



## **ADVANCED METERING INFRASTRUCTURE**

### **BUDGET APPLICATION 2009-11**

**Version - Public**

**27 February 2009**

## Certification

I certify that in my opinion the information contained in this document is, to the best of my knowledge and belief, a true and fair view of the current and future financial and operating performance of CitiPower's metering business. My opinion is based on assessments of CitiPower's internal and external experts and advisors, and is based on their advice that the document is based on the regulatory principles and methodology required by the Australian Energy Regulator.

  
.....  
**Shane A Breheny**  
Chief Executive Officer

## Table of Contents

CERTIFICATION.....	2
TABLE OF CONTENTS.....	3
ABBREVIATIONS.....	5
<b>1. EXECUTIVE SUMMARY.....</b>	<b>6</b>
<b>2. INTRODUCTION.....</b>	<b>8</b>
2.1 BACKGROUND.....	8
2.2 PURPOSE OF THIS BUDGET APPLICATION.....	8
2.3 OUTLINE OF THIS BUDGET APPLICATION.....	9
<b>3. IMPACT OF AMI PROGRAM ON CITIPOWER.....</b>	<b>11</b>
3.1 OVERVIEW.....	11
3.2 PROJECT OBJECTIVES.....	11
3.3 KEY AREAS OF IMPACT.....	11
3.4 KEY AREAS OF COMPLIANCE.....	12
3.5 GOVERNANCE ARRANGEMENTS.....	13
3.6 FINANCIAL / COST IMPACT.....	13
<b>4. AMI PROGRAM REQUIREMENTS.....</b>	<b>14</b>
<b>5. FUNCTIONALITY AND SERVICE LEVEL REQUIREMENTS.....</b>	<b>16</b>
<b>6. METER VOLUMES.....</b>	<b>18</b>
<b>7. OVERVIEW OF COMPETITIVE TENDERING PROCESS.....</b>	<b>20</b>
7.1 APPROACH TO PROCUREMENT.....	20
7.2 CORPORATE GOVERNANCE AND PROBITY.....	22
7.3 PROCUREMENT PROCESS.....	23
7.4 CONTRACTUAL ARRANGEMENTS.....	26
<b>8. CAPITAL EXPENDITURE 2009-11.....</b>	<b>28</b>
8.1 METER SUPPLY AND INSTALLATION.....	29
8.1.1 Meter supply.....	29
8.1.2 Logistical support.....	30
8.1.3 Installation.....	30
8.2 COMMUNICATIONS TECHNOLOGY SUPPLY AND INSTALLATION.....	33
8.2.1 Communications technology selection.....	33
8.2.2 Communications technology supply.....	36
8.2.3 Installation of communications infrastructure.....	36
8.3 INFORMATION TECHNOLOGY.....	37
8.3.1 IT program management.....	42
8.3.2 Infrastructure.....	42
8.3.3 Mobility.....	44
8.3.4 Interval meter billing.....	45
8.3.5 Meter/data management system and scaling.....	45
8.3.6 System and NMS integration.....	47
8.3.7 Workforce scheduling.....	47

## CITIPOWER'S BUDGET APPLICATION 2009-11

---

8.3.8	Network management.....	48
8.3.9	Other.....	49
8.4	PROGRAM GOVERNANCE AND MANAGEMENT/CHANGE MANAGEMENT .....	50
<b>9.</b>	<b>OPERATING COSTS .....</b>	<b>53</b>
9.1	METER DATA SERVICES .....	53
9.2	OPERATION AND MAINTENANCE OF IT.....	54
9.3	COMMUNICATIONS OPERATIONS .....	55
9.4	TELECOMMUNICATION SYSTEMS WAN/BACKHAUL.....	55
9.5	CUSTOMER SERVICE ASSOCIATED WITH AMI TECHNOLOGY .....	57
9.6	METER MAINTENANCE .....	58
9.7	CUSTOMER RESPONSE TRIALS .....	58
9.8	EXECUTIVE AND CORPORATE OFFICE SERVICES .....	58

### APPENDICES

<b>A</b>	CHED SERVICES PTY LTD, ADVANCED METER INFRASTRUCTURE QUALITY ASSURANCE REVIEW, FINAL REPORT, KEMA, NOVEMBER 2008
<b>B</b>	CHED SERVICES PTY LTD, ADVANCED METER INFRASTRUCTURE INDEPENDENT TECHNICAL REVIEW, TECHNICAL ASSESSMENT REPORT, KEMA, OCTOBER 2008
<b>C</b>	AUDIT OF AMI PROGRAMME SOURCING PROCESSES, PORTLAND GROUP, 16 JANUARY 2008
<b>D</b>	AMI RFP INTERIM DRAFT REPORT PROCUREMENT AUDIT, PORTLAND GROUP, 20 SEPTEMBER 2007
<b>E</b>	AMI RFP INTERIM DRAFT REPORT SOURCING STRATEGY AUDIT, PORTLAND GROUP, 20 SEPTEMBER 2007
<b>F</b>	PROBITY AUDIT SUMMARY CONDUCTED FOR CHED SERVICES PTY LTD, PORTLAND GROUP, 19 JANUARY 2009
<b>G</b>	PROVISION OF SOURCING AND EVALUATION SERVICES FOR THE AMI PROGRAMME, DELOITTE, 15 FEBRUARY 2008
<b>H</b>	CITIPower 2008 – 2013 METERING & FIELD SERVICES AGREEMENT
<b>I</b>	CHED SERVICES 2008 – 2013 METERING & FIELD SERVICES AGREEMENT (CITIPower)
<b>J</b>	CITIPower 2008 - 2010 SERVICES AGREEMENT
<b>K</b>	AMI VENDOR SECURITY THREAT AND RISK ASSESSMENT, CSC, SEPTEMBER 2008

## **Abbreviations**

AER	Australian Energy Regulator
AMI	Advanced Metering Infrastructure
B2B	Business to Business
CCWG	Consumer Communications Working Group
CIS	Customer Information System
CSC	Computer Sciences Corporation
CT	Current Transformer
DOI	Department of Infrastructure
DPI	Department Primary Industries
DR	Disaster Recovery
ESCV	Essential Services Commission of Victoria
FRC	Full Retail Contestability
GIS	Geographic Information System
GSL	Guaranteed Service Level
HAN	Home Area Network
IMRO	Interval Meter Rollout
ISM	Industrial, Scientific and Medical Radio Band
MDM	Meter Data Management
MMS	Meter Management System
MRIM	Manually Read Interval Meters
NEMMCO	National Electricity Market Management Company
NER	National Electricity Rules
NIEIR	National Institute of Economics and Industry Research
NMS	Network Management System
NOC	Network Operations Centre
OIC	Order in Council
PSTN	Public Switched Telephone Network
RFI	Request for Information
RFP	Request for Proposal
SLA	Service Level Agreement
TWG	Trials Working Group
USB	Utility Service Bus
WAN	Wide Area Network

## **1. Executive summary**

The Victorian Government has mandated that Advanced Metering Infrastructure (AMI) be rolled out to all customers consuming less than 160MWh of electricity per annum between 2009 and 2013. The legislative basis for this rollout was established in August 2006 through amendments to the Electricity Industry Act 2000. These amendments also provided powers for the Victorian Government to create a number of Orders in Council (OIC) relating to areas including cost recovery, functional requirements and service standard specifications.

The AMI program has emerged from a related metering initiative, the Interval Meter Rollout (IMRO) Program. The IMRO program commenced following a July 2004 determination by the Essential Services Commission of Victoria (ESCV) that a rollout of interval meters was required to achieve cost effective pricing and develop the technological platform necessary for the realisation of a range of potential economic and social benefits. The IMRO initiative anticipated an industry wide rollout of 1.6 million type 5 interval meters across Victoria. In 2006, the Department of Infrastructure (DOI) undertook a review into interval metering which resulted in the decision that IMRO requirements should be expanded to include two way communications to all customers consuming less than 160MWh per annum in Victoria. Significantly, the DOI review concluded that there was a positive business case for the additional expenditure on two way communications infrastructure based on a minimum functionality which would enable remote meter reading and remote connection and disconnection of customers. On this basis the IMRO program transitioned to the AMI regime.

This Budget Application provides CitiPower's expenditure for regulated services for each year of the initial AMI budget period (2009-11) including total maintenance and operating expenditure and total capital expenditure. It has been prepared in accordance with clause 5A.1(a) of the AMI OIC that requires a distributor to lodge a Budget Application by no later than 27 February 2009.

The expenditure proposed in this Budget Application will be incurred in response to the Victorian Government's decision to mandate the rollout of AMI to all customers consuming less than 160MWh per annum.

Under the AMI program, some 2.9 million new "smart" meters will be installed over a four year period in Victoria (approximately 0.3 million by CitiPower). These AMI meters will allow Victorian consumers to better manage their energy use by providing more detailed information about their consumption and the opportunities available to save money and reduce greenhouse gas emissions.

The philosophy the business has employed in preparing this Budget Application is to use wherever possible market generated information. To this end, the majority of the forecasts presented in this Budget Application are based on costs derived from competitive tenders. At the time of preparing the Budget Application however, a number of these tendering processes are incomplete. As a consequence, the costs presented are generally representative of the average short listed vendor forecasts. By

## CITIPOWER'S BUDGET APPLICATION 2009-11

---

1 June 2009, the business expects to be in a position to provide the outcomes of each of its competitively tendered contracts.

The business expects to submit a revised budget application under clause 5B.3 of the AMI OIC at the same time that it submits its 2009-11 Charges Application which is due on 1 June 2009. A further revised budget application under clause 5B.3 of the AMI OIC may be submitted by 31 August 2009 if additional contracts are entered into between 1 June and 31 August 2009 or if there is a material change in a metering regulatory obligation or requirement.

The table below summarises the expenditure required over the period 2009-11.

	2009	2010	2011
Capital expenditure	23,683	42,829	46,976
Operating expenditure	13,988	10,088	10,358
<b>Total expenditure</b>	<b>37,671</b>	<b>52,917</b>	<b>57,334</b>

Table 1: Total expenditure (\$'000 2008)

## 2. Introduction

### 2.1 Background

The Victorian Government has mandated that Advanced Metering Infrastructure (AMI) be rolled out to all customers consuming less than 160MWh of electricity per annum between 2009 and 2013 and that each Victorian electricity distributor is responsible for the rollout to customers connected to its network. This means that CitiPower, as a holder of the electricity distribution licence for Melbourne's central business district, Dockland's and Melbourne's inner suburbs, will be required to install approximately 0.3 million new AMI meters over a four year period. These meters will replace existing type 5 meters (manually read interval meters) and type 6 meters (manually read accumulation meters).

The legislative basis for the AMI rollout was established in August 2006 through amendments to the Electricity Industry Act 2000. These amendments also provided powers for the Victorian Government to create a number of Orders in Council (OIC). The regulatory arrangements relating to the rollout are set out in the Order in Council made on 28 August 2007 under sections 15A and 46D of the Electricity Industry Act 2000 (AMI Cost Recovery Order) and amended by Order in Council made on 25 November 2008 (Revised OIC). The AMI Cost Recovery Order and the Revised OIC have collectively been referred to as the AMI OIC in the remainder of this document. The Revised OIC sets out the regulator's role and is the primary regulatory instrument which will guide the determination of the prudence of AMI related expenditure by the regulator. The Victorian Government's move to mandate the AMI program followed an extensive cost-benefit study.

The AMI program has emerged from a related metering initiative, the Interval Meter Rollout (IMRO) Program. The IMRO program commenced following a July 2004 determination by the Essential Services Commission of Victoria (ESCV) that a rollout of interval meters was required to achieve cost effective pricing and develop the technological platform necessary for the realisation of a range of potential economic and social benefits. The IMRO program subsequently transitioned to the AMI regime.

### 2.2 Purpose of this budget application

The Revised OIC establishes that "*the Commission*", meaning the ESCV, is responsible for ensuring that the metering charges of each Victorian electricity distribution business recover actual expenditure unless the expenditure is not within "*scope*" as defined by the Revised OIC<sup>1</sup> or is not prudent. On 1 January 2009 the ESCV's powers and functions under the Revised OIC were transferred to the Australian Energy Regulator (AER). Accordingly, the AER is now responsible for assessing and determining the cost recovery that distribution businesses are entitled to for metering services.

---

<sup>1</sup> "Scope", being the scope of activities that are reasonably required for the provision of regulated and in order to comply with the metering regulatory obligations. The "scope" is defined in Schedule 2 of the Revised OIC.



The purpose of this Budget Application is to seek the AER's approval of an expenditure budget for each year of the initial AMI budget period (2009-11) for regulated services.

Importantly, the expenditure forecast set out in this Budget Application relates to the total maintenance and operating expenditure and total capital expenditure for regulated services only.

In accordance with the requirements of paragraph 2.2.1 of the AER's Framework and approach paper - Advanced Metering Infrastructure Review 2009-11 (**Framework and Approach Paper**), which sets out the information required by distribution businesses in their initial budget applications, this Budget Application provides:

- the forecast capital expenditure and operating and maintenance expenditure for AMI related regulated services for each year of the initial budget period;
- the information required under the AER's Framework and Approach Paper;
- completed templates issued by the AER;
- CitiPower's competitive tender process, that has been applied to award contracts for the provision of regulated services;
- the forecast number of metering installations that CitiPower proposes to install each year; and
- all other relevant information used by CitiPower in preparing this Budget Application for the AER.

This Budget Application has been prepared in accordance with, and gives effect to all relevant legislative and regulatory instruments as discussed in section 3.4 of this Application.

### **2.3 Outline of this budget application**

The remainder of this application is structured as follows:

- Chapter 3 summarises the impact of the AMI rollout on CitiPower;
- Chapter 4 summarises the program and scope of the activities set out in the Revised OIC and other relevant regulatory and legislative instruments, that CitiPower is reasonably required to undertake to satisfy the requirements of the AMI rollout and to comply with metering regulatory obligation;
- Chapter 5 sets out the AMI functionality and service level requirements under the regulatory and legislative framework and CitiPower's interpretation of these requirements;

## **CITIPOWER'S BUDGET APPLICATION 2009-11**

---

- Chapter 6 presents CitiPower's forecast of the number of metering installations that it is proposing to install each year of the AMI budget period (2009-11);
- Chapter 7 overviews CitiPower's competitive tendering process how it has been applied to select providers of the Regulated Services as required under the AMI OIC;
- Chapter 8 sets out CitiPower's capital expenditure for the AMI program for each year of the initial AMI budget period (2009-11); and
- Chapter 9 sets out CitiPower's operating expenditure for the AMI program for each year of the initial AMI budget period.

### 3. Impact of AMI program on CitiPower

#### 3.1 Overview

The AMI Order requires that all households and small business in Victoria, consuming less than 160MWh, will have an AMI meter installed<sup>2</sup>. This means that CitiPower must replace all existing type 5 (manually read interval meters) and type 6 meters (manually read accumulation meters) with AMI meters.

AMI meters are remotely read interval meters and therefore provide customers with half-hourly consumption measurement and recording, compared to quarterly mechanical meter reading currently available under type 5 and 6 meters. Other minimum functionality requirements of AMI meters have been prescribed by the Victorian Government in the Minimum AMI State-wide Functionality Specification (Victoria) Release 1.1.

The installation of AMI meters involves multiple technologies and communication interfaces that are both internal and external to CitiPower. It also involves the application of leading edge technologies that have not been applied elsewhere in the world in the scale proposed in Victoria.

#### 3.2 Project objectives

The Victorian Government's overall objective of the AMI rollout is to allow Victorian consumers to better manage their energy use by providing improved price signals and more detailed time of use consumption information. This will in turn allow customers to better manage their demand for peak power and thereby save money and reduce greenhouse gas emissions.

The Victorian Government's AMI rollout mandate followed an extensive cost-benefit study co-funded by the DOI and Victoria's electricity distribution and retail businesses which found that distributor-led rollout of AMI metering would deliver positive net benefits to Victorians.

#### 3.3 Key areas of impact

The rollout of AMI meters will impact significantly on the technology, business functionality, internal processes, procedures and staff of CitiPower. The key impacts are categorised as follows:

- **Meter supply and installation** - this involves the replacement of existing manually read meters with remotely read interval meters and the installation of new AMI capable accumulation or manually read interval meters in areas that are not currently covered by the AMI program. The AMI program meter supply and installation activities have been subject to competitive tender process;

---

<sup>2</sup> Smart meters are only required in areas of the State identified by the AMI Order. The AMI rollout has not been extended to all areas of the State.

- **Communications supply and installation** – communications systems and interfaces are required to expand, empower and enhance the services provided by AMI meters. This will be achieved through a mesh radio system solution which receives and transmits signals to individual meters. The mesh radio solution requires the installation of access points, relays and extenders to collect and process data;
- **Information technology** – the AMI program represents major changes to CitiPower's existing IT architecture to facilitate the rollout of smart meters, particularly in the area of meter data processing requirements. The major changes to existing IT architecture are required despite CitiPower only introducing new systems where modifications to existing systems would not be possible or would be too expensive; and
- **Ongoing operations and maintenance** – the AMI program requires ongoing operating and maintenance activities to support AMI metering services including meter data management, customer services, IT support costs, and meter maintenance.

### **3.4 Key areas of compliance**

CitiPower, as the distribution licence holder for the Melbourne's central business district, Docklands and Melbourne's inner suburbs, must comply with:

- the AER's Framework and Approach Paper;
- Victorian Government Gazette issued 22 January 2009 (**the Scope Document**);
- the Order in Council made on 25 November 2008 under sections 15A and 46D of the Electricity Industry Act 2000 (**Revised OIC**);
- the Order in Council made on 28 August 2007 under sections 15A and 46D of the Electricity Industry Act 2000 (**AMI Cost Recovery Order**);
- the Order in Council made on 12 November 2007 under sections 15A and 46D of the Electricity Industry Act 2000 (**AMI Specifications Order**);
- minimum AMI State-wide Functionality Specification (Victoria) Release 1.1; and
- minimum AMI Service Levels Specification (Victoria) Release 1.1.

CitiPower confirms that it has complied with the relevant requirements of the above instruments in preparing this Budget Application.

### **3.5 Governance arrangements**

A four tiered governance structure is in place within CitiPower to support the delivery of the AMI program and to facilitate and direct clear and efficient decision making and ensure that all AMI program timelines are met. The structure includes:

- ultimate accountability for the AMI program residing with the Board of Directors;
- strategic direction is provided by CitiPower's AMI Steering Committee;
- project sponsorship is provided by a dedicated General Manager responsible for AMI Services; and
- project management is provided by the AMI Management Team which comprises the business' internal subject matter experts and is lead by the General Manager AMI Services.

### **3.6 Financial / Cost impact**

CitiPower estimates that the total AMI rollout and business as usual metering costs<sup>3</sup> during the period 2009-11 will be \$147.9M. The table below summarises the expenditure required over the period 2009-11.

	2009	2010	2011
Capital expenditure	23,683	42,829	46,976
Operating expenditure	13,988	10,088	10,358
<b>Total expenditure</b>	<b>37,671</b>	<b>52,917</b>	<b>57,334</b>

Table 2: Total expenditure (\$'000 2008)

The philosophy the business has employed in preparing this Budget Application is to use wherever possible market generated information. To this end, the majority of the forecasts presented in this Budget Application are based on costs derived from competitive tenders. At the time of preparing the Budget Application however, a number of these tendering processes are incomplete. As a consequence, the costs presented are generally representative of the average short listed vendor forecasts. By 31 August 2009, the business expects to be in a position to provide the outcomes of each of its competitively tendered processes.

The business expects to submit a revised budget application under clause 5B.3 of the AMI OIC at the same time as it submits its 2009-11 Charges Application which is due on 1 June 2009. A further revised budget application under clause 5B.3 of the AMI OIC may be submitted by 31 August 2009 if additional contracts are entered into between 1 June and 31 August 2009 or if there is a material change in a metering regulatory obligation or requirement.

---

<sup>3</sup> Business as usual costs are included in the total forecast expenditure for the AMI rollout because in some business as usual circumstances, the business may be required to install a new AMI capable accumulation or manually read interval meter in areas the AMI program has not extended to. Consequently the cost of meters for the AMI project and business as usual fall across clauses S2.1(a)(i) and S2.1(b)(1)(i) of the Scope Document.

## 4. AMI program requirements

The Budget Application is based on the program and scope set out in the AMI OIC (including the scope of activities for CitiPower and Powercor Australia set out on page 143 of edition G4 of the Victorian Government Gazette issued 22 January 2009 (the **Scope Document**), the Order in Council made on 12 November 2007 under section 15A and 46D of the Electricity Industry Act 2000 (**AMI Specifications Order**), the Minimum AMI Functional Specification (Victoria) Release 1.1 and the Minimum AMI Service Levels Specification (Victoria) Release 1.1.

CitiPower's understanding of the mandated AMI program is as follows:

Date	Industry milestone	Interpretation
1 January 2009	Program commencement	<ul style="list-style-type: none"> <li>2009 metering charges take effect (and associated cost recovery commences).</li> </ul>
30 November 2009	NEM meter exchange process improvement (change request) operational	<ul style="list-style-type: none"> <li>Date on which NEMMCO systems are available for ongoing use (ie: testing has completed and changes are in production). Market testing will be completed in advance.</li> <li>Date is dependent on NEM Working Groups reviewing and approving changes. As a member of the relevant Groups, CitiPower will be assisting in the progress of this change.</li> </ul>
30 April 2010	Core AMI services enabled	<ul style="list-style-type: none"> <li>Date on which all market requirements for ongoing operation of core AMI services have been met ie: successful test and go-live authorisation (as required).</li> <li>Business as usual approach to testing of NEM market change is assumed though this is co-ordinated at in Industry level.</li> </ul>
30 November 2010	Core AMI Services & Service Levels commenced	<ul style="list-style-type: none"> <li>Remaining type 5 current service level expectations apply.</li> </ul>
30 June 2010	5% of AMI meters deployed	<ul style="list-style-type: none"> <li>% volume refers to minimum AMI meters deployed.</li> <li>Additional meter volumes may be deployed that are either Type 5 or Type 6.</li> </ul>
31 December 2010	10% of AMI meters deployed	<ul style="list-style-type: none"> <li>% volume refers to minimum AMI meters deployed.</li> <li>Majority of AMI meters installed as type 6 are converted to type 5.</li> </ul>
30 June 2011	25% of AMI meters deployed	<ul style="list-style-type: none"> <li>% volume refers to minimum AMI meters deployed.</li> </ul>
1 January 2012	AMI service levels apply	<ul style="list-style-type: none"> <li>"Core service" levels apply for daily data provision (type 5 AMI).</li> </ul>
30 June 2012	60% of AMI meters deployed	<ul style="list-style-type: none"> <li>% volume refers to minimum AMI meters operated to type 5 metrology (with "core service" levels).</li> </ul>
30 June 2013	95% of AMI meters deployed	<ul style="list-style-type: none"> <li>% volume refers to minimum AMI meters operated to type 5 metrology (with "core service" levels).</li> </ul>
31 December 2013	100% of AMI meters deployed	<ul style="list-style-type: none"> <li>% volume refers to AMI meters operated to type 5 metrology (with "core service" levels).</li> </ul>

Table 3: AMI program

Other relevant assumptions with respect to the AMI program include:

- distributors may initially deploy AMI meters into the field as type 6 meters (as registered in the market) on a transitional basis where applicable; and
- testing for market readiness will occur as a synchronised industry activity.

## 5. Functionality and service level requirements

The Budget Application is based on the AMI OIC, AMI Specifications Order, Minimum AMI State-wide Functionality Specification (Victoria) Release 1.1 and Minimum AMI Service Levels Specification (Victoria) Release 1.1. CitiPower's interpretation of these documents is summarised in the tables below.

Functionality	Comment
<b>Metrology</b>	
<ul style="list-style-type: none"> <li>• Daily collection of interval data &amp; total accumulated energy consumption</li> <li>• Import/export energy</li> <li>• Reactive energy (3Ø meters only)</li> <li>• Compliant to NER requirements for type 4 &amp; 6 meters</li> <li>• Compliant to NER requirements for type 5 meters</li> <li>• Minimum 35 days interval data storage</li> </ul>	99% of daily interval data to be collected by 4am next day
<b>Control</b>	
<ul style="list-style-type: none"> <li>• Remote de-energisation/re-energisation</li> <li>• Controlled load switching</li> <li>• Interface for control of other loads</li> <li>• Remote load switching override</li> <li>• Supply capacity control (normal &amp; emergency)</li> </ul>	90% of remote de-energisation/re-energisation to be performed within 30 minutes  Group commands for load control – action to be performed to 99% of meters in 1 minute  Load control commands to individual meters – 90% within 30 minutes
<b>HAN</b>	
<ul style="list-style-type: none"> <li>• ZigBee® interface in meter</li> <li>• Support for ZigBee® Smart Energy Profile including:                             <ul style="list-style-type: none"> <li>○ Load control</li> <li>○ Pricing</li> <li>○ Usage</li> <li>○ Messaging</li> </ul> </li> </ul>	AMI system now required to support up to 6 messages for ZigBee® HAN instructions per meter per day  ZigBee® network to operate in "Utility Private HAN" configuration  Connection of ZigBee® devices to AMI meter managed by utility
<b>Quality of supply</b>	
<ul style="list-style-type: none"> <li>• Supply failure detection</li> <li>• Under/over voltage</li> </ul>	
<b>Other</b>	
<ul style="list-style-type: none"> <li>• Tamper detection</li> <li>• Remote settings change</li> <li>• Event recording</li> <li>• Remote firmware upgrade</li> </ul>	

Table 4: Functionality requirements



## CITIPOWER'S BUDGET APPLICATION 2009-11

---

In terms of service obligations, CitiPower understands the following will apply:

Service obligation	Required by
Install AMI meters capable of recording half hourly interval data	Based on a forecast of the installed meter population as at 31 December 2013, minimum AMI meter installation/penetration requirements are: <ul style="list-style-type: none"><li>• 5% - 30 June 2010</li><li>• 10% - 31 December 2010</li><li>• 25% - 30 June 2011</li><li>• 60% - 30 June 2012</li><li>• 95% - 30 June 2013</li><li>• 100% - 31 December 2013</li></ul>
Remote reading of AMI meters	By 1 January 2012
Remote energisation and remote de-energisation	Best endeavours once the capability exists. [The " <i>capability</i> " includes the supporting back-office systems and processes].

Table 5: Service obligations

## **6. Meter volumes**

In accordance with clause 5.5(b) of the AMI OIC, this section presents a forecast of the number of metering installations CitiPower is proposing to install for each year of the period covered by the Budget Application. The total volume of meter installations has been derived from the application of business rules for the conversion of the existing meter population as at 2 January 2009 (as reported in the business' Customer Information System) plus the net increase in meters forecast from the business as usual activities for 2009 and beyond. All existing third party remotely read interval meters (types 1-4) have been excluded from the AMI rollout projections as have all customers consuming more than 160MWh per annum.

The business approach to physical rollout of AMI meters has been determined by reference to the mandatory requirements set out in Schedule 1 of the AMI OIC. CitiPower has also considered its technical readiness in terms of having established appropriate processes and systems that have been fully tested and implemented and the requisite field resources being in place.

The proposed annual schedule of meters to be installed is provided in the table below in compliance with clause 5.5(b) of the AMI OIC.

	2009	2010	2011
Accumulation meters	8,112	1,317	0
Manually read interval meters	1,038	157	0
AMI meters	2,888	68,098	102,377
<b>Total</b>	<b>12,038</b>	<b>69,572</b>	<b>102,377</b>

Table 6: Volumes of meters installed

Other relevant assumptions made in forecasting meter installations include:

- new connection meter volume assumptions are derived from customer growth forecasts provided by the National Institute of Economics and Industry Research (NIEIR);
- new connection meter volumes are calculated on the basis of one meter per customer;
- from January to April 2010, CitiPower will be phasing in the replacement of all new connections and meter faults with an AMI meter;
- annual fault rates for non-AMI meters is derived from the number of 2008 faults as a percentage of the 2 January 2009 meter population;
- the AMI meter fault rate is assumed to be 0.5 per cent per annum. This is based on a 0.3 per cent historical fault rate for electronic interval meters plus an allowance of 0.2 per cent for faults associated with communications equipment (which are embedded in the AMI meters);

## CITIPOWER'S BUDGET APPLICATION 2009-11

---

- annual customer initiated meter replacement rates are derived from the number of 2008 customer initiated meter replacements as a percentage of the 2 January 2009 meter population;
- annual abolishment forecasts are derived from the 2008 abolishment rate;
- the ratio of monthly to quarterly read accumulation meters is assumed to remain the same as that for 2008;
- all new connections will be supplied by single element meters;
- the mass deployment of AMI meters will be based around meter read routes; and
- AMI meters installed prior to March 2010 will be read as basic (type 6) meters. Between March and June 2010 the AMI capable installed meters with access to the communications network will be converted to remotely read type 5. AMI meters installed by new connection or normal replacement may not have access to the communications network by the end of 2011 since the communications network will not have been fully rolled out by then.

## 7. Overview of competitive tendering process

Activities to be outsourced where the tender process is deemed to comply with the requirements of the AMI OIC requirement for a competitive tender process are as follows:

- Communications technology;
- meters;
- backhaul services; and
- field services.

This section sets out the process that is proposed for competitive tenders for contracts for Regulated Services as required by clause 5.5(a) of the AMI OIC. Only the costs associated with these activities have been reported as contract costs in the cost templates.

Many other activities have been outsourced, but the process that applied in retaining those service providers may not comply with the requirements of the AMI OIC. The costs for these activities have not been reported as contract costs for the purposes of the cost templates.

### 7.1 Approach to procurement

CitiPower's approach to procurement has been:

- ensuring it acquires the most efficient and effective solution that delivers the mandated specifications;
- ensuring the compatibility of the solution with the network; and
- demonstrating the efficiency of the solution to the AER and the Victorian Government.

CitiPower will acquire all activities associated with the provision of regulated services from CHED Services Pty Ltd (**CHED Services**) except for IT hardware and one licence which will be acquired directly by CitiPower. CHED Services, like CitiPower, is ultimately owned jointly by Cheung Kong Infrastructure, HongKong Electric Holdings and Spark Infrastructure. CitiPower chose to acquire all activities through CHED Services as it offered a full "turn key" solution and enabled the business to take advantage of the economies of scale CHED Services could provide that CitiPower, on its own, would not have otherwise been able to realise.

CHED Services has subcontracted a number of activities to Powercor Network Services Pty Ltd (**Network Services**). Network Services is a separate legal entity from CitiPower, ultimately owned jointly by Cheung Kong Infrastructure, HongKong Electric Holdings and Spark Infrastructure. Network Services specialises in the

provision of project management, supply chain solutions, engineering, design and construction services. The agreement between CHED Services and Powercor Network Services is included in Appendix I.

The following activities are being provided through Network Services:

- field and logistics based activities;
- meter provision; and
- communications equipment provision.

The CitiPower Board has a strict set of principles governing any engagement of a related party, such as CHED Services, for the provision of services. Under these principles, requirements for such engagements include:

- being supported by a contract;
- the contract being on commercial terms and “*arms length*”;
- the contract being subject to independent verification;
- the transactions complying with relevant laws; and
- the transactions complying with the relevant undertakings.

As part of the Board’s requirements, KPMG was engaged to undertake a compliance review. KPMG confirmed both the contracts between CitiPower and CHED Services and CHED Services and Network Services met the Board’s principles.

Two agreements cover the breadth of services being provided by CHED Services to CitiPower. The CitiPower 2008-2013 Metering & Field Services Agreement (**Metering Agreement**) covers activities associated with:

- new connection metering and servicing – labour and materials;
- fault replacements metering and servicing – labour and materials;
- customer initiated replacements metering and servicing – labour and materials;
- non-compliance meter replacements – labour and materials;
- AMI meter accelerated rollout – labour and materials;
- AMI meter complex installations – labour and materials;
- AMI communications equipment installation and supply;
- meter maintenance;

- meter abolishments;
- provision of backhaul communications;
- project management, logistics and quality control;
- AMI project management including technology selection, forecasting, program management office, business transformation and asset management plan;
- ongoing consultancy work; and
- service maintenance.

The Metering Agreement allows for a 1 per cent margin to be applied to any outsourced metering, field or backhaul services. It also requires that AMI project management costs be inclusive of an 11.5 per cent margin. Appendix J presents the Metering Agreement in its entirety.

The remaining services are to be supplied under the existing CitiPower Services Agreement (**Services Agreement**). The Services Agreement covers activities associated with customer services, IT (excluding hardware and licences) and regulation. Appendix J presents the Services Agreement in its entirety.

The remainder of section 7 discusses the corporate governance and probity surrounding the competitive tendering processes undertaken by CHED Services and Network Services.

## **7.2 Corporate governance and probity**

The procurement processes undertaken by CHED Services and Network Services have followed appropriate corporate governance and probity and are in accordance with Corporate Procurement Policies and Procedures.

Further controls have been included for the AMI program including:

- review through the AMI Management Team;
- review through relevant General Managers;
- review by relevant AMI Stream Management Committees;
- AMI Steering Committee approval for each key milestone;
- Capital Investment Committee approval; and
- Procurement Steering Committee approval.

### **7.3 Procurement process**

Under clause 5C.2 of the AMI OIC, the AER is required to approve submitted budget expenditure unless it establishes that the expenditure is for activities outside the scope at the time of commitment to that expenditure and at the time of the determination or is not prudent. The scope for CitiPower and Powercor Australia is published in edition G4 of the Victorian Government Gazette in accordance with clause 14B.1 of the AMI OIC.

Where the relevant expenditure is a contract cost, under clause 5C.3(a), the expenditure is prudent and must be approved unless the AER establishes that the contract was not let in accordance with a competitive tender process. A “*contract cost*” is any expenditure incurred pursuant to a contract entered into prior to the day on which the distributor made its budget application, or the date on which it made a revised budget application under clause 5B.3.

Clause 5C.10 provides that in making a determination in which the AER establishes that a contract was not let in accordance with a competitive tender process, the AER must have regard to:

- the tender process for that contract;
- whether there has been compliance with that process; and
- whether the request for tender unreasonably imposed conditions or requirements that prevented or discouraged the submission of any tender that was consistent with the selection criteria.

Importantly, this means that the AER must approve submitted budget expenditure unless it can establish that the expenditure is:

- for activities that are outside scope at the time of commitment to that expenditure and the time of the budget determination; or
- not prudent.

Under the AMI OIC budgeted expenditure is taken to be prudent where that expenditure is incurred prior to the 2009-11 Budget approval date or is a contract cost, unless the regulator establishes that the contract was not let in accordance with a competitive tender process.

This means that the onus of establishing that a contract was not let in accordance with a competitive tender process is on the AER and similarly, the onus of establishing that a tender unreasonably imposed condition that prevented or discouraged the submission of tenders is also on the AER.

If expenditure is not a contract cost or the AER establishes that it was not let in accordance with a competitive tender process, then under clause 5C.3(b) that expenditure is prudent and must be approved unless the AER establishes that :

- it is more likely than not that the expenditure will not be incurred; or
- 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.

The onus is again on the AER to establish that the expenditure is not prudent under this test.

The first limb of this test can only exclude expenditure where it is more likely than not that the expenditure will not be incurred. This limb only relates to whether the expenditure will be incurred and it does not allow the AER to second guess the reasonableness of the expenditure. If the expenditure is required to be paid under a contract then that contract is evidence that the expenditure will be incurred hence the expenditure cannot be treated as not prudent under this limb.

The reasonableness of expenditure can only be examined under the second limb of this test. Under this second limb, expenditure can only be treated as not prudent if the AER establishes that the expenditure involves a substantial departure from the commercial standard that a reasonable business would exercise in the circumstances. In making that determination, the AER is required to have regard to the factors set out in clause 5I.8 of the AMI OIC.

The notes in clauses 5.5 and 5C.11 provide that, the competitive tender process need not be conducted by CitiPower, nor need the contract be one that CitiPower has entered into.

The costs forecast to be incurred by CitiPower in relation to technology, meter provision, telecommunications wide area network (**WAN**)/backhaul and field installation activities have been established by reference to a competitive tender process that is being conducted either by CHED Services or Network Services.

Where the competitive tender process has commenced but has not been completed and the contract therefore has not yet been entered into, the business has used forecasts based on the responses from vendors as part of the competitive tender process. The use of those vendor responses from a competitive tender process demonstrates that this forecast expenditure is in accordance with the commercial standard that a reasonable business would exercise in the circumstances and is therefore prudent under clause 5C.3(b).

The business believes the tender processes conducted for each activity have been highly competitive and fair to all vendors. To confirm that a competitive tender process has been used and to demonstrate that the expenditure forecasts are consistent with the commercial standard that a reasonable business would exercise in the circumstances, the tendering processes have been facilitated and reviewed by a number of parties independent of CitiPower, CHED Services and Network Services. Deloitte Touche Tohmatsu (**Deloitte**) were involved in the facilitation and review of the Request for Proposals (**RFP**) processes for technology, meters, backhaul communications and the Request for Information (**RFI**) for field services (see



Appendix G). Protiviti were involved in the facilitation and review of the field services RFP. The Portland Group was appointed as the probity auditor and has overseen the RFP processes (see Appendices C, D, E and F).

In addition to the RFP/RFI process, CitiPower has also undertaken/ensured:

- industry trials of various technologies in conjunction with the Victorian Government Department of Primary Industries (DPI) and the other Victorian distribution businesses;
- establishment of detailed evaluation framework, process and methodology;
- rigorous vendor and technical due diligence including commercial and risk assessments and reference site visits;
- independent technical review undertaken by KEMA of each short listed technology vendor's compliance with the Minimum AMI State-wide Functionality Specification (Victoria) Release 1.1 (see Appendix B);
- security review undertaken by Computer Science Corporation (CSC);
- an independent quality assurance review undertaken by KEMA (see Appendix A);
- use of expert consultants in Australia and the United States to stay informed of emerging technologies and deployments; and
- engagement of external legal advisors DLA Phillips Fox to prepare contracts.

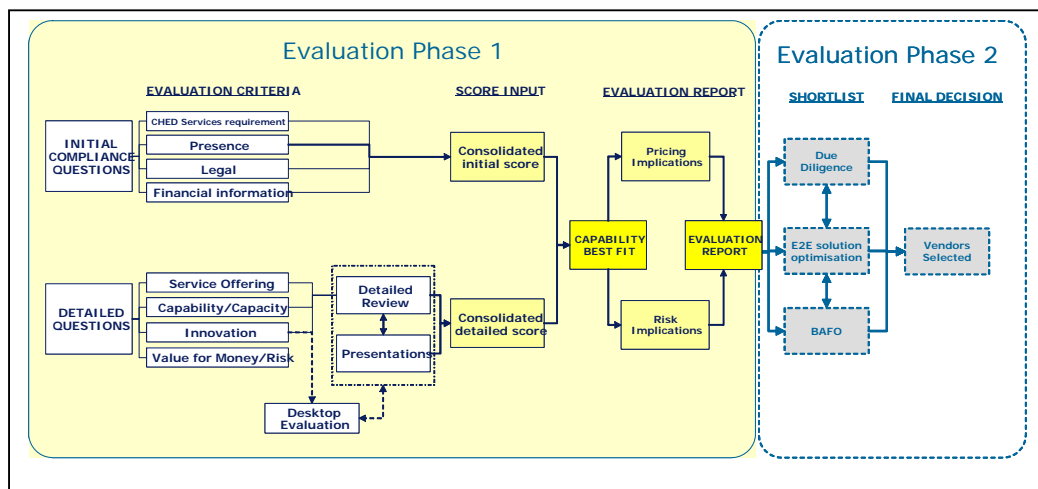


Figure 1: Tender evaluation process

As at 27 February 2009, the evaluation processes have not progressed to a final vendor selection for any individual tender. Because of the linkages between the various components of the AMI program, a decision with respect to the technology provider is necessary before the business is able to conclude the other vendor selection processes.

The business is anticipating executing a contract with a preferred technology vendor by the end of the first quarter 2009.

Once the technology provider has been secured, the business will be able to move forward on executing contracts with meter providers and a backhaul service provider. In the case of meter providers, the business is anticipating up to three providers. In the case of backhaul services, it is anticipated there will be a single provider. Contracts for meter provision and backhaul services are both expected to be executed by the end of the second quarter 2009.

An RFP for field force deployment was issued in the fourth quarter of 2008. Execution of contract(s) with the preferred vendor(s) hence is not expected to occur until the second quarter of 2009.

In the case of meters and field installation, it is anticipated multiple vendors will be engaged. The decision to engage multiple vendors is premised on limiting the risk the business would face engaging an individual vendor.

At the same time as submitting its 2009-11 Charges Application (which is due on 1 June 2009) the business expects to submit a revised Budget Application under clause 5B.3 of the AMI OIC to update technology, meter, backhaul and field deployment expenditure to reflect the actual expenditure that will be incurred pursuant to contracts that have been executed with the various service providers. A further revised Budget Application under clause 5B.3 may be submitted by 31 August 2009 should contracts be executed subsequent to preparation of the 1 June documents or should there be a material change in a metering regulatory obligation or requirement.

Once the revised Budget Application has been submitted, the expenditure that is covered by a contract that has been entered into prior to the date of the revised Budget Application will be a "*contract cost*" under the AMI OIC. It will therefore be prudent and must be approved by the AER unless the AER establishes that it is outside of the scope set out in the Scope Document or that the contract was not let in accordance with a competitive tender process.

## **7.4 Contractual arrangements**

The business engaged DLA Phillips Fox to assist in the preparation of its initial term sheet as the basis for negotiating specific contract terms and conditions with vendors. The purpose of seeking external advice was to ensure the adoption of the most reasonable and prudent contract terms and conditions. The main features of the contract terms and conditions the business has sought include:

- contract terms and duration to allow for contract extension and termination;
- reasonable termination costs;
- tiered governance structure to manage compliance with contract terms and conditions;

## CITIPOWER'S BUDGET APPLICATION 2009-11

---

- requirement for a performance security linked to the estimated overall value of the contract;
- start, stop, pause, ramp up and ramp down clauses;
- performance management service levels for support and maintenance and service credits where the relevant service levels are not met;
- warranties in relation to the standard of performance, design, delivery, compliance with laws, policies, safety standards etc;
- indemnities;
- penalties for late delivery of materials;
- insurance coverage on a per occurrence and in aggregate per annum basis; and
- escrow agreements for software, firmware and hardware.

The business believes these terms and conditions reflect an appropriate sharing of risks with vendors and will afford customers a level of protection against technological change and further shifts in the timing, functionality or services required by the AMI program. However, final contract terms and conditions will depend upon the outcome of the negotiation with vendors.

## **8. Capital expenditure 2009-11**

The AMI program is a complex undertaking involving multiple technologies and interfaces that are both internal and external to CitiPower. It also involves the application of a leading edge set of technologies that have not been applied elsewhere in the world in the volumes required for Victoria.

The leading edge nature and pace of technological advancement in the AMI field have made the business particularly conscious of securing the most efficient and effective long term solution for the benefit of its customers and the community in general. To that end, as outlined in section 7, many aspects of the AMI program have been subject to competitive tendering. CitiPower has also sought advice from a wide range of well respected advisors including Deloitte Touche Tohmatsu, Portland Group, Gibson Quai AAS and United States based Michael Wiebe Consulting in arriving at the most efficient and appropriate choices.

The major capital expenditure items for the AMI program are meter supply and installation, communications supply and installation and IT. In accordance with normal accounting practice, a proportion of program governance/change management costs have been capitalised into the AMI program expenditures.

It is expected that most AMI communications technology and meter costs will be quoted in United States dollars. The business expects to enter into exchange rate hedging arrangements at the time that AMI communications technology and meter contracts are executed to appropriately manage exchange rate risk. Expenditure on exchange rate hedging is covered by clause S2.1(b)(2)(xii) of the Scope Document. CitiPower will update the exchange rate assumption once the foreign exchange hedging contracts have been executed. The proposed exchange rate assumptions are provided in the table below.

	2009	2010	2011
US\$ per AU\$	0.659	0.650	0.638

Table 7: Exchange rate assumption (\$2008)

The capital expenditure for each year of the initial AMI budget period as required by clause 5B.1 of the AMI OIC is set out below. The expenditure presented includes all capital items included under clause S2.1(a), (b) and (c) of the Scope Document.

	2009	2010	2011
Meter supply and installation	4,049	31,180	43,259
Communications supply and installation	1,010	948	1,095
IT	18,517	10,595	2,595
Other	107	106	27
<b>Total</b>	<b>23,683</b>	<b>42,829</b>	<b>46,976</b>

Table 8: Total capital expenditure (\$'000 2008)

## 8.1 Meter supply and installation

### 8.1.1 Meter supply

As discussed in section 7, AMI meter supply is subject to a competitive tender process. As such, the unit prices presented below are based on the prices submitted by the short listed vendors. AMI meter supply unit costs will be updated in a revised Budget Application under clause 5B.3 of the AMI OIC to reflect the actual unit costs that will be incurred pursuant to the contracts with the selected vendors. That expenditure will therefore become a contract cost and thus should be considered prudent because the contract was let in accordance with a competitive tender.

There is no single metering solution. The size and purpose for which the customer uses its connection determines the most appropriate metering solution for their situation. For the purposes of the Budget Application, meters (AMI, accumulation and MRIM) have been differentiated by the phases the customer is receiving (ie: single or three phase), whether the customer requires load management (ie: is a load contactor required) and lastly whether a current transformer (CT) is required.

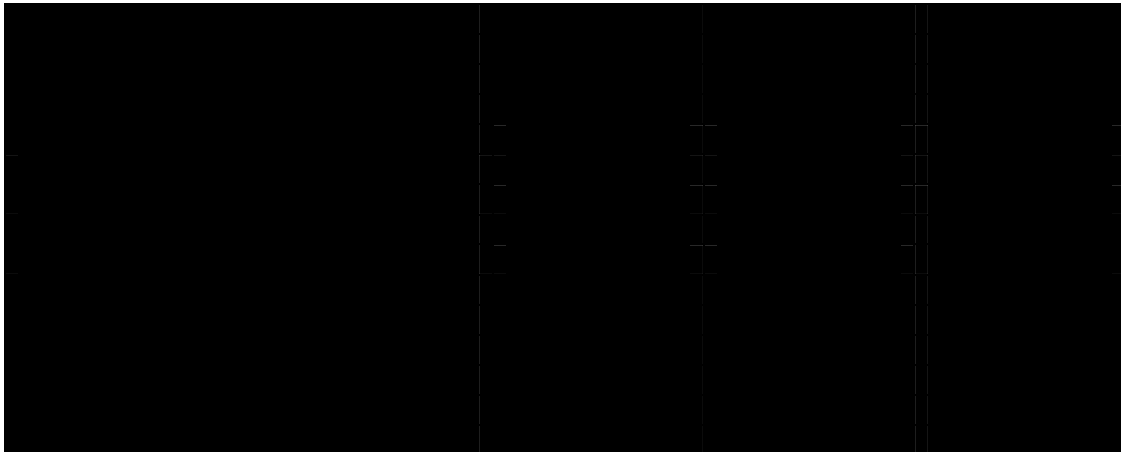


Table 9: Meter unit costs (\$2008)

Over the period 2009-11, the business will be required to meet both the requirements of the AMI program and continue its business as usual arrangements (eg: new connections, faults etc). In some business as usual circumstances, the business may be required to install a new AMI capable accumulation or manually read interval meter in areas the AMI program has not extended to. Consequently the cost of meters for the AMI project and business as usual fall across clauses S2.1(a)(i) and S2.1(b)(1)(i) of the Scope Document.

Table 10 sets out the meter supply capital expenditure.

## CITIPOWER'S BUDGET APPLICATION 2009-11

	2009	2010	2011
New connections - meters	749	2,808	3,806
Normal replacements - meters	292	960	1,126
AMI meter rollout - meters	754	17,380	25,161
<b>Total expenditure</b>	<b>1,795</b>	<b>21,148</b>	<b>30,093</b>

Table 10 Meter supply capital expenditure (Real 2008 \$)

### 8.1.2 Logistical support

Logistical support is critical to procurement, contract and supplier management and the efficient and effective delivery of materials. Logistical support includes:

- warehousing, distribution and transport between the storage facility and the installation site or vendor pick up point;
- transport of new meter/technology equipment to the customer site; and
- return, storage and disposal of removed and faulty meters.

Presently the business receives, inspects and installs a relatively modest number of meters per week (less than 200). During the AMI rollout program, this will increase to more than 1,500 meters per week. Managing volumes of this magnitude will require new and expanded capability within the business to ensure the delivery of required volumes of equipment within the required quality and time specifications.

The AMI program will necessitate the development of a more complete end to end contract fulfilment and management process. This includes quality assurance processes for contract management and monitoring, supplier quality process audits and supplier performance management.

There will also be a requirement to dispose of hundreds of thousands of non AMI meters and time switches. CitiPower will use its existing arrangements with an external provider for dismantling the meters to avoid contamination of the environment (accumulation meters generally contain lead and mercury).

Logistical support is required for both the AMI project and metering business as usual operations. As a consequence, logistical support is covered under clauses S2.1(a)(i) and S2.1(b)(2)(xi)(C) of the Scope Document. The costs associated with logistical support have been incorporated in the installation unit rates.

### 8.1.3 Installation

As noted in Section 7, the procurement process in relation to field services for the AMI program will not be completed until the second quarter of 2009. As a consequence the AMI program unit rates presented reflect the rates submitted by vendors in the fourth quarter 2008 RFP process. A revised Budget Application under clause 5B.3 of the AMI OIC will update the AMI program installation unit rates to reflect the actual expenditure that will be incurred pursuant to the contract(s) with selected vendor(s).

## CITIPOWER'S BUDGET APPLICATION 2009-11

---

That expenditure will therefore become a contract cost and thus should be deemed prudent because the contract was let in accordance with a competitive tender.

Meter installation costs have been mapped to the meter supply categories and divided by the number of meters supplied in each category to determine installation unit rates by meter supply category. In determining meter installation rates a number of factors were taken into account including:

- the circumstance under which a meter is replaced (eg: fault or AMI rollout);
- the time at which the meter is replaced (eg: normal time or after hours);
- the type of meter being removed and the type of meter being replaced;
- expectations with respect to revisits (eg: no access or inaccessible meter board);
- expectations with respect to difficult or complex sites (eg: replacing and rewiring meter panels or presence of asbestos);
- the physical location of the meter (ie: is it above 2 metres?).

As noted previously, the AMI program installation activities above will be performed by the successful vendor(s) identified through the competitive tendering process.

The costs involved in accelerated rollout installation are included under clause S2.1(b)(1)(i) of the Scope Document.

In addition to these activities, there is a requirement for the management and oversight of the successful vendor(s) activities.

Miscellaneous installation materials, such as nuts and bolts have been included in the installation rates. These costs are covered by clause S2.1(b)(1)(i) of the Scope Document.

The unit rates in Table 11 exclude back office processing costs.



Table 11: Accelerated rollout meter replacement installation unit costs (Real \$2008)

The unit rates in Table 12 are for the hazard fixes and antennas. Hazards and fixes represent a small number of special activities concerned with ensuring safety in relation to metering activities. These unit rates also exclude back office processing costs.

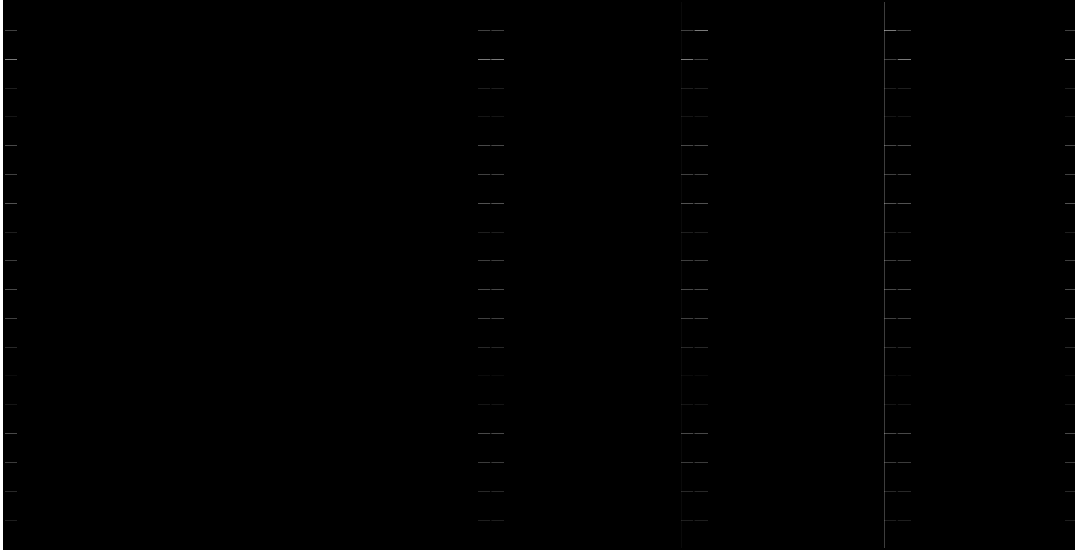


Table 12: AMI hazards and fixes and antenna replacement installation rates (Real \$2008)

In addition to the AMI program, the business will continue to be required to install meters on as a business as usual basis for new connection and fault situations. In such circumstances, the efficiencies available under the AMI program in terms of travel to and from the site and time between jobs will not be available. The costs associated with business as usual replacement meter installation (new connection installation costs are within the scope of regulated services) are covered under clause S2.1(a)(i) of the Scope Document.

In addition to the field based activities, back office support is required to initiate service orders and implement changes within relevant information systems. Specifically the functions undertaken in the back office include:

- processing the schedule of meter exchanges;
- managing service orders for meter exchanges;
- dispatching service orders to field crews;
- commissioning of two way communications;
- processing completed service orders into customer information systems;
- processing consequential tariff changes arising from the meter exchange; and
- resolving exceptions and incomplete service orders that arise from meter exchanges.



The costs associated with back office support are included under clauses S2.1(a)(i) and S2.1(b)(1)(iii) of the Scope Document.

Table 13 sets out back office costs for the accelerated AMI meter rollout.

	2009	2010	2011
Total back office	8.53	3.68	4.05

Table 13 Back office costs for accelerated AMI meter rollout (Real 2008 \$)

Table 14 sets out the total meter installation capital expenditure.

	2009	2010	2011
Normal replacements - installation	1,530	1,933	2,063
AMI meter rollout – meter installation	626	6,017	8,168
AMI meter rollout – hazards, fixes and antennas	97	2,081	2,935
<b>Total expenditure</b>	<b>2,253</b>	<b>10,031</b>	<b>13,166</b>

Table 14 Meter installation capital expenditure (Real 2008 \$)

## **8.2 Communications technology supply and installation**

### **8.2.1 Communications technology selection**

The AMI program involves expanding, empowering and enhancing the services presently received by customers. There is no single solution to delivering these enhanced services to customers but rather several solutions that involve multiple technologies and interfaces.

At its simplest level, an AMI solution will comprise a meter, a Local Area Network (**LAN**) connecting the meter to an access point or relay, a Wide Area Network (**WAN**) providing connection between the access point and the Network Management System (**NMS**).

To establish and operate the WAN, the business will be required to engage a telecommunications provider. The connectivity between the NMS and the IT systems is the responsibility of the business.

CitiPower's evaluation of potential AMI solutions has been extensive involving assessments through industry forums, internal bench and field trials and international study tours. The industry evaluation included active participation with the Industry Trials Working Group (**TWG**). The TWG was formed in May 2006 with a charter to test available AMI communications technologies.

The choice of an appropriate solution is dependent upon a number of factors. These include:

- **value:** delivery of a solution that delivers the most cost effective outcome;

## CITIPOWER'S BUDGET APPLICATION 2009-11

---

- **compliance:** the ability of a solution to deliver all the functional and service level requirements as set out in the AMI Specification Order, the Minimum AMI Functionality Specification (Victoria) Release 1.1 and Minimum AMI Service Level Specification (Victoria) Release 1.1;
- **network impact:** the compatibility of the solution with the distribution network;
- **reliability:** ability of the solution to consistently deliver the required functionality and services when required;
- **future proofing:** the ability of the solution to meet future changes in the Minimum AMI Functionality Specification (Victoria) Release 1.1 and Minimum AMI Service Levels Specification (Victoria) Release 1.1;
- **solution maturity:** the solution can be demonstrated in the field with a significant number of end points meeting the required functional and performance requirements; and
- **security:** the solution must demonstrate effective security controls to safe guard system and personal information.

Based on an assessment of each technology against these criteria, CitiPower has adopted a predominantly mesh radio based solution as shown in the table below.

Technology	Share(%)
Mesh	100
Point to point (mobile wireless)	0
<b>Total</b>	<b>100</b>

Table 15: Proportion of meters read by each communications technology

Mesh radio is a private radio network technology, operating in one of the unlicensed ISM bands for communicating with meters. The access point receives and transmits signals to meters which in turn pass these signals through to other meters, as illustrated in the diagram below.

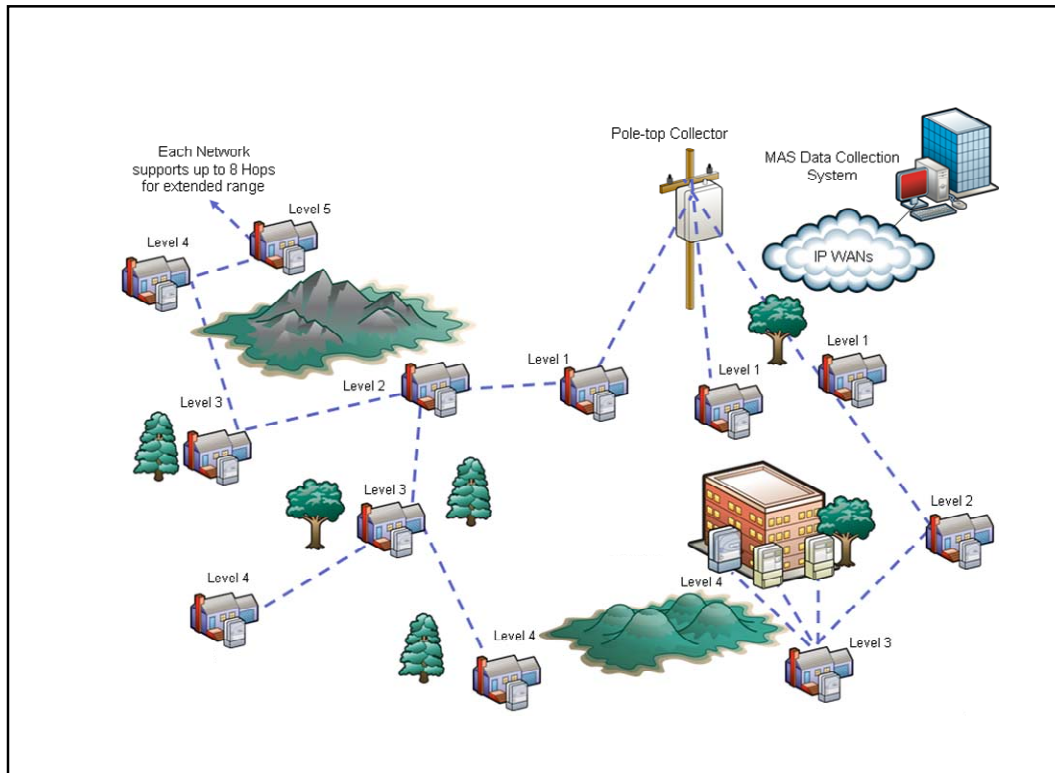


Figure 2: Mesh radio layout

The layout of mesh is such that meters will be able to communicate through “*multiple paths*” so that if one path to an access point is not operational at any given time, an alternate path may be found through relays and/or meters. The preferred vendor’s solution will involve 61 access points and 60 relays. This equates to around 5,600 meters per access point and 5,600 meters per relay. There will however be many access points with less than the average number of meters and some access points managing more than 5,600 meters. The minimum expected number of meters managed by an access point will be around 250.

CitiPower’s evaluation of mesh radio as an AMI solution is as follows:

- competitive with other technologies in terms of value;
- demonstrated capacity to comply with the minimum functionality and service level requirements;
- no observed adverse impact on the distribution network
- “*self healing*” capabilities allow meters to communicate with multiple access points and re-route communications in the event of one signal path being blocked;

- sufficient capacity to meet the current minimum functionality and service level requirement and the capacity to allow for future changes to the minimum AMI functionality/service levels;
- operationally flexible, ie: independent of the distribution network; and
- outage detection capability.

Mesh radio will economically reach in the vicinity of 100 per cent of CitiPower's customers.

### 8.2.2 Communications technology supply

The unit rates presented below reflect the information provided by the final vendor for technology supply. As discussed in section 7, the business expects to have executed an agreement with the successful vendor by the end of the first quarter 2009. A revised Budget Application under clause 5B.3 of the AMI OIC will update the AMI program installation unit rates to reflect the actual expenditure that will be incurred pursuant to the contract with the selected vendor. That expenditure will therefore become a contract cost and the expenditure will be prudent because the contract was let in accordance with a competitive tender.

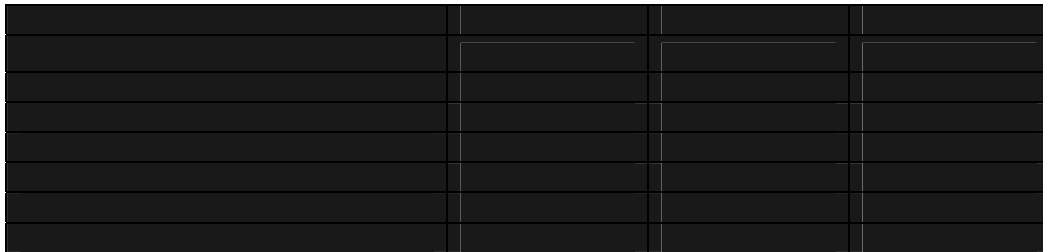


Table 16: Communications equipment unit costs (\$2008)

The costs associated with technology supply are included under clause S2.1(b)(1)(i) of the Scope Document.

### 8.2.3 Installation of communications infrastructure

Mesh radio solutions require the installation of access points, relays and extenders to collect data and send it to the NMS. Like the installation of meters, this activity was subject to a competitive tender process (see section 7).

It is assumed all access points/relays installed in underground areas of the distribution network will be placed in kiosk substations and all access points/relays that are to be installed in overhead areas of the distribution network will be placed on poles. The costs of underground versus overhead installation will differ. It is also assumed that all installations will be done during normal work hours.

In addition to the field labour installation of access points, each access point (not relays) must be designed and included in GIS.

The following costs are partly based on the costs provided by the short listed vendors for field services. As with other unit rates, a revised Budget Application under clause 5B.3 of the AMI OIC will update those rates to reflect the actual expenditure that will be incurred under the contracts with the successful vendors.

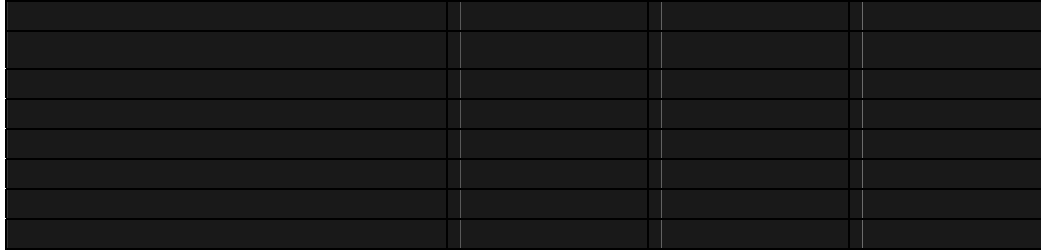


Table 17: Communications equipment rollout field installation unit costs (\$2008)

The costs associated with technology installation are included under clause S2.1(b)(1)(i) of the Scope Document.

### **8.3 Information Technology**

The AMI program will present significant challenges for IT systems in terms of delivery of the Minimum AMI Functionality Specification (Victoria) Release 1.1 and Minimum AMI Service Levels Specification (Victoria) Release 1.1. This is particularly evident in the area of meter data processing requirements.

CitiPower has conducted extensive research of the energy sector throughout Europe and North America and to date, has been unable to identify any organisation or jurisdiction implementing AMI that is currently processing the anticipated AMI meter data volumes within the specified timeframes in a contestable market. The business' research has been verified through independent research conducted by Gartner Consulting<sup>4</sup>.

As a consequence Victoria will be a “*trail blazer*” with respect to the IT component of the AMI program requiring the adoption of relatively immature technologies with attendant risk. CitiPower has sought to proactively manage this risk through:

- leveraging its existing world class systems where ever possible (such as SAP (logistics, works management) and Customer Information System (CIS));
- selecting off the shelf solutions from IT companies who are technology leaders in AMI for new systems, such as meter data management;
- using experienced technology partners such as CSC to design the underlying technical infrastructure required to meet the “*non-stop*” processing and systems availability requirements of AMI;

---

<sup>4</sup> Gartner is one of the world's leading information technology research and advisory companies. For more information refer to their website <http://www.gartner.com/>.

## CITIPOWER'S BUDGET APPLICATION 2009-11

- adopting techniques such as the Utility Service Bus (USB) to ensure that the inevitable future changes to AMI functions and service levels are managed cost effectively;
- where possible, benchmarking its proposed AMI architecture against other companies, particularly in North America to ensure lessons learnt can be incorporated. For example, this has led to the inclusion of an extensive field mobile computing program to support the rollout and ongoing meter faults and maintenance programs; and
- apply the lessons learnt from the introduction of full retail contestability to extensively automate business processes and rules early, particularly where there are significant increases in transaction volumes to avoid large scale increases in back office staff.

CitiPower and Powercor Australia operate from a single IT platform, thus delivering significant operating efficiencies. The approach agreed between the businesses for allocating costs is based on if the system is considered volume related then costs are split based on customer numbers of each business (70% Powercor, 30% CitiPower). If the systems are non-volume based costs are split 50:50.

The key IT components of the AMI program are presented below:

	2009	2010	2011
Asset management	2,242	706	-
Workforce scheduling and mobility	3,706	2,596	-
Connection point management	160	320	-
Outage management	21	1,400	-
Network management	2,198	1,033	476
Meter data management	1,032	515	515
Performance and regulatory reporting	1,582	404	378
Revenue management	-	291	-
Geospatial information	-	290	-
IT program management	2,339	717	568
Logistics management	370	37	17
Hardware	2,967	1,118	531
System integration	690	510	110
Other B2B	1,210	658	-
<b>Total</b>	<b>18,517</b>	<b>10,595</b>	<b>2,595</b>

Table 18: IT capital expenditure (\$'000 2008)

While the AMI program represents a major change to CitiPower's existing IT architecture, the key strategy has been to leverage off and re-use existing IT systems where practical. CitiPower has chosen to introduce new systems where modification to existing systems was not possible or would be more expensive than introducing new systems.

The costs associated with IT expenditure are included under clauses S2.1(b)(1)(ii) and S2.1(c)(vi) of the Scope Document.

## **CITIPOWER'S BUDGET APPLICATION 2009-11**

---

The tables below identify the new systems, significant implementations and modifications to existing systems.

# CITIPOWER'S BUDGET APPLICATION 2009-11

## Existing and IMRO Functional Architecture September 2007

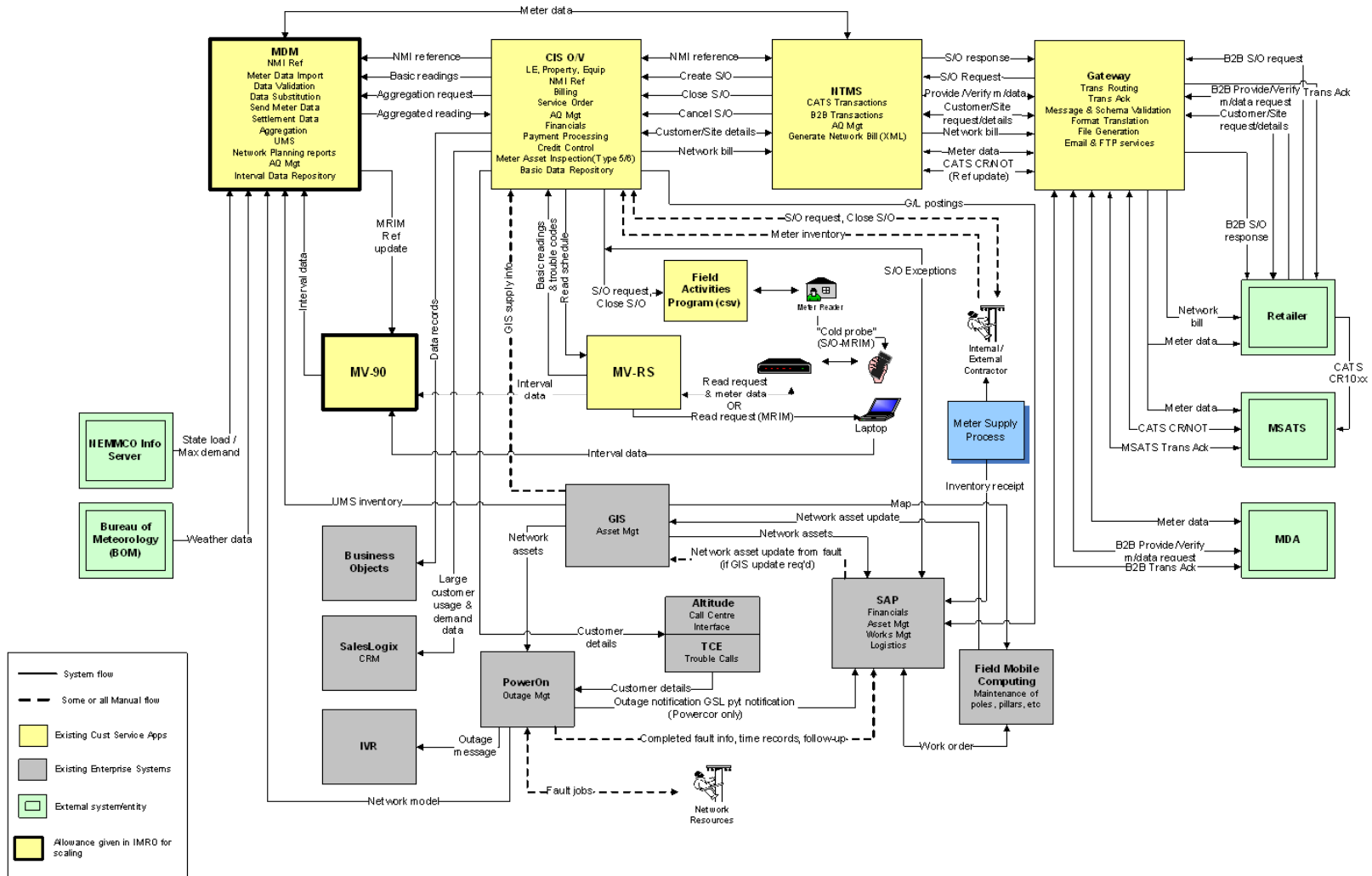


Figure 3: Existing Functional Architecture



# CITIPOWER'S BUDGET APPLICATION 2009-11

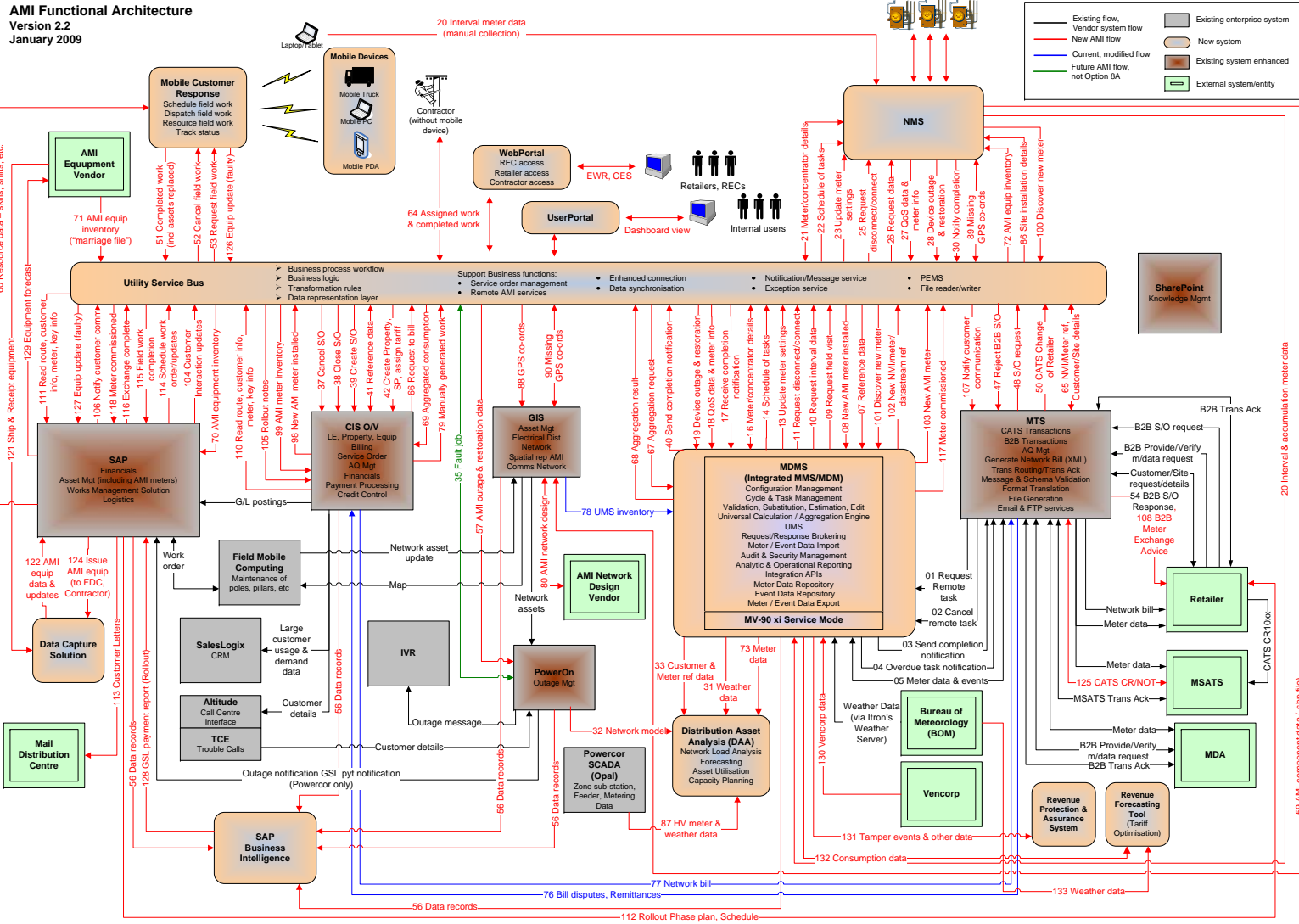


Figure 4: AMI Functional Architecture

The following sections provide a brief scope of the IT program under each major project.

### 8.3.1 IT program management

The IT AMI program is probably the most complex project ever undertaken by the Victorian Electricity Supply Industry.

For CitiPower the management complexity includes:

- over 40 separate projects;
- peak resource requirement of over 120 people;
- planned and executed over six years;
- parallel running of AMI with existing market/metrology procedures;
- industry participant testing programs; and
- more than 20 separate technology partners.

Due to the management complexity, a specific program management resource allowance has been included. This has been reviewed with Gartner Consulting who have advised that for a large complex IT program an allowance of between 5-10 per cent of cost is reasonable. It is assumed that IT program management will need to continue to support the program through until successful transition onto new service levels in 2012.

### 8.3.2 Infrastructure

The increased functionality and services under AMI will require a complete transformation of CitiPower's IT architecture with a specific focus in moving towards a near "*real-time*" "*non stop*" environment in the following areas:

- increasing server capacity to cater for new and upgraded applications with high transaction throughput requirements;
- upgrading storage and backup infrastructure to accommodate increased data volumes with varied data retention and archiving requirements;
- upgrading networks in support of systems availability to match the near "*real-time*" requirement;
- up scaling of the current Disaster Recovery (**DR**) facilities to cater for new near "*non-stop*" and increased processing requirement; and
- introducing new technologies and efficiencies in the areas of:
  - virtualisation;
  - blade servers;

- security and portal infrastructure;
- Oracle database management; and
- enhanced monitoring capabilities across the architecture landscape.

The following diagram represents a “simplified” view of the proposed production systems being housed at a “tier 1” CSC data centre at Clayton with the existing DR centre at CitiPower’s Market Street head office.

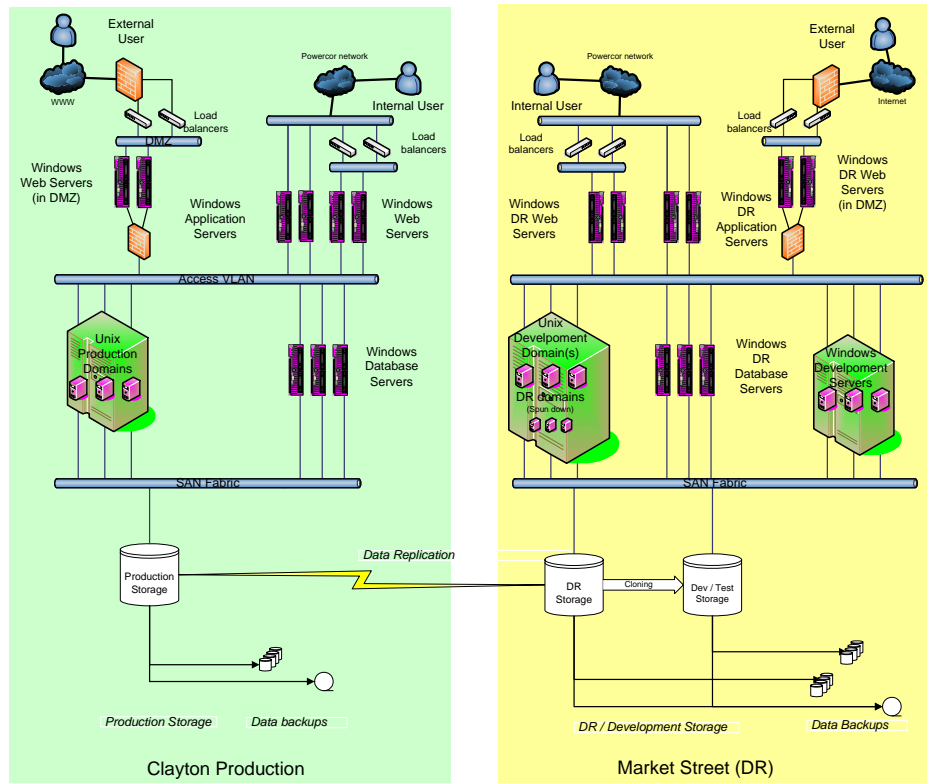


Figure 5: CitiPower's IT Production Environment

This architecture has been designed by CSC<sup>5</sup> after an extensive review of the AMI minimum functionality and associated service levels against CitiPower’s current environment. CSC has conducted a peer review of the proposed architecture and found that the CitiPower “AMI Infrastructure solution has been designed to meet the requirements of the AMI program in terms of additional capacity, high availability, and additional functionality”.

The service level requirements mean that the DR site must provide 100 per cent of the capacity of the production environment which is a significant increase from today.

CitiPower will also be utilising the disaster recovery facility as its development and test environment during non disaster recovery situations.

To identify the growth in processing and storage, a detailed analysis of the proposed transaction volumes has been undertaken based on the minimum service levels.

<sup>5</sup> CSC is recognised as a world leader in the use of information technology.

Other key factors considered within the architecture were the flow on effect increased transaction volumes would have on sub infrastructure. These include:

- during times of systems outages transactions will continue to arrive and will need to be processed in parallel once systems are restored;
- disaster recovery facilities designed to cater for extended outages, planned or unplanned;
- the increased data storage volume will require a significant increase in backup and restore capability; and
- the increase in infrastructure (servers, storage) has resulted in the need to expand data centre facilities including power, water supply and air conditioning, smoke detection and fire suppression equipment.

### **8.3.3 Mobility**

The experience observed in North America (Pennsylvania Power and Light and Toronto Hydro), highlighted that the introduction of field mobile computing to support the meter rollout and ongoing AMI customer response work was regarded as mandatory to ensure day to day control of the program.

CitiPower has therefore included a field mobile computing program that will enable a more efficient and effective delivery of the AMI meter exchange and customer response process through:

- automating the dispatch of service orders and tracking the progress of field crews associated with exchanging and commissioning of meters and access points;
- delivering savings in reduced travel times due to:
  - more efficient route planning;
  - increases in home starts;
  - more efficient allocation of re-scheduled installation work;
  - reduced fleet costs; and
- providing a scheduling and dispatching solution to automate the metering and communication fault response processes to efficiently manage the increased faults expected to arise from the implementation of new technology and multiple failure points.

Software market assessments and reference checks were undertaken to address field mobile computing systems. The preferred solution provider for core AMI functions is Ventyx Systems (formerly known as MDSI). This system has been implemented in Australia for Optus, Energex and Sydney Water.

#### **8.3.4 Interval meter billing**

The increase in interval meter data volumes has required a re-evaluation of the existing CIS billing system processes. These systems have been based largely around:

- register reads; and
- manual meter reading via pre-determined meter reading routes issued daily to contract meter readers.

For the existing population of interval read meters, the billing system carries out interval billing by sending a request to the existing meter data system to aggregate data received from meter data providers and by adding the consumption to the last billable reading in the billing system. This process essentially replicates the process for accumulation meters.

When an account requires manual intervention to the bill or a re-bill (eg: where data is missing or upgraded), the user needs to run a manual aggregation in the meter data management (**MDM**) system to confirm the consumption quantity to be billed.

Once the consumption quantity has been derived, the user must manually create adjusted reading values in the billing system that reflect this level of consumption.

This is an extremely complex process which makes billing of interval meters very time consuming. Whilst AMI is expected to deliver a higher level of data quality and therefore fewer exceptions per meter read, the magnitude of the increase in interval data being received would more than offset this benefit. Therefore the current system would be unable to handle the additional data without the addition of significant numbers of full time equivalent employees.

The review considered a full CIS replacement. The conclusion drawn, however, was it is more efficient to enhance the existing system to accommodate new time of use meter types and network tariffs while continuing to support the four year overlap of accumulation meters rather than develop a new system.

#### **8.3.5 Meter/data management system and scaling**

A new Meter Management System (**MMS**) will be required to manage the AMI meter data processing requirements and provide the platform for integrating multiple meter data collection technologies with back office applications.

In preparing for the AMI program, the business undertook extensive software market assessments and reference checks in considering an appropriate market data system. The preferred solution identified by the business was an Itron system that had the ability to provide for core AMI functions as well as providing the database of record for interval meter data.

The new meter management system will be required to manage and process the increased interval meter data volumes, file formats and market standards for AMI data collection. The meter management system will:

- automatically poll, collect and validate meter data;
- hold reference data such as premises and market participants;
- manage missing data;
- manage and administer meters and access points remotely;
- provide event management and maintain ancillary data;
- facilitate metering asset maintenance;
- perform scheduling and tracking of remote tasks;
- generate substituted data (at interval and day level) for delivery to the market where actual data from the AMI meters is not received. The substituted data will be versioned out when actual data is subsequently received by the MMS;
- perform estimation - forward usage estimates for accumulation meter data;
- process settlement data – including actuals, substitutes and forward estimates for accumulation meter data;
- perform aggregation on interval data for billing purposes;
- generate metering data for un-metered supplies;
- integrate with the new NMS systems;
- assist with Energy Profile modelling;
- process market data for responsible participants; and
- provide a repository for meter data usage (two years online, five years near line).

The AMI program will have a significant impact on the number of market related transactions to be initiated or processed by the business:

- each meter exchange requires a minimum of four transactions to complete and update the market systems. This volume will need to be accommodated in addition to current market transaction volumes; and
- provision of new interval data to market.

As a direct result of these volume increases the application infrastructure of the gateway and market transaction systems need to be enhanced to process the volume of

transactions within the accepted service levels for both AMI meter types and for existing business as usual volumes.

This project is based on the assessment that it is more efficient to “*scale*” the existing gateway and market transaction application systems to deal with the increase in transaction volumes than to replace those systems. In acquiring meter data management system enhancements the business sought competitive tenders from a number of vendors. The costs presented reflect the outcome of that tender.

### **8.3.6 System and NMS integration**

The AMI program will result in the number of IT applications expanding and the rate of change to those applications increasing. This is a consequence of:

- evolving and expanding services and service levels as AMI is implemented;
- business processes expected to change multiple times during AMI implementation; and
- the high level of process automation required to meet transaction volumes.

The AMI functional architecture will involve at least 110 points of integration. Managing integration of this scale will require the use of a USB which has the following advantages over traditional point to point integration. Where necessary the USB will:

- remove business logic from each system interface;
- enable the reuse of interfaces;
- change individual interfaces without impacting on others; and
- hold non application related business rules in a single “*rules engine*”.

In addition to the USB, the business will also be required to integrate the NMS with CitiPower’s existing back office IT applications.

In preparing for the AMI program, software market assessments and reference checks were undertaken. This provides a flexible architecture to cater for future changes as functionality evolves. The selection of Oracle Fusion provides the business with the added benefit of no licence costs.

### **8.3.7 Workforce scheduling**

To support the field deployment, enhancements are required to CitiPower’s existing Geographic Information System (GIS), CIS and SAP applications to provide a works management solution that supports the specific AMI rollout requirements with forecasting, planning and tracking support.

- **meter technology representation:** multiple telecommunication and meter technologies will be deployed during the AMI rollout. GIS will be the repository for representing appropriate meter technologies and telecommunications coverage. Spatial queries on GIS will extract the proposed meter technology at supply points and this will be stored in CIS against the property;
- **forecasting:** SAP will be enhanced to show future work and allow forecasting for the AMI rollout. The entire AMI deployment forecast will be visible and managed from SAP. Work is also generated from SAP for meter replacement. On work creation, proposed meter technology and relevant customer status/details are extracted from CIS;
- **planning:** SAP will be enhanced to allow rollout team members to maintain and plan large volumes of work orders from a single screen. From the list of jobs, one or many items can be selected and updated with planned dates, assigned to a resource provider and released for execution. Work orders requiring customer interaction, appointments and re-planning will be visible from this tool. Additional functionality will also be incorporated to allow for the generation of both AMI audit and inspection work orders; and
- **logistics:** the AMI rollout will involve the use of bar coding for the first time to track and trace all new meters from supplier, via the warehouse to multiple resource providers responsible for installations. A supply chain mobile scanning technology solution will be implemented to cater for increased volumes of meters, meter recalls, meter warranty claims and the identification of meters issued but not installed. It will also provide early identification of faulty meters via faulty meter analysis.

### 8.3.8 Network management

One of the key systems within the AMI solution is the NMS, it is the system ultimately responsible for managing the communications infrastructure and ensuring timely ongoing access, through the chosen communications technology, to all meters.

The NMS will manage the:

- commissioning of newly installed meters and communications nodes;
- ongoing collection of meter reading data;
- transmittal of event information to and from the meter;
- alarm and alert functions for communication failures; and
- delivery of meter and communications access point firmware upgrades.

Currently there are no standards for NMS software, as the solutions are proprietary and tightly linked to the technology selected. During recent technology trials it was evident that NMSs are still very early in their evolutionary lifecycle. These solutions varied significantly in functionality and provided a number of challenges during install and



operation with none capable of fully performing the proposed Victorian functionality in its current release.

Due to the immaturity of the NMSs and related technology it can be reasonably expected there will be a number of new releases and bug fixes required as vendors come to terms with the planned functionality and scale and volume of operation proposed. It is not reasonable to assume that vendors will have all "*transactions*" in place day one. CitiPower anticipates the NMS will be a high risk area presenting significant challenges during installation, integration and ongoing operation.

### 8.3.9 Other

Management and regulatory reporting are an important component of the management and control aspects of Full Retail Contestability (FRC) and MDM functions. Within the current (pre AMI) environment CitiPower has an inventory of approximately 350 reports used to manage the operational and management information requirements of these business functions.

The AMI rollout will add complexity to the end to end meter data business environment through the implementation of multiple new applications, increases in data volumes and heightened service level requirements for market interaction.

Given this complex applications environment and the need to provide accurate end to end views of information for both management and compliance reporting, CitiPower has determined the most efficient manner to meet existing and ongoing reporting requirements is to leverage and upgrade the existing "*data warehouse*" approach to reporting.

This approach allows CitiPower to:

- continue support of current management and control reporting requirements (for existing meter types);
- develop reports for AMI process control and management;
- meet the reporting requirements where a consistent view is required across both existing and AMI meter information;
- have more flexibility to develop new reports as the program unfolds; and
- publish required compliance reporting to the internet via the portal.

Importantly, the management reporting environment needs to support the transition from the current environment, through an extended metering rollout to the end state where all type 5 and 6 meters have been replaced with AMI meters. During this timeframe accurate reporting will be vital to ensure existing service levels continue to be met along with the emerging AMI process requirements.

During the AMI rollout, a wide variety of internal and external stakeholders will require access to up to date information on the rollout plan and have the ability to raise

queries. In order to provide for the efficient and controlled access to this information the business will expand the use of the existing internet “portal” application.

This approach will provide access to information and the ability for customers to conduct selected transactions via automated means, 24 hours per day, 7 days per week. This will significantly reduce manual intervention from CitiPower staff to progress each inquiry or transaction.

Areas that will be included under the portal project include:

- retailer access to rollout plans and progress;
- compliance reporting;
- customer access to rollout information, particularly in regards to their individual installation;
- contractor access to certain transaction functions; and
- customer ability to request a reschedule of an installation appointment, log a meter fault, or generally query the program.

#### **8.4 Program governance and management/change management**

Clauses S2.1(b)(xi) and (x) of the Scope Document allow for the recovery of costs associated with program governance and management and provision and implementation of change management, training and business continuity plans. In order to deliver the project in the most efficient manner, CHED Services is providing these services to both CitiPower and Powercor Australia.

The key aspects of the AMI program governance/change management costs relate to:

- **Project management office** – Includes developing an appropriate business structure to support the works program and the ongoing change and reporting requirements; ensuring a complete, co-ordinated program plan is in place across the business, along with associated monitoring, controls and reporting measures; ensure that outstanding project issues are identified, assigned to the relevant areas and resolved in the required timeframe; and manage a matrix/register of program risks across the business that relate to the AMI program of works. Also includes program financing costs.
- **Technology procurement:** – Includes the following activities:
  - selecting the most appropriate end to end technologies that will enable CitiPower to meet the AMI functional and service requirements;
  - advising the business with respect to backhaul communications options and managing the business relationship with telecommunications carriers;

- advise the business on which technology option will be rolled out for each geographical region/situation. In addition to network design, support will need to be provided to resolve field deployment difficulties arising from technological issues ie: access point faults, recovery from storms and switching and resetting access points;
- **Business transformation** – The AMI program requires major reorganisation within the business including development of new business capabilities, modification of existing capabilities and support for existing operations to ensure continuity of current performance levels. In terms of delivering these changes, the business has been required to establish over 40 separate projects that impact across 80 per cent of current business operations. These projects are not discretionary in nature, but are necessary to ensure the business will be compliant with the relevant functional and service level specifications and the AMI rollout schedule specified in the AMI OIC.
- **Field implementation** – These activities will include planning, resource scheduling, compliance auditing, technical and hazard advice, contract management, preparation and the issuing of site information to field staff, induction training and reporting. These costs are covered by clause S2.1(b)(2)(xi)(B) and (C) of the Scope Document. Network Services has applied a margin of 5.3 per cent to these activities.
- **Regulation** – Clause S2.1(b)(xi)(G) of the Scope Document allows for the recovery of legal and regulatory costs including budget, charges and fees application processes. The AMI OIC will require the business over the period 2009-11 to:
  - prepare and submit a Budget Application for the period 2009-11 (and potentially one or more revised Budget Applications for the same period);
  - prepare and submit a Charges Application for the period 2009-11;
  - review and respond to the AER Draft Decision on the budget and charges for the period 2009-11;
  - prepare and submit actual audited costs for 2009 by August 2010;
  - prepare and submit a Budget Application and Charges Application for the period 2012-15 (and potentially one or more revised Budget Applications for the same period);
  - review and respond to the AER Draft Decision on the budget and charges for the period 2012-15; and
  - prepare and submit actual audited costs for 2010 by August 2011.

An allowance has been included for the costs associated with these processes.

In addition, the following functions must also be provided in order to effectively implement and oversee the AMI program. These include:

- management of the RFP process, which incorporates documentation, placing the RFP in the market, organising vendor presentations, evaluation, short listing and contract negotiation (this expenditure is covered by clause S2.1(b)(2)(xi)(C) of the Scope Document);

## CITIPOWER'S BUDGET APPLICATION 2009-11

- audits and quality assurance (this expenditure is covered by clause S2.1(b)(2)(xi)(D) of the Scope Document;
- participation in State and national industry activities related to industry co-ordination, industry governance and developing related cross industry material (this expenditure is covered by clause S2.1(b)(2)(xi)(A) of the Scope Document);
- preparing regulatory reports and collating meter installation metrics so as to meet the informational requirement of the AER (this expenditure is covered by clause S2.1(b)(2)(xi)(G) of the Scope Document); and
- the development of AMI program budgets and forecasts (this expenditure is covered by clause S2.1(b)(2)(xi)(G) of the Scope Document).

CHED Services costs have been allocated between CitiPower and Powercor Australia based on customer numbers (30 per cent CitiPower, 70 per cent Powercor Australia). The costs associated with program governance and management and change management are usually allocated to direct capital and operating costs in accordance with CitiPower's current statutory accounting policies. Due to the low value of forecast direct costs in 2009 program governance and management and change management are expensed in 2009, and then fully allocated to direct capital and operating costs thereafter.

	2009	2010	2011
Project management office	2,666	2,199	1,749
Technology procurement	676	180	-
Business transformation	1,530	707	214
Field implementation	996	172	118
Regulation	48	16	16
<b>Total</b>	<b>5,916</b>	<b>3,274</b>	<b>2,097</b>

Table 19: Programme governance and management (\$'000 2008)

The following table shows the forecast treatment of programme governance and management/change management costs.

	2009	2010	2011
Project management costs capitalised	-	3,016	1,984
Project management costs applied to direct operations and maintenance	-	258	113
Project management costs remaining expensed	5,916	-	-
<b>Total</b>	<b>5,916</b>	<b>3,274</b>	<b>2,097</b>

Table 20: Allocation of programme governance and management (\$'000 2008)

## 9. Operating costs

Operating activities to support current metering services currently fall into four main categories: meter data management, customer services, IT support costs and meter maintenance. In addition to these traditional activities, the AMI program will require a Network Operations Centre (NOC) to manage the AMI systems from the meter to the NMS and telecommunication systems associated with retrieving data from AMI meters.

Year ending	2009	2010	2011
IT	1,485	2,432	2,581
Meter data services	1,580	2,196	1,769
Meter maintenance	2,536	2,551	2,445
Customer service	688	1,613	2,224
Customer service response trials	433	192	133
Backhaul communications	301	11	26
Communication operations	868	913	999
Project management	5,916	0	0
Executive and corporate office services	181	181	181
<b>Total</b>	<b>13,988</b>	<b>10,089</b>	<b>10,358</b>

Table 21: Total operating and maintenance expenditure (\$'000 2008)

This section steps through the changes in operating costs associated with the AMI program. The majority of these activities are performed by CHED Services under contract to CitiPower. CHED Services will procure backhaul services using a competitive tender process.

### 9.1 Meter data services

The AMI program will impact on the cost of meter data services. Whilst manual meter reading costs will steadily decline, this will be offset by complexities introduced through higher service level requirements and additional data which will need to be managed.

Meter data services include costs associated with the collection, validation and provision of data to the market. The increased complexity, higher service standards and greater functionality will result in the AMI program having a significant incremental impact on meter data service costs. These incremental changes include:

- a higher unit cost per manual read due to the loss of economies of scale. This arises due to the reduction in the number of manual reads as AMI meters are progressively rolled out;
- the Minimum AMI Service Levels Specification (Victoria) Release 1.1 requires that from 1 January 2012 at the latest, 95 per cent of actual data must be available to the market by 6am the following day, 99 per cent by 24 hours and 99.9 per cent within ten business days;

- increased volume of re-reads as consequence of multiple points of failure in the AMI system, ie: meters, communications or back office systems generating larger and additional error queue management;
- obtaining type 5 and 6 re-accreditation for new systems and processes;
- have in place contingency arrangements in the event of a long term communications failure to obtain meter data from the field;
- monitor data completeness and notify the NOC of any communications and/or data security issues;
- provide troubleshooting and exception management associated with issues and receive commands related to meter event advice, meter loss of supply and outage management;
- an increase in meter data requests from retailers. Whilst it is anticipated that the accuracy and timeliness of meter data should reduce the overall percentage of requests, there is increased complexity in moving away from a system with a single failure point to one with multiple failure points; and
- management of meter type exceptions resulting from the conversion of AMI meters from installed to operational. Exceptions are expected to cover approximately 10 per cent of all conversions.

A related issue with meter data collection is access keys. Presently CitiPower's meter reading contractor holds more than 21,000 access keys. With the phasing out of manual meter reading, customer access keys will need to be transitioned from meter reading contractors to the AMI rollout team and then to maintenance crews without compromising the security of customer premises.

There will be a requirement for the business to maintain its business as usual meter data management activities in addition to transitioning to a post AMI project environment. Clauses S2.1(a)(ii) and (iii), S2.1(b)(iii) and S2.1(c)(ii) and (iv) of the Scope Document refer to these activities.

## **9.2 Operation and maintenance of IT**

The need to augment and enhance existing IT systems and develop new IT systems to support the AMI program will require additional hardware, software, telecommunications and labour to keep the systems operational to the required service levels.

In addition to these costs, there are support and maintenance costs payable by CitiPower to third parties. These items include:

- software maintenance fees that provide for access to the latest versions of the software including bug fixes;

- hardware maintenance fees that provide for the necessary monitoring and repairs and maintenance of the assets;
- data centre charges to house and operate the additional equipment;
- disaster recovery testing charges continuing the program of two tests per year;
- additional telecommunication charges resulting from increased capacity links with the national market and the introduction of field mobile computing; and
- consumable items such as disks, tapes, etc.

IT maintenance costs will be incurred in maintaining the existing metering business as usual arrangements, during the AMI program and post the AMI rollout. Consequently the costs associated with IT maintenance are covered under clauses S2.1(a)(v), S2.1(b)(iii) and S2.1(c)(vi) of the Scope Document.

### **9.3 Communications operations**

A range of new functions that presently fall outside the business' core areas of expertise must be acquired by the business to deliver the strict performance levels required for AMI. These new functions have been included under communications management and are as follows:

- **network operations:** this involves managing the AMI infrastructure network. The operations group will be responsible for fault detection, fault investigation, fault resolution and reporting. This is a particularly complex task as faults can originate from a number of sources (such as meters, access points, modems and the NMS) which presents major challenges as these must be resolved within the specified AMI service levels. The group will also have responsibility for training field resources with the necessary technical, diagnostic and problem solving skills to rectify faults; and
- **compliance and quality assurance:** this involves end to end AMI system testing, maintaining and documenting changes in technology and radio frequencies. Additional testing must also be conducted to ensure compliance with relevant NEMMCO requirements for meter data collection and processing.

The costs associated with Communication Operations will be incurred during and post the AMI program. Clauses S2.1(b)(1)(i) and S2.1(c)(i) of the Scope Document refer to these activities.

### **9.4 Telecommunication systems WAN/backhaul**

The AMI program requires communication between access points/meters and the business. In the case of mesh radio, backhaul communications cover the link between

the access points and the data and disaster recovery centres. The reliability of the backhaul communications is critical to the delivery of AMI. The ability of CitiPower to read upward of 300,000 meters per day and more than 14 million data points per day, and manage remote connect/disconnect of meters will be contingent on the backhaul service provider.

Telecommunications technology evolves rapidly. Consequently, in developing its approach to telecommunications, CitiPower relied on the expertise of Gibson Quai AAS, Australia's leading telecommunication advisors, and the market to inform its decisions. Gibson Quai AAS were asked to evaluate 25 possible communications technology options and to assist the business in evaluating the results of its backhaul communications RFP.

Based on the Gibson Quai AAS analysis and the business RFP process it was determined the best solution for CitiPower was the mobile wireless network. The mobile wireless network solution was considered the most appropriate solution as:

- it proved the most cost effective solution through the RFP process;
- it provided the greatest coverage across the CitiPower network;
- it supports an “*always on*” link with access points ie: would not be disconnected by the telecommunications carrier in preference for voice communications;
- it could communicate directly to access points and meters; and
- it was assessed to have the longest future lifespan (around ten years).

The preferred proposal, utilising the mobile wireless network, involves an end to end managed solution between the mesh radio access points and CitiPower's data and disaster recovery centres and the point to point meters and data and disaster recovery centres. The critical aspects of the backhaul communications arrangements are as follows:

- the telecommunication carrier providing a managed service from the modem to the data and disaster recovery centres;
- CitiPower having responsibility for the installation of modems;
- the telecommunications carrier having responsibility for monitoring and operational management of the modem;
- CitiPower having responsibility for all field works associated with management and maintenance; and
- the backhaul communication charge to be based on a fixed annual service charge and an annual variable charge based on the number of access points and point to point connections.



The costs included in the Budget Proposal represent the short listed vendors still under consideration. Telecommunications WAN/backhaul costs will be updated in a revised Budget Application under clause 5B.3 of the AMI OIC to reflect the actual expenditure that will be incurred under the contracts with the successful vendors.

Clause S2.1(c)(i) of the Scope Document covers telecommunications WAN/backhaul costs.

## **9.5 Customer service associated with AMI technology**

Customer service includes costs associated with managing the customer interface, call centre, appointments, claims and disputes and Guaranteed Service Levels (GSL) as allowed for under clause S2.1(b)(iii) and S2.1(c)(v) of the Scope Document.

Customer enquiries are expected to be significant. The greater complexity of the AMI meter itself will increase the number and average handling time of customer enquiries due to issues relating to meter functionality, how to read the meter and load management.

In addition, the complexity of AMI meters will mean in a number of instances, technical and/or supply enquiries cannot be resolved by the call centre. As a consequence the issue will require escalation to a technical officer. Consistent with the increase in customer enquiries, a proportionate increase in technical escalations is expected, necessitating additional resources to handle the enquiries.

CitiPower expects to receive claims relating to a diverse range of matters such as site aesthetics and site defect costs. Additional resources will also be required to assess, investigate, notify and resolve these claims over the life of the rollout.

In some circumstances, customers will be entitled to GSL payments under the Electricity Distribution Code in relation to missed appointments. The number of appointments will be greater than that today due to the need to conduct a greater number of revisits. Cost associated with managing these GSL claims and payments are covered by clauses S2.1(b)(iii)(a) and S2.1(c)(v)(a) of the Scope Document.

There will also be costs associated with the development of programs for communication with customers and retailers on specific AMI issues including enquiries related to final reads of accumulation meters. These costs include mail outs to customers and ascertaining customer feedback with respect to the rollout which will feed into a continuous improvement process over the remainder of the rollout process.

Lastly there will also be costs associated with the customer information pack, which the Consumer Communications Working Group recommended and the business is obliged to provide. The information pack sets out a range of general information for customers including how to read the meter and customer feedback forms.

## **9.6 Meter maintenance**

Under the National Electricity Rules, meter accuracy testing is a mandatory requirement for accredited meter providers. In particular, when a new family of meters is rolled out additional testing is required to satisfy that the meters are compliant with these rules as well as the Electricity Customer Metering Code within two years of installation.

Therefore with the introduction of AMI meters, CitiPower will be required to implement a new testing program. This requirement to introduce additional testing when rolling out a new family of meters was recognised in the 2006-10 Electricity Distribution Price Determination and a specific provision was provided. However there are some subtle differences between the two types of meters which alter the frequency and complexity of the inspections as per AS1284.13, the National Metrology Procedure for direct connected meters and CT connected meters.

To assist in the asset management of the new AMI meter fleet, particularly in light of the fact that new technologies are involved, annual performance testing/inspection will be undertaken. This involves testing a sample group of AMI meters to monitor their condition for early identification of degradation of meters due to load, environmental or other impacts.

Currently every individual CT connected meter is required to be tested for accuracy and inspected every five years in accordance with the requirements of the National Metrology Procedure and the meter provider's metering asset management plan, approved by NEMMCO.

Meter maintenance costs will be incurred on a business as usual basis, during and post the AMI program. Meter maintenance costs are covered under clause S2.1(a)(i), S2.1(b)(i) and S2.1(c)(iii) of the Scope Document.

## **9.7 Customer response trials**

CitiPower will incur costs in relation to participating in the Victorian Government sponsored Customer Response Trials. The purpose of these trials is to assess customer demand responses to a range of pricing options based on internal consumption data.

CitiPower understands from the Victorian Department of Primary Industries that the AMI OIC of 28 August 2007 allows the business to recover the costs of the customer response trials as part of its budget application.

## **9.8 Executive and corporate office services**

Clauses S2.1(a)(vi), S2.1(b)(xiii) and S2.1(c)(vii) of the Scope Document allow for the recovery of costs associated with executive and corporate office services for metering business as usual, AMI program and post AMI program.

## CITIPOWER'S BUDGET APPLICATION 2009-11

---

CitiPower's accounting policy in respect of executive and corporate office costs is to allocate a portion to direct capital and operating costs and then allocate the remaining expensed cost between the regulated services. Executive and corporate office service costs are only allocated to metering business as usual activities (and not AMI rollout costs) so as not to alter the amount of executive and corporate office service costs allocated to standard control services. These costs are embedded in direct costs eg: new connections capital expenditure, normal replacement capital expenditure and meter maintenance. The remainder of executive and corporate office service costs have been allocated to metering (the amount is shown in Table 21) in the same amount as the historical allocation to metering so as not to alter the amount of executive and corporate office service costs allocated to standard control services.