



ADVANCED METERING INFRASTRUCTURE

Final Evaluation Report

Version 0.4

Commercial in Confidence

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Document History

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0.2	06 Feb 2014	Further draft incorporating additional information from vendors
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1 Executive Summary

Tonga Power Limited (TPL) is considering the business case for the replacement of its existing fleet of accumulation meters with smart meters as part of an AMI deployment across its network. A major driver for this change is securing a future proof means of managing its credit management issues through some form of prepay electricity solution. TPL has secured a NZ Aid grant to assist with this objective.

TPL has undertaken a procurement process to identify appropriate suppliers for an Advanced Metering Infrastructure (AMI) deployment for Tongatapu. Three documents were issued as part of the procurement process (i) a base RFP document for all components of an AMI solution, (ii) a RFP for a Meter data Management and Pre Pay Management solutions and (iii) a RFI for Point of Sale vending services.

The documents were issued to a number of pre-qualified vendors and also released on the Pacific Power Association website. The closing date was 20th December 2013 and a total of 19 vendors responded.

A nine person Evaluation team consisting of five persons from TPL and four persons from Power Business Limited (PBL) evaluated the responses. The evaluation Team determined that the best technology set would be provided by selecting TPL's current billing system supplier, Agility, and one of four shortlisted meter and headend vendors. Reference site visits to the 4 meter and headend vendors were conducted by two TPL Directors, TPL's Business Development Engineer and a PBL telecommunications and meter specialist.

Following a comprehensive evaluation process and taking into account TPL's Management and Board guidance, the Evaluation Team recommends that:

Itron's RF Mesh Managed Service solution is selected as the meters and headend solution and Agility's meter Data Management and prepayment systems be selected as the technology solution set for the AMI project.

However it is to be noted that the cost of this solution set is significantly above the budget of the business case. The Cellular business case budget was Capital TOP4.65m and Opex TOP0.35m and the RF Mesh business case budget was Capital TOP5.12m and Opex TOP0.77m. The evaluated cost of the recommended solution is Capital TOP9.11m and Opex TOP0.39m.

Although the cost components evaluated herein constitute the major cost items of the overall Project they are to be evaluated together with the balance of costs including TPL project management and meter installation in an economic model where the benefit streams are included. If the recommended technology solution does not meet the TPL investment criteria, TPL can consider the same Itron meters and headend solution using a SAAS or as a last resort a cellular solution with an alternative vendor.

2 Introduction

Tonga Power Limited (TPL) is considering the business case for the replacement of its existing fleet of accumulation meters with smart meters as part of an AMI deployment across its network. A major driver for this change is securing a future proof means of managing its credit management issues through some form of prepay electricity solution.

An indicative business case has been developed and TPL now seeks to validate that analysis using responses from AMI technology and service providers against TPL's specific requirements, as well as formal modeling of confirmed costs.

3 Scope

The scope of this work was to secure proposals and information relating to a full end to end AMI solution together with a prepayment management system and point of sale vending services to enable a token less prepay electricity proposition.

No limitations were placed on communications technologies nor the delivery model from vendors, with TPL prepared to consider options, including: licensed or bespoke software provision, a full outsourced service or software as a service.

There are essentially 6 parts to the end-to-end AMI solution that TPL requires:

- (i) Meters;
- (ii) Communications;
- (iii) Headend;
- (iv) Meter Data Management System (MDMS);
- (v) Prepayment Management System (PMS); and
- (vi) Prepayment vending solution.

4 Vendor pre qualification

TPL is looking to procure technology and services from vendors with a proven track record in the AMI domain in which they operate. On this basis the procurement team from Power Business Limited (PBL) and TPL compiled a list of vendors considered most likely to provide realistic responses for TPL to consider.

The following 20 vendors were pre-qualified:

Document	Vendor	Document	Vendor
Base RFP	EDMI	MDM & PMS RFP	Agility CIS
	Itron		Harris Utilities
	Arc Innovations		Point West
	Metrix	Vending RFI	OCL
	Secure		Digicel
	Glen Canyon		TCC
	L & G		
	Echelon-Holley		
	GE Digital Energy		
	Elster		
	Trilliant		
	Sensus		
	Huawei		
	SSN		

5 RFP Process

5.1 RFP document issue

PBL compiled the tender specification and the RFP and RFI documents, which were subsequently reviewed by TPL and then issued on 16 November 2013.

5.2 RFP timetable

The indicative timetable in each of the RFP and RFI documents was:

Activity	Date
RFP Issued	16 November 2013
Proponents confirmation of receipt	18 November 2013
Proponents confirmation of intent to respond	22 November 2013
Last date for questions	06 December 2013
RFP Closing Date (responses by email)	13 December 2013
Last date for hard copy responses	20 December 2013
Advise Short-Listed Proponents	17 January 2014
Programme of visits commences	20 January 2014
Preferred Proponent notified	31 January 2014
Contract Awarded	28 February 2014

Following the issue of the documents a number of proponents requested an extension to the closing date, which was subsequently extended a week to 20 December 2013.

5.3 Additional vendors

To ensure a comprehensive profile of this procurement activity the RFP and RFI documents were posted on the Pacific Power Association website. Consequently an additional 10 vendors to those pre qualified indicated an interest in participating in the RFP or RFI process.

Document	Vendor
Base RFP	AD Riley
	Powercom (SGI)
	SmartGrid Innovation
	ABB
	Phoenix IT Solutions
	Texas Power & Associates
	Unique Mbane
MDM & PMS RFP	Siemens
	Smart Grid CIS (PMS only)
	Oracle

5.4 Notices to respondents

Notices of clarification or in respect of questions that had general interest to all respondents were issued as follows during the RF period.

- Base RFP - 4
- MDMS/PMS - 3
- Prepayment Vending - 3

5.5 Withdrawals

The following companies withdrew during the tender period:

- Elster citing that their US parent did not consider the Australasia/Pacific area as core interest
- Arc Innovations saying that they did not think the TPL AMI project was a good fit for their business

Several companies did not acknowledge receipt of the RFP documents and failed to reply when follow up emails were issued.

6 RFP Responses received

RFP responses closed at 4pm 20 December 2013 and 19 bona fide responses were received from as follows.

Document	Vendor	Document	Vendor
Base RFP	EDMI	MDM & PMS RFP	Agility CIS
	Itron (2 responses)		Harris Utilities
	Metrix		Siemens
	Glen Canyon		Oracle
	L & G		Point West
	Trilliant (2 responses)	Vending RFI	OCL
	SSN		Digicel
	Echelon-Holley		
	AD Riley		
	SmartGrid Innovations		
	ABB		

The number of responses by telecommunications technology were:

Comms Technology	No Responses
RF Mesh	5
GPRS	3
RFF Mesh	1
PLC / LRR	1
Total Responses with comms	10

7 RFP Evaluation

7.1 Evaluation Team

Given the large level of interest and the number of responses to the RFP and RFI documents, the evaluation of responses was split in two between PBL subject matter experts:

- **Meters, Communications and Head End** were considered by John McCutcheon and Stephen Atkinson
- **Meter Data Management, Pre Pay Management and Vending services** were considered by Grant Dennehy and Lorina Capistrano

During early January both teams undertook initial evaluation of the assigned AMI components to facilitate discussion and a wider evaluation process that included a team from TPL.

TPL selected the following persons, who along with the PBL persons formed the Evaluation team:

- Nikolasi Fonua – Business Development Engineer
- Michael Lani 'Ahokava – Power Generation Manager
- Ian Skelton - Network Investments Manager
- Lualala Tapueluelu – IT Manager
- Peni Fukofuka - Accountant

7.2 Methodology

The RFPs which were sent out consisted of two proforma schedules requiring proponents to indicate whether their solution confirmed or otherwise and a schedule for pricing.

It was recognised however that the differing architectures of the received proposals would mean that in some cases a particular question may not be applicable. It was also anticipated that some of the answers may need to be edited so that they could be captured in tabular form facilitating easy comparison.

Statements of Compliance by the respondents were generally taken at face value unless accompanied by an explanation or qualification. In responses with accompanying text, this was read to confirm that the text reinforces the compliance statement rather than making it conditional or limited in any way. Where a compliance statement was subsequently found to be less than envisaged by the requirement, the response has been categorised as requiring further investigation/consideration or as failing to meet the requirement.

Several question sets were issued to proponents to clarify their responses as part of the conformance process.

Because of the large number of responses received, the Evaluation Team decided to conduct a two-stage approach to the evaluation:

Stage 1: shortlist to 5 or 6 end-to-end solution sets; and

Stage 2: identify a preferred solution set of vendors with up to 3 other sets that rank as acceptable alternatives

The full evaluation team met at TPL's offices in Nuku'alofa from the 10th to the 12th of February. At this meeting all the proposals shortlisted from the previous meeting in New Zealand were reassessed and a revised short list determined.

7.3 Summary of Meter, Communications and Head End Responses

7.3.1 EDM I

The EDM I response comprised of their own range of smart meters (EDMI Atlas Series) combined with a GPRS point-to-point communications solution and their associated headend software named Multidrive. The Atlas series of meters are fully featured and well proven with large scale deployments in both New Zealand and Australia. The point-to-point GPRS solution involves fitting a third party GPRS modem into each meter under the terminal cover, such that each meter can connect directly to a GPRS network. TPL would then need to take a network service from either TCC or Digicel to provide the communications link between the headend and each meter. In the case of the headend software, EDM I provide the option to either purchase a license for their Multidrive system or take a SaaS service from an EDM I owned and operated headend in Australia or New Zealand. The complete EDM I solution as proposed is a mature product with a number of quality reference sites and is well supported from EDM I's offices in Brisbane and Wellington.

EDMI priced their proposal in TOP, but noted that they could potentially provide a more competitive price in USD. EDM I were asked to re-price their proposal in USD. In comparison to the proposal received from Holley (Formway), the GPRS modems in the EDM I proposal are priced at a significant premium. However, when the EDM I modem price is benchmarked against their pricing in the New Zealand market, it appears to be similar.

7.3.2 Itron

Itron responded with two alternate proposals, a primary proposal based on their existing smart metering solution, which for the purposes of their offering to TPL utilizes GPRS point-to-point communications, and an alternative proposal utilizing their latest OpenWay mesh solution.

The primary proposal is based on their EM420i smart meter, fitted with an Itron GPRS module rather than a third party modem, and working with their Saturne MDC (Meter Data Collection) headend software. The EM420i is a fully featured smart meter, with slots for two comms modules (separate WAN & HAN) but is only available in a single and three element version, there is no two element model. While a number of reference sites are provided in the US, Europe and South Africa, it's not clear which of these reference sites actually used the EM420i meter, no reference sites in Asia or Australasia were provided. Little is known about their Saturne headend solution, but is assumed to have been proposed as a cost effective alternative to their IEE product which is more suited to large scale deployments. They have provided pricing for both licensed and SaaS options for the headend.

Itron's alternative OpenWay proposal, based on Cisco's IPv6 technology, supports multiple communication technologies including RF mesh, PLC, and cellular. First developed for North America and based on ANSI C12.19/C12.22 metering standards, Itron is now extending it for use globally by introducing an OpenWay IEC meter that supports DLMS/Cosem standards. The OpenWay International IEC meter won't be available till the middle of 2014 according to Itron's current roadmap. China Light & Power in Hong Kong is the first customer contracted to receive delivery of this meter. There is an increased risk in Itron's alternate proposal, due to the meter being under development, but it does appear to offer a chance to implement the latest standards based mesh solution at an introductory price.

The evaluation team has asked Itron for further details on the pricing for alternative proposal and additional information on the design methodology to determine the number mesh network devices required.

7.3.3 Metrix

The Metrix proposal is based on a consortium comprising Metrix, Landis & Gyr and Silver Spring Networks (SSN). Metrix would act as the prime vendor and offer a SaaS solution via a SSN UtilityIQ headend it is currently building at its data centre in Auckland. TPL could then purchase U-series smart meters from Landis & Gyr and mesh network components from SSN. It is effectively the same solution that Metrix has contracted to provide for Counties Power in New Zealand. For Metrix to add value for the AMI component, TPL would have to take a SaaS solution from Metrix for the headend. If TPL chose to purchase a licensed for UtilityIQ directly from SSN, Metrix could still play a more limited role as an MDM provider only. As a solution, the Landis & Gyr U-series meter has already been integrated with the UtilityIQ headend and used in deployments in Australia (CitiPower & Powercor) and New Zealand (WEL Networks / SmartCo). It is a mature solution backed by some of the major players in smart metering. The SSN mesh solution has the

potential to be further utilized by TPL for other Distribution Automation (DA) initiatives and is a very strong in its technical attributes. The key issue with the proposal is the price which worked out to be the most expensive solution based on the pricing as provided and included transactional pricing for disco/reco at NZD \$18.50 per time.

The Metrix proposal was eliminated in the first round.

7.3.4 Glen Canyon Corporation

The Glen Canyon (GCC) proposal is based on their own smart meter which comes standard with an integrated WiFi modem and can accept a GPRS or Long Range Radio (LRR) module for a choice of comms options. Where GPRS is used, the Glen Canyon proposal is based on an average of 20 WiFi connected meters for every GPRS meter. Alternatively if a LRR solution was to be implemented, it is estimated that 10 LRR base stations would be needed to provide the necessary coverage.

The single phase IEC meter is a new product and was to have been IEC certified in December. Currently GCC is supplying sub-meters to the State Grid of China, these meters will monitor the power usage in 2 million apartments. The product utilizes the same technology as the product being proposed to TPL. Meter variants are available with and without 100A disconnect relays, neither meter comes with load control relays. This capability could possibly be provided separately via a 100A Smart Relay product. While getting a lot of attention in various markets around the world with the promise of a cheap IP-based meter, the product offered to TPL is new and largely unproven.

The Glen Canyon meters are priced at a significant discount to all the other vendors. This is in part achievable through integrating a low cost WiFi solution into the meter and also due a simple meter design that lack of any load control functionality. It's also possible Glen Canyon is offering their meters at a discount to establish a reference site for strategic reasons. Pricing of their cloud based VAMI (Virtual AMI) headend service was initially misunderstood, but has since been clarified. This is now confirmed as based on 1% of the meter capital value per month, with an uplift to cover GPRS connection costs for only the 5% of meters that have GPRS modems. On this basis the VAMI service fees are significantly lower than first understood and combined with the lowest cost meter offering of any vendor, the Glen Canyon solution is clearly the lowest cost offering received.

Concerns around the stability of the Glen Canyon Business and the maturity of their AMI product were put to TPL's CEO by the Evaluation Team and it was decided that these outweighed the their price advantage. Consequently the Glen Canyon proposal was eliminated.

7.3.5 Landis & Gyr

The Landis & Gyr (L&G) proposal was a partial proposal for their U-Series meters only. As part of their partnership with Metrix and SSN it is intended that TPL would implement a complete AMI solution using L&G meters combined with an SSN mesh network and Metrix SaaS Solution using SSN's UtilityIQ software. On the basis that TPL may not choose to take a complete solution from any one provider, L&G were asked to separately provide their meter pricing. It was noted that the meter pricing offered by L&G was less than that provided by Metrix for the same meter, it therefore has to be assumed that Metrix were adding a priming fee into their pricing.

7.3.6 Echelon-Holley (Formway)

Formway Group Metering is a metering service provider based in Australia and New Zealand, they hold an agency for the sale of meters from Holly Metering Limited, which is one of China's largest meter manufactures. Holley has entered into a joint venture with Echelon to develop new smart metering products including the EdgeSense platform targeted for the UK and Australasian markets. To complete the solution for TPL, they have combined the EdgeSense meter with a GPRS module and a new headend system being developed specifically for small scale utility deployments. It's noted that the system is still under development, Holley has formed a product development team to adapt their existing local-market HES/MDM solution to incorporate the EdgeSense (DLMS) meter range. The risks of an unproven solution are partially counterbalanced by the low price and the opportunity for TPL to have an input into the development. Commercial release of the system is scheduled for August 2014. The proposal is very attractive from a price point and would allow TPL to benefit from significant development work needed to meet the stringent smart metering criteria specified for the UK market.

Echelon-Holley have been in discussions with Trilliant around the possibility of integrating the EdgeSense meter range with Trilliant's SecureMesh AMI solution. This development is still at the discussion stage, but does provide for a possible second choice of meters for use with a Trilliant mesh network.

7.3.7 Trilliant

The proposal from Trilliant is based on the General Electric (GE) SGM3000 meter range, which is a fully featured smart meter, combined with a Trilliant 2.4GHz Securemesh Neighbourhood Area Network. SecureMesh NAN radios are based on the IEEE 802.15.4 standard and support an air data rate of 250kbps. Trilliant have proposed two options for the WAN component, an option that uses GPRS for backhaul from the mesh gateway devices, or a second option that replaces the mesh gateways with a dual radio device that acts as a gateway to the NAN, but also serves as node in a private 5.8GHz WAN (WiFi) network. In both options the comms networks interface with the Trilliant Unity Suite Headend. This headend system has been deployed by Trilliant to a number of customers using ANSI meters in North America, however TNBR from Malaysia are the first to use it with the SGM3000 IEC meter.

The proposal for Tonga is based on a number of design assumptions, including a requirement for 66 repeaters in the NAN to support the meter mesh network and in the case of private WAN option, a WiFi network comprising 24 nodes to cover all of Tongatapu. Trilliant have advised that they have taken a conservative approach in developing their design and that the NAN benefits from the meshing capability of the meters to extend the coverage. As the WAN solution operates at the higher 5.8GHz frequency there would need to be line of sight between the nodes, requiring the radios to be mounted high above surrounding foliage. The Tongan Authorities would also need to be consulted regarding use of the 2.4GHz and 5.8GHz frequency bands, which are shared spectrum bands in many countries, but potentially require a license in Tonga.

Trilliant's proposal was originally priced with the private WiFi based WAN network included. Pricing was subsequently provided for the cellular backhaul option. The cost difference in terms of network components between the two designs was minimal. The infrastructure costs to construct the towers necessary to mount the radios for WiFi backhaul is likely to exceed the operational costs associated with a cellular backhaul solution.

7.3.8 Silver Spring Networks (SSN)

The Silver Springs Networks (SSN) proposal was a partial proposal for their mesh networking technology and their UtilityIQ headend, supply of meters was not included in their proposal. As part of their partnership with Metrix and Landis & Gyr, it is intended that TPL would implement a complete AMI solution using L&G meters combined with an SSN mesh network and Metrix SaaS solution using SSN's UtilityIQ software. On the basis that TPL may not choose to take a complete solution from any one provider, L&G were asked to separately provide their meter pricing. Pricing for the SSN mesh and headend solution was higher under the SSN proposal than that provided in the Metrix Proposal, but this is due to a more complete cost estimate from SSN, individual component prices were actually higher in the Metrix Proposal. Technically the SSN solution rates very strongly, with potential for further developments around Outage Detection and Distribution Automation. It is a mature solution with large scale deployments in Australia and New Zealand using the L&G meter and also has the benefit of already been integrated with EDM and Secure IEC meters. While technically one of the best proposals received, it was priced at a significant premium to all of the other vendor's proposals, consequently SSN were subsequently asked to re-evaluate their pricing to explore ways that could reduce the overall cost of their proposal for TPL.

SSN provided revised pricing for a solution based only on the core components of their system and also for a ten year project life. While this pricing was consistent with the SSN pricing used in the initial budget for TPL, it was still significantly above the other shortlisted proposals. SSN subsequently provided an alternative proposal based on their Micro AP product. This alternate proposal was also evaluated, but still remained at a cost premium to the other proposals received.

7.3.9 AD Riley

The AD Riley proposal is based on the Landis & Gyr Cashpower MMI Prepayment Meter, which is a dedicated prepayment meter and is not considered a true smart meter. As the solution is designed purely for prepayment, it is not suitable for post pay customers, and therefore does not offer a complete solution. Two communications solutions are offered using PLC and mesh radio technology for the NAN and in the case of the PLC solution it is also used to communicate to a in-home customer interface unit. Both the PLC concentrator and the mesh radio gateway / concentrator use GPRS to communicate back to a centralized prepayment vending system (Suprima). Reference sites are provided for a full deployment in South Africa and various components of the proposed solution that have been deployed in Samoa, Papua New Guinea, Micronesia and Saipan.

7.3.10 Smart Grid Innovations

Smart Grid Innovations Pty. Ltd. (SGI) was established in 2008 as a subsidiary of an Israeli company PowerCom Ltd. PowerCom was established in 2006, has a design group based in Israel and joint ventures/subsidiaries in South Africa, India, Hong Kong and Australia providing sales support. The company has developed strengths in PLC based smart meter solutions with centralized prepayment vending. The PowerCom meters proposed support PLC along with GPRS and RF communications options, although the SGI proposal is for PLC communications to a concentrator which then communicates via GPRS to a central headend. The solution offered has an integrated headend and MDM which also incorporates a prepayment system. The SGI solution is not well known in the Australasian market and it is not clear what support could be provided from their offices in Australia and Hong Kong. The solution offered is very competitively priced, particularly so in the case of the integrated headend and MDM solution, which raises

questions as to whether the true costs have been fully developed in their proposal. Little detail has been provided for reference sites, other than a list of customers that are predominately in the Middle East and Africa.

Concerns around the performance of a PLC solution over TPL's distribution network were such that it was decided to eliminate the SGI proposal.

7.3.11 ABB / Tropos

The ABB Tropos proposal is a partial proposal for a Field Area Network (FAN) only and would need to be integrated with another vendor's AMI solution. A FAN is a multi-purpose, secure, broadband wireless network that covers an entire distribution area. In the case of an AMI solution a FAN network could be used for backhaul to a central office location. Being multi-purpose, the ABB Tropos network could also be used for SCADA communication, Distribution Automation and other smart grid applications, mobile workforce communications, substation security or any other application requiring secure broadband communications. Where it has been used for AMI backhaul, the ABB Tropos has been used in conjunction with Itron (OpenWay), Elster (EnergyAxis), Trilliant(SecureMesh), and Landis & Gyr (GridStream) AMI solutions. In the case of its deployment in Guam, the ABB Tropos solution was used to backhaul from a L&G Gridstream mesh network / NAN. L&G have not proposed their Gridstream AMI solution for TPL, only their meters in combination with a SSN NAN.

The network design proposed by ABB Tropos for TPL consists of a number of high capacity (100Mbps) point-to-point microwave links connecting key sites, the Tier 1 network, and a combination of point-to-multipoint and mesh radios, the Tier 2 network. The Average Tier 2 throughput is > 2 Mbps with a minimum of > 250 Kbps. The Tropos Mesh Infrastructure routers (Tropos 7320) with dual 2.4GHz / 5.8GHz radios operate as the Tier 2 broadband mesh network and interface with the Tier 3 AMI network. The dual WiFi radios in the Tropos 7320 support both meshing and client connectivity at either frequency. They also incorporate an Ethernet interface which could be used to connect to a SSN / Trilliant AMI Access Point or PLC concentrator. The proposed ABB Tropos design for Tongatapu calls for 324 outdoor mesh routers (802.11n mesh radios) to be deployed to provide full coverage of the island, this compares to the private WAN proposed by Trilliant which only requires 22 devices (802.11a mesh radios) for their broadband WAN solution.

7.4 Summary of MDMS, PMS and Vending Services Responses

7.4.1 Meter Data Management

There were 11 responses in total for MDM capability a brief description of each is provided below:

7.4.1.1 Metrix

- Business Unit of Mighty River Power based in Auckland, New Zealand
- Response was on the basis of an outsourced service to TPL with a fixed monthly charge for meter data services and per transaction charges for disconnection and reconnection.
- Response reflected a relatively low level of compliance with the stated business requirements, with 25% of requirements "Fully met" with the Metrix current solution
- While Metrix has a reasonably mature MDM solution for the most part this is based on providing services to Mercury Energy within the MRP group and have no experience in providing services off shore

7.4.1.2 EDM I

- Leading smart metering manufacturer with Headquarters in Singapore and an operational centre in New Zealand.
- Response included multiple options including providing a licensed software solution, Software as a Service and an outsourced service proposition
- Response reflected a relatively high level of compliance with the stated business requirements, with 75% of requirements fully met with EDM I's current solution
- EDM I is the leading provider of smart metering in the New Zealand market and its MDM platform is used to service virtually all of the New Zealand Commercial Industrial sites. It is also a mature provider of technology in Australia and throughout Asia

7.4.1.3 Itron

- One of the world largest smart metering manufacturers, headquartered in the United States, with an operational centre in Sydney, Australia
- Response included multiple options including providing a licensed software solution, Software as a Service and an outsourced service proposition
- Response reflected a reasonably high level of compliance with the stated business requirements, with 69% of requirements fully met with Itron's current solution
- Itron's solution components have been deployed extensively internationally, but there are limited reference sites in the APAC region

7.4.1.4 Formway – Holley

- Response was provided by Formway on the basis of technology developed by Holley metering of China, who has a joint venture with Echelon for the US to develop intellectual Property relating to smart metering
- Response was on the basis of a bespoke solution however on review it appeared to actually be for a licensed MDM solution. Following further clarification with the vendor – bespoke development would be required to take the existing MDM functionality and change it for TPL's requirements
- Response reflected a complete 100% compliance with the stated business requirements, which is unlikely to be an accurate position unless what is actually proposed is the development of software for TPL. (See comment above)
- Holley is a reasonably mature producer of metering technology, but to date any MDM sales have occurred in China. There is no experience of working in the Pacific

7.4.1.5 Siemens

- One of the oldest and largest multinationals, with an operational centre in Melbourne Australia.
- Response was based on a licensed or fully outsourced solution
- Response reflected a significant level of compliance with the stated business requirements, with 91% of requirements fully met with Siemen's Energy IP solution
- Energy IP is the product developed by eMeter – one of the most mature MDM applications internationally, albeit for large scale vertically integrated utility companies

7.4.1.6 Agility CIS

- A company providing utility CIS and billing systems to the APAC region and beyond. Headquartered in New Zealand owned by a number of private investors, also TPL's current provider of CIS.
- Response is based on licensed software solution

- Response reflected a reasonably high level of compliance with the stated business requirements, with 66% of requirements fully met with Agility's current solution known as Orion
- Agility's MDM is considered to be relatively mature with multiple utilities in NZ, AU and the US understood to have implemented it.

7.4.1.7 Smart Grid Innovations

- A wholly owned subsidiary of PowerCom – an Israel metering technology company, which is based in Sydney, Australia
- Response was on the basis of a bespoke or SaaS model, although on review it is likely that the vendor is offering a licensed rather bespoke option
- Response reflected a complete 100% compliance with the stated business requirements, which is unlikely to be an accurate position unless what is actually proposed is the development of software for TPL.
- There are no reference sites in APAC for any projects undertaken by SGI, however their response indicates many AMI/Smart Grid projects have been completed by PowerCom around the world

7.4.1.8 Oracle

- One of the world's largest providers of ERP software with an operational centre in Sydney, Australia.
- Response did not conform with the RFP issued, with no information provided against specific requirements, rather a set of product brochures were provided. It is assumed that Oracle would provide a licensed MDM solution.
- Oracle's MDM solution is considered mature with it being used in New Zealand by Metrix and about to be implemented by AMS

7.4.1.9 Glen Canyon

- A relative newcomer to smart metering, Glen Canyon is based in Santa Cruz, California
- Response is based on an outsourced service per meter approach using cloud computing
- Response reflected a low level of compliance with the stated business requirements, with 41% of requirements fully met by Glen Canyon's current solution
- Glen Canyon is providing its technology to the State Grid Corporation in China to support a 2 million site deployment

7.4.1.10 Pointwest

- A large software development company based in the Philippines
- Response is on the basis of a bespoke software development
- Once developed, the software would comply with all of TPL's stated business developments
- Pointwest has no smart metering experience, but is a highly experienced developer of software for specific client requirements

7.4.1.11 Meter Sense – Harris Utilities

- A increasingly prominent supplier of AMI solutions for utilities mostly in North America and the Caribbean, Harris Utilities is based in Ontario, Canada
- Response is based on a Licensed or SaaS MDM solution
- Response reflected a 100% match with business requirements based on the current meter Sense MDM solution
- Meter Sense is considered a very mature MDM solution based on its deployment with 50 Utilities worldwide. The product has recently been deployed for the electricity utility in Guam

7.4.2 Pre payment Management System

There were 7 responses in total for a PMS capability, with a brief description of each provided below:

7.4.2.1 Metrix

- Response provided no information for its pre pay solution, however referred to its “Glo Bug” proposition, which is a reasonably mature prepay platform deployed in the New Zealand market using EDM smart meters.
- Further discussion required on TPL’s specific requirements before Metrix will engage on this proposition. Given the likely costs and lack of experience in deploying this solution outside of NZ it is unlikely to meet TPL’s requirements

7.4.2.2 Formway – Holley

- Response was on the basis of a bespoke solution, with the PMS integrated within the MDM. On review it appeared to actually be for a licensed software solution
- Response reflected a complete 100% compliance with the stated business requirements, which is unlikely to be an accurate position unless what is actually proposed is the development of software for TPL.
- Holley is a reasonably mature producer of metering technology, but there did not appear to be any references for PMS implemented as part of an MDM utilizing smart metering technology. There is no experience of working in the Pacific

7.4.2.3 Siemens

- Response was based on a licensed or fully outsourced solution
- Response reflected a significant level of compliance with the stated business requirements, with 86% of requirements fully met with Siemens prepay solution
- Siemens solution is very mature having been deployed in the UK for a number of years, however this Prepay solution is not integrated into its MDM solution

7.4.2.4 Agility

- Response is based on licensed software solution
- Response reflected a reasonably high level of compliance with the stated business requirements, with 76% of requirements fully met with Agility’s current solution which is a module of its Orion CIS platform
- Agility’s prepay solution based on smart metering appears to have been implemented with at least one utility offshore (Frontier Utilities in Texas), but there is no other mention of other implementations

7.4.2.5 Smart Grid Innovations

- Response was on the basis of a bespoke or SaaS model, although on review it is likely that the vendor is offering a licensed rather bespoke option. PMS appears to be fully integrated within the SGI MDM platform.
- Response reflected a complete 100% compliance with the stated business requirements, which is unlikely to be an accurate position unless what is actually proposed is the development of software for TPL.
- There are no reference sites in APAC for any prep pay projects undertaken by SGI, however their response indicates many AMI/Smart Grid projects have been completed by PowerCom around the world.

7.4.2.6 Glen Canyon

- Response is based on an outsourced service per meter approach using cloud computing
- Response reflected a low level of compliance with the stated business requirements, with 45% of requirements fully met by Glen Canyon's current solution.
- No PMS references, or specific experience provided

7.4.2.7 Point West

- Response is on the basis of a bespoke software development
- Once developed, the software would comply with all of TPL's stated business developments
- Point West has no specific prepay experience, but is a highly experienced developer of software for specific client requirements

7.4.2.8 In Charge – Harris Utilities

- Response is based on a Licensed or SaaS MDM solution
- Response reflected a 100% match with business requirements based on the current PMS offering known as "In Charge" which can be integrated with the Meter Sense MDM solution
- Harris Utilities solutions are mature, however there is no specific detail on the maturity of the In Charge offering.

7.4.2.9 AD Riley

- Prepay equipment and solution provider based in Wellington, New Zealand
- Response did not conform with the RFP for this capability and does not reflect a smart metering approach to prepay, rather a traditional encryption based model
- AD Riley is the current provider of solutions through much of the Pacific including, Samoa, The Solomon Islands and PNG.

7.4.2.10 Smart Grid CIS

- Smart Grid solution Provider based in Atlanta in the US, offering specific prepay capability
- Response reflected a relatively high level of compliance with the stated business requirements, with 76% of requirements fully met with Smart Grid CIS's current solution
- Solution appears to be relatively mature having been deployed in multiple instances with US utilities and it is also about to be implemented with Horizon Energy in Western Australia

7.4.2.11 Itron

- Response included multiple options including providing a licensed software solution, Software as a Service and an outsourced service proposition.
- Unfortunately there was no response against business requirements
- Itron claim to have a very mature Prepay solution with 12 million meters deployed internationally – but it is not clear in its response if that reflects a smart meter based solution or a traditional encryption based model. It is assumed to be the later

7.4.2.12 EDM I

EDMI provided no information relating to PMS in its response but subsequently indicated it has partnered with Orga Systems (www.orga-systems.com) to provide a PMS solution that it considers would meet all of the documented requirements.

7.4.3 Vending Services Solution

There were three responses against the RFI for vending services, but only two reflected the services actually being sought by TPL.

7.4.3.1 Digicel

- Cellular network operator through most of the Pacific based on a prepay call time model. Has access to a vending infrastructure to support this model
- Response is based on utilizing the agent network of OCL who it contracts with for physical top up services. In addition there are a number of electronic channels (internet/ offshore/credit card) payment channels) that it has developed itself
- Response reflected only a 30% compliance with the stated business requirements
- Given Digicel’s response is largely based on utilizing the OCL network of agents (who has provided a response to the RFI also), there is unlikely to be strong benefit to TPL dealing with an intermediary to access that capability

7.4.3.2 Oceanic Communications Limited (OCL)

- Prepay vending services provider for Digicel throughout the Pacific with head quarters in Wellington New Zealand
- Response based on utilizing its existing agent network in Tonga for physical top up, as well as activating a range of electronic payment channels
- Response reflected a high 86% compliance with the stated business requirements
- Very mature operator looking to grow its business and reduce it’s reliance on it’s existing major relationship with Digicel

7.5 Ratings of Meter, Communications and Head End Responses

The following non-price based ratings were agreed between the Evaluation Team in a workshop held the week of 13th January 2014. The rating scale was 1 – 10, with 10 being the best rating.

7.5.1 Meters

Criteria	EDMI	L & G	Trilliant/ GE	Formway/ Holley	ITRON	SGI	Glen Canyon
Metrology	9	7	8	9	7	8	8
Configurability	10	8	9	9	7	8	7
Specific Functionality	9	8	9	9	8	9	7
External Interfaces	9	7	9	7	8	9	7
Track Record	10	10	6	7	10	7	1
Total	47	40	41	41	40	41	30

The prices for each meter vendor are reflected below:

Cost	EDMI	L & G	Trilliant/ GE	Formway/ Holley	ITRON	SGI	Glen Canyon
1 Phase	\$ 158	\$163	\$164	\$128	\$261	\$114	\$57.10
3 Phase – WC	\$ 430	\$417	\$329	\$246	\$421	\$236	\$313.30
3 Phase - CT	\$ 299	\$548		\$295			

7.5.2 Communications

Criteria	TCC	Digice I	SGI	Trilliant Option 1	Trilliant Option 2	ABB Tropos	Glen Canyon	Itron	SSN
NAN Soln	N/A	N/A	PLC	RF Mesh	RF Mesh		LRR, GPRS	Mesh, PLC or Cellular	Mesh
WAN Soln	GPRS	GPRS	GPRS	Cellular	RF Mesh	BroadB WiFi	Cellular	NAN & WAN	Cellular
Implement	6	7	5	5	4	6	6	6	6
Support	8	7	4	6	6	7	6	7	7
Reliability / Robustness	6	9	7	8	8	9	7	8	8
Network Benefits (DA)	2	2	5	7	8	10	4	8	8
Track Record / Future Proofed	7	6	5	7	9	9	4	9	8
Total	29	31	26	33	35	41	27	38	37

7.5.3 Head End

Criteria	EDMI - Multidrive	Formway - HES	Glen Canyon - VAMI	Itron - Saturne	SSN - UtilityI Q	Trilliant - Unity Suite	SGI	ITRON - Openway
Implementation	8	6	8	8	8	7	8	8
Meter Integration	3	5	3	5	7	3	3	4
Support	8	7	6	7	8	6	5	7
MDM Integration	5	5	5	5	7	6	5	5
SaaS vs Licensed	Both	Licensed	SaaS	Both	Both	Licensed	Both	SaaS
Track Record	7	6	4	8	8	6	5	8
Total	31	29	26	33	38	28	26	32

7.5.4 Inclusion of Cost ratings for meter, comms and head end vendors

The addition of cost information and consequent ratings across vendors was then considered with a 60% rating for technical fit and 40% for the cost of each solution.

Company		Meters	Headend	Comms - NAN/WAN	Technical	Technical 60%	COST	COST 40%	TOTAL	Cost (TOP) (Meters - Headend)
Itron - secondary	Mesh/PLC	40	33	38	111	58	8	32	90	6,538,000
Formway/Holley	GPRS	41	29	31	101	53	9	36	89	5,550,000
SGI	PLC/GPRS	41	26	26	93	49	10	40	89	5,012,000
EDMI	GPRS	47	31	31	109	57	7	28	85	8,161,000
ITRON - primary	GPRS	40	32	31	103	54	6	24	78	9,789,000
Trilliant/GE option 2	SecureMesh/Wifi	41	28	35	104	54	5	20	74	11,670,000
Trilliant/GE option 1	SecureMesh/GPRS	41	28	33	102	53	5	20	73	11,670,000
SSN	Mesh/GPRS	40	38	37	115	60	3	12	72	13,349,000
Glen Canyon	GPRS/LRR/Mesh/Wifi	30	26	27	83	43	4	16	59	11,957,000
SSN Revised¹	Mesh/GPRS									11,169,000
Glen Canyon Revised²	GPRS/LRR/Mesh/Wifi									1,818,000
SGI Revised³	PLC/GPRS									4,197,000
Trilliant Revised⁴	SecureMesh/Wifi									8,955,000

1. Based on revised pricing received from SSN
2. Based on the correct application of Glen Canyon's VAMI Headend pricing, pricing considered incomplete, very light on professional services – original price was interpreted incorrectly (TOP11.957)
3. Corrected for a more accurate estimate of the number of transformers in the TPL network.
4. Based on individual component prices for 15k meters, rather than the 21,000 meters quoted for in their proposal

7.6 Rating of MDMS, PMS and Vending Services

A different approach was taken to rating these components using a set of criteria considered most appropriate to these components of the required solution, including:

- Fit for Purpose against requirements - 30% weighting
- Suitable for implementation in the Pacific – 20% weighting
- Maturity of solution – 10% weighting
- Initial cost – 25% weighting
- Ongoing cost 15% weighting

Each Vendor was evaluated across each component using a score out of 10 on the basis of its response to determine potential short listed options to discuss with the TPL team as part of the wider evaluation. Components were evaluated separately to provide maximum flexibility on mixing and matching components within the end to end AMI solution.

7.6.1 MDM Ratings

MDM Vendor	Fit for Purpose vs Requirements	Weight	Suitable for Implement in Pacific	Weight	Maturity	Weight	Initial cost	Weight	Ongoing cost	Weight	Total Score out of 10
Metrix	4	30%	4	20%	8	10%	2	25%	2	15%	3.6
EDMI	8	30%	6	20%	8	10%	5	25%	6	15%	6.55
Itron	7	30%	5	20%	7	10%	6	25%	7	15%	6.35
Formway - Holley	10	30%	5	20%	1	10%	7	25%	8	15%	7.05
Siemens* (New Cost)	9	30%	5	20%	8	10%	2(6)	25%	2(6)	15%	5.3(6.9)
Agility	7	30%	8	20%	7	10%	9	25%	10	15%	8.15
Smart Grid Innovations (SGI)	10	30%	4	20%	2	10%	7	25%	8	15%	6.95
Oracle		30%		20%		10%		25%		15%	0
Glen Canyon	4	30%	4	20%	1	10%	10	25%	4	15%	5.2
Point West	10	30%	8	20%	0	10%	5	25%	10	15%	7.35
Meter Sense	10	30%	9	20%	8	10%	6	25%	7	15%	8.15

7.6.1.1 MDM costs based on service model

A number of vendors provided multiple delivery models for their technology or services. To enable a comparison between vendors for different an approach of using 10 years of costs was taken. An assumed hardware cost was used across all vendors, as a number did not have hardware costs within their responses.

Bespoke

Criteria	Formway	SGI	Point West
Upfront	52,416	558,000	651,000
Implementation	149,436		
Ongoing Support	54,800	111,000	
Hardware	25,000	25,000	46,500
Training		176,700	
3 rd party licenses			
Total	283,652	870,000	697,500

Licensed

Criteria	EDMI	Itron	Siemens*	Agility	Meter Sense
Upfront	542,500	in HES cost	347,820	42,625	202,967
Implementation	37200		261,428	33,600	501,749
Ongoing Support	1,167,500		695,640		541,000
Hardware	25,000		25,000	25,000	22,000
Training	18,600		24,800		
3 rd party licenses					35,000
Total	1,790,800		1,304,888	101,225	1,302,716

*Siemens resubmitted significantly reduced pricing after it was advised it had not made the short list.

SaaS

Criteria	EDMI	Itron	SGI	Meter Sense
Service Fees	1,476,000		1,841,400	1,500,000
Implementation			176,700	501,749
Training	18,000			
Ongoing Support				
Total	1,494,600		2,018,100	2,001,749

Outsourced

Criteria	EDMI	Itron	Metrix	Siemens* includes PMS	Glen Canyon
Service Fees	7,200,000		15,061,600	4,910,400	13,140,000
Implementation			1,000,000		
Training					
Ongoing Support				5,499,600	
Total	7,200,000		16,061,600	10,410,000	13,140,000

7.6.2 PMS Ratings

PMS Vendor	Fit for Purpose vs Requirements	Weight	Suitable for Implement in Pacific	Weight	Maturity	Weight	Initial cost	Weight	Ongoing cost	Weight	Total Score out of 10
Metrix		30%		20%		10%		25%		15%	0
Formway - Holley	10	30%	5	20%	1	10%	10	25%	10	15%	8.1
Siemens* (New Cost)	9	30%	5	20%	9	10%	3(6)	25%	6(7)	15%	6.25(7.15)
SmartGrid CIS	8	30%	6	20%	7	10%	4	25%	4	15%	5.9
Agility	8	30%	8	20%	7	10%	10	25%	10	15%	8.7
Smart Grid Innovations (SGI)	10	30%	4	20%	2	10%	10	25%	10	15%	8
AD Riley	1	30%	6	20%	1	10%	6	25%	0	15%	3.1
Glen Canyon		30%		20%		10%		25%		15%	0
Point West	10	30%	8	20%	0	10%	5	25%	10	15%	7.35
Meter Sense	10	30%	8	20%	8	10%	2	25%	4	15%	6.5
Itron	0	30%	0	20%	9	10%	6	25%	6	15%	3.3

7.6.2.1 PMS costs based on service model

A number of vendors provided multiple delivery models for their technology or services. To enable a comparison between vendors for different an approach of using 10 years of costs was taken. An assumed hardware cost was used across all vendors, as a number did not have hardware costs within their responses.

Bespoke

Component	Formway	SGI	Point West
Upfront	34,944		651,000
Implementation	58,032		
Ongoing Support	54,800		
Hardware	10,000		10,000
Training			
3 rd party licenses			
Total	157,776	Included in MDM	661,000

Licensed

Component	Itron	Siemens*	Agility	Meter Sense	Smart Grid CIS
Upfront	372,000	103,044	15,500	2,520,000	465,000
Implementation	744,000	157,102	22,400	92,000	364,560
Ongoing Support		206,000			930,000
Hardware	10,000	10,000	10,000	10,000	10,000
Training		24,800			
3 rd party licenses				216,000	
Total	1,126,000	466,146	47,900	2,839,000	1,769,560

*Siemens resubmitted significant/y reduced pricing after it was advised it had not made the short list.

SaaS

Component	Smart Grid CIS	Meter Sense
Service Fees	1,339,200	2,520,000
Implementation	364,560	501,749
Training		92,000
Ongoing Support	27,900	
Total	1,494,600	2,995,280

Outsourced

Component	Siemens
Service Fees	incl. in MDM
Implementation	
Training	
Ongoing Support	
Total	incl in MDM

7.6.3 Vending Services Ratings

Vending System Vendor	Fit for Purpose vs Requirements	Wt	Suitable for Implement in Pacific	Wt	Maturity	Wt	Initial cost	Wt	Ongoing cost	Wt	Total Score out of 10
OCL	9	30%	10	20%	8	10%	10	25%	5	15%	8.75
Digicel	6	30%	10	20%	7	10%	7	25%	7	15%	7.3

7.6.3.1 Vending Service Solution Cost

These costs were determined on the basis of 10 years of transaction costs assuming 3 transactions per installation per month.

Cost component	OCL	Digicel
Upfront		140,000
Transactional	1,350,000	540,000
Total	1,350,000	680,000

7.7 Evaluation Findings

Using the mix of evaluation information and a thorough discussion in an Evaluation Team workshop held on the 17 January the following key findings were agreed:

- There was no single vendor for a complete end to end solution that was considered fit for purpose from a technical and cost perspective
- A number of combinations within the end to end solution were considered viable based on the maturity of the vendors and their solutions
- A solution where TPL built, owned and operated its own communication infrastructure was seen to be a preferable solution if it was economically feasible, rather than taking a GPRS service from an existing telco in Tonga
- A number of the respondents that provided 100% compliance with requirements were not credible given the lack of experience or track record in the specific areas of capability being sought. These responses require significant more scrutiny to determine their viability
- A licensed or SAAS solution for technology were considered viable alternatives rather than Bespoke software development or fully outsourced propositions

Consequently the overall cost rankings for the end-to-end solutions were determined:

AMI:

ITEM#	VENDORS	COMMS	CAPEX	CAPEX	OPEX	CAPEX	OPEX	CAPEX	OPEX	CAPEX	OPEX	\$M
			METER	COMMS	HEADEND	MDMS	PMS	Total				
1	ITRON B	MESH/PLC	3.570	0.120		0.340	2.510	0.100	-	0.030		6.670
2	FORMWAY	GPRS	2.200	1.050	1.550	0.710	0.050	0.220	0.080	0.035	0.058	5.953
3	SGI	PLC	2.440	1.810	0.090	0.570	0.096	0.580	0.110	-	-	5.696
4	EDMI	GPRS	3.250	2.000	1.550	0.390	0.970	0.540	1.200	0.030	-	9.930
5	TRILLIANT A	MESH	4.200	1.330		0.770	1.970	0.100	-	0.030	-	8.400
E*	ITRON A	GPRS	4.120	2.630	1.550	0.870	0.620			0.370	0.740	
P*	GLEN CANYON	LRR/GPRS	0.970	0.220	0.180	0.040	10.500	0.100	-	0.030	-	12.040
P*	SSN	MESH/GPRS	3.180	3.210	0.400	0.220	6.350		15.000	0.030	-	28.390
R*	SGI	PLC	2.440	0.998	0.093	0.570	0.096	0.580	0.110	-	-	4.887
R*	TRILLIANT A	MESH	3.575	2.684		0.722	1.973	0.100	-	0.030	-	9.084
R*	GLEN CANYON	LRR/GPRS	0.814	0.014		0.035	0.955	0.100	-	0.030	-	1.948
R*	SSN	MESH/GPRS	3.176	3.051	0.476	0.158	4.308		15.000	0.030	-	26.199

* Notes: P = Pending E = Eliminated R = Revised

MDM/PMS/Vending:

ITEM#	VENDORS		CAPEX	OPEX	CAPEX	OPEX	CAPEX	OPEX	\$M
			MDMS	PMS	VENDING	Total			
1	AGILITY	MDMS/PMS	0.100		0.030				0.130
2	HARRIS	MDMS/PMS	0.700	0.600	2.600	0.210			4.110
	POINTWEST	MDMS/PMS	0.650		0.650				1.300
E*	SIEMENS	MDMS/PMS	0.609	.695	.260	.206			1.770
E*	SMARTGRID CIS	PMS			0.830	0.94			1.770
	OCL	VENDING					-	1.300	1.300
	DIGICEL	VENDING					0.140	0.540	0.680

* Notes: E = Eliminated

8 Budget Comparison

The following tables indicate how the responses to the RFP compare to the budget. Red text indicates within budget.

TPL Power RFP	Meters & Comms	Delta to Budget	Headend & Support (10 year DCF)	Delta to Budget
Budget	\$3,762,297		\$2,628,517	
EDMI	\$5,255,000	\$1,492,703	\$2,422,304	-\$206,213
Formway (Holley)	\$3,254,328	-\$507,969	\$1,990,898	-\$637,618
Glen Canyon	\$828,070	-\$2,934,227	\$806,861	-\$1,821,656
Itron (Primary)	\$6,748,800	\$2,986,503	\$2,623,939	-\$4,578
Itron (Alternative)	\$3,681,944	-\$80,353	\$2,386,509	-\$242,008
Landis & Gyr	\$6,227,313	\$2,465,016	\$4,046,032	\$1,417,516
Metrix	\$5,167,018	\$1,404,721	\$6,779,118	\$4,150,601
Silver Springs Networks (SSN) - Original	\$6,385,170	\$2,622,873	\$5,702,669	\$3,074,152
Silver Springs Networks (SSN) - Revised	\$6,227,313	\$2,465,016	\$4,046,032	\$1,417,516
Smart Grid Innovation	\$3,438,715	-\$323,582	\$722,574	-\$1,905,943
Trilliant	\$6,260,138	\$2,497,841	\$2,315,862	-\$312,655
Average	\$4,861,255	\$1,098,958	\$3,076,618	\$3,016,618

Smart Metering Capital Costs	Budget \$	Agility	EDMI	Harris	Siemens
MDM & Headend Interfaces	450,000	100,000	540,000	700,000	609,000
Prepayment System	279,000	30,000	No info	94,000	260,000

O&M Costs pa	Budget Cost \$/pa	Agility	EDMI	Harris	Siemens
Prepayment System	116,075	0	No info	252,000	20,000
Pre pay vending costs	Not included	130,000	130,000	130,000	130,000
MDM System	60,000	0	120,000	60,000	69,000

9 Short-listed Vendor Recommendation

The evaluation team met in Tonga from the 6th to the 10th of February 2014 to review the evaluation data and responses received to follow up questions sent to specific vendors. The team identified a confirmed short list of vendors and assessed the requirements for reference site visits.

9.1 Meter and Headend:

Of the 19 original responses received, four companies were short listed for the provision of meters and headend systems.

EDMI a Singaporean company with a strong presence in Wellington and Brisbane offering a GPRS solution

Holley (represented by Formway based in Brisbane) a Chinese company offering a GPRS solution

Itron a US company with a strong presence in Sydney offering a radio mesh solution; and

Trilliant a US company with a presence in Singapore also offering a radio mesh solution.

Glen Canyon was considered for a time in the shortlist but was eliminated. While it was acknowledged that the Glen Canyon proposal was at a significant discount, concerns around product availability (Q4 2014 at best), the maturity of their solution, very limited functionality of the meter, SaaS only business model were in combination considered to outweigh the price advantage.

9.2 Meter Data Management and Prepayment

There was a clear choice for the meter data management and prepayment systems, namely Agility, the provider of TPL’s current billing system, Orion.

9.3 Prepayment Vending

Only two responses were received but OCL was the outstanding response.

10 Site Reference Visit

A sub group of the Evaluation Team accompanied by 2 TPL directors completed a site reference visit covering New Zealand, Singapore, Malaysia, Hong Kong and China over two weeks in March.

The Site Reference visits were conducted for TPL by:

- Carl Sanft (Chairman, NZ reference sites only)
- George Koloamatangi, TPL Director
- William Edwards, TPL Director
- Nikolasi Fonua – Business Development Engineer
- Stephen Atkinson – PBL senior engineer

The conclusion from the visit was that all 4 shortlisted companies offered feasible options but each having advantages and disadvantages with differing overall risk profiles for TPL.

EDMI

Advantages	Disadvantages
<ul style="list-style-type: none"> • Tried and proven solution, already deployed in scale in New Zealand and the UK • Available now for immediate deployment • Supported out of New Zealand and Australia 	<ul style="list-style-type: none"> • Meters priced at a premium to other vendors • Dependent on GPRS service provider for meter communications

Holley/Formway – Advantages

Advantages	Disadvantages
<ul style="list-style-type: none"> • Low cost solution • High specification meter design to meet stringent UK requirements 	<ul style="list-style-type: none"> • Production version of the meter not available to Q4 2014 • Headend software development required • Yet to be deployed anywhere else in the world

Trilliant

Advantages	Disadvantages
<ul style="list-style-type: none"> • Large scale deployments in the US • Supports a private backhaul independent of telcos • Provision for combined Distribution and automation network 	<ul style="list-style-type: none"> • GE is the only integrated third party meter provider • Expensive in comparison to the other shortlisted vendors • Full mesh design required to confirm deployment costs

Itron

Advantages	Disadvantages
<ul style="list-style-type: none"> • Large scale deployments in the US • Use of Cisco's standards based mesh network devices • Flexible connection options including PLC, RF Mesh and GPRS 	<ul style="list-style-type: none"> • G2 version of the meter not available until Q4 2014 • Full mesh design required to confirm deployment costs

Preferred Vendors:

Considering the material presented whilst on the reference site tour and evaluating further information received in response to further questions sets issued, the Evaluation Team has a preference for Itron as a radio mesh solution and EDM I for a GPRS solution.

Capital and Economics:

The table below summarizes the relative costs of the Itron and EDM I vendors' solution when combined with the meter data management and prepayment vendor costs. The bracketed figures are the original business case figures.

Prime Vendor	Capital (TOP)	Opex (TOP pa)	Post Tax IRR	NPV (TOP)
Itron (Mesh)	6.18m [6.16m]	797k [1.22m]	11.3% [11%]	1.10m [0.85m]
EDMI (GPRS)	6.06m [5.62m]	795k [734k]	12.1% [24%]	1.37m [5.68m]

It should be noted that the Itron pricing was tentative pending response to a further question set to ascertain the costs of a Licenced deployment of Openway, a scaled down version of the Itron headend software that would be quite sufficient for the number of meters required for TPL. The costs of the design and implementation also required further clarification from Itron.

The economic calculations assumed a discount rate of 8.5%, inflation rate 3%, tax rate 25%, depreciation rate 10% and no borrowing. The reason for the differences in the economic parameters between the GPRS and radio mesh solutions is due to the operational cash flow being related to the rate of deployment of meters

for the GPRS solution where as for the mesh solution the full operational costs begin once the radio mesh is established.

Choice – Radio mesh or GPRS:

The costs and economics between the two preferred options are sufficiently close that the choice comes down to a tradeoff between a relatively low risk GPRS solution versus a higher risk associated with the implementation of a radio mesh solution, but which is mitigated by greater independence from cellular providers. As well as a commercial risk in selecting Itron, there is a delivery risk as the mesh solution is not yet in production and thus is not proven in the marketplace. Manufacturing delays and integration delays could be as long as 9 to 12 months. However the mesh solution offered is a development of an existing mesh product.

11 Interim TPL Board Recommendation to the TPL Board – March 2014

1. If TPL would like a GPRS solution that would require long-term reliance on either TCC or Digicel EDM I should be selected as the preferred vendor. If TPL wants to be essentially independent of either TCC or Digicel it is recommended that a radio mesh solution be selected. Based on the evaluation of Itron and Trilliant RFP responses and the site reference visits it is recommended that the preferred radio mesh vendor be Itron for meters, radio mesh and headend. The latter recommendation is made subject to the further due diligence and satisfactory commercial discussions being conducted with Itron.

Board Decision: Itron was appointed as the preferred AMI vendor

2. That Agility be appointed, subject to concluding satisfactory commercial negotiations, as the vendor for meter data management and prepayment systems.

Board Decision: Agility was appointed as the vendor for MDM and prepayment

3. The evaluation process is concluded by undertaking the next steps as set out below.

12 Preferred Vendor Economic Analysis

Additional pricing information was received from Itron in April and an audio was held on the 16th of April with representatives of Itron and TPL to discuss the revised pricing. During this meeting Itron offered to price an alternative ‘appliance’ model. Under the ‘appliance’ model, the headend hardware is assembled and tested in Itron’s factory and then delivered to site as a working system. Pricing for the ‘appliance’ solution was received the 28th April 2014.

A workshop was held on the 1st and 2nd of May with a sub-committee of the Evaluation team and the preferred vendors. During this workshop clarification of the Itron Appliance option was provided and the extent of the integration between Itron’s headend and the Agility MDM system was mapped out.

On the 6th of May Itron submitted a final price for an ‘appliance’ solution. An economic analysis of the venture as a whole was then completed based on an Itron ‘appliance’ solution combined with an Agility MDM. The key points from this analysis follow:

Itron price comparison with Trilliant:

An update on the relative position between Itron and Trilliant, the second choice mesh proponent, is shown in the table below. The main point noted was that the SAAS option is significantly cheaper. The pricing received was considered to be very good given the scale of the venture and considering that Itron technology is state of the art and is standards based. The partnership with Agility is thought to be a very good solution for TPL.

10 Years Licenced Solution

	Itron (ROSA Appliance)	Trilliant
Meters & Mesh	\$4,836,000	\$5,006,000
Licensed Headend	\$1,921,000	\$1,322,000
Maintenance	\$716,000	\$1,600,000
Headend Hardware	\$1,504,000	\$1,500,000 (indicative only)
Total	\$8,977,000	\$9,428,000

- Totals excluded DB & OS Licensing; all costs TOP.

10 Years SaaS Solution

	Itron (TOP)
Meters & Mesh	\$4,836,000
SaaS Establishment	\$345,000
SaaS Fees	\$2,050,000
Maintenance	Included in SaaS
Headend Hardware	Not Applicable
Total	\$7,231,000

Whilst there is a significant cost reduction from the SAAS option, there is some concern at the reliability of international telecommunications circuits to support realtime pre-payment transactions.

Budget Comparison – Final costs:

Smart Metering Capital Costs Summary (TOP)	Original Budget (EDMI GPRS, Licenced model)	Original Budget (SSN Mesh, SAAS)	Current price (Itron Mesh, Managed service)
Cost of Meters & mesh kit	3,762,297	3,589,823	3,882,221
Meter Priming Fee (N/A)		100,000	
Field Implementation (Vendor)		215,873	540,000
Vendor Project Management		200,000	776,000
Backhaul Network (as applicable)		2,700	78,400
Headend Cost	60,000	111,723	3,232,812
MDM & Headend Interfaces	450,000	556,875	218,025
Prepayment System	279,000	279,000	282,376
Asset Management System (provision)	100,000	100,000	100,000
Total	4,651,297	5,155,994	9,109,834

Note: The figures above relate only to the RFP vendor's costs portion of the total project

O&M Costs TOP pa Summary	Original Budget (EDMI GPRS, Licenced model)	Original Budget (SSN Mesh, SAAS)	Current price (Itron Mesh, Managed service)
Headend licences & software support	34,659	648,879	269,000
Prepayment System	116,075	116,075	116,376
Backhaul network costs	198,769	3,840	5,000
Total	349,503	768,794	390,376

Note: The figures above relate only to the RFP vendor's costs portion of the total project

As can be seen the capital cost of the preferred solution is significantly higher than the budgeted RF Mesh figure however the operational cost is less than half that budgeted for a mesh solution. If TPL would consider a SAAS implementation of the Itron solution, the saving would be approximately 20%.

Based on the elimination of cellular solutions, the RFP process has identified the Itron price is the best available to TPL for a smart meters and headend, for both SAAS and Managed Service (appliance model) solutions - SGI and Glen Canyon having been eliminated. Technically Itron is considered to be a very good offering.

13 Prepayment Technology and Cost Summary

It is understood that TPL has secured a New Zealand MFAT grant for the deployment of prepayment meters. The proposed solution supports the provision of a tokenless prepay electricity offering for TPL customers. This means that the prepayment meters will not be standalone meters with a keypad that customers have to enter prepay card numbers into. Instead the meters will be smart meters with a communications module that will connect the meter to the TPL back office systems.

The solution components that support prepayment include:

- 1. Smart meter with RF communications:** this technology enable electricity supply to be remotely disconnected and reconnected, based on the business rules that TPL determine
- 2. Prepay Management System:** this is a module within the Agility Billing and Meter Data Management software, that manages the decrementation of prepaid balances of customers' accounts using regular readings from the customers' smart meters
- 3. Prepay Vending arrangements:** several options have been identified and costed relating to making available a various payment channels for TPL's customers to make prepayments on their electricity account.

TPL can utilise existing payment agents in the form of Western Union or EM Jones, and/or enter a relationship with OCL Limited who currently provide real time top up services for prepay mobile phone across Tonga, using a significant agent network and a range of electronic channels such as the internet and mobile wallet.

All customers with a smart meter installed will be able to either select or be moved to TPL's prepay option at TPL's discretion.

Because the smart meters that support prepayment are part of an integrated communications technology and headend and meter data management system, the costs cannot readily be separated out for prepayment alone. However the capital costs for prepayment, using Itron's and Agility's costs, can be approximated by taking a per meter unit cost approach. The budget for MFAT funding is in the table below and the right hand column is the application of funds proposed under the smart metering and prepayment solution recommended within this paper. There is a shortfall in funding that will be made up by TPL.

Component	Total Cost for MFAT Project (NZD)	Itron/Agility RFP Costs (NZD)	Itron/Agility Notes
3000 x 1-phase meters	\$ 339,400	\$ 298,440	Meters priced without comms modem. Meters priced at \$153 with comms modem assessed at \$60
50 x 3-phase meters	\$ 21,000	\$ 13,240	Meters priced without comms modem. Meters priced at \$318 with comms modem assessed at \$60
Back-office Equipment	\$ 50,500	\$ 0	Existing hardware will support additional prepayment software
Software	\$ 116,500	\$ 281,480	Prepayment and MDM software and integration with Orion and meter headend
System Installation	\$ 35,500	\$ 129,750	Includes hardware
Meter Installation	\$ 160,000	\$ 25,070	Installation of smart meters
Other Costs	\$ 35,050	\$ 20,810	
Project Management	\$ 50,000	\$ 151,210	TPL + Itron project management (based on 3,050 meters)
Meter headend	N/A	\$ 460,720	Itron headend (equivalent cost based on 3,050 meters)
Meter RF Mesh	N/A	\$ 327,950	Cost based on unit costs for 3,050 meters + modem cost
10% Contingency	-	\$ 170,870	
TOTAL	\$ 807,950	\$ 1,879,530	
Prepay costs to be funded by TPL		\$ 1,071,580	
Balance of project costs (11,610 meters)		\$ 5,313,900	
GRAND TOTAL PROJECT COST		\$ 6,385,480	Equivalent to TOP9.3m (including MFAT grant) at 1.46TOP=1NZD

14 Final Recommendation

Members of the Evaluation Team recommend that:

Itron's RF Mesh Managed Service solution is selected as the meters and headend solution and Agility's meter Data Management and prepayment systems be selected as the technology solution set for the AMI project.

Subject to noting that:

1. This recommendation is made taking into account TPL's stated preferences after the RFP closed, not to use a cellular meters-to-headend solution and to have the hardware and software for all systems based in TPL's data centre in Tongatapu. It is noted that the Itron recommended meter-to-headend solution is not the lowest cost compared to the Itron SAAS option and is higher risk and more expensive than the EDMC cellular solution.
2. The pre-payment vending option, other than the use of merchant stores and TPL's offices, has still to be fully evaluated but this option is not material to the core technology selection.

Project Economic Evaluation:

Although the cost components evaluated herein constitute the major cost items of the whole Project, they are to be evaluated together with the balance of costs including TPL project management and meter installation in an economic model where the benefit streams are included. If the recommended technology solution does not meet the TPL investment criteria, TPL can consider the same solution using a SAAS or as a last resort a cellular solution with an alternative vendor.

Members of the Evaluation team:

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