conservative given Jemena has the highest NMS capex in Victoria.

While some costs JEN shared with UED during the original design and build phases may need to be repeated for SPA, we believe these are likely to be more than offset by the benefits of:

- previous experience and learning;
- project outputs including work plans, technical specifications, testing scripts, etc.; and
- the existence of a proven IT and integration architecture.

Energeia notes that our view of a relatively straightforward NMS build and integration project is in part based on our previous assumption that JEN and SPA have both implemented an Enterprise Service Bus (ESB) as part of a Service Orientated Architecture (SOA).[100] This would mean that the new NMS could be integrated with the ESB only and not have to develop point-to-point integration points with all impacted systems.

[100] *Review of SP AusNet's WiMax Related Expenditure, Prepared by Energeia for the Australian Energy Regulator*, Energeia, August 2012, page 24.

6.4.2 Operational Expenditure

Energeia have decreased our mesh opex estimate by $14.3 million relative to our August 2012 report, which is mainly driven by a $11.9 million reduction in our estimate of network backhaul costs. Our NMS and MDMS opex cost estimates have not changed.

Our revised AMI opex estimate is $93.6 million lower than KEMA's, which is mainly due to their $82.4 million higher mesh NMS opex estimate.

6.4.2.1 Mesh NMS

SPA's revised mesh NMS opex estimate is $98 million, which is comprised of $69.1 million in SPA resources, $10.6 million in annual vendor charges, and $18.3 million in software maintenance charges. This compares to Energeia's August 2012 estimate of $15.5 million based on the full NMS costs of Jemena. Licensing costs have been adjusted on a pro-rata basis to reflect SPA's larger network size, i.e. number of meters.

Energeia's review and investigation of KEMA's estimate of NMS operating costs has found it:

- unsubstantiated,
- based on a flawed variable cost model, and
- materially out of line with comparable Australian DNSP benchmarks.

Each of our findings is detailed in the following sections.

Unsubstantiated Benchmark

KEMA's estimate is based on a variable cost approach that assumes $22/meter/year for utility personnel (reducing 10% per year post 2013), $[redacted] meter/year for software (IT) support, and 20%/year/capex for software maintenance.[101] KEMA does not define these categories nor provide specific references for the benchmarks used. Energeia cannot therefore be certain what these benchmarks reflect or their validity.

Flawed Modelling Approach

In Energeia's experience, costs associated with IT applications other than licensing and software maintenance fees are typically fixed in nature and therefore scalable. These costs are in our view the only significant NMS IT cost that would materially increase with network size.

Estimates based on a variable cost structure should therefore be treated with caution except in the case of a managed service. In this case, KEMA uses their variable cost model to estimate NMS support labour opex of $14.3M in 2014, implying a headcount of approximately 100 personnel, which is significantly higher than the 5 estimated by CitiPower and Powercor, for example.[102]

Inconsistent with Comparable Benchmarks

Energeia tested the reasonableness of KEMA's NMS cost estimate by comparing it to the other Victorian DNSPs on a per meter basis (see Figure 29).

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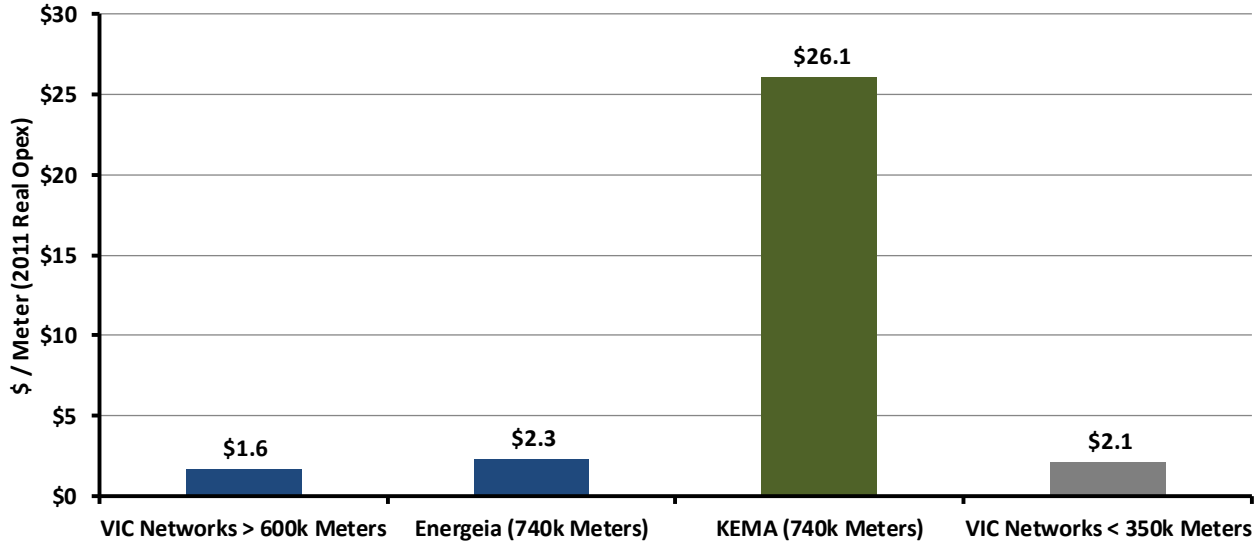
[101] *SP AusNet, Assessment of AMI Communication Options*, DNV KEMA, 14 September 2012, page 31.

[102] Based on an independent labour rate analysis of average MDM IT labour rates and AMI Comms Control headcount by Deloitte for Citipower / Powercor titled – "Cost Model for AER determination response"

Figure 29 – Normalised KEMA, Energeia and Victorian NMS Opex Estimates (2015)



Source: KEMA, Powercor, CitiPower, UED, Jemena, Energeia

As was the case with NMS capex, Energeia found KEMA's variable pricing approach generated materially higher estimates than comparable Victorian benchmarks. Although we cannot be certain due to the lack of information regarding KEMA's own benchmarks and modelling approach, Energeia believes the variation is largely due to KEMA's use of a variable cost modelling approach for a largely fixed cost item category.[103]

Based on the outcomes of our review and investigation of KEMA's NMS opex estimate, Energeia have concluded that our previous estimate based on a pro-rata adjustment to Jemena's NMS opex remains the most appropriate approach in the circumstances.

We believe our estimate accounts for SPA's circumstances because it is based on the costs delivered by a shared IT service provider and adjusted to account for higher maintenance and license maintenance costs that the NMS vendor would charge SPA due to their larger size.

6.4.2.2 Backhaul Communications

SPA has submitted a revised estimate of $17.4 million for lifetime mesh network backhaul opex based on KEMA's modelling of SPA's assumptions, which is $8.9 million lower than Energeia's August 2012 estimate. SPA's Reconsidered Submission did not consider the lifetime costs of mesh backhaul. Instead, SPA based its 2012-15 mesh backhaul estimate on a pro-rata adjustment of Powercor's backhaul opex for 2015.

Energeia's review and investigation of mesh backhaul costs has found SPA's assumed 3G backhaul costs for meters is based on the miscalculation already described in Section 6.3.2.1. Energeia has also found SPA's assumed 3G meter and AP volumes to be significantly overstated due to their mesh coverage and access point ratio assumptions already addressed in Section 6.4.1.5.

Correcting for the identified issues in SPA's volume and pricing assumptions, Energeia has calculated a revised lifetime mesh backhaul opex estimate of $14.5 million over the period. This estimate is based on a

[103] Energeia expects NMS opex to be a relatively fixed cost because the number of staff needed to maintain it, like most software applications, is not expected to scale with the level of information in the system.

bottom up modelling of annual backhaul costs, and is $11.9 million lower than our previous estimate, which was based on the same pro-rata adjustment of Powercor's backhaul opex estimate relied upon by SPA.

6.4.2.3 Communications Operations

KEMA's 15 year communications operations opex estimate is $15.1 million, which initially appears consistent with Energeia's August 2012 estimate of $15.9 million. However, KEMA's estimate is driven by its mesh network design assumptions, which include about double the access points and relays than Energeia has found to be reasonable in the circumstances.

KEMA's communications operations model is driven by the number of hours per year they assume is required to maintain access points and relays (4 hours), multiplied by the number of meters and access points deployed (9,204 by 2015), and divided by the average hours per year per field technician (1,700).

Energeia's review and investigation of KEMA's mesh network operations opex estimate has found it:

- is based on unsubstantiated and incomplete cost assumptions, and
- varies materially from comparable Victorian DNSP benchmarks.

Each of our findings is detailed in the following sections.

Unsubstantiated Benchmark

KEMA do not provide a reference for their assumed field hours per network device, which is constant over time. Energeia have been unable to substantiate KEMA's assumption, and does not see the need for field resources to operate or maintain the network as it is all done remotely. The exception to this rule would be during the network's initial rollout when it is being stabilised as part of the deployment capex.

Incomplete Model

KEMA's network operations model does not appear to include costs associated with managing network faults or operating the communications network itself. As each meter is also a communications node and potential relay for other communications nodes, Energeia's view is that managing these devices forms a critical element of any model of communications network opex.

Inconsistent with Comparable Benchmarks

Energeia developed a bottom-up field resourcing model based on Victorian DNSP benchmarks where available to test the reasonableness of KEMA's estimate.

The key assumptions we have relied upon and their sources are displayed in Figure 30. The number of NMS operators, engineers and managers required has been based on Powercor's approach and reflects SSN's own recommendations.[104] Energeia notes that as is the case with Powercor and CitiPower, SPA could see lower engineering and management costs if it shared a communications operations function with Jemena.

[104] *Advanced Metering Infrastructure, Amended Submitted Budget and Charges Application 2012-15, Annexure 4 - Deloitte Model.xlsx*, Powercor, 26 August 2011, O-2.2 ACC exp 12-15 tab.

Figure 30 – Key Network Operations Cost Modelling Assumptions

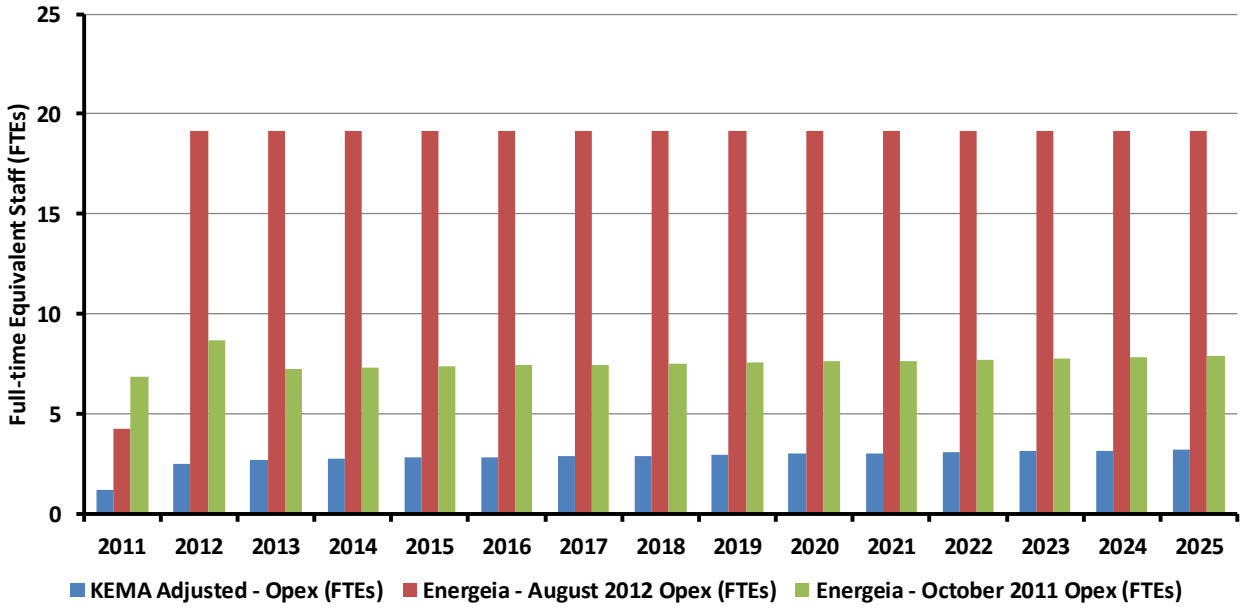
Assumption	2011-2013	2014-2025	Source
Comms Fault Rate	0.05%	0.03%	Powercor
Repair Times (Minutes)	45	30	Energeia
Annual Hours per Field FTE	1,700	1,700	KEMA
Non-Field Staff (FTEs)	5	5	Powercor

Source: KEMA, Powercor, Energeia

No estimate of average fault response times for field resources have been provided by SPA, so Energeia has developed an estimate based on antenna installation and NIC retrofit costs.[105] Our model assumes communications faults are initially addressed through higher gain antennas until the network is fully deployed in 2013, when we assume repair times largely reflect average travel times and NIC replacement costs.

Figure 31 compares Energeia's previous and revised resourcing profiles with KEMA's. Energeia notes that our original expenditure profile was based on Powercor's 28 February 2011 budget, which also included their Technology Assurance Group (TAG). This activity, which represented around 6 FTEs, was later moved by Powercor to capex and largely accounts for Energeia's higher previous estimate.[106]

Figure 31 – A Comparison of KEMA and Energeia Network Operations Resourcing Profiles



Source: KEMA, Powercor, Energeia

In summary, Energeia has revised its estimate of mesh network operations using a bottom-up resourcing model that in our view more reasonably reflects SPA's circumstances with respect to their metering and network deployment as at 28 February 2011. Energeia's estimate of the 15 year PV of mesh network opex is now $13.4 million, representing an average of 7-9 FTEs over the period.

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[105] Our fault response time estimates include an assumption of additional drive time over and above the time assumed for a more geographically concentrated and optimised retrofit program.

[106] *Powercor & CitiPower Communications Operations Opex.xls, Powercor, 26 August 2011, Project 13.6 AMI Comms Ctrl tab.*

Appendix 1 – Detailed Assessment

See attachment: *Energeia Review of SP AusNet WiMax Expenditure Phase II 130128v1.xlsx*

Appendix 2 – International Mesh Network Design References

1. Richard Tell Associates, Inc., An Analysis of Radiofrequency Fields Associated with Operation of the Hydro One Smart Meter System, 13 October 2010, page 3.
2. Electric Power Research Institute, An Investigation of Radiofrequency Fields Associated with the Itron Smart Meter, Technical Report, Dec 2010, page 1-1.
3. Powercor Australia, Advanced Metering Infrastructure, Budget Application 2009-11, version 7-2, 27 February 2009, page 36.
4. Electric Power Research Institute, Characterization of Radiofrequency Emissions From Two Models of Wireless Smart Meters, Technical Report, Dec 2011, pages 1-2.
5. Oncor, Overview of Oncor's Advanced Metering System, December 2011, page 17.
6. Black&Veatch, Advanced Metering Infrastructure Evaluation, Final Report, Completed for Commonwealth Edison Company, July 2011, page 71.
7. Theo Woodard, Center Point Energy Presentation, Proven Smart Grid Communication Network Solutions For Advanced Meter Systems and the Intelligent Grid, April 2012, page 5.
8. Baltimore Gas and Electricity, Presentation for the 2011 GridWeek, page 3.
9. Jemena Asset Management, Response to the AER Draft Determination on the Victorian Advanced Metering Infrastructure Review, 2012 – 2015 Budget and Charges Applications, 26 August 2011, page 40.
10. Michael J Martin, Mesh Network Designs, Elster vs Sensus, IBM, page 2.
11. Citipower, Advanced Metering Infrastructure, Budget Application 2009-11, version 7-3, 26 February 2009, page 36.

Appendix 3 – International AMI Business Case References

1. Southern California Edison, Edison SmartConnect Deployment Funding and Cost Recovery, Exhibit 3: Financial Assessment And Cost Benefit Analysis, July 2007.
2. Application of the Connecticut Light and Power Company to Implement Time-of-use, Interruptible or Load Response, and Seasonal Rates – Review of Metering Plan [05-10-03RE01], CL&P AMI and Dynamic Pricing Deployment Cost Benefit Analysis, Order No.4, October 2010.
3. ConEdison, Plan for Development and Deployment of Advanced Electric and Gas Metering Infrastructure by Consolidated Edison Company of New York, Inc. and Orange and Rockland Utilities, Inc., Prepared for the State of New York Public Service Commission March 2007.
4. PECO Energy Company, Petition of PECO Energy Company for Approval of its Smart Meter Technology Procurement and Installation Plan, Prepared for the Pennsylvania Public Utility Commission, August 2009.
5. KEMA Netherland B.V., Smart Meters in the Netherlands – Revised Financial Analysis and Policy Advice, July 2010.
6. UK Department of Energy and Climate, GB-wide Smart Meter Roll Out for the Domestic Sector, July 2010.
7. BC Hydro, Smart Metering & Infrastructure Program Business Case, 18 January 2011.
8. Division of Ratepayer Advocates, Case Study of Smart Meter System Deployment – Recommendations for Ensuring Ratepayer Benefits, March 2012.
9. Capgemini, Smart Meter Business Case Scenario for Denmark, Developed for the Danish Energy Association, September 2008.

Appendix 4 – International End Points by Vendor References

1. Gigaom.com, Trilliant Raises a Whopping $106M, 15 July 2010.
2. Gigaom.com, Silver Spring Networks raising $30M, despite planned IPO, 13 December 2011.
3. Gigaom.com, Smart Grid Startups Compete for Highly Variable Venture Funding, 14 March 2012.
4. Silver Spring Networks, Amendment No.8 to Form S-1: Registration Statement Under The Securities Act of 1933, 14 September 2012.
5. [redacted]
6. [redacted]
7. AusGrid, Press Release: Smart Grid Smart City Underway After Agreement Signed, 8 October 2010.
8. Silver Spring Networks, Press Release: PG&E Selects Silver Spring Networks for Smart Grid Networking, 29 July 2008.
9. Silver Spring Networks, Press Release: Australia's Jemena and UED select Silver Spring Networks for Smart Grid, 15 April 2009.
10. Silver Spring Networks, Press Release: Miami proposes to lead the nation in energy efficiency with $200 million Smart Grid initiative, 20 April 2009.
11. Silver Spring Networks, Press Release: Australia's CitiPower and PowerCor Select Silver Spring Networks for Major Advanced Metering Infrastructure Rollout, 9 June 2009.
12. Silver Spring Networks, Press Release: Silver Spring Networks Selected for AEP's gridSMART Projects, 20 October 2009.
13. Silver Spring Networks, Press Release: Western Power to Deploy World-Class Smart Energy Platform in Rural Australia, 23 March 2010.
14. Silver Spring Networks, Press Release: Guelph Hydro Electric Systems Selects Silver Spring Networks for Smart Grid Rollout, 15 April 2010.
15. Silver Spring Networks, Press Release: Silver Spring Networks to Assist Indianapolis Power & Light Company with Smart Grid Roll Out, 30 August 2010.
16. Silver Spring Networks, Press Release: Baltimore Gas and Electric Company Selects Silver Spring Networks for Smart Grid Initiative, 1 September 2010.
17. Silver Spring Networks, Press Release: Silver Spring Networks Rolls Out Smart Grid Initiative in Oklahoma, 23 March 2011.
18. Silver Spring Networks, Press Release: Silver Spring Networks and OG&E Electric Services Partner to Deploy Smart Grid Technology, 21 January 2009.
19. Silver Spring Networks, Press Release: Silver Spring Networks selected for Smart Grid Deployment in Florida and the Carolinas, 24 January 2012.
20. Silver Spring Networks, Press Release: ComEd and Silver Spring Networks Expand Successful Smart Grid Program, 16 February 2012.
21. Silver Spring Networks, Press Release: AES Eletropaulo, Silver Spring Networks and Senergy/Nansen Announce Deployment of Successful Smart Grid Technology Project in São Paulo Community, 10 April 2012.

22. Silver Spring Networks, Press Release: Silver Spring Networks Selected by CPFL to Deploy Smart Grid Network, 30 July 2012.
23. Unison, Annual Report 2012, 22 June 2012
24. Unison, Press Release, World Class Solution Heading to Unison's Regions as Smart Grid Enabler, 27 August 2012.
25. Silver Spring Networks, Press Release: Silver Spring Networks Surpasses One Million Australian Homes and Businesses Connected With IPv6-based Smart Energy Network, 10 August 2012.
26. United Energy Distribution, Distribution Determination 2011-2015, September 2012.
27. Jemena Electricity Networks (Victoria) Ltd, Distribution Determination 2011-2015, September 2012.
28. Citipower Pty, Distribution Determination 2011-2015, September 2012.
29. Silver Spring Networks' Website http://www.silverspringnet.com/customers/, 23 November 2012

Appendix 5 – Detailed Responses to Selected Claims

In their Response submission SPA raise a number of specific arguments and objections in relation to Energeia's assumptions, reasoning and conclusions. This section aims to provide specific commentary on what Energeia sees as the most material of the issues raised.

1. *SPA make a number of claims that the theoretical timetable developed by Energeia for a mesh based replacement network is unrealistic.*

   In the experience of Energeia's personnel, our timetable represents typical industry practice. It is not unreasonable to expect SPA to meet this standard given that SPA has the benefit of:

   - having an established workforce with experience in each of smart metering, IT integration and radio communications; and
   - being able to utilise an alternative technology that has been successfully implemented by 4 other utilities in Victoria.

   Accordingly, the vendor would also have the benefit of significant local experience and learning.

   - The SPA Board had already been presented with a similar contingency approach; and
   - The strategy would align with SPA's requirement to avoid further reputational damage by achieving the earliest possible target date.

   Much of the objection to our timeframe comes from an estimated timing of a reasonable procurement process. As stated previously, we do not accept that an open tender would have been appropriate in this instance for a number of reasons including:

   - No other mesh vendor besides SSN has deployed in Australia;
   - 3 other utilities in Victoria have conducted trials of competing mesh technology, and in each instance they have selected SSN. We understand that this is due in part to the better ratio of access points to meters, which results in lower overall costs.
   - A number of the major meter vendors in Australia already have experience in integrating and supporting SSN in their product; and
   - SPA's own internal IT services division, EBS, has already implemented the SSN NMS.

   What has not been acknowledged by SPA is that in order to complete a budget re- evaluation, a significant portion of the negotiation process would have already been undertaken prior to entering into formal negotiations.

   SPA would have had the negotiating benefit of already having an incumbent smart metering technology (WiMax). The vendor would have understood that their value proposition needed to be compelling enough to convince both the SPA Board and the AER that it was prudent to walk away from a significant existing sunk investment.

   In the event that SPA did not believe SSN was offering a competitive price, they always had the credible threat of going to tender. This would have been supported by SPA's access to key pricing information on the Jemena deployment, which occurs due to its common ownership structure.

   In this context Energeia believe it is reasonable to assume that one month is sufficient to formalise the negotiated SSN pricing and terms into a formal contract.

2. *SPA claim that the Energeia timetable has failed to take into account the task of retrofitting mesh NICs into the existing WiMAX meters.*[107]

   This criticism fails to acknowledge that mesh NIC retrofits and new mesh meter installations could be conducted in parallel due to the different skill set requirements for the respective tasks. SPA could access NIC retrofit resources from a number of 3rd parties. UXC and Electrix workforce consists mainly of qualified electricians, which are not required for a NIC retrofit.

3. *SPA claim that Energeia have failed to account for the different terrain of SPA's coverage area when compared to the benchmark based on the Powercor network.* [108]

   Unquantified differences are used to justify SPA's estimate of mesh providing a lower 93% coverage when compared to Energeia's estimate of 97% coverage.

   Energeia acknowledge that there are some small pockets of population in SPA's network area that are in geographical areas that are more challenging to radio networks than that of Powercor. These are mainly in mountainous areas where meter-to-meter communication is blocked by the landmass.

   Energeia has therefore calculated the number of households in these more challenging radio environments. Our calculations show these unique geographical areas account for less than 1% of SPA's addressable metering base. This is well inside the 3% of the meter population that Energeia has allowed for as being outside the total coverage of a mesh network.

   Energeia also reiterates that SPA has an average customer density that is higher than Powercor. This single characteristic is widely recognised as being the greatest determinant of mesh network costs. Mesh networks by their very nature are more cost effective as customer density increases.

   Accordingly, by using Powercor as the comparable benchmark, Energeia believe we have been conservative in assuming SPA can achieve the same ratio of meters to access points and relays.

4. *KEMA claims Energeia's analysis is weakened by the lack of a sensitivity analysis.*[109]

   Energeia dispute that the type of sensitivity analysis KEMA has performed is required as part of a robust methodology in this instance. In our experience deploying emerging energy technology as part of pilots and trials, a sensitivity analysis of this type would only typically be undertaken for an immature or very early stage project where there are little or no comparable benchmarks to refer to.

   Energeia personnel have significant experience developing business cases and cost-benefit assessments in Australia, including smart meter business cases. In our experience, the level of uncertainty and risk typically declines with the stage of the project's development due to the acquisition of more accurate pricing and other inputs used in the analysis.

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[107] SP Ausnet Assessment of AMI Communications Options, DNV KEMA, 14 September 2012, page 3.

[108] Ibid page 27.

[109] Ibid page 18.

Appendix 6 – About Energeia

Energeia Pty Ltd (Energeia) based in Sydney, Australia, brings together a group of hand-picked, exceptionally qualified, high calibre individuals with demonstrated track records of success within the energy industry and energy specialist academia in Australia, America and the UK.

Energeia specialises in providing professional research, advisory and technical services in the following areas:

- Smart networks and smart metering
- Network planning and design
- Policy and regulation
- Demand management and energy efficiency
- Sustainable energy and development
- Energy product development and pricing
- Personal energy management
- Energy storage
- Electric vehicles and charging infrastructure
- Generation, including Combined Heat and Power (CHP)
- Renewables, including geothermal, wind and solar PV
- Wholesale and retail electricity markets

The quality of our work is supported by our energy-only focus, which helps ensure that our research and advice reflects a deep understanding of the issues, and is often based on first-hand experience within industry or as a practitioner of theoretical economic concepts in an energy context.

Energeia's Relevant Experience

Energeia's recent smart metering and smart grid related engagements are summarised below.

Review of Victorian DNSPs' 2009-11 Advanced Metering Infrastructure Budgets

The Australian Energy Regulator engaged Energeia to undertake a review of Victorian Distribution Network Service Providers' (DNSPs) 2009-2011 budget proposals for Advanced Metering Infrastructure against the regulatory criteria specified in the revised Order in Council.

Review of Advanced Metering Infrastructure Enabled Load Control Performance Levels

A Victorian DNSP engaged Energeia to undertake a review of current load control enabling performance levels and to make recommendations considering the impact of updated use case benefits and communications cost information.

Review of Overseas Regulation of Smart Metering Information for Customers

An Australian jurisdictional regulator engaged Energeia to review the arrangements in place in comparable overseas jurisdictions and the experience of EnergyAustralia during their roll out of interval meters and ToU pricing to nearly 140,000 customers using between 15MWh and 160MWh per annum (p.a.).

Best Practice Regulation of Smart Metering

A smart metering vendor engaged Energeia to identify policy and regulatory options for improving the smart meter deployment in Victoria. The engagement included a detailed review of leading international smart metering deployments in California, Texas, Pennsylvania, Ontario and Sweden.

International Smart Meter Based Energy Retailing: Review and Recommendations

A top-tier Australian energy retailer engaged Energeia undertake a review of international deployments of smart metering and ToU based products to identify innovation and key lessons learned. The purpose of the engagement was to identify innovative products that the retailer could consider deploying across its smart meter enabled customer base.

Smart Meter Enabled Retail Product Development and Trialling

An Australian energy retailer engaged Energeia to support the design, development, justification and trialling of three innovative smart meter enabled electricity pricing plans that would save customers money, improve the retailer's margin and reduce customer churn.

Smart Meter Enabled Network Product Development and Trialling

A NSW DNSP engaged Energeia to support the design, development, justification and trialling of innovative, smart meter enabled network tariffs that could reduce network investment costs, save end user customers money and improve retailer margins. The engagement included the design of a robust sampling approach that would enable the rigorous quantitative assessment of product impacts on key performance indicators.

Review of Advanced Metering Infrastructure Related Threats and Opportunities in Australia

A top-tier Australian energy retailer engaged Energeia to undertake a review of emerging threats and opportunities in the electricity sector as it transitions to a more intelligent platform (smart grid) over the next five to ten years. The key area of focus was the deployment of advanced metering infrastructure and related customer energy technologies, products and services.

Smart Grid Design and Development

Energeia was engaged by a major Australian utility to develop a smart grid solution for minimising the costs and carbon intensity of generating power in a remote island energy system. The engagement included designing a fit-for-purpose smart grid concept, developing functional and technical specifications, supporting market engagement, modelling project costs and benefits, and developing the project business case.

Smart Grid, Smart City Proposal Support

Energeia was engaged by a DNSP to support the development of their winning proposal for the $100M Smart Grid, Smart City project. The engagement included the development of a retailer value proposition and engagement strategy, development of the project's delivery and operating models, and development of related proposal documentation.

Network of the Future Design

A top tier field services provider engaged Energeia to support the development of a Network and Substation of the Future concept design and development roadmap. The engagement included researching international best practice, facilitating a number of concept development workshops with project stakeholders, developing the client proposal, and sourcing the skilled resources needed to deliver it.

Future Operating Model Design

An Australian DNSP engaged Energeia to support the development of their Future Operating Model blueprint and roadmap to 2026. The engagement included facilitating a series of whole-of-business workshops to gain strategic alignment on the DNSP's future customers, network and organisation, and the development of documentation to support stakeholder engagement and communication.

Embedded Networks for Electric Vehicles

Energeia was engaged by a leading electric vehicle infrastructure company to review the existing market arrangements around embedded networks and to provide recommendations regarding how these arrangements may be used to support the deployment of electric vehicle charging infrastructure.

Appendix 7 – Resumes of Key Personnel

EZRA BEEMAN

MANAGING DIRECTOR

SUMMARY OF EXPERIENCE

Ezra Beeman has consulted on business strategy, asset transactions, contract structuring, energy and information technology, market design and industry regulation for company directors, executives and managers of major oil, gas and power companies across Europe, the Americas and the Asia Pacific region.

Ezra's industry career has spanned a number of strategic and internal advisory roles where he helped propel EnergyAustralia into a position of international leadership in smart metering, products and services. During his time with the company, he built a reputation for tackling some of the company's toughest challenges and achieving exceptional results.

In addition to his consulting and utility executive experience, Ezra is an internationally recognized expert on advanced metering infrastructure, wholesale and retail markets, customer research, and demand response.

QUALIFICATIONS

- Masters of Applied Finance, Macquarie University, Australia
- Bachelor of Arts in Economics and Philosophy (Hons), Claremont McKenna College, USA

SUMMARY OF EXPERIENCE AT ENERGEIA

As the Managing Director, Ezra has overall responsibility for achieving the company's vision of becoming Australia's leading specialist consultancy and industry research firm. Ezra is responsible for setting and delivering the company's research agenda and developing new business. In this role his major achievements have been:

- Advising and supporting 21 companies pursuing ground-breaking outcomes in FY10, representing a broad cross-section of Australia's energy industry.
- Developing a 20 year industry roadmap for the establishment of a smart grid in Australia on behalf of the Electricity Networks Association (ENA).
- Authoring two chapters of the winning proposal for the $100M Smart Grid, Smart City project and contributing to its overall development.
- Developing a smart grid solution for minimising the costs and carbon intensity of generating power in a remote system on behalf of a major Australian utility.
- Reviewing over $2 billion in Victorian distribution network's smart grid budget proposals on behalf of the Australian Energy Regulator (AER).
- Creating a continuous improvement process for promoting best available technology for energy efficiency and carbon reduction on behalf of Newcastle City Council.
- Identifying international best practice in smart meter enabled retail pricing and related customer protections on behalf of a jurisdictional regulator.
- Developing a business plan and authoring a winning proposal for the supply of electrical vehicle charging infrastructure on behalf of an electric vehicle infrastructure provider.
- Creating a value framework, integrated network and retail price and benefits capture strategy to maximise the value of demand response on behalf of a new entrant retailer.

- Estimating the market and network value of demand response across a range of service levels on behalf of a Victorian DNSP.
- Identifying the key risks and opportunities related to smart metering and the emerging smart energy market strategy on behalf of an energy retailer.
- Authoring major studies of residential renewable generation, micro-combined heat and power, the smart energy market, personal energy management and electric vehicles.

SUMMARY OF EXPERIENCE ENERGY AUSTRALIA

As the A/Mgr – Alliance Strategy, Ezra was responsible for managing the implementation of two Alliances to deliver up to $1.5B in capital projects over five years. In this role his major achievements were:

- managing the legal and commercial negotiations to achieve commercial alignment, and developing a comprehensive Alliance implementation plan, including a resourcing model for $8B capital program

As the A/Executive Mgr – Strategic Services, Ezra was responsible for the coordination of the Executive team on behalf of the Executive General Manager, Network. His duties included:

- providing advice to the Executive General Manager, Network; Strategy development, business planning and divisional communication; performance measurement, monitoring and reporting; Board, ministerial and inter-divisional interfaces and coordination of the executive management team

As the Mgr – Network Metering & Pricing Strategy, Ezra was responsible for the formulation, justification and delivery of company's strategic pricing and metering initiatives. His responsibilities included:

- leading the development and delivery of the $500M Advanced Metering Infrastructure (AMI) strategy, which included Australia's largest technology pilot & customer research study
- driving the deployment of Australia's largest smart metering fleet and representing the Division during a $70M strategic metering procurement

As the Network Business Consultant, Ezra was responsible for internal business consulting, including:

- providing strategic advice to senior management on B2B, metering, pricing and retail services; managing retail market interfaces, including internal service providers; managing strategic initiatives including the Time-of-Use (ToU) / interval meter rollout; leading negotiations between EA Network, retailers and end-users, and increasing faltering ToU project output from 2,500/ year to 16,000/ year.

SUMMARY OF EXPERIENCE CAMBRIDGE ENERGY RESEARCH ASSOCIATES

As the Senior Associate, Global Gas & Power, Ezra provided expertise to the group's four regional gas and power teams. Projects included:

- overseeing the Asia Pacific gas and power component of a Board level strategy project; lead author of long-term N.A. gas scenarios study and editor and co-author of regional Latin American power sector briefings.

As an Associate Director, European Power, Ezra was a senior member of a team serving 50 clients. His role was responsible for the network sector, retail & wholesale markets and player strategy, ad-hoc client advisory service and new business development. In this role Ezra's achievements were;

- becoming the youngest Associate Director in the company's history; leading projects on retailer entry and a international investment framework; developing a pan-European pricing model for due diligence on $800M IPP; providing Board level due diligence to a major trading bank's generator investment in South Australia.

Ezra Beeman has published more than 15 articles and papers in his field of expertise.

TERRY DALY

PRACTICE LEADER

SUMMARY OF EXPERIENCE

Deep subject matter expertise, a track record of transformative strategy development and execution, and unrivaled experience managing emerging energy technology deployment give the Terry necessary credentials and capabilities required to tackle the industry's key challenges and opportunities as Energeia's Practice Leader for Emerging Technology.

Terry has over 15 years' experience applying strategy development and commercial skills in the evaluation and development of new business opportunities in the IT&T and energy industries. During his 8 years of experience at Ausgrid, Terry has played a number of central roles in the development and execution of their Smart Grid and Multi-Utility strategic initiatives. These experiences have honed his ability to develop robust business strategy through thorough research, business case development, stakeholder consultation and risk analysis.

Terry's first-hand experience with emerging consumer side technologies is among the most comprehensive in Australia due to his management of the consumer-side technology work stream within Ausgrid's $100 million Smart Grid, Smart City (SGSC) initiative. There he managed the development and deployment of the full range of emerging technologies including smart metering, telecommunications networks, customer feedback technologies, electric vehicles, micro-generation, storage and load control.

QUALIFICATIONS

- Masters of Science & Technology (Energy), University of NSW
- Bachelor of Economics, Sydney University
- Admitted as a member of Institute of Chartered Accountants

SUMMARY OF EXPERIENCE AT ENERGEIA

As a Practice Leader, Terry has responsibility for:

- Extending Energeia's technical expertise, consulting skills and experience in investment strategy, demand management, emerging technology and telecommunications
- Developing and delivering cutting edge consulting solutions to our client's key challenges and opportunities
- Leading Energeia's landmark multi-client study of Australia's smart grid drivers, reference design, development path, supply chain and investment levels over the next 20 years

SUMMARY OF EXPERIENCE AT AUSGRID (FORMERLY ENERGYAUSTRALIA)

As the Manager – Commercial Strategy, Operational Technology and Innovation, Terry was responsible for:

- Developing Ausgrid's future load control and smart metering strategies to support its 5 year regulatory submission
- Negotiating access arrangements and pricing for the National Broadband Network's access to Ausgrid's low voltage electricity infrastructure

As the Manager – Customer and Electric Vehicle Smart Grid Programs, Terry was responsible for:

- Conducting scaled trials of “last mile” communications technologies and assessing their potential to form part of the Smart Grid program
- Testing and deployment of smart metering infrastructure and a variety of customer feedback technologies including In home display’s, Home Area Networks and Customer web portals as part of the Newington Smart Village and SGSC trials
- Managing the integration of various vendor IT systems to support the above programs including CRM, meter management, network management, billing and fault management
- Developing, planning , vendor selection and constructing Ausgrid’s 4G wireless network using a mix of WiMax and LTE technologies
- Acting as Ausgrid’s representative on the National Smart Metering Program Working Group
- Planning and development of the Newington “Smart Home” including the first Australian residential implementation of the BlueGen natural gas fuel cell and Redflow zinc bromine flow battery. See: http://www.smarthomefamily.com.au/
- Contributing author to Ausgrid’s winning bid for the Federal Government $100 Million SGSC initiative
- Deployment of charging infrastructure and data capture to support the 20 car electric vehicle trial as part of SGSC
- Group commercial strategy including responsibility for negotiating and managing all material smart grid vendor contracts
- Numerous speaking engagements at industry conferences on developments in customer and electric vehicles markets

As the Manager – Business Development, Terry was responsible for:

- Developing the business case and modelling to support EnergyAustralia’s entry into the NSW retail gas market
- Representing the company on the state government committee to set the competition rules for contestability of the NSW gas market
- Developing the business case, vendor selection and financial modelling for Down Town Utilities and EnergyAustralia’s investment in "Powertel"

SUMMARY OF PREVIOUS EXPERIENCE

In addition to his energy experience, Terry has worked for a number of industry leaders in IT&T developing corporate strategy. Key highlights of this experience include:

- DOWNER EDI
  - Key member of the team planning, negotiating and developing the $30M optical fibre telecommunications network build across Tasmania.
  - Delivered successful regulatory submission to allow market entry as a wholesale carrier
- AUSTAR
  - Developed strategy for market entry as an Internet Service Provider
  - Executed strategy via acquisition and integration of customers, staff and systems of Australia’s then 2nd largest ISP into Austar’s pay TV operations
  - Involved in the software development and launch of the Interactive TV platform
  - OPTUS
  - Business case development for their launch into the local phone market

- Numerous regulatory submissions to influence the industry structure around the development of competition in the telecommunications industry
- ERNST & YOUNG
- 5 years consulting and support to numerous businesses in the process of financial re-structure