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Australian Energy Regulator

Review of DNSPs Amended AMI Budget Submissions for 2012 to 2015

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List of Abbreviations

Abbreviation	Meaning
ACS	Alternative Control Service
AEMO	Australian Energy Markets Operator
AMI	Advanced Metering Infrastructure
AMIPO	AMI Program Office – cross industry program office that supports cross industry AMI work including supporting the ISC
B2B	Business To Business eHub – a part of MSATS used to send messages between NEM market participants
BAU	Business as Usual – referring to normal utility operations
CIS	Customer Information System – an IT system used by Utilities to manage customer and tariff information
CP	Citipower Pty Ltd
CROIC	Cost Recovery Order In Council
CT	Current Transformer – used with meters for larger energy users
DB	Distribution Business – another term for a DNSP
DMS	Distribution Management System – an IT system used to manage and operate the distribution network
DNSP	Distribution Network Service Provider (also called Distribution Business (DB))
DPI	Department of Primary Industries
DR	Disaster Recovery
DUOS	Distribution Use of System
EDPD	Electricity Distribution Price Determination
EDPR	Electricity Distribution Price Review
FTE	Full Time Equivalent – of human resources
HAN	Home Area Network – AMI meters include an interface to a home area network

Abbreviation	Meaning
ISC	Industry Steering Committee – a committee of representatives of Retailers, DNSPs, Government and Regulators that has the oversight of the AMI rollout in relation to cross industry matters
IEE	Itron Enterprise Edition – an MDMS system
JAM	Jemena Asset Management
JEN	Jemena Electricity Networks
MAMP	Meter Asset Management Plan
MDMS	Meter Data Management System – an IT system that receives interval energy data from meters and performs validation and, if there is missing or incorrect data, substitutions
MMS	Meter Management System – an IT system to manage metering assets
MRO	Mass Rollout
MSATS	Market Settlement and Transfer System - operated by AEMO
MTS	Market Transaction System – an IT system used to communicate with MSATS and B2B
NEM	National Electricity Market
NIC	Network Interface Card – an electronics module put into a meter to allow connectivity to the AMI communications network
NMI	National Meter Identifier
NMS	Network Management System – an IT system used to manage the AMI communications network
NOC	Network Operations Centre (for communications network)
NST	Neutral Service Testing
OMS	Outage Management System – an IT system used to manage the Utilities' response to outages on the electricity network
PAL	Powercor Australia Limited
PMO	Project Management Office
PSTN	Public Switched Telephone Network
RU	Rack Units – a measure of the height of equipment racks used for IT and electronic systems
SPA	SP AusNet
SPI	Singapore Power International
SSN	Silver Spring Networks – a vendor of wireless mesh networks for AMI
TOU	Time of Use tariff
UED	United Energy Distribution
USB	Utility Service Bus – a middle ware layer to allow connectivity of various IT applications

Abbreviation	Meaning
WiMAX	Worldwide Interoperability for Microwave Access – a wireless communications technology in accordance with IEEE 802.16

1 Executive Summary

1.1 Background

The Victorian Government mandated the rollout of Advanced Metering Infrastructure (AMI) over the period 2009–15 for all customers consuming less than 160MWh per annum. In late October 2009, the Australian Energy Regulator (AER) released its final determination on the Distribution Network Service Providers' (DNSPs) AMI budgets and charges for 2009–11. In February 2011 the DNSPs lodged budget and charges applications for 2012 -15. The AER engaged Impaq Consulting (Impaq) to provide advice to the AER in relation to these applications. In July 2011 the AER made its Draft Determination on the DNSPs' AMI budget and charges submissions for 2012-2015. The DNSPs lodged amended budget and charges applications (amended applications) with the AER on 26 August 2011. The AER has engaged Impaq to assist in its review of the DNSPs' amended applications.

1.2 Approach

This review by Impaq has been based on the requirements in the Cost Recovery Order in Council (CROIC) and is to assist the AER in making its final determination on the DNSPs' amended budget and charges applications. In reviewing the amended budget applications, Impaq has only made an assessment on those items of Capital and Operating expenditure which the DNSPs have included in their amended budget applications. Items for which the DNSPs have not provided any comment or information in their amended applications, Impaq has not reviewed its previous assessment.

Impaq wishes to acknowledge the effort of the DNSPs in responding to the AER's Draft Determination and Impaq's previous report. In many cases, the DNSPs have taken on board the comments made by Impaq and have adjusted their forecasts accordingly. In other cases, the DNSPs have provided further details and analyses to support their original forecast, which has been taken into account by Impaq in this report. Further, Impaq acknowledges the prompt and detailed response by the DNSPs to requests for additional information

1.3 Impaq Assessment of proposed costs

Table 1 to Table 6 show a summary of the capital and operating expenditure applications and assessments:

- The DNSPs initial applications (February 2011);
- The AER's draft determination;
- The DNSPs amended applications; and
- Impaq's current assessment.

Table 1 – Citipower – Summary of proposed and assessed costs

Citipower – ($,000 real 2011)		2012	2013	2014	2015	Total
Initial application	Capital Expenditure proposed	50,350	36,391	8,055	7,591	102,387
	Operating Expenditure Proposed	13,726	13,167	14,090	13,551	54,534
	Original Total proposed expenditure	64,076	49,558	22,145	21,142	156,921
AER Draft Determination	Capital Expenditure	35,395	23,980	2,531	2,712	64,618
	Operating Expenditure	5,541	5,426	6,530	6,395	23,892
	Original Total proposed	40,936	29,406	9,061	9,107	88,510
Amended Application	Capital Expenditure proposed	45,460	31,273	5,921	5,225	87,879
	Operating Expenditure Proposed	10,960	10,032	9,566	9,493	40,051
	Total proposed expenditure	56,420	41,305	15,487	14,718	127,930
Impaq Assessment	Capital Expenditure	39,972	27,263	5,222	4,727	77,184
	Operating Expenditure	7,925	6,819	6,130	5,947	26,821
	Total	47,897	34,082	11,352	10,674	104,005

Table 2 – Jemena – Summary of proposed and assessed costs

Jemena – ($,000 real 2011)		2012	2013	2014	2015	Total
Initial application	Capital Expenditure proposed	33,573	17,562	7,398	7,074	65,607
	Operating Expenditure Proposed	19,422	17,227	15,820	15,941	68,410
	Original Total proposed expenditure	52,995	34,789	23,218	23,015	134,017
AER Draft Determination	Capital Expenditure	24,736	12,617	4,884	3,079	45,316
	Operating Expenditure	12,608	10,847	9,493	9,551	42,499
	Original Total proposed	37,344	23,464	14,377	12,630	87,815
Amended Application	Capital Expenditure proposed	32,352	16,783	5,437	5,144	59,716
	Operating Expenditure Proposed	19,872	17,589	15,844	15,985	69,290
	Total proposed expenditure	52,160	34,277	21,097	20,966	128,500
Impaq Assessment	Capital Expenditure	31,583	15,496	5,324	5,000	57,403
	Operating Expenditure	14,782	12,995	10,518	10,607	48,903
	Total	46,365	28,491	15,842	15,607	106,306

Table 3 – Powercor - Summary of proposed and assessed costs

Powercor – ($,000 real 2011)		2012	2013	2014	2015	Total
Initial application	Capital Expenditure proposed	116,276	81,652	16,210	13,472	227,610
	Operating Expenditure Proposed	27,877	28,241	27,454	26,435	110,007
	Original Total proposed expenditure	144,153	109,893	43,664	39,907	337,617
AER Draft Determination	Capital Expenditure	80,576	52,503	6,699	6,447	146,225
	Operating Expenditure	12,232	13,257	15,821	15,490	56,800
	Original Total proposed	92,808	65,760	22,520	21,937	203,025
Amended Application	Capital Expenditure proposed	117,541	79,828	16,628	13,199	227,196
	Operating Expenditure Proposed	24,882	23,393	21,854	21,673	91,802
	Total proposed expenditure	142,423	103,221	38,482	34,872	318,998
Impaq Assessment	Capital Expenditure	99,885	67,525	14,860	12,462	194,732
	Operating Expenditure	20,714	18,929	14,500	14,259	68,402
	Total	120,599	86,454	29,360	26,721	263,134

Table 4 – SpAusNet - Summary of proposed and assessed costs

SpAusNet – ($,000 real 2011)		2012	2013	2014	2015	Total
Initial application	Capital Expenditure proposed	171,025	49,081	7,367	3,999	231,472
	Operating Expenditure Proposed	48,550	40,149	26,441	24,351	139,491
	Original Total proposed expenditure	219,575	89,230	33,808	28,350	370,963
AER Draft Determination	Capital Expenditure	133,639	39,249	5,320	1,899	180,107
	Operating Expenditure	18,659	14,290	10,362	9,286	52,597
	Original Total proposed	152,298	53,539	15,682	11,185	232,704
Amended Application	Capital Expenditure proposed	169,655	90,527	7,018	3,740	270,940
	Operating Expenditure Proposed					144,359
	Total proposed expenditure	214,387	133,784	35,180	31,948	415,299
Impaq Assessment	Capital Expenditure	114,345	55,899	3,209	2,089	175,542
	Operating Expenditure	30,414	26,418	15,229	14,023	86,083
	Total	144,759	82,317	18,437	16,112	261,626

Table 5 – UED - Summary of proposed and assessed costs

United Energy – ($,000 real 2011)		2012	2013	2014	2015	Total
Initial application	Capital Expenditure proposed	104,586	20,891	10,086	9,868	145,431
	Operating Expenditure Proposed	28,300	22,810	21,430	22,730	95,270
	Original Total proposed expenditure	132,886	43,701	31,516	32,598	240,701
AER Draft Determination	Capital Expenditure	66,844	14,245	5,428	3,905	90,422
	Operating Expenditure	18,807	15,155	13,227	13,382	60,571
	Original Total proposed	85,651	29,400	18,655	17,287	150,993
Amended Application	Capital Expenditure proposed	100,775	17,269	5,755	5,537	129,336
	Operating Expenditure Proposed	29,602	24,460	21,813	22,044	97,919
	Total proposed expenditure	130,377	41,729	27,568	27,581	227,255
Impaq Assessment	Capital Expenditure	86,139	15,212	5,482	5,265	112,098
	Operating Expenditure	21,775	17,883	14,050	14,183	67,891
	Total	107,914	33,095	19,532	19,448	179,989

Table 6- All DNSPs- Summary of proposed and assessed costs

All DNSPs – ($,000 real 2011)		2012	2013	2014	2015	Total
Initial application	Capital Expenditure proposed	475,810	205,577	49,116	42,004	772,507
	Operating Expenditure Proposed	137,875	121,594	105,235	103,008	467,712
	Original Total proposed expenditure	613,685	327,171	154,351	145,012	1,240,219
AER Draft Determination	Capital Expenditure	341,190	142,594	24,862	18,042	526,688
	Operating Expenditure	67,847	58,975	55,433	54,104	236,359
	Original Total proposed	409,037	201,569	80,295	72,146	763,047
Amended Application	Capital Expenditure proposed	465,783	235,680	40,759	32,845	775,067
	Operating Expenditure Proposed	130,048	118,731	97,239	97,403	443,421
	Total proposed expenditure	595,767	354,316	137,814	130,085	1,217,982
Impaq Assessment	Capital Expenditure	371,923	181,395	34,098	29,544	616,959
	Operating Expenditure	95,610	83,045	60,427	59,019	298,100
	Total	467,533	264,439	94,524	88,562	915,059

1.4Observations on the DNSPs amended submissions

- The amended submissions from four of the five DNSPs have expenditure proposals which are less than their initial submissions. SP AusNet's amended application is however more than 10% higher than its initial submission
- The level of overhead costs for 2012 to 2015 are excessive. By the end of 2011 all DNSPs should have AMI rollout and operational systems and processes bedded down. Instead the submissions show high levels of overhead costs which are more in line with the initial phases of a major project rather than of a project that is well established and heading towards its conclusion.
- The Opex proposals of all DNSPs for 2014 and 2015 are excessive and reflective of a continuation of high Opex costs that are associated with the AMI rollout years rather than post the AMI rollout. With the very large capital investment made to automate the collection and processing of metering data the operating costs should reduce in 2014 and 2015 because:
    - The legacy manual meter reading systems and processes which needed to be run in parallel with AMI systems during the rollout can be switched off
    - The meter data management processes should be fully automated including the management of exceptions where substitution is required
    - The customer service costs should be greatly reduced because Retailers will all have daily interval data and will therefore have the information needed to deal with almost all customer issues without needing to seek additional information from DNSPs.

1.5SP AusNet AMI program concerns

Impaq has concerns about the viability of the SP AusNet (SPA) AMI program.

- [C-I-C]

- The cost per meter of the SPA AMI program is far higher than that for the other 4 DNSPs
- WiMAX performance is not good and higher levels of 3G fill in are being considered to make up for WiMAX inadequacies
- SPA is the only utility in the world rolling out WiMAX. Other utilities have tried WiMAX and decided not to proceed.
- WiMAX is a dying technology. The major telecommunications carriers have considered WiMAX and decided instead to adopt LTE (which is not compatible with WiMAX) as their 4G technology

- [C-I-C]

- The spectrum licence for the spectrum (2.3GHz) that SPA are using for their WiMAX AMI system expires in July 2015 and there is no certainty of SPA having continued access to that spectrum at a reasonable cost

Because of the above, it is Impaq's view that SPA would do well to consider transitioning to a different and proven AMI technology.

2 Background and scope

2.1Background

The Victorian Government mandated the rollout of AMI over the period 2009–15 for all electricity customers consuming less than 160MWh per annum. Electricity distributors Citipower, Jemena Electricity Networks, Powercor Australia, SP AusNet and United Energy Distribution were given an exclusive mandate to roll out the meters and commenced their rollouts in late 2009. The Victorian rollout must be completed by the end of 2013. AMI charges enabling cost recovery for the rollout will apply until the end of 2015.

The regulatory arrangements relating to the rollout are set out in an August 2007 Order in Council (Cost Recovery Order in Council or CROIC) made under sections 15A and 46D of the Electricity Industry Act 2000, which was then amended on 25 November 2008 and again in early 2009 (revised Order). The revised Order sets out, amongst other things, the regulator's role in determining cost recovery for the rollout and is the primary regulatory instrument that guides the determination of prices for metering services.

In late October 2009, the AER released its final determination on the AMI budgets and charges for 2009–11. In February 2011, the Victorian DNSPs submitted AMI budget and charges applications for 2012-15. The AER engaged Impaq to provide advice in relation to these applications.

In July 2011 the AER released its draft determination on the 2012–15 budgets and charges. The Victorian DNSPs submitted amended AMI budgets and charges applications for 2012–15 in August 2011. The AER is required under the revised CROIC to make a final determination on the 2012–15 budgets and charges by 31 October 2011.

The AER has engaged Impaq to assist in its review of the DNSPs' amended budget submissions. This document is Impaq's report to the AER on its assessment of the cost forecasts contained in the DNSPs' amended budget submissions, in accordance with the CROIC.

2.2 Scope of Impaq's Analysis

The scope of Impaq's review as required by the AER is to:

- provide advice regarding the technical requirements of the AMI rollout (as specified by the Victorian Government in various documents) in relation to the DNSPs' proposed AMI expenditure;
- provide advice regarding the likely market value of the DNSPs' proposed AMI expenditure, particularly in relation to metering, IT and communications equipment;
- review the DNSPs' revised budget proposals (and additional information provided following AER requests) as to whether each DNSPs' proposed expenditure meets the tests set out in the revised Order, particularly in relation to scope and prudency; and

- review the material provided by the DNSPs as part of the AER's 2009 review of AMI budgets for 2009-11.

However, this review does not include assessment of the reasonableness or otherwise of the DNSP's proposals on:

- forecast CPI;
- forecast real labour escalation rates;
- debt raising costs; and
- margins payable to related party contractors.

For the sake of its analysis, Impaq has adopted the values for these factors proposed by the DNSPs in their respective submissions and other information. Assessment of the appropriateness of these factors and the values proposed is a matter for the AER.

2.3 About Impaq Consulting

Impaq Consulting is a management consulting firm dedicated to serving the needs of the Electricity, Gas, Water and Telecommunications industries. We assist clients in relation to strategy, operations, policy, technology, mergers and acquisitions. Impaq has specialist expertise in Smart Metering and AMI, including the related telecommunications technologies and IT systems. In these areas Impaq has provided advice to Retailers, Distributors, Governments and Regulators. The following are some examples of the projects in which Impaq has been involved.

National smart metering program

Impaq was engaged by the Victorian Government Department of Primary Industries (DPI) to provide advice on the national smart metering functionality working group. Impaq provided extensive advice on the technical requirements of smart metering as an input to the development of the national smart metering functionality specification.

Smart Grid Smart City

Impaq was appointed by the Commonwealth Government (DCCEE/DRET) to provide advice in relation to the Smart Grid Smart City project and the review of applications for Commonwealth grants.

Smart metering benefits realisation project

As part of a consortium of consultants, Impaq undertook a study for DPI on the benefits of smart metering for Victoria and the actions needed to be taken to realise those benefits. A component of this work was translating the technical functionality of smart meters into potential new services that provided benefits to DNSPs, Retailers and Customers.

National smart metering cost benefit analysis

As part of a consortium of consultants, Impaq undertook a study for MCE/DRET on the costs and network benefits of smart metering for each jurisdiction in Australia.

This involved a detailed technical understanding of smart metering, communications and IT.

Victorian AMI functionality specification development and technology trials

Impaq Consulting was appointed as the Technical Adviser and project manager of the establishment phase of the AMI project for DPI. This involved facilitating a large number of workshops with industry to develop the AMI functionality specification and service levels specification. Impaq also led the co-ordinated AMI technology trials which involved all of the Victorian DNSPs.

Asian Utilities

Impaq has provided advice to utilities in Asia on smart metering cost benefit analyses, policy and implementation matters.

Advice to the AER and ESCV

Impaq has provided advice to the AER and Essential Services Commission, Victoria on a range of regulatory matters.

3 Approach to this review

3.1 Requirements of the Order in Council

Impaq has approached this review of the DNSPs' revised AMI budget submissions for 2012-2015 with the CROIC as the basis. The requirements of section 5C.2 of the CROIC are:

5C.2 The Commission must approve the Submitted Budget unless the Commission establishes that the expenditure (or part thereof) that makes up the Total Opex and Capex for each year:

(a) is for activities outside scope at the time of commitment to that expenditure and at the time of the determination; or

(b) is not prudent.

5C.3 For the purposes of clause 5C.2 (b), expenditure is prudent and must be approved:

(a) where that expenditure is a contract cost, unless the Commission establishes that the contract was not let in accordance with a competitive tender process; or

(b) where that expenditure:

(i) is not a contract cost; or

(ii) is a contract cost and the Commission establishes that the contract was not let in accordance with a competitive tender process,

unless the Commission establishes that:

(iii) it is more likely than not that the expenditure will not be incurred; or

(iv) the expenditure will be incurred but incurring the expenditure involves a substantial departure from the commercial standard that a reasonable business would exercise in the circumstances.

3.2 Review of revised budget submissions

Impaq wishes to acknowledge the effort of the DNSPs in responding to the AER's Draft Determination and Impaq's previous report. In many cases, the DNSPs have taken on board the comments made by Impaq and have adjusted their forecasts accordingly. In other cases, the DNSPs have provided further details and analyses to support their original forecast, which has been taken into account by Impaq in this report. Further, Impaq acknowledges the prompt and detailed response by the DNSPs to requests for additional information

Impaq has reviewed each of the DNSPs' revised budget submissions in detail. Where DNSPs have presented expenditure as a contact cost, Impaq has made an assessment as to whether the contract was let in accordance with a competitive tender process. Where Impaq has assessed that a contract has resulted from a competitive tender process, the contract costs have been not been tested for prudency.

However where:

- contracts have been let without evidence of a competitive tender process; these costs have been the subject of a prudency review. For example, where:

- a contract has been let to a related party without evidence of a competitive tender process; or
- reputable sources of relevant goods or services have been excluded from consideration;

- the contract documentation provided to the AER does not included prices or costs for goods or services to be provided, these have not been considered to be contract costs;
- contracts have been in foreign currencies (eg: US dollars), the contract cost has been taken to be the foreign currency cost and the exchange rate applied to convert these costs to Australian dollars has been the subject of a prudency review; and
- contracts have been for unit prices of equipment (eg: meters); the quantities and combinations of such equipment have been the subject of a prudency review.

3.3DNSP's criticism of Impaq

Some of the DNSPs have stated in their amended applications that they consider Impaq may not be free of bias because of its former work in relation to cost benefit analyses for AMI[1]. There is also the implied allegation that Impaq's analysis in previous cost benefit analyses has been flawed and citations from the Victorian Auditor General's criticisms of the AMI project have been made in relation to this.

Impaq notes that there have been multiple analyses of the costs and benefits of the Victorian AMI program undertaken. These include:

- Initial cost benefit analysis done by CRA and Impaq - 2005
- the National smart metering cost benefit analysis – 2007/8 where the costs were done by EMCa and the overall cost benefit analysis was done by NERA
- Benefits realisation report for DPI done by Futura Consulting – 2009/10
- Oakley Greenwood review of costs and benefits of AMI for DPI – 2010

Hence the Victorian Government has had advice from multiple sources on the projected costs of the AMI program.

Impaq rejects these allegations of bias. Impaq's has undertaken the previous report and this report in line with the CROIC and has made assessments of what is prudent expenditure according to the commercial standard. . Impaq's assessments of prudent expenditure are based on facts and evidence.

It is however the case that Impaq has a detailed understanding of the specifications, functionalities, activities and costs associated with AMI because of an extensive

[1] For example "Impaq may not approach the question of the prudency of DNSPs' AMI budget costs with the necessary degree of disinterest. In particular, it is conceivable that Impaq's analysis and conclusions may be influenced by its previous assignments and recommendations". Citipower amended application page 13.

range of work done in relation to AMI. Impaq also has a detailed understanding of the operations of DNSPs from many years of experience with DNSPs.

3.4Key Assumptions

3.4.1 AU$ to US$ exchange rate

The DNSPs have made various assumptions for the AU$ to US$ exchange rate for 2012 to 2015. Impaq has assumed an exchange rate of 1.05 over the period in line with its previous report to the AER. It is however noted that in the last few days prior to completion of this report that exchange rates have moved somewhat below this value. The AER may need to adjust the exchange rate used in Impaq's calculations depending on the rate movements in October 2011. The exchange rate mainly affects the cost meters supply-contracted and communications equipment supply-contracted.

3.4.2 Human resource costs

The costs of many of the categories forecast are heavily affected by human resources costs. Where human resource costs are involved, Impaq has established its view by using salary rates taken from the series of 'Hays Salary Guide – 2010', adjusted to $2011 real.

On costs of 30% have been assumed, as detailed in Table 7. It is noted that these are relatively generous on-costs. Low case on-costs are 18%.

Table 7 – On Cost Calculation

Item	Low case On Costs	Assumed On Costs - %	Comment
Superannuation	9%	12%	The Superannuation guarantee value is 9%. The 12% makes allowance for the higher employer superannuation contributions associated with parts of the Power Industry
Long Service Leave	1.7%	2.5%	The low case is based on Long Service Leave of 13 weeks after 15 years' service. The assumed case is 13 weeks Long service leave after 10 years of service (which has been characteristic of the public sector and parts of the Power Industry rather than most of the private sector)[2]
Workcover (estimate)	1%	1.5%	Impaq estimates of typical DNSP rates.
Payroll Tax	4.95	4.95%	Victorian Payroll Tax Rate

[2] Allowance has been made for the need to over accrue to take into account that when long service leave is taken salaries are higher than during the accumulation of the provision.

Item	Low case On Costs	Assumed On Costs - %	Comment
Annual leave loading (17.5%)	1.3%	1.3%	Based on 17.5% loading on 4 weeks annual leave. (Impaq notes that annual leave loading is generally included in the salary package for middle and senior managers and is not a labour overhead. Impaq has not adjusted for this)
Other employee benefits	0%	8%	Includes performance bonus, and other benefits
Total On costs	18%	30%	

An allowance for other, accommodation, office supplies, IT services, etc of $20,000 per annum has also been made.

3.5 The structure of this report

This report reviews the amended submissions made by each of the DNSPs in order. Each section starts with a summary of the Capital Expenditure and Operating Expenditure proposed. Capital Expenditure is reviewed first, followed by Operating Expenditure. Where the AER has accepted an item of expenditure in the draft determination and the DNSP has not changed its original forecast, Impaq has made no comment on that item.

The DNSPs reviewed in the following sections are:

- Section 4 – Citipower (CP);
- Section 5 – Jemena (JEN);
- Section 6 – Powercor (PAL);
- Section 7 – SP AusNet (SPA); and
- Section 8 – United Energy Distribution (UED).

Unless stated otherwise the values in tables are $,000 real 2011.

4 Citipower

The CP initial submission[3], Impaq's assessment, the AER's draft determination and the CP amended application for 2012-2015 are summarised[4] in Table 8 and Table 9.

Table 8 – CP Capex Summary

	2012	2013	2014	2015	Total
CP Initial Budget Application	50,350	36,391	8,055	7,591	102,388
Impaq Assessment	35,230	23,878	2,526	2,704	64,339
AER Draft Determination	35,395	23,980	2,531	2,712	64,619
CP Amended Application	45,460	31,273	5,921	5,225	87,880

Table 9 – CP Opex Summary

	2012	2013	2014	2015	Total
CP Initial Budget Application	13,726	13,167	14,090	13,551	54,535
Impaq Assessment	5,541	5,425	5,563	5,481	22,009
AER Draft Determination	5,541	5,426	6,530	6,395	23,892
CP Amended Application	10,960	10,032	9,566	9,493	40,051

4.1 Capex summary

Table 10 lists the items in the CP amended application Capex proposal.

Table 10 – Capex items in the CP revised proposal

	2012	2013	2014	2015	Total
Meter Supply - Contract	20,273	14,162	1,059	1,417	36,911
Meter Supply other	2,352	1,822	595	696	5,465
Meter installation - contract	7,275	5,000	0	0	12,275
Meter installation - other	6,174	5,384	659	637	12,854
Communications equipment supply - contract & non-contract	16	12	32	34	94

[3] Citipower 2011 – 1 "AMI Budget and Charges Application 2012-15" February 2011, Table 14, page 47 and Table 25, page 76.

[4] Citipower 2011 – 2 "Advanced Metering Infrastructure Amended Submitted Budget and Charges Application 2012-2015" August 2011, page 10.

	2012	2013	2014	2015	Total
Communications equipment installation – other	260	229	106	62	657
IT Capex	9,109	4,664	3,471	2,379	19,623
Total	45,459	31,272	5,921	5,225	87,877

It is noted that the original CP proposal included project management costs of $2,119,000 in 2012 and $1,576,000 in 2013 that have not been included in the amended application.

Each of the Capex items is considered in turn. Where the AER has accepted an item of expenditure in the draft determination and CP has not changed its original forecast, Impaq has made no comment on that item.

4.2Meter Supply Contract cost - quantities and prices

The CP Advanced Metering Infrastructure Amended Submitted Budget and Charges Application 2012-2015 (amended application) provides more information[5] on the impact on the volumes and prices of meters proposed of abolishments, meter exchanges and faulty meters.

Impaq accepts that not all meters removed for abolishments and meter exchanges can be reused. Further Impaq accepts the CP statement that about 2% of these meters when removed are not suitable for reuse.

Impaq has reviewed the Meter and Communications supply unit rate spreadsheet provided and notes that CP and PAL have calculated the adjustment for reuse of abolished meters and meter exchanges in the unit price rather than in the unit volumes. Although this model has been useful to gain a better understanding of the volumes of meters, Impaq has found it to be deficient in that:

- it assumes that where a meter is removed due to a meter fault and the meter is not under warranty then a repair fee of $[C-I-C] would apply[6]. Yet the weighted average unit cost of meters (considering all types) is US$[C-I-C]. . Impaq considers it more appropriate to substitute a new meter in these circumstances;
- the exchange rate assumptions are lower than Impaq accepts; and
- the approach of adjusting the meter price to take into account the proportion of meters that are able to be reused makes the impact of reusing meters on costs more opaque.

[5] Citipower 2011 – 2, Figure 5, page 38.

[6] The AER questioned CP/PAL in relation to this $[C-I-C] figure. The CP/PAL response (dated 2 Sept 2011) was "*The $[C-I-C] referred to by the AER is a blended repair rate for all meter types including 3 phase meters with a replacement price range of $[C-I-C]-$[C-I-C], depending on the type of 3 phase meter. The blended repair rate takes into consideration the fault meter mix and the possible repair costs of each meter vendor*". Impaq's analysis of the repair versus replace with new meters tradeoff did not support the PC/PAL statement. It is only the meters used in very low volumes for which the repair price was substantially below the replacement price.

Accordingly, Impaq has modified its own model for meter supply cost taking into account the items above. Table 11 shows a summary of the CP submissions and the Impaq assessments.

Table 11 – Meter supply – contract costs

	2012	2013	2014	2015	Total
CP Initial Budget Application	21,621	15,482	1,682	2,199	40,984
Impaq assessment for the draft determination	19,355	12,977	694	1,005	34,030
CP Amended Application	20,273	14,162	1,059	1,417	36,912
Impaq assessment	19,736	13,329	720	1,040	34,736

4.3Meter supply – non contract costs

CP's amended application in relation to "meter supply – non contract costs" is shown in Table 12, as is the CP original submission, the Impaq assessment for the draft determination and the current Impaq assessment.

Table 12 – Meter Supply – non-contract costs[7]

	2012	2013	2014	2015	Total
CP Initial Budget Application	2,389	1,825	455	595	5,263
Impaq assessment for the draft determination	150	150	150	150	600
CP Amended Application	2,352	1,822	595	696	5,466
Impaq Assessment	2,471	1,822	626	723	5,642

The CP amended application contends that Impaq and the AER have misunderstood what these costs represent:

"CitiPower does not agree with the AER's assessment. The scope of CitiPower's Meter Supply – Non-Contract Capital Expenditure is fundamentally different to what Impaq and the AER have assumed"[8]

The CP amended application and accompanying spreadsheets[9] show that the non-contract cost for rollout is made up of a share of:

- CHEDS[10] project management; and
- CHEDS margin (which is 27% of the project management cost).

[7] Citipower 2011 - 2, page 68
[8] Citipower 2011 – 2, page 68
[9] Citipower meter & comms capex.xls
[10] CHEDS is an abbreviation for CHED Services

The CP amended application and accompanying spreadsheets[11] show that the non-contract cost for BAU metering supply is made up of a share of:

- PNS non-contract unit costs;
- PNS logistics;
- PNS corporate overhead;
- PNS margin;
- CHEDS margin;
- CP fleet & property overhead; and
- CP corporate overhead.

4.3.1 CHEDS project management costs

The CHEDS project management costs are a major component of the Meter Supply Non Contract costs and hence are analysed here in more detail. The composition of the CHEDS project management cost is given in Table 13. It is noted that these costs are not just for Meter Supply but are allocated across four categories.

- Meter Supply – non contract costs;
- Communications supply – non contract costs;
- Meter installation – non contract costs; and
- Communications installation – non contract costs.

The allocation to CP is 31% based on the ratio of customer numbers.

Table 13 – CHEDS Project management proposed costs

Category	2012	2013	2014	2015	total
Industry planning & liaison (FTEs)	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	
Project management (PMO) (FTEs)	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	
Management of AMI program (FTEs)	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	
Gateway review (FTEs)	[C-I-C]	[C-I-C]			
Pilot metering groups (FTEs)	[C-I-C]				
Total FTEs	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	
Costs ($,000)					
Industry planning & liaison	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Project managements	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]

[11] Citipower meter & comms capex.xls

Category	2012	2013	2014	2015	total
Management of AMI program	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Gateway review	[C-I-C]	[C-I-C]			[C-I-C]
Pilot metering groups	[C-I-C]				[C-I-C]
Resource management	[C-I-C]				[C-I-C]
Transition planning	[C-I-C]	[C-I-C]			[C-I-C]
Total	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
CHEDS margin	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Total	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]

The large number of FTEs in the PMO is consistent with a major project in its start-up phase or mid-term phase, not with a project coming to completion. This project will be well advanced by the start of 2012 and the rollout will be 40% complete. The business processes will be bedded down and the work instructions fine-tuned. There should be reduced resourcing needed in the PMO after this time. Further, CP forecasts that the PMO resources continue into 2014 and 2015, although the project is completed in 2013, which is not prudent. The Impaq assessment is shown in Table 14.

Table 14 – Impaq assessment of CHEDS project management costs

Category	2012	2013	2014	2015	total
Industry planning & liaison (FTEs)	0.25	0.25	0.25	0.25	
Project management (PMO) (FTEs)	7.9	5.9	0	0	
Management of AMI program (FTEs)	3.95	3.35	0	0	
Gateway review (FTEs)	2	2			
Pilot metering groups (FTEs)	1				
Total FTEs	15.1	11.5	0.3	0.3	
Costs ($,000)					
Industry planning & liaison	375	345	41	41	801
Project management	1,786	1,384	-	-	3,170
Management of AMI program	2,816	2,018	-	-	4,833
Gateway review	227	227	-	-	453
Pilot metering groups	323	-	-	-	323
Resource management	30	-	-	-	30
Transition planning	575	-	-	-	575

Category	2012	2013	2014	2015	total
Total	6,130	3,973	41	41	10,185
CHEDS margin	705	457	5	5	1,171
Total	6,835	4,430	46	46	11,356

In the original CP application there was a separate cost item for project management of $2,119,000 for 2012 and $1,576,000 in 2013, which was considered prudent in the previous Impaq review[12]. It would appear that these project management costs have been included in the CHEDS project management category discussed above. Hence, Impaq has not included this previous project management item as a separate cost item in the Capex assessment.

It is noted that the Meter Supply – Non Contract costs also includes costs for BAU metering. Impaq has included the overhead costs for BAU metering and these comprise the total cost in Impaq's assessment for this cost category.

The Impaq assessment of Meter Supply – Non Contract costs is given in Table 12. The assessment is higher than the CP application principally due to CP's overheads which end up having a higher allocation to this cost category because the Impaq assessment of Meter Installation – Non Contract category costs is substantially lower than the CP amended application value.

Impaq has not reviewed the prudency of the PNS margins, CHEDS margins or the CP overheads as this is a matter for the AER. However, it is noted that these make a substantial contribution to the overall costs.

4.4Meter installation – contract costs

Table 15 shows the costs CP proposed in their initial application, the Impaq assessment for the draft determination and the CP amended application.

Table 15 – Contract meter installation cost

	2012	2013	2014	2015	Total
CP initial application	6,146	4,178	0	0	10,325
Impaq Assessment for draft determination	5,729	3,762	0	0	9,491
CP amended application[13]	7,275	5,000	0	0	12,276

The CP contract installation cost has increased from the original submission. In the amended application CP outlines that the installation contracts have been re-negotiated and as a result:

[12] See table 33 of the Impaq Review.

[13] Citipower meter and comms capex.xls – summary tab, meter installation heading, contract unit costs, line 110.

[C-I-C]

.[14]

CP claims that this has reduced the overall cost of the program as the non-contract costs have decreased by more than the increase in the contract costs.

Impaq has reviewed the meter installation contract costs and considers these costs, based on the unit rate installation contracts, are prudent.

4.5Meter Installation – non contract costs

CP has provided a considerable amount of further information on the makeup of the cost for the non-contracted component of meter installation cost. However Impaq's investigation indicates that many of the costs are excessive and the work practices implied are less than prudent.

Table 16 – Meter installation – non contract costs

	2012	2013	2014	2015	Total
CP initial application	10,183	8,025	1,822	1,811	21,841
Impaq Assessment for Draft determination	959	824	0	0	1,783
CP Amended Application	6,174	5,384	659	637	12,853
Impaq Assessment	3,615	2,687	511	491	7,303

CP has provided detailed information on the makeup of these costs. The major items are listed below.

- PNS Direct Costs 69%
- PNS Margin 4%
- CHEDS project management 12%
- CHEDS margin 4%

4.5.1 PNS Direct Costs

There are a range of costs included in the PNS Direct Costs[15].

Impaq has reviewed these costs and has assessed that there are about [C-I-C] FTEs, amongst other things, included in the PNS Direct Costs to service both CP and PAL. Some positions are specifically nominated such as:

- Specialist Metering Technicians ([C-I-C]);

[14] Citipower 2011 - 2, page 49, section highlighted in yellow.
[15] Refer Citipower meter and comms capex spreadsheet, PNS rollout direct costs

- Resolution Officers ([C-I-C]);
- Field Resource Manager;
- Field Installation Co-ordinators ([C-I-C]);
- Quality Auditors ([C-I-C]);
- Quality Manager;
- Quality Administrator;
- Quality Technical Officer;
- Logistics – Contracts Performance Manager; and
- Logistics – Inventory Co-ordinator.

Other resources are implied in the costs. For example:

- CBD/Site specific project approach at $[C-I-C] for 2012. This implies about [C-I-C] FTEs;
- Complex installation support –MOG at $[C-I-C] for 2012. This implies about [C-I-C] FTEs; and
- Additional field auditors at $[C-I-C] for 2012. this implies about [C-I-C] FTEs.

This implies an overhead FTE count for CP at 31% of the total [C-I-C] FTEs or [C-I-C] of overhead. This is possibly an acceptable level for the first phases of meter installation. However it is an excessive level of resources for 2012 and 2013 considering that there would only be about [C-I-C] FTEs required to do the contract installation work in CP in 2012[16]. This is based on installers doing an average of 32 installs per day. The typical installation time for an AMI meter is around 8 to 15 minutes[17].with many installations taking less than 10 minutes. Impaq has witnessed installations taking this time and it is noted that the ESV reported that AMI installations occur in around 10 minutes and that they meet the appropriate safety requirements.

By the end of 2011 the CP AMI rollout will be 40% complete and the business processes and work procedures will be bedded down. Going forward there will be the need for:

- quality auditing of installations;
- installation co-ordination;
- specialists to some a very small number of complex installations; and

[16] Assumes 220 working days, 14 minutes average installation time, 7.5 working hours per day

[17] The Energy Safe Victoria review of smart metering installations (Final Report on safety aspects of the Victorian Advanced Metering Infrastructure (AMI) Program Meter Deployment Activities) refers to installations in accordance with safe processes occurring in "about 10 minutes" page 4, "often less than 10 minutes" – p28,

- logistics support – however this will not be a major task as there are only 3 installation companies and two meter vendors involved.

It is Impaq's view that the number of resources required for 2012 is only half of that proposed by CP and for 2013 is only one third.

4.5.1.1 Excessive salary costs

The average fully absorbed annual salary cost for the resources listed above, at $[C-I-C], is excessive. The typical charge-out rate for this type of resource is around $116 per hour[18]. Assuming 220 working days per year, a nominal 8 hour day and a utilisation rate of 70% (net 5.5 hours chargeable time per day) this gives an annual cost of $139,000. Taking off the PNS margin of [C-I-C] % gives $132,000 as the annual cost (fully absorbed). The CP rate is [C-I-C]% above the commercial standard.

4.5.1.2 Logistics Buffer stock

CP has stated it needs 2 months stock of meters for logistics reasons. Impaq does not consider that is in line with a commercial standard. For example, the Automotive industry moved away from holding such large stocks many years ago. Instead they have placed the onus on their suppliers to deliver products just in time (which in practical terms is about 2 to 4 days of stock). The broader manufacturing industry has also moved to low stock levels with greater emphasis on managing logistics well to avoid stock-outs.

Even if CP needs 2 months stock the values they have nominated appear to be excessive as shown in Table 17. Furthermore for the values to be the same for 2012 and 2013 is not realistic as the volume of meter installs in 2012 is about 50% more than for 2013.

Table 17 – Logistics buffer stock

	2012	2013	Total
Cost of capital associated with 2 months of inventory rotated through storage. Based on WACC of 10%. 2 months of 'working' inventory is considered minimum required for a large-scale roll-out.	$[C-I-C]	$[C-I-C]	$[C-I-C]
Annual meter volumes	127069	89826	216895
Weighted average unit price of meters	$[C-I-C]	$[C-I-C]	$[C-I-C]

[18] Refer Impaq Consulting report "Review of Distributors Proposed Rates in ACS Charges" for the AER on alternative control service in 2010 and review of charge-out rates. For categories that do not include the cost of a vehicle

	2012	2013	Total
Impaq assessment of cost of capital for buffer stock assuming 10% WACC	$[C-I-C]	$[C-I-C]	$[C-I-C]
Impaq assessment as a proportion of CP's proposal			65%

4.5.1.3 Logistics costs for returned meters

PAL will have almost no need for non-AMI meters in the future. The decision of PAL to keep electronic meters may be prudent as these meters could be reused by other companies in the CKI group or sold into other markets. However, since the beneficiaries of such sale or transfer are other entities, the AMI program should not be required to fund the logistics cost. In addition, any revenue gained by PAL in the sale of these meters to others should be an offset against the costs of the AMI program.

4.5.1.4 Logistics audit

The allowance of [C-I-C] FTEs for a logistics audit for PAL and CP ([C-I-C] FTEs for PAL) is excessive. It would be expected that such an audit would be performed within three to four months using one FTE and covering both PAL and CP. An allowance for one FTE for 6 months (4 months PAL and 2 months CP) has been made.

4.5.1.5 Customer Calling card

Impaq agrees that PAL is required to provide a customer calling card for AMI meter installations after June 2011. Since this is an activity done by the installation contractor it would be expected that PAL would have had this cost included in the recent renegotiation of contract installation rates.

There is very little to be filled in on this card (the installer's name, registration details and other minor information). This card is quite simple and the printing cost is low. The installation contractor would complete this card at the conclusion of the installation and the time cost for doing this is an installation contractor cost. Impaq does not consider the PAL proposed cost of $4.26 per card is prudent. The time to complete the card will be less than 1 minute. At a cost of $4.26 this equates to an hourly rate of $255 which is excessive. Installation contractor rates are closer to $100 per hour[19]. Hence Impaq considers that a prudent cost is half this rate.

[19] Refer Impaq Consulting report to the AER in relation to charge out rates for Alternative Control Services

4.5.1.6 Utilisation of metering technicians

CP has provided information on the times for metering technicians[20], to travel from the Rooney St Depot (Burnley) to the first job of the day, and the time taken from the last job of the day back to the depot.

This type of work practice is not the commercial standard. The commercial standard for technician grade field personnel is that they go direct from home to the first job. Similarly they go direct from the last job to home. There is no need for the technicians to go to the depot twice a day. About once a week when near the depot the technician would call in to restock the vehicle and for necessary administrative information and briefings from management.

Furthermore, the resulting time to install a replacement AMI meter due to a fault is excessive. It is 2.17 hours for a single phase installation and 3.5 hours for a direct connected three phase installation. Contractors are doing those installations in 12 minutes and 15 minutes respectively; plus travel time. It is noted that the installations that these technicians are doing are marginally more complicated than the ordinary installation because it is due to a meter fault, and some basic fault investigation would be needed before replacing the meter. However, with AMI meters, there is little that can be done on site to rectify a fault unless it is a marginal communications area and the addition of an external antenna might improve communications performance. Mostly if the meter is faulty it is dead – nothing on the LCD display and no response to button presses. Hence, in most fault instances, there is little more to do than just replace the meter.

The resulting cost for the installation of a single phase meter is $[C-I-C] and for a three phase direct connected meter is $[C-I-C]. This is an excessive cost. Contractors charge $40 to $50 for single phase (plus travelling time cost) and $44 to $60 for three phase (plus travelling time cost).

4.5.2 Deloittes report

CP and PAL engaged Deloitte[21] to provide an opinion on some Opex and Capex cost categories, including this category of Capex: Installation – Non Contract costs. The Deloitte analysis "*is structured around Deployment Management and Field Force Training and Management*[22]". It is noted that this does not align well with the resource categories in the CP amended application or financial models. Table 18 shows the CP/PAL resource categories and numbers of FTEs and Table 19 gives the Deloitte resources categories and FTEs. Some of the anomalies are:

- there are [C-I-C] PNS specialist metering resources which don't appear in the Deloitte list; and
- there are more resources in the Deloittes list than in the CP/PAL list.

[20] Citipower non-contract unit rates spreadsheet, hours tab

[21] Deloitte report – CP/PAL "CitiPower Pty Powercor Australia Ltd AMI Cost Review – final report v1.1" 26 August 2011.

[22] Deloitte report – CP/PAL, page 29 section 3.3.1.

Table 18 – CP/PAL Categories and FTEs

FTEs	2012	2013
PNS Metering Services Manager	[C-I-C]	[C-I-C]
Manager Metering Operations Group	[C-I-C]	[C-I-C]
PNS Specialist Metering #1	[C-I-C]	[C-I-C]
PNS Specialist Metering #2	[C-I-C]	[C-I-C]
PNS Specialist Metering #3	[C-I-C]	[C-I-C]
AMI Deployment Planning Manager	[C-I-C]	[C-I-C]
Resolution Officer # 1	[C-I-C]	[C-I-C]
Resolution Officer # 2	[C-I-C]	[C-I-C]
Resolution Officer # 3	[C-I-C]	[C-I-C]
Senior Deployment Planning Coordinator	[C-I-C]	[C-I-C]
Field Planner Team Leader	[C-I-C]	[C-I-C]
Field Planner # 2	[C-I-C]	[C-I-C]
Field Planner # 3	[C-I-C]	[C-I-C]
AMI Field Resource Manager	[C-I-C]	[C-I-C]
Field Installation Coordinator 1	[C-I-C]	[C-I-C]
Field Installation Coordinator 2	[C-I-C]	[C-I-C]
Field Installation Coordinator 3	[C-I-C]	[C-I-C]
Training Coordinator PNS	[C-I-C]	[C-I-C]
Training Administrator	[C-I-C]	[C-I-C]
Business Project Manager	[C-I-C]	[C-I-C]
Logistics - Contracts Performance Manage	[C-I-C]	[C-I-C]
Logistics - Inventory Coordinator	[C-I-C]	[C-I-C]
Quality Manager	[C-I-C]	[C-I-C]
Quality Administrator	[C-I-C]	[C-I-C]
Quality Technical Officer	[C-I-C]	[C-I-C]
Quality Auditor #1	[C-I-C]	[C-I-C]
Quality Auditor #2	[C-I-C]	[C-I-C]
Quality Auditor #3	[C-I-C]	[C-I-C]
Reporting & Compliance Officer	[C-I-C]	[C-I-C]
Total FTE's	[C-I-C]	[C-I-C]

Table 19 – Deloittes Categories and FTEs

FTEs	2012	2013
Deployment schedule management	0.5	0.5
Deployment capability management	2	2
Deployment exception optimisation	1	1
Deployment/Region Management	1	1
Field force training – resource management	6	5.85

FTEs	2012	2013
Field force training – training and SME support	4.25	3.44
Field force training – deployment scheduling	8	6.83
Quality management	7.2	7
Logistics management	2	2
Project Operations	1.6	1.6
Total FTE's	33.6	31.2

Impaq has reviewed the Deloitte view on Meter Installation – non contract costs but does not consider that the FTE requirements analysis is robust. Some examples are considered below.

4.5.2.1 Logistics management

Deloittes describe this activity[23] as:

> *Logistics Management consists of four sub-functions (Table 19) that coordinate the delivery of AMI meters into receiving Powercor Network Services (PNS) distribution centres. Logistics Management also forecasts the demand requirements of regions, and send stock to the nine field distribution centres across Victoria for contracted installers to collect.*
>
> *Costs for Logistics Management only include the management of logistics service providers, including management of the handling of returned meters by service providers (the unit cost of actually moving an article from the PNS distribution centre to the field distribution centre is included in the unit price of meter supply).*
>
> *CP/PAL forecast that a combined number of ~311,000 deployments will occur in 2012, and ~133,000 in 2013. Each deployment involves the actual meter, as well as a number of ancillary products such as access points and antennas. In addition the Meter Procurement Contract Management sub-function lags the physical supply of meters into the distribution centre, because contract management activities can only occur once meters have been procured. Based on our review of Logistics Management we believe that 2 FTEs for 2012 and 2013, and 0.13 FTEs for quarter 1 2014 is reasonable.*

[23] Deloittes report CP/PAL,, page 34, section e.

Table 20 – Deloitte logistic FTE forecast.

Logistics management activities	Deloitte validated FTEs			
	2012	2013	2014	2015
Procurement coordination, supply and demand forecasting, warehouse and distribution management, meter procurement contract management.	2	2	0.13	-

Firstly, it is noted that Deloitte appear to have the volumes of meters wrong by about 50%. The combined CP/PAL numbers are 414,000 in 2012 and 278,000 in 2013 (not 311,000 in 2012 and 133,000 in 2013). It is noted that there are 9 distribution centres and 2 meter vendors. There are also some ancillary products such as antennas, meter seals and other minor items. The major items are 6 meter types from 2 vendors equating to 12 items. With ancillary items there are perhaps 30 items to be managed. Deloitte considers that 2 FTEs are required - for a year this is 3300 working hours. Across 30 items this is 110 hours per item. This is a huge amount of time to do very little. The activities Deloitte have identified are considered in order.

- Procurement co-ordination – this is hardly difficult when there are only two vendors and the quantities are already known. A simple delivery schedule sent to each vendor is all that is needed.
- Supply and demand forecasting – The quantities of each item are known and the demand pattern is approximately known. With a 2 month buffer stock[24] demand forecasting does not have to be accurate.
- Warehouse and distribution management – this is not hard either. Deliveries of 30 items come into the warehouse and they are sent on to each of nine distribution centres. Again simple delivery schedules are all that is needed.
- Meter procurement contract management – there are two contracts to be managed, which have been established for some time. The contracts are not due for renegotiation and hence it is purely the tracking of deliveries, clearing invoices for payment and the recording of vendor performance against contract KPIs.

Based on the information provided by Deloitte this is a task for perhaps 0.5 FTEs. There should be no overhang of contract management into the 2014 year because there is a 2 months buffer stock, which in the later months of 2013 would be run down. The last deliveries from vendors should happen at the latest in October 2013, which gives another 2 months to do reconciliation of deliveries against invoices etc. Hence there is no need of FTE resources in 2014 for this activity.

[24] Refer 4.5.1.2.

4.5.2.2 Deployment exceptions optimisation[25]:

> *Deployment Exception Optimisation involves the analysis of SLA and KPI information, and exceptions to continuously improve systems and processes, and refine operations. This activity is closely aligned with Deployment/Region Management, in particular the resolution of issues and coordination of technology, customer and field activities. Deployment Exception Optimisation is also closely aligned with Deployment Capability Management.*
>
> *There have been a number of unforseen issues with the roll out to date, such as customer refusal, state government changes (e.g. tariff reassignment, two element meters), and unanticipated complexities with the rollout caused by multi-occupancy sites, and geographic issues. 14% of attempted installations to date remain outstanding and are unable to be completed at present, due to some of these issues. Based on this, we believe that 1 FTE is appropriate to manage Deployment Exception Optimisation from 2012-2013*

Impaq considers the case for Deployment Exception optimisation resources has not been adequately established. One case quoted concerning customer refusals requires little management. Indeed, if the customer refuses installation it merely needs to be recorded by the installer that that has happened. No optimisation of that outcome is possible. The case of tariff reassignment where a customer is moving from a two element meter (or two meters) for off peak water heating, to a single element meter, is not going to be an exception. Rather, it will be a standard installation issue that will be resolved at a policy level and not an exceptions level in relation to field installations.

4.5.3 Impaq Assessment

Impaq has recalculated the costs for the meter installation – non contract category, taking into account the issues raise above, as shown in Table 21. The major adjustments are:

- the PNS direct dost annual FTE rate to $132,000 from $[C-I-C];
- the number of FTEs for PNS direct cost category by 50% in 2012 and 66% in 2013; and
- the stock holding cost as outlined above.

[25] Deloittes report CP/PAL, page 30 item b.

Table 21 – Installation – Non Contract costs[26]

	2012	2013	2014	2015	Total
CP application	10,183	8,025	1,822	1,811	21,841
Impaq Assessment for Draft Determination	959	824	0	0	1,783
CP Amended Application	6,174	5,384	659	637	12,853
Impaq Assessment	3,615	2,687	511	491	7,303

4.6 Capex – Communications Supply and installation

The CP forecast for Communications Supply and Installation consists of the following categories:

- Communications Equipment Supply – contracted and non-contracted; and
- Communications Equipment Installation – other.

Each of these categories are analysed in the following sections. It is noted that CP has not included costs in the Communications Equipment Installation – Contracted category.

4.6.1 Communications equipment supply – contract and non-contract

The details of CP's proposal for costs in this category are shown in Table 22.

Table 22- Communications equipment supply – contract and non-contract costs[27]

	2012	2013	2014	2015	Total
CP initial application	17	12	23	25	76
Impaq Assessment for Draft Determination	16	11	20	22	69
CP Amended Application	16	12	31	34	93

Impaq considers these costs prudent.

4.6.2 Communications Equipment Installation

The details of CP's proposal for costs in this category are shown in Table 23.

Table 23 - Communications equipment installation - other[28]

	2012	2013	2014	2015	Total
CP Initial Budget Application	1,119	1,034	400	27	2,580

[26] Citipower meters and comms capex – summary.
[27] Citipower Meters and Communications costs spreadsheet – summary tab.
[28] Citipower 2011 – 2, page 79.

	2012	2013	2014	2015	Total
Impaq assessment for the draft determination	304	304	87	91	786
CP Amended Application - contract	62	61	27	21	171
CP Amended Application –non-contract	198	168	79	41	487
CP Amended Application - total	260	229	106	62	658

Impaq considers the CP amended application costs for this category to be prudent.

4.7IT Capex

Table 24 shows the costs CP proposed in their initial application, the Impaq assessment for the draft determination, the CP amended application and the Impaq assessment..

In its amended application, CP has provided additional information on the areas where it disagreed with Impaq's previous assessment. Each of these areas is discussed in turn.

Table 24 – IT Capex Summary

	2012	2013	2014	2015	Total
CP Initial Budget Application	8,875	5,834	3,674	2,934	21,316
Impaq assessment for the draft determination	6,598	4,274	1,576	1,437	13,885
CP Amended Application	9,109	4,664	3,471	2,379	19,623
Impaq Assessment	6,598	4,274	3,228	2,378	16,478

4.7.1 Workforce scheduling and mobility

Table 25 shows the CP initial application, the AER draft determination, the CP amended application and the Impaq assessment in relation to workforce scheduling and mobility.

Table 25 – Scheduling and mobility

	2012	2013	2014	2015	Total
CP Initial Budget Application	1,992	1,275	60	110	3,437
Impaq assessment for the draft determination	0	0	0	0	0
CP Amended Application	0	0	0	0	0
Impaq Assessment	0	0	0	0	0

The CP amended application states[29]:

The Draft Determination removed all workforce scheduling and mobility projects on the basis the technology should be mature and the rollout should be bedded down by the end of 2011.

For the Amended Application, the business has deleted all workforce scheduling and mobility expenditure. It has however identified two projects that were previously included under the workforce scheduling and mobility category of the Initial Budget Application that were better classified as connection point management projects, namely 'remote configuration of meters' and 'remote connect disconnect'.

The 'remote configuration of meters' project is not related to the AMI rollout but rather to address current BAU system and process gaps in the areas of:

- *Additions and alterations to AMI enabled sites;*
- *Abolishments of AMI enabled sites;*
- *Remote meter configurations; and*
- *Meter faults.*

Impaq does not agree that this expenditure is prudent because:

- expenditure to implement connection management was included in the 2009 CP budget application[30] and in the Draft Determination of July 2011; and
- the requirement for remote configuration of meters and for remote connect disconnect was always required and is part of the minimum functionality specification. The application architecture diagram provided in CP's 2009 submission[31] shows data flows for configuration and remote connect/disconnect. Hence it is assumed that this was funded in that application.

4.7.2 Connection point management

Impaq noted in its previous report that although the major IT build to enable AMI is complete, there will be some expenditure in 2012- 2015 due mainly to some of the applications being somewhat immature (particularly the NMS and MDMS systems) and the need for additional meter data storage. Impaq at that point was doubtful about the need for expenditure on a connection point management system because:

- the requirement for connection point management was known from the beginning of the AMI project and would be required for the start of the rollout and hence the system build would presumably be complete ahead of the rollout; and
- the CP application architecture shows the continued use of a CIS (CIS O/V), which would appear to provide the connection point management needs.

[29] Citipower 2011 – 2, page 82.
[30] Citipower AMI Budget Application 2009-11 page 38
[31] Citipower AMI Budget Application 2009-11, page 41

The additions to this connection point management system that CP is seeking (remote meter configuration and connect/disconnect) were known requirements from the beginning of the project. Hence, it is Impaq's view, that the additional cost in the CP amended application is not prudent. Refer Table 26.

Table 26 – Connection Point Management

	2012	2013	2014	2015	Total
CP Initial Budget Application	2,302	0	140	0	2,442
Impaq assessment for the draft determination	2,302	0	140	0	2,442
CP Amended Application	3,861	0	140	0	4,001
Impaq Assessment	2,302	0	140	0	2,442

4.7.3 Performance and Regulatory Reporting

Table 27 shows the original CP submission, the draft determination, the CP amended application and the Impaq assessment.

Table 27 – Regulatory and Performance reporting

	2012	2013	2014	2015	Total
CP Initial Budget Application	285	285	285	285	**1,140**
Impaq assessment for the draft determination	0	0	0	0	**0**
CP Amended Application	952	389	242	-	**1,584**
Impaq Assessment	0	0	0	0	**0**

CP's amended application states:

The Draft Decision rejected all expenditure on performance and regulatory projects on the basis there were no proposed changes to the Business' external regulatory reporting requirements.

The AER has not understood the nature of the expenditure included under performance and regulatory reporting. The expenditure relates to the creation of a data warehouse using the Teradata product.

The data warehouse is required to store the interval data for a period of 7 years. The costs of the project are spread over multiple years to allow for the scaling of the data warehouse as the data population grows.

The two key reporting areas to be delivered from the data warehouse are:

- *Reporting against the interval data delivery performance targets for 6am, 24hrs and 10 days after each read day. The Business presently has in place a*

temporary reporting solution but it is not scalable to the full meter population; and

- *The AMI IT program replaced the legacy Meter Data System (MDS) with an application from Itron Enterprise Edition (IEE) that was scalable to 1.2 million interval meters. The MDS system had a suite of reports to meet the internal requirements of the Business. These reports are still in use today, despite the new Meter Data Management (MDM) application being implemented. Provision of these reports from the legacy system is a temporary measure until the data warehouse project is implemented*

Based on the information provided by CP, Impaq now understands that this is a data warehousing project. However Impaq does not consider this capital expenditure to be prudent because:

- if it were vital to CP's AMI implementation it should have been included in the CP 2009 submission;
- Impaq is not convinced that it is required to meet the performance and regulatory obligations of CP. The requirement for reporting data delivery performance against targets can be met by creating a database report utilising the data in the Itron IEE MDMS database. Eg: the MS SQL Server database has facilities for developing custom reports; and
- the requirement for storage of 7 years of interval data[32] can be met through archiving procedures (eg: using Mag tape storage) because the incidence of needing to access data more than 13 months old is likely to be very infrequent and there is specified timeframe in the NER or the Metrology procedure for the retrieval of this data. In addition, Retailers will have access to interval data in MSATS and can have their own storage of interval data.

4.7.4 IT Program Management

Impaq considers that the CP amended application for IT Program Management is prudent given that there will be some IT projects occurring in 2014 and 2015.

Table 28 – IT Program Management

	2012	2013	2014	2015	Total
CP Initial Budget Application	300	300	300	300	1,200
Impaq assessment for the draft determination	300	300	-	-	600
CP Amended Application	300	300	200	140	941

[32] National Electricity Rules (rule change in 2011) chapter 7 – section 7.9 & 7.11 requires 13 months online storage and 7 years of archive storage.

4.7.5 Infrastructure

Impaq considers that the CP amended application for IT Infrastructure is prudent.

Table 29 – IT Infrastructure

	2012	2013	2014	2015	Total
CP Initial Budget Application	893	936	1,952	1,301	5,082
Impaq assessment for the draft determination	893	936	500	500	2,829
CP Amended Application	893	936	1,952	1,301	5,082
Impaq Assessment	893	936	1,952	1,301	5,082

4.8 Capital Expenditure Summary

Table 30 shows a summary of the CP amended forecast cost and Impaq's view for each item of Capex.

Table 30 – CP Capex summary – proposed and Impaq view

	2012	2013	2014	2015	Total
Meter Supply - Contract – Proposal	20,273	14,162	1,059	1,417	36,911
Meter Supply - Contract – Impaq view	19,737	13,239	720	1,040	34,736
Meter Supply other – Proposal	2,352	1,822	595	696	5,465
Meter Supply other – Impaq view	2,471	1,822	626	723	5,642
Meter installation - contract – Proposal	7,275	5,000	0	0	12,275
Meter installation - contract – Impaq view	7,275	5,000	0	0	12,275
Meter installation - other –Proposal	6,174	5,384	659	637	12,854
Meter installation - other – Impaq View	3,615	2,687	511	491	7,304
Communications equipment supply – contract & non-contract - Proposal	16	12	32	34	94
Communications equipment supply - contract & non-contract – Impaq view	16	12	32	34	94
Communications equipment installation – other - proposal	260	229	106	62	657
Communications equipment installation – other – Impaq view	260	229	106	62	657
IT Capex - Proposed	9,109	4,664	3,471	2,379	19,623
IT Capex – Impaq view	6,598	4,274	3,228	2,378	16,478

	2012	2013	2014	2015	Total
Total – Proposal	45,459	31,272	5,921	5,225	87,877
Total – Impaq view	39,972	27,263	5,222	4,727	77,184

4.9 Operating Costs

Table 31 shows the summary of each of the items of Opex with the value proposed by CP in its amended application.

Table 31 - Operating Expenditure Budget Summary

Opex	2012	2013	2014	2015	Total
Meter data services	2,714	2,120	1,500	1,500	7,834
Meter maintenance	1,045	1,023	1,334	1,357	4,759
Customer service	2,722	2,221	507	523	5,973
Backhaul communications	45	71	73	74	263
Communication operations	508	508	877	877	2,770
Project management	0	0	1,429	1,287	2,716
Executive and corporate office services	300	309	403	392	1,404
Debt raising			84	77	161
IT	3,662	3,816	3,412	3,458	14,348
Total	10,960	10,032	9,566	9,493	40,051

Each of the above Opex items is considered in turn in the following sections. The costs of many of the items are heavily affected by human resources costs. Where human resource costs are involved, Impaq's assessment is determined based on the assumptions given in Section 3.4.2.

Items for which CP has accepted the AER's draft Determination are not discussed in this report.

4.10 Meter Data Services

Table 32 shows the costs CP proposed in their initial application, the Impaq assessment for the draft determination, the CP amended application and the current Impaq assessment.. It is noted that the Impaq assessment includes allowance for manual meter reading contract costs.

Table 32 – Meter Data Services

	2012	2013	2014	2015	Total
CP Initial Budget Application	1,909	1,701	1,321	982	5,913

	2012	2013	2014	2015	Total
Impaq assessment for the draft determination	465	378	246	246	1,335
CP Amended Application	2,714	2,120	1,500	1,500	7,834
Impaq Assessment	1,105	575	339	312	2,331

In its amended application CP has increased the number of activities covered in this category[33]. The activities now are:

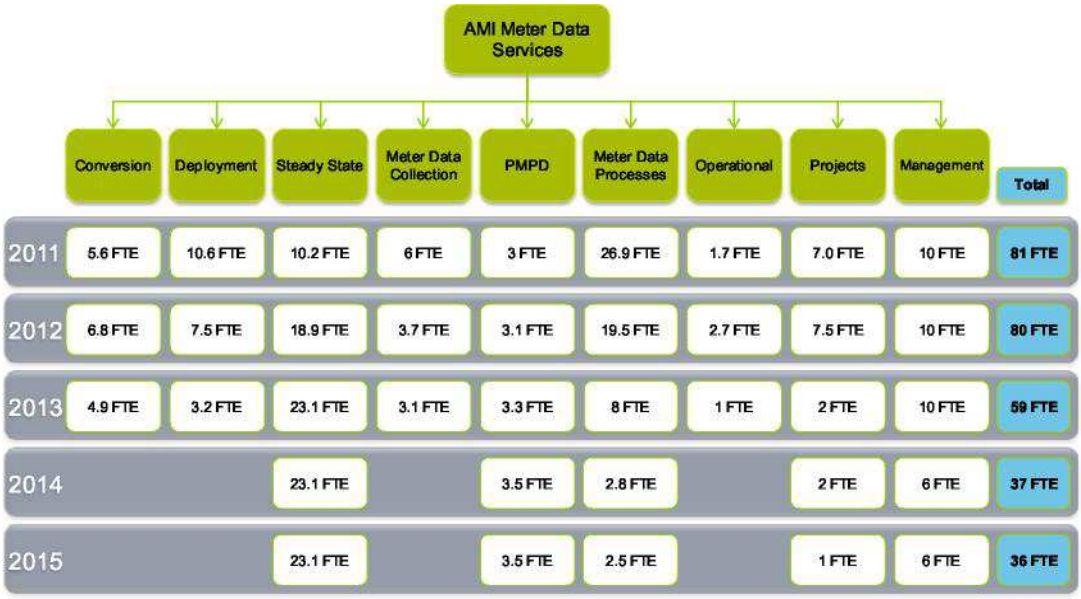
- *Conversion – this activity takes a currently installed interval meter and makes it a fully functional AMI meter by logically converting (activating) it. Since the Initial Budget Application, the Business has needed to increase the number of conversions from manually read interval meters to remotely read interval meters on account of reductions in conversions in 2011;*
- *Deployments – this activity replaces a currently installed basic meter with an AMI meter and immediately activates it as opposed to simply installing it and logically converting it later;*
- *Steady State Preparation – these are BAU activities that are not part of the conversion or deployment processes but are day-to-day activities needed to maintain the AMI data;*
- *Meter Data Collection – this activity covers basic meter reading exceptions which will continue until accumulation meters are replaced with AMI meters. This activity also includes meter reading for accumulation and manually read interval meters. Since the Business's Initial Budget Application, it has continually lost efficiencies on meter reading routes due to many routes being unable to be closed out as a function of it needing to by-pass meters. Whilst this only impacts on 2012, it has led to an increase in payments to the Business's meter reading vendor to compensate for the loss of efficiencies;*
- *Performance Monitoring and Process Development – this function represents CitiPower at industry forums and acts as a liaison between the broader community and the Business. This function also considers changes arising from the National Energy Customer Framework, data management change requests and administrative work flow to ensure industry policies are transferred into the Business when needed;*
- *Meter Data Processes (basic and interval) – these activities cover data reporting, data requests and overall reporting functions for both basic and interval meters;*
- *Operational – this activity manages local network service provider retailer inquiries and activity queues; and*
- *Projects – this covers enhancements required as part of the of the AMI rollout and to support on-going operations.*

[33] Citipower amended application, page 101.

Deloitte, in their report[34] for CP and PAL has documented its analysis of the FTEs involved in these activities. This report refers to a Deloitte excel model, however, due to email issues, the AER has not been able to provide this to Impaq.

Figure 1 is taken from the Deloittes report[35].

Figure 1 – Deloittes FTE analysis



The following is Impaq's comments on each of these activities.

4.10.1 Conversion

The Victorian AMI Minimum Performance Levels specification requires all meters to be providing interval data from 1 Jan 2012. This means that all meters should have been converted to AMI meters by that date. Hence, for 2012- 2015 there should be no conversions occurring. Hence this item is out of scope.

4.10.2 Deployment

Impaq is of the view that this activity should be treated as part of the installation of an AMI meter and its cost included in the Capex category Meter Installation – non contract costs. However, Impaq is satisfied that CP has not included the cost of this activity in Capex and will treat it as part of this activity

During 2012 there are to be 127,069 meters installed for CP and 287,850 installed for PAL, or 414,919 in total. Deloitte states that the error rate for deployments will reduce to 0.4% by the end of 2011, resulting in 1660 errors. With 7.5 FTEs, or

[34] Deloitte AMI Cost Review for CP/PAL
[35] Deloitte AMI Cost Review for CP/PAL, page 9, Fig 4.

12,600 hours, for this task in 2012, this allows approximately one man day to fix each error. This is excessive.

The nature of the errors given by Deloitte are:

- interval meter exceptions;
- commissioning not completed in IEE;
- IEE can't load data; and
- communication issues at time of deployment.

These errors seem to be IT related and in particular indicate issues with Itron IEE or SI issues. These should be able to be fixed by the end of 2011.

Impaq considers 1.5 FTE for 2012 and 0.9 FTE for 2013 to cover both businesses should be adequate. This translates to approximately one hour to fix each error. For CP this equates to 0.5 FTEs for 2012 and 0.3 FTE for 2013.

4.10.3 Steady State

The activity is described as being about maintaining AMI data. Deloitte have identified several items that it forecasts will incur FTE effort. These are commented on in Table 33.

Table 33 – Steady State issues

Item	Impaq Comment
Failed export from UIQ to IEE ,	This is an IT application or integration issue to be fixed together with other teething problems. There is large Capex allowance for improvement of both UIQ and IEE. This should not be a BAU Opex issue.
Communications faults,	The Communications operations people should fix this.
Meter faults – meter stops reading	Meter faults will occur and there is Capex allowance for replacing faulted meters. Missing data from a faulted meter is to be substituted as per the validation and substitution rules. This should be automated.
Retailer requests – email/VMDR,	With the provision of interval data to retailers on a daily basis the requests for information should reduce markedly, apart from requests in relation to new connections or de-energisations and re-energisations, which are Alternative Control Services.
General data requests,	With interval data going to Retailers and to the market and with standing data on MSATS it is hard to see what other data can be asked for.

Item	Impaq Comment
Monitoring 10 day sub data	This should be an automated activity.
AEMO reports – Estimates,	This should be an automated report.
AEMO reports – Nulls,	This should be an automated report.
AEMO reports – NWADS	This should be an automated report.

It is Impaq's view that the Meter Data Management System (MDMS) and Network Management System (NMS) will fully automate the activity of collecting and validating data from the AMI meters. The vast majority, if not all, of the processing of the data, including validation, estimation and substitution, will also be automated. It will only be a very small number of exceptional situations that will require manual intervention, which should have minimal impact on CP meeting its service level obligations.

The AMI performance levels[36] for the collection of daily meter readings require 99% by 4 hours after midnight and 99.9% within 24 hours. Hence there will be 99.9% of data delivered to the NMS from meters that will not require any kind of correction because it is correct data.

Deloitte has said[37]

The current total error rate for these activities is 1.7%. This rate is expected to decrease significantly to 0.2% during 2012 – several initiatives have been identified to improve the process and reduce the need for manual intervention.

Based on CP having 350,000 meters, a 0.1% rate of meter data inaccuracy equates to 16,800 data points per day. The vast majority of these errors will be addressed using standard and automated algorithms in the NEM validation and substitution procedures. Impaq assumes that at least 99% of the erroneous data points will be corrected by the MDMS, leaving 168 data points, or equivalent to 3.5 meters, which may require manual intervention per day.

Table 34 shows the maximum and minimum theoretical number of FTE's required to correct data errors for CP and PAL combined. This is based on a 0.2% error rate and 0.1% rate of those errors needing manual intervention. The worst case scenario is that each erroneous data point that requires manual intervention is from a separate meter and each point needs to be manually substituted individually. The best case scenario is where all the data points are from whole meters that have failed for 24 hours and 48 data points can be substituted in one block. Each substitution, either individually or in blocks (as required) is assumed to 10 minutes (which is a more than generous allowance).

[36] Minimum AMI Functionality Specification (Victoria) Sept 2008, Ver 1.1 section 4.1
[37] Deloitte report CP/PAL, page 13.

Table 34 - Analysis of FTE's required to correct data errors

	2012	2013	2014	2015
No AMI Meter	922,000	1,132,000	1,132,000	1,132,000
No Errors daily	88,512	108,672	108,672	108,672
No error requiring manual substitution	885	1,087	1,087	1,087
Worst case – No Substitution	885	1,087	1,087	1,087
Best Case scenario – No Substitutions	19	23	23	23
Worst case FTEs	19.7	24.2	24.2	24.2
Best case FTEs	0.4	0.5	0.5	0.5

For 2012 the FTE requirement ranges from 0.4 to 19.7 and in 2013 it ranges from 0.5 to 24.2. Impaq believes that it is more likely that errors that require manual intervention will occur in blocks, although not necessarily 24 hour blocks. This is because an individual erroneous bit of data will probably be picked up the next time the meter is read that day and, if not the substitution rules for individual half-hourly reads are simple and easily automated. The most likely cause of errors requiring manual substitution will be communications or meter failures where a whole stream of half hourly reads cannot be obtained.

Impaq believes that an appropriate level of resourcing for this activity would be 8 FTEs across CP and PAL

4.10.4 Meter Data Collection

CP has stated that[38]:

This activity covers basic meter reading exceptions which will continue until accumulation meters are replaced with AMI meters. This activity also includes meter reading for accumulation and manually read interval meters.

Managing exceptions with the reads from legacy meters is discussed and assessed in Section 4.10.6. The reading of legacy meters for CP is done by contractors and is discussed and assessed in Section 0.

Impaq believes these costs are already addressed.

4.10.5 Performance Monitoring and Process Development

Deloitte has described this activity[39] as:

The PMPD activity is responsible for data management activities including change requests and administration workflow management. In addition it

[38] Citipower 2011 -2, page101.
[39] Deloitte report CP/PAL,page 14.

represents CP/PAL at industry forums, and acts as a liaison within CP/PAL. This helps to ensure that industry policies are transferred to CP/PAL when needed.

In relation to change requests and improvements of work flow, this is a capital expenditure item and there have been a sizeable capital expenditure items for NMS and MDMS enhancements over the 2012 to 2015 period. Impaq considers that there is no need for a duplication of allowance for this activity.

In relation to representation on industry forums such as that for NECF, this affects the whole of the business not just that for AMI. The proposed 3.0 to 3.5 FTEs is excessive. Impaq considers that 1 FTE shared between the two businesses is ample resource.

4.10.6 Meter Data Processes – basic and manually read interval meters

Deloitte have described this activity[40] as:

Meter data processes include data reporting, managing data requests, and overall reporting functions for basic, interval type 1-4 and type 5 manually read interval meters. This activity will not see any improvements as Basic and Interval meters will largely be phased out by 2013. Table 7 presents a list of meter data process activities and the estimated FTEs required. Some residual work will remain in 2014-2015 to account for non-AMI (type 1-4) meters still in service.

The Deloittes FTE estimates for this activity are shown in Table 35

Table 35 – Deloitte FTE estimates – Meter data Process - Manual

Meter data processes (basic and manually read interval meters)	Deloitte estimated FTEs				
	2011	**2012**	**2013**	**2014**	**2015**
BASIC METERS: AEMO Reports (nulls, NWADS, Estimates), Retailer Requests, Missing Reads, VMDR"s, Abnormal Consumption Reports, Reject Data Report, HULL Report Expired / Retrigger	11.3	7.8	3.8	1.3	1.0
MANUALY READ INTERVAL METERS: Import (MRIM, Type 1-4), Exception Reports, MSATS Reports (Nulls, Estimates), B2B Reporting	15.6	11.7	4.2	1.5	1.5

Deloitte appear to have misunderstood the AMI CROIC or the NER in relation to meter types.

[40] Deloittes report page 14

1. Meter types 1 to 4 in the NER are remotely read and hence should not be included in the manually read category.
2. Meter types 1 to 4 are not within scope as these are contestable meters, the cost of which is separately charged to customers.
3. After 2012 there will be no manually read interval meters in CP or PAL that are <160MWh (which is the CROIC scope). Hence there will be no need for FTEs for this activity in 2013, 2014 and 2015.
4. After 2012 there will be no basic meters in CP or PAL.

In relation to manually read interval meters, across CP and PAL there will be, on average, 30,100 MRIMs in 2012[41]. These are read quarterly ie: 4 times a year. This is a total of 120,400 reads. The Deloittes proposed FTEs is 11.7 for 2012. This gives a total of 19,656 FTE hours. The vast majority of MRIM data is processed automatically – without human intervention. Even if an extremely high error rate of 10% is assumed, this equates to 1.6 FTE hours per meter reading to fix errors do reporting and respond to retailer requests. Even half an hour would be to stretch credibility, but 1.6 hours is just not credible.

In relation to basic meters, in 2012 there will be on average 472,257 basic meters across CP and PAL. These are read quarterly (only a very small percentage are read monthly). This gives a total of 1.9M reads (each read is a single 6 to 8 digit number). The error rate on basic meter reads should not exceed 0.5%. This gives a total of 9445 errors per annum. With 7.8 FTEs the available hours is 13,104. This is 1.4 hours for each meter read error.

Impaq considers this resource level excessive however given that basic meters are to be phased out has not adjusted the FTE forecast.

The resulting Impaq assessment of FTEs is in Table 36.

Table 36 – Impaq FTE assessment

Meter data processes (basic and manually read interval meters)	Impaq estimated FTEs			
	2012	**2013**	**2014**	**2015**
BASIC METERS: AEMO Reports (nulls, NWADS, Estimates), Retailer Requests, Missing Reads, VMDR"s, Abnormal Consumption Reports, Reject Data Report, HULL Report Expired / Retrigger	7.8	3.8		
MANUALY READ INTERVAL METERS: Import (MRIM, Type 1-4), Exception Reports, MSATS Reports (Nulls, Estimates), B2B Reporting	1.5	0.5		

[41] Citipower and Powercor budget templates, Feb 2011

4.10.7 Operational (LNSP) (in relation to meter exchanges)

Deloitte have described this activity as[42]

Local Network Service Provider activities will address the increasing number of enquiries coming from retailers regarding localised networking and meter exchange. These enquiries result from an increasing awareness of the meter exchange program, and are expected to taper off as the exchange program finishes in 2013 – this is aligned with the meter rollout program.

Table 37 - Deloitte FTE estimates - Operational

Operational (LNSP) activities	Deloitte estimated FTEs				
	2011	2012	2013	2014	2015
LNSP Retailer Enquiries – emails, phone calls, and System Activity Queues (AQ"s)	1.72	2.7	1.0	-	-

The cost of dealing with customer requests, either directly or through their retailer, is allowed for in the activity of call centre under Customer Service.

4.10.8 Projects

Deloittes have described this activity as[43]:

Projects include enhancements that are currently scheduled as part of the AMI rollout (refer to Table 9). Projects also include oversight of a number of initiatives (outlined in Appendix D) that need to be implemented by 2012 to maintain efficient levels of automation. The majority of these projects will be completed by 2013, as the AMI rollout is completed, with some residual effort required in the energisation project until 2015.

Table 38 – Deloitte FTE estimates - Projects

Projects activities	Deloitte estimated FTEs				
	2011	2012	2013	2014	2015
Energisation (manual, semi-automatic, fully automatic), Data Management Transition & Support, Type 5 to Market, Data Management (deployment, operations), Tariff Re-Assignment and Monthly Billing	7.0	7.5	2.0	2.0	1.0

Some of the projects that are listed here should be complete by the end of 2011 – eg: Type 5 to Market transitions are required to be done before 1 Jan 2012 by the Vic AMI Service Levels specification. Tariff re-assignment has been a requirement

[42] Deloittes report page 15
[43] Deloittes report page 15

since the beginning of the AMI program and the systems and processes required for this should have been established long ago. Projects in relation to the improvement of the management of meter data retrieval and validation and substitution through the NMS (Utility IQ) and the MDMS (Itron IEE) have been amply provided for in the large IT Capex allowance for these systems.

However, Impaq accepts that process improvement will continue in 2014 and 2015 and accepts Deloitte's forecast for 2014 and 2015

4.11 Meter reading contract

The CP amended budget submission does not include this cost category. However the Deloitte report identified this omission and hence Impaq has made an assessment of the cost of manual meter reading required till all manual meters are phased out in 2013.

Manual meter reading (contractor) costs are normally around $0.50 per read for basic meters and $1.00 for MRIMs. Assuming that density of reading routes is lost through the partial rollout of AMI in various geographic areas the costs are assumed to be $0.75 per read for a basic meter and $1.50 per read for an MRIM. It is further assumed that monthly reads apply to 5% of all customers and quarterly reads to 95% of customers. **Error! Reference source not found.**Table 39 shows the Impaq assessment.

Table 39 - Meter reading contract

($, 2011)	Meters	2012	2013	Total
CP	MRIM	[C-I-C]	[C-I-C]	
	Basic	[C-I-C]	[C-I-C]	
	Read cost basic ($)	[C-I-C]	[C-I-C]	
	Read cost MRIM ($)	[C-I-C]	[C-I-C]	
	Reads cost total ($)	[C-I-C]	[C-I-C]	[C-I-C]
PAL	MRIM	[C-I-C]	[C-I-C]	
	Basic	[C-I-C]	[C-I-C]	
	Read cost basic ($)	[C-I-C]	[C-I-C]	
	Read cost MRIM ($)	[C-I-C]	[C-I-C]	
	Reads cost total ($)	[C-I-C]	[C-I-C]	[C-I-C]

4.12 Meter Maintenance

Table 40 shows the costs CP proposed in their initial application, the Impaq assessment for the draft determination, the CP amended application and the current Impaq assessment.

Table 40 – Meter Maintenance CP cost forecast and Impaq assessment

	2012	2013	2014	2015	Total
CP Initial Budget Application [44]	1,420	1,451	1,668	1,534	6,073
Impaq assessment for the draft determination	394	354	557	557	1,862
CP Amended Application	1,045	1,023	1,334	1,357	4,758
Impaq Assessment	675	618	685	691	2,669

The CP amended application identified that Impaq had omitted some components of the cost for the Meter Maintenance category. CP has also provided a spreadsheet[45] which models the activities and costs in the CP amended application for this category. In relation to the nature and scope of activities, Impaq agrees with what has been presented by CP with the exception of "Customer Investigations". CP has stated that:

> *These activities are associated with field metering investigations and rectification where no equipment is replaced and the customer has not requested a meter accuracy test. Historically, the Businesses have not charged customers for these activities, particularly where the investigation cannot establish any fault of the customer in contributing to the problem identified.*
>
> *These field investigations are initiated via:*
>
> - *Customer/retailer meter data enquiries;*
> - *EWOV enquiries; and*
> - *Internal business initiated investigations.*

It is Impaq's view that these activities more align with a pre-AMI world. When there is interval data for all customers, Retailers will not need to ask for investigations of a particular meter as the data will be available to them on a daily basis. Similarly with EWOV enquiries, customers will be able to see their own interval data and make this available to EWOV. If a customer seeks an investigation then the customers should pay for this unless it can be demonstrated that CP is at fault. Hence it is Impaq's view that this activity is not required.

In relation to the times and costs for all the activities it is Impaq's view that in most cases CP's rates are excessive and do not conform to a commercial standard. Table 41 compares the CP rate for single phase and polyphase meter testing with that of Formway Metering[46] and UED.

[44] The Citipower forecasts for 2014 and 2015 were revised in the third set of responses to AER questions in April 2011. These are as shown.

[45] Powercor and Citipower Meter Maintenance.

[46] Formway metering are a metering services provider that is an AEMO accredited meter verifier. www.formway.com.au/Default.aspx?alias=www.formway.com.au/groupmetering Impaq has obtained quotations for undertaking the meter testing activities required for meter maintenance.

Table 41 – Meter testing rates

	Citipower rate	Formway quotation	UED Alternative control service rate[47]
Single phase meter test	$259.28	$60	$51.22
Polyphase meter test	$426.95	$105	$79.67
CT Meter	$336.90	$200	N/A
CT testing	$686.23	$370	

Impaq has used the Formway rates in its calculation of meter testing costs. This is considered to be the higher end of the commercial standard with the UED costs at the lower end.

In relation to times taken to do the tests, Impaq believes these also are excessive. For example, CP correctly lists that CT testing is required such that all CTs are tested every 10 years[48]. However CP advises that the testing of a set of 3 CTs takes 4.42 hours. The Citipower and Powercor Meter Asset Management plan states that the Redphase Model 590 CT tester is used for testing CTs. The product information for this CT tester does indeed indicate that it is designed for testing CTs in the field and allows secondary injection testing, which is a much simpler test method. The test procedure given in the data sheet is reproduced here:

> **4.0. TEST PROCEDURE FOR C.T.s.** [49]
>
> **4.1.** Isolate the C.T. primary side. Use a length of cable to place one turn through the window of the C.T. and connect it to "VB" and "COM" terminals of 590G-V2.
>
> **4.2.** Isolate the C.T. secondary side, and using the 4 wire test lead supplied with the 590G-V2 and connect the secondary to the group of 4 terminals marked "VA" and "COM".
>
> **4.3.** Test data for the C.T. is keyed in. This includes: Primary current; secondary current; VA rating; PF; % burden ; accuracy class; Model No. and serial number.
>
> **4.4.** The test which takes around 1 minute are then displayed on the LCD as results at 120%, 100%, 50%, 20% and 5% current at both 100% and 25%VA burden. At the end of this test various options are available including saving the test results.

[47] UED Alternative Control services for metering - http://www.ue.com.au/industry/network_tariffs/download/2010/Appendix%20C.pdf

[48] NER requirement

[49] Red Phase CT tester model 590 product information. http://www.redphase.com.au/Files/590G-V2_DATASHEET.pdf

In 4.4 it states that the test time is around 1 minute. For three CTs that is 3 minutes. In addition there is time required to isolate the CTs before testing and to reconnect them afterwards. There is also travel time (however, from 2014 onwards, CT testing can be done at the same time as testing of the three phase CT meter that the CTs are connect to). Hence it is not surprising that the Formway cost for CT testing is a little over half of the CP/PAL cost.

4.13 Customer Service

Table 42 shows the costs CP proposed in their initial application, the Impaq assessment for the draft determination, the CP amended application and the current Impaq assessment.

Table 42 – Customer Service – Citipower Forecast and Impaq Assessment

		2012	2013	2014	2015	Total
CP Initial Budget Application		2,722	2,221	507	523	5,973
Impaq assessment for the draft determination		212	187	114	114	627
CP Amended Application		2,686	2,185	454	471	5,796
Impaq Assessment	Call Centre	692	568	-	-	1,260
	Customer Interaction	1,017	822	-	-	1,260
	Revenue Management	194	126	0	0	320
	Community Engagement and Education	0	0	0	0	0
	Customer Service overheads	419	438	0	0	857
	TOTAL	1,161	941	0	0	2,102

4.13.1 Call Centre

In its previous report, Impaq removed the forecast call centre costs from this category because it believed that these costs were included in the meter installation capital costs. CP has demonstrated that these costs were not included in meter installation and should be included in this cost category. Impaq is satisfied that these costs are not being counted twice and reinstates these costs into this category.

Based on historical data of average call times and ratio of new installation to calls, CP has used an ‘erlang’ analysis to determine the number of Customer Service Agents (CSA) FTE’s required, that being [C-I-C] for 2012 and [C-I-C] for 2013. CP also claims that an additional [C-I-C] FTE’s are required in both 2012 and 2013 for the management of this team and to provide technical support. Impaq has reviewed this calculation and supports it.

CP has costed all of these FTE's at mid $[C-I-C] per annum. While Impaq disagrees with the labour rates for the individual resources, overall, Impaq's analysis of the total labour costs is not substantially different from CP's. Impaq accepts CP's forecast of call centre costs as prudent.

4.13.2 Customer Interaction and treatment

In its first report, Impaq removed the forecast customer interaction costs from this category because it believed that these costs were included in the meter installation capital costs. CP has demonstrated that these costs were not included in meter installation and should be included in this cost category. Impaq is satisfied that these costs are not being counted twice and reinstates these costs into this category.

CP has provided a detailed breakdown of the resources and costs of interacting with customers. This includes:

- [C-I-C] FTEs;
- understanding customer issues and concerns through focus groups and surveys;
- training;
- mailing costs;
- development of brochures and other information for customers;
- media advertising;
- payment of claims, net of amount recovered from contractors;
- cost of claims referred to the Ombudsman;
- cost of translation and interpretative services; and
- engagement in community partnerships and forums.

Impaq has reviewed the costs forecast by CP and has found them to be reasonable and prudent.

4.13.3 Revenue Management

This category includes the activities of:

- addressing and resolving final meter read discrepancies with the removed non-AMI meter; and
- addressing and resolving revenue protection issues associated with the meter exchanges.

CP has stated that actual data for 2010 demonstrated that 12 per cent of final reads required manual intervention, taking on average of 10 minutes to resolve[50].

[50] Citipower 2011-2, page 115

In its previous report, Impaq stated that CP's contractor has contractual service level requirements with respect to final meter reads and that if CP is experiencing an error rate of this magnitude it needs to address this with its contractor rather than be funded by customers. CP acknowledges its contractual rights but has stated that the majority of these discrepancies are not a function of the final meter read but, rather, are caused by:

- previous cyclic meter reads being in error;
- previous cyclic meter reads being estimated; or
- identified network tariff errors at meter exchange.

Impaq is surprised that 12 per cent, or 1 in 8, final reads display these problems such that they require manual intervention.

In respect of erroneous previous cyclic reads, this previous read would need to be such that it is greater than the actual final read or, at least, sufficiently incorrect that 'trending' analysis flags this as an error that requires manual intervention. Small errors in the previous read would not be noticed and would, in effect, be corrected with the actual final read. Impaq expects that this level of error would be small, say less than 1 per cent. If the level of 'erroneous' reads is significant, this is a matter that CP should address with the contract meter reader for non-AMI meters.

Previous estimated reads that are sufficiently 'incorrect' to raise an error that requires manual intervention are likely to be greater, as a proportion of estimated reads, than erroneous reads. However, the number of meters that are estimated is small relative to the number of meters that are actually read. If the rate of estimated reads that flag an error that require manual intervention is 10% and the rate of estimated reads is 10% of meters at any point in time, the proportion of final reads which require manual intervention as a result of this factor is 1%.

The meters which are being removed have been in the field for many years. During this time:

- they have been regularly inspected as part of the meter reading process;
- data has been read, processed and validated;
- retailers have received network bills and customers have received energy bills based on the reads; and
- manual energisation and de-energisations have occurred for many of them.

It should be rare that a network tariff error has gone undetected and uncorrected for this period of time that would be found at meter exchange. Impaq is of the view that a rate of this type of error of 1 per cent is conservative.

Additionally, as stated in its initial report, Impaq accepts that a 0.5% error rate in the final meter read is acceptable and within the contractual limits of CP's contractor.

Overall, Impaq believes that an estimate of 3.5% of meter exchanges that require manual intervention as a result of these causes is conservative but acceptable. This equates to 0.6 FTE's in 2012 and 0.4 FTEs in 2013 for CP.

In relation to revenue protection, CP states that they have found through the rollout that 1.5 per cent of sites have revenue protection issues. These are either:

- identifying fraudulent activity with the existing meter installation; or
- sites where the existing metering arrangement has not been correctly metering the network tariff the customer has been assigned to.

Impaq considers this to be an extremely large number of occurrences.

As stated in its initial submission, accepted industry standards for fraudulent activity in respect of the meter and installation is between 0.1% and 0.5%.

In respect of metering arrangements that have not been correctly metering the network tariff, Impaq believes that the majority of these should have been identified in the normal course over the life of the meter and its operation. Impaq is of the view that a rate of this type of error of 1 per cent is conservative.

Overall, Impaq believes that an estimate of 1.5% of meter exchanges that require manual intervention for revenue protection purposes is conservative but acceptable. Impaq accepts that some of these matters may take longer to resolve and estimates an average time for resolution of 30 minutes. This equates to 0.7 FTE's in 2012 and 0.5 FTEs in 2013 for CP.

Impaq accepts CP's forecast of other costs in this category.

4.13.4 Community engagement and education

This activity relates to the engagement of customers following the completion of the Victorian Government Review, expected the end of 2011. CP has stated that:

On completion of the Victorian Government review, it is anticipated the Business will be required to undertake further AMI rollout education programs to regain the confidence of the community in the AMI program.

Impaq is of the view that, at this point in time, this activity is out of scope. If, following the completion of the Government's review, CP believes it will be necessary for it to incur additional costs then a revised budget application should be made.

4.13.5 Customer Service overheads

CP has allocated a portion of corporate customer service overhead costs to the AMI program.

"The allocation is made consistent with the Business' Regulatory Accounts for 2009 and 2010. These allocations have been audited and approved by Deloitte as being within the AMI Scope. The amount included in the forecasts is consistent with the allocation for 2009-10."[51]

[51] Ibid page 116

Impaq provides no comment on the appropriateness of this allocation for 2012 and 2013. However, as there are no costs for the direct activities for 2014 and 2015 in both the CP amended forecast and the Impaq assessment, , Impaq is of the view that there should be no overhead costs allocated to this category for these years.

Impaq notes that in the CP templates this allocation is described as 'General Manager' at an annual amount that would equate to about [C-I-C] FTEs. Impaq does not believe that the level of activity and responsibility in this category would justify overheads of [C-I-C] general managers.

4.14 Backhaul Communications

Table 43 shows the costs CP proposed in their initial application, the Impaq assessment for the draft determination, the CP amended application and the Impaq assessment.

Table 43 – Backhaul Communications Costs

	2012	2013	2014	2015	Total
CP Initial Budget Application	45	71	73	74	263
Impaq assessment for the draft determination	31	31	32	33	127
CP Amended Application	45	71	73	74	263
Impaq assessment	31	31	32	33	127

The CP amended application has not changed from their initial application. The CP amended application provides no information in relation to this category and hence Impaq has had no reason to change its view.

4.15 Communication operations

Table 44 shows the costs CP proposed in their initial application, the Impaq assessment for the draft determination and the CP amended application.

Table 44 – Communications Operations

	2012	2013	2014	2015	Total
CP Initial Budget Application	1,323	1,323	1,323	1,322	5,293
Impaq assessment for the draft determination	633	633	633	633	2,532
CP Amended Application	508	508	877	877	2,770

Impaq considers that the CP amended application cost for this category is prudent.

4.16 Project Management

Table 45 shows the costs CP proposed in their initial application, the Impaq assessment for the draft determination, the CP amended application and the current Impaq assessment.

Table 45 – Project Management

	2012	2013	2014	2015	Total
CP Initial Budget Application	0	0	1,429	1,287	2,716
Impaq assessment for the draft determination	0	0	586	484	1,079
CP Amended Application	0	0	1,429	1,287	2,716
Impaq assessment	0	0	586	484	1,079

CP has maintained its forecast of expensed project management costs in its amended application. However CP has not provided any expanded or additional justification for these amounts. Consequently, Impaq is of the view that its assessment of this category in its previous report is still valid.

4.17 Executive and corporate office services

Table 46 shows the costs CP proposed in their initial application, the Impaq assessment for the draft determination, the CP amended application and the current Impaq assessment.

Table 46 – Executive and Corporate Services

	2012	2013	2014	2015	Total
CP Initial Budget Application	300	309	403	392	1,404
Impaq assessment for the draft determination	102	102	382	382	968
CP Amended Application	300	309	403	392	1,404
Impaq assessment	279	279	333	319	1,210

CP has provide a significantly greater level of detail regarding the activities undertaken in 'accounting services' and 'regulatory activities and has clarified that the regulatory component includes more than just 'support for the 2016 – 2020 EDPR' as was indicated in its previous submission.

Subsequently, in a request for additional information, CP has provided further detail on these costs[52].

Impaq has reviewed the data that has been provided by CP. Impaq has a number of concerns with the analysis, including:

- the time and/or resources required for some of the activities are excessive; and
- not all of the activities are required for the full 2012 to 2015 period, particularly those activities that are related to the rollout.

The areas that Impaq has concern are discussed below.

The forecast of resources should represent the incremental burden on the business and not the stand-alone activity.

[52] Citipower and Powercor 2011, "Response to AER questions of 15 September 2011".

4.17.1 Annual budget

CP has forecast that for CP and PAL, the incremental effort required to prepare the annual budget for the Regulated Services is 3 FTEs for 2.5 weeks each month for 2.5 months, or 18 man weeks. Impaq believes that this is excessive, given that rollout numbers and contract costs are already known. Impaq is of the view that a total of 6 man weeks would be sufficient.

4.17.2 Program reporting – Board, Steering Committee

CP has stated that this activity will take 1 day per month for 1 FTE. However, in its calculation, CP has used 1 week per month or 12 man weeks. This should be 2.4 man weeks.

Additionally, this activity is only required until the end of the rollout.

4.17.3 WIP Clearance

After the rollout, the activity in this area will be significantly reduced.

4.17.4 Annual Regulatory Accounts

CP has stated that this activity will take 1 month for 2.5 FTEs or 10 man weeks. Impaq notes that this activity should be incremental to the development of the business' regulatory accounts for the Regulated Metering activities only. Impaq believes that 1 month for 1 FTE, or 4 man weeks would be sufficient for both of the businesses, particularly since the preparation of the Annual/Half Year Statutory Accounts, upon which the Regulatory Accounts are based, is forecast to only take 6 man weeks.

4.17.5 Provision of support to Regulation

CP has stated that this activity will take 1 month for 3 FTEs or 12 man weeks. Additionally, CP has forecast a significant amount of effort in the Regulatory area of this cost category. Impaq believes that much of the effort in this activity is already addressed and that 1 month for 1 FTE will be sufficient.

4.17.6 Financial support to Program, Management Team, Project Managers

CP has stated that this activity will take 4 days per month for 3 FTEs or 29 man weeks. Impaq accepts this forecast but notes that this activity will only be required until the end of the rollout.

4.17.7 Margin

In its response to further questions, CP has identified that a margin of about [C-I-C] % has been included. While Impaq makes no comment on the validity of this margin, Impaq has recalculated the margin as [C-I-C] % on its assessment.

4.17.8 Advertising

In its response to further questions, CP has identified an allocation of corporate advertising costs. Impaq notes that, under 'Customer Service – Customer Interaction and Treatment, (see Section 4.13.2), funds have already been allowed for media activities including:

- mailing costs;
- development of brochures and other information for customers; and
- media advertising;

Given that direct funding has been provided for media activity, Impaq does not believe that an allocation for advertising is appropriate.

4.17.9 External Audit Fees

CP has forecast costs for external audit fees. Impaq accepts that this is a required cost. However, in its response to further questions, CP has indicated that these costs will be increasing each year. Impaq sees no reason why the cost of the internal audit will be increasing in real terms and believes the forecast for 2012 will apply for 2012-2015.

4.17.10 Miscellaneous Legal Opinion

CP has forecast costs for miscellaneous legal opinion. Impaq accepts that it is likely that CP will need to seek legal opinion on matters such as contract terms, regulatory requirements, etc. However, in its response to further questions, CP has indicated that these costs will be increasing each year. Impaq sees no reason why the cost of the legal fees will be increasing in real terms and believes the forecast for 2012 will apply for 2012-15

4.17.11 EDPR 2016-2020

In its response to further questions, CP has provided additional information on its forecast of costs for the EDPR 2016-2020 in respect of metering regulated services. Impaq accepts that costs will be incurred in this area but has the following concerns with the CP forecast.

- CP has forecast costs for 2012 and 2013. Impaq does not believe that costs will be incurred for this activity in these years.
- CP's forecast for 2014 and 2015 are based on the costs that it has currently incurred in respect of this current AMI price review. While Impaq does not dispute the costs that CP has incurred on this matter, the subject of this review is sole regulated metering and so these costs are totally attributable to metering. However, metering will only be an incremental part of the EDPR 2016-2120 and thus the costs will be incremental,

Impaq believes that no costs will be incurred for 2012 and 2013 and half the costs forecast by CP for 2014 and 2015 is appropriate.

4.18 IT Opex

Table 47 shows the costs CP proposed in their initial application, the Impaq assessment for the draft determination, the CP amended application and the current Impaq assessment.

Table 47 – Summary of IT Opex

	2012	2013	2014	2015	Total
CP Initial Budget Application	6,007	6,092	6,240	6,308	24,647
Impaq assessment for the draft determination	3,704	3,740	3,012	3,031	13,487
CP Amended Application	3,662	3,816	3,412	3,458	14,349
Impaq assessment	3,649	3,719	3,185	3,154	13,708

The Impaq assessment makes only one adjustment to the CP amended application, which is the removal of the Data Warehouse Opex cost in line with the removal of the Data Warehouse Capex.

4.19 Operating Cost Summary

Table 48 – Summary of Operating Costs – proposed and Impaq view

	2012	2013	2014	2015	Total
Meter Data Services – Proposal	2,714	2,120	1,500	1,500	7,834
Meter Data Services – Impaq view	1105	575	339	312	2,331
Manual meter reading – proposal					0
Manual meter reading – Impaq view	517	148			665
Meter Maintenance – Proposal	1,045	1,023	1,334	1,357	4,759
Meter Maintenance – Impaq view	675	618	685	691	2,669
Customer Service – Proposal	2,686	2,185	454	471	5,796
Customer Service – Impaq view	1161	941	0	0	2,102
Backhaul Communications –Proposal	45	71	73	74	263
Backhaul Communications – Impaq View	31	31	32	33	127
Communications operations - Proposal	508	508	877	877	2,770
Communications operations – Impaq view	508	508	877	877	2,770
Project Management – Proposal	0	0	1,429	1,287	2,716
Project Management – Impaq view	0	0	595	484	1,079
Executive & corporate services – Proposal	300	309	403	392	1,404
Executive & corporate services – Impaq view	279	279	333	319	1,210
Debt raising costs - proposal			84	77	161
Debt raising costs - Impaq view			84	77	161
IT Opex – Proposal	3,662	3,816	3,412	3,458	14,348
IT Opex – Impaq view	3,649	3,719	3,185	3,154	13,707

	2012	2013	2014	2015	Total
Total – Proposal	10,960	10,032	9,566	9,493	40,051
Total – Impaq view	7,925	6,819	6,130	5,947	26,821

5 Jemena

The tables below compare the JEN amended application and initial budget submission for Capital Expenditure and Operating Expenditure for AMI for 2012-2015[53].

Table 49 – Amended JEN Capex Budget Submission Summary

	2012	2013	2014	2015	Total
Meters (Mass Rollout)	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Installation (Mass Rollout)	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
New Connections, Adds and Alts	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
AMI technology and communications	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
IT Infrastructure and systems	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
MRO back office -	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Total Revised Proposal	**32,352**	**16,783**	**5,436**	**5,143**	**59,714**

Table 50 – Original JEN Capex Budget Submission Summary

	2012	2013	2014	2015	Total
Meters (Mass Rollout)	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Installation (Mass Rollout)	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
New Connections, Adds and Alts	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
AMI technology and communications	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
IT Infrastructure and systems	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
MRO back office -	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Total Original Proposal	**33,573**	**17,562**	**7,398**	**7,074**	**65,607**

Table 51 – Amended JEN Opex Budget Submission Summary

	2012	2013	2014	2015	Total
Asset Strategy and Planning-	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Asset Operations	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Customer Contact & Back Office	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
AMI Network Operations	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Meter Data Collection	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
AMI Transitional Business Activities	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Backhaul Communications	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]

[53] Jemena Asset Management 2011 "Response to the AER Draft Determination on the Victorian Advanced Metering Infrastructure Review 2012 – 2015 Budget and Charges Applications" August 2011, pages 12 & 13.

	2012	2013	2014	2015	Total
Management	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Finance & HR	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Regulatory Audit	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Service Delivery & Contract Management	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Stakeholder Relations	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Premises	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
IT Opex	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Total – JEN Proposal	**19,872**	**17,589**	**15,844**	**15,985**	**69,290**

Table 52 – Original JEN Opex Budget Submission Summary

	2012	2013	2014	2015	Total
Asset Strategy and Planning-	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Asset Operations	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Customer Contact & Back Office	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
AMI Network Operations	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Meter Data Collection	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
AMI Transitional Business Activities	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Backhaul Communications	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Management	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Finance & HR	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Regulatory Audit	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Service Delivery & Contract Management	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Stakeholder Relations	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Premises	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
IT Opex	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Total – JEN Proposal	**19,422**	**17,227**	**15,820**	**15,941**	**68,410**

In this section of the report each of the cost items in the above tables are reviewed in order. Where the AER has accepted an item of expenditure in the draft determination and the DNSP has not changed its original forecast, Impaq has made no comment on that item

It is noted that JAM engaged KEMA to undertake a review of selected items of the JAM Capex amended application. KEMA's views are considered on each of the Capex items on which they have commented.

5.1Capital Expenditure Meters (Mass Rollout)

5.1.1 Meter Volumes

In the JAM amended application, the mass rollout meter volumes for JEN are given[54]. An excerpt from this for 2012 and 2013 is given in Table 53. It is noted that JEN expects to complete the rollout by the end of 2013 and hence there are no rollout volumes for 2014 and 2015.

Table 53 – Revised meter rollout volumes

Meter Types	2012	2013
Single Phase Single element	75,084	31,285
Single phase single element with load control	24,887	10,369
Three phase direct connect	11,524	4802
Three phase direct connect with load control	3,272	1,364
Three phase CT connect	1,985	827
Total	**116,752**	**48,647**

JEN has changed its rollout profile since its initial submission, it has chosen to reduce the number of meters rolled out in 2010/11 and increase the number in 2012/13. The number of meters for 2012/13 in the amended application is 14.5% higher than that in the original submission for those years. Table 54 shows the original volumes

Table 54 – Original meter rollout volumes

Meter Types	2012	2013
Single Phase Single element	61,990	25,829
Single phase single element with load control	24,887	10,369
Three phase direct connect	9,773	4,072
Three phase direct connect with load control	3,272	1,364
Three phase CT connect	2,038	849
Total	**101,960**	**42,483**

5.1.2 Meter Unit Prices

The meter unit prices are unchanged in the amended submission.

[54] Jemena Asset Management 2011, "Response to the AER Draft Determination on the Victorian Advanced Metering Infrastructure Review 2012 – 2015 Budget and Charges Applications" August 2011, , table 4-3, page 30.

5.1.3 External Antennas

Impaq has made allowance for 10% of Rollout meters to have external antennas.

5.1.4 Impaq assessment of meter (mass rollout) Capex cost

Table 55 shows the JEN Original Submission, the Impaq advice to AER for the draft determination, the JEN amended application and corresponding Impaq assessment of meter MRO cost. The Impaq assessment has increased since the draft determination mainly due to the 14.5% increase in meter numbers in the revised submission. The difference between the Impaq Assessment and the JEN amended application for MRO meters is now 3.1% which is due to differences in AU$ to US$ exchange rate assumptions.

Table 55 – MRO Meter purchase Capex

	2012	2013	2014	2015	Total
JEN Initial Budget Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq assessment for the draft determination	14,941	6,018	0	0	20,959
JEN Amended Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq Assessment	17,172	6,917	0	0	24,089

5.2Capital Expenditure – Installation (Mass Rollout)

The JEN amended application for MRO installation has increased by 12.5% over the initial budget submission. Part of this is due to the increased volume of meters being rolled out in 2012 and 2013, as noted in section 5.1.1

5.2.1 Panel replacements

In its amended application JEN has agreed that the rate of panel replacement across the whole rollout should be 5%. However, due to having skipped some of the more difficult installations in earlier years, the rate applicable for 2012 and 2013 is [C-I-C][55]. The Impaq assessment uses this figure of [C-I-C].

5.2.2 NST testing

In its amended application JEN emphasised that Neutral Service Testing is a requirement in the Service Installation Rules for meter exchanges. Impaq has validated this on the VESI website.

[55] Jemena Asset Management 2011, page 56.

5.2.3 No Access rates

Impaq's assessment of the "no –access" rates of 6.3% in its previous report was taken from the ISC dashboard for the rollout period up to February 2011. The JEN amended application provides data to show that JEN's no access rate for Jan to June 2011 was [C-I-C]. The ISC dashboard for July shows an average no access rate since commencement of [C-I-C]. Impaq acknowledges that in 2011 there has been significant negative media coverage of the smart meter rollout and statements from the new Government that have not been supportive of the program. However, given the review that has been undertaken by the Department of Treasury and Finance, which will inform the Minister of options in relation to the smart meter program, it is expected that the Government will make announcements in relation to the program which will remove the current levels of uncertainty. Hence, it is Impaq's view that the no-access rate will decrease in 2012. Nevertheless Impaq has made its assessment based on a no access rate of [C-I-C] in 2012 and [C-I-C] in 2013. The higher figure in 2013 is because those that have previously not given access will be visited again for AMI meter installation.

5.2.4 Truck support costs

KEMA has commented on the use of truck support as follows[56]:

> *In its finding, Impaq makes (sic) that argument that the incidence of panel replacements and no access letters reflected in the overall installation cost for the UE and JEN rollout are overstated, and that the approach to dealing with panel replacements is adding additional unwarranted cost to the rollout of meters. In regard to the process related to replacing defective meter panels that require replacement before an AMI meter can be installed, UE and JEN confirm that the approach taken during the rollout thus far is for the installer to refer the matter to a specialist team for remedy. This follows best practice among utilities installing AMI meters and is designed to maximize efficiency of installation as well as leverage appropriate skill sets. The approach allows utilities to divide meter installation work between job categories. One workforce is trained with the primary focus on performing volumes of meter installations. Their training includes identification of situations that might involve a specialist installer because of technical or safety issues such as involving energised lines or asbestos removal. Another workforce is trained with a set of specialized skills to resolve these situations.*

Impaq fully agrees that special installation teams are a good way to deal with matters such as panel replacement, which are exceptional installation circumstances, hence freeing up the main installation crews to work on the straightforward installation sites. However the justification for truck support

[56] KEMA 2011 "Response to the AER Draft Determination on the Victorian Advanced Metering Infrastructure Review 2012 – 2015 Budget and Charges Applications",, page 20.

presented by JAM is to do with customer supply isolations (eg: when isolation needs to occur on a service pole). Hence the KEMA commentary is not quite on the topic.

Nevertheless, Impaq has accepted JEN's advice in its amended application that the higher truck support costs are part of the overall installation contract with Service Stream and, although this rate is high, the overall contract cost for meter installation with Service Stream was somewhat lower than that offered by other installation companies.

5.2.5 MRO installation Capex cost

The net effect of the changes outlined above does not make a material difference to the JEN forecast. Hence Impaq accepts the JEN forecast. Table 56 shows JEN's original submission, Impaq's initial assessment, and JEN's amended application.

Table 56 – MRO meter installation Capex

	2012	2013	2014	2015	Total
JEN Initial Budget Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq assessment for the draft determination	6,892	2,851			9,743
JEN Amended Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]

5.3Capital Expenditure – BAU Metering

In its amended application JEN has revised its projected volumes and costs of BAU metering to take into account:

- that installation of new connection meters is an Alternative Control Service;
- revised projections of growth in customer numbers for 2012 to 2015; and
- that most meters recovered from abolishments and meter exchanges in 2012 and 2013 will be AMI meters and can be reused after re-verification.

JEN's amended application also provided an explanation of the need for external antennas on some BAU meters. Accordingly Impaq has included external antennas on 100% of BAU meters in 2012 and 20% on BAU meters in 2013. It is acknowledged that in 2013 about 30% of AMI meters in new estates may need an external antenna, but for all other infill new connections the mesh will be well enough built out to only require external antennas on 10% of meters. Hence an average of 20% has been used for 2013.

Table 57 shows the Impaq assessment of BAU metering supply cost which takes into account the above adjustments.

Table 57 – Impaq assessment of BAU metering supply cost

	2011	2012	2013	2014	2015	Total
Metering cost adjusted for reduction in antennas to 8.4% and exchange rate of 1.05		1461	882	808	803	3954
JEN customer numbers projection	312006	317363	322004	326272	330524	
Increase in customer numbers		5357	4640	4268	4252	
Meter numbers in revised proposal		8919	5354	4455	4414	23142
Ratio of proposed meter numbers to increase in customer numbers		166%	115%	104%	104%	
Target Meter to NMI ratio after rollout		1.03	1.03	1.03	1.03	
Impaq cost estimates for new meters		1099	790	797	797	3483
Meter re-verification cost		107	18	2	1	128
Impaq Total Metering cost		1206	808	799	798	3611
Average % rollout completion in each year		69%	97%	100%	100%	

JEN has advised that there is a proportion of BAU installs which are to replace failed meters including those which have failed due to lightning, High Voltage injection and accidental damage[57]. It is, however, noted that Australian metering standards place requirements on meters to reduce the incidence of failure due to lightning and High Voltage injection[58]. This has been very effective and the number of meters that fail due to these causes is very low. In general it is appliances in a customer's premise that will fail due to these factors before the meter will fail. Impaq has assumed that after rollout about 500 meters will fail per annum[59]. In the 2012-2015 the vast majority of these will be replaced under warranty, however the installation cost of these has been included in the total cost assessment.

Table 58 shows a summary of the BAU meter supply and installation cost.

[57] Jemena Asset Management 2011, page 62.

[58] For example High Voltage impulse testing of 10kV.

[59] This is 0.15% failure rate, which is what large rollouts such as ENEL and PG&E are experiencing.

Table 58 – BAU Meter supply and installation Capex

	2012	2013	2014	2015	Total
JEN Initial Budget Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq assessment for the draft determination	968	836	789	784	3,377
JEN Amended Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq Assessment	1,325	887	863	862	3,937

5.4 AMI Technology and Communications Capex

In JEN's amended application there is considerable justification for the full cost presented in the initial submission for the AMI technology test laboratory. KEMA also supports the inclusion of the cost of the AMI test laboratory[60]:

The lab contains the Quality Assurance (QA) environment. This QA environment needs to mirror the entire AMI technology production environment, from the field to the back office. It is comprised of many components such as access points, relays, meters and a suite of interconnected server systems. Each of these components has configurable items such as firmware and settings, and together they form a matrix of inter-dependencies. The modular architecture of an AMI system with its independent, loosely coupled components requires that the numerous interconnections need to be extensively exercised when changes are made to this infrastructure. It is essential that a robust QA environment is maintained to ensure that the AMI infrastructure is stable.

Impaq accepts this cost. Accordingly Impaq now considers the amended application for this category to be prudent.

Table 59 shows JEN's original proposal, the AER Draft Determination and the amended application from JEN.

Table 59 – Communications Capex

	2012	2013	2014	2015	Total
JEN Initial Budget Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq assessment for the draft determination	954	711	373	453	2,491
JEN Amended Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]

[60] KEMA report on draft determination, page 16.

5.5IT Infrastructure and Systems Capex

The JEN amended application for IT Capex is the same as it was for the initial submission. In its amended application JEN has provided evidence that the Impaq proposal to delay server replacements in 2015 was not ideal.

KEMA has commented on this issue[61]:

KEMA finds these [JAM] replacement guidelines appropriate and consistent with our industry experience In our experience, the replacement or upgrade cycle must also consider the time needed to integrate, test, and install into production the replacement hardware and software. In the case of storage there is the additional task of relocating data from the old infrastructure to the new that should not be underestimated when considering the volume of meter data generated over a 4-5 year period). This time, typically 6 to 18 months, means that the replacement hardware must be purchased well in advance of the planned replacement date.

Impaq has reviewed the information provided by both JAM and Deloitte and now accepts the JEN forecast.

However Impaq does note that the CROIC provides for 7 year asset lives for IT systems[62]. It is an anomaly that JEN agreed to 7 year asset lives for IT systems at the time the CROIC was negotiated.

Table 60 – IT Capex

	2012	2013	2014	2015	Total
JEN Initial Budget Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq assessment for the draft determination	606	2,135	3,814	1,968	8,523
JEN Amended Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]

5.6MRO Back Office Capex

Impaq had previously reviewed JEN's original proposal for this cost category and found it prudent. In JEN's amended application there is additional cost included in this category which relates to JEN's response to the Energy Safe Victoria report[63] concerning a defective AMI meter installation which resulted in an electrocution.

The amended application indicates that JEN is adopting the recommendations of this report and increasing the level of Service Stream's supervision of its installers and also increasing the level of auditing of installations. Specifically this involves increasing the supervision rate from [C-I-C] installers to [C-I-C] installers. It also involves increasing the number of auditors from [C-I-C] across the JEN and UED

[61] KEMA, Review of AER Draft Determination, page 13

[62] CROIC 4.1 (g)

[63] Final report on safety aspects of the Victorian Advanced Metering Infrastructure (AMI) Program Meter Deployment Activities.

networks. Impaq assumes that the split between JEN and UED would be in proportion to meter numbers. Hence [C-I-C] additional auditors for JEN and [C-I-C] for UED.

The increase in cost between the initial proposal and the amended application is more than Impaq considers prudent for the changed circumstances outlined above. The supervision increase is an FTE increase of 4.5% overall. The installation labour component of the total contract installation activity is 73%. So an increase of 4.5% results in an overall installation cost increase of 3.3%. This translates to an increase in installation cost of [C-I-C] for 2012 and [C-I-C] in 2013.

In relation to the additional installation auditors the cost is assumed to be equivalent to that of an electrical inspector with a chargeout rate of [C-I-C] hour. This results in a cost increase of [C-I-C] in 2012 [C-I-C] in 2013.

Table 61 gives a summary of the JEN proposals and the Impaq assessment.

Table 61 – MRO Back Office

	2012	2013	2014	2015	Total
JEN Initial Budget Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq assessment for the draft determination	776	244	0	0	1,020
JEN Amended Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq Assessment	1,593	584	0	0	2,176

5.7 Summary of Capex adjustments

Table 62 shows a summary of the JEN submission Capex items together with the Impaq assessment.

Table 62 – Summary of Capex

	2012	2013	2014	2015	Total
MRO Meter supply - Amended Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
MRO Meter supply - Impaq Assessment	17,172	6,917			24,089
MRO Installation - Amended Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
MRO Installation - Impaq Assessment	9,649	3,975			13,624
BAU metering - Amended Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
BAU metering -Impaq Assessment	1,325	887	863	862	3,937
Communications - Amended Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Communications - Impaq Assessment	1,238	998	647	747	3,630
IT Capex - Amended Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
IT Capex - Impaq Assessment	606	2,135	3,814	3,391	9,946
MRO back office - Amended Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
MRO Back office - Impaq Assessment	1,593	584			2,176

	2012	2013	2014	2015	Total
Total JEN - Amended Application	32,352	16,783	5,436	5,143	59,714
Total - Impaq Assessment	31,583	15,496	5,324	5,000	57,403

5.8 Operating Expenditure

Table 63 shows a summary of the operating expenditure proposed by JEN in its amended application. JEN has also provided a report from Deloitte in support of three Opex categories[64]:

- Asset Strategy and Planning
- Customer Contact and back office
- IT Opex

Throughout this section, most of the Opex costs are driven by human resource costs. Where Impaq has made its own assessment of human resource costs it has used the assumptions detailed in 3.4.2.

Table 63 Summary of Operating Expenditure

	2012	2013	2014	2015	Total
Asset Strategy and Planning	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Asset Operations	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Customer Contact & Back Office	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
AMI Network Operations	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Meter Data Collection	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
AMI Transitional Business Activities	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Backhaul Communications	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Management	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Finance & HR	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Regulatory Audit	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Service Delivery & Contract Management	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Stakeholder Relations	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Premises	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
IT Opex	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Total	19,871	17,589	15,844	15,984	69,288

Each of these operating costs is analysed in turn in the following sections.

5.9 Asset Strategy and Planning

Table 64 shows JEN's original proposal, the AER Draft Determination, the amended application from JEN and the Impaq assessment.

[64] Deloitte report JEN/UED "Jemena Asset Management – AMI Opex review – final report Ver 1.0", 26 August 2011.

Table 64- Asset Strategy and Planning costs

	2012	2013	2014	2015	Total
JEN initial application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq assessment for the draft determination	145	148	152	154	599
JEN Amended Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq Assessment	319	326	297	302	1,243

JEN has provided a detailed and comprehensive breakup and description of the roles and activities under the heading of Asset Strategy and Planning. Additionally, Deloitte has also carried out an analysis of this cost category[65], which has also been taking into account by Impaq in making its assessment.

These activities are provided by JAM for both JEN and UED, with costs shared between the two businesses.

JEN has more appropriately moved the funding for the:

- AMI Communications Field team from Asset Strategy and Planning to AMI Network Operations; and
- AMI Test Laboratory team from Network Operations to Asset Strategy and Planning

Each of the roles and their activities that are funded through this category are discussed below.

AMI Security Architect

This role is forecast to be 1 FTE funded 50:50 between JEN and UED. JEN has stated that this role[66]:

is responsible for maintenance compliance of the ISO27001 security accreditation which was explicitly established for the AMI Technology Meter to Network Management System. AMI technology can be regarded as critical infrastructure and an equal to Supervisory Control and Data Acquisitions (SCADA) systems being one of the most critical of distribution management systems. As such AMI Security is regarded as a vital ongoing and evolving part of the AMI infrastructure and includes costs for activities like annual Security and Penetration Audit costs, security remediation activities and external audit costs.

In particular, this role:

[65] Deloitte report JEN/UED, pages 26 to 38.
[66] Jemena Asset Management 2011, page 8.

- provides planning and governance to support an ISO 27001/2 Information Security Management System (ISMS) for compliance, and ensure ongoing stability of AMI communications network security and business continuity;
- ensures end-to-end security of the AMI system (e.g. Home Area Networks, Secure Mesh Radio, and Meter to Market);
- provides strategic and tactical management of Information Technology security across the AMI environment; including policy development and compliance, security processes, security incident response, vulnerability analysis, risk compliance, identity and access management; and
- manages security accreditation, audits, reviews and remediation activities.

Ensuring and maintaining the security of IT and communications is an activity that JEN is already required to do extensively. The management of the security of the AMI systems and communications should be incremental to what is already done within the business.

Impaq believes that a dedicated FTE for these activities from 2012 to 2015 is excessive.

ISO 27001/2 is a standard to which systems and processes are designed. Given that the major AMI systems and, in the case of JEN, most of the communications platform, will be completed by the start of 2012, it would be expected that the AMI systems and processes already comply with this standard. To ensure ongoing compliance, an audit would be conducted every year. This audit would take a maximum of 1 month to complete. Any issues which were identified by the audit would be raised by the Security Architect to the appropriate area to rectify.

This role would also be the point to which any security issues are raised. However, given that the systems, equipment and processes are up to date, that they comply with ISO 27001/2 and that regular audits are conducted, the likelihood or security issues is small.

Impaq believes that, as an increment to the security management already undertaken by JEN, an additional 0.5 FTEs across both UED and JAM would be sufficient.

AMI Communications Engineer

This role is forecast to be 1 FTE funded 50:50 between JEN and UED. JEN has stated that this role[67]

Maintains asset lifecycle management plans (LCMP) for AMI communication WAN/LAN assets. Analyse WAN/LAN capacity and performance, initiates optimisation and augmentation works. Communications subject matter expert for MRO, operations, planning, regulatory and compliance. Supports evolving HAN services and undertakes research into upcoming communication technologies.

[67] Jemena Asset Management 2011, page 90.

Impaq supports the requirement for this role and believes it should be expanded to include the overall management of this section, including the:

- Communications and Metering Engineers;
- Geospatial Analyst (2012 only); and
- AMI security Architect.

Impaq supports the requirement and forecast for this role.

Geospatial Analyst

This role is forecast to be 1 FTE until the end of 2013 funded 50:50 between JEN and UED. JEN has stated that this role[68]

Provides and maintains geospatial AMI data records compiled from AMI, Legacy and GIS systems. Provides visualisation and mapping data sets for MRO, AMI Network Operations, Planning Optimisation and New Connections. Maintains models of AMI Communications assets, relationships and associations.

By the end of 2011, JEN will have completed the installation of most of its communications network. JEN is forecasting that in 2012 it will only need to install a further 16 Access Points out of a total of 82, and by the end of 2012, the installation of the communications infrastructure will be complete. Impaq believes that a full FTE is excessive and believes that 0.5 FTE's shared across JEN and UED for 2012 and 2013 would be sufficient.

Metering and Communications Engineers

This role is forecast to be 3 FTEs funded 50:50 between JEN and UED. About this role JEN has said[69]:

Originally there were two metering engineers (base). These positions have been expended to include the increased complexity of operating advanced meters e.g. the addition of the metering communication function. With the increased complexity an additional FTE was required to cover the extended scope of this role.

This role:

- *provides asset management of electricity metering and measurement systems including AMI Meters and Legacy Metering (non-AMI), unmetered supplies and associated equipment or systems;*

[68] Jemena Asset Management 2011, page 90.
[69] Jemena Asset Management 2011,, page 90.

- *develops strategy for the management of measurement assets including metering asset management plans, life cycle management, technology roadmaps and release plans;*
- *ensures that compliance with regulatory, industry and safety requirements is achieved in the design, application and management of and electrical measurement technology;*
- *provides technical design and support of the AMI solution. Performs investigations of escalated measurement operational issues and reviews and approves metering equipment designs, configurations and firmware. Implements planning and strategic development of metering technical standards, prepares business cases, forecasts, conceptual papers, scopes of works and submissions;*
- *develops and maintains asset management plans for meters and metering transformers including researching and developing alternative strategies for approval by industry regulators;*
- *develops technical specifications for purchase of meters and metering transformers and outworking of life cycle and meter asset management plans;*
- *ensures policies and systems are in place to facilitate the maintenance of Meter Provider accreditation and develop and implement meter equipment policy including development of training for affected teams like New Connections;*
- *manages technical issues associated with Meter Equipment and Communications supply contracts and develop budgets for metering and communications equipment including reforecasting;*
- *undertakes regulatory technical and economic consultations including for AEMO, ESC, VESI, NMI, AER;*
- *escalated complex customer Issues including EWOV and billing complaints and other technical queries; and*
- *expert representatives on industry groups with AEMO, National Measurement Institute and Standards Australia.*

While on the one hand, the complexity of AMI is greater than legacy metering because of the addition of communications, on the other hand, after the rollout, management of the fleet of meters will be significantly simplified because:

- the number of meter types and vendors has been significantly reduced;
- the age of the meter fleet is much less;
- all the meters are electronic rather than electro-mechanical; and
- all the meters are covered by warranty.

Furthermore there are metering staff FTEs included in the Asset Operations Opex category (as shown in Table 66) who will be undertaking some of the activities outlined for this role. Consequently, Impaq is of the view that, overall, the level of complexity and activity in this role is about the same as prior to the rollout, albeit that the mix will be different.

Impaq believes that 2 FTEs for JEN and UED will be sufficient.

Graduate Engineer

This role is forecast to be 1 FTE funded 50:50 between JEN and UED.

Primarily employed to enable prudent succession planning and works across a number of areas before finally taking a permanent role in Asset Strategy and Planning. The graduate scheme includes rotations for the first 2 years and for this graduate there are up to 20 permanent positions related to AMI where the graduate could gain a permanent or interim longer term role at the end of their rotation program. The Jemena Graduate Development Program has been active for 10 years and maintains an annual intake of Electrical and Communications graduate engineers. As AMI Technology and Metering is a very narrow discipline in the resource market it is vital and prudent to develop graduates into skilled resources to support and replace staff that move within or outside of JAM.

AMI and its associated technologies is a developing field and its utilisation around Australia and the world is growing rapidly. The demands for qualified and experienced resources will also grow. Impaq believes it is prudent for JEN to foster the development of this expertise through the support of a graduate program.

AMI Technology and Planning Manager

This role is forecast to be 1 FTE funded 50:50 between JEN and UED. This role:

Oversees the enterprise strategic planning and management of the AMI Technology Planning team.

Impaq does not believe that this management role is required. Post 2012 (after the cessation of the Geospatial Analyst), this section will consist of a communications and metering section and an AMI Security Analyst. As discussed earlier, the management of this section should be encompassed by the AMI Communications Engineer.

AMI Test Lab resources

This area consists of 3 FTEs (AMI Test Lab manager, AMI Technology Engineer and AMI Technology Tester) funded 50:50 between JEN and UED. Impaq notes that the cost of these three lab resources is already included in the AMI Technology and Communications Capex costs for each year of 2012 to 2015.

5.10 Asset Operations

Table 65 shows JEN's original proposal, the AER Draft Determination, the amended application from JEN and the Impaq assessment.

Table 65 – Asset Operations costs

	2012	2013	2014	2015	Total
JEN initial application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq assessment for the draft determination	406	406	544	544	1,899
JEN Amended Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq Assessment	459	459	584	584	2,086

The JEN amended application comprises the items in Table 66. It is noted that the totals of this table do not agree with the JEN amended application in Table 65.

Table 66 – JEN Amended proposal

	2012	2013	2014	2015	Total
Meter testing	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
CT meter testing	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Unmetered supply audits	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Staff	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
LVCT testing	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Meter maintenance-field download and reset	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Meter control and retest	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Annual MPB audit fee	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Total	868	868	868	868	3,473

JEN advised that the meter testing unit costs applicable were lower than those in Impaq's previous report. Impaq has now included those costs in its model. JEN also pointed out that the previous report did not include the cost of CT testing. In the NER, all CT meters are required to have their CTs tested every 10 years. This has now been included. The CT meter testing in Table 66 commences too early as there are no CT meters installed until 2012. Hence CT meter testing does not need to start until 2014.

Furthermore, JEN has provided no justification for the item "meter control and retest". As far as Impaq is aware all the activities apart from this item are the tasks that a metering department would need to undertake. Indeed, the function of a metering department should be much simpler over 2012-2015 as the old meter fleet is replaced with new meters that have remote communications and remote diagnosis capabilities. Hence this item has not been included. The results of the revisions to Impaq calculations are shown in Table 67.

Table 67 – Impaq assessment of meter testing costs

	2012	2013	2014	2015	Total
Meter testing	63	63	63	63	252
CT meter testing			119	119	238
CT testing	105	105	105	105	419
Unmetered supplies audit	15	15	15	15	60
Staff	230	230	230	230	920
Meter maintenance field - download and reset	10	10	10	10	40
MPB audit fee	10	10	10	10	
Total	433	433	551	551	1,968
[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]

5.11 Customer Contact & Back Office

Table 68 shows JEN's original proposal, Impaq's assessment for the Draft Determination, the amended application from JEN and the Impaq assessment.

Table 68 – Customer Contact and Back Office

	2012	2013	2014	2015	Total
JEN Initial Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq assessment for the draft determination	311	317	227	231	1,086
JEN Amended Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq Assessment	315	317	258	263	1,153

In its amended application, JEN maintains that its original forecast is the most appropriate, with adjustments due to a formula error in its model and for revised meter installation forecasts.

JEN has said[70]

As outlined in Section 3.1 JAM AMI Transitional Model, and as approved by the AER in the previous submission, JAM has implemented an operating model which ensures a cost effective and low risk approach to business transition, which includes the implementation of the new AMI systems in parallel with existing legacy systems and processes, and managing the transition from legacy to AMI from 2010 (when AMI systems went live) to the end of 2013 when the AMI mass rollout project is completed.

[70] Jemena Asset Management 2011, page 105.

The majority of costs that have been removed by the AER from the UED and JEN budgets relate directly the management of the legacy systems and processes during this period.

Impaq acknowledges that its analysis for 2012 and 2013 did not take into account the burden of managing the legacy systems in parallel with the AMI systems.

JEN has provided an organisation structure for the Customer Contact and Back Office function[71].

Impaq believes that all the resources in the grouping called 'Select Solutions (DMS) Contract' are responsible for new connections and thus are covered by Alternative Control Services and are out of scope.

Similarly, the grouping called 'Aegis Contract' is responsible for network faults and emergencies. Impaq accepts that, during the rollout, there will be an incremental increase in calls to the fault line as customers may incorrectly ring this number to enquire or complain about their AMI meter. Impaq accepts the JEN forecast of the cost of this increment[72].

The remaining parts of the chart show 19 resources of which:

- 1 resources is directly and fully involved in new connections;
- 6 resources are directly and fully involved in network billing;
- 1 Service Desk SME would be 50% involved in new connections;
- 1 Connections Point Manager with half of their reports involved in new connections;
- 2 Managers with half of their reports involved in network billing; and
- The Back Office Operations Manager with approximately half of its role being network billing and new connections.

Impaq supports the need for the remaining resources in 2012 and 2013. Impaq believes that the number of Meter Data Management SME's and in scope Exception Data Analysts required for 2014 and 2015 will be 2 of each for JEN and UED combined.

5.12 AMI Network Operations

Table 69 shows JEN's original proposal, Impaq's assessment for the Draft Determination, the amended application from JEN and the Impaq assessment.

Table 69 – AMI Network Operations

	2012	2013	2014	2015	Total
JEN Initial Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]

[71] Jemena Asset Management 2011, page 104.
[72] JAM Spreadsheet "V3 JEN AIMRO Financial Model_v1.33(AER DD)", 29. Opex field & Back Office.

	2012	2013	2014	2015	Total
Impaq assessment for the draft determination	559	583	591	613	2,347
JEN Amended Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq Assessment	842	867	688	712	3,108

Subsequent to the draft determination, JAM has reallocated some costs between "Asset Strategy and Planning" and "AMI Network Operations". JEN and UED have advised that the Field Technician team has moved from the former to the latter cost category.

The major cost items in this category are:

- Field technician team – 8 FTEs;
- Operations team – 7 FTEs;
    - AMI NMS application administrator – 2 FTEs
    - AMI Communications analyst – 4 FTEs
    - AMI security administrator – 1 FTE
- The annual security and penetration audit and remedial actions at [C-I-C] per annum.

It is expected that this level of resource will be needed during the rollout phase. There will be network operation issues in bringing many new meters onto the network and issues around the performance and reach of access points and relays. Once rollout is complete in mid-2013 the changes to the network will only be as a result of new connections.

By the end of 2013 it would expected that the network would be very stable. In relation to the maintenance team, there will be some 285 access points and 930 relays across both JEN and UED networks to maintain. There will be investigation of meter communication issues, with perhaps the addition of antennas to some meters to improve performance. Impaq considers that the field team will be able to be reduced to 6 FTEs from the beginning of 2014 and the Operations team can be reduced to 5 FTEs from the beginning of 2014.

5.13 Meter Data Collection

Table 70 shows JEN's original proposal, Impaq's assessment for the Draft Determination, the amended application from JEN and the Impaq assessment.

Table 70 – Meter data collection costs

	2012	2013	2014	2015	Total
JEN Initial Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq assessment for the draft determination	553	80	0	0	633

	2012	2013	2014	2015	Total
JEN Amended Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq Assessment	669	251	0	0	920

Impaq accepted the previous JEN forecast for this category. In its amended application, JEN has said

Subsequent to the May submission JAM has found that the forecast rate of cost reduction of Meter Data Collection is not being realised as meter reading routes are becoming less efficient due to a partial AMI rollout.

In mass rollout areas the AMI meter population varies in the order of 50% to 70% dependent on the exchange refusal rate and number of complex sites within that meter reading route. As such all remaining non AMI meters need to be face read within that route 30% to 50% of meters. The resulting meter reading route is effectively the same travel distance for the meter reader with less meters to read taking only marginally less time to complete that the original 100% face read route before AMI.

As a result of the number of the number (most) incomplete AMI meter routes only small reductions have been possible to date and a reforecast of the Meter Data Collection costs results in a higher cost for 2012.

Impaq accepts that higher than expected rates of customers refusing to have an AMI meter installed has materially reduced the efficiency of manual meter reading routes. Impaq accepts JEN's forecast.

5.14 AMI transitional business activities

Table 71 shows JEN's original proposal, Impaq's assessment for the Draft Determination, the amended application from JEN and the Impaq assessment.

Table 71 – AMI transitional business activities

	2012	2013	2014	2015	Total
JEN Initial Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq assessment for the draft determination	835	356			1,191
JEN Amended Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq Assessment	902	384			1,286

Impaq accepted the previous JEN forecast for this category. Due to a reduction in the number of meters to be installed in 2011 and a commensurate increase in the number of meters to be installed in 2012 and 2013, JEN has stated that the number of claims it will need to pay in 2012 and 2013 will increase, resulting in the change to the forecast in this category.

Impaq accepts JEN's forecast.

5.15 AMI Backhaul Communications

Table 72 shows JEN's original proposal, Impaq's assessment for the Draft Determination, the amended application from JEN and the Impaq assessment.

Table 72 – AMI backhaul communications costs

	2012	2013	2014	2015	Total
JEN Initial Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq assessment for the draft determination	24	24	24	24	96
JEN Amended Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq Assessment	137	144	144	144	569

Impaq has reviewed the information provided by JEN and considers that the revised proposal is prudent.

5.16 Management

Table 73 shows JEN's original proposal, Impaq's assessment for the Draft Determination, the amended application from JEN and the Impaq assessment.

Table 73 – Management

	2012	2013	2014	2015	Total
JEN Initial Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq assessment for the draft determination	152	182	187	190	711
JEN Amended Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq Assessment	0	0	0	0	0

JEN has not provided any comment on this cost category. However, it has argued that the activities of industry development and stakeholder relations should be included in the Stakeholder Relations cost category. Accordingly, Impaq will consider these activities as included in Stakeholder Relations and not Management.

With these activities removed from Management and a component of management included in most of the forecast categories, Impaq cannot identify any activities in Management that are not covered elsewhere. Consequently, Impaq has amended its forecast for this Category to zero.

5.17 Finance & HR

Table 74 shows JEN's original proposal, Impaq's assessment for the Draft Determination, the amended application from JEN and the Impaq assessment.

Table 74 – Finance and HR costs

	2012	2013	2014	2015	Total
JEN Initial Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq assessment for the draft determination	110	112	115	117	454
JEN Amended Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq Assessment	223	227	74	76	600

5.17.1 Finance

JEN has provided significant detail of the roles and activities forecast to be required for the finance area of this category, as well as an organisation structure. The structure shows 9 roles which are discussed below. These resources serve both JEN and UED and costs are split 32:68.

Finance Operations Team Leader

This role represents 0.5 FTEs. The responsibilities of this role are[73]:

- to provide financial support for the SmartNet management team under the guidance of the Finance Manager;
- manage the business support functions and direct activities as per the AMI program requirements; and
- asset owner AMI program billing and revenues determination.

Impaq accepts that these activities are required to the end of the rollout. However, from the end of the rollout, managing the business support functions and AMI billing and revenue will be significantly reduced or not required. The remaining activity does not justify even part of this FTE and will be picked up by others.

Management Accountant, SmartNet

The responsibilities of this role are[74]:

- consolidate and reports on the AMI Program metering results and conducts variance analysis to budget and forecast and works with the relevant Asset Owner to advise on commercial outcomes;
- maintain finance master data and ensures that SAP tools maintain and track all AMI transactions. A full review and actions the weekly reconciliation reports to be produced;
- be the key contact for all AMI queries and involved in preparation of cashflow reporting and setting up of hedging arrangements for all AMI related purchases with overseas vendors; and

[73] JAM 2011, page 117.
[74] Jemena Asset Management 2011, page 117.

- engage cost capture activities in order to ensure accurate and methodical reporting of the AMI program costs against the correct SAP costing elements.

Impaq accepts that these activities are currently needed. However, all of these activities are related to the rollout and will not be required in 2014 and 2015.

Business Support Officer

There are 2 FTE's in this role with 50% being charges to metering regulated services. The responsibilities of this role are[75]:

- to provide administration support to the SNACS finance and accounting team under the guidance of the SNACS Senior Management Accountant in validation, administration and reconciliation of timesheets and vendor invoices surrounding the AMI program.

Impaq accepts the need for, effectively, 1 FTE to provide administrative support to the SNACS finance and accounting team during the rollout. Impaq expects that the workload will reduce to no more than half after the rollout and thus only 0.5 FTEs will be required for 2014 and 2015.

Financial Analyst

The responsibilities of this role are[76]:

- be the key liaison for all enquiries relating to the financial model for the AMI Program;
- responsibility for updating and providing the AMI models to UED and JEN asset owners;
- compilation of data for regulatory account purposes for the AMI program; and
- to provide financial scenario modelling to support management decision making.

The responsibility for the AMI financial model will cease at the end of the rollout. Also, the requirement to provide financial scenario modelling to support management decision making will reduce significantly. Providing support for the development of the Regulatory Accounts will be 4 weeks per year. Impaq believes that this role will require 0.2 FTEs in 2014 and 2015

Accountant Metering

The responsibilities of this role are[77]:

- to provide 100 per cent Finance and Accounting support for a Profit and Loss perspective for AMI SmartNet metering management in terms of Revenues and cost captures;

[75] Jemena Asset Management 2011, page 118
[76] Jemena Asset Management 2011, page 118
[77] JAM 2011, page 118

- monthly management accounting – profit centre financial stewardship, variance analysis, reporting for AMI;
- monthly AMI meter reconciliation of MRO data to SAP ledgers; and
- assist with the processing and reporting of AMI Program Delivery and assist with development of cost recovery for ongoing AMI Smart Meter operational costs.

The internal management costs of a contractor are not costs that should be directly recovered and are out of scope. These costs should be recovered by the contractor through their margin. Providing finance support for a 'Profit and Loss' perspective and 'profit centre financial stewardship' are clearly for the purposes of JAM, not JEN and are out of scope.

Reconciliation of MRO data and process and reporting of AMI Program Delivery will not be required after the rollout.

Impaq believes that the components of this role that are within scope represent 0.5 FTEs for 2012 and 2013 only.

Senior Management Accountant

JEN states that 50% of this roll is chargeable to metering regulated services. The responsibilities of this role are[78]:

- providing both strategic and commercial support and financial stewardship to the SmartNet & Customer Service (SNACS) / AMI Program business unit;
- to provide strategic and commercial support and financial stewardship to the AMI & Back Office business unit. The role will be responsible for providing financial and commercial support in managing this function and managing all relevant alliance relationships with respect to AMI & Back Office:
    - key "go to" point for AMI operational accounting queries;
    - AMI Treasury liaison and reporting to Asset Owners;
    - review the monthly performance of AMI and provides a health check of the business to ensure financial commitments are deliverable. This Includes variance analysis and reporting;
    - ensures the integrity of the financial data and lead the continuous improvement program for the accounting systems, their feeder systems and processes for the ultimate aim of providing timely and accurate financial information;
    - responsible for validating AMI Program invoices, ensuring the integrity of amounts payable and ongoing management of vendor contractual payments to ensure no contractual arrangements are breached;

[78] JAM 2011, page 119

- capitalisation of AMI WIP – providing accurate Asset Details as per Asset Owner Capitalisation Policies;
- day-to-day management of seven (7) AMI Finance team members;
- key AMI Programme liaison point for internal and external audit queries; and
- key liaison point for all auditor activities relating to AMI – regulatory & statutory.

A significant number of these activities are specifically related to the rollout and will either not be required or be significantly reduced following completion, including:

- treasury matters;
- validating AMI invoices, payables and vendor payments; and
- capitalisation of WIP invoices.

Further, given Impaq's view of the reduction in the roles managed, Impaq believes that this role will require 0.5 FTEs for 2012 and 2013 and 0.25 FTEs for 2014 and 2015.

Assistant Accountant Metering

The responsibilities of this role are[79]:

- to support the Metering Accountant with relevant AMI meter rollout databases to ensure accurate cost capture and reporting to support MRO.

Impaq accepts the need for this role for 2012 and 2013 only.

Accounts Receivable Officer

The responsibilities of this role are[80]:

- to manage retailer remittances and payments.; and
- to manage the reconciliation of retailer remittances and invoices across both AMI and legacy systems during AMI Mass Rollout.

Retailer remittances and payments are network billing issues and are out of scope.

5.17.2 Human Resource Management

In respect of the HR function, JEN has stated that the JAM SNACs business unit will contain between 150 and 180 FTEs and that this justifies an HR resource. Impaq accepts that the increment in staff due to metering regulated services justifies incremental resources and that JEN's forecast of 1 FTE across JEN and UED is prudent.

[79] JAM 2011, page 120
[80] JAM 2011, page 120

5.18 Service Delivery & Contract Management

Table 75 shows JEN's original proposal, Impaq's assessment for the Draft Determination, the amended application from JEN and the Impaq assessment.

Table 75 – Service Delivery and Contract Management Costs

	2012	2013	2014	2015	Total
JEN Initial Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq assessment for the draft determination	517	526	541	550	2,134
JEN Amended Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq Assessment	586	595	135	138	1,454

JEN has provided significant detail of the resources forecast, their roles and the organisation structure for this category. Impaq is concerned that JEN is depicting this area as a standalone function (with the exception of the AIMRO Compliance Specialist). Impaq accepts that due to the high level of activity during the rollout, the extensive use of contractors and the nature of the technology, a dedicated section and additional resources are warranted for 2012 and 2013. However, JEN has many contractors providing services to its overall business that it needs to manage. The additional burden of AMI after the roll out should be incremental to the service delivery and contract management activities already undertaken by the business as a whole. Prior to AMI, JEN had contracts for meter supply, meter installation and back office functions that did not require a separate metering contract management group. Impaq does not accept that AMI will require a separate group in the future.

Impaq accepts that the additional FTEs detailed as required are warranted during the rollout. However, with the exception of the AIMRO Compliance Specialist, Impaq believes that the incremental burden of metering on current business activity would be met with an additional 0.25 FTEs for each of the roles for 2014 and 2015.

In the case of the AIMRO Compliance Specialist, Impaq accepts that the requirements of the Electricity Safety Management Scheme AMI Variation and the need for safety audits and assurances is ongoing.

Impaq accepts JEN's forecast of the costs for audit, legal and consulting services.

5.19 Stakeholder Relations

Table 76 shows JEN's original proposal, Impaq's assessment for the Draft Determination, the amended application from JEN and the Impaq assessment.

Table 76 – Stakeholder relations

	2012	2013	2014	2015	Total
JEN Initial Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq assessment for the draft determination	0	0	0	0	0
JEN Amended Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq Assessment	103	89	65	67	324

JEN has provided additional information on the roles and activities in this category. JEN state that 1.69 FTEs are required, made up of:

- Industry Development Manager – 100% shared 50:50 with UED;
- Retail Account Manager – 30% shared 68:32 with UED;
- Stakeholder Relations Team Leader – 45% shared 68:32 with UED; and
- Mass Rollout Stakeholder Communications Advisor – 100% shared 68:32 with UED.

Impaq supports these requirements during the rollout. However, Impaq does not see the requirement for the Mass Rollout Stakeholder Communications Advisor after the rollout is completed.

Impaq agrees with the JEN forecast for 2012 and 2013. Impaq believes that the forecast for 2014 and 2015 should be reduced to reflect to incremental nature of the activities after the rollout.

5.20 IT Opex

Table 77 shows JEN's original proposal, Impaq's assessment for the Draft Determination, the amended application from JEN and the Impaq assessment. The JAM revised proposal makes no change in the IT Opex proposal for JEN.

Table 77 – IT Opex

	2012	2013	2014	2015	Total
JEN Initial Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq assessment for the draft determination	8,765	7,851	6,758	6,785	30,159
JEN Amended Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq Assessment	9,881	8,989	7,925	7,974	34,769

Table 78 gives a summary of the IT Opex categories in the JEN amended application.

Table 78 – Summary of categories of IT Opex in the JEN amended application

	2012	2013	2014	2015	Total
Base IT allocation	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Software licence maintenance	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Hardware maintenance	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Operating Software maintenance	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Infrastructure support	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Metering IT Opex	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Subtotal Total	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Total	**11,231**	**10,304**	**9,247**	**9,301**	**40,083**

Table 79 shows the Impaq assessment of IT Opex which was provided to the AER prior to the draft determination.

Table 79 – Impaq Assessment of IT Opex

	2012	2013	2014	2015	total
Base IT allocation	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Software licence maintenance	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Hardware maintenance	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Operating Software maintenance	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Infrastructure support	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Metering IT Opex	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Total	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Total	**8,765**	**7,851**	**6,758**	**6,785**	**30,159**

JEN, in its amended application, has rejected the adjustments proposed by Impaq, in particular in relation to “IT Infrastructure and support costs” and “Metering IT Opex”. Each of these are discussed in order.

5.21 Infrastructure support

Impaq’s previous report identified that there was excessive rack space used for AMI IT systems. JEN disagrees with this assessment and states:

While physically being able to put equipment into a rack enclosure is obviously one consideration when determining rack density, there are a number of other factors that are of equal if not higher importance. These factors combine to

determine the amount and density of equipment that can be placed into a data centre and in rack enclosures.

The key factors are:

- *Power requirements: The capability of the data centre to provide the required amount of power to the rack enclosure as well as the internal power distribution design within the rack enclosure will constrain the amount of equipment that can be deployed. Typically more modern IT equipment has a higher power requirement.*
- *Cooling: The data centres cooling design will determine the ability to cool the equipment within the rack enclosure and consequently the amount of equipment that can be deployed. Advanced cooling techniques such as water cooling may allow a higher density of equipment over traditional air cooled data centres.*
- *Equipment Weight: Data centres generally have constraints on the amount of weight that can be placed on the floor.*

For the EDC data centre, which is the production data centre for the UED and JEN metering services infrastructure, the primary constraint that is driving the density of equipment in the rack enclosures is power consumption. EDC have a maximum limit of a 3kW load on each rack. For UED and JEN the current point in-time total power requirement for the infrastructure in EDC is approximately 30kW. This means that considering power consumption alone this equipment is required to be spread across a minimum of ten rack enclosures.

Deloitte has provided an opinion that supports the statements made by JAM about the utilisation of rack space in the data centre. However Deloitte appears to have relied upon data provided by JAM. For example[81]:

JAM has indicated to Deloitte that:

- The maximum power consumption the LogicaCMG data centre is permitted per rack is 3kW
- The AMI IT infrastructure in the JEN and UED data centre allocated to production is consuming up to approximately 30kW during point measurements

Based upon this information, Deloitte considers that the AMI IT infrastructure allocated to production must occupy at least 10 racks to ensure the average of 3kW is not breached.

It would have been preferable if Deloitte had determined the power consumption loading by adding up all the power consumption values from each item of equipment.

Impaq agrees that the factors identified by JAM are the most common limitations on the amount of equipment that can be installed in any given rack. However for JEN and UED there are racks which are only 30% used and which contain UTP patch

[81] Deloitte report on JEN Opex, page 67

panels and system ties. These are not power consuming devices and are not major emitters of heat (affecting cooling capacity). There are also racks with one Brocade DCX[82] switch with only fibre distribution panels and cable patch panels. These racks contain 60% vacant space and not up to the 3kW limit.

Impaq has reviewed its analysis and considers that its original estimate of 30% excess space is correct and consequently a 30% reduction is considered prudent.

5.22 Metering IT Opex

JEN has provided information that the Meter IT support department has 33 FTEs[83] and that the costs of these are shared between JEN and UED. It also points out that Impaq did not take into account that these were shared resources. The Deloitte review of Metering IT Opex[84] concludes that 26 to 29 FTEs is required. The CSC review quoted by Deloitte suggests 27.5 FTEs. Accordingly Impaq considers that a reduction to 29 FTEs would be prudent, which is a 10% reduction.

Impaq notes that the salary levels that are used are in excess of the commercial standard. However Impaq has made no adjustment for this it its assessment.

5.23 Summary of Operating Expenditure

Table 80 – Summary of Operational Opex – JEN amended application and Impaq's Assessment

	2012	2013	2014	2015	Total
Asset Strategy and Planning - Proposal	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Asset Strategy and Planning – Impaq view	319	326	297	302	1,244
Asset Operations – Proposal	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Asset Operation – Impaq view	459	459	584	584	2,086
Customer Contact & Back Office - Proposal	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Customer Contact & Back Office – Impaq view	315	317	258	263	1,153
AMI Network Operations - Proposal	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
AMI Network Operations – Impaq view	842	867	688	712	3,109
Meter Data Collection - Proposal	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Meter Data Collection – Impaq view	669	251	0	0	920
AMI Transitional Business Activities - Proposal	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
AMI Transitional Business Activities – Impaq view	902	384	0	0	1,286
Backhaul Communications - Proposal	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Backhaul Communications – Impaq View	137	144	144	144	569
Management - Proposal	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Management – Impaq view	0	0	0	0	0

[82] www.brocade.com/data-center-best-practices/competitive-information/directors_env.page

[83] JAM Response to AER draft determination, page 134, section 24.1

[84] Deloitte report on JEN Opex, page 58 Table 24

	2012	2013	2014	2015	Total
Finance & HR - Proposal	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Finance & HR – Impaq view	223	227	74	76	600
Regulatory Audit - Proposal	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Regulatory Audit – Impaq view	95	95	95	95	380
Service Delivery & Contract Management - Proposal	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Service Delivery & Contract Management – Impaq view	586	595	135	138	1,454
Stakeholder Relations - Proposal	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Stakeholder Relations- Impaq view	103	89	65	67	324
Premises - Proposal	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Premises – Impaq view	252	252	252	252	1,009
IT Opex – proposal	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
IT Opex - Impaq view	9,881	8,989	7,925	7,974	34,769
Total – JEN Proposal	19,871	17,589	15,844	15,984	69,289
Total – Impaq Assessment	14,782	12,995	10,518	10,607	48,903

6 Powercor

The PAL amended application for 2012 to 2015 is summarised[85] in Table 81 and Table 82.

Table 81 – PAL Capital Expenditure

	2012	2013	2014	2015	Total
PAL Initial Budget Application	116,276	81,652	16,210	13,472	227,609
AER Draft Determination	80,576	52,503	6,699	6,447	146,225
PAL Amended Application	117,541	79,828	16,628	13,199	227,195

Table 82 – PAL Operating Expenditure

	2012	2013	2014	2015	Total
PAL Initial Budget Application	27,877	28,241	27,454	26,435	110,006
AER Draft Determination	12,232	13,257	15,821	15,490	56,800
PAL Amended Application	24,882	23,393	21,854	21,673	91,802

6.1 Capex summary

Table 83 lists the items in the PAL amended application Capex proposal.

Table 83 – Capex items in the PAL revised proposal

	2012	2013	2014	2015	Total
Meter Supply - Contract	45,511	30,990	2,197	2,118	80,816
Meter Supply other	6,247	5,382	2,564	2,573	16,766
Meter installation - contract	20,114	12,943	-	-	33,057
Meter installation - other	14,083	12,369	1,791	1,859	30,102
Communications equipment supply - contract	2,312	25	36	36	2,409
Communications equipment supply - other	2,579	1,763	246	247	4,835
Communications equipment installation – Contract	6,630	2,590	424	167	9,811
Communications equipment installation – other	5,154	4,196	1,949	1,053	12,352

[85] Powercor Australia's amended submitted budget 2012-15 – Tables 1 & 2, page 10

	2012	2013	2014	2015	Total
IT Capex	14,787	9,452	7,303	5,021	36,563
Project Administrative	123	117	117	126	483
Total	117,540	79,827	16,627	13,200	227,194

It is noted that the original CP proposal included project management costs of $4,716,000 in 2012 and $3,509,000 in 2013 that have not been included in the amended application.

Each of the Capex items is considered in turn. Where the AER has accepted an item of expenditure in the draft determination and the DNSP has not changed its original forecast, Impaq has made no comment on that item

6.2Meter Supply - Contract cost

The PAL amended application provides more information[86] on the impact of abolishments, meter exchanges and faulty meters on the volumes and prices of meters proposed.

Impaq accepts that not all meters removed for abolishments and meter exchanges can be reused. Further Impaq accepts the CP statement that about 2% of these meters when removed are not suitable for reuse.

Impaq has reviewed the Meter and Communications capex series of spreadsheets provided and notes that CP and PAL have calculated the adjustment for reuse of abolished meters and meter exchanges in the unit price rather than in the unit volumes. This model has been useful to gain a better understanding of PAL's meter supply Capex. Impaq has made changes to some inputs and used this model as an input into its own cost assessment. The major changes have been:

- The PAL model assumes that where a meter is removed due to a meter fault and the meter is not under warranty then a repair fee of $[C-I-C] would apply[87]. Yet the weighted average unit cost of meters (considering all types) is US$[C-I-C]. . Impaq considers it more appropriate to substitute a new meter in these circumstances;
- the exchange rate assumptions are lower than Impaq accepts;
- The CROIC does include for two element meters and hence where two element meters have been assumed the cost for single element with contactor have been substituted; and

[86] Resubmission Figure 5, page 39.

[87] The AER questioned CP/PAL in relation to this $[C-I-C] figure. The CP/PAL response (dated 2 Sept 2011) was "*The $[C-I-C] referred to by the AER is a blended repair rate for all meter types including 3 phase meters with a replacement price range of $[C-I-C]-$[C-I-C], depending on the type of 3 phase meter. The blended repair rate takes into consideration the fault meter mix and the possible repair costs of each meter vendor*". Impaq's analysis of the repair versus replace with new meters tradeoff did not support the PC/PAL statement. It is only the meters used in very low volumes for which the repair price was substantially below the replacement price.

- the approach of adjusting the meter price to take into account the proportion of meters that are able to be reused makes the impact of reusing meters on costs more opaque.

The summary of the PAL initial application, the Impaq assessment for the draft determination, the PAL amended application and the Impaq assessment are shown in Table 84.

Table 84 – Meter supply contracted

	2012	2013	2014	2015	Total
PAL initial application	48,484	33,757	3,730	3,552	89,523
Impaq assessment for the draft determination	43,584	28,506	2,089	1,968	76,147
PAL Amended Application	45,511	30,990	2,197	2,118	80,816
Impaq assessment	43,413	28,405	2,109	2,075	76,002

6.3Meter supply – non contract costs

PAL's amended application in relation to "meter supply – non contract costs" is shown in Table 85 as is the PAL original submission and the AER draft determination.

Table 85 – Meter supply – non contracted[88]

	2012	2013	2014	2015	Total
PAL Initial application	4,697	3,986	1,140	1,085	10,907
Impaq Assessment for Draft determination	300	300	300	300	1,200
PAL Amended Application	6,247	5,382	2,564	2,573	16,766
Impaq Assessment	6,473	5,649	2,739	2,754	17,615

The PAL amended application contends that Impaq and the AER have misunderstood what these costs represent:

"Powercor does not agree with the AER's assessment. The scope of Powercor's Meter Supply – Non-Contract Capital Expenditure is fundamentally different to what Impaq and the AER have assumed"[89]

The PAL amended application and accompanying spreadsheets[90] show that the non-contract cost for rollout is made up of a share of:

- CHEDS project management; and

[88] Powercor AMI budget Charges Resubmission page 69
[89] Citipower AMI budget Charges Resubmission page 69
[90] Citipower meter & comms capex.xls

- CHEDS margin (which is 27% of the project management cost).

The PAL amended application and accompanying spreadsheets[91] show that the non-contract cost for BAU metering supply is made up of a share of:

- PNS non-contract unit costs;
- PNS logistics;
- PNS corporate overhead;
- PNS margin;
- CHEDS margin;
- PAL fleet & property overhead; and
- PAL corporate overhead.

The composition of the CHEDS project management cost is given in Table 86. The allocation to PAL is 69% based on the ratio of customer numbers.

Table 86 – CHEDS Project management proposed costs

Category	2012	2013	2014	2015	total
Industry planning & Liaison (FTEs)	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	
Project management (PMO) FTEs	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	
Management of AMI program (FTEs)	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	
Gateway review (FTEs)	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	
Pilot metering groups (FTEs)	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	
Total FTEs	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	
Costs ($,000)					
Industry planning & Liaison	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Project Management Costs	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Management of AMI program	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Gateway review	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Pilot metering groups	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Resource Management	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Transition planning	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Total Cost	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
CHEDS margin	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]

[91] Citipower meter & comms capex.xls

Category	2012	2013	2014	2015	total
Total	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]

The large number of FTEs in the PMO is consistent with a major project in its start-up phase. This project will be well advanced, by the end of 2011 and the rollout will be 40% complete. The business processes will be bedded down and the work instructions fine-tuned. There should be minimal resourcing needed in the PMO after this time. Further, PAL forecasts that the PMO resources continue into 2014 and 2015 when the project is completed, which is not prudent. The Impaq assessment is shown in Table 87.

Table 87 – Impaq assessment of CHEDS project management costs

Category	2012	2013	2014	2015	total
Industry planning & liaison (FTEs)	0.25	0.25	0.25	0.25	
Project management (PMO) (FTEs)	7.9	5.9	0	0	
Management of AMI program (FTEs)	3.95	3.35	0	0	
Gateway review (FTEs)	2	2			
Pilot metering groups (FTEs)	1				
Total FTEs	15.1	11.5	0.3	0.3	
Costs ($,000)					
Industry planning & liaison	375	345	41	41	801
Project management	1,786	1,384	-	-	3,170
Management of AMI program	2,816	2,018	-	-	4,833
Gateway review	227	227	-	-	453
Pilot metering groups	323	-	-	-	323
Resource management	30	-	-	-	30
Transition planning	575	-	-	-	575
Total	6,130	3,973	41	41	10,185
CHEDS margin	705	457	5	5	1,171
Total	6,835	4,430	46	46	11,356

In the original PAL application there was a separate cost item for project management of $4,176,000 for 2012 and $3,509,000 in 2013, which was considered prudent in the Impaq review prior to the draft determination[92]. It would appear that these project management costs have been included in the CHEDS project

[92] See table 33 of the Impaq Review.

management category discussed above. Hence, Impaq has not included this previous project management item as a separate cost item in the Capex assessment.

It is noted that the meter supply – non contract costs also include costs for BAU metering. Impaq has accepted the overhead costs for BAU metering and these comprise the total cost in Impaq's assessment for this cost category.

The Impaq assessment of Meter Supply – Non Contract costs is given in Table 85. The assessment is higher than the CP application principally due to CP's overheads which end up having a higher allocation to this cost category because the Impaq assessment of Meter Installation – Non Contract category costs is substantially lower than the CP amended application value.

Impaq has not reviewed the prudency of the PNS Corporate overhead, PNS margins, CHEDS margins, PAL fleet and property overhead and PAL corporate overhead as this is a matter for the AER however, the summation of the overheads and margins seems excessive. To end up with BAU contract meter costs of $2,117,899 for 2015 and have total overheads and margins equating to 130% of this cost is excessive.

6.4Meter installation – contract costs

Impaq's advice to the AER for this cost category for the draft determination is reproduced in Table 88 together with the PAL amended application values.

Table 88 – Contract meter installation cost

	2012	2013	2014	2015	Total
PAL proposal	17,009	10,429	0	0	27,438
Impaq Assessment for draft determination	15,909	9,209			25,118
PAL Amended Application [93]	20,114	12,943	0	0	33,057

The PAL contract installation cost has increased from the original submission and in the amended application it outlines that the installation contracts have been re-negotiated and as a result:

[C-I-C]

.[94]

[93] Powercor meter and comms capex.xls – summary tab, meter installation heading, contract unit costs, line 110.

PAL claims that this has reduced the overall cost of the program as the non-contract costs have decreased by more than the increase in the contract costs.

Impaq has reviewed the meter installation contract costs and is satisfied that these do not include costs for new connections. Hence Impaq considers these costs, based on the unit rate installation contracts, are prudent.

6.5Meter Installation – non contract costs

PAL has provided a considerable amount of further information on the makeup of the cost for the non-contracted component of meter installation cost. However Impaq's investigation indicates that many of the costs are excessive and the work practices implied are less than prudent.

Table 89 – Meter installation – non contract costs

	2012	2013	2014	2015	Total
PAL application	20,885	17,461	2,494	2,486	43,326
Impaq Assessment for Draft determination	1,876	1,513	0	0	3,390
PAL Amended Application	14,083	12,369	1,791	1,859	30,102
Impaq Assessment	10,047	7,752	1,465	1,525	20,789

PAL has provided detailed information on the makeup of these costs. The major items are listed below.

- PNS Direct Costs 69%
- PNS Margin 4%
- CHEDS project management 12%
- CHEDS margin 4%

6.5.1 PNS Direct Costs

There are a range of costs included in the PNS Direct Costs[95]

Impaq has reviewed these and has assessed that there are about [C-I-C] FTEs amongst other things included in the PNS Direct Costs. This includes positions such as:

- Specialist Metering Technicians ([C-I-C]);
- Resolution Officers ([C-I-C]);
- Field Resource Manager;
- Field Installation Co-ordinators ([C-I-C]);
- Quality Auditors ([C-I-C]);

[94] Powercor amended application, page 50, section highlighted in yellow.
[95] Refer Citipower meter and comms capex spreadsheet, PNS rollout direct costs

- Quality Manager;
- Quality Administrator;
- Quality Technical Officer;
- Logistics – Contracts Performance Manager; and
- Logistics – Inventory Co-ordinator.

Other resources are implied in the costs. For example:

- CBD/Site specific project approach at $[C-I-C] for 2012. This implies about [C-I-C]FTEs;
- Complex installation support –MOG at $[C-I-C] for 2012. This implies about [C-I-C] FTEs; and
- Additional field auditors at $[C-I-C] for 2012. this implies about [C-I-C] FTEs.

This implies an overhead FTE count for PAL at 69% of the total 34 FTEs or 23 FTEs of overhead. This is possibly an acceptable level for the first phases of meter installation. However it is an excessive level of resources for 2012 and 2013 considering that there would only be about [C-I-C] FTEs required to do the contract installation work in PAL in 2012[96]. This is based on installers doing an average of 32 installs per day. The typical installation time for an AMI meter is around 8 to 15 minutes[97].with many installations taking less than 10 minutes. Impaq has witnessed installations taking this time and it is noted that the ESV reported that AMI installations occur in around 10 minutes and that they meet the appropriate safety requirements.

By the end of 2011 the CP AMI rollout will be 40% complete and the business processes and work procedures will be bedded down. Going forward there will be the need for:

- quality auditing of installations;
- installation co-ordination;
- specialists to some a very small number of complex installations; and
- logistics support – however this will not be a major task as there are only 3 installation companies and two meter vendors involved.

It is Impaq's view that the number of resources required for 2012 is only half of that proposed by PAL and for 2013 is only one third.

[96] Assumes 220 working days, 14 minutes average installation time, 7.5 working hours per day

[97] The Energy Safe Victoria review of smart metering installations (Final Report on safety aspects of the Victorian Advanced Metering Infrastructure (AMI) Program Meter Deployment Activities) refers to installations in accordance with safe processes occurring in "about 10 minutes" page 4, "often less than 10 minutes" – p28,

6.5.1.1 Excessive salary costs

The average fully absorbed annual salary cost for the resources listed above, at $[C-I-C], is excessive. The typical charge-out rate for this type of resource is around $116 per hour[98]. Assuming 220 working days per year, a nominal 8 hour day and a utilisation rate of 70% (net 5.5 hours chargeable time per day) this gives an annual cost of $139,000. Taking off the PNS margin of [C-I-C]% gives $[C-I-C] as the annual cost (fully absorbed). The PAL rate is 30% above the commercial standard.

6.5.1.2 Logistics Buffer stock

PAL has stated it needs 2 months stock of meters for logistics reasons. Impaq does not consider that is in line with a commercial standard. For example, the Automotive industry moved away from holding such large stocks many years ago. Instead they have placed the onus on their suppliers to deliver products just in time (which in practical terms is about 2 to 4 days of stock). The broader manufacturing industry has also moved to low stock levels with greater emphasis on managing logistics well to avoid stockouts.

Even if PAL needs 2 months stock the values they have nominated appear to be excessive as shown in Table 90. Furthermore for the values to be the same for 2012 and 2013 is not realistic as the volume of meter installs in 2012 is about 50% more than for 2013.

Table 90 – Logistics buffer stock

	2012	2013	Total
Cost of capital associated with 2 months of inventory rotated through storage. Based on WACC of 10%. 2 months of 'working' inventory is considered minimum required for a large-scale roll-out.	[C-I-C]	[C-I-C]	[C-I-C]
Annual meter volumes	127069	89826	216895
Weighted average unit price of meters	[C-I-C]	[C-I-C]	[C-I-C]
Impaq assessment of cost of capital for buffer stock assuming 10% WACC	[C-I-C]	[C-I-C]	[C-I-C]
Impaq assessment as a proportion of PAL's proposal			[C-I-C]

[98] Refer Impaq Consulting report "Review of Distributors Proposed Rates in ACS Charges" for the AER on alternative control service in 2010 and review of charge-out rates. For categories that do not include the cost of a vehicle

6.5.2 Logistics costs for returned meters

PAL will have almost no need for non-AMI meters in the future. The decision of PAL to keep electronic meters may be prudent as these meters could be reused by other companies in the CKI group or sold into other markets. However, since the beneficiaries of such sale or transfer are other entities, the AMI program should not be required to fund the logistics cost. In addition, any revenue gained by PAL in the sale of these meters to others should be an offset against the costs of the AMI program.

6.5.3 Logistics audit

The allowance of [C-I-C] FTEs for a logistics audit for PAL and CP ([C-I-C] FTEs for PAL) is excessive. It would be expected that such an audit would be performed within three to four months using one FTE and covering both PAL and CP. An allowance for one FTE for 6 months (4 months PAL and 2 months CP) has been made.

6.5.4 Customer Calling card

Impaq agrees that PAL are required to provide a customer calling card for AMI meter installations after June 2011. Since this is an activity done by the installation contractor it would be expected that PAL would have had this cost included in the recent renegotiation of contract installation rates.

There is very little to be filled in on this card (the installer's name, registration details and other minor information). This card is quite simple and the printing cost is low. The installation contractor would complete this card at the conclusion of the installation and the time cost for doing this is an installation contractor cost. Impaq does not consider the PAL proposed cost of $4.26 per card is prudent. The time to complete the card will be less than 1 minute. At a cost of $4.26 this equates to an hourly rate of $255 which is excessive. Installation contractor rates are closer to $100 per hour[99]. Hence Impaq considers that a prudent cost is half this rate.

6.5.4.1 Utilisation of metering technicians

PAL has provided information on the times for metering technicians[100] To travel from the Rooney St Depot (Burnley) to the first Job of the day and the time taken from the last job of the day back to the depot.

This type of work practice is not the commercial standard. The commercial standard for technician grade field personnel is that they go direct from home to the first job. Similarly they go direct from the last job to home. There is no need for the technicians to go to the depot twice a day. About once a week when near the depot the technician would call in to restock their vehicle and for necessary admin information and briefings from management.

[99] Refer Impaq Consulting report to the AER in relation to charge out rates for Alternative Control Services

[100] Powercor non-contract unit rates spreadsheet, hours tab

Furthermore, the resulting time to install a replacement AMI meter due to a fault is excessive. It is 2.17 hours for a single phase installation and 3.5 hours for a direct connected three phase installation. Contractors are doing those installations in 20 minutes and 30minutes respectively; to which needs to be added travel time. It is noted that the installations which these technicians are doing is marginally more complicated than the ordinary installation because it is due to a meter fault, and some basic fault investigation would be needed before replacing the meter. However, with AMI meters, there is little that can be done on site to rectify a fault unless it is a marginal communications area and the addition of an external antenna might improve communications performance. Mostly if the meter is faulty it is dead – nothing on the LCD display and no response to button presses. Hence in most fault instances there little more to do than just replace the meter.

The resulting cost for installation of a single phase meter is $[C-I-C] and for a three phase direct connected meter is $[C-I-C]. This is an excessive cost. Contractors charge $40 to $50 for single phase (plus travelling time cost) and $44 to $60 for three phase (plus travelling time cost).

6.5.5 Deloittes report

CP and PAL engaged Deloitte[101] to provide an opinion on some Opex and Capex cost categories, including this category of Capex: Installation – Non Contract costs. The Deloitte analysis "*is structured around Deployment Management and Field Force Training and Management*[102]". It is noted that this does not align well with the resource categories in the CP amended application or financial models. Table 91 shows the CP/PAL resource categories and numbers of FTEs and Table 92 gives the Deloitte resources categories and FTEs. Some of the anomalies are:

- there are [C-I-C] PNS specialist metering resources which don't appear in the Deloitte list; and
- there are more resources in the Deloittes list than in the CP/PAL list.

Table 91 – CP/PAL Categories and FTEs

FTEs	2012	2013
PNS Metering Services Manager	[C-I-C]	[C-I-C]
Manager Metering Operations Group	[C-I-C]	[C-I-C]
PNS Specialist Metering #1	[C-I-C]	[C-I-C]
PNS Specialist Metering #2	[C-I-C]	[C-I-C]
PNS Specialist Metering #3	[C-I-C]	[C-I-C]
AMI Deployment Planning Manager	[C-I-C]	[C-I-C]
Resolution Officer # 1	[C-I-C]	[C-I-C]

[101] Deloitte report – CP/PAL "CitiPower Pty Powercor Australia Ltd AMI Cost Review – final report v1.1" 26 August 2011.
[102] Deloitte report – CP/PAL, page 29 section 3.3.1.

FTEs	2012	2013
Resolution Officer # 2	[C-I-C]	[C-I-C]
Resolution Officer # 3	[C-I-C]	[C-I-C]
Senior Deployment Planning Coordinator	[C-I-C]	[C-I-C]
Field Planner Team Leader	[C-I-C]	[C-I-C]
Field Planner # 2	[C-I-C]	[C-I-C]
Field Planner # 3	[C-I-C]	[C-I-C]
AMI Field Resource Manager	[C-I-C]	[C-I-C]
Field Installation Coordinator 1	[C-I-C]	[C-I-C]
Field Installation Coordinator 2	[C-I-C]	[C-I-C]
Field Installation Coordinator 3	[C-I-C]	[C-I-C]
Training Coordinator PNS	[C-I-C]	[C-I-C]
Training Administrator	[C-I-C]	[C-I-C]
Business Project Manager	[C-I-C]	[C-I-C]
Logistics - Contracts Performance Manage	[C-I-C]	[C-I-C]
Logistics - Inventory Coordinator	[C-I-C]	[C-I-C]
Quality Manager	[C-I-C]	[C-I-C]
Quality Administrator	[C-I-C]	[C-I-C]
Quality Technical Officer	[C-I-C]	[C-I-C]
Quality Auditor #1	[C-I-C]	[C-I-C]
Quality Auditor #2	[C-I-C]	[C-I-C]
Quality Auditor #3	[C-I-C]	[C-I-C]
Reporting & Compliance Officer	[C-I-C]	[C-I-C]
Total FTE's	[C-I-C]	[C-I-C]

Table 92 – Deloittes Categories and FTEs

FTEs	2012	2013
Deployment schedule management	0.5	0.5
Deployment capability management	2	2
Deployment exception optimisation	1	1
Deployment/Region Management	1	1
Field force training – resource management	6	5.85
Field force training – training and SME support	4.25	3.44
Field force training – deployment scheduling	8	6.83
Quality management	7.2	7
Logistics management	2	2
Project Operations	1.6	1.6
Total FTE's	33.6	31.2

Impaq has reviewed the Deloitte view on Meter Installation – non contract costs but does not consider that the FTE requirements analysis is robust. Some examples are considered below.

6.5.5.1 Logistics management

Deloittes describe this activity[103] as:

> *Logistics Management consists of four sub-functions (Table 19) that coordinate the delivery of AMI meters into receiving Powercor Network Services (PNS) distribution centres. Logistics Management also forecasts the demand requirements of regions, and send stock to the nine field distribution centres across Victoria for contracted installers to collect.*
>
> *Costs for Logistics Management only include the management of logistics service providers, including management of the handling of returned meters by service providers (the unit cost of actually moving an article from the PNS distribution centre to the field distribution centre is included in the unit price of meter supply).*
>
> *CP/PAL forecast that a combined number of ~311,000 deployments will occur in 2012, and ~133,000 in 2013. Each deployment involves the actual meter, as well as a number of ancillary products such as access points and antennas. In addition the Meter Procurement Contract Management sub-function lags the physical supply of meters into the distribution centre, because contract management activities can only occur once meters have been procured. Based on our review of Logistics Management we believe that 2 FTEs for 2012 and 2013, and 0.13 FTEs for quarter 1 2014 is reasonable.*

Table 93 – Deloitte logistic FTE forecast.

Logistics management activities	Deloitte validated FTEs			
	2012	2013	2014	2015
Procurement coordination, supply and demand forecasting, warehouse and distribution management, meter procurement contract management.	2	2	0.13	-

Firstly, it is noted that Deloitte appear to have the volumes of meters wrong by about 50%. The combined CP/PAL numbers are 414,000 in 2012 and 278,000 in 2013 (not 311,000 in 2012 and 133,000 in 2013). It is noted that there are 9 distribution centres and 2 meter vendors. There are also some ancillary products such as antennas, meter seals and other minor items. The major items are 6 meter types from 2 vendors equating to 12 items. With ancillary items there are perhaps 30 items to be managed. Deloitte considers that 2 FTEs are required - for a year this is

[103] Deloittes report CP/PAL,, page 34, section e.

3300 working hours. Across 30 items this is 110 hours per item. This is a huge amount of time to do very little. The activities Deloitte have identified are considered in order.

- Procurement co-ordination – this is hardly difficult when there are only two vendors and the quantities are already known. A simple delivery schedule sent to each vendor is all that is needed.
- Supply and demand forecasting – The quantities of each item are known and the demand pattern is approximately known. With a 2 month buffer stock[104] demand forecasting does not have to be accurate.
- Warehouse and distribution management – this is not hard either. Deliveries of 30 items come into the warehouse and they are sent on to each of nine distribution centres. Again simple delivery schedules are all that is needed.
- Meter procurement contract management – there are two contracts to be managed, which have been established for some time. The contracts are not due for renegotiation and hence it is purely the tracking of deliveries, clearing invoices for payment and the recording of vendor performance against contract KPIs.

Based on the information provided by Deloitte this is a task for perhaps 0.5 FTEs. There should be no overhang of contract management into the 2014 year because there is a 2 months buffer stock, which in the later months of 2013 would be run down. The last deliveries from vendors should happen at the latest in October 2013, which gives another 2 months to do reconciliation of deliveries against invoices etc. Hence there is no need of FTE resources in 2014 for this activity.

6.5.5.2 Deployment exceptions optimisation[105]:

> *Deployment Exception Optimisation involves the analysis of SLA and KPI information, and exceptions to continuously improve systems and processes, and refine operations. This activity is closely aligned with Deployment/Region Management, in particular the resolution of issues and coordination of technology, customer and field activities. Deployment Exception Optimisation is also closely aligned with Deployment Capability Management.*
>
> *There have been a number of unforseen issues with the roll out to date, such as customer refusal, state government changes (e.g. tariff reassignment, two element meters), and unanticipated complexities with the rollout caused by multi-occupancy sites, and geographic issues. 14% of attempted installations to date remain outstanding and are unable to be completed at present, due to some of these issues. Based on this, we believe that 1 FTE is appropriate to manage Deployment Exception Optimisation from 2012-2013*

[104] Refer 4.5.1.2.

[105] Deloittes report CP/PAL, page 30 item b.

Impaq considers the case for Deployment Exception optimisation resources has not been adequately established. One case quoted concerning customer refusals requires little management. Indeed, if the customer refuses installation it merely needs to be recorded by the installer that that has happened. No optimisation of that outcome is possible. The case of tariff reassignment where a customer is moving from a two element meter (or two meters) for off peak water heating, to a single element meter, is not going to be an exception. Rather, it will be a standard installation issue that will be resolved at a policy level and not an exceptions level in relation to field installations.

6.5.6 Impaq Assessment

Impaq has recalculated the costs for the meter installation – non contract category taking into account the issues raised above as shown in Table 94. The major adjustments are:

- the PNS direct dost annual FTE rate to $132,000 from $[C-I-C];
- the number of FTEs for PNS direct cost category by 50% in 2012 and 66% in 2013; and
- the stock holding cost as outlined above.

Table 94 – AMI meter Installation – non contract costs

	2012	2013	2014	2015	Total
PAL initial application	20,885	17,461	2,494	2,486	43,326
Impaq Assessment for Draft determination	1,876	1,513	0	0	3,390
PAL Amended Application	14,083	12,369	1,791	1,859	30,102
Impaq Assessment	10,047	7,752	1,465	1,524	20,790

6.6 Capex – Communications Supply and installation

The PAL forecast for Communications Supply and Installation consists of the following categories:

- Communications Equipment Supply – contract
- Communications Equipment Supply - non-contract; and
- Communications Equipment Installation –-contract.
- Communications Equipment Installation – non-contract.

Both of these categories are analysed in the following sections. It is noted that PAL has not included costs in the Communications Equipment Installation – Contracted category.

6.6.1 Communications equipment supply – contract and non-contract

Table 95 shows a summary of the composition of this cost category as proposed by PAL[106] in its amended application for both contracted and non-contracted communications costs.

Table 95 – Communications equipment supply

($, 2011)	2012	2013	2014	2015	Total
Rollout					
Contract unit costs	2,312,432	25,222	0	0	2,337,654
PNS non-contract unit costs	2,388,726	1,743,875	0	0	4,132,600
CHEDS project management	128,611	1,589	0	0	130,200
CHEDS margin	61,802	17,874	0	0	79,675
Total	4,891,570	1,788,559	0	0	6,680,129
Business as usual					
Contract unit costs			36,032	36,345	72,378
PNS non-contract unit costs	0	0	103,269	100,344	203,612
PNS logistics	0	0	3,315	3,344	6,659
PNS corporate overhead	0	0	6,603	6,484	13,087
PNS margin	0	0	526	521	1,047
CHEDS margin	0	0	1,497	1,470	2,968
Powercor fleet & property overhead	0	0	35,098	36,095	71,193
Powercor corporate overhead	0	0	95,835	98,559	194,393
Total	0	0	282,175	283,162	565,337

Table 96 shows the Impaq assessment of these cost items.

Table 96 – Communications equipment supply – Impaq assessment

($, 2011)	2012	2013	2014	2015	Total
Rollout					
Contract unit costs	2,312,432	25,222	0	0	2,337,654
PNS non-contract unit costs	1,226,950	901,336	0	0	2,128,286
CHEDS project management	135,667	1,732	0	0	137,399
CHEDS margin	50,996	9,465	0	0	60,460
Total	3,726,045	937,755	0	0	4,663,800
Business as usual					
Contract unit costs			36,032	36,345	72,378
PNS non-contract unit costs	0	0	39,371	38,527	77,897
PNS logistics	0	0	3,315	3,344	6,659
PNS corporate overhead	0	0	3,645	3,621	7,266

[106] Taken from the Powercor meter & Comms spreadsheet, summary tab.

($, 2011)	2012	2013	2014	2015	Total
PNS margin	0	0	369	369	738
CHEDS margin	0	0	827	822	1,649
Powercor fleet & property overhead	0	0	20,920	21,816	42,736
Powercor corporate overhead	0	0	57,123	59,570	116,692
Total	0	0	161,602	164,414	326,016

6.6.2 Communications equipment supply – contract

Table 97 shows the communications equipment supply – contract, costs which PAL proposed in their initial application and that which is in their amended application (from Table 95). Impaq Consulting considers the amended application costs prudent.

Table 97 – Communications equipment supply - contract

($,000 real 2011)	2012	2013	2014	2015	Total
PAL application	2,437	27	38	37	2,539
Impaq Assessment for Draft determination	2,220	23	32	31	2,306
PAL Amended Application	2,312	25	36	36	2,410

6.6.3 Communications equipment supply – non-contract

Table 98 shows the costs PAL proposed in their initial application, the Impaq assessment for the draft determination, the PAL amended application and the Impaq assessment.

Table 98 – Communications – non contracted costs

($,000 real 2011)	2012	2013	2014	2015	Total
PAL initial application	2,726	1,891	108	105	4,830
Impaq Assessment for Draft determination	222	2	3	3	230
PAL Amended Application	2,579	1,763	246	247	4,835
Impaq assessment	1,413	912	125	128	2,580

PAL have now provided information to substantiate the non-contracted costs. This includes the cost of 3G, PSTN and satellite communications for a small proportion of PAL's customers for which the mesh radio cannot economically reach.

Impaq is not satisfied with the numbers of BAU PSTN and 3G communications connections as shown in Table 99. They seem to be reversed. Impaq considers

that it is more likely for BAU metering to need a 3G connection than for a PSTN connection. Hence Impaq has swapped the quantities.

Table 99 – Number of BAU 3G and PSTN connections for 2014/15[107]

	2014	2015
3G	[C-I-C]	[C-I-C]
PSTN	[C-I-C]	[C-I-C]

Impaq also considers the cost of 3G modems at $[C-I-C] to $[C-I-C] is excessive. Quad band modems are not required as the Telstra NextG network mainly relies on a single band 850MHz for rural areas. Meter vendors can provide dual band modems for the 850/2100MHz bands at a cost of $160[108] in the quantities being considered. Similarly, the price of PSTN modems at $[C-I-C] is excessive. PSTN modems suitable for meters can be procured from meter vendors and others for $300 in the quantities being considered.

6.6.4 Communications Equipment Installation – contracted.

PAL's revised application includes this category of costs which was previously not included in the initial application[109].

	2012	2013	2014	2015	Total
PAL Amended Application	6,630	2,590	424	167	9,811
Impaq Assessment	3,867	1,266	72	71	5,276

Although this category of costs is entitled "Contract" PAL have provided no evidence that these costs have been through a competitive tender process. The majority of the cost is made up of the installation costs of Mesh Radio Access Points, Mesh Radio Relays and PSTN connections. The Access Point and Relay installation costs at about $[C-I-C] is well above other DNSPs costs for this installation activity. Impaq has instead used a value of $1500, which is about 50% higher than other DNSPs costs.

6.6.5 Communications Equipment Installation – non-contract.

Table 100 shows the PAL initial application cost, the AER draft determination, the PAL amended application cost and the Impaq Assessment.

Table 100 – Communications equipment installation – non contract

[107] Taken from the Powercor meter and comms spreadsheet, PNS non-contract unit costs, line 114 and 115

[108] Pricing of the modems from the modem vendors is even lower at $95 plus aerial cost of $15.

[109] Refer Powercor meter and comms capex spreadsheet, summary tab

	2012	2013	2014	2015	Total
PAL Initial Budget Application	8,145	3,345	892	47	12,429
Impaq Assessment for Draft determination	2,726	1,010	178	178	4,092
PAL Amended Application[110]	5,154	4,196	1,949	1,053	12,352
Impaq Assessment	3,154	1,912	1,460	727	7,254

6.6.5.1 CHEDS Direct Costs

The largest component of the PAL costs in this category is what PAL terms "CHEDS direct costs". These costs are really about AMI mesh radio Technology Management. The costs are for a shared resource between PAL and CP, where the PAL share is 96% of the total.

For 2012 and 2013 this cost category includes the following resources.

Technology Management

- System Development & Performance Manager.
- Deployment Project Manager #1.
- Deployment Project Manager #2.
- Deployment Project Manager #3.
- Metering Engineer.
- Graduate Engineer.
- Systems Investigation Engineer #1.
- Systems Investigation Engineer #2.
- Smart Grid Engineer #1.
- Smart Grid Engineer #2.

Technology Acceptance

- Technology Assurance Manager.
- AMI Meter Test Technician.
- AMI Lab Co-ordinator.
- Systems Engineer.
- Systems Engineer.
- Senior Systems Engineer.

AMI communications control

[110] Powercor revised budget and charges submission – page 85

- AMI Tech - ACC Controller.
- AMI Tech - Communications Engineer.
- AMI Tech - ACC Controller.
- AMI Tech - ACC Controller.
- AMI Tech - Operations Manager.
- ACC Operator 4.
- ACC Operator 5.

This is a total of [C-I-C] FTEs for both 2012 and 2013. Impaq considers this resourcing level to be excessive.

In relation to 2012, there should be no smart grid engineers as smart grid is outside of the CROIC scope. The CROIC scope is AMI. There should also be no need for a metering engineer – the metering technology support is provided in Metering Installation – Other costs. The [C-I-C] FTEs for AMI communications control are already covered in "Opex Communications Operations". Hence, for 2012, Impaq considers that 13 FTEs is all that is in scope for this activity.

In relation to 2013, virtually all of the AMI network has been rolled out. By then about 738 access points and 2470 relays will have been rolled out in the PAL area. In 2013 PAL intend to rollout 5 access points and no relays. The installation of the AMI mesh radio network it virtually finished in 2012. Hence many of the roles are not needed for 2013. eg: Two of the three Deployment Project Managers should not be required and one of the systems investigations engineers should not be needed. In all this give 9 FTEs for 2013

For 2014 the FTEs in this category are.

Rollout Closeout

- System Development & Performance Manager.
- Deployment Project Manager #1.
- Deployment Project Manager #2.
- Metering Engineer.
- Graduate Engineer.

Technology Acceptance

- Technology Assurance Manager.
- AMI Meter Test Technician.
- AMI Lab Co-ordinator.
- Systems Engineer.
- Systems Engineer.
- Senior Systems Engineer.

A rollout closeout in effect should have happened in 2013 as the AMI communications network was almost totally complete by end of 2012. There seems no need for deployment managers – deployment of the network will have been completed in 2013. Again there seems to be no need for a metering engineer - these costs are about communications not metering. This reduces the FTEs to 8.

In 2015 the resources PAL has proposed is the Technology acceptance team of 6 FTEs. By this stage rollout is well and truly over. It is steady state operations with minor releases and major releases from SSN to be tested. It seem excessive to 6 FTEs to be doing technology acceptance for firmware releases. It is Impaq's view that 4 FTEs would be adequate.

6.6.5.2 PNS Rollout Direct Costs

The second largest item of costs in this category is PNS Rollout Direct Costs. The components of this cost are given in Table 101.

Table 101 – PNS Rollout Direct Costs – Comms installation

	2012	2013
Network suppressions costs	[C-I-C]	[C-I-C]
Meter antenna installation delays	[C-I-C]	[C-I-C]
Meter antenna complaints	[C-I-C]	[C-I-C]
Road opening permits & traffic management	[C-I-C]	[C-I-C]
Telco contract implementation	[C-I-C]	[C-I-C]
AP/Relay Construction Installation Design	[C-I-C]	[C-I-C]
Comms - Cable installation of APs/Relays to nearest Telco pit (where 3G is not available)	[C-I-C]	[C-I-C]
Trenching costs	[C-I-C]	[C-I-C]
Total comms installation	[C-I-C]	[C-I-C]

Some of these items are excessive in cost or not technically correct.

- The Comms cable installation of Aps/Relays includes the comms cabling to relays as well as access points. However relays are not connected to the WAN only to the LAN. Over 80% of this cost is for connecting relays to Telco pits when such a connection will not occur.
- The AP/Relay installation design (item 6) seems excessive. By the end of 2011 most of the access points and a high proportion of the relays will have been installed. The designs for almost all configurations and installation circumstances will have been done. It is hard to see that there will need to be much custom designs for installations for 2012 onwards; almost all will have been done. Impaq considers this can be reduced by 80%.

6.7IT Capex

Table 102 shows the summary of the PAL initial application, the Impaq Assessment for the Draft determination, the PAL amended application and the Impaq assessment in relation to IT Capex.

In its amended application, PAL has provided additional information on the areas where it disagreed with Impaq's previous assessment. Each of these areas is discussed in turn.

Table 102 – IT Capex Summary

	2012	2013	2014	2015	Total
PAL Initial Budget Application	11,682	10,366	7,402	5,795	35,246
Impaq Assessment for Draft determination	9,143	8,544	3,982	3,844	25,513
PAL Amended Application	14,787	9,452	7,303	5,021	36,563
Impaq Assessment	8,969	8,544	6,737	5,020	29,270

6.7.1 Workforce scheduling and mobility

Table 103 shows the PAL initial application, the Impaq Assessment for the Draft determination, the PAL amended application and the Impaq assessment in relation to workforce scheduling and mobility.

Table 103 – scheduling and mobility

	2012	2013	2014	2015	Total
PAL Initial Budget Application	2,035	1,317	60	110	3,522
Impaq Assessment for Draft determination	0	0	0	0	0
PAL Amended Application	0	0	0	0	0
Impaq Assessment	0	0	0	0	0

The PAL amended application states[111]:

The Draft Determination removed all workforce scheduling and mobility projects on the basis the technology should be mature and the rollout should be bedded down by the end of 2011.

For the Amended Application, the business has deleted all workforce scheduling and mobility expenditure. It has however identified two projects that were previously included under the workforce scheduling and mobility category of the Initial Budget

[111] Powercor amended application page 88

Application that were better classified as connection point management projects, namely 'remote configuration of meters' and 'remote connect disconnect'.

The 'remote configuration of meters' project is not related to the AMI rollout but rather to address current BAU system and process gaps in the areas of:

- *Additions and alterations to AMI enabled sites;*
- *Abolishments of AMI enabled sites;*
- *Remote meter configurations; and*
- *Meter faults.*

Impaq does not agree that this expenditure is prudent because:

- expenditure to implement connection management was included in the 2009 PAL budget application[112] and in the Draft Determination of July 2011; and
- the requirement for remote configuration of meters and for remote connect disconnect was always required and is part of the minimum functionality specification. The application architecture diagram provided in PAL's 2009 submission[113] shows data flows for configuration and remote connect/disconnect. Hence it is assumed that this was funded in that application.

6.7.2 Connection point management

Impaq noted in its report to the AER before the draft determination that although the major IT build to enable AMI is complete, there will be some expenditure in the 2012 to 2015 period due mainly to some of the applications being somewhat immature (particularly the NMS and MDMS systems) and the need for additional meter data storage. Impaq at that point was doubtful about the need for expenditure on a connection point management system because:

- the requirement for connection point management was known from the beginning of the AMI project and would be required for the start of rollout and hence the system build would presumably be complete ahead of rollout; and
- the PAL application architecture shows the continued use of a CIS (CIS O/V) which would appear to provide the connection point management needs.

The additions to this connection point management system that PAL is seeking (remote meter configuration and connect/disconnect) were known requirements from the beginning of the project. Hence it is Impaq's view that the additional cost in the PAL amended application is not prudent. Refer Table 104.

[112] Powercor original submission of 2009, page 38
[113] Powercor original submission of 2009, page 41

Table 104 – Connection Point Management

	2012	2013	2014	2015	Total
PAL Initial Budget Application	2,302	-	140	-	2,442
Impaq Assessment for Draft determination	2,302	-	140	-	2,442
PAL Amended Application	5,724	-	140	-	5,864
Impaq Assessment	2,302		140		2,442

6.7.3 Performance and Regulatory Reporting

Table 105 shows the original PAL submission, the draft determination, the PAL amended application and the Impaq assessment.

Table 105 – Regulatory and Performance reporting

	2012	2013	2014	2015	Total
PAL Initial Budget Application	505	505	505	505	2,020
Impaq Assessment for Draft determination	0	0	0	0	**0**
PAL Amended Application	2,222	908	566	-	3,696
Impaq Assessment	0	0	0	0	**0**

PAL's revised application states[114]:

The Draft Decision rejected all expenditure on performance and regulatory projects on the basis there were no proposed changes to the Business' external regulatory reporting requirements.

The AER has not understood the nature of the expenditure included under performance and regulatory reporting. The expenditure relates to the creation of a data warehouse using the Teradata product.

The data warehouse is required to store the interval data for a period of 7 years. The costs of the project are spread over multiple years to allow for the scaling of the data warehouse as the data population grows.

The two key reporting areas to be delivered from the data warehouse are:

- *Reporting against the interval data delivery performance targets for 6am, 24hrs and 10 days after each read day. The Business presently has in place a temporary reporting solution but it is not scalable to the full meter population; and*

[114] Powercor revised budget and charges application, page 89

- *The AMI IT program replaced the legacy Meter Data System (MDS) with an application from Itron Enterprise Edition (IEE) that was scalable to 1.2 million interval meters. The MDS system had a suite of reports to meet the internal requirements of the Business. These reports are still in use today, despite the new Meter Data Management (MDM) application being implemented. Provision of these reports from the legacy system is a temporary measure until the data warehouse project is implemented*

Based on the information provided by PAL Impaq now understands that this is a data warehousing project. However Impaq does not consider this capital expenditure to be prudent because:

- if it were vital to PAL's AMI implementation it should have been included in the PAL 2009 submission;
- Impaq is not convinced that it is required to meet the performance and regulatory obligations of PAL. The requirement for reporting data delivery performance against targets can be met by creating a database report utilising the data in the Itron IEE MDMS database. Eg: MS SQL Server database has facilities for developing custom reports; and
- The requirement for storage of 7 years of interval data[115] can be met through archiving procedures (eg: using Mag tape storage) because the incidence of needing to access data more than 13 months old is likely to be very infrequent and there is no requirement in the NER or the metrology procedure on required response times for the provision of this data. In addition, Retailers will have access to interval in MSATS and can have their own storage of interval data.

6.7.4 IT Program Management

Impaq considers that the PAL amended application for IT Program Management is prudent given that there will be IT projects occurring in 2014 and 2015.

Table 106 – IT Program Management

	2012	2013	2014	2015	Total
PAL Initial Budget Application	300	300	300	300	1,200
Impaq Assessment for Draft determination	300	300	-	-	600
PAL Amended Application	300	300	200	140	941
Impaq Assessment	300	300	200	140	941

[115] National Electricity Rules (rule change in 2011) chapter 7 – section 7.9 & 7.11 requires 13 months online storage and 7 years of archive storage.

6.7.5 IT Infrastructure

Impaq considers that the PAL amended application for IT Infrastructure is prudent.

Table 107 – IT Infrastructure

	2012	2013	2014	2015	Total
PAL Initial Budget Application	2,083	2,185	4,555	3,036	11,858
Impaq Assessment for Draft determination	2,083	2,185	2,000	2,000	8,268
PAL Amended Application	2,083	2,185	4,555	3,036	11,858

6.8 Capex - Project and administrative Costs

The PAL revised submission[116] has accepted the AER's draft determination in relation to this category of Capex as shown in Table 108 .

Table 108 – Project and Admin Capex

	2012	2013	2014	2015	Total
Motor Vehicles	42	42	42	42	170
General Equipment and Test Lab	81	75	75	84	314
Total	**123**	**117**	**117**	**126**	**483**

6.9 Capital Expenditure Summary

Table 109 shows a summary of the PAL forecast cost and Impaq's view for each item of Capex.

Table 109 – PAL Capex summary – proposed and Impaq view

	2012	2013	2014	2015	Total
Meter Supply - Contract – Proposal	45,511	30,990	2,197	2,118	80,816
Meter Supply - Contract – Impaq view	43,413	28,405	2,109	2,075	76,002
Meter Supply other – Proposal	6,247	5,382	2,564	2,573	16,766
Meter Supply other – Impaq view	6,473	5,649	2,739	2,754	17,615
Meter installation - contract – Proposal	20,114	12,943	-	-	33,057
Meter installation - contract – Impaq view	20,114	12,943	-	-	33,057
Meter installation - other –Proposal	14,083	12,369	1,791	1,859	30,102
Meter installation - other – Impaq View	10,047	7,752	1,465	1,525	20,789
Communications equipment supply - contract - Proposal	2,312	25	36	36	2,409

[116] PAL Revised budget templates – AMI Capex Detail tab

	2012	2013	2014	2015	Total
Communications equipment supply - contract – Impaq view	2,312	25	36	36	2,409
Communications equipment supply - other– Proposal	2,579	1,763	246	247	4,835
Communications equipment supply – other – Impaq view	1,413	912	125	128	2,578
Communications equipment installation – contract - Proposal	6,630	2,590	424	167	9,811
Communications equipment installation – contract – Impaq view	3,867	1,266	72	71	5,276
Communications equipment installation – other - proposal	5,154	4,196	1,949	1,053	12,352
Communications equipment installation – other – Impaq view	3,154	1,912	1,460	727	7,253
IT Capex - Proposed	14,787	9,452	7,303	5,021	36,563
IT Capex – Impaq view	8,969	8,544	6,737	5,020	29,270
Project Administrative - proposed	123	117	117	126	483
Project Administrative – Impaq view	123	117	117	126	483
Total – Proposal	117,540	79,827	16,627	13,200	227,196
Total – Impaq view	99,885	67,525	14,860	12,462	194,732

6.10 Operating Costs

Table 110 is a summary of each of the items of Operating Expenditure with the value proposed by the PAL amended application.

Table 110 – Operating Expenditure Budget Summary

Opex	2012	2013	2014	2015	Total
Meter data services	6,285	4,516	2,896	2,896	16,593
Meter maintenance	1,401	1,440	1,859	1,890	6,590
Customer service	6,113	5,004	1,156	1,199	13,472
Backhaul communications	2,195	3,487	3,564	3,638	12,884
Communication operations	1,131	1,131	1,952	1,952	6,166
Project management	-	-	3,180	2,864	6,044
Executive & corporate office services	424	436	638	609	2,107
Debt raising			214	197	411
IT	7,332	7,378	6,395	6,427	27,532
Total	24,881	23,392	21,854	21,672	91,802

Each of the above Opex items is considered in turn. The cost of many of these items is heavily affected by human resources costs. Where human resource costs are involved the Impaq view has been established based on the assumptions in section 3.4.2.

6.11 Meter Data Services

Table 111 gives a summary of the meter data services proposals together with the AER draft determination and the Impaq assessment. It is noted that the Impaq assessment includes allowance for manual meter reading contract costs.

Table 111 – Meter Data Services

	2012	2013	2014	2015	Total
PAL Initial Budget Application	5,343	4,663	3,577	2,824	16,407
Impaq Assessment for Draft determination	1,079	904	641	553	3,177
PAL Amended Application	6,285	4,516	2,896	2,896	16,593
Impaq Assessment	2,455	1,212	672	612	4,953

In its revised submission PAL have increased the number of activities covered in this category[117]. The activities now are:

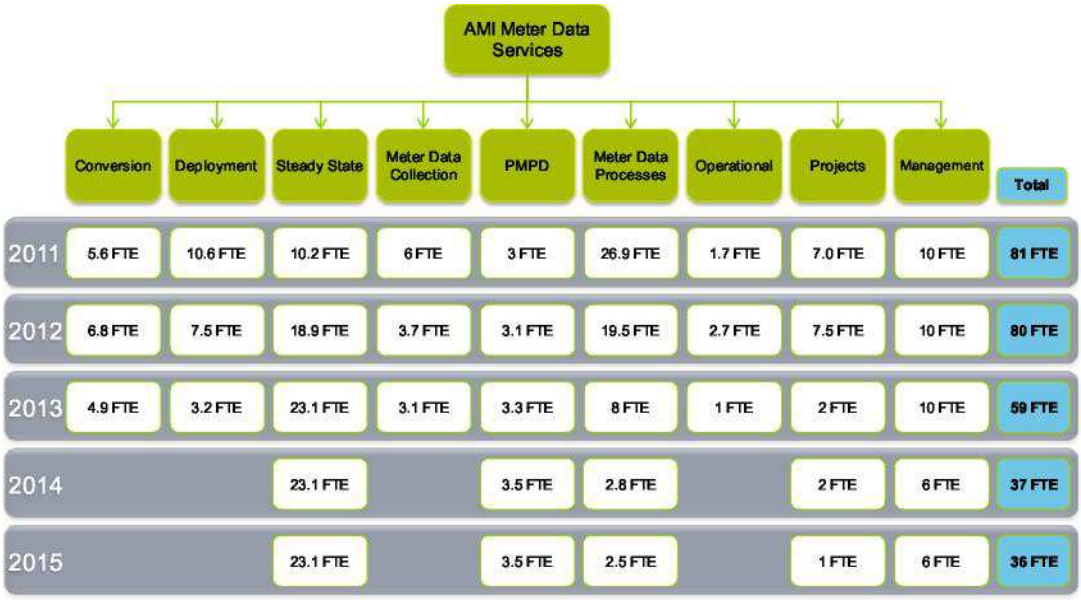
- *Conversion – this activity takes a currently installed interval meter and makes it a fully functional AMI meter by logically converting (activating) it. Since the Initial Budget Application, the Business has needed to increase the number of conversions from manually read interval meters to remotely read interval meters on account of reductions in conversions in 2011;*
- *Deployments – this activity replaces a currently installed basic meter with an AMI meter and immediately activates it as opposed to simply installing it and logically converting it later;*
- *Steady State Preparation – these are BAU activities that are not part of the conversion or deployment processes but are day-to-day activities needed to maintain the AMI data;*
- *Meter Data Collection – this activity covers basic meter reading exceptions which will continue until accumulation meters are replaced with AMI meters. This activity also includes meter reading for accumulation and manually read interval meters. Since the Business's Initial Budget Application, it has continually lost efficiencies on meter reading routes due to many routes being unable to be closed out as a function of it needing to by-pass meters. Whilst this only impacts on 2012, it has led to an increase in payments to the Business's meter reading vendor to compensate for the loss of efficiencies;*

[117] Revised submission page 107

- *Performance Monitoring and Process Development – this function represents CitiPower at industry forums and acts as a liaison between the broader community and the Business. This function also considers changes arising from the National Energy Customer Framework, data management change requests and administrative work flow to ensure industry policies are transferred into the Business when needed;*
- *Meter Data Processes (basic and interval) – these activities cover data reporting, data requests and overall reporting functions for both basic and interval meters;*
- *Operational – this activity manages local network service provider retailer inquiries and activity queues; and*
- *Projects – this covers enhancements required as part of the of the AMI rollout and to support on-going operations.*

Deloitte in their report[118] for PAL and CP (provided to the AER on 12 September 2011) has documented its analysis of the FTEs involved in these activities. This report refers to a Deloittes excel model, however this model has not been provided to the AER. Figure 2 is taken from the Deloittes report[119].

Figure 2 – Deloittes FTE analysis



The following is Impaq's comments on each of these activities.

6.11.1 Conversion

The Victorian AMI Minimum Performance Levels specification requires all meters to be providing interval data from 1 Jan 2012. This means all meters would be

[118] Deloittes report "AMI Cost Review" 26 August 2011, final report v1.1
[119] Deloitte report Page 9, Fig 4

converted to AMI meters by that date. Hence for the 2012 to 2015 period there should be no conversions occurring. Hence this item is out of scope.

6.11.2 Deployment

Impaq is of the view that this activity should be treated as part of the installation of an AMI meter and its cost included in the Capex category Meter Installation – non contract costs. However, Impaq is satisfied that PAL has not included the cost of this activity in Capex and will treat it as part of this activity

During 2012 there are to be 127,069 meters installed for CP and 287,850 installed for PAL, or 414,919 in total. Deloitte states that the error rate for deployments will reduce to 0.4% by the end of 2011, resulting in 1660 errors. With 7.5 FTEs, or 12,600 hours, for this task in 2012, this allows approximately one man day to fix each error. This is excessive.

The nature of the errors given by Deloitte are:

- interval meter exceptions;
- commissioning not completed in IEE;
- IEE can't load data; and
- communication issues at time of deployment.

These errors seem to be IT related and in particular indicate issues with Itron IEE or SI issues. These should be able to fixed by the end of 2011.

Impaq considers 1.5 FTE for 2012 and 0.9 FTE for 2013 t0 cover both businesses should be adequate. This translates to have one hour to fix each error. For PAL this equates 1 FTE for 2012 and 0.6 FTEs for 2013.

6.11.3 Steady State

The description of this activity is about maintaining AMI data. Deloitte have identified several items that they forecast will incur FTE effort. These are commented on in Table 112.

Table 112 – Steady State issues

Item	Impaq Comment
Failed export from UIQ to IEE ,	This is an IT application or integration issue to be fixed together with other teething problems. There is large Capex allowance for improvement of both UIQ and IEE. This should not be a BAU Opex issue.
Comms Faults,	The Comms operations people should fix this.
Meter Faults – meter stops reading	Meter faults will occur and there is Capex allowance for replacing faulted meters. Missing data from a faulted meter is to be substituted as

Item	Impaq Comment
	per the validation and substitution rules. This should be automated.
Retailer Requests – email / VMDR,	With the provision of interval data to retailers on a daily basis the requests for information should reduce markedly, apart from requests in relation to new connections or de-energisations and re-energisations which are Alternative Control Services.
General Data Requests,	With interval data going to Retailers and to the market and with standing data on MSATS it is hard to see what other data can be asked for.
Monitoring 10 day sub data	This should be an automated activity
AEMO reports – Estimates,	This should be an automated report
AEMO reports – Nulls,	This should be an automated report
AEMO reports – NWADS	This should be an automated report

It is Impaq's view that the Meter Data Management System (MDMS) and Network Management System (NMS) will fully automate the activity of collecting and validating data from the AMI meters. The vast majority, if not all, of the processing of the data, including validation, estimation and substitution, will also be automated. It will only be a very small number of exceptional situations that will require manual intervention, which should have minimal impact on CP meeting its service level obligations.

The AMI performance levels[120] for the collection of daily meter readings require 99% by 4 hours after midnight and 99.9% within 24 hours. Hence there will be 99.9% of data delivered to the NMS from meters that will not require any kind of correction because it is correct data.

Deloitte has said[121]

The current total error rate for these activities is 1.7%. This rate is expected to decrease significantly to 0.2% during 2012 – several initiatives have been identified to improve the process and reduce the need for manual intervention.

Based on CP having 350,000 meters, a 0.1% rate of meter data inaccuracy equates to 16,800 data points per day. The vast majority of these errors will be addressed using standard and automated algorithms in the NEM validation and substitution procedures. Impaq assumes that at least 99% of the erroneous data points will be

[120] Minimum AMI Functionality Specification (Victoria) Sept 2008, Ver 1.1 section 4.1
[121] Deloitte report CP/PAL, page 13.

corrected by the MDMS, leaving 168 data points, or equivalent to 3.5 meters, which may require manual intervention per day.

Table 113 shows the maximum and minimum theoretical number of FTE's required to correct data errors for CP and PAL combined. This is based on a 0.2% error rate and 0.1% rate of those errors needing manual intervention. The worst case scenario is that each erroneous data point that requires manual intervention is from a separate meter and each point needs to be manually substituted individually. The best case scenario is where all the data points are from whole meters that have failed for 24 hours and 48 data points can be substituted in one block. Each substitution, either individually or in blocks (as required) is assumed to 10 minutes (which is a more than generous allowance).

Table 113 - Analysis of FTE's required to correct data errors

	2012	2013	2014	2015
No AMI Meter	922,000	1,132,000	1,132,000	1,132,000
No Errors daily	88,512	108,672	108,672	108,672
No error requiring manual substitution	885	1,087	1,087	1,087
Worst case – No Substitution	885	1,087	1,087	1,087
Best Case scenario – No Substitutions	19	23	23	23
Worst case FTEs	19.7	24.2	24.2	24.2
Best case FTEs	0.4	0.5	0.5	0.5

For 2012 the FTE requirement ranges from 0.4 to 19.7 and in 2013 it ranges from 0.5 to 24.2. Impaq believes that it is more likely that errors that require manual intervention will occur in blocks, although not necessarily 24 hour blocks. This is because an individual erroneous bit of data will probably be picked up the next time the meter is read that day and, if not the substitution rules for individual half-hourly reads are simple and easily automated. The most likely cause of errors requiring manual substitution will be communications or meter failures where a whole stream of half hourly reads cannot be obtained.

Impaq believes that an appropriate level of resourcing for this activity would be 8 FTEs across CP and PAL

6.11.4 Meter Data Collection

PAL has stated that[122]:

This activity covers basic meter reading exceptions which will continue until accumulation meters are replaced with AMI meters. This activity also includes meter reading for accumulation and manually read interval meters.

[122] PAL amended budget application, page101.

Managing exceptions with the reads from legacy meters is discussed and assessed in Section 6.11.6. The reading of legacy meters for PAL is done by contractors and is discussed and assessed in Section 6.12.

Impaq believes these costs are already addressed.

6.11.5 Performance Monitoring and Process Development

Deloitte has defined this activity[123] as:

The PMPD activity is responsible for data management activities including change requests and administration workflow management. In addition it represents CP/PAL at industry forums, and acts as a liaison within CP/PAL. This helps to ensure that industry policies are transferred to CP/PAL when needed.

In relation to change requests and improvements of work flow, this is a capital expenditure item and there have been a sizeable capital expenditure items for NMS and MDMS enhancements over the 2012 to 2015 period. Impaq considers that there is no need for a duplication of allowance for this activity.

In relation to representation on industry forums such as that for NECF, this affects the whole of the business not just that for AMI. The proposed 3.0 to 3.5FTEs is excessive. Impaq considers that 1 FTE shared between the two businesses is ample resource.

6.11.6 Meter Data Processes – basic and manually read interval meters

Deloitte have described this activity[124] as:

Meter data processes include data reporting, managing data requests, and overall reporting functions for basic, interval type 1-4 and type 5 manually read interval meters. This activity will not see any improvements as Basic and Interval meters will largely be phased out by 2013. Table 7 presents a list of meter data process activities and the estimated FTEs required. Some residual work will remain in 2014-2015 to account for non-AMI (type 1-4) meters still in service.

The Deloittes FTE estimates for this activity are shown in Table 114.

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[123] Deloitte report – page 14
[124] Deloittes report page 14

Table 114 – Deloittes FTE estimates – Meter data Process - Manual

Meter data processes (basic and manually read interval meters)	Deloitte estimated FTEs				
	2011	**2012**	**2013**	**2014**	**2015**
BASIC METERS: AEMO Reports (nulls, NWADS, Estimates), Retailer Requests, Missing Reads, VMDR"s, Abnormal Consumption Reports, Reject Data Report, HULL Report Expired / Retrigger	11.3	7.8	3.8	1.3	1.0
MANUALY READ INTERVAL METERS: Import (MRIM, Type 1-4), Exception Reports, MSATS Reports (Nulls, Estimates), B2B Reporting	15.6	11.7	4.2	1.5	1.5

Deloitte appear to have misunderstood the AMI CROIC or the NER in relation to meter types:

- Meter types 1 to 4 in the NER are remotely read and hence should not be included in the manually read category
- Meter types 1 to 4 are not within scope as these are contestable meter the cost of which is separately charged to customers.
- After 2012 there will be no manually read interval meters in PAL or CP that are <160MWh (which is the CROIC scope). Hence there will be no need for FTEs for this activity in 2013, 2014 and 2015
- After 2012 there will be no basic meters in PAL or CP.

In relation to manually read interval meters, across PAL and CP there will be, on average, 30,100 MRIMs in 2012[125]. These are read quarterly ie: 4 times a year. This is a total of 120,400 reads. The Deloittes proposed FTEs is 11.7 for 2012. This gives a total of 19,656 FTE hours. The vast majority of MRIM data is processed automatically – without human intervention. Even if an extremely high error rate of 10% is assumed, this equates to 1.6 FTE hours per meter reading to fix errors do reporting and respond to retailer requests. Even half an hour would be to stretch credibility, but 1.6 hours is just not credible.

In relation to basic meters, in 2012 there will be on average 472,257 basic meters across PAL and CP. These are read quarterly (only a very small percentage are read monthly). This gives a total of 1.9M reads (each read is a single 6 to 8 digit number). The error rate on basic meter reads should not exceed 0.5%. This gives a total of 9445 errors per annum. With 7.8 FTEs the available hours is 13,104. This is 1.4 hours for each meter read error.

[125] Citipower and Powercor budget templates, Feb 2011

Impaq considers this resource level excessive however given that basic meters are to be phased out has not adjusted the FTE forecast.

The resulting Impaq assessment of FTEs is in Table 115.

Table 115 – Impaq FTE assessment

Meter data processes (basic and manually read interval meters)	Deloitte estimated FTEs			
	2012	**2013**	**2014**	**2015**
BASIC METERS: AEMO Reports (nulls, NWADS, Estimates), Retailer Requests, Missing Reads, VMDR"s, Abnormal Consumption Reports, Reject Data Report, HULL Report Expired / Retrigger	7.8	3.8		
MANUALY READ INTERVAL METERS: Import (MRIM, Type 1-4), Exception Reports, MSATS Reports (Nulls, Estimates), B2B Reporting	1.5	0.5		

6.11.7 Operational (LNSP) (in relation to meter exchanges)

Deloitte have described this activity as[126]

Local Network Service Provider activities will address the increasing number of enquiries coming from retailers regarding localised networking and meter exchange. These enquiries result from an increasing awareness of the meter exchange program, and are expected to taper off as the exchange program finishes in 2013 – this is aligned with the meter rollout program.

Table 116 - Deloitte FTE estimates - Operational

Operational (LNSP) activities	Deloitte estimated FTEs				
	2011	**2012**	**2013**	**2014**	**2015**
LNSP Retailer Enquiries – emails, phone calls, and System Activity Queues (AQ"s)	1.72	2.7	1.0	-	-

The cost of dealing with customer requests, either directly or through their retailer, is allowed for in the activity of call centre under Customer Service.

6.11.8 Projects

Deloittes have described this activity[127]

[126] Deloittes report page 15
[127] Deloittes report page 15

Projects include enhancements that are currently scheduled as part of the AMI rollout (refer to Table 9). Projects also include oversight of a number of initiatives (outlined in Appendix D) that need to be implemented by 2012 to maintain efficient levels of automation. The majority of these projects will be completed by 2013, as the AMI rollout is completed, with some residual effort required in the energisation project until 2015.

Projects activities	Deloitte estimated FTEs				
	2011	2012	2013	2014	2015
Energisation (manual, semi-automatic, fully automatic), Data Management Transition & Support, Type 5 to Market, Data Management (deployment, operations), Tariff Re-Assignment and Monthly Billing	7.0	7.5	2.0	2.0	1.0

Some of the projects that are listed here should be complete by the end of 2011 – eg: Type 5 to Market transitions are required to be done before 1 Jan 2012 by the Vic AMI Service Levels specification. Tariff re-assignment has been a requirement since the beginning of the AMI program and the systems and processes required for this should have been established long ago. Projects in relation to the improvement of the management of meter data retrieval and validation and substitution through the NMS (Utility IQ) and the MDMS (Itron IEE) have been amply provided for in the large IT Capex allowance for these systems.

However, Impaq accepts that process improvement will continue in 2014 and 2015 and accepts Deloitte's forecast for 2014 and 2015

6.12 Meter reading contract

The PAL amended budget submission does not include this cost category. However the Deloitte report identified this omission and hence Impaq has made an assessment of the cost of manual meter reading required till all manual meters are phased out in 2013.

Manual meter reading (contractor) costs are normally around $0.50 per read for basic meters and $1.00 for MRIMs. Assuming that density of reading routes is lost through the partial rollout of AMI in various geographic areas the costs are assumed to be $0.75 per read for a basic meter and $1.50 per read for an MRIM. It is further assumed that monthly reads apply to 5% of all customers and quarterly reads to 95% of customers. Table 117 shows the Impaq assessment.

Table 117 – Meter reading contract

($, 2011)	Meters	2012	2013	Total
CP	MRIM	[C-I-C]	[C-I-C]	[C-I-C]
	Basic	[C-I-C]	[C-I-C]	[C-I-C]
	Read cost basic ($)	[C-I-C]	[C-I-C]	[C-I-C]
	Read cost MRIM ($)	[C-I-C]	[C-I-C]	[C-I-C]
	Reads cost total ($)	[C-I-C]	[C-I-C]	[C-I-C]
PAL	MRIM	[C-I-C]	[C-I-C]	[C-I-C]
	Basic	[C-I-C]	[C-I-C]	[C-I-C]
	Read cost basic ($)	[C-I-C]	[C-I-C]	[C-I-C]
	Read cost MRIM ($)	[C-I-C]	[C-I-C]	[C-I-C]
	Reads cost total ($)	[C-I-C]	[C-I-C]	[C-I-C]

6.13 Meter Maintenance

Table 118 shows the PAL initial application, the Impaq Assessment for the Draft determination, the PAL amended application and the Impaq assessment.

Table 118 – Meter Maintenance PAL cost forecast and Impaq assessment

	2012	2013	2014	2015	Total
PAL Initial Budget Application	1,274	2,004	2,429	2,299	8,005
Impaq Assessment for Draft determination	787	707	1,114	1,114	3,722
PAL Amended Application	1,401	1,440	1,859	1,890	6,591
Impaq Assessment	789	692	914	927	3,323

The PAL revised submission identified that Impaq had omitted some components of the cost for the Meter Maintenance category. PAL has also provided a spreadsheet[128] which models the activities and costs in the PAL proposal for this category. In relation to the nature and scope of activities Impaq agrees with that presented by PAL with the exception of "Customer Investigations". PAL has stated that:

> *These activities are associated with field metering investigations and rectification where no equipment is replaced and the customer has not requested a meter accuracy test. Historically, the Businesses have not charged customers for these activities, particularly where the investigation cannot establish any fault of the customer in contributing to the problem identified.*
>
> *These field investigations are initiated via:*

[128] Powercor and Citipower Meter Maintenance

- *Customer/retailer meter data enquiries;*
- *EWOV enquiries; and*
- *Internal business initiated investigations.*

It is Impaq's view that these activities more align with a pre-AMI world. When there is interval data for all customers, Retailers will not need to ask for investigations of a particular meter as the data will be available to them on a daily basis. Similarly with EWOV enquiries, customers will be able to see their own interval data and make this available to EWOV. If a customer seeks an investigation then the customers should pay for this unless it can be demonstrated that PAL is at fault. Hence it is Impaq's view that this activity is not required.

In relation to the times and costs for the activities it is Impaq's view that in most cases they are excessive and do not conform to a commercial standard. Table 119 compares the PAL rate for single phase and polyphase meter testing with that of Formway Metering[129] and UED.

Table 119 – Meter testing rates

	Powercor rate	Formway quotation	UED Alternative control service rate[130]
Single phase meter test	$259.28	$60	$51.22
Polyphase meter test	$426.95	$105	$79.67
CT Meter	$336.90	$200	N/A
CT testing (set of 3)	$686.23	$370	

Impaq has used the Formway rates in its calculation of meter testing costs. This is considered to be the higher end of the commercial standard with the UED costs at the lower end.

In relation to times for tests these also are excessive. For example, PAL correctly lists that CT testing is required such that all CTs are tested every 10 years and that the testing of a set of 3 CTs takes 4.42 hours. The Citipower and Powercor Meter Asset Management plan references that the Redphase Model 590 CT tester is used for testing CTs. The product information for this CT tester does indeed indicate that it is designed for testing CTs in the field and allows secondary injection testing which

[129] Formway metering are a metering services provider that is an AEMO accredited meter verifier. www.formway.com.au/Default.aspx?alias=www.formway.com.au/groupmetering Impaq has obtained quotations for undertaking the meter testing activities required for meter maintenance

[130] UED Alternative Control services for metering - http://www.ue.com.au/industry/network_tariffs/download/2010/Appendix%20C.pdf

is a much simpler test method. The test procedure given in the data sheet is reproduced here:

> **4.0. TEST PROCEDURE FOR C.T.s.** [131]
>
> **4.1.** Isolate the C.T. primary side. Use a length of cable to place one turn through the window of the C.T. and connect it to "VB" and "COM" terminals of 590G-V2.
>
> **4.2.** Isolate the C.T. secondary side, and using the 4 wire test lead supplied with the 590G-V2 and connect the secondary to the group of 4 terminals marked "VA" and "COM".
>
> **4.3.** Test data for the C.T. is keyed in. This includes: Primary current; secondary current; VA rating; PF; % burden ; accuracy class; Model No. and serial number.
>
> **4.4.** The test which takes around 1 minute are then displayed on the LCD as results at 120%, 100%, 50%, 20% and 5% current at both 100% and 25%VA burden. At the end of this test various options are available including saving the test results.

In 4.4 it states that the test time is around 1 minute. For three CTs that is 3 minutes. Now on top of that there is time required to isolate CTs before testing and reconnecting them afterwards. There is also travel time (however from 2014 on CT testing can be done at the same time as testing of the Three Phase CT meter which the CTs connect to). Impaq estimate is that to test 3 CTs will take about an hour[132].

6.14 Customer Service

Table 120 shows the PAL original cost forecast, the AER draft determination, the PAL amended application and the Impaq assessment.

Table 120 – Customer Service

		2012	2013	2014	2015	TOTAL
PAL Initial application		6,192	5,083	1,274	1,315	13,864
Impaq Assessment for Draft determination		336	264	114	114	828
PAL Amended application		6,113	5,004	1,156	1,199	13,472
Impaq assessment	Call Centre	1,540	1,265	-	-	2,806
	Customer Interaction	2,264	1,830	-	-	
	Revenue	431	281			

[131] Red Phase CT tester model 590 product information. http://www.redphase.com.au/Files/590G-V2_DATASHEET.pdf

[132] Because these customers are <160MWh per annum the electrical installation around the CTs is not going to be characterised by large busbars and heavy equipment.

	2012	2013	2014	2015	TOTAL
Management					
Community Engagement and Education	0	0	0	0	0
Customer Service overheads	1,068	1,116	0	0	4,538
TOTAL	5,293	4,492	0	0	9,785

6.14.1 Call Centre

In its first report, Impaq removed the forecast call centre costs from this category because it believes that these costs were included in the meter installation capital costs. PAL has demonstrated that these costs were not included in meter installation and should be included in this cost category. Impaq is satisfied that these costs are not being counted twice and reinstates these costs into this category.

Based on historical data of average call times and percentage of new installation to calls, PAL has used an 'erlang' analysis to determine the number of Customer Service Agents (CSA) FTE's required, that being 12.7 for 2012 and 9.8 for 2013. PAL also claims that an additional 3.62 FTE's are required in both 2012 and 2013 for the management of this team and to provide technical support. Impaq has reviewed this calculation and supports it.

PAL has costed all of these FTE's at mid $80,000 per annum. While Impaq disagrees with the labour rates for the individual resources, overall, Impaq's analysis of the total labour costs is not substantially different from PAL's. Impaq accepts PAL's forecast of call centre costs as prudent.

6.14.2 Customer Interaction and treatment

In its first report, Impaq removed the forecast customer interaction costs from this category because it believed these costs were included in the meter installation capital costs. PAL has demonstrated that these costs were not included in meter installation and should be included in this cost category. Impaq is satisfied that these costs are not being counted twice and reinstates these costs into this category.

CP has provided a detailed breakdown of the resources and costs of interacting with customers. This includes:

- 9.3 FTEs;
- understanding customer issues and concerns through focus groups and surveys;
- training;
- mailing costs;
- development of brochures and other information for customers;

- media advertising;
- payment of claims, net of amount recovered from contractors;
- cost of claims referred to the Ombudsman;
- cost of translation and interpretative services; and
- Engagement in community partnerships and forums.

Impaq has reviewed the costs forecast by CP and has found them to be reasonable and prudent.

6.14.3 Revenue Management

This category includes the activities of:

- addressing and resolving final meter read discrepancies with the removed non-AMI meter; and
- addressing and resolving revenue protection issues associated with the meter exchanges.

PAL has stated that actual data for 2010 demonstrated that 12 per cent of final reads required manual intervention, taking on average 10 minutes to resolve[133].

In its previous report, Impaq stated that PAL's contractor has contractual service level requirements with respect to final meter reads and that if PAL is experiencing an error rate of this magnitude it needs to address this with its contractor rather than be funded by customers. PAL acknowledges its contractual rights but has stated that the majority of these discrepancies are not a function of the final meter read but rather are caused by:

- previous cyclic meter reads being in error;
- previous cyclic meter reads having being estimated; or
- identified network tariff errors at meter exchange.

Impaq is surprised that 12 per cent, or 1 in 8, final reads display these problems that require manual intervention.

In respect of erroneous previous cyclic reads, this read would need to be such that it is greater than the actual final read or, at least, sufficiently incorrect that 'trending' analysis flags these as errors. Small errors in the previous read would not be noticed and would, in effect, be corrected with the actual final read. Impaq expects that this level of error would be small, say less than 1per cent. If the level of 'erroneous' reads is significant, this is a matter that PAL should address with the contract meter reader for non-AMI meters.

Previous estimated reads that are sufficiently 'incorrect' to raise an error that requires manual intervention are likely to be greater, as a percentage of estimated

[133] Powercor 2011-2, page 115

reads, than erroneous reads. However, the number of meters that are estimated is small relative to meters that are actually read. If the rate of estimated reads that flag an error that require manual intervention is 10% and the rate of estimated reads is 10% of meters at any point in time, the proportion of final reads which require manual intervention as a result of this factor is 1%.

The meters which are being removed have been in the field for many years. During this time:

- they have been regularly inspected as part of the meter read;
- data has been read, processed and validated;
- retailers have received network bills and customers have received energy bills based on the reads; and
- manual energisation and de-energisations have occur for many of them.

It should be rare that a network tariff error has gone undetected and uncorrected for this period of time that would be found at meter exchange. Impaq is of the view that a rate of this type of error of 1 per cent is conservative.

Additionally, as stated in its initial report, Impaq accepts that a 0.5% error rate in the final meter read is acceptable and within the contractual limits of PAL's contractor.

Overall, Impaq believes that an estimate of 3.5% of meter exchanges that require manual intervention as a result of these causes is conservative but acceptable.

In relation to revenue protection, PAL states that they have found through the rollout that 1.5 per cent of sites have revenue protection issues. These are either:

- identifying fraudulent activity with the existing meter installation; or
- sites where the existing metering arrangement has not been correctly metering the network tariff the customer has been assigned to.

Impaq considers this to be an extremely large number of occurrences.

As stated in its initial submission, accepted industry standards for fraudulent activity in respect of the meter and installation is between 0.1% and 0.5%.

In respect of metering arrangements that have not been correctly metering the network tariff, Impaq believes that the majority of these should have been identified in the normal course over the life of the meter and its operation. Impaq is of the view that a rate of this type of error of 1 per cent is conservative.

Overall, Impaq believes that an estimate of 1.5% of meter exchanges that require manual intervention for revenue protection purposes is conservative but acceptable. Impaq accepts that some of these matters may take longer to resolve and estimates an average time for resolution of 30 minutes.

Impaq accepts PAL forecast of other costs in this category.

6.14.4 Community engagement and education

This activity relates to the engagement of customers following the completion of the Victorian Government Review, expected the end of 2011. PAL has stated that

On completion of the Victorian Government review, it is anticipated the Business will be required to undertake further AMI rollout education programs to regain the confidence of the community in the AMI program.

Impaq is of the view that, at this point in time, this activity is out of scope. If, following the competition of the Government's review, PAL believes it will be necessary for it to incur additional costs then a revised budget application should be made.

6.14.5 Customer Service overheads

PAL has allocated a portion of corporate customer service overhead costs to the AMI program.

"The allocation is made consistent with the Business' Regulatory Accounts for 2009 and 2010. These allocations have been audited and approved by Deloitte as being within the AMI Scope. The amount included in the forecasts is consistent with the allocation for 2009-10."[134]

Impaq provides no comment to the appropriateness of this allocation for 2012 and 2013. However, as there are not costs for the direct activities, even in the PAL amended forecast, for 2014 and 2015, Impaq is of the view that there should be no overhead costs allocated to this category for these years.

Impaq notes, however, that in the PAL templates this allocation is described as 'General Manager' at an annual amount that would equate to about 2 FTE's. Impaq does not believe that the level of activity and responsibility in this category would justify overheads of 2 general managers.

6.15 Communication operations

Table 121 shows the PAL original cost forecast, the AER draft determination and the PAL revised forecast.

Table 121 – Communications Operations

	2012	2013	2014	2015	Total/Average
PAL Initial application	3,082	3,082	3,082	3,083	12,329
Impaq Assessment for Draft determination	1,267	1,267	1,267	1,267	5,067
PAL amended application	1,131	1,131	1,952	1,952	6,166

Impaq considers that the PAL amended application cost for this category is prudent.

[134] Ibid page 116

6.16 Project Management

Table 122 shows the PAL original cost forecast, the AER draft determination, the PAL amended application and the Impaq assessment.

Table 122 – Project Management

	2012	2013	2014	2015	Total
PAL Initial Application	0	0	3,180	2,864	6,044
Impaq Assessment for Draft determination	0	0	690	484	1,174
PAL Amended Application	0	0	3,180	2,864	6,044
Impaq Assessment	0	0	690	484	1,174

PAL maintained its forecast of expensed project management costs in its amended application. However PAL has not provided any expanded or additional justification for these amounts. Consequently, Impaq is of the view that its assessment of this category in its previous report is still valid.

6.17 Executive and corporate office services

Table 123 shows the PAL original cost forecast, the AER draft determination, the PAL amended application and the Impaq assessment.

Table 123 – Executive and Corporate Services[135]

	2012	2013	2014	2015	Total
PAL Initial Application	424	436	638	609	2,170
Impaq Assessment for Draft determination	102	102	382	382	968
PAL Amended Application	424	436	638	609	2,170
Impaq Assessment	320	320	380	365	1,385

PAL has provide a significantly greater level of detail regarding the activities undertaken in 'accounting services' and 'regulatory activities and has clarified that the regulatory component includes more than just 'support for the 2016 – 2020 EDPR' as was indicated in its previous submission.

Impaq has reviewed the data that has been provided by PAL. Impaq has a number of concerns with the analysis, including:

- the time and/or resources required for some of the categories are excessive; and
- not all of the activities are required for the full 2012 to 2015 period, particularly those activities that are related to the rollout.

[135] It is noted that the Impaq assessment of costs for this category is the same for Citipower and PAL. This is because the activities involved are largely not variable with numbers of customers

The areas that Impaq has concern are discussed below.

The forecast of resources should represent the incremental burden on the business and not the stand-alone activity.

6.17.1 Annual budget

PAL has forecast that for PAL and CP, the incremental effort required to prepare the annual budget for the Regulated Services is 3 FTEs for 2.5 weeks each month for 2.5 months, or 18 man weeks. Impaq believes that this is excessive, given that rollout numbers and contract costs are already known. Impaq is of the view that a total of 6 man weeks would be sufficient.

6.17.2 Program reporting – Board, Steering Committee

PAL has stated that this activity will take 1 day per month for 1 FTE. However, in its calculation, PAL has used 1 week per month or 12 man weeks. This should be 2.4 man weeks.

Additionally, this activity is only required until the end of the program.

6.17.3 WIP Clearance

After the rollout, the activity in this area will be significantly reduced.

6.17.4 Annual Regulatory Accounts

PAL has stated that this activity will take 1 month for 2.5 FTEs or 10 man weeks. Impaq notes that this activity should be incremental to the development of the business' regulatory accounts for the Regulated Metering activities only. Impaq believes that 1 month for 1 FTE, or 4 man weeks would be sufficient for both of the businesses, particularly since the preparation of the Annual/Half Year Statutory Accounts, upon which the Regulatory Accounts are based, only takes 6 man weeks.

6.17.5 Provision of support to Regulation

PAL has stated that this activity will take 1 month for 3 FTEs or 12 man weeks. Additionally, PAL has forecast a significant amount of effort in the Regulatory area of this cost category. Impaq believes that much of the effort in this activity is already addressed and that 1 month for 1 FTE will be sufficient.

6.17.6 Financial support to Program, Management Team, Project Managers

PAL has stated that this activity will take 4 days per month for 3 FTEs or 29 man weeks. Impaq accepts this forecast but notes that this activity will only be required until the end of the rollout.

6.17.7 Margin

In its response to further questions, PAL has identified that a margin of about [C-I-C]% has been included. While Impaq makes no comment on the validity of this margin, Impaq has recalculated the margin as [C-I-C]% on its forecast.

6.17.8 Advertising

In its response to further questions, PAL has identified an allocation of corporate advertising costs. Impaq notes that, under 'Customer Service – Customer Interaction and Treatment, (see Section 6.14.2), funds have already been allowed for media activities such as:

- mailing costs;
- development of brochures and other information for customers; and
- media advertising;

Given that direct funding has been provided for media activity, Impaq does not believe that an allocation for advertising is appropriate.

6.17.9 External Audit Fees

PAL has forecast costs for external audit fees. Impaq accepts that this is a required cost. However, in its response to further questions, PAL has indicated that these costs will be increasing each year. Impaq sees no reason why the cost of the internal audit will be increasing in real terms and accepts the forecast for 2012 and applies it for each year.

6.17.10 Miscellaneous Legal Opinion

PAL has forecast costs for miscellaneous legal opinion. Impaq accepts that it is likely that PAL will need to seek legal opinion on matters such as contract terms, regulatory requirements, etc. However, in its response to further questions, PAL has indicated that these costs will be increasing each year. Impaq sees no reason why the cost of the legal fees will be increasing in real terms and accepts the forecast for 2012 and applies it for each year.

6.17.11 EDPR 2016-2020

In its response to further questions, PAL has provided additional information on its forecast of costs for the EDPR 2016-2020 in respect of metering regulated services. Impaq accepts that costs will be incurred in this respect but has the following concerns with the PAL forecast.

- PAL has forecast costs for 2012 and 2013. Impaq does not believe that costs will be incurred for this activity in these years.
- PAL's forecast for 2014 and 2015 are based in the costs that it has currently incurred in respect of this current AMI price review. While Impaq does not dispute the costs the PAL has incurred on this matter, the subject of this review is sole regulated metering and so these costs are totally attributable to metering. However, metering will only be an incremental part of the EDPR 2016-2120 and thus the costs will be incremental,

Impaq believes that no costs will be incurred for 2012 and 2013 and half the costs forecast by PAL for 2014 and 2015 is appropriate.

6.18 IT Opex

Table 124 shows the initial submission, the AER draft determination, the PAL amended submission and the Impaq assessment.

Table 124 – Summary of IT Opex

	2012	2013	2014	2015	Total
PAL Initial Application	9,365	9,485	9,710	9,803	38,364
Impaq Assessment for Draft determination	6,463	6,523	5,277	5,304	23,567
PAL Amended Application	7,332	7,378	6,395	6,427	27,533
Impaq Assessment	7,319	7,281	6,168	6,123	26,892

The Impaq assessment makes only one adjustment to the PAL amended application, which is the removal of the Data Warehouse Opex cost in line with the removal of the Data Warehouse Capex[136].

6.19 Operating Cost Summary

Table 125 – Summary of Operating Costs – revised proposal and Impaq view

	2012	2013	2014	2015	Total
Meter Data Services – Proposal	6,285	4,516	2,896	2,896	16,593
Meter Data Services – Impaq view	2,455	1,212	672	612	4,951
Meter Maintenance – Proposal					0
Meter Maintenance – Impaq view	1,241	343			1,584
Manual meter reading - Proposal	1,401	1,440	1,859	1,890	6,590
Manual meter reading - Impaq view	789	692	914	927	3,322
Customer Service – Proposal	6,113	5,004	1,156	1,199	13,472
Customer Service – Impaq view	5,293	4,492			9,785
Backhaul Communications –Proposal	2,195	3,487	3,564	3,638	12,884
Backhaul Communications – Impaq View	2,195	3,487	3,564	3,638	12,884
Communications operations - Proposal	1,131	1,131	1,952	1,952	6,166
Communications operations – Impaq view	1,131	1,131	1,952	1,952	6,166
Project Management – Proposal	-	-	3,180	2,864	6,044
Project Management – Impaq view	-	-	690	484	1,174

[136] Refer section 6.7.3

	2012	2013	2014	2015	Total
Executive & corporate services – Proposal	424	436	638	609	2,107
Executive & corporate services – Impaq view	291	291	326	326	1,234
Debt raising – Proposal			214	197	411
Debt raising – Impaq view			214	197	411
IT Opex –proposal	7,332	7,378	6,395	6,427	27,532
IT Opex – Impaq View	7,319	7,281	6,168	6,123	26,891
Total – Proposal	24,881	23,392	21,854	21,672	91,802
Total – Impaq view	20,714	18,929	14,500	14,259	68,402

7 SpAusNet

The SPA AMI subsequent period (2012 to 2015) original budget application and amended application are summarised in Table 126 and Table 127.

Table 126 – Original Submission - Summary of Opex and Capex[137]

	2012	2013	2014	2015	Total
Total Operating Expenditure	48,549	40,149	26,441	24,352	139,491
Total Capital Expenditure	171,025	49,081	7,367	3,999	231,472
Total Expenditure	**219,575**	**89,231**	**33,808**	**28,352**	**370,966**

Table 127 –Amended Submission - Summary of Opex and Capex[138]

	2012	2013	2014	2015	Total
Total Operating Expenditure	44,381	42,531	26,678	26,200	139,790
Total Capital Expenditure	169,656	90,527	7,018	3,740	270,941
Total Expenditure	**214,037**	**133,058**	**33,696**	**29,940**	**410,731**

7.1 Concerns with the SPAusNet AMI program

Impaq has concerns with the SPA amended application and its overall AMI program.

7.1.1 Technology concerns

Impaq is entirely agnostic in relation to AMI technology. Impaq has no preference on technologies whether they be WiMAX, 3G, Mesh Radio, Powerline Carrier, PSTN, Fibre Optic, Satellite or any other technology. However, Impaq does consider it prudent for utilities to rollout proven technologies that are also proven to be cost effective. Conversely, Impaq considers it not prudent for utilities to implement unproven technologies that have a high cost structure.

For example, in North America Mesh Radio has now been rolled out to in excess of 30 million customers in the service territories of major utilities including[139]:

- Oncor;
- Centerpoint;
- AEP;
- Southern California Edison;

[137] "SpAusNet AMI subsequent budget and charges application" August 2011 – table E-1, page 12. A detailed breakdown is provided in the SpAusNet budget template spreadsheet (revision 1).
[138] SPA 2011 "Advanced Metering Infrastructure 2012-15 Budget and Charges Application - Draft Determination Response ", – pages 77 to 82.
[139] Refer Appendix A for more detail

- Pacific Gas and Electric;
- Oklahoma Gas and Electric;
- Toronto Hydro; and
- Hydro One.

These AMI implementations are reporting excellent performance and the cost structures are in line with the costs proposed in their cost benefit analyses submitted to their regulators.

The territories covered by these overseas utilities are every bit as complex and varied as that of SPA. Yet SPA does not appear to given thorough consideration to using Mesh Radio despite the cost structure of Mesh Radio being about half of the cost structure of the SPA mixture of WiMAX and 3G. The territory SPA has to cover does have many hills and mountains, but the vast majority of its customers are not sparsely scattered across these hills and mountains , the majority are in towns which are perfectly suitable for mesh radio technologies (or other proven technologies).

Furthermore, Impaq is unaware of any other utility in the world that has rolled out WiMAX for communication to meters, or is committed to rolling out the technology. Appendix A gives a summary of the large number of AMI rollouts around the world. Many utilities have considered WiMAX and decided not to proceed with it – for example Consumers Energy (Michigan) and American Electric Power (Michigan). Ausgrid (NSW) is planning on using WiMAX for 30,000 meters for the Smartgrid SmartCity pilot project, however this is not operational yet. A couple of utilities have used WiMAX for backhaul from Mesh Radio concentrators (Hydro One (Ontario) & Centerpoint (Texas)).

Impaq believes that WiMAX is a technology in decline. All major telecommunications carriers in the world have chosen to go with other 4G technologies (LTE[140]), not WiMAX. The two technologies are not compatible. The next generation of WiMAX is sometimes described as LTE but this is not correct. There are now serious questions about WiMAX's future. Should technical support disappear for WiMAX this would cause major negative cost impacts on SPA and its customers.

7.1.2 Spectrum concerns

The SPA WiMAX system operates in the 2.3GHz radio frequency band. This is a licenced spectrum band. SPA has obtained access to a part of this band through

[140] WiMAX and LTE are similar but not compatible. Both use OFDMA (Orthogonal Frequency Division Multiple Access) and IP based communications. However they are not compatible. Some of the differences are – The uplink is different – LTE uses SC-OFDMA whereas WiMAX uses OFDMA. The spectral data density is different too. The following link explains some of the differences http://images.intomobile.com/wp-content/uploads/2010/05/wimax-lte-4g-mobile-broadband-shootout.jpg

agreements with [C-I-C] and what is now [C-I-C] (the licencee was previously [C-I-C]). The [C-I-C] licence for this 2.3GHz band expires in July 2015. [C-I-C]'s WiMAX internet service has not achieved major uptake except perhaps in Perth. [C-I-C]. Further discussion on this matter is found in Impaq's report to the AER before the Draft Determination.

7.1.3 Performance concerns

The performance of WiMAX in terms of coverage of the SPA customer is poor. Figure 3 which is taken from the SPA Amended application shows the coverage of WiMAX. The blue dots are customers covered by WiMAX and the red dots are customers not covered by WiMAX. This shows that the WiMAX coverage is very poor.

Figure 3 – Areas not covered by WiMAX[141]

[C-I-C]

In its original submission SPA stated that it would require 3G for 10% of its meters to cover areas not reached by WiMAX. In the amended application it states 3G requirements at 10% in some places[142], 15% in other places[143] and in tender documents requires quotations for [C-I-C]%[144] while it states it is planning on using 3G for between [C-I-C]% and [C-I-C]% of its rollout. 3G is a very expensive

[141] SP AusNet submission appendix D AMI 3G RFI, page 81
[142] SPA 2011, page 39.
[143] SPA 2011, page 32.
[144] SPA 2011, – appendices page 669 (of pdf version provided to AER).

technology (in terms of Capex and Opex) and where it has been used for commercial/industrial remote meter reading its performance has been less than startling.

In comparison Powercor is installing mesh radio and is expecting to need less than [C-I-C]% infill with 3G or Satellite communications.

7.1.4 Inability to meet DPI milestones concerns

The SPA amended application outlines a major rework of its AMI program. [C-I-C][145].

SPA undertook a review of its AMI program. In response to questions from the AER[146] SPA provided copies of the slides presented to the SPA AMI executive committee in May. One of these slides is reproduced in Figure 4

Figure 4 – SPA performance to DPI obligations

[C-I-C]

This slide and other information provided with SPA amended application shows that SPA:

[145] SP AusNet response to 2009 2011 questions – page 99 (Appendix A1.1)
[146] SP AusNet response to 2 September 2011 questions on amended application, dated 9 September.

- [C-I-C]
- [C-I-C]
- [C-I-C]
- [C-I-C]

At the SPA AMI executive committee meeting on 19 May 11 it is recorded that[147]

[C-I-C]

7.1.5 Cost concerns

The SPA amended application and the original submission present costs for meters and communications that are well above that of the other DNSPs. Furthermore, the costs have increased markedly in just 6 months.

- The total cost in the amended application is 10% higher than the original submission.
- The total Capex cost has increased 20%.
- The total AMI cost per meter is far higher than any of the other DNSPs.
- 3G technology is known to be expensive and its inadequacies in relation to consistent performance are well known. For example, in the greater than 160MWh market in Australia mobile telephony communications does not have performance levels as good as that required for AMI.

7.1.6 Risk Management concerns

In SPA's original submission in 2009 there was significant emphasis on detailed risk management processes that were in place. Similarly in the initial submission of February 2011 for the subsequent period 2012-2015 there was also much emphasis on risk management. Despite this, the costs of the SPA AMI program have blown out and mandated milestones have been and are going to be missed. Yet SPA continues down a high risk path endeavouring to rollout unproven technology while ignoring other risk mitigation options.

7.1.7 Over emphasis on one performance level

SPA have advised the AER in meetings that WiMAX is the only technology that can meet the DPI load control performance level of 99% in 1 minute. Impaq considers

[147] SPA AMI executive committee meeting minutes for19 May2011 item 2.30

that it is not prudent to countenance a much more costly AMI technology on the basis of this one performance level because:

- The performance level was only introduced into the Victorian Functionality Specification late in its development in 2007 in an attempt to align with an early version of the draft National Specification. At the meetings where it was adopted it was understood that this requirement was a placeholder and relaxation would be considered if it proved too onerous
- SPA had the option of seeking a relaxation of this level from DPI. Other DNSPs have sought that relaxation and it is an item pending resolution with the ISC
- During the development of the National Smart Metering Specification, it was evident in 2009 that a relaxed level of 90% in 5 minutes was the likely outcome and indeed became the requirement. Furthermore the DPI presentation to the National Stakeholder Steering Committee (NSSC) of the National Smart Meter Program (NSMP) in August 2010 advised that Victoria would be seeking to align with the National Specification where appropriate.

7.1.8 Opportunity to change technologies

There is still the opportunity for SPA to change technologies to that which is proven. Impaq is of the view that SPA could change to the mesh radio solution chosen by the other 4 DNSPs and end up with a lower cost solution which has performance which is proven to meet the DPI requirements and has a much lower risk profile.

Impaq has validated that the meters which SPA have installed could have their network cards replaced with mesh radio network cards. Hence the investment in meters would not be lost in such a technology change. The cost to install access points and relays to communicate with these meters is much less than the expenditure SPA is yet to make on WiMAX towers. Furthermore the time taken to do this is only a few months and then using a cloud computing solution available through a mesh radio vendor data could be provided to SPA ready for validation and substitution.

There is the opportunity for another DNSP to assist SPA with AMI back end processing until SPA has its own systems operational.

Impaq emphasises that it is technology agnostic and has no preferences for AMI technology. However Impaq considers that implementing the same mesh radio solution that the other Victorian DNSPs have implemented is prudent because:

- The performance of that mesh radio solution is proven in many utilities
- There are field proven AMI meters available for this technology that meet with Victorian AMI specifications from at least two vendors
- There is the availability of human resources that are skilled in the design, implementation and operation of this mesh radio technology
- There is support available from the other Victorian DNSPs

It is Impaq's view that continuing with the SPA selected technology on the basis of it costing too much and taking too long to change is tantamount to 'throwing good money after bad.'

7.1.9 Submission concerns

Impaq has concerns about the quality of the SPA amended application. The amended application appears to have multiple errors.

- The number of meters to be rolled out to replace existing meters has increased by 15,000 since the original submission. It would be expected that all the DNSPs would know the number of meters they require to replace existing customer meters to a greater accuracy than 15,000.[148]
- The number of meters projected to be required for new customer connections is less than the number of net new customers. That means not enough meters have been forecast for new customers[149].
- There are inconsistent values in some tables compared to other tables[150].
- The submission makes much of having competitive tendering for major equipment items. [C-I-C][151].
- The proportion of 3G meters is variously stated to be 10% and 15% in different places in the document[152]. The 3G tender documents indicate it could be [C-I-C]%.
- It is a large submission – 1365 pages. However the quality of the submission is not high. Pages 295 to 363 are empty apart from random blocks of shading. Pages 363 to 404 contain random information.

7.2Capex – Meter Supply

Impaq in its previous report identified that the metering costs for SPA were over 50% above the commercial standard. SPA, in its amended application, has increased its metering cost forecast by 20% more than the original submission for the rollout period (up to 2013) and over 18% taking into account the full 2012-2015. Refer tables below.

[148] See Table 132 in this document
[149] See Table 135 in this document and the discussion around the table.
[150] SPA 2011, - The tables on pages 63 to 65 are inconsistent.
[151] SPA 2011, appendix B.
[152] SPA 2011, page 32 section 5.1.2.4, compared with page 39 section 5.3.2.1 and page 54.

Table 128 – Original application - Meter Supply Capex[153]

	2012	2013	2014	2015	Total
Meters Contracted	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Other (3G meters)	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Total	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]

Table 129 - Amended application Meter Supply Capex[154]

	2012	2013	2014	2015	Total
Meters Contracted	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Other (3G meters)	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Total	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]

Table 130 – Original application – rollout period

	2012	2013	Total
Meters Contracted	[C-I-C]	[C-I-C]	[C-I-C]
Other (3G meters)	[C-I-C]	[C-I-C]	[C-I-C]
Total	[C-I-C]	[C-I-C]	[C-I-C]

Table 131 – Amended application – rollout period

	2012	2013	Total
Meters Contracted	[C-I-C]	[C-I-C]	[C-I-C]
Other (3G meters)	[C-I-C]	[C-I-C]	[C-I-C]
Total	[C-I-C]	[C-I-C]	[C-I-C]

7.2.1 Meter Volumes

SPA has advised that the number of meters installed in 2011 will be less than proposed in its submission of Feb 2011 and the shortfall will be made up in 2012 and 2013. However, when the original submission volumes for 2011 to 2013 are compared to those in the amended application there is a significant difference. The total volume of meters has increased by 14,977 which is a 2.4% increase. Refer Table 132.

[153] Original submission Budget template, AMI Capex detail tab.
[154] SPA 2011, page 36 table 5.9.

Table 132 – Meter Volumes – Original and amended applications

	2011	2012	2013	Total
SPA Initial Budget Application	**231,990**	**340,715**	**58,668**	**631,373**
SPA Amended Application	**177,521**	**316,329**	**152,500**	**646,350**
Difference				**14,977**

This 14,977 difference in meter numbers is not due to changes in BAU metering volumes for 2012 and 2013 as these have only changed by 20. This difference might indicate errors in metering records or a calculation error.

SPA did not agree[155] with the previous Impaq analysis[156] of metering volumes for BAU metering where Impaq made adjustments to metering volumes to take into account abolishments and meter exchanges.

SPA in its amended application has provided different BAU meter numbers and customer numbers. Refer Table 133.

Table 133 – SPA new and replacement customer/NMI numbers[157]

Meter Configuration	Number of NMIs at end of 2010	Forecast New Connections					
		2011	2012	2013	2014*	2015*	Total
Single phase single element	366,261	10,320	10,630	10,949	11,278	11,616	**421,054**
Single phase single element with contactor	0	0	0	0	1,755	1,773	**3,528**
Single phase two element with contactor	145,015	1,704	1,721	1,738	0	0	**150,178**
Multiphase	80,214	1,522	1,533	1,584	1,616	1,648	**88,117**
Multiphase with contactor	41,978	36	35	35	36	36	**42,156**
Multiphase CT connected	3,711	56	56	57	58	59	**3,998**

[155] SP AusNet revised submission page 31, Abolishments and meter v customer volumes.

[156] Impaq report to the AER in relation to the draft determination – section 7.1.1 pages 116 & 117

[157] SP AusNet revised submission table 5.4 page 32

		Forecast New Connections				
Sub-Total	**637,179**	**13,638**	**13,976**	**14,364**	**14,743**	**15,132**
Combined Total				**709,031**		

SPA has stated that they have confirmed the existing number of customers/NMIs as at 31 December 2010, being 637,179 as shown in Table 133. Impaq considers that this figure appears reasonable. SPA has also provided a forecast of meter numbers required to meet the number of NMIs. Refer Table 134 The increase in meters for net new connection NMIs does not look reasonable.

Table 134 – SPA new and replacement meter numbers[158]

Meter Configuration	No Required AMI Meters at of 2010	Forecast New Connections					
		2011	2012	2013	2014*	2015*	Total
Single phase single element	402,327	10,320	10,630	10,949	9,924	10,222	454,372
Single phase single element with contactor	0	0	0	0	1,545	1,560	3,105
Single phase two element with contactor	145,015	1,704	1,721	1,738	0	0	150,178
Multiphase	80,304	1,522	1,533	1,584	1,422	1,450	87,815
Multiphase with contactor	49,130	36	35	35	31	31	49,299
Multiphase CT connected	3,711	56	56	57	51	52	3,984
Sub-Total	402,327	10,320	10,630	10,949	9,924	10,222	454,372
Combined Total				**748,754**			

When the SPA forecasts of new connection meters and new connection NMIs are analysed there is a significant difference. Table 135 shows the customer numbers given in the EDPR for 2010 and the forecast increase in customer numbers based

[158] SP AusNet revised submission table 5.5 page 33

on that. The table also shows the SPA forecast increase in NMIs as given in the SPA amended application. These NMI increases are in some cases much above the EDPR values. The BAU meter numbers are shown as well – those in the original SPA application of February 2011 and those in the amended application. SPA has advised in the amended application that they have included abolitions in the revised numbers for 2014 and 2015. However it would appear that there is an error here because now the increase in meter numbers for both 2014 & 2015 is only 88% of the net increase in NMIs (customers). This would indicate that at least 12% of new connection customers will not get a meter. Furthermore, SPA has indicated that the meter to customer ratio should be 1.1 to 1 for new connections[159]. For all of the years 2012 to 2015 the meter customer ratio is less than 110%. The SPA forecast meter numbers are therefore incorrect.

Table 135 – Analysis of BAU meter quantities

	2011	2012	2013	2014	2015
Customer Numbers (from EDPR 2010)	633,847	646,034	657,240	667,352	677,204
Increase in customer numbers (NMIs)		12,187	11,206	10,112	9,852
SPA amended application increase in NMIs	13,638	13,796	14,364	14,743	15,132
meter numbers for BAU - Original submission		13,995	14,363	14,743	15,132
meter numbers for BAU - amended application	13,638	13,976	14,364	12,974	13,316
Ration of increase of meters to increase in customer numbers		101%	100%	88%	88%
Post rollout meter to customer ratio		110%	110%	110%	110%

7.2.2 SPA's proposed meter costs

SPA's meter prices in its amended application continue to be significantly above the commercial standard for AMI meters. Table 136 shows the prices proposed by SPA.

[159] Revised submission page 31, 2nd last para

Table 136 – SP AusNet meter prices ($AUD)[160]

METER COMPONENT	METER TYPE	
	WiMAX	**3G**
Single phase single element	[C-I-C]	[C-I-C]
Single phase single element with contactor	[C-I-C]	[C-I-C]
Single phase two element with contactor	[C-I-C]	[C-I-C]
Multiphase	[C-I-C]	[C-I-C]
Multiphase with contactor	[C-I-C]	[C-I-C]
Multiphase CT connected	[C-I-C]	[C-I-C]
Comms module (incl. ZigBee card) for WiMAX	[C-I-C]	[C-I-C]
Comms module (incl. ZigBee card) for 3G	[C-I-C]	[C-I-C]
Antenna	[C-I-C]	[C-I-C]
Extended Antenna	[C-I-C]	[C-I-C]

The prices of meters used for WiMAX or 3G should be the same. The major meter vendors all have meters to which comms cards for WiMAX, SSN mesh, 3G, GPRS etc can be added. There should be no impact on the meter price.

All AMI meters need to have a communications card (which also has a ZigBee Smart Energy Profile radio) and in SPA's case an antenna (to be mounted external to the meter). The cost of the components of an AMI meter have been taken from Table 136 and added to give SPA's AMI meter costs as shown in Table 137. In addition there is a comparison to the costs for AMI meters for PAL[161]. The ratio of SPA prices to that of PAL are shown for each of WiMAX and 3G together with a blended value which assumes 85% WiMAX and 15% 3G.

[160] SPA 2011, table 5.7, page 35.

[161] Powercor budget and charges application – Feb 2011. The Powercor prices have been converted from US$ to AUD$ at rate of **[C-I-C]**

Table 137 – SP AusNet AMI Meter costs

METER COMPONENT	Powercor	SP AusNet AMI Meter prices		Ratio of SP AusNet prices to Powercor's		
	(Mesh Radio) AUD$	WiMAX	3G	WiMAX	3G	WiMAX & 3G Blended
Single phase single element	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]%	[C-I-C]%	[C-I-C]%
Single phase single element with contactor	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]%	[C-I-C]%	[C-I-C]%
Single phase two element with contactor	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]%	[C-I-C]%	[C-I-C]%
Multiphase	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]%	[C-I-C]%	[C-I-C]%
Multiphase with contactor	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]%	[C-I-C]%	[C-I-C]%
Multiphase CT connected	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]%	[C-I-C]%	[C-I-C]%

This demonstrates that the SPA prices are well above the commercial standard. It is noted that single phase meters (the top three rows in the table) represent 80% of SPA's meter fleet. Taking into account the proportions of meter types used by SPA, the overall ratio of SPA prices to PAL's prices is [C-I-C]%.

7.2.3 Prudent meter prices

The SPA meter prices included in the AER's final determination for the initial budget of 2009 to 2011 were more in line with the PAL meter prices. These meter unit prices are shown in Table 138. For example for SPA a single phase single element meter was a total of US$[C-I-C] (including the WiMAX communications module and ZigBee HAN radio) and for PAL a single phase single element meter (including the communications module) is US$[C-I-C].

Table 138 – SpAusNet Meter Unit Costs[162] - initial budget determination

Meter type	Meter Cost[163] (US$)	Comms Module Cost (US$)	AMI Meter Unit Cost (US$)	Powercor Prices (US$)
Single Phase single element	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Single Phase two element	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]

[162] Costs taken from SpAusNet Revised Budget Application dated 28 February 2011, table 8.3, page 38 –budgeted unit costs per L&G meter per the Approved Budget.

[163] The SpAusNet Landis and Gyr contract explicitly states that the prices are fixed for the term of the contract (and there are provisions to allow extensions).

Meter type	Meter Cost[163] (US$)	Comms Module Cost (US$)	AMI Meter Unit Cost (US$)	Powercor Prices (US$)
Multiphase	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Multiphase Direct connected with contactor	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Multiphase Current Transformer connected	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]

Hence it is Impaq's view that the commercial standard for AMI meter pricing was that proposed by SPA in 2009 or that of PAL's current pricing.

7.2.4 Proposed Metering Capital Expenditure

Impaq has validated that the total meter Capex costs shown in Table 139 from the SPA amended application equates approximately to the meter volumes detailed in the previous section multiplied by the meter prices proposed by SPA.

Table 139 – Metering Capex[164]

	2012	2013	2014	2015	Total
Meters contracted	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Other (3G meters)	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Total	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]

7.2.5 Impaq Assessment of WiMAX meter costs

As indicated above, Impaq considers that the SPA meter costs in its amended application to be above that which is the commercial standard for AMI meters (including communications). Further, it is Impaq's view that SPA did not competitively tender for AMI meters and communications as it excluded Mesh Radio and other AMI technologies that have been successfully implemented by all the other Victorian DNSPs and many overseas Utilities.

Because of the above, Impaq has used the PAL unit meter costs[165] as the commercial standard in making its cost assessment. These meter unit costs (in US$) are similar to those approved by the AER for SPA in its final decision in 2009. It is noted that these meter unit costs do not include an external antenna. The other DNSPs have external antennae for 5% to 10% of meter installations. Despite this,

[164] SPA 2011, , page 36.

[165] The Powercor meter unit costs include an AMI communications module which also has ZigBee HAN interface.

Impaq has included the cost of an external antenna for all SPA meters at a cost of $[C-I-C] as shown in Table 136[166].

7.2.6 Impaq assessment of 3G meter costs

In SPA's original submission it stated that a secondary communications network is required to cover about 10% of the customer base[167]. This secondary network is to utilise the Telstra 3G (Next G) network. The amended application in some places indicates it is 10% and other places between 15% and [C-I-C]% of meters will require 3G meters. If WiMAX were such a good communications technology it would not need such a high level of infill of a secondary technology. PAL in their amended application has also indicated that it will be requiring 3G communications for a small proportion of meters (of the order of [C-I-C]% to [C-I-C]%). Impaq considers that even 10% infill is too high, but has used this for its estimate of a prudent cost. .

Impaq considers that its previous estimate for 3G metering costs is still valid and these are shown in Table 140.

Table 140 – Next G Meter cost

Meter type	Base interval meter (US$)	Next G Comms card (US$)	ZigBee (US$)	Total (US$)
Single phase, single element	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Single phase, two element with contactor	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Multi phase	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Multi phase, with contactor	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Multi phase current transformer connected	[C-I-C]	[C-I-C]	[C-I-C][168]	[C-I-C]

The base interval meter costs reflect other DNSPs' costs of a meter that will support the Victorian Functionality specification, excluding the communications.

The Next G communications card cost is the cost of a single band 850MHz 3G modem which is suitable of use in AMI meters[169]. The Telstra Next G network uses the 850MHz band. There are 3G modems which are quad band at about US$250 in reasonable volume; however the extra 3 bands are redundant if Telstra Next G is used. The cost of the ZigBee module is also included.

[166] SpAusNet's revised budget application, page 39, states that the cost of the antenna was previously included in the communications Capex cost.
[167] SP AusNet budget and charges application, section 5.3.3, page 57.
[168] ZigBee HAN interface is not required for CT connected meters in the VIC Functionality Specification
[169] Pricing from meter vendors

7.2.7 Impaq assessment on meter supply Capex

Impaq has assessed the US$ meter supply cost based on:

- revised volumes of meters given in the SPA amended application[170];
- 90% of meters with WiMAX - unit costs as given for Powercor in Table 138 (plus antenna cost of US$[C-I-C]); and
- 10% of meters with Next G communications – unit costs as given in Table 140 (plus antenna cost of US$[C-I-C]).

The resulting total meter supply cost is as shown in Table 141.

Table 141 – Impaq calculation of meter supply cost

US$, 000 – real 2011	2012	2013	2014	2015	Total
Impaq Assessment	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]

Exchange rate impacts

SPA has indicated that it has US$ foreign exchange hedge contracts in place at an average hedge rate of [C-I-C] and that therefore sets the exchange rate for the 2012 to 2015 period. SPA has listed its foreign exchange hedge contracts to a total value of US$[C-I-C]M[171].

In response to AER questions SPA provided an table showing the expenses paid through to end of August using the FX hedge contracts. Refer Table 142. Based on the revised budget application the projected value of meters and comms cards through to the end of 2011 will be AUD$[C-I-C]M[172] which is US$[C-I-C]M. Together with the other items in Table 142 a total of US$[C-I-C]M of the US$ hedge contracts are expected to have been used by the end of 2011.

Table 142 – SPA expenses paid using FX hedge contracts[173]

Volume US$M	Supplier	Items
[C-I-C]	[C-I-C]	[C-I-C]
[C-I-C]	[C-I-C]	[C-I-C]
[C-I-C]	[C-I-C]	[C-I-C]
[C-I-C]	[C-I-C]	[C-I-C]
[C-I-C]	[C-I-C]	[C-I-C]
[C-I-C]	[C-I-C]	[C-I-C]

[170] Revised Budget application of August 2011, page 36 table 5.8
[171] Revised Budget application of August 2011, page 72
[172] Revised submission, tables 8.1 and 8.2 pages 77 and 78
[173] SPA response to 02092011 questions – table 6.2 page 14

Over 2012-2015 the Impaq assessment of AMI meter purchase costs is US$[C-I-C]M of which US$[C-I-C]M will be drawn from the hedge contract and US$[C-I-C]M at current US$ rates. This gives an effective blended rate over the period of [C-I-C]. This is the rate that Impaq has used in making its assessment of meter costs.

Table 143 compares these calculated meter supply costs against the meter supply costs in the SPA amended application.

Table 143 – SpAusNet submission compared with Impaq Assessment

	2012	2013	2014	2015	Total
SPA Initial Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq Assessment of initial application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
SPA Amended Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq Assessment	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]

7.3Capex – Meter Installation cost.

The SPA amended application has less than two pages of detail and explanation of meter installation costs. SPA has not responded to most of what Impaq presented on meter installation costs in relation to the draft determination. Table 144 shows the SPA revised proposal for meter installation costs.

Table 144 – Revised proposal for meter installation costs[174]

	2012	2013	2014	2015	Total
Meter installation*	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
New Customer – antenna and comms module installation	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Total Amended proposal	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Revised proposal[175]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Initial proposal	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]

The amended application is an increase of 20.3% over the initial proposal. However the number of meters in the revised proposal has only increased by 15.3% as shown in Table 145.

[174] SPA AMI revised budget application –draft determination response page 38 table 5.10

[175] SPA attachment B – SPAusNet Budget – second AMI budget period (26 August 2011) – revised – AMI Capex detail tab

Table 145 – Increase in meter volumes CIC

	2012	2013	2014	2015	Total
SPA Initial Budget Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
SPA Amended Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Increase					15.3%

There are also some anomalies in this area of the amended application. In 2013 the installation cost for just antennas and comms modules for new customers is $[C-I-C]M. The number of new customer installations in 2013 forecast by SPA is 14,364[176]. This is $[C-I-C] per meter just to install the communications card (which is normally already installed in the meter as supplied) and the antenna. This is excessive and far from prudent.

The SPA amended application maintains the position of the initial application that the average installation unit cost is $[C-I-C]. Impaq considers this excessive. As outlined in Impaq's previous report to the AER, the other DNSPs have total installation costs that are of the order of half that proposed by SPA.

The typical installation time for an AMI meter is around 8 to 15 minutes[177].with many installations taking less than 10 minutes. Impaq has witnessed installations taking this time and it is noted that the ESV reported AMI installations occurring in less than 10 minutes that meet the appropriate safety requirements. Hence SPA's proposed average costs of $[C-I-C] for an installation would translate to an hourly cost of $[C-I-C] when charge-out rates for this sort of work is around $[C-I-C] per hour. Hence the SPA unit installation rate is not prudent.

In relation to meter installation for new connections (which is a cost to be recovered through Alternative Control Services) SPA have also stated that the "*installation cost of the antenna and communications module … is not recoverable from the customer*". Impaq does not accept this statement as the National Electricity Rules (NER) definition of a metering installation[178] includes those items and therefore they are part of installing a meter at a customer premises.

> "The assembly of components including the *instrument transformer*, if any, measurement element(s) and processes, if any, recording and display equipment, *communications interface*, if any, that are controlled for the purpose of metrology and which lie between the *metering point(s)* and the point at or near the *metering point(s)* where the *energy data* is made available for collection."

[176] Revised submission page 33 table 5.5 and table 5.4 page 32

[177] The Energy Safe Victoria review of smart metering installations (Final Report on safety aspects of the Victorian Advanced Metering Infrastructure (AMI) Program Meter Deployment Activities) refers to installations in accordance with safe processes occurring in "about 10 minutes" page 4, "often less than 10 minutes" – p28,

[178] NER Chapter 10 Glossary – metering installation definition

Accordingly, Impaq has not changed its assessment of unit meter installation costs from its prior report, although the total assessed cost has increased because of increases in meter numbers. Table 146 shows the SPA proposals and the Impaq assessments.

Table 146 – Installation costs Impaq assessment

	2012	2013	2014	2015	Total
SPA Initial Budget Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq Assessment of initial application	22,070	2,832			24,901
SPA Amended Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq Assessment	21,368]	9,746	0	0	31,114

7.4Capex - Information Technology

The IT Capex proposed by SPA is shown in Table 147.

Table 147 – IT Capex

	2012	2013	2014	2015	Total
SPA Initial Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq Assessment of initial application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
SPA Amended Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq Assessment	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]

In just 6 months SPA has increased its proposed IT Capex by 60%. It is Impaq's view that the SPA situation in relation to IT systems was entirely foreseeable. The requirements of the systems were all known at the beginning of the project in 2008/9. SPA chose to implement unproven technology sourced from a small startup business with no track record of implementing large scale AMI systems. The risk profile of this decision should rest with SPA and its shareholders and not the Victorian electricity customers. Impaq does not consider the IT Capex cost increases that SPA is seeking to be prudent.

7.5Capex - Communications

Table 148 details the amended communications Capex proposed by SPA, including both the supply of the equipment and the installation cost.

Table 148 – Capex for communications

	2012	2013	2014	2015	Total
SPA Initial Budget Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq Assessment of initial application	8,215	5,743	1,117	-	15,075
SPA Amended Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq Assessment	8,215	5,743	1,117	-	15,075

Figure 5 shows a map of the SPA territory and the NMIs that are covered by WiMAX (in blue) and those that are not covered by WiMAX (in red). It is not prudent for such a large capital expenditure for communications Capex for a WiMAX network that gives so little coverage of the customer base. Other technologies offer far higher coverage at far lower cost.

Figure 5 – Areas not covered by WiMAX[179]

[C-I-C]

[179] SP AusNet submission appendix D AMI 3G RFI, page 81

Based on the information provided by SPA, Impaq has not changed its view on this expenditure. Impaq considers the level of expenditure proposed is excessive, is not prudent and is well above a commercial standard.

7.6 Capex Summary

Table 149 summarises the SPA revised Capex proposal and the Impaq assessments of prudent Capex.

Table 149 – Capex Summary

	2012	2013	2014	2015	Total
Meter Supply - proposal	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Meter Supply - Impaq view	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Meter Installation - proposal	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Metering installation - Impaq view	21,368	9,746	0	0	31,114
IT Capex - Proposal	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
IT Capex - Impaq view	10,761	6,914	0	0	17,675
Comms Capex - Proposal	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Comms Capex - Impaq view	9,237	4,442	1,061	1	14,741
Total - proposal	169,654	90,525	7,017	3,740	270,940
Total - Impaq view	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]

7.7 Operating Expenditure

Table 150 shows the summary of all the categories of Operating Expenditure proposed by SPA.

Table 150 – Summary of Amended Operating Expenditure Forecast[180]

	2012	2013	2014	2015	Total
Meter Reading	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Meter Data Management	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Meter maintenance	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Customer Service	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Communication infrastructure maintenance	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
3G Meter trial	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Project Management	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]

[180] From SpAusNet budget template, tab - AMI O&M Detail

	2012	2013	2014	2015	Total
AMIPO and AMI ISC costs	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Audit and quality assurance	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
AMI budget and charges applications	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Equity raising costs	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Management fees or overhead	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Extra Accommodation Cost	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
IT Opex	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Total of above items	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
SPA amended application Opex total	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]

It is noted that the total of each of Opex items is more than the SPA amended application total Opex.

The cost of many of these items is heavily affected by human resources costs. Where human resource costs are involved the Impaq view has been established based on the assumptions in section 3.4.2.

These categories of Opex are considered in turn in the following sections. Where the AER has accepted an item of expenditure in the draft determination and the SPA has not changed its original forecast, Impaq has made no comment on that item.

7.8Meter data management

Table 151 shows SPA's original proposal, the AER Draft Determination, the amended application from SPA and the Impaq Assessment.

Table 151 – Meter Data Management

	2012	2013	2014	2015	Total
SPA Initial Budget Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq Assessment of initial application	396	396	309	309	1,410
SPA Amended Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq Assessment	3,031	1,667	714	734	6,146

SPA's amended application provides little further information on this cost category. SPA disagrees with the AER's draft determination:

SP AusNet believes the AER has erred in the calculation of meter data management costs by not allowing for the management of the existing but declining fleet of accumulation data at the same costs currently incurred. SP AusNet also believes Impaq consulting, on whom the AER rely, have failed to

allow for data storage of accumulation data storage and management to required levels.

The amended application includes the following table showing a breakdown of the SPA cost forecast.

Table 152 – SPA Meter data Management forecast[181]

	2012	2013	2014	2015	Total
Special Meter Reading Costs	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Faults	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Data Exceptions	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Team leading and support	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Total	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]

In relation to the first item, Special Meter Reading is an Alternative Control Service and the costs are recovered directly from customers. Hence this cost item is out of scope.

In relation to faults, meter faults are expected to be at the rate of about 0.25% per annum. For the SPA meter fleet (once fully rolled) this equates to 1630 meters per annum. For meters with faults, substitution of meter data will be required which is to be done according to the AEMO procedure. For 2014 to 2015 this would mean a cost of about $1000 per meter to do a semi-automated process. This is clearly excessive. It would be expected that such substitutions would take between 5 minutes and 15 minutes to manage through an MDMS and CIS. At 15 minutes the cost is about $25 per fault substitution (assuming an effective rate of $100 per hour (fully absorbed cost)). This reduces this cost item to about $40,000 per annum for 2014 and 2015.

In relation to data exceptions, Impaq, through the AER, asked SPA in April 2011 to explain the high cost of exceptions considering that it was expected that this would be an automated process. The SPA response[182] was:

[C-I-C]

[C-I-C]

[181] SP AusNet revised budget application page48, table 6.2

[182] SpAusNet reply to AER questions of 11 April, 2011

Table 153 – *SpAusNet response - Breakdown of forecast meter cost (real 2011 $)*

	2015
No. of meters	[C-I-C]
Expected % of read exceptions	[C-I-C]
Estimated no. of exceptions	[C-I-C]
1 FTE's work days per year	[C-I-C]
*Exceptions per day per FTE **	[C-I-C]
*FTE required **	[C-I-C]
Salary per FTE (including supervisor and OH costs)	[C-I-C]
Budgeted cost	[C-I-C]

That SPA expects to have a [C-I-C]% exception level on meter reads after systems are bedded down is a concern. In the Functionality Specification the performance levels required[183] for daily reading[184] are 99% by 4 hours after midnight and 99.9% within 24 hours. Hence it is required that 99.9% of the data delivered to the NMS from meters will be correct data. This performance level would not be met with a [C-I-C]% exception level.

Given the performance level requirements, the vast majority, if not all, of the processing of the data, including validation, estimation and substitution should be automated. The NEM procedures for validation and substitution provide rules for undertaking this activity which should be implemented as automatic functions in the MDMS. It is expected that 99.9% of data will be correct and complete when delivered to the NMS from meters and based on SPA having 730,000 meters; this equates to an error rate of 35,040 data points per day. The vast majority of these errors will be addressed using standard and automated algorithms. Impaq assumes that at least 99% of the data points will be corrected by the MDMS, leaving 350 data points, or 7.3 meters, that may involve manual intervention per day.

Hence Impaq considers that the SPA forecast is excessive and not prudent.

Because of the lack of detailed information on SPA's meter data processing requirements, Impaq has pro-rated the PAL Impaq assessment to give the Impaq assessment in Table 151

7.9Meter maintenance

Table 154 shows SPA's original proposal, the AER Draft Determination, the amended application from SPA and the Impaq Assessment.

[183] AMI minimum functionality specification (Victoria) – Sept 2008 Release 1.1, clause 4.1

[184] Daily reading is required from 1 Jan 2012 as per the Minimum Service Levels specification Sept 2008 Release 1.1 clause 4.3

Table 154 – Meter maintenance cost

	2012	2013	2014	2015	Total
SPA Initial Budget Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq Assessment of initial application	538	538	689	689	2,454
SPA Amended Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq Assessment	486	628	783	783	2,679

SPA has provided some information in relation to the makeup of its amended cost forecast, which is shown in Table 155

Table 155 – SP AusNet Meter maintenance proposal

	2012	2013	2014	2015	Total
Usual maintenance (BAU meter)	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Usual maintenance (AMI meter)	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Annual compliance audit/inspection	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Batch testing	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Total	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]

Each of these items is discussed in turn.

7.9.1 Usual maintenance (BAU Meter)

Impaq does not consider that there will be this level of maintenance required on the legacy metering fleet. Meters are very reliable devices and hence there does not need to be a large allowance for replacing them. Furthermore, SPA will have many good meters removed from other premises which can be used to replace the odd meter here and there that fails. The only cost then is the installation cost, which should be quite small. A larger issue is that of resetting time switches and reprogramming electronic meters. An allowance has been made for this.

7.9.2 Usual Maintenance (AMI meter)

This item is not substantiated. AMI meters will be under warranty and it will be only those very very few meters damaged by lightning, HV injection or similar which will not be covered by warranty. The cost of meters and installation for these replacements is a capital expenditure item. Hence this item is not considered prudent.

7.9.3 Annual Compliance audit/inspection

SPA intends to inspect each meter in each premise once a year. The SPA concern is that without meter readers visiting sites, metering installations may be tampered with. Impaq does not believe this is necessary as AMI meters have tamper detection to remotely alarm when a tamper of metering occurs. Further, tampering of a metering installation is not necessarily obvious to someone inspecting. For example, bypassing of the meter can be done behind the metering panel. With AMI meters, bypassing is better found by using analytical techniques on interval data.

7.9.4 Batch testing

The value ascribed to batch testing is too little to perform the required code compliance testing of meters in the field. Impaq has made a bottom up assessment of these costs.

7.9.5 Impaq Assessment

Impaq has refined its previous bottom up analysis. Impaq has been able to source commercial pricing[185] for field code compliance testing of meters in accordance with the requirements of the NER and the AEMO Metrology Procedure. This has resulted in a reduction in the cost for code compliance testing of meters. The cost assessment is shown in Table 156. The explanation of this table is given in the previous Impaq report[186].

Table 156 – Meter testing numbers and costs

	Meter numbers [187]	No of families	Meter per family	Sample Size	Meters to be tested	Testing cost ($)	Annual test Cost($)
Single Phase single element	354,330	12	29,528	315	3780	60	56,700
Single Phase two element with contactor	172,094	8	21,512	315	2520	60	37,800
3 Phase Direct Connect	77,645	4	19,411	315	1260	102	32,130
3 Phase direct connect with contactor	43,119	2	21,560	315	630	102	16,065
Total	650,955	26	25,037		8190		142,695

Since its previous report, some items have been added to Impaq's assessment of meter maintenance costs. These are:

[185] Pricing from Formway Metering - www.formway.com.au/groupmetering/Home.aspx
[186] Impaq review of AMI submissions, 20 July 2011, section 7.9
[187] SPA 2011, Table 3.1, page 25 – meter quantities at end of 2011.

- field downloads and resets – this covers the circumstance where meters needs reconfiguring manually in the field. This is not expected to be a large item as normally reconfiguration is done remotely; and
- MPB audit fees – the DNSPs are Meter Providers as per the NER and are required to be audited.

Table 157 gives a summary of the Impaq assessment of meter maintenance costs. It is noted that meter testing (code compliance) does not need to start until 2013 as SPA's first AMI meters were installed in 2010. CT meter testing does not need to start until 2014 as SPA will not be installing CT meters until 2012. The staff allowance has been increased since the previous report to allow more resource to manage the meter maintenance activities and also to allow involvement in metering standards activities and other stakeholder and regulatory activities.

Table 157 – Summary of meter maintenance costs

	2012	2013	2014	2015	Total
Meter testing		143	143	143	428
CT meter testing			154	154	309
CT testing	137	137	137	137	546
Unmetered supplies audit	15	15	15	15	60
Staff	304	304	304	304	1,216
Field - download and reset	20	20	20	20	80
MPB audit fee	10	10	10	10	40
Total	486	628	783	783	2,679

7.10 Customer service

Table 158 shows SPA's original proposal, the AER Draft Determination, the amended application from SPA and the Impaq assessment.

Table 158 – Customer Service Costs

	2012	2013	2014	2015	Total
SPA Initial Budget Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq Assessment of initial application	999	103	103	10	1,215
SPA Amended Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq Assessment	999	103	103	10	1,215

SPA has provided little information to substantiate the forecast expenditure in this category. The amended application forecast is broken down into four categories as shown in Table 159.

Table 159 – Revised SP AusNet customer service forecast[188]

	2012	2013	2014	2015	Total
Customer Queries Handling	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Customer Complaints Handling	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Customer Claims Handling	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Training & Telephone Hand Sets	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Total	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]

SPA has also provided graphs of the number of customer enquiries and complaints. This shows enquiries at July being [C-I-C]% and complaints at [C-I-C]%. This is somewhat above the average across the industry as reported at the ISC. The figures for July[189] were enquiries at 30% and complaints at 7.8%.

The level of enquires and complaints in July were quite high and well above the average for the program to date. This also coincided with much media publicity around the Victorian Government review of the AMI program and other related matters. Given that the results of the Government review will be announced later this year it would be expected that the level of angst in the community will reduce for 2012 and 2013.

In the absence of detailed modelling of customer service costs from SPA, Impaq considers that its previous assessment is still valid.

7.11 Communication infrastructure maintenance

Table 160 shows SPA's original proposal, the Impaq Assessment of initial application, the amended application from SPA and the Impaq assessment. Impaq has included the costs of backhaul into this category.

Table 160 – Communications infrastructure maintenance cost

	2012	2013	2014	2015	Total
SPA Initial Budget Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq Assessment of initial application	600	600	600	600	2,400
SPA Amended Application[190]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
SPA Amended revised[191]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]

[188] Revised submission page 51, table 6.5
[189] ISC July AMI implementation dashboard
[190] SPA revised budget submission – draft determination response, page 55 table 6.7
[191] SPA attachment B – SPAusNet Budget – second AMI budget period (26 August 2011) – revised – AMI – AMI O&M detail tab

	2012	2013	2014	2015	Total
Impaq Assessment	4,750	4,750	4,750	4,750	19,000

SPA has stated that the increase in this cost category is because of costs that were previously in IT Opex that have been moved to this category. The proposed costs in this category have increased from $[C-I-C]M to $[C-I-C]M, an increase of $[C-I-C]M. The IT Opex proposed cost has reduced from $[C-I-C]M to $[C-I-C]M a reduction of $[C-I-C]M. Hence the cost shifting still results in an overall increase of $[C-I-C]M.

The title for this cost category as "communications infrastructure maintenance" is only a part of the scope of costs now proposed by SPA as shown in Table 161. It is perhaps better described now as "communications operations and maintenance".

Table 161 – Revised proposal communications cost itemisation[192]

	2012	2013	2014	2015	Total
Communications Charges	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Security	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Network Maintenance	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Other	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Site Leases	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Communications Labour	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Backhaul communications	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Total	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]

SPA believes the draft determination did not take into account the following considerations[193]:

- *To achieve the mandated 99% availability for all hardware and software a support and maintenance contract is required with each equipment vendor. These contracts provide assurance that any faults, bugs or service incidents should be resolved within an agreed period, subject to the priority of the incident. It is generally accepted that vendors will not respond in any timely manner to support incidents without an annual support contract.*
- *Given the 99% availability requirement an operational support team is required 24x7. This requires resources be scheduled across 3 shifts with appropriate back-up resources in the case of major incidents or unavailability of staff.*

[192] This table is a merger of two tables in the SP AusNet revised budget application – table 6.7 (page 55) and table 6.8 page 57.
[193] SP AusNet revised application, page 52

- *Given the geographical distribution of WiMAX sites, a number of depots throughout the SP AusNet region is (sic) required for field engineering resources with access to critical spares.*
- *SP AusNet has invested in Network Management systems to provide monitoring and alerting capabilities. Whilst these toolsets automate some maintenance and management tasks, skilled resources are still required to interpret and respond to alerts to ensure the network has 99% availability. SP AusNet believes the support organisation is of an appropriate size given access to essential support tools.*
- *To maximise WiMAX coverage the towers typically need to be in high density locations which generally have limited availability of land. Where possible SP AusNet is leveraging its power distribution assets to provide locations for WiMAX towers or entering into commercial agreements to install WiMAX towers on third party property (e.g. local councils for statutory authorities). In both situations site lease costs must be incurred at market rates. SP AusNet has forecast the costs for 106 sites based on the weighted average of existing lease costs across 11 sites.*

Given the difficulty in maintaining the 99% availability it would be expected that SPA would have given a high weighting to self-healing communications as a requirement at the technology evaluation stage. Other technologies are available which do have self-healing communications and redundant communications paths to deal with the availability issues that SPA has highlighted, but without the high cost structure.

Impaq Assessment

The revised proposal from SPA for this item is in essence Communications Network Operations and Maintenance. SPA has not provided sufficient information to analyse its costs in detail. At a macro level the equivalent costs from PAL is a commercial standard. The total cost of communications operation, maintenance and backhaul for PAL is $[C-I-C]M over 2012 to 2015. Impaq considers this a commercial standard and a prudent cost.

7.12 Technology trial

This item was not in the SPA initial budget application. Table 162 shows SPA's cost forecast in its amended application and the Impaq Assessment.

Table 162 – 3G Technology trial costs

	2012	2013	2014	2015	Total
SPA Amended Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq Assessment	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]

In response to questions from the AER[194], SPA provided more information on the nature of the proposed trials.

[C-I-C]

The trial cost is for 1000 meters over a 4 to 6 week period. The trial scope is:

- 1. Solution Scalability Confirmation;
- 2. Capability Validation;
- 3. Functional Specification; and
- 4. Geographical Impact on performance.

Impaq considers that it is important to validate the meter to MMS capability before rollout. Although Impaq considers this should be a capital cost rather than an operating cost, it is considered prudent.

7.13 Project management

Table 163 shows SPA's initial application, the Impaq Assessment of the initial application, the amended application from SPA and the Impaq assessment. The SPA amended application for this category also includes "Meter Services"[195].

Table 163 – Project Management

	2012	2013	2014	2015	Total
SPA Initial Budget Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq Assessment of initial application	1,582	1,257	679	0	3,518
SPA Amended Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq Assessment	9,891	6,973	0	0	16,866

SPA has provided more information on what this cost category comprises. Whereas in reviewing the original submission Impaq was of the view that this covered the costs of program and project management, the SPA amended application shows that this category comprises much of the project team including those resources that undertake the design and deployment of AMI – that is much of the doing of the project work, not just the project management. Table 164 gives the nature and number of the resources in the SPA amended application.

[194] SP AusNet response to 2 Sept 2011 questions, page 26
[195] SPA AMI revised budget application – draft determination response – page 65, table 6.13

Table 164 – SP AusNet PMO resource numbers forecast[196]

	2012	2013	2014	2015
AMIPMO General	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
AMIPMO Finance	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
AMIPMO Change Management	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
AMIPMO Customer Services	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
AMIPMO Supplier Management	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
AMIPMO Sourcing	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
AMIPMO Solution	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Service Operations	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Meter Deployment	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Meter Data Management	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Sub Total PMO	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Meter Services	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Total	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]

It is noted that there are resources for the project in years 2014 and 2015. The rollout should be complete by the end of 2014 and there should be no ongoing project costs. Table 165 shows the SPA forecast of PMO resources as given in the original submission in February 2011.

Table 165 – Original submission PMO resource numbers forecast

	2012	2013	2014	2015
Solution	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Meter & Communications	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Testing	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Operations	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Business Transformation	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
PMO	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Total	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]

It is noted that:

[196] SPA 2001, page 63, table 6.11.

- the resource numbers in 2012 have increased from [C-I-C] to [C-I-C];
- the number of resources across all years has increased from [C-I-C] ([C-I-C] in 2012 and [C-I-C] in 2013) to [C-I-C] – an increase of 70%; and
- the forecast cost over the 4 year period has reduced from $[C-I-C]M to $[C-I-C]M.

It is remarkable that SPA's forecast of resource level should increase by such a large percentage in just 6 months between the original and revised submissions.

Table 166 is taken from the SPA amended application and shows the average FTE cost.

Table 166 – Amended application average PMO FTE cost[197]

	2012	2013	2014	2015
AMIPMO General	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
AMIPMO Finance	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
AMIPMO Change Management	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
AMIPMO Customer Services	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
AMIPMO Supplier Management	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
AMIPMO Sourcing	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
AMIPMO Regulatory Info Support	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
AMIPMO Solution	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Service Operations	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Meter Deployment	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Meter Data Management support	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Sub Total PMO	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Meter Services	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Total	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]

The average FTE cost includes some remarkable numbers. AMIPMO solution FTEs average at $[C-I-C]. AMIPMO sourcing FTEs at $[C-I-C]. These salary costs are excessive in the extreme. The overall average is $[C-I-C]. It would be expected that the salary costs of the resources listed would be in the range of $[C-I-C] to $[C-I-C] per annum based on salary surveys[198]. On-costs should be between 18% and 30% as outlined in section 3.4.2. With an average salary cost of $[C-I-C] pa and on-costs of 30% and accommodation costs gives an FTE cost of about $[C-I-C] pa. Hence the FTE costs aappear to be about 20% too high.

[197] SPA 2001, page 63, table 6.12.
[198] Eg: http://projectmanager.com.au/news/project-management-salary-review00023.html

The total PMO forecast costs for each item are given in Table 167.

Table 167 – Total PMO forecast costs[199]

	2012	2013	2014	2015
AMIPMO General	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
AMIPMO Finance	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
AMIPMO Change Management	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
AMIPMO Customer Services	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
AMIPMO Supplier Management	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
AMIPMO Sourcing	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
AMIPMO Regulatory Info Support	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
AMIPMO Solution	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Service Operations	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Meter Deployment	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Meter Data Management support	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Additional costs (training, recruitment, communication etc)	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Sub Total PMO	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Meter Services	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Total	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]

It is noted that:

- the list of items has expanded from that in previous tables – there are now two extra items:
    - AMI PMO Regulatory info support; and
    - Additional costs (training, recruitment, communication etc): and
- the values in most of these items do not correlate with the number of FTEs times the average FTE costs. eg: AMIPMMO solution with 2 FTEs and a cost of $[C-I-C] does not give an average FTE cost of $[C-I-C], but rather $[C-I-C] (which is still an excessive value).

SPA has provided some detailed qualitative information on the various items that comprise this category. However much of the activities for these items should be completed before 2012: For example:

- supplier management and sourcing – refers to developing a sourcing strategy. This should have been completed about 2 years ago;

[199] SPA 2001, page 65, table 6.13.

- service operation - design and deploy communications infrastructure – the design part should have happened well before 2012;
- service operation - design and deploy backhaul solution – again the design should have happened well before 2012; and
- service operation - design and expand WAN network.

Impaq Assessment

In the absence of an SPA detailed model of costs, Impaq has made an assessment based on high level analysis. This has:

- removed the costs in 2014 and 2015 as being not appropriate as project costs for a project that finishes in 2013; and
- reduced the costs in years 2012 and 2013 by 30% because the overhead levels in the FTE costs were too high by at least 20% and the design activities of the project should have been completed (assumed to be about 10% of the costs).

7.14 Management fees or overhead

Table 168 shows the SPA cost forecast for Management Fees and Overheads.

Table 168 – Management fees or overheads

	2012	2013	2014	2015	Total
SPA Initial Budget Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq Assessment of initial application	516	350	271	270	1,407
SPA Amended Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq Assessment	516	350	271	270	1,407

SPA's amended application provides only the following table as support for its forecast cost.

Table 169 – Overheads forecast[200]

	2012	2013	2014	2015	Total
Accommodation	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Management Costs (SPIMS)	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Indirect Overhead Costs (SPA)	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Total overheads & Accommodation	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]

[200] SPA 2011, page 67 table 6.17.

The accommodation cost was accepted in the AER draft determination. In relation to the other two items (which total to the SPA proposal values in Table 168), nothing has come to Impaq's attention to indicate that the assessment in the draft determination is not valid.

7.15 IT Opex

The SPA IT Opex component of its amended application is summarised in Table 170.

Table 170 – Proposed IT Opex

	2012	2013	2014	2015	Total
SPA Initial Budget Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq Assessment of initial application	6,463	6,523	5,276	5,304	23,566
SPA Amended Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq Assessment	6,000	8,000	7,000	6,000	27,000

SPA's amended application for IT Opex is significantly reduced because $[C-I-C]M of this has been transferred to the Opex category "Communications Infrastructure Maintenance" – refer section 7.11. The amended proposal includes only 1.5 pages of information on IT Opex and there is very little substantiation for this major cost. Table 171 is taken from the amended application.

Table 171 – IT Opex categories[201]

	2012	2013	2014	2015	Total
Field Mobility	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
RTS MMS and CNMS	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
IT Support – Application Services, Managed Services, End User Services	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
IT Support – Other (licences and overheads)	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Total	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]

Based on the little information given, Impaq does not consider the Field Mobility Opex for 2014 and 2015 to be prudent. Field Mobility is required for the rollout (which concludes in 2013) but is not justified on AMI alone for subsequent years. If SPA wants to use this field mobility solution for the rest of the business then it should be a DUOS cost.

[201] SP AusNet revised submission, table 6.19, page 70

In the absence of detailed information from SPA, Impaq is not able to evaluate the prudency of its IT Opex proposal. Instead, Impaq considers that the nearest benchmark is that of PAL. PAL, like SPA, is a distributor with a large rural area and some metro areas. PAL is a little larger than SpAusNet in terms of customer numbers, but not so much different that economies of scale will be greatly different. Hence the cost drivers for PAL should be similar to that for SPA. Impaq's assessment is therefore derived from a comparison with that of PAL. In line with SPA's comment that as systems mature the Opex tends to decrease, so the apportionment of cost over 2012 to 2015 reflects this principle.

7.16 Operating Expenditure summary

Table 172 shows the summary of all the categories of Operational Expenditure.

Table 172 – Summary of Operational Opex – proposal and Impaq view

	2012	2013	2014	2015	Total
Meter Reading - Proposal	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Meter Reading – Impaq view	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Meter Data Management - Proposal	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Meter Data Management – Impaq view	3031	1667	714	734	6,146
Meter maintenance Proposal	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Meter Maintenance – Impaq view	486	628	783	783	2,679
Customer Service - Proposal	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Customer Service – Impaq view	999	103	103	10	1,215
Communication infrastructure maintenance - Proposal	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Communication infrastructure maintenance – Impaq view	4,750	4,750	4,750	4,750	19,000
3G meter trial – proposal	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
3G meter trial – Impaq view	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Project Management – Proposal	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Project Management – Impaq view	9,891	6,973	0	0	16,864
AMIPO and AMI ISC costs - Proposal	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
AMIPO and AMI ISC costs Impaq view	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Audit and quality assurance - Proposal	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Audit and quality assurance – Impaq view	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
AMI budget and charges applications - Proposal	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
AMI budget and charges applications – Impaq	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]

	2012	2013	2014	2015	Total
view					
Equity raising costs - Proposal	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Equity raising costs – Impaq view	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Management fees or overhead - Proposal	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Management fees or overhead – Impaq view	516	350	271	270	1,407
Extra Accommodation Cost - Proposal	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Extra Accommodation Cost – Impaq view	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
IT Opex - proposal	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
IT Opex – Impaq view	6,000	8,000	7,000	6,000	27,000
Total – Proposal	44,732	43,257	28,162	28,208	144,359
Total – Impaq view	30,414	26,418	15,229	14,023	86,083

8 United Energy

The tables below compare the UED amended application and the Initial Budget Submission for Capital Expenditure and Operating Expenditure for AMI for 2012 to 2015[202].

Table 173 – Amended UED Capex Budget Submission Summary

	2012	2013	2014	2015	Total
Meters (Mass Rollout)	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Installation (Mass Rollout)	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
New Connections, Adds and Alts	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
AMI technology and communications	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
IT Infrastructure and systems	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
MRO back office -	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Total Revised Proposal	100,775	17,270	5,755	5,537	129,337

Table 174 – Original UED Capex Budget Submission Summary

	2012	2013	2014	2015	Total
Meters (Mass Rollout)	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Installation (Mass Rollout)	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
New Connections, Adds and Alts	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
AMI technology and communications	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
IT Infrastructure and systems	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
MRO back office -	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Total Original Proposal	112,392	19,025	8,113	7,769	147,299

Table 175 – Amended UED Opex Budget Submission Summary

	2012	2013	2014	2015	Total
Asset Strategy and Planning-	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Asset Operations	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Customer Contact & Back Office	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
AMI Network Operations	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Meter Data Collection	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
AMI Transitional Business Activities	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Backhaul Communications	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Management	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]

[202] JAM substantiation document pages 16 & 17

	2012	2013	2014	2015	Total
Finance & HR	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Service Delivery & Contract Management	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Stakeholder Relations	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Premises	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
IT Opex	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Total – UED Proposal	29,602	24,460	21,813	22,044	97,919

Table 176 – Original UED Opex Budget Submission Summary

	2012	2013	2014	2015	Total
Asset Strategy and Planning-	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Asset Operations	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Customer Contact & Back Office	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
AMI Network Operations	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Meter Data Collection	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
AMI Transitional Business Activities	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Backhaul Communications	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Management	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Finance & HR	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Service Delivery & Contract Management	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Stakeholder Relations	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Premises	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
IT Opex	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Total – UED Proposal	28,582	23,695	21,996	22,203	96,476

In this section of the report each of the cost items in the above tables are reviewed in order. Where the AER has accepted an item of expenditure in the draft determination and the UED has not changed its original forecast, Impaq has made no comment on that item

UED has engaged KEMA to review some aspects of their Capex submission and Deloitte to review some aspects of their Opex submission.

8.1Capital Expenditure Meters (Mass Rollout)

8.1.1 Meter Volumes

In the JAM amended application, the mass rollout meter volumes for UED are given[203]. An excerpt from this for 2012 and 2013 is given in Table 177 It is noted

[203] JAM response to AER draft determination 26 August 2011 , table 4-4, page 31

that UED expects to complete the rollout by the end of 2013 and hence there are no rollout volumes for 2014 and 2015.

Table 177 – Revised meter rollout volumes

Meter Types	2012	2013
Single Phase Single element	139,702	21,402
Single phase two element with load control	113,218	5,959
Three phase direct connect	47,383	3,610
Three phase direct connect with load control	12,498	658
Three phase CT connect	2,660	140
Total	**315,461**	**31,769**

UED has changed its rollout profile since its initial application and has chosen to reduce the number of meters rolled out in 2010/11 and increase the number in 2012/13. The number of meters for 2012/13 in the amended application is 13% higher than that in the original submission for those years. Table 178 shows the initial application volumes

Table 178 – Original meter rollout volumes

Meter Types	2012	2013
Single Phase Single element	104,038	22,128
Single phase single element with load control	113,218	5,959
Three phase direct connect	41,913	3,796
Three phase direct connect with load control	12,498	658
Three phase CT connect	2,718	143
Total	**274,385**	**32,684**

8.1.2 Meter Unit Prices

The meter unit prices are unchanged in the revised submission.

8.1.3 External Antennas

Impaq has made allowance for 10% of Rollout meters to have external antennas.

8.1.4 Impaq assessment of meter (mass rollout) Capex cost

Table 55 shows the UED Initial application, the Impaq assessment for the draft determination, the UED amended application and corresponding Impaq assessment of meter MRO cost. The Impaq assessment has increased since the draft determination mainly due to the 13% increase in meter numbers in the amended application.

Table 179 – MRO Meter purchase Capex

	2012	2013	2014	2015	Total
UED Initial Budget Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq assessment for the draft determination	44,347	4,566			48,913
UED Amended Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq Assessment	49,398	4,854			54,252

The UED amended application includes the cost of two element meters. Since the CROIC does not allow for two element metering the Impaq assessment has substituted the cost of single element meters.

8.2 Capital Expenditure – Installation (Mass Rollout)

The UED amended application submission for MRO installation is increased by 12.5% over the initial budget submission. Part of this is due to the increased volume of meters as noted in section 5.1

8.2.1 Panel replacements

UED in its amended application has agreed that the rate of panel replacement across the whole rollout should be [C-I-C]. However due to having skipped some of the more difficult installations in earlier years the rate applicable for 2012 and 2013 is [C-I-C] [204]. The Impaq assessment uses this figure of 8.4%.

8.2.2 NST testing

In its amended application UED emphasised that Neutral Service Testing is a requirement in the Service Installation Rules for meter exchanges. Impaq has validated this on VESI website.

8.2.3 No Access rates

Impaq's assessment of the "no –access" rates of 6.3% for advice to the AER in relation to the draft decision was taken from the ISC dashboard for the rollout period up to February 2011. The UED amended application provides data to show that the UED no access rate for Jan to June 2011 was 17.90%. The ISC dashboard for July shows an average no access rate since commencement of 9.88%. It does however need to be remembered that in 2011 there has been significant negative media coverage of the smart meter rollout and statements from the new Government which have not been supportive of the program. However given the review that has been undertaken by the Department of Treasury and Finance which will inform the Minister of options in relation to the smart meter program it is expected that the

[204] JAM response to AER draft determination page 56

Government will make pronouncements in relation to the program which will remove the current levels of uncertainty. Hence, it is Impaq's view that the no-access rate will decrease in 2012. Nevertheless Impaq has made its assessment based on a no access rate of [C-I-C] in 2012 and [C-I-C] in 2013. The higher figure in 2013 is because those that have previously not given access will be visited again for AMI meter installation.

8.2.4 Truck support costs

KEMA has commented on the use of truck support as follows[205]:

> *In its finding, Impaq makes (sic) that argument that the incidence of panel replacements and no access letters reflected in the overall installation cost for the UE and JEN rollout are overstated, and that the approach to dealing with panel replacements is adding additional unwarranted cost to the rollout of meters. In regard to the process related to replacing defective meter panels that require replacement before an AMI meter can be installed, UE and JEN confirm that the approach taken during the rollout thus far is for the installer to refer the matter to a specialist team for remedy. This follows best practice among utilities installing AMI meters and is designed to maximize efficiency of installation as well as leverage appropriate skill sets. The approach allows utilities to divide meter installation work between job categories. One workforce is trained with the primary focus on performing volumes of meter installations. Their training includes identification of situations that might involve a specialist installer because of technical or safety issues such as involving energised lines or asbestos removal. Another workforce is trained with a set of specialized skills to resolve these situations.*

Impaq fully agrees that special installation teams are a good way to deal with matters such as panel replacement, which are exceptional installation circumstances, hence freeing up the main installation crews to work on the straightforward installation sites. However the justification for truck support presented by JAM is to do with customer supply isolations (eg: when isolation needs to occur on a service pole). Hence the KEMA commentary is not quite on the topic.

Nevertheless Impaq has accepted UEDs advice in the amended application that the higher truck support costs are part of the overall installation contract with Service Stream[206] and, although this rate is high, the overall contract cost for meter installation with Service Stream was somewhat lower than that offered by other installation companies.

[205] KEMA 2011 "Response to the AER Draft Determination on the Victorian Advanced Metering Infrastructure Review 2012 – 2015 Budget and Charges Applications",, page 20.
[206] JAM response to AER draft determination, page 51 Table 10-4

However the proportion of truck support in the total installation cost does not agree with the JAM forecasts. In the service stream contract revisits and truck support is [C-I-C]; ie [C-I-C]. In the UED forecast for 2012 to 2015 truck support is [C-I-C] of total installation costs. Had this been factored into the original installation contract negotiation it may have made another installation provider to be the least cost provider.

8.2.5 MRO installation Capex cost

The net effect of the adjustments above is to make no material difference to the amended UED forecast.

Table 180 shows UED's original submission, Impaq's initial assessment, and UED's amended application.

Table 180 – MRO meter installation Capex – Impaq view

	2012	2013	2014	2015	Total
UED Initial Budget Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq assessment for the draft determination	16,412	2,618			19,030
UED Amended Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]

8.3Capital Expenditure – BAU Metering

In its amended application UED has revised its projected volumes and costs of BAU metering to take into account:

- that installation of new connection meters is an Alternative Control Service;
- revised projections of growth in customer numbers for 2012 to 2015; and
- that most meters recovered from abolishments and meter exchanges in 2012 and 2013 will be AMI meters and can be reused after re-verification.

UED has advised that there is a proportion of BAU installs which are to replace failed meters including those which have failed due to lightning, High Voltage injection and accidental damage[207]. It is accepted that this does occur but that it is a very small percentage of meters affected. It is noted that Australian metering standards place requirements on meters to reduce the incidence of failure due to lightning and High Voltage injection[208]. This has been very effective and the number of meters that fail due to these causes is very low. In general it is appliances in a customer's premise that will fail due to these factors before the meter will fail. . Impaq has assumed that after rollout about 1000 meters will fail per annum[209]. In the

[207] JAM response to AER draft determination – page 62.

[208] For example High Voltage impulse testing of 10kV.

[209] This is 0.15% failure rate, which is what large rollouts such as ENEL and PG&E are experiencing.

2012-2015 the vast majority of these will be replaced under warranty, however the installation cost of these has been included in the total cost assessment.

Table 181 shows the forecasts of net increase in customer numbers and the BAU metering volumes proposed by UED.

Table 181 – Impaq assessment of BAU metering volumes

	2011	2012	2013	2014	2015	Total
UED Customer Numbers (from EDPR final)	627,203	633,295	638,757	643,600	648,220	
Increase in customer numbers from EDPR numbers		6,092	5,462	4,843	4,620	21,017
UED model - customer growth		3681	3536	4447	5083	
BAU Meter numbers proposed by UED		13,942	6,289	5,171	4,948	30,350

In reviewing the UED financial model in relation to BAU metering, there appear to be some anomalies. The net customer growth numbers[210] do not appear to match well with the BAU meter forecast volumes in the JAM documentation[211].

- The meter volumes for 2015 in the JAM document are less than the net customer growth number in the model. There will not be enough meters for new customers.
- There is no apparent reference in the model to recertification of AMI meters removed due to abolitions or meter exchanges (eg: a customer changing from single phase to three phase).

Hence, Impaq has modified the UED model to develop a forecast of BAU metering supply cost:

- The unit cost for installing a replacement set of CT's is [C-I-C]. This is excessive. This is not a new connection as that is covered by Alternative Control Services. Hence the task is much simpler. Impaq considers that $500 is a more prudent estimate[212];
- The UED forecast for sets of CTs for new connections is 32 per month. This is 384 per year. Considering that there are only 2861 CT meter customers in UED this is a 12% growth rate of CT meter customers, which is out by a factor of 10. The Impaq assessment is 3 sets of CTs per month;

[210] AIMRO financial model – Meter numbers - tab 2.1 UED

[211] JAM response to AER draft determination – page 63.

[212] CT testing costs about $350 and in the process of doing that CTs have to be disconnected and removed. Refer section on Asset Operations 8.10

- Since the CROIC does not allow for 2 element meters, Impaq has changed two element meters to be one element;

The total quantity of new connection meters in 2012 and 2013 is too high even taking into account abolishments and meter exchanges. This is evident in Table 181.

- Impaq has reduced the purchase quantity by 30% in each of those years to allow for net new connections with new meters and the use of reuse of AMI meters for about 50% of the difference in quantity between net new connections and the number of BAU new connection meters to be purchased; and
- Adjustment to the proportion of meters with antennas. Impaq has included external antennas on [C-I-C] of BAU meters in 2012 and [C-I-C] on BAU meters in 2013. It is acknowledged that in 2013 about 30% of AMI meters in new estates may need an external antenna, but for all other infill new connections the mesh will be well enough built out to only require external antennas on 10% of meters. Hence an average of [C-I-C] has been used for 2013

Impaq does agree with the UED estimates of numbers and costs of meters replaced due to faults.

Table 182 shows a summary of the BAU meter supply and installation cost.

Table 182 – BAU Meter supply and installation Capex

	2012	2013	2014	2015	Total
UED Initial Budget Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq assessment for the draft determination	1,199	980	1,009	975	4,163
UED Amended Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq Assessment	2,302	801	967	968	5,037

8.4AMI Technology and Communications Capex

The UED amended application does not have any reduction in cost for the Access Points and Relays which was expected as UED decided to rollout their comms network ahead of schedule and so create a full but thin mesh.

There are some issues with the UED model:

- In Jan 2014 it has the replacement of all access points and relays.
- the total number of relays (repeaters) to be installed is 96 more than the number purchased.

Nevertheless Impaq agrees that amended application in this category is prudent.

Table 183 shows the submission values and the Impaq assessments.

Table 183 – Communications Capex

	2012	2013	2014	2015	Total
UED Initial Budget Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq assessment for the draft determination	5,784	3,712	701	906	11,104
UED Amended Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]

8.5IT Infrastructure and Systems Capex

UED's amended application is unchanged from their original submission for IT costs. The components of their IT Capex proposal are shown in Table 184.

Table 184 – UED IT Capex

	2012	2013	2014	2015	Total
Hardware - Life cycle replacement	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Major Release	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Legacy Archive & Decommission	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Business Intelligence - Major upgrade	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Integration (Webmethods) major upgrade	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
System improvement and defect release	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Two element metering cost	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Second meter provider	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Total	**10,848**	**2,260**	**3,815**	**3,391**	**20,313**

In its amended application UED has provided evidence that the Impaq proposal to delay server replacements in 2015 was not ideal. KEMA has commented on this issue[213]:

KEMA finds these [JAM] replacement guidelines appropriate and consistent with our industry experience In our experience, the replacement or upgrade cycle must also consider the time needed to integrate, test, and install into production the replacement hardware and software. In the case of storage there is the additional task of relocating data from the old infrastructure to the new that should not be underestimated when considering the volume of meter data generated over a 4-5 year period). This time, typically 6 to 18 months, means that the replacement hardware must be purchased well in advance of the planned replacement date.

Impaq has reviewed the information provided by both JAM and KEMA and now accepts the UED forecast.

[213] KEMA, Review of AER Draft Determination, page 13

However Impaq does note that the CROIC provides for 7 year asset lives for IT systems[214]. It is an anomaly that JEN agreed to 7 year asset lives for IT systems at the time the CROIC was negotiated with the DNSPs and yet now are insisting that 5 years is the limit.

Second Meter provider

UED's amended application [215] asserts that the AER's draft determination for IT costs for the introduction of a second metering supplier is inadequate. UED have also engaged KEMA to provide advice on IT costs and KEMA has endorsed the UED IT cost estimates as prudent.

Irrespective of whether UED's IT costs for bringing on a second metering provider are reasonable or not, there is an issue of prudency here. Having second sources for supply of meters is normally done to mitigate a number of risks, which include:

- price risk - to create competitive pressure so that suppliers do not attempt to price gouge;
- supply continuity risk - To mitigate the risk of supply chain failures leading to lack of supply. eg: A meter manufacturers factory burns down and supply is interrupted; and
- market risk - to ensure that a viable meter market is maintained which will stimulate product innovation for the benefit of customers.

In relation to the first of these, the pricing for meters from Secure Meters is locked in for the duration of the 2012 to 2015 period. Hence there is no price risk for that period. After the rollout there will not be major quantities of meters procured for the next 15 years. Instead there will be meter quantities sufficient to meet BAU requirements – about 5000 meters per annum. UED's proposed IT cost of [C-I-C] to support a second meter vendor translates to a cost of [C-I-C] per meter over the next 10 years. This is in effect a doubling of the weighted average meter cost. The risk that having a single supplier will result in a doubling of meter prices seems unlikely.

In relation to supply continuity risk, Secure meters have multiple factories. As such UED will not incur a supply risk issue as Secure are able to produce their meters at numerous locations..

In relation to market risk, other DNSPs have contracts with other meter vendors and hence it would appear that there will be sufficient volume of meters being procured to the VIC AMI specification from at least two vendors that this risk is mitigated.

Hence it is Impaq's view that IT Capex of this level is not prudent and hence the Impaq assessment has removed all costs from this category.

[214] CROIC 4.1 (g)
[215] UED revised budget application page 28

Two element metering

Impaq has reviewed the CROIC in relation to this and is of the view that two element meters are not within scope. Hence the Impaq assessment removes this cost item.

Impaq's assessment of IT costs is shown in Table 185 and Table 186.

Table 185 – Impaq IT Capex assessment

	2012	2013	2014	2015	Total
Hardware - Life cycle replacement	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Major Release	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Legacy Archive & Decommission	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Business Intelligence - Major upgrade	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Integration (Webmethods) major upgrade	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
System improvement and defect release	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Two element metering cost	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Second meter provider	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Total Impaq View	606	2,260	3,815	3,391	10,071

Table 186 – IT Capex

	2012	2013	2014	2015	Total
UED Initial Budget Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq assessment for the draft determination	2,106	2,260	3,815	2,091	10,272
UED Amended Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq Assessment	606	2,260	3,815	3,391	10,071

8.6MRO Back Office Capex

Impaq had previously reviewed UED's original proposal for this cost category and found it prudent. In UED's amended application there is additional cost included in this category which relates to UED's response to the Energy Safe Victoria report[216] concerning a defective AMI meter installation which resulted in an electrocution.

The revised proposal indicates that UED is adopting the recommendations of this report and increasing the level of Service Stream's supervision of its installers and also increasing the level of auditing of installations. Specifically this involves increasing the supervision rate from [C-I-C] installers. It also involves increasing the number of auditors from [C-I-C] across the JEN and UED networks. Impaq assumes

[216] Final report on safety aspects of the Victorian Advanced Metering Infrastructure (AMI) Program Meter Deployment Activities.

that the split between JEN and UED would be in proportion to meter numbers. Hence 3 additional auditors for JEN and 6 for UED.

The increase in cost between the initial proposal and the amended application is more than Impaq considers prudent for the changed circumstances outlined above. The supervision increase is an FTE increase of 4.5% overall. The installation labour component of the total contract installation activity is 73%. So an increase of 4.5% results in an overall installation cost increase of 3.3%. This translates to an increase in installation cost of [C-I-C] for 2012 and [C-I-C] in 2013.

In relation to the additional installation auditors the cost is assumed to be equivalent to that of an electrical inspector with a chargeout rate of [C-I-C] per hour. This results in a cost of [C-I-C] in 2012 and [C-I-C] in 2013.

Table 187 gives a summary of the UED applications and the Impaq assessments.

Table 187 – MRO Back Office

	2012	2013	2014	2015	Total
UED Initial Budget Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq assessment for the draft determination	1,700	500	-	-	2,200
UED Amended Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq Assessment	3,526	1,009			4,534

8.7Summary of Capex adjustments

Table 62Table 188 shows a summary of the JEN submission Capex items together with the Impaq assessment.

Table 188 – Summary of Capex

	2012	2013	2014	2015	Total
MRO Meter supply Proposal	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
MRO Meter supply - view	49,398	4,854			54,252
MRO Installation - Proposal	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
MRO Installation Impaq view	24,523	2,576			27,099
BAU metering Proposal	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
BAU metering Impaq view	2,302	801	967	968	5,038
Communications- Proposal	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Communications - Impaq view	5,784	3,712	701	906	11,104
IT Capex - Proposal	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
IT Capex - Impaq view	606	2,260	3,815	3,391	10,071
MRO back office - Proposal	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
MRO Back office - Impaq view	3,526	1,009			4,534

	2012	2013	2014	2015	Total
Total JEN Proposal	100,775	17,270	5,755	5,537	129,337
Total Impaq view	86,139	15,212	5,482	5,265	112,098

8.8 Operational Opex

Table 189 shows a summary of the UED operating expenditure amended application by category.

Table 189 – Summary of UED's revised Opex proposal

($M real 2011)	2012	2013	2014	2015	Total
Asset Strategy and Planning	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Asset Operations	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Customer Contact and Back Office	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
AMI Network Operations	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Meter Data Collection	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
AMI Transitional Business Activities	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
AMI Back haul Communications	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Management	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Finance and HR	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Regulatory Audit	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Service Delivery and Contract Management	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Stakeholder Relations	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Premises	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
AMI IT	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Total Opex	29,602	24,460	21,812	22,045	97,919

Almost all of the costs of the Opex items is driven by human resource costs. Where Impaq has made its own assessment of human resource costs it has used the assumptions given in section 3.4.2

It is noted that UED have provided a Deloitte report which reviews some items of Opex proposed by UED.

8.9 Asset Strategy and Planning

Table 190 shows UED's original proposal, the AER Draft Determination, the amended application from UED and the Impaq assessment.

Table 190- Asset Strategy and Planning costs

	2012	2013	2014	2015	Total
UED Initial Budget Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq assessment for the draft determination	217	222	228	232	899
UED Amended Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq Assessment	319	289	297	302	1,206

UED has provided a detailed and comprehensive breakup and description of the roles and activities under the heading of Asset Strategy and Planning. Additionally, Deloitte has also carried out an analysis of this cost category[217], which has also been taking into account by Impaq in making its assessment. These activities are provided by JAM for both UED and JEN, with costs shared between the two businesses.

Also UED has appropriately moved the funding for the:

- AMI Communications Field team from Asset Strategy and Planning to AMI Network Operations; and
- AMI Test Laboratory team from Network Operations to Asset Strategy and Planning

Each of the roles and their activities that are funded through this category are discussed below.

AMI Security Architect

This role is forecast to be 1 FTE funded 50:50 between UED and JEN. UED have stated that this role[218]

is responsible for maintenance compliance of the ISO27001 security accreditation which was explicitly established for the AMI Technology Meter to Network Management System. AMI technology can be regarded as critical infrastructure and an equal to Supervisory Control and Data Acquisitions (SCADA) systems being one of the most critical of distribution management systems. As such AMI Security is regarded as a vital ongoing and evolving part of the AMI infrastructure and includes costs for activities like annual Security and Penetration Audit costs, security remediation activities and external audit costs.

In particular, this role:

- provides planning and governance to support an ISO 27001/2 Information Security Management System (ISMS) for compliance, and ensure ongoing stability of AMI communications network security and business continuity;

[217] Deloitte report JEN/UED, pages 26 to 38.
[218] JAM 2011-2, page 8

- ensures end-to-end security of the AMI system (e.g. Home Area Networks, Secure Mesh Radio, and Meter to Market);
- provides strategic and tactical management of Information Technology security across the AMI environment; including policy development and compliance, security processes, security incident response, vulnerability analysis, risk compliance, identity and access management; and
- manages security accreditation, audits, reviews and remediation activities.

Ensuring and maintaining the security of IT and communications is an activity that the UED is already required to do extensively. The management of the security of the AMI systems and communications should be incremental to what is already done within the business.

Impaq believes that a dedicated FTE for these activities from 2012 to 2015 is excessive.

ISO 27001/2 is a standard to which systems and process are designed. Given that the major AMI systems and, in the case of UED, most of the communications platform will be completed by the start of 2012, the systems and processes already comply with this standard. To ensure compliance, an audit would be conducted every year. This audit would take a maximum of 1 month to complete. Any issues which were identified by the audit would be raised by the Security Architect to the appropriate area to rectify.

This role would also be the point to which any security issues are raised. However, given that the systems, equipment and processes are up to date, that they comply with ISO 27001/2 and that regular audits are conducted, the likelihood or security issues is small.

Impaq believes that, as an increment to the security management already undertaken by UED, an additional 0.5 FTEs across both UED and JAM would be sufficient.

AMI Communications Engineer

This role is forecast to be 1 FTE funded 50:50 between UED and JEN. UED has stated that this role[219]

Maintains asset lifecycle management plans (LCMP) for AMI communication WAN/LAN assets. Analyse WAN/LAN capacity and performance, initiates optimisation and augmentation works. Communications subject matter expert for MRO, operations, planning, regulatory and compliance. Supports evolving HAN services and undertakes research into upcoming communication technologies.

Impaq supports the requirement for this role and believes it should be expanded to include the overall management of this section, including the:

- Communications and Metering Engineers;

[219219] UED 2011-2, page 90.

- Geospatial Analyst (2012 only); and
- AMI security Architect.

Impaq supports the requirement and forecast for this role.

Geospatial Analyst

This role is forecast to be 1 FTE until the end of 2013 funded 50:50 between UED and JEN. UED has stated that this role[220]

Provides and maintains geospatial AMI data records compiled from AMI, Legacy and GIS systems. Provides visualisation and mapping data sets for MRO, AMI Network Operations, Planning Optimisation and New Connections. Maintains models of AMI Communications assets, relationships and associations.

By the end of 2011, UED will have completed the installation of most of its communications network. UED is forecasting that in 2012 it will only need to install a further 16 Access Points out of a total of 203, and by the end of 2012, the installation of the communications infrastructure will be complete. Impaq believes that a full FTE is excessive and believes that 0.5 FTE's shared across UED and JEN for 2012 only would be sufficient.

Metering and Communications Engineers

This role is forecast to be 3 FTEs funded 50:50 between UED and JEN. About this role UED has said[221]:

Originally there were two metering engineers (base). These positions have been expended to include the increased complexity of operating advanced meters e.g. the addition of the metering communication function. With the increased complexity an additional FTE was required to cover the extended scope of this role.
This role:

- *provides asset management of electricity metering and measurement systems including AMI Meters and Legacy Metering (non-AMI), unmetered supplies and associated equipment or systems;*
- *develops strategy for the management of measurement assets including metering asset management plans, life cycle management, technology roadmaps and release plans;*
- *ensures that compliance with regulatory, industry and safety requirements is achieved in the design, application and management of and electrical measurement technology;*
- *provides technical design and support of the AMI solution. Performs investigations of escalated measurement operational issues and reviews and approves metering equipment designs, configurations and firmware. Implements planning and strategic development of metering technical*

[220] UED 2011-2, page 90.
[221] UED 2011-2, page 90.

standards, prepares business cases, forecasts, conceptual papers, scopes of works and submissions;

- *develops and maintains asset management plans for meters and metering transformers including researching and developing alternative strategies for approval by industry regulators;*
- *develops technical specifications for purchase of meters and metering transformers and outworking of life cycle and meter asset management plans;*
- *ensures policies and systems are in place to facilitate the maintenance of Meter Provider accreditation and develop and implement meter equipment policy including development of training for affected teams like New Connections;*
- *manages technical issues associated with Meter Equipment and Communications supply contracts and develop budgets for metering and communications equipment including reforecasting;*
- *undertakes regulatory technical and economic consultations including for AEMO, ESC, VESI, NMI, AER;*
- *escalated complex customer Issues including EWOV and billing complaints and other technical queries; and*
- *expert representatives on industry groups with AEMO, National Measurement Institute and Standards Australia.*

While on the one hand, the complexity of AMI is greater than legacy metering because of the addition of communications, on the other hand, after the roll out, management of the fleet of meters will be significantly simplified because:

- the number of meter types and vendors has been significantly reduced;
- the age of the meter fleet is much less;
- all the meters are electronic rather than electro-mechanical; and
- all the meters are covered by warranty.

Consequently, Impaq is of the view that, overall, the level of complexity and activity in this role is about the same as prior to the rollout, albeit that the mix is different.

Impaq believes that 2 FTE's for UED and JEN will be sufficient.

Graduate Engineer

This role is forecast to be 1 FTE funded 50:50 between UED and JEN.

Primarily employed to enable prudent succession planning and works across a number of areas before finally taking a permanent role in Asset Strategy and Planning. The graduate scheme includes rotations for the first 2 years and for this graduate there are up to 20 permanent positions related to AMI where the graduate could gain a permanent or interim longer term role at the end of their rotation

program. The Jemena Graduate Development Program has been active for 10 years and maintains an annual intake of Electrical and Communications graduate engineers. As AMI Technology and Metering is a very narrow discipline in the resource market it is vital and prudent to develop graduates into skilled resources to support and replace staff that move within or outside of JAM.

AMI and its associated technologies is a developing field and its utilisation around Australia and the world is growing rapidly. The demands for qualified and experienced resources will also grow. Impaq believes it is prudent for UED to foster the development of this expertise through the support of a graduate program.

AMI Technology and Planning Manager

This role is forecast to be 1 FTE funded 50:50 between UED and JEN. This role:

Oversees the enterprise strategic planning and management of the AMI Technology Planning team.

Impaq does not believe that this management role is required. Post 2012 (after the cessation of the Geospatial Analyst), this section will consist of a communications and metering section and an AMI Security Analyst. As discussed earlier, the management of this section should be encompassed by the AMI Communications Engineer.

AMI Test Lab resources

This area consists of 3 FTEs (AMI Test Lab manager, AMI Technology Engineer and AMI Technology Tester) funded 50:50 between UED and JEN. Impaq notes that the cost of these three lab resources are already included in AMI technology and communications Capex costs for each year of 2012 to 2015.

8.10 Asset Operations

Table 191shows UED's original proposal, the AER Draft Determination, the revised proposal from UED and the Impaq Assessment.

Table 191 – Asset Operations costs

	2012	2013	2014	2015	Total
UED Initial Budget Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq assessment for the draft determination	316	316	362	362	1,355
UED Amended Application [222]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq Assessment	459	459	584	584	2,086

The UED amended application indicates that the cost is comprised of the items in Table 192. However there is a significant discrepancy between the total costs.

[222] JAM Response to the AER draft determination, page 16, table 1-6

Further the totals for 2012, 2014 and 2015 have been altered to correctly sum the individual costs for those years.

Table 192 – UED Revised proposal[223]

	2012	2013	2014	2015	Total
Meter Testing	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
CT Meter Testing	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Unmetered Supply audits	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Staff	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
LVCT Testing	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Meter Maintenance-field download and reset	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Meter control and retest	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Annual MPB audit fee	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Total	1440	1440	1440	1440	5,760

UED advised that the unit meter testing costs applicable were lower than those in Impaq's previous report. Impaq has now included those costs in it model. UED also pointed out that the previous report did not include the cost of CT testing. In the NER, all CT meters are required to have their CTs tested every 10 years. This has now been included. The CT meter testing in Table 192 commences too early as there are no CT meters installed until 2012. Hence CT meter testing does not need to start till 2014.

Furthermore UED have provided no justification for the item "meter control and retest". As far as Impaq is aware all the activities apart from this item are the tasks that a metering department would need to undertake. Indeed the function of a metering department should be much simpler over the 2012 to 2015 period as the old meter fleet is replaced with new meters which have remote communications and therefore remote diagnosis capabilities. Hence this item has not been included. The results of the revisions to Impaq calculations are shown in Table 193.

Table 193 – Impaq assessment of meter testing costs

	2012	2013	2014	2015	Total
Meter testing	136	136	136	136	544
CT meter testing			118	118	236
CT testing	104	104	104	104	415
Unmetered supplies audit	15	15	15	15	60

[223] JAM Response to the AER draft determination, page 100, table 18-2

	2012	2013	2014	2015	Total
Staff	304	304	304	304	1,216
Meter maintenance field - download and reset	7	7	7	7	28
MPB audit fee	10	10	10	10	40
Total	576	576	694	694	2,539
[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]

8.11 Customer Contact & Back Office

Table 194 shows UED's original proposal, the AER Draft Determination, the amended application from UED and the Impaq assessment.

Table 194 – Customer Contact and Back Office

	2012	2013	2014	2015	Total
UED Initial Budget Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq assessment for the draft determination	405	412	276	280	1,373
UED Amended Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq Assessment	623	635	517	525	2,300

In its amended application, UED maintains that its original forecast is the most appropriate, with adjustments due to a formula error in its model and for revised meter installation forecasts.

UED has said[224]
As outlined in Section 3.1 JAM AMI Transitional Model, and as approved by the AER in the previous submission, JAM has implemented an operating model which ensures a cost effective and low risk approach to business transition, which includes the implementation of the new AMI systems in parallel with existing legacy systems and processes, and managing the transition from legacy to AMI from 2010 (when AMI systems went live) to the end of 2013 when the AMI mass rollout project is completed.
The majority of costs that have been removed by the AER from the UED and JEN budgets relate directly the management of the legacy systems and processes during this period.

Impaq acknowledges that its analysis for 2012 and 2013 did not take into account the burden of managing the legacy systems in parallel with the AMI systems.

UED has provided an organisation structure for the Customer Contact and Back Office function. Impaq believes that all the resources in the grouping called 'Select

[224] JAM amended submission page 105

Solutions (DMS) Contract' are responsible for new connections and thus are covered by Alternative Control Services and are out of scope. Similarly, the grouping called 'Aegis Contract' is responsible for network faults and emergencies and is also out of scope.

The remaining parts of the chart show 19 resources of which:

- 1 resources is directly and fully involved in new connections;
- 6 resources are directly and fully involved in network billing;
- 1 Service Desk SME would be 50% involved in new connections;
- 1 Connections Point Manager with half of their reports involved in new connections;
- 2 Managers with half of their reports involved in network billing; and
- The Back-office Operations Manager with approximately half of their role being network billing and new connections.

Impaq supports the need for the remaining resources in 2012 and 2013. Impaq believes that the number of Meter Data Management SME's and in scope Exception Data Analysts required for 2014 and 2015 will be 2 of each for UED and JEN combined.

8.12 AMI Network Operations

Table 195 shows UED's initial application, Impaq's assessment for the Draft Determination, the amended application from UED and the Impaq assessment.

Table 195 – AMI Network Operations

	2012	2013	2014	2015	Total
UED Initial Budget Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq assessment for the draft determination	1,002	1,036	1,058	1,091	4,187
UED Amended Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq Assessment	1,620	1,644	1,270	1,307	5,841

Subsequent to the draft determination JAM has reallocated some costs between "Asset Strategy and Planning" and "AMI Network Operations". JEN and UED have advised that the Field Technician team was moved from the former to the latter cost category.

The major cost items in the JAM AMI network operations category (allocated across JEN and UED) are:

- Field technician team – 8 FTEs;
- Operations team – 7 FTEs;
    - AMI NMS application administrator – 2 FTEs

- AMI Communications analyst – 4 FTEs
- AMI security administrator – 1 FTE

- The annual security and penetration audit and remedial actions at [C-I-C] per annum.

It is expected that this level of resource will be needed during the rollout phase. There will be network operation issues in bringing many new meters onto the network and issues around the performance and reach of access points and relays. Once rollout is complete in mid-2013 the changes to the network will only be as a result of new connections.

By the end of 2013 it would expected that the network would be very stable. In relation to the maintenance team, there will be some 285 access points and 930 relays to maintain. There will be investigation of meter communication issues, with perhaps addition of antennas to some meters to improve performance.

The Deloitte report[225] on Opex costs considers the number of field technicians required to support both the JEN and UED networks. Table 196 and Table 197 are drawn from this report.

Table 196 – Deloitte – combined JEN & UED meter numbers

JEN+UED	2009	2010	2011	2012	2013	2014	2015
A. Total Meter Installed							
Per Year	**24,079**	**109,604**	**345,880**	**398,944**	**87,480**	**9,616**	**9,362**
Cumulative Total	**24,079**	**133,683**	**479,563**	**878,507**	**965,987**	**975,603**	**984,965**

Table 197 – Deloitte – Field Technician FTEs calculation

	2011	2012	2013	2014	2015
B. Early life cycle failure rate (Day 0 to 45)	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
C. Field Investigations Early Life Cycle (A x B)	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
D. Failures during life cycle	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
E. Life cycle failures over 15 Years (A x D)	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
F. Meter failures investigated during life cycle PA (C + E)	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
G. Number of meter faults investigated per week (F/52)	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
H. Meter faults investigated per week: Hours (G x 2)	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]

[225] Deloitte review of JAM opex – page 27

	2011	2012	2013	2014	2015
I. Meters requiring comms fault investigations/meter reading	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
J. Number of comms faults investigations / Meter readings (A x I)	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
K. Comms faults investigations/ Meter readings: Hours (J x 1)	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
L. Number of customer investigations (A/200,000 x 5)	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
M. Customer investigations: Hours (L x 3)	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
N. Number of Access Point/Relay commissioning and defect investigations	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
O. Access Point/Relay commissioning and defect investigations: Hours (N x 4)	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
P. Hours Per Week (H + K + M + O)	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Q. Hours Per Week + Overheads (P x 1.2)	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
FTE (Q/37.5)	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]

Impaq broadly agrees with the analysis presented by Deloitte. Impaq would reduce the number of hours associated with meter faults as in its experience microprocessor based meters either work properly or are totally dead. It is interesting that the JAM modelling of field technicians does not follow the profile presented by Deloitte.

Impaq considers that the field team will be able to be reduced to 6 FTEs from the beginning of 2014 and the Operations team can be reduced to 5 FTEs from the beginning of 2014.

8.1 Meter Data Collection

Table 198 shows UED's initial application, Impaq's assessment for the Draft Determination, and the amended application from UED.

Table 198 – Meter data collection costs

	2012	2013	2014	2015	Total
UED Initial Budget Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq assessment for the draft determination	1,225	163	0	0	1,388
UED Amended Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]

Impaq accepted the previous UED forecast for this category. In its amended application, UED has said[226]

Subsequent to the May submission JAM has found that the forecast rate of cost reduction of Meter Data Collection is not being realised as meter reading routes are becoming less efficient due to a partial AMI rollout.

In mass rollout areas the AMI meter population varies in the order of 50% to 70% dependent on the exchange refusal rate and number of complex sites within that meter reading route. As such all remaining non AMI meters need to be face read within that route 30% to 50% of meters. The resulting meter reading route is effectively the same travel distance for the meter reader with less meters to read taking only marginally less time to complete that the original 100% face read route before AMI.

As a result of the number of the number (most) incomplete AMI meter routes only small reductions have been possible to date and a reforecast of the Meter Data Collection costs results in a higher cost for 2012.

Impaq accepts that higher than expected rates of customers refusing to have an AMI meter installed has materially reduced the efficiency of manual meter reading routes. Impaq accepts UED's forecast.

8.2 AMI transitional business activities

Table 199 shows UED's original proposal, the AER Draft Determination, the amended application from UED and the Impaq assessment.

Table 199 – AMI transitional business activities

	2012	2013	2014	2015	Total
UED Initial Budget Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq assessment for the draft determination	2,029	497	0	0	2,526
UED Amended Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq Assessment	2,216	492	0	0	2,708

Impaq accepted the previous UED forecast for this category. Due to a reduction in the number of meters to be installed in 2011 and a commensurate increase in the number of meters to be installed in 2012 and 2013, UED has stated that the number of claims it will need to pay in 2012 and 2013 will increase, resulting in the change to the forecast in this category.

Impaq accepts UED's forecast.

[226] JAM response to AER draft determination, page 34

8.3 AMI Backhaul Communications

Table 200 shows UED's initial application, the Impaq assessment for the Draft Determination and the amended application from UED.

Table 200 – AMI backhaul communications costs

	2012	2013	2014	2015	Total
UED Initial Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq assessment for the draft determination	49	49	49	49	195
UED Amended Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]

Impaq accepts the UED revised application as prudent.

8.4 Management

Table 201 shows UED's initial application, Impaq's assessment for the Draft Determination, the amended application from UED and the Impaq assessment

Table 201 – Management

	2012	2013	2014	2015	Total
UED Initial Budget Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq assessment for the draft determination	285	289	295	299	1,168
UED Amended Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq Assessment	0	0	0	0	0

UED has not provided any comment on this cost category. However, it has argued that the activities of industry development and stakeholder relations should be included in the Stakeholder Relations cost category. Accordingly, Impaq will consider these activities as included in Stakeholder Relations and not Management.

With these activities removed from Management and a component of management included in most of the forecast categories, Impaq cannot identify any activities in Management that are not covered elsewhere. Consequently, Impaq has amended its forecast for this Category to zero

8.5 Finance & HR

Table 202 shows UED's initial application, Impaq's assessment for the Draft Determination, the amended application from UED and the Impaq assessment.

Table 202 – Finance and HR costs

	2012	2013	2014	2015	Total
UED Initial Budget Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq assessment for the draft	110	112	115	117	454

	2012	2013	2014	2015	Total
determination					
UED Amended Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq Assessment	473	483	159	162	1,277

UED has provided significant detail of the roles and activities forecast to be required for the finance area of this category, as well as an organisation structure. The structure shows 9 roles which are discussed below. These resources serve both UED and JEN and costs are split 68:32.

Finance Operations Team Leader

This role represents 0.5 FTEs. The responsibilities of this role are[227]:

- To provide financial support for the SmartNet management team under the guidance of the Finance Manager;
- manage the business support functions and direct activities as per the AMI program requirements; and
- To provide asset owner AMI program billing and revenues determination.

Impaq accepts that these activities are required to the end of the rollout. However, from the end of the rollout, managing the business support functions and AMI billing and revenue will be significantly reduced or not required. The remaining activity does not justify even part of this FTE and will be picked up by others.

Management Accountant, SmartNet

The responsibilities of this role are[228]:

- consolidate and reports on the AMI Program metering results and conducts variance analysis to budget and forecast and works with the relevant Asset Owner to advise on commercial outcomes.
- maintain finance master data and ensures that SAP tools maintain and track all AMI transactions. A full review and actions the weekly reconciliation reports to be produced.
- Be the key contact for all AMI queries and involved in preparation of cashflow reporting and setting up of hedging arrangements for all AMI related purchases with overseas vendors.
- engage cost capture activities in order to ensure accurate and methodical reporting of the AMI program costs against the correct SAP costing elements.

Impaq accepts that these activities are currently needed. However, all of these activities are related to the roll out and will not be required in 2014 and 2015.

[227] JAM 2011, page 117.
[228] JAM 2011, page 117.

Business Support Officer

There are 2 FTE's in this role with 50% being charges to metering regulated services. The responsibilities of this role are[229]:

- to provide administration support to the SNACS finance and accounting team under the guidance of the SNACS Senior Management Accountant in validation, administration and reconciliation of timesheets and vendor invoices surrounding the AMI program.

Impaq accepts the need for, effectively, 1 FTE to provide administrative support to the SNACS finance and accounting team during the rollout. Impaq expects that the workload will reduce to no more than half after the roll out.

Financial Analyst

The responsibilities of this role are[230]:

- Be the liaison for all enquiries relating to the financial model for the AMI Program.
- responsibility for updating and providing the AMI models to UED and JEN asset owners.
- compilation of data for regulatory account purposes for the AMI program.
- to provide financial scenario modelling to support management decision making.

The responsibility for the AMI financial model will cease at the end of the rollout. Also, the requirement to provide financial scenario modelling to support management decision making will reduce significantly. Providing support for the development of the Regulatory Accounts will be 4 weeks per year. Impaq believes that this role will require 0.2 FTEs in 2014 and 2015

Accountant Metering

The responsibilities of this role are[231]:

- to provide 100 per cent Finance and Accounting support for a Profit and Loss perspective for AMI SmartNet metering management in terms of Revenues and cost captures;
- monthly management accounting – profit centre financial stewardship, variance analysis, reporting for AMI;
- monthly AMI meter reconciliation of MRO data to SAP ledgers;
- assist with the processing and reporting of AMI Program Delivery and assist with development of cost recovery for ongoing AMI Smart Meter operational costs.

[229] JAM 2011, page 118
[230] JAM 2011, page 118
[231] JAM 2011, page 118

The internal management costs of a contractor are not costs that should be directly recovered and are out of scope. These costs should be recovered by the contractor through their margin, Providing finance support for a 'Profit and Loss' perspective and 'profit centre financial stewardship' are clearly for the purposes of JAM, not UED and are out of scope.

Reconciliation of MRO data and process and reporting of AMI Program Delivery will not be required after the rollout.

Impaq believes that the components of this role that are within scope represent 0.5 FTE's for 2012 and 2013 only.

Senior Management Accountant

UED state that 50% of this roll is chargeable to metering regulated services. The responsibilities of this role are[232]:

- providing both strategic and commercial support and financial stewardship to the SmartNet & Customer Service (SNACS) / AMI Program business unit.
- To provide strategic and commercial support and financial stewardship to the AMI & Back Office business unit. The role will be responsible for providing financial and commercial support in managing this function and managing all relevant alliance relationships with respect to AMI & Back Office:
    - key "go to" point for AMI operational accounting queries;
    - AMI Treasury liaison and reporting to Asset Owners;
    - review the monthly performance of AMI and provides a health check of the business to ensure financial commitments are deliverable. This Includes variance analysis and reporting;
    - ensures the integrity of the financial data and lead the continuous improvement program for the accounting systems, their feeder systems and processes for the ultimate aim of providing timely and accurate financial information;
    - responsible for validating AMI Program invoices, ensuring the integrity of amounts payable and ongoing management of vendor contractual payments to ensure no contractual arrangements are breached;
    - capitalisation of AMI WIP – providing accurate Asset Details as per Asset Owner Capitalisation Policies;
    - day-to-day management of seven (7) AMI Finance team members;
    - key AMI Programme liaison point for internal and external audit queries; and

[232] JAM 2011, page 119

- key liaison point for all auditor activities relating to AMI – regulatory & statutory.

A significant number of these activities are specifically related to the rollout and will either not be required or be significantly reduced following completion, including:

- treasury matters;
- validating AMI invoices, payables and vendor payments; and
- capitalisation of WIP invoices.

Further, given Impaq's view of the reduction in the roles managed, Impaq believes that this role will require 0.5FTEs for 2012 and 2013 and 0.25 FTEs for 2014 and 2015.

Assistant Accountant Metering

The responsibilities of this role are[233]:

- to support the Metering Accountant with relevant AMI meter rollout databases to ensure accurate cost capture and reporting to support MRO.

Impaq accepts the need for this role for 2012 and 2013 only.

Accounts Receivable Officer

The responsibilities of this role are[234]:

- to manage retailer remittances and payments; and
- To manage the reconciliation of retailer remittances and invoices across both AMI and legacy systems during AMI Mass Rollout.

Retailer remittances and payments are network billing issue and are out of scope.

Human Resource Management

In respect of the HR function, UED has stated that the JAM SNACs business unit will contain between 150 and 180 FTEs and that this justifies an HR resource. Impaq accepts that the increment in staff due to metering regulated services justifies incremental resources and that UED's forecast of 1 FTE across UED and JEN is prudent.

8.6 Service Delivery & Contract Management

Table 203 shows UED's initial application, Impaq's assessment for the Draft Determination, the amended application from UED and the Impaq assessment

[233] JAM 2011, page 120
[234] JAM 2011, page 120

Table 203 – Service Delivery and Contract Management Costs

	2012	2013	2014	2015	Total
UED Initial Budget Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq assessment for the draft determination	517	527	541	551	2,136
UED Amended Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq Assessment	808	822	182	185	1,997

UED has provided significant detail of the resources forecast, their roles and the organisation structure for this category. Impaq is concerned that UED is depicting this area as a standalone function (with the exception of the AIMRO Compliance Specialist). Impaq accepts that due to the high level of activity during the rollout, the extensive use of contractors and the nature of the technology, a dedicated section and additional resources are warranted for 2012 and 2013. However, UED has many contractors providing services to its business that it needs to manage. The additional burden of AMI after the roll out, should be incremental to the service delivery and contract management activities already undertaken by the business. Prior to AMI, UED had contracts for meter supply, meter installation and back office functions that did not require a separate metering contract management group. Impaq does not accept that AMI will require a separate group in the future.

Impaq accepts that the additional FTEs detailed as required are warranted during the rollout. However, with the exception of the AIMRO Compliance Specialist, Impaq believes that the incremental burden of metering on current business activity would be met with an additional 0.25 FTEs for each of the roles for 2014 and 2015.

In the case of the AIMRO Compliance Specialist, Impaq accepts that the requirements of the Electricity Safety Management Scheme AMI Variation and the need for safety audits and assurances is ongoing.

Impaq accepts UED's forecast of the costs for audit, legal and consulting services.

8.7 Stakeholder Relations

Table 204 shows UED's initial application, Impaq's assessment for the Draft Determination, the amended application from UED and the Impaq assessment.

Table 204 – Stakeholder relations

	2012	2013	2014	2015	Total
UED Initial Budget Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq assessment for the draft determination	0	0	0	0	0
UED Amended Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq Assessment	219	190	111	113	633

UED has provided additional information on the roles and activities in this category. UED state that 1.69 FTEs are required, made up of:

- Industry Development Manager – 100% shared 50:50 with JEN;
- Retail Account Manager – 30% shared 68:32 with JEN;
- Stakeholder Relations Team Leader – 45% shared 68:32 with JEN; and
- Mass Rollout Stakeholder Communications Advisor – 100% shared 68:32 with JEN.

Impaq supports these requirements during the rollout. However, Impaq does not see the requirement for the Mass Rollout Stakeholder Communications Advisor after the rollout is completed.

Impaq agrees with the UED forecast for 2012 and 2013. Impaq believes that the forecast for 2014 and 2015 should be reduced to reflect to incremental nature of the activities after the rollout.

8.8 IT Opex

Table 205 shows UED's initial application, Impaq's assessment for the Draft Determination, the amended application from UED and the Impaq assessment. The JAM amended application makes no change in the IT Opex proposal for UED.

Table 205 – IT Opex

	2012	2013	2014	2015	Total
UED Initial Budget Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq assessment for the draft determination	12,077	10,881	9,502	9,541	42,000
UED Amended Application	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Impaq Assessment	12,637	11,478	10,149	10,224	44,488

Table 206 gives a summary of the IT Opex categories in the UED proposal.

Table 206 – Summary of categories of IT Opex in the UED proposal

	2012	2013	2014	2015	Total
Base IT allocation	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Software licence maintenance	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Hardware maintenance	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Operating Software maintenance	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Infrastructure support	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Metering IT Opex	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]

	2012	2013	2014	2015	Total
Subtotal Total	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Total	13,975	12,815	11,487	11,562	49,839

Table 207 shows the Impaq assessment of IT Opex which was provided to the AER prior to the draft determination.

Table 207 – Impaq Assessment of IT Opex

	2012	2013	2014	2015	Total
Base IT allocation	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Software licence maintenance	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Hardware maintenance	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Operating Software maintenance	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Infrastructure support	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Metering IT Opex	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Total	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Total	12,077	10,881	9,502	9,541	42,000

UED, in its revised submission, has rejected the adjustments proposed by Impaq. In particular in relation to “IT Infrastructure and support costs” and “Metering IT Opex”. Each of these are discussed in order.

8.9 Infrastructure support

Impaq’s previous report identified that there was excessive rack space used for AMI IT systems. JAM disagrees with this assessment and states:

While physically being able to put equipment into a rack enclosure is obviously one consideration when determining rack density, there are a number of other factors that are of equal if not higher importance. These factors combine to determine the amount and density of equipment that can be placed into a data centre and in rack enclosures.

The key factors are:

- *Power requirements: The capability of the data centre to provide the required amount of power to the rack enclosure as well as the internal power distribution design within the rack enclosure will constrain the amount of equipment that can be deployed. Typically more modern IT equipment has a higher power requirement.*
- *Cooling: The data centres cooling design will determine the ability to cool the equipment within the rack enclosure and consequently the amount of equipment that can be deployed. Advanced cooling techniques such as*

water cooling may allow a higher density of equipment over traditional air cooled data centres.

- *Equipment Weight: Data centres generally have constraints on the amount of weight that can be placed on the floor.*

For the EDC data centre, which is the production data centre for the UED and JEN metering services infrastructure, the primary constraint that is driving the density of equipment in the rack enclosures is power consumption. EDC have a maximum limit of a 3kW load on each rack. For UED and JEN the current point in-time total power requirement for the infrastructure in EDC is approximately 30kW. This means that considering power consumption alone this equipment is required to be spread across a minimum of ten rack enclosures

Impaq agrees that the factors identified by JAM are the most common limitations on the amount of equipment that can be installed in any given rack. However for JEN and UED there are racks which are only 30% used and which contain UTP patch panels and System ties. These are not power consuming devices and are not major emitters of heat (affecting cooling capacity). There are also racks with one Brocade DCX[235] switch with only fibre distribution panels and cable patch panels. These racks are 60% vacant space and not up to the 3kW limit.

Impaq has reviewed its analysis and considers that its original estimate of 30% excess space is correct and consequently a 30% reduction is considered prudent.

8.10 Meter IT

UED has provided information that the Meter IT support department has 33FTEs and that the costs of these are shared between UED and JEN. It also points out that Impaq did not take into account that these were shared resources.

Impaq however maintains that 33FTEs for maintaining the applications involved in AMI is excessive. Furthermore the salary levels that are used are in excess of the commercial standard. However Impaq has made no adjustment to the UED proposal.

8.11 Operating Expenditure Summary

Table 208 – Summary of Operational Opex – UED amended application and Impaq Assessment

($m, Real 2011)	2012	2013	2014	2015	Total
Asset Strategy and Planning - Proposal	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Asset Strategy and Planning – Impaq view	319	289	297	302	1,207
Asset Operations – Proposal	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Asset Operation – Impaq view	459	459	584	584	2,086
Customer Contact & Back Office - Proposal	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Customer Contact & Back Office – Impaq view	623	635	517	525	2,300

[235] www.brocade.com/data-center-best-practices/competitive-information/directors_env.page

($m, Real 2011)	2012	2013	2014	2015	Total
AMI Network Operations - Proposal	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
AMI Network Operations – Impaq view	1,620	1,644	1,270	1,307	5,841
Meter Data Collection - Proposal	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Meter Data Collection – Impaq view	1,626	610	0	0	2,236
AMI Transitional Business Activities - Proposal	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
AMI Transitional Business Activities – Impaq view	2,216	492	0	0	2,708
Backhaul Communications - Proposal	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Backhaul Communications – Impaq View	239	245	245	245	974
Management – proposal	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Management – Impaq view	0	0	0	0	0
Finance & HR - Proposal	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Finance & HR – Impaq view	473	483	159	162	1,277
Service Delivery & Contract Management - Proposal	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Service Delivery & Contract Management – Impaq view	808	822	182	185	1,997
Stakeholder Relations - Proposal	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Stakeholder Relations- Impaq view	219	190	111	113	633
Premises - Proposal	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
Premises – Impaq view	536	536	536	536	2,144
AMI IT– Proposal	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]	[C-I-C]
AMI IT– Impaq view	12,637	11,478	10,149	10,224	44,488
Total – Proposal	29,602	24,460	21,812	22,045	97,919
Total – Impaq view	21,775	17,883	14,050	14,183	67,891

A Worldwide AMI rollouts

A.1 Overview

Smart metering or AMI is gaining rapid acceptance in a large number of countries around the world. There are now hundreds of smart metering rollouts either in the planning phase or implementation phase. Tens of millions of smart meters are now being installed each year. In 2010 China alone ordered 38 million meters and it is expected another 42 million meters will be order in 2011. It is projected that by 2020 the vast majority of electricity customers in Europe, China and North America will have smart meters.

Almost all rollouts have come about because of Government or Regulatory mandates. Where Government mandates have not been in place rollouts have in the main been slow and not included all customers. Almost all mandated rollouts have been accelerated rollouts (ie: done in just a few years) so as to enable the realisation of smart metering benefits for all customers as early as possible.

A.2 United States and Canada

There are over 75 AMI rollouts occurring in the USA and Canada. Section A.5 details 59 of these rollouts in USA. Table 209 lists some of the larger AMI rollouts in North America. This table shows the current number of meters rolled out for each utility and the target number to be rolled out to provide all customers with AMI meters by the completion date. It also lists the AMI communications technology and the functionality implemented.

Table 209 – Larger rollouts in USA and Canada

Utility	No meters	Target no of meters	Completion by	Technology	Functionality[236]
American Electric Power	700,000	5,300,000	2016	Mainly Mesh Radio	Mainly Full AMI
Southern California Edison	2,520,000	5,300,000	2012	Mesh Radio	Full AMI
Pacific Gas and Electric	4,000,000	5,100,000	2012	Mesh Radio	Full AMI
Florida Power and Light	1,200,000	4,500,000	2013	Mesh Radio	Full AMI
Southern Company	2,750,000	4,300,000	2013	Point to point private radio	AMI – No HAN
Oncor	2,400,000	3,400,000	2012	Mesh Radio	Full AMI
CenterPoint	1,200,000	2,200,000	2012	Mesh Radio	Full AMI

[236] "Full AMI" means the full suite of AMI functionalities as listed in **Error! Reference source not found.** are included. "AMI – no HAN" means the full suite of AMI functionalities implemented with the exception of a Home Area Network (HAN) interface. "AMI w/o HAN or Service relay" – means the full suite of AMI functionalities with the exception of HAN and Connect/Disconnect (which uses a Service Relay).

Utility	No meters	Target no of meters	Completion by	Technology	Functionality[236]
NV Energy	300,000	1,450,000	2012	Point to point private radio	Full AMI
Alliant	900,000	1,400,000	2012	Point to point private radio	AMI – No HAN
Baltimore Gas and Electric	30,000	1,300,000	2013	Mesh Radio	Full AMI
Hydro Quebec	200,000	3,960,000	2014	Mesh radio	Full AMI
Hydro One	1,350,000	1,350,000	2010	Mesh radio	AMI w/o HAN or Service relay
BC Hydro	50,000	1,800,000	2014	Mesh Radio	Full AMI

A.3 Europe and Scandinavia

ENEL in Italy was one of the earliest smart metering rollouts (completed in 2006) and is still the largest in the world at 33,000,000 meters. (The other Italian Utilities have since completed rollouts.) Scandinavia has been progressing with rollouts quite quickly, but the rest of Europe is lagging. Table 210 shows the larger rollouts by country.

Table 210 – Rollouts in Europe and Scandinavia by Country

Country	No meters	Target no of meters	Completion by	Technology	Functionality
Italy	37,000,000	37,000,000	2008	PLC	AMI w/o HAN
France	300,000	30,000,000	2017	PLC	Full AMI
UK	200,000	27,000,000	2020	Radio	Full AMI
Spain	1,000,000	23,000,000	2017	PLC	AMI w/o HAN
Greece	50,000	5,500,000	2020	Undecided	Undecided
Sweden	4,000,000	4,000,000	2009	PLC	AMI w/o HAN
Finland	1,100,000	3,100,000	2014	Radio & PLC	AMI w/o HAN
Ireland	100,000	3,000,000	2020	Radio	Full AMI
Norway	200,000	2,400,000	2017	PLC	Full AMI

It is noted that the Netherlands had announced a mandated rollout of smart meters in 2008 however at the request of some consumer groups this was commuted to voluntary rollout (non-mandated). As a result the rollout of smart meters has virtually ceased.

A.4 Asia Pacific

The level of AMI activity in Asia Pacific is less than in Europe and North America. Table 211 lists the major rollouts in Asia Pacific (excluding Victoria, Australia). The number of rollouts is expected to rise significantly in the next couple of years as several countries in Asia are about to announce rollouts.

Table 211 – Asia Pacific Rollouts

Country	No meters	Target no of meters	Completion by	Technology	Functionality

Country	No meters	Target no of meters	Completion by	Technology	Functionality
China	2,000,000	400,000,000	2020	Various	Full AMI
Japan	1,400,000	50,000,000	2020	Radio	Full AMI
Korea	20,000	20,000,000	2030	Not Decided	Not Decided
New Zealand	367,000	1,800,000	2016	Mobile Phone	Part AMI

A.5 Detailed AMI Rollout information for USA

Table 212 – AMI Rollouts in USA

Utility	Actual meters rolled out	Target No of Meters	Target completion date	Technology	Functionality	Notes	Sources
AEP Ohio	110,000	Not Determined	Not Determined	Silverspring Mesh radio GE Meters ZigBee HAN	Full AMI	AEP Ohio has implemented 110,000 AMI meters in their GridSmart project which started in April 2010. The project is a full smart grid project with Distribution Automation, VoltVAR controls, as well as AMI. The trial includes HAN technology and direct	Aepohio.com Gridsmartohio.com
AEP - Indiana Michigan Power company	10,000	575,000	Not determined	Silver Spring mesh and GE meters	Full AMI	In 2008 Indiana Michigan Power installed 10,000 smart meters at South Bend to pilot the technology. Rollout timetable not determined	Indianamichiganpower.com
AEP - Texas	550,000	900,000	2013	Landis & Gyr Gridstream mesh radio	Full AMI	AEP Texas is rolling AMI in line with the Texas PUC requirements of all TDUs. Completion is scheduled for	Aeptexas.com
AEP – Oklahoma Public Service company (PSO)	13,200	530,000	2014	Silver Spring Mesh ZigBee HAN Landis & Gyr meters	Web Portal HAN Outage detection Connect/ Disconnect IHDs optional	PSO installed a smart meter trial of 14,000 meters in 2009. On 28 March 2011 it announced that it will rollout smart meters to all 530,000 customers.	psoklahoma.com
Allegheny Power (Maryland, Pennsylvania & West Virginia)	93,000	711,000	2014	Sensus - Point to Point radio and ZigBee HAN	ZigBee HAN Interval Data Connect/Disconnect	Allegheny launched pilots in Morgantown, WV and Urbana, MD to test smart meters and thermostats (1,140 meters installed). In PA, Act 129 (2008) requires electric distribution companies with more than 100,000 customers to file a smart meter technology procurement and installation plan for Commission approval. Allegheny's plan to deploy smart meters throughout their service territory was rejected in October 2009 but a revised plan was accepted in Dec 2010. The SMI plan includes rollout of IHDs to all customers.	Allegheny Power 2008 Annual Report, MD H.B. 1072 PUC filings

Utility	Actual meters rolled out	Target No of Meters	Target completion date	Technology	Functionality	Notes	Sources
Alliant Energy – Located in Iowa, Minnesota & Wisconsin. Has two utilities - Wisconsin Power and	900,000	1,400,000	2012	Sensus - Point to Point radio and 900Mhz (but not ISM band)	Interval data, Outage management Connect/disconnect No HAN	Deployment began in WI in 2008, currently 900,000 meters are deployed with expected completion by 2012. The rollout includes gas meters too.	emeter.com, alliantenergy.com
Ameren (Illinois)	900,000	1,100,000	2012	Meters – Landis & Gyr	Interval Data No connect/disconnect No HAN	Ameren began their smart meter deployment in 2006 and reached 50% of their installation target by June 2008. Full deployment is expected by 2011-12. Ameren operations in Missouri manage 1M meters capable of remote readings. Ameren offers customers an hourly pricing tariff with pricing for the next day by hour available at www.powersmartpricing.org Ameren claim that participants in the hourly pricing program have saved on average 16% compared to normal prices	smartmeters.com
Arizona Public Service (Arizona)	600,000	1,000,000	2012	Elster Mesh radio	No HAN Remote connect /disconnect Interval Data	APS expects completion of their smart meter investments in 2012. As of May 2011 over 600,000 are already in place in the Phoenix area. APS customers can enrol in the Time Advantage Plan, a time-of-use (TOU) rate structure.	APS news release; Arizona Department of Commerce;
Austin Energy (Texas)	410,000	410,000	2010	Landis and Gyr mesh radio.	Interval data Connect/disconnect, HAN (but not	Austin Energy's smart meter program was approved in 2008, and completed in 2010.	greentechgrid.com
Baltimore Gas & Electric (Pennsylvania)	3,000	1,300,000	2013	Silverspring Mesh Radio ZigBee HAN	HAN Remote Connect/Disconnect Interval Data	BG&E began with a smart meter pilot of 3,000 meters in 2008 and was awarded $200M in SGIG funds ($452M total project value) to deploy 1.3M residential smart meters, coupled with dynamic pricing. The utility aims to deploy smart meters throughout their service territory with a planned completion date of 2014. Reimbursement for installation will not occur until 2014 pending commission approval. Also includes upgrading 650,000 gas meters.	Constellation (BG&E) press release; Baltimore Sun

Utility	Actual meters rolled out	Target No of Meters	Target completion date	Technology	Functionality	Notes	Sources
Bangor Hydro-Electric	115,000	120,000	2011	PLC (TWACS)	Interval Data	BHE has deployed 2-way smart meters to 97% of their service territory and plan to complete deployment to the remaining 3% in 2011.	www.bhe.com
CenterPoint Energy (Texas)	1,200,000	2,200,000	2013	Itron Open Way mesh radio ZigBee HAN	Interval Data Connect/Disconnect HAN Outage detection	CenterPoint Houston received approval in 2008 to install an advanced metering system across its service territory, and was awarded $200M in SGIG funds ($639M total project value) to support the deployment effort. As of May 2011 CenterPoint had installed 1.2M meters.	CenterPoint 2008 Annual Report; Navigant Consulting
Central Maine Power Company	620,000	650,000	2012	Trilliant Mesh Radio GE & Landis and Gyr meters	Full AMI	Central Maine Power Company (which is a subsidiary of Iberdrola of Spain) is rolling out smart meters for all customers in their service territory. The utility was awarded $96M in SGIG funds ($192M total project value) to assist with the planned installation. Central Maine has had opposition from consumer groups and the Maine PUC has required Central Maine to provide an Opt Out option to customers not a smart meter.	Central Maine Power Company press release
Central Vermont Public Service	50,000	180,000	2013	Radio Mesh, Does not include provision of IHDs	Full AMI – incl HAN, disconnect, interval data,	Central Vermont Public Service started in October 2010 a full rollout of smart meters to all 180,000 customers. The utility was awarded $69M ($138M total project value) in SGIG funding for the meter installation and the development of additional demand response programs.	CVPS press release, CVPS.com
Cleco Power (Louisiana)	1000	279,000	Not determined	Not Determined	Not Determined	Cleco Power intends to install a smart meter network for the utility's entire service territory pending approval from the Louisiana Public Service Commission. $20M in SGIG funds ($72.9M total project value) was awarded to the utility. Cleco are still investigating AMI technologies before making a decision on rollout	newsbanner.com cleco.com

Utility	Actual meters rolled out	Target No of Meters	Target completion date	Technology	Functionality	Notes	Sources
Commonwealth Edison (Illinois) owned by Exelon	130,000	3,800,000	Not Determined	Not Determined	Not Determined	ComEd is running a pilot in the greater Chicago area with 130,000 smart meters installed in homes. An 8,000 household subgroup is testing different dynamic pricing, in-home display, and web-portal- based information options. 31 May 2011 the trial programs are to end and decisions about rollout taken.	ComEd PowerPoint Presentation, IEE September 2010 meeting.
Connecticut Light & Power	10,000	1,200,000	Not Determined	Not Determined	Not Determined	CL&P undertook a limited study of AMI with 10,000 meters and reported the results in Feb 2010. CL&P has filed plans to deploy smart meters to all 1.2 million of its customers between 2012 and 2016. Under the plan, all CL&P customers can select different dynamic pricing structures: TOU and CPP rates for all customers, and PTR for low income customers only.	CL&P website
Consolidated Edison (New York, New York)	1500	1,500,000	2019	Not Chosen	ZigBee HAN Remote connect/disconnect	Con Ed is piloting a $6M smart grid program in northwest Queens. 300 eligible customers will test in-home displays that monitor energy usage by appliance. Con Ed is not planning to rollout smart metering until smart grid trials have been done. There is concern that Radio technologies will not work well in Manhattan.	Con Ed press release
Consumers Energy	7,000	1,800,000	2015	Silversprings networks	Full AMI	By 2012 rollout is commence to its 1.8M electric customers and be complete by 2015 In 2010 set up a successful trial of 7000 smart meters in Jackson County. In 2011 have set up a trial site called SmartStreet in East Hills, Grand Rapids, Michigan. This is a smart grid trial of 30 homes and 30 businesses. This includes a web portal plus IHDs for all customers, control of electric vehicle charging, solar PV controls, air-conditioning controls	smartgridnews.com consumersenergy.com

Utility	Actual meters rolled out	Target No of Meters	Target completion date	Technology	Functionality	Notes	Sources
CPS Energy	20,000	707,000	2016	Landis and Gyr mesh radio and meters	Full AMI	CPS has commenced rolling out a 40,000 meter AMI pilot in Jan 2011. CPS intends to install a smart meter in every home within its territory by 2015.	smartgrid.tmcnet.com
Dominion	100,000	2,400,000	Not determined	Elster Energy Axis Mesh radio	Full AMI – incl HAN	Dominion has installed 7,000 smart meters in Midlothian and 48,000 in Charlottesville to test the technology, with plans to expand testing in Northern Virginia with a 30,000 meter installation. With commission approval, the utility plans for a system wide installation of 2.4 million smart meters once testing is complete.	Richmond Times Dispatch
Detroit Edison (DTE)	300,000	2,700,000	No date set	Itron Openway Mesh radio.	Full AMI incl HAN – Smartcurrents program has 1500 customers with IHDs and smart thermostats	DTE initially tested 30,000 meters in Grosselle Township and developed a dynamic pricing pilot for 5,000 customers. DTE's "SmartCurrents" program has 300,000 meters installed and on 14 May 2011 DTE announced the planned deployment of another 800,000 meters by early 2012. This is supported by $84M in SGIG funds ($168M total project value). DTE intends to fully deploy smart meters in its service territory at a later date.	DTE press release; annarbor.com article Smartmeters.com dte.com
Duke Energy (Indiana, Kentucky, Nth Carolina, Ohio, Sth Carolina)	390,000	1,500,000	No date set	140,000 Echelon PLC meters installed together with 22,000 communications nodes. Connecting up 450,000 smart gas meters in Ohio, and 100,000 are installed so far	Connect/Disconnect, Interval data	Duke has moved forward with smart meter deployment in Ohio after receiving approval from the state commission in May 2010. As of May 2010 approximately 200,000 of the planned 700,000 meters had been installed. Duke filed with the Indiana Commission a revised pilot request for 40,000 meters to be installed in 2011 and intends to request full deployment (800,000 meters) at a later date. Duke was awarded $200M in SGIG funds for its grid modernization project that will support the deployment of 1.5M smart meters in Indiana and Ohio. Duke has trialled Echelon PLC metering but not taken it further. Duke is not intending to pursue AMI for Kentucky or Sth and Nth Carolina areas yet.	Duke press release; PowerPoint presentation, IEE September 2010 meeting Sustainability report on Duke

Utility	Actual meters rolled out	Target No of Meters	Target completion date	Technology	Functionality	Notes	Sources
Entergy New Orleans	500	7,400	2011	Sensus FlexNet AMI – point to point radio from towers	Full AMI incl HAN	Entergy plans to pilot smart meters and dynamic pricing in low-income households in New Orleans. A total of 7,400 homes will have AMI meters installed and of these 3,600 will have IHDs. 2,400 customers will be able to go on-line to check usage. 400 will have a smart thermostat. Another 400 will be in peak time rebate. The utility was awarded $5M in SGIG funding ($10M total project value) to support this project.	Entergy New Orleans press release
FirstEnergy Corp (Comprises 11 utilities)	5,000	58,000	Not determined	Not determined	Not determined	FirstEnergy is moving forward with its Smart Grid Modernization Initiative as advanced metering infrastructure (AMI) was approved by the PUCO in June 2010. FirstEnergy Corp has used part of the $57.4M SGIG award and matching company money to install 5,000 residential smart meters in the Cleveland Electric Illuminating Company service territory. Time-of-Use rates and other incentive programs are being piloted over a 3 year period. Another 39,000 meters could be installed later with cost recovery to be addressed at a later date. In York, PA, FirstEnergy seeks 14,000 customers to be volunteer participants in a two-way demand response system.	Public Utility Commission of Ohio press release; cleveland.com
Hawaii Electric Company	14,400	451,000	Not determined	Not determined. Trial has used Sensus FlexNet point to point radio	Not determined	HECO is planning to deploy smart meters throughout their service territory by mid-decade using company funding. HECO received a $5.4M SGIG award, however, their proposal did not include smart meter details HECO piloted 9,400 Sensus smart meters in 2008/9 and found considerable communications problems. HECO is now trialling another 5,000 second generation Sensus meters to see if this fixes the problems. No decision has been made on rollout	Energy Efficiency News; HECO press release

Utility	Actual meters rolled out	Target No of Meters	Target completion date	Technology	Functionality	Notes	Sources
Idaho Power	380,000	478,000	2012	Landis & Gyr meters & TWACs PLC	Interval Data Remote connect/disconnect	Idaho Power engaged in a smart meter pilot in 2007 with full deployment to 478,000 customers expected by 2011. By the end of 2010, 334,000 Idaho Power customers had smart meters. The utility received $47M ($94M total program cost) of SGIG funds to support the deployment effort.	Idaho Power press release & AMI FAQ page; Idaho Power AMI deployment map
Indianapolis Power & Light	2,000	28,000	2013	Silver Springs Wireless mesh	Full AMI incl HAN	As part of IPL's residential focused Smart Energy Project, 28,000 smart meters will be installed throughout IPL's service territory. IPL was awarded $20M in SGIG funds (total program cost, $48.78M) to deploy smart meters along with 22,000 HANs for IHDs and PCTs	IPL press release; AllBusiness
Los Angeles Department of Water and Power	76,500	76,500	2011	Smartsynch	Not Known	Los Angeles DWP has 1.4 million electricity customers and has implemented a trial AMI project of 64,000 residential customers with monthly energy consumption over 1200 kWh; 10,000 high turn-over residencies; and 2,500 critical care residential customers. LADWP received $60M in SGIG funds.	California Energy Commission
JEA (Jacksonville, Tennessee))	3000	103,000	2012	Tantalus wireless network connected to FTTH fibre.	Full AMI including HAN	JEA has 417,000 electricity customers and is moving forward with smart meters and is running a dynamic pricing pilot and consumer engagement software for 3,000 customers. The utility was awarded $13M in SGIG funding for this project. JEA owns a major fibre network and announced a program to install another 100,000 smart meters attached to the fibre network plus a triple play media offering.	DOE Recovery Act Jea.com
Louisville Gas & Electric (Owned by PPL)	Not determined	2,000	Not determined	Not determined	Not determined	LG&E has 394,000 electricity customers and is in the third year of a Responsive Pricing and Smart Meter pilot program. 100 customers have time of use (TOU) pricing.	LGE POWER Source newsletter

Utility	Actual meters rolled out	Target No of Meters	Target completion date	Technology	Functionality	Notes	Sources
Madison Gas & Electric (Wisconsin)	1,750	1,750	Not determined	Not determined	Not determined	MGE generates and distributes electricity to 138,000 customers. MGE is installing a small-scale smart grid network, including meters, EV charging stations, and in-home management systems. $5.5M in SGIG funds ($11M total project value) was awarded to the utility to support their efforts.	MGE press release; DOE Recovery Act, Smart Grid
National Grid (Massachusetts & New York State)	0	54,400	Not Determined	Not Determined	Not Determined	National Grid is a UK company which owns four utilities in the North eastern USA. Total customer numbers is 3.4 million. Under the MA Green Communities Act, all four utilities submitted plans for a smart grid pilot. National Grid's plan is currently being considered by the Commission and, if approved, would deploy 15,000 smart meters to customers in the Worcester area. National Grid has also proposed a smart grid demonstration program in the Syracuse area, that includes a planned deployment of 39,400 meters at a cost of $123M	www.smartmeters. com; Worcester Business Journal
Florida Power and Light (FPL)	1,200,000	4,500,000	End 2013	Silverspring Mesh with GE meters	Full AMI	FPL's Energy Smart Florida program, includes 2.6M smart meters for customers in south Florida. FPL plans to deploy smart meters throughout their service territory with assistance coming from a $200M SGIG award.	Sun Sentinel; fpl.com
Nebraska Public Power District	29,000	68,500	End 2015			NPPD is small municipal utility with about 80,000 customers. NPPD in the process of installing smart meters throughout the state. 68,500 smart meters will be installed by 2015. As of August 2010 a total of 29,000 meters have been installed.	NPPD AMI FAQ; Smart Grid Investment Clearinghouse

Utility	Actual meters rolled out	Target No of Meters	Target completion date	Technology	Functionality	Notes	Sources
NSTAR (Massachusetts)	2000	2,800	2012	GE IHDs for some trial customers Tendril customer web portal Smart thermostats	ZigBee HAN	NSTAR has 1.1 million electricity customers in Massachusetts and is installing 2,800 smart meters in Newton, Hopkinton, and Jamaica Plains as part of a $16M pilot project approved by the Massachusetts Public Utilities Commission. The project is more of a smart grid project than a smart metering one and is expected to run through 2012. NSTAR's investments satisfy the 2008 Green Communities Act requirement that all public utilities in Massachusetts develop and implement a smart grid pilot.	smartmeters.com; NSTAR press release
NV Energy	300,000	1,450,000	2012	Sensus FlexNet point to point RF	ZigBee HAN, Remote connect/disconnect Interval data Outage detection	NV Energy received approval from the Public Utilities Commission of Nevada on July 28, 2010 to go forward with their Advanced Service Delivery (ASD) allowing for the installation of 1.45M smart meters. $138M in SGIG funds ($301M total project value) was awarded to the utility to assist with this effort. 10,000 meters are planned for installation in 2010 with project completion by 2012.	PR-Inside; T&D World, smartmeters.com
Oklahoma Gas & Electric	200,000	771,000	2012	Silver Spring Mesh radio with ZigBee HAN and GE meters	ZigBee HAN Remote connect/disconnect Interval data Outage detection	OG&E has installed 200,000 meters with full deployment of a smart grid network to the entire service territory, including 771,000 meters and dynamic pricing options available by 2012. OGE has received approval from the Oklahoma Corporation Commission and was awarded $130M in SGIG funds ($366M total project cost).	smartmeters.com, Silverspringnetworks.com

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Oncor (Texas)	1,400,000	3,400,000	2012	Landis & Gyr Mesh Radio with ZigBee HAN	ZigBee HAN Remote connect/disconnect Interval data Outage detection	Originally a deployment of 600,000 DCSI TWACS meters were done but these could not meet the requirements for reliable provision of interval data. Oncor subsequently trialled Current BPL technology in 2006 and found this PLC technology was also unreliable. Oncor then changed to Landis & Gyr mesh radio which works well. Oncor's program expanded for all customers in north Texas; as of June 30, 2010 over 1,000,000 meters were installed; full deployment of 3.4M meters is expected by 2012. The Texas PUC has required Oncor to provide IHDs to low income consumers. The cost of doing this is about $10m	Dallas Morning News; Navigant Consulting
Orlando Utilities Commission (Florida)	20,000	60,000	2012	Elster Mesh Radio 1000 meters with disconnect contactors No HAN,	Interval data	OUC is a municipal electricity utility supplying 254,000 customers, located in Orlando, FL, has about 20,000 meters on the Elster Energy Axis two way communication AMI system. In June 2010 OUC committed another $3.4m for smart meters.	metering.com
Pacific Gas & Electric	4,000,000	5,100,000	2012	Silver Springs Mesh radio ZigBee HAN Mix of Landis & Gyr meters and GE meters.	HAN, Interval data Outage detection Remote connect/disconnect	Originally installed some 700,000 DCSI TWACs PLC meters through 2005 & 2006. These were not able to reliably provide interval data and hence the rollout was stopped. In 2006 PG&E reviewed a range of technologies and decided to use Silver Spring mesh radio. As of May 2011 more than 4M electric smart meters have been installed throughout PG&E's service territory. A critical peak pricing (CPP) rate structure is in place for some customers along with a voluntary SmartRate program. The utility expects to reach full deployment by 2012. PG&E have also installed about 4M smart gas meters. The Gas meters use separate communication to the electricity meters. An Opt Out option is now available which has monthly costs for manually reading meters.	PG&E Smart Meter executive summary

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PECO Energy Company	170,000	787,000	2012	Sensus FlexNet RF point to point technology Meter vendors – Sensus, Elster & Landis and Gyr	HAN, Interval data Outage detection Remote connect/disconnect	PECO intends to upgrade its communications infrastructure to support a smart meter network with installation of meters by end 2012. Washington DC will be completed (255,709) by end 2011 and Maryland (531,354) by end 2012. PECO received the maximum SGIG award of $200M to support their smart grid efforts.	PECO.com
Pennsylvania Power and Light (PPL)	1,400,000	1,400,000	2005	DCSI TWACs power line carrier	Interval Data Outage detection	PPL was one of the first utilities to rollout AMI. The technology used was PLC and the rollout was completed in 2005. All Customers are read every 6 hours and energy data for yesterday is available today on the PPL website..	
PEPCO Holdings	400,000	1,900,000	2013	Silver Spring Mesh radio Broadband backhaul by Verizon	ZigBee HAN, Remote connect/disconnect Interval data	In January 2010, PEPCO received DC Commission approval to install smart meters in DC and received MD commission approval in August 2010. With intentions to fully deploy smart meters in its entire service territory by 2013, PEPCO is installing 280,000 meters in DC by the end of 2011 and 570,000 meters in MD. PEPCO received $168.1M in SGIG funds ($300M total combined value for two projects) to assist with their investments. Demand response from TOU and CPP are integral to business case	Washington Post: Reuters; Washington Informer; PEPCO press release
Portland General Electric	800,000	850,000	2011	Sensus FlexNet	ZigBee HAN Remote connect/disconnect Interval data	PGE's smart meter program was approved by the commission in 2008; full deployment is expected to be completed by the end of 2011.	PGE Earnings Report; PGE Smart Meters web page

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Progress Energy		160,000	Not determined	Not Determined	Not Determined	Progress Energy includes two utilities in the Carolinas and Florida with a total of 3.1 million customers. Progress Energy is planning to deploy 160,000 smart meters, building off of the success of its EnergyWise program that provides energy savings to 400,000 residential customers through direct load control on certain appliances. Progress received a $200M SGIG award to assist with meter deployment and other customer-facing initiatives. Duke Energy announced acquisition of Progress Energy in Jan 2011. Progress Energy' AMI plans are on hold.	Progress Energy press release
Public Service Electric & Gas Company (PSE&G) (New Jersey)	5,000	17,500	2012	Not available	Not Available	PSE&G has 2.1 million electricity customers and 1.7 million gas customers. PSE&G received approval from NJ Board of Public Utilities to install 17,500 smart meters in three Passaic County towns. PSE&G are not in a hurry to rollout smart meters to all customers	PR Newswire
Puget Sound Energy	1,400,000	1,400,000	2003			PSE did a smart metering rollout between 2011 to 2003 and also ran a customer response trial from 2003 to 2004	PSE press release
Sacramento Municipal Utility District (Sacramento CA)	540,000	620,000	2011	Silver Springs Networks	ZigBee HAN, Remote connect/disconnect Interval data, Outage detection	SMUD has 592,000 customers in Sacramento CA. The utility board approved a 30-month rollout of the meters in June 2009. SMUD plans to install meters throughout their service territory along with dynamic pricing, 100 EV charging stations, and 50,000 demand response control devices. SMUD was awarded $127.5M in SGIG funds ($307.7M total project value) to support their efforts.	Sacramento Bee article; DOE Recovery Act, Smart Grid smud.org

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Salt River Project	680,000	935,000	April 2013	Elster mesh radio and Elster meters	No HAN Remote connect/disconnect Interval data Web portal and usage emails for customers	Salt River Project currently has approximately 680,000 meters installed and intends to complete rollout by April 2013.. Their next step is to provide a dynamic pricing structure to their customers. Salt River Project received $56.8M in SGIG funds (total program cost, $114M) to support the 540,000 smart meter investment. Offering customers optional TOU tariffs	SRP Smart Meter Page; metering.com ; Phoenix Business Journal article
San Diego Gas & Electric	1,200,000	1,400,000	2011	Itron Open Way mesh radio	ZigBee HAN Remote connect/disconnect Interval data Outage detection Web portal and usage emails for customers	SDG&E's full scale smart meter deployment and infrastructure investment has been approved by the CA Commission. This $572M project will be complete in 2011. As of August 2010, SDG&E was installing 6,000 meters per day. SDG&E was awarded $28.1M in SGIG funds ($60.1M total project value) to develop the infrastructure to support the deployment of smart meters.	SDG&E Smart Meter website
Southern California Edison	2,520,000	5,300,000	2012	Itron Openway mesh radio ZigBee HAN Landis & Gyr meters	ZigBee HAN Remote connect/disconnect Interval data Outage detection Web portal and usage emails for customers	Deployment began in June 2009, with full deployment expected by 2012 at a cost of $1.6B. As of May 2011, 2.5M meters were installed. Critical Peak Pricing (CPP) and Peak Time Rebate (PTR) rates are available to customers with enabling technologies.	SCE Presentation, IEE September 2010 meeting

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Southern Company (incl – Georgia Power, Alabama Power, Gulf Power)	2,750,000	4,300,000	End 2013	Sensus FlexNet using licenced spectrum, point to point technology	Remote connect/disconnect Interval Data No HAN	Southern Company is moving forward with smart meter deployments throughout its service area. Georgia Power has deployed 1.3M meters out of a planned 2.5M; Alabama Power has deployed 1.45M smart meters; Gulf Power has deployed 13K of 420K meters. Southern Company is projected to reach full deployment by 2012-2013. Southern Company was awarded $165M in SGIG funds (total program cost, $330M) to upgrade necessary infrastructure. Georgia Power receiving negative press about high bills happening after smart meters installed	GA Power smart meter page; AL Power smart meter page; Reuters press release; Greentech Media article
Tampa Electric (Florida)	250	10,000	2012	Variety	Remote Connect/Disconnect for the 10,000 meter trial	TECO implemented a drive by AMR system for about half their meters several years ago. TECO is piloting a set of 250 smart meters in two of Tampa's most recently erected high-rise buildings. This uses the EKA cellular mobile technology. Plans to extend the pilot to 10,000 units to test remote connect/disconnect and DSM in 2010 or 2011.	metering.com
Tacoma Public Utilities (Washington)	17,000	17,000				Tacoma Public Utilities has 170,000 customers and currently has 17,000 smart meters installed and are seeking assistance from the federal government for an additional 135,000 meters.	Mytpu.org

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Texas New Mexico Power (Texas)	10,000	231,000	2013	SmartSynch – public wireless point to point	ZigBee HAN Remote connect/disconnect Interval data Outage detection Web portal and usage emails for customers	A trial of 10,000 smart synch was undertaken in 2009 and worked well. TNMP decided in May 2010 to expand rollout of meters to entire service territory by 2013. The utility is employing SmartSynch's residential Smart Meter solution which uses standard IP communications via public wireless networks.	TNMP press release
Tucson Electric Power	30,000	100,000		Itron AMR (not AMI)	Interval Data only (one way communications)	TEP has expanded advanced metering infrastructure and related support technologies to roughly 100,000 of their 400,000 customers.	Itron.com; metering.com
Westar Energy (Kansas)	1,500	45,000	2013	Elster Energy Axis mesh radio	ZigBee HAN Remote connect/disconnect Interval data Outage detection Web portal and usage emails for customers	Westar serves 690,000 customers in Kansas. Westar is piloting smart meters in its SmartStar project in Lawrence, KS. SmartStar is a customer- centric project and all customers are being offered a personal energy web portal accompanying the smart meter installation. The project includes other infrastructure required to support system wide deployment of smart metering. The project is expected to take between 24 and 36 months to implement, with meter installations beginning Q2 2011. Westar was awarded $19M in SGIG funds (total project value, approx. $40M). Full rollout will be determined once the SmartStar project is completed.	Marketwire.com article Smartstarlawrence.com Westarenergy.com

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Xcel Energy	20,000	50,000	No target	SmartSynch Current group	Full AMI	Excel energy serves 3.3 million electricity customers in Colorado, Michigan, Minnesota, New Mexico, North Dakota, South Dakota, Texas, and Wisconsin.Xcel is piloting a smart grid system known as SmartGridCity in Boulder, CO, testing peak pricing and in-home power monitoring and management technologies. The project was originally to cost $15.3M but as of Jan 2011 is now $44.8M. The project has been plagued with equipment faults, communications problems and software problems. The	SmartGridCity, Xcel FAQ
Total		64,839,650					