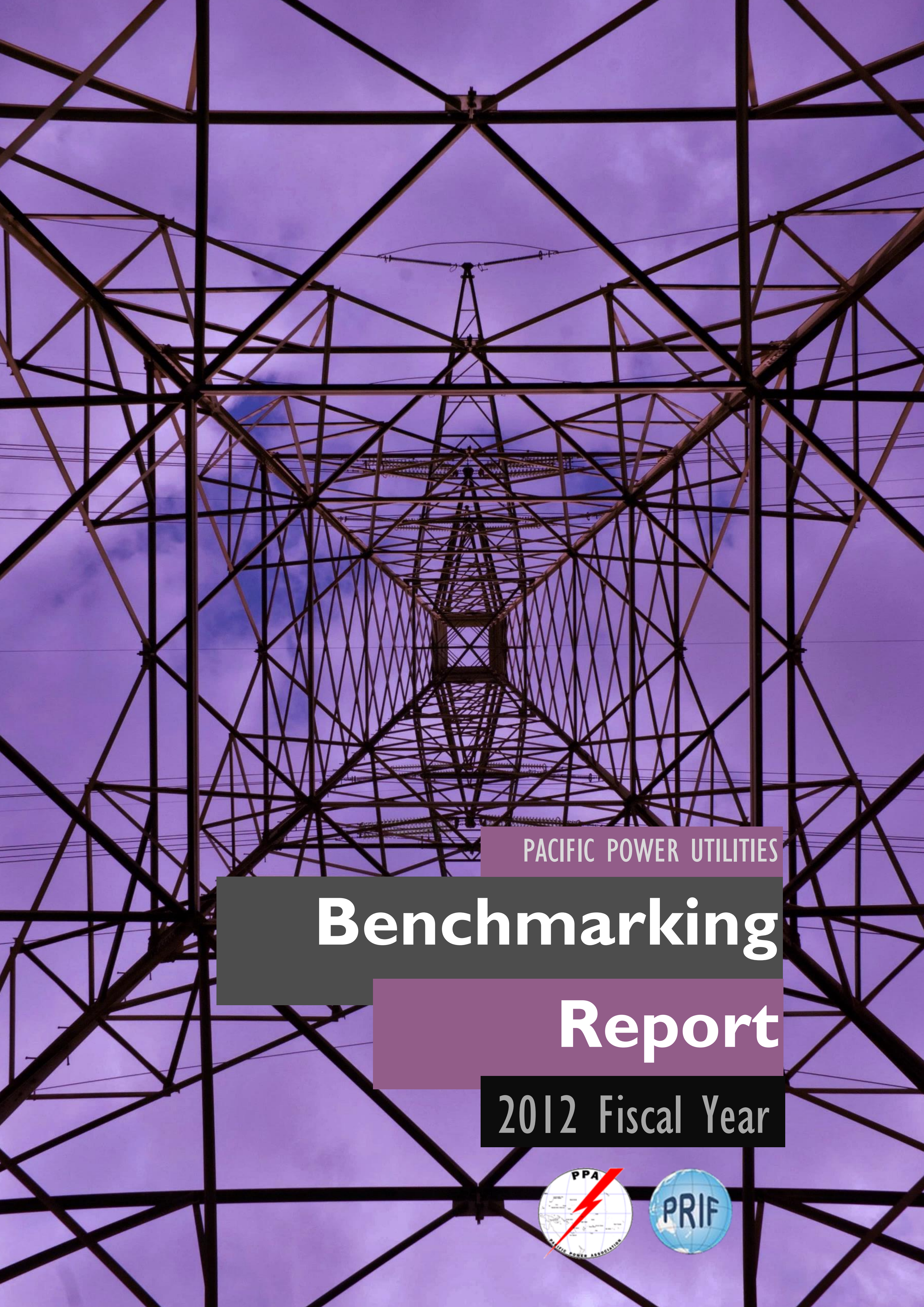

PACIFIC POWER UTILITIES

Benchmarking Report

2012 Fiscal Year

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The project has been overseen by an Implementation Review Committee consisting of the PPA Secretariat, the PRIF Coordination Office (PCO), and the Secretariat of the Pacific Community (SPC).

This report was prepared in two stages by consultants working for the PCO: Pauline Muscat was responsible for the analysis in the first stage and prepared the initial draft of the report; Derek Atkinson undertook further analysis in the second stage and finalised the report.

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PACIFIC POWER

Benchmarking Report

2012 Fiscal Year

PREPARED BY THE PACIFIC POWER ASSOCIATION (PPA) WITH TECHNICAL SUPPORT FROM THE PACIFIC REGION INFRASTRUCTURE FACILITY (PRIF)

JUNE 2015

PREFACE

The Pacific Power Association is pleased to release the 2012 Fiscal Year Benchmarking Report, based upon the 2012 fiscal reporting year relevant to each utility. This report presents the results of the third successive annual assessment of Pacific electricity utility performance since the initiative resumed in 2011.

It is encouraging to note that the quality of data has improved significantly and an increased number of utilities fully responded to the data collection questionnaire. It is also encouraging to see is that there is a growing number of utilities using the results from the previous assessments to put together improvement plans for their organizations. This is of course the most important use of the benchmarking assessment and the PPA encourages all utilities to do likewise.

This round of benchmarking is part of a transition period with the process involving only one consultant in the analysis of the data, making follow-up visits to those utilities that needed additional support in the data collection, and holding discussions with key utility staff on different aspects of benchmarking. This is a reduction in the number of consultants and it places more emphasis on the PPA Secretariat managing the data collection and initial vetting of the data received from the utilities.

In recognizing the important role that benchmarking plays in utility operations, the Board of the PPA has reaffirmed its commitment to the work and has given its support for the continuation of this exercise. A one day benchmarking workshop (organized by the PPA and PCO during PPA's 23rd Annual Conference in Pape'ete, French Polynesia), provided an opportunity for the utility technical staff and Benchmarking Liaison Officers to address weaknesses in the data collection and reinforced messages about the importance of good quality data received in a timely manner.

The CEOs of the Member Utilities have agreed at the last PPA Board Meeting to fully disclose the financial indicators which shows that members are becoming more comfortable with the benchmarking process and understand the benefits it can give them in continuous improvement of operation. On behalf of the PPA, I thank all the Active PPA Members' Management and Staff and I encourage everyone to continue working on the benchmarking Initiative.

Kione Isechal
CEO, Palau Public Utilities Corporation
Acting Chairman, Pacific Power Association
Koror, Republic of Palau

ACKNOWLEDGEMENTS

The PPA would like to acknowledge a number of groups and individuals who have contributed significantly to this benchmarking exercise.

The PPA Secretariat provided overall coordination and led the data collection and validation, liaising with the participating PPA member utilities. In particular, the leadership of the PPA Executive Director, Andrew Daka, was critical to project success. In addition, Gordon Chang (Deputy Executive Director), Paula Loga (Administrative Clerk), Devina Patel (Finance Officer), and Ana Chan (Administration Officer) were involved in a range of tasks supporting the data collection, analysis and production of the report.

PRIF provided funding and overall support in the preparation and implementation of the project. Appreciation also goes to the PCO and in particular to Christine McMahon who managed the consultancy and provided support throughout the project; Pauline Muscat and Derek Atkinson, the two consultants who analysed the data and prepared this report; Lorena Estigarribia who provided administrative assistance throughout the project; Sanjivi Rajasingham who reviewed the final report; and Fiona Mackenzie and Sheenal Singh who provided publishing assistance. Anthony Maxwell (ADB) and Merinda-Lee Hassall (NZMFAT) provided support in their roles as Coordinators of the PRIF Energy Sector Working Group. Mike Trainor (ADB Manila) and Chris Russell (ADB Consultant) provided expertise on the Governance chapter of the report, including preparation of governance indicators and review of the data and analysis.

Staff members of the SPC – most notably Solomone Fifita and Frank Vukikomoala - were a part of the project's Implementation Review Committee and provided input at different stages during the project. The SPC also houses the final data, provides it to requesting organisations and individuals, and uses it in reports it prepares on the energy sector in the Pacific.

Chief Executive Officers, the Benchmarking Liaison Officers and other utility staff have played a vital role in the project and, without them, this report could not have been completed. They supplied data and clarified points for the data analysis process, as well as providing valuable feedback on the benchmarking process and the application of individual indicators in their utilities. Their commitment to improving operations and service delivery to their communities is acknowledged and appreciated.

Acronyms

ADB	Asian Development Bank
AF	Availability Factor
APPA	American Public Power Association (of which PPA is a member)
ASPA	American Samoa Power Authority
CARICOM	Caribbean Community
CARILEC	Caribbean Electric Utility Services Corporation
CEO	Chief Executive Officer
CF	Capacity Factor
CPUC	Chuuk Public Utility Corporation
CoP	Community of Practice
CROP	Council of Regional Organisations of the Pacific
CUC	Commonwealth Utilities Corporation (Saipan)
DFAT	Australia's Department of Foreign Affairs and Trade
DSM	Demand Side Management
EDT	Electricité de Tahiti
EEC	Electricité et Eau de Caledonie
EEWF	Electricité et Eau de Wallis et Futuna
EIB	European Investment Bank
ENERCAL	Societe Neo-Caledonenne D'Energie
EPC	Electric Power Corporation (Samoa)
EU	European Union
Eurelectric	European Electrical Utility Association
FEA	Fiji Electricity Authority
FSM	Federated States of Micronesia
FTE	Full Time Equivalent
GDP	Gross Domestic Product
GNP	Gross National Product
GPA	Guam Power Authority
GW, GWh	Gigawatt (1 GW = 1,000 MW); Gigawatt hour (1 GWh = 1,000 MWh)
HV	High voltage
IPP	Independent Power Producer, usually private sector
JICA	Japan International Cooperation Agency
KAJUR	Kwajalein Atoll Joint Utility Resources
KEMA, DNV KL	KEMA was a consulting company, now DNV GL (PPA Allied Member)
kg	kilogram
km	kilometre
KPIs	Key Performance Indicators
kV	kilovolt (1,000 Volts)
KUA	Kosrae Utilities Authority
kWh	kilowatt; (1000kW = 1 MW); kilowatt hours; (1000kWh = 1MWh)
kWh/L	kilowatt hours per litre
LF	Load Factor
LTI	Lost Time Injury
LTIDR	Lost Time Injury Duration Rate
MEC	Marshall Energy Company
MOU	Memorandum of Understanding
MVA	Megavolt Ampere
MW, MWh	Megawatt (1 MW = 1,000 kW), Megawatt hour (1 MWh = 1,000 kWh)
NESIS	Network of Experts of Small Island System Managers (European utilities)
NPC	Niue Power Corporation
NUA	Nauru Utilities Corporation
NZMFAT	New Zealand Ministry of Foreign Affairs and Trade
O&M	Operations and Maintenance
PCO	PRIF Coordination Office
PIAC	Pacific Infrastructure Advisory Centre
PICs	Pacific Island Countries
PICTs	Pacific Island Countries and Territories
PIPs	Performance Improvement Plans
PNG	Papua New Guinea
PPA	Pacific Power Association; also Power Purchase Agreement
PPL	PNG Power Ltd.
PRDR	Pacific Regional Data Repository
PRIF	Pacific Region Infrastructure Facility
PPUC	Palau Public Utilities Corporation
PUB	Public Utilities Board (Kiribati)
PUC	Pohnpei Utilities Corporation
PV	Photovoltaic
RE	Renewable Energy
RMI	Republic of the Marshall Islands
ROA	Return on Assets

Acronyms cont.

ROE	Return on Equity
RORA	Rate of Return on Assets
SAIDI	System Average Interruption Duration Index
SAIFI	System Average Interruption Frequency Index
SCADA	Supervisory Control and Data Acquisition
SIEA	Solomon Islands Electricity Authority
SFC	Specific Fuel Consumption
SOPAC	Applied Geosciences and Technology Division of SPC
SPC	Secretariat of the Pacific Community
T&D	Transmission and Distribution
TAU	Te Aponga Uira O Tumu-Te-Varovaro (Cook Islands)
TEC	Tuvalu Electricity Corporation
TPL	Tonga Power Limited
UNELCO	UNELCO Vanuatu Limited
USA	United States of America
USD	United States Dollar
WBG	World Bank Group
YSPSC	Yap State Public Service Corporation

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EXECUTIVE SUMMARY

Overview

Benchmarking is a valuable instrument for comparing the performance of a utility over time, as well as performance between similar organisations and between regions. It allows better understanding of performance gaps across the Pacific, improved decision-making within power utilities and increased efficiency and improved performance of participating power utilities. Key Performance Indicators (KPIs) provide a means for utilities to monitor, assess and improve their performance over time by identifying and responding to trends, and by comparing performance with other similar utilities elsewhere.

This report presents the results of the latest benchmarking round, as based upon data collected for the 2012 fiscal year for each utility. It includes the results of 46 KPIs plotted against the previous two years data to show trends, as well as new utility governance and employee gender composition data.

In this round, financial data has been fully disclosed with agreement from the Pacific Power Association (PPA) utilities at the PPA annual conference that was held in Tahiti, French Polynesia from 7-11 July 2014. This enhances the usefulness of the data, allowing utilities to engage in dialogue regarding their respective results and how improvements can be attained.

Table A compares the average results of the current exercise (2012 data) with that of the previous periods (i.e. 2001, 2010 and 2011) and highlights any associated trends over time.[1] In summary of the generation indicators, the areas of load factor, capacity factor, specific fuel oil consumption and operating ratio have remained fairly stable. Availability factor values have improved but low confidence is placed in the comprehensiveness of out-of-service data provided. Lube oil consumption and power station usage have both improved. Forced outage and planned outage have also reportedly improved but the increase in averages may simply reflect an improvement in the number of utilities reporting and the quality of the data they are reporting. Generation labour productivity has declined overall and is a key area of concern. Generation operations and maintenance have decreased significantly to very low levels, indicating a neglect of adequate maintenance practices for generation plant and equipment.

A decline in performance has been observed in labour productivity, transformer utilisation, return on equity and consequently in the overall composite indicator. Other indicators including load factor, capacity factor, and specific fuel oil consumption distribution losses and operating ratio have remained fairly stable.

Regional comparisons can be helpful for highlighting issues and prioritising action. In this report, comparison has been made with two regions that hold some similarity to the PPA utilities; the Caribbean Electric Utility Services Corporation (CARILEC) and Network of Experts of Small Island System Managers (NESIS), a network of European utilities. Of these CARILEC bears the most useful comparison. The results show that CARILEC lead the Pacific in most indicators, however, the margin in many cases is not large and further investigation of how the CARILEC region has attained their results could prove helpful to the Pacific.

1 In the case that the result is inconclusive, this is stated. Where an increase or decrease has been observed but it cannot be said if this represents an improvement or decline in performance, 'increase' or 'decrease' is simply stated. For new indicators where no comparative data is available, or where previous data is unreliable, the 'Trend' column is left blank.

Table A: Summary of Indicator Trends 2012

Key Indicators		2001 Results		Goals 2002	International Best Practice (2002 report)	2010 Results		2011 Results		2012 Results		Trend
		Av	Med			Av	Med	Av	Med	Av	Med	
Generation												
Load factor (%)	↑ better	67	66	50-80	50-80	64	65	67	68	67	65	stable
Capacity factor (%)	↑ better	34	33	> 40	35-65	32	31	36	37	36	35	stable
Availability factor (%)	↑ better	93	97	80-90	10-65	98	100	82	81	92	99.6	improved*
Generation labour productivity (GWh/FTE employee)	↑ better					2.7	1.2	2.5	1.2	2.2	1.3	declined
Specific fuel oil consumption (kWh/ litre)	↑ better	3.8	3.7	4	Over 4	3.8	3.8	3.8	3.8	3.9	3.8	stable
Specific fuel oil consumption (kWh/ kg)	↑ better									4.5	4.5	
Lube oil consumption (kWh/litre)	↑ better	N/A	N/A	N/A	No standard	1302	971	1084	936	1096	984	improved
Forced outage factor (%)	↓ better	7.9	3.2	5-14	0	1	0.2	8.3	6.3	5.4	0.4	improved*
Planned outage factor (%)	↓ better	4.3	3.9	3	3	1	0.1*	3.9	1.8	2.64	0.04	improved*
O&M (USD per MWh)	varies	58	14	18		148*	71*	214*	132*	47	40	decreased
Power Station Usage (%)	↓ better				3-5	4.7	4.8	3.9	3.6	3.5	2.7	improved
Renewable energy to grid (%)	varies	N/A	N/A	N/A	No standard	22% main grid*		26% of all grids*				
Transmission												
Transmission losses (%)	↓ better	8	N/A	5	5			5*	5*	0.9*	0.9*	
Transmission reliability (outages/100km)	↓ better							41.8	18.2	11.5*	15.9*	improved*
Transmission SAIDI (min/cust) Unplanned	↓ better									52.7	60.9	
Planned	↓ better									0	0	
Transmission SAIFI (events/cust) Unplanned	↓ better									5.3	6.3	
Planned	↓ better									0	0	
Distribution												
Network delivery losses (%)	↓ better					12.8	11.7	11.8	9.2	14.0	12.2	*
Distribution losses (%)	↓ better	12*	N/A	5	5	12	10.4	14.2	10.7	14.1	12.2	stable
Transformer utilisation (%)	↑ better	18	18	30	50	19	21	18	19	16	16	declined
Distribution reliability (events per 100km)	↓ better					51	26	135	19	64	23	*
Customers per dist employee	↑ better	242	224	240	350	334	297	259	249	246	253	declined
Distribution O&M (USD/km)	↑ better							5846	4648	8662	5574	improved
SAIDI and SAIFI												
SAIDI (mins/customer)	↓ better	592	33	200	47	530*	139*	794*	583*	5664	475	increased
SAIFI (interruptions/cust)	↓ better	19	8	10	0.9	8*	4*	10*	6*	9	4	stable
Financial												
Ave. supply cost (USD/kWh)										0.45	0.44	
Debt to equity ratio (%)	↓ better	26	N/A	< 50	< 50	10	18	47	24	38	13	*
Rate of return on assets (%)	↑ better	-16.8	-	> 0	> 10	-4	1	3	0	-12	2	*
Return on equity (%)	↑ better					5.7	5.7	8.1	5.7	2.0	0	declined
Current ratio (%)	↑ better			>100				168	109	204	102	*
Operating ratio (%)	↓ better			<100				100	99	98	99	stable
Debtor days (days)	↓ better	79	51	< 50	30	115	56	62	51	57	50	improved
Human Resources and Safety												
Lost Time Injury Duration Rate (days / FTE employee)	↓ better							0.09*	0.04*	0.1	0.03	
Lost Time Injury Freq Rate (incidents per million hrs) (number of incidents per million hours)	↓ better							10	6.3	6.0	2.3	improved
Labour Productivity (customers per employee)	↑ better					85	74	71	59	81	55	*
Technical Composite												
Composite Indicator	↑ better	NA	N/A	NA	Not defined	2.8	2.8	2.7	2.7	2.5	2.4	declined

Notes: 1. (*) = questionable result

Recommendations

The key recommendations from Chapter 8 are provided below, which make recommendations in the areas of performance improvement, knowledge sharing and capacity building.

Performance Improvement Areas

Recommendations for performance improvement have not changed significantly from previous years. The key areas that require attention on a regional scale are low labour productivity, poor knowledge of customer outages and poor safety reporting, poor financial performance, and high losses.

Low Labour Productivity, (as represented by generation labour productivity, customers per distribution employee and overall labour productivity) is a key concern, noting that productivity has been steadily declining over the past two years. A regional program is recommended to address the issue. Recommendations echo those of the previous two benchmarking reports, which involves firstly ascertaining the reasons for poor labour productivity, whether it be poor skill level, poor management, social issues, high turn-over, low levels of automation, poor technical training or investment or other reasons. Where outer islands are involved, the serious consideration as to what extent SCADA[2] and telecommunications can improve labour productivity needs to be investigated. As highlighted in the last Benchmarking Report, technical skills of senior management teams are crucial to the success of Pacific utilities.

Poor knowledge of outages and customer experience across utilities: Though data collection of service reliability indicators SAIDI[3] and SAIFI[4] is improving, it remains inadequate for drawing conclusion. Continued efforts are needed to develop utility understanding of how to record outages, monitor system health and the effectiveness of staff response, as well as planning works and guiding decision-making on maintenance and capital works. Utilities need to track service reliability performance internally on a monthly or quarterly basis to heighten awareness of the service being delivered to the customer.

Poor safety and incident reporting continues to be an issue. Currently, the safety management systems of many utilities are immature and, in many cases, non-existent. Lost Time Injuries are not being recorded in many utilities. This is also indicative of a contributing factor to poor labour productivity with return to work not being closely managed in many cases. As emphasised by the Chairman of the PPA at the recent PPA conference, safety needs to be of utmost priority in the management of utility operations. A program to heighten awareness of the importance of safety across the region is recommended.

Poor financial performance: Indicators such as operating ratio show that approximately half of the utilities are struggling to achieve a positive return. Tariff setting continues to be at odds with the cost for producing electricity in many cases, that is, it is not sufficient to cover costs. Improvements in operational efficiencies and labour productivity will improve the situation. It is hoped the benchmarking reports will help to raise understanding and awareness of the impact low tariff setting has on power utility operations and, ultimately, the quality of service provided in the country.

High losses: Network and distribution losses continue to be high at 14%. Reduction in losses will result in direct savings and will have a direct impact on the ‘bottom line’ for a utility. Technical losses normally require changes to asset design or operation, or replacement of major infrastructure. Non-technical loss reductions are often easier to manage through addressing metering issues and customer behaviour.

Transformer utilisation has dropped further from the 2012 benchmarking round and the Pacific average is at 16%. This may be related to reduced generation demand and also low population density affecting lead times for usage of assets in terms of network extension. However, due to the often prohibitive cost of replacing distribution transformers, correct sizing of transformers should maintain a priority when designing and installing new plant.

Performance Improvement Plans

The Pacific power utilities have become familiar with the concept of developing Performance Improvement Plans (PIPs) through the benchmarking project site visits and workshops over the past three years. Benchmarking Liaison Officers presented at the 2014 workshop on areas that had been identified for improvement within their utility and how the improvements are being pursued and, for some of them, results are already being realised. Utility Chief Executive Officers (CEOs) are encouraged to review the benchmarking results and adopt PIPs for their utilities that address their priority areas.

2 Supervisory control and data acquisition
3 System Average Interruption Duration Index
4 System Average Interruption Frequency Index

Performance-Based Contracts and Bonuses

Performance- based contracting is recommended as a means for unifying utility staff and driving performance through an incentivised reward structure. Performance-based contracts have the following elements:

- a clear set of objectives and indicators
- systematic efforts to collect data on the progress of the selected indicators, and
- consequences, either rewards or sanctions, for the contractor that are based on performance.[5]

Performance-based contracts are powerful for integrating the PIP into the focus and output of utility staff. In organisations that have implemented performance-based contracts, the results have been markedly positive.

Knowledge Sharing and Capacity Building

There is opportunity for utilities to assist each other through the sharing of tools and processes for adoption in other Pacific nations as comfort level increase in the sharing of data. The use of online Communities of Practice and Webinars are recommended as a platform for facilitating continued collaboration of issues discussed at the annual PPA conference. The CARILEC group has been benchmarking since 2002 and as such have developed their process and utilisation of results to a greater level of maturity than the Pacific. Increased collaboration with CARILEC members is another way recommended to increase knowledge sharing between the two regions.

A challenge faced by many small Pacific Island countries is that there is a small pool of adequately-qualified people to assume technical and managerial roles in the power utilities. The strategy to appoint a Benchmarking Liaison Officer to co-ordinate data inputs at each utility has been effective in strengthening engagement of the utilities. One issue, however, is the retention of Benchmarking Liaison Officers. Often, training and skills development opens more growth opportunities abroad. A program of professional development, involving the clear creation of a career path for Benchmarking Liaison Officers, and involving exchange or secondment to other utilities to learn new methods of doing things is recommended to help develop and retain Benchmarking Liaison Officers from the different utilities.

For the past three years, the PPA Benchmarking Workshop has focused on developing the skills of Benchmarking Liaison Officers in benchmarking. The feedback received is that the workshops are a positive learning experience for the attendees and, though progress is gradual, advancement can be observed through more comprehensive responses to benchmarking questionnaires and clear performance progress of some utilities. At the PPA Conference, the CEOs indicated that training is needed in how to interpret benchmarking results, develop a response/business case, and carry out appropriate action (including applying for loans or funding). This represents a maturing in the stage of benchmarking in the Pacific and is a positive step towards utility ownership of the benchmarking results and exercise. Supporting this training initiative is highly recommended.

A range of progress is observed among the utilities in both data collection and reporting processes and in the application of benchmarking results for performance improvement. The dynamic exchange between CEOs and between Benchmarking Liaison Officers demonstrates the benefit that the utilities can provide to each other by sharing what has worked for them.

5 *Performance-Based Contracting for Health Services in Developing Countries: A Toolkit*, World Bank, 2008, p. 9.

INTRODUCTION

1.1 Benchmarking Overview

Benchmarking is a valuable instrument for comparing the performance of a utility over time, as well as performance between similar organisations and between regions. It allows better understanding of performance gaps across the Pacific, improved decision-making within power utilities and increased efficiency and improved performance of participating power utilities. Key Performance Indicators (KPIs) provide a means for utilities to monitor, assess and improve their performance over time by identifying and responding to trends, and by comparing performance with other similar utilities elsewhere. The overarching goal of this benchmarking initiative is to help power utilities improve their performance and contribute to enhanced service delivery in the power sector.

In August 2010, the PPA, the Secretariat of the Pacific Community (SPC), and the Pacific Infrastructure Advisory Centre (PIAC)[6] signed a Memorandum of Understanding (MOU) to establish a sustainable benchmarking system for the power utilities of the Pacific Island Countries and Territories (PICTs). Within the Council of Regional Organisations of the Pacific (CROP), the PPA is the lead CROP agency responsible for electric power assistance activities, with 25 member utilities among the PICTs[7].The SPC signed the MOU as the lead CROP coordinating agency for energy and PIAC acted on behalf of the Pacific Regional Infrastructure Facility (PRIF).

A benchmarking exercise that built on an earlier 2001 round[8] was completed in 2011 and was based on 2010 data, which had the participation of 19 utilities[9]. From 2012 to 2013 another benchmarking round was undertaken using 2011 data, with the participation of 21 utilities. The 2011 and 2012 rounds of benchmarking provide baseline data on performance in the energy sector, helping staff of the utilities to understand the potential of benchmarking in supporting performance improvement and providing training to utility staff. Data quality has shown continual improvement since the introduction in benchmarking in 2001. The exercises have developed the capacity of power utilities to collect, monitor, report, and assess data, and empowers them to identify and enact Performance Improvement Plans (PIPs).

This report provides the results of the third consecutive round of Pacific power benchmarking. This current round was based on data from the 2012 fiscal year applicable to each utility and was completed throughout 2014 and early 2015. The exercise involves data from 21 power utilities[10]. Table 1.1 shows the utilities that have participated in the Pacific benchmarking initiative since 2001.This round of benchmarking covered data on utility ownership and establishment (Section 1 questionnaire), governance, gender composition of the workforce, and KPI operational and performance data KPIs (Section 2 questionnaire).

6 Now replaced by the PRIF Coordination Office (PCO)
7 Contact details for the utilities are provided in Appendix A.
8 The 2001 round was run by PPA and ADB.
9 Some of these utilities completed Section 1 data, but not Section 2 data.
10 Due to a realignment of the data period, the data for four utilities (MEC, NUC, TPL and YSPSC) was the same as what was submitted in the previous round. TPL resubmitted a revised version to address some new questions in the Section 2 Questionnaire.

Table 1.1: Utility Participation in Benchmarking 2001, 2010 - 2012 Data Periods

Utility			Data Period			
			2001	2010	2011	2012
			Year Data Collated			
Acronym	Name	Country / Territory	2002	2011	2012/13	2013/14
ASPA	American Samoa Power Authority	American Samoa	✓	✓	✓	✓
CPUC	Chuuk Public Utility Corporation	Fed States of Micronesia (FSM)	✓	✓	✓	✓
CUC	Commonwealth Utilities Corporation	Commonwealth of N Marianas	×	✓	✓	✓
EDT	Electricité de Tahiti	French Polynesia	✓	✓	✓	✓
EEC	Electricité et Eau de Caledonie	New Caledonia	✓	×	×	✓
EEWF	Electricité et Eau de Wallis et Futuna	Wallis & Futuna	✓	×	×	×
ENERCAL	Societe Neo-Caledonenne D'Energie	New Caledonia	✓	×	×	×
EPC	Electric Power Corporation	Samoa	✓	✓	✓	✓
FEA	Fiji Electricity Authority	Fiji	✓	✓	✓	✓
GPA	Guam Power Authority	Guam	✓	✓	✓	✓
KAJUR	Kwajalein Atoll Joint Utility Resources	Marshall Islands (RMI)	✓	✓	✓	✓
KUA	Kosrae Utilities Authority	Fed States of Micronesia (FSM)	✓	✓	✓	✓
MEC	Marshall Energy Company	Marshall Islands (RMI)	×	✓	✓	✓
NPC	Niue Power Corporation	Niue	✓	✓	×	×
NUA	Nauru Utilities Corporation	Nauru	×	✓	✓	✓
PPL	PNG Power Ltd.	Papua New Guinea (PNG)	✓	✓	✓	×
PPUC	Palau Public Utilities Corporation	Palau	✓	✓	✓	✓
PUB	Public Utilities Board	Kiribati	✓	✓	✓	✓
PUC	Pohnpei Utilities Corporation	Fed States of Micronesia (FSM)	✓	×	✓	✓
SIEA	Solomon Islands Electricity Authority	Solomon Islands	✓	✓	✓	✓
TAU	Te Aponga Uira O Tumu -Te-Varovaro	Cook Islands	✓	✓	✓	✓
TEC	Tuvalu Electricity Corporation	Tuvalu	×	✓	✓	✓
TPL	Tonga Power Limited	Tonga	✓	✓	✓	✓
UNELCO	UNELCO Vanuatu Limited	Vanuatu	✓	✓	✓	✓
YSPSC	Yap State Public Service Corporation	Fed States of Micronesia (FSM)	×	✓	✓	✓
		Total	20	19	21	21

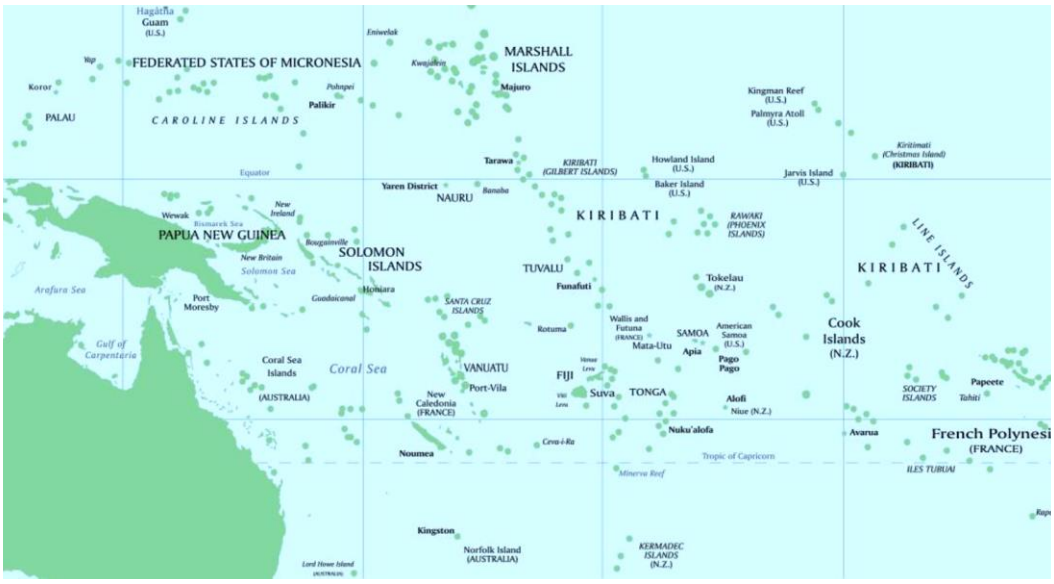
In this report, Chapter 1 provides regional context for the utilities. The key results of the Governance indicators are reported in Chapter 2. Gender results are reported in Chapter 3. The Data Reliability Assessment Results are in Chapter 4. The KPI results are provided in Chapter 5, with comparison of results in Chapter 6. Discussion follows in Chapter 7 and Recommendations are in Chapter 8.

1.2 Regional Overview

The PICTs have an estimated population of 10.0 million people living on 553,519 km^2 of land. [11,12] Figure 1.1 shows the PICTs in the region served by the PPA. The geography of the region and the individual utility service areas poses extreme challenges for the delivery of affordable electricity of reasonable quality. There is a wide variation in populations, land areas, per capita Gross National Product (GNP), Gross Domestic Product (GDP), and recent economic growth rates per capita.

11 SPC, Pacific Regional Information System. http://www.spc.int/prism/.
12 PNG dominates, with over two-thirds of the population and occupying nearly 84 % of the land area.

Figure 1.1: Map of the Area Served by the PPA



Source: Applied Geosciences and Technology Division of the Secretariat of the Pacific Community (SOPAC), *Member Countries* (2012), http://www.sopac.org/index.php/member-countries.

Table 1.2 summarises key economic and demographic characteristics of the countries in which the utilities that participated in this exercise operate, as relevant for the 2012 fiscal year where available. Great variance is observed between the countries in population and land area, as well as economic indicators GDP and GNP. These differences ought to be kept in mind when comparing benchmarking KPI results.

Table 1.2 Economies and Populations of Independent Pacific Island Countries

Country	Population (mid-2012)	Land area (km²)	GNP per capita US$ (2009)	GDP per capita		GDP growth rate per capita		Current account balance % GDP (2012)	High exposure to fuel price rises
				US$	Year	% 2011	%2012		
Cook Island	15,087	237	n.a.	11,917	2010	-0.8	3.4	-2.2e	✓
Fiji	855,545	18,273	3,840	3,472	2010	0.0	1.3	-1.6p	✓
Kiribati	106,886	811	1,830	1,664	2011	0.1	3.5	-10p	✓
RMI	53,679	181	3,060	3,130	2008	0.0	5.4	1.4e	✓
FSM	102,948	701	2,500	2,889	2010	n.a.	1.0	0.4e	✓
Nauru	10,292	21	n.a.	7,121	2009	1.9	4.8	0.6e	✓
Palau	17,445	444	6,220	10,692	2011	n.a.	4.0	-2.3e	✓
PNG	7,229,077	462,840	1,180	2,700	2012	6.2	7.5	-1.2p	✓
Samoa	187,610	2,785	2,840	3,706	2011	2.7	1.0e	-7.3e	✓
Solomon Is.	587,068	30,407	n.a.	1,181	2009	5.2	6.0	6.0e	✓
Tonga	103,276	650	3,260	4,394	2011	0.2	1.3e	3.0e	✓
Tuvalu	10,732	26	n.a.	4,002	2011	-0.5	1.2	10.0e	✓
Vanuatu	257,031	12,281	2,620	3,022	2008	1.2	3.0	0.0e	✓
PIC average				4,607		1.5	3.7		
CARICOM average				11,632	various				

Notes*:* 1. *e* = estimated.2.n.a. = not available.3.p = projection.
Sources:1. Asian Development Bank (ADB), *Asian Development Outlook* (2011). 2. ADB, *Pacific Economic Monitor* (2012). 3. GNPs from ADB; GDPs from SPC, (2012).4. SPC, Populations from Pacific Island Populations: Estimates and Projections (2014). 5. CARICOM GDPs sourced from CIA, *The World Factbook*, https://www.cia.gov/library/publications/the-world-factbook/geos/xx.html.

Table 1.3 provides the population, land area and GDP or the Pacific territories and dependencies. The territories and dependencies have far higher GDP per capita than the independent Pacific Island Countries (PICs). It follows that consumers are better able to afford higher electricity charges.

Table 1.3: Economies and Populations of Pacific Island Territories or Dependencies[13]

Dependency or Territory	Population (mid-2012)	Land area km^2	GDP per capita	
			US$	Year
American Samoa	56,173	199	7,874	2007
Guam	169,719	541	23,134	2007
Niue	1,556	259	11,985	2009
Northern Mariana Islands	55,094	457	16,494	2007
New Caledonia	255,645	18,576	37,993	2008
French Polynesia	268,270	3,521	21,071	2006
Wallis & Futuna	12,449	142	12,640	2005
Average			18,741	

Sources: 1. Asian Development Bank (ADB), *Asian Development Outlook* (2011). 2. ADB, *Pacific Economic Monitor* (2012). 3. GNPs from ADB; GDPs from Secretariat of the Pacific Community (SPC), (2012). 4. SPC, Populations from Pacific Island Populations: Estimates and Projections (2014). 5. CARICOM GDPs sourced from CIA, *The World Factbook*, (2011), https://www.cia.gov/library/publications/the-world-factbook/geos/xx.html.

13 French Polynesia is designated as an overseas territory. In 2003 it became an overseas collectivity (collectivités d'outre-mer or COM) and in 2004 an overseas country inside the French Republic (pays d'outre-mer au sein de la République, or POM), with considerable autonomy but without a legal modification of its status. New Caledonia was also an overseas territory but gained a special status (statut particulier or statut original) in 1999, with New Caledonian citizenship and a gradual transfer of power from France to New Caledonia itself.

2 GOVERNANCE

- **Most utilities are government-owned.**
- **Practices vary in respect to composition of the Board in the utilities and whether the CEO is a Board member or attends the Board meetings.**
- **Most CEOs are on performance-based contracts.**
- **The majority of utilities have internal audit processes.**
- **Annual reports are produced within three to nine months after the end of the financial year.**
- **Most utilities have Strategic Plans, however few are reporting on progress annually.**
- **Baseline analysis of the composite governance indicator is demonstrating a preliminary link between good governance and financial performance.**

2.1 Introduction

Since the recommencement of the benchmarking initiative three years ago, utilities have been asked to provide information on governance issues such as the utility ownership and institutional arrangements, regulatory and service framework, tariff determination methods, taxes and duties. Furthermore, this year additional governance questions were asked in the area of board composition, code of conduct and conflict of interest, commercial mandate of the utility, performance evaluation of CEOs, internal auditing and annual reporting.

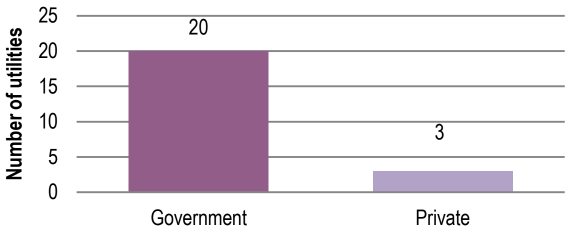
It is important to bear in mind in reviewing the information in this chapter that the data has not been independently verified, and is based solely on participant responses. The results have therefore been collated as an initial baseline for discussion at the next PPA conference, which is likely to consider issues of definition, data capture and presentation methodologies. With this in mind some key results, particularly concerning governance, have been presented below in Section 2.2,[14] with an analysis of an aggregate governance score presented in Section 2.3. A full table of results is provided in Appendix B.

2.2 Key Governance Results

(i) Utility Ownership

Of 23 utilities that have participated in the power benchmarking since it recommenced three years ago, 20 are government-owned and three are private (refer Figure 2.1). The three private utilities are EDT (Tahiti), EEC (New Caledonia) and UNELCO (Vanuatu), which are also owned by the same parent company (GDF-Suez).

Figure 2.1: Utility Ownership: Government-Owned (Public) versus Private



14 Some of the questions asked in the area of governance both in the Section 1 survey and the additional governance questions were open ended, and so responses varied and some responses were extensive. This makes it difficult to present these results. The results presented here focus on areas of key interest and quantitative responses that lend themselves to graphical representation.

(ii) Board Composition

As shown in Figure 2.2, of 17 utilities, 11 appoint Ministers and/or public servants to the Board, 5 do not allow their appointment to the Board and one did not provide a response to this question. Of the 11 utilities, 7 appoint directors to represent the line Ministry, while the Minister or public servant appointed in one of the 11 utilities does not formally represent the line Ministry. As shown in Figure 2.3, 10 utilities reported that the CEO or senior management served on the Board in varying capacities. Some specified that the CEO is appointed ex-officio (i.e. by virtue of holding the office of CEO) and others stated that the CEO is on the Board but does not have voting rights. One utility indicated that, while the CEO was not a member of the Board, he attends meetings.

Figure 2.2: Ministers and Public Servants on the Board

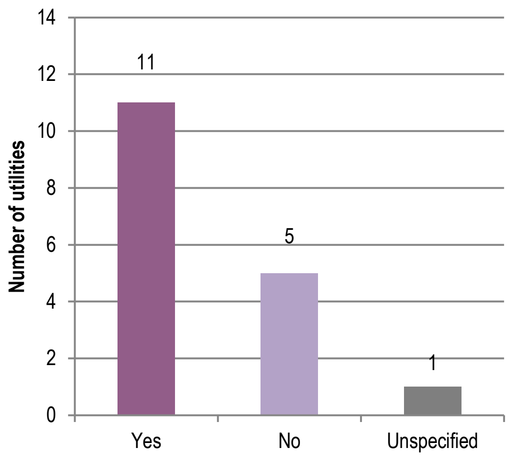
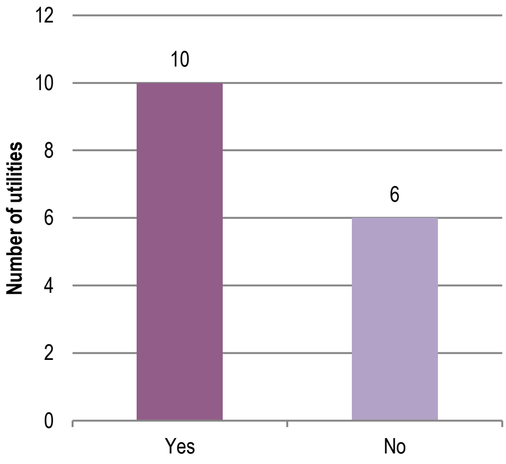
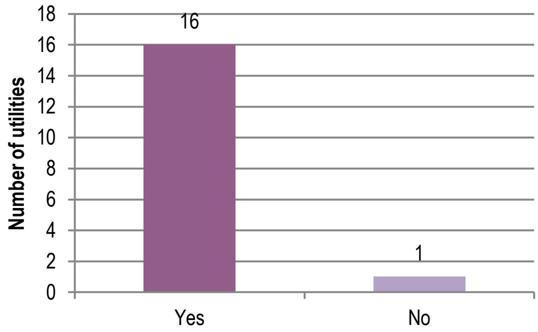


Figure 2.3: CEOs and Senior Management on the Board



(iii) Code of Conduct and Conflict of Interest

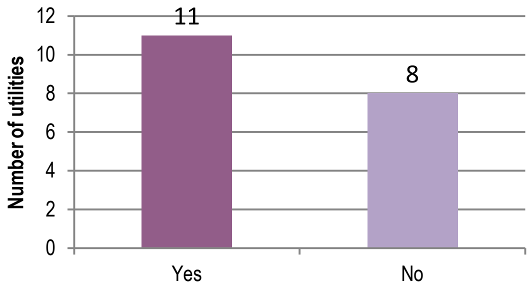
Figure 2.4: Code of Conduct and Conflict of Interest Policy



All but one of 17 utilities reported having a Code of Conduct and Conflict of Interest policy. Of these, the majority, 14 out of 16, said these were being fully implemented.

(iv) Commercial Mandate

Figure 2.5: Defined Commercial Mandate



Of 19 utilities, 11 reported having a clearly defined commercial mandate, whereas 8 utilities did not (refer Figure 2.5). Of those that responded positively, 9 indicated that it was being fully implemented.

(v) CEO Performance

As shown in Figure 2.6, thirteen out of 17 utilities reported that the CEO is employed under a performance-based contract, with the remaining four utilities answering in the negative. Of the 13 utilities with CEOs operating under a performance-based contract, 12 review the CEO's performance annually and one every three years (see Figure 2.7).

Figure 2.6: CEO Employed under a Performance Contract

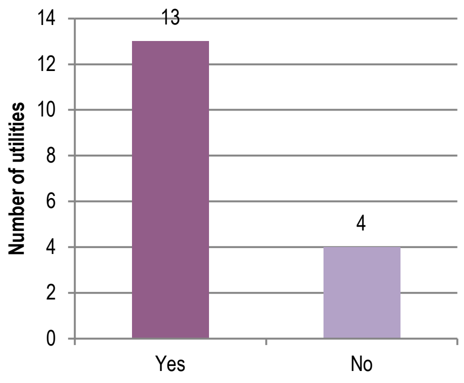
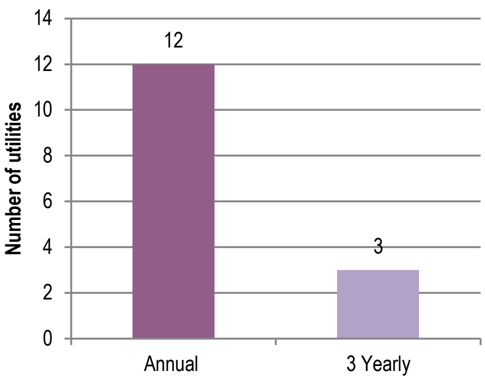


Figure 2.7: Period of Review for CEO Performance Contract



(vi) Financial Audit

Ten out of 17 utilities have an internal auditor (or audit or compliance department), as shown in Figure 2.8. Of those that have an internal auditor, four have the internal auditor reporting directly to the Board while six report to the CEO (refer Figure 2.9). Two of the utilities indicated that the auditor, though reporting to the CEO, could be approached directly by the Board if required. One utility reported that the internal auditor reports administratively to the CEO and functionally to the Board.

Figure 2.8: Internal Auditor

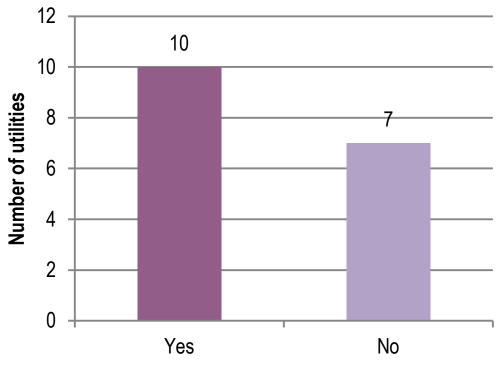
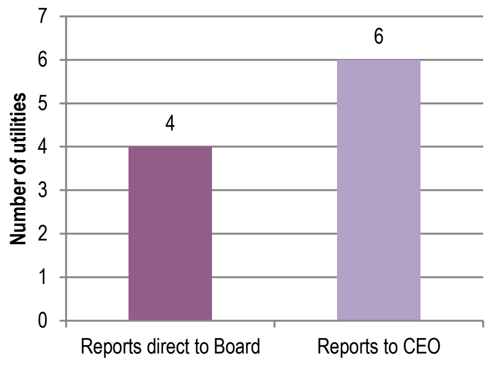


Figure 2.9: Internal Auditor Reporting Line



(vii) Strategic Planning

All but one of 17 utilities reported that the Board develops a strategic plan with financial, operational and capital expenditure projections (refer Figure 2.10). Of those with a plan, six have a five year plan, five have a three year plan, and the remaining have one, two, four, or seven year plans, as shown in Figure 2.11. Many of the utilities reported reviewing the plan on an annual basis.

Figure 2.10: Strategic Plan Developed by the Board

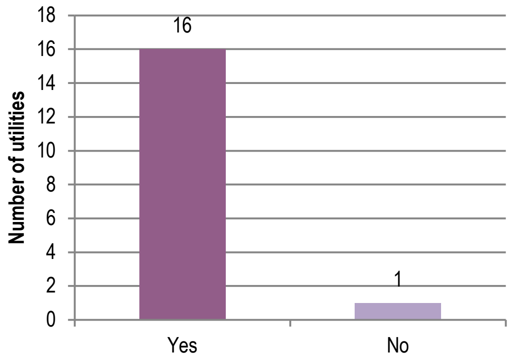
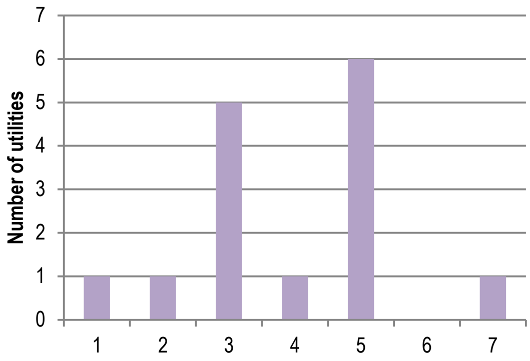
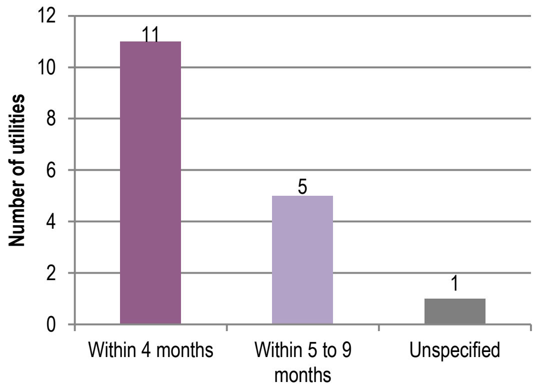


Figure 2.11: Period Covered by the Strategic Plan



(viii) Annual Report

Figure 2.12: Period Taken to Develop Annual Report



All of the 17 utilities reported producing an Annual Report. As Figure 2.12 shows, 11 of the utilities produce this report within four months of the end of the financial year, another 5 prepare the report between 5 and 9 months after the end of the financial year, and one utility did not specify. Of the utilities that responded, 14 report progress against the Strategic Plan in their Annual Report. Others stated that they report on progress, but not in the Annual Report. All utilities reported that the Annual Report is publically available.

2.3 Governance Analysis

A composite governance score has been introduced to this years' power benchmarking exercise for the purpose of analysing if good governance mechanisms are delivering tangible benefits to utilities in the form of improved financial performance.[15] The composite score is comprised of weighted indicators,[16] determined from relevant responses in the governance questionnaire using a governance scorecard (Table 2.1).

15 This is the first time the utilities have reported on governance arrangements, so it is expected that the quality of the data may show some inconsistencies. As has occurred with other data collected for benchmarking, both reliability and validity of the information is likely to improve after utilities have discussed the information from a comparative perspective and also sought advice from regulators working with them. It may then be possible to develop reliability scores as is used for other indicators of this report.

16 The weightings reflect specialist advice from the Asian Development Bank about the comparative importance of the respective governance indicators and their impact on performance. For example, if a Board does not have up-to-date and reliable financial information it cannot undertake basic governance tasks, it cannot assess performance to date nor does it have a financial foundation to plan for the future. Timely audited financial information is therefore given the highest equal weighting with a clear commercial mandate. Robust forward planning is listed third followed by Board composition.

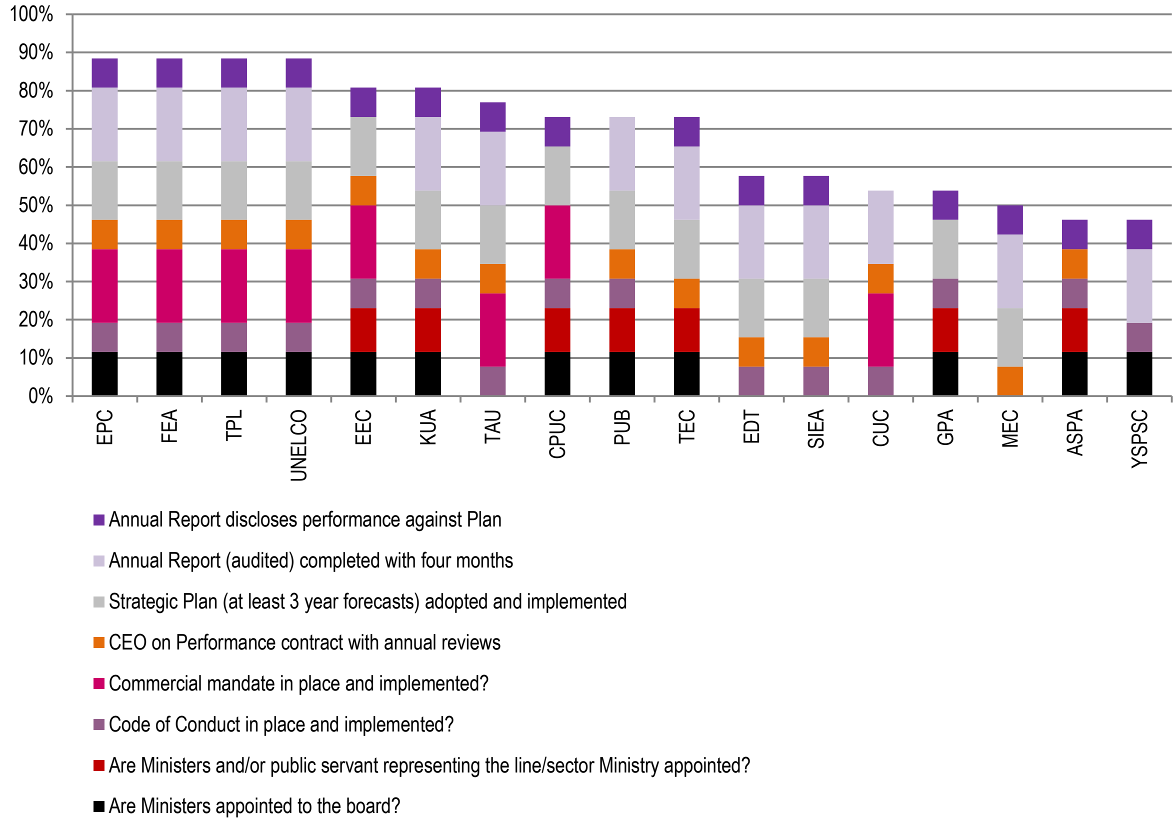
Table 2.1: Governance Scorecard

Governance Indicator	Good Governance	Poor Governance	Weighting
Are Ministers appointed to the Board?	No	Yes	12%
Are Ministers/ public servants representing the line/sector Ministry appointed to the Board?	No	Yes	12%
Is a Code of Conduct in place and implemented?	Yes	No	8%
Is a commercial mandate in place and implemented?	Yes	No	19%
Is the CEO on performance contract with annual reviews?	Yes	No	8%
Has a Strategic Plan (at least 3 year forecasts) been adopted and implemented?	Yes	No	15%
Is the Annual Report (audited) completed within four months of end of reporting year?	Yes	No	19%
Does the Annual Report disclose performance against Plan?	Yes	No	8%
Total Score			**100%**

Note: A good governance score results in full marks for each indicator, whilst a poor governance result receives a zero for each applicable indicator. In regard to the indicator on Annual Reports being completed within four months of the end of the reporting year, this has been used as a good practice standard but it is acknowledged that several utilities have agreements with their regulators that allow for longer periods for production of Annual Reports.

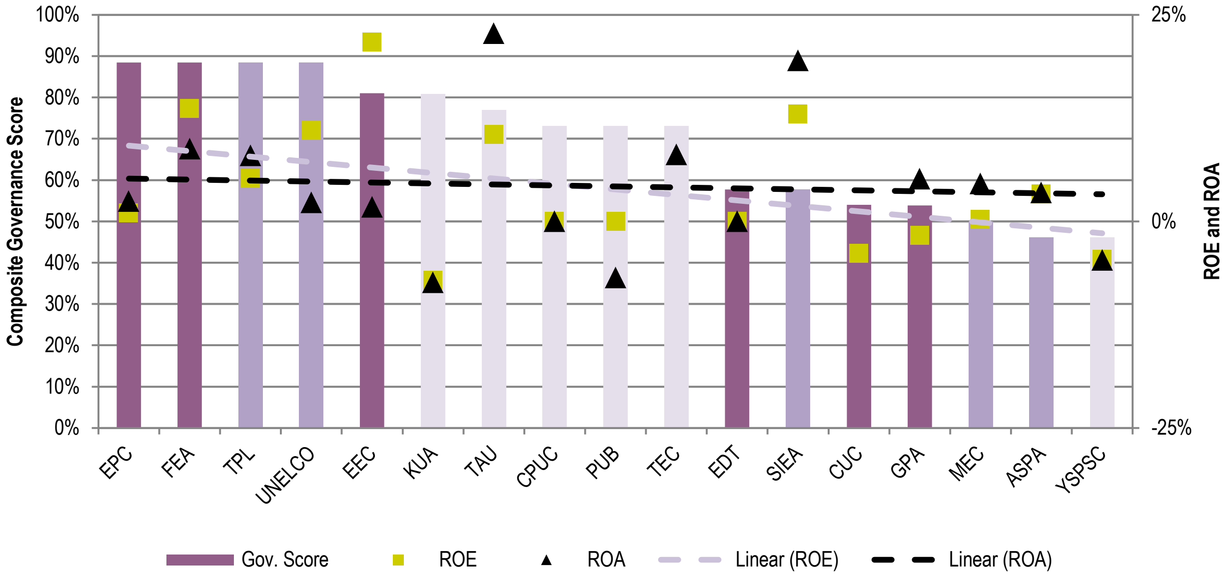
The composite governance scores for the utilities that provided sufficient responses to enable the weightings to be calculated are represented in Figure 2.13, ranked from highest score (closest to 100%) to lowest. It can be seen that no utility obtained a perfect score, however, there is a wide spread in result ranging from FEA, TPL and UNELCO with 88% to ASPA and YSPSC with a 46% composite governance score. It can also be seen that the effective implementation of a commercial mandate is a key-determining factor driving a comparatively higher composite score.

Figure 2.13: Composite Governance Score



In an attempt to determine what, if any, governance practices have on financial performance, the composite governance score has been correlated with the Return on Equity (ROE) and Return on Assets (ROA) data (see Section 5.7 for a detailed ROE and ROA analysis). The baseline results of these initial results (see Figure 2.14) are indicating a potential relationship – with a lower composite governance score generally correlating with a slightly lower ROE and ROA. However, in reviewing these results it should be noted that both governance and financial practices are dynamic and may change over time with delayed impacts upon associated analysis. Ongoing assessment in terms of comparison of these indicators is therefore recommended over subsequent benchmarking exercises in order to better assess the accuracy and impact of this correlation and trends over time.

Figure 2.14: Composite Governance Score compared with ROE and ROA



3 GENDER

- **Overall staffing of Pacific Power utilities is: 23% female, 77% male.**
- **The gender distribution of technical staff in utilities is: 7% female, 93% male.**
- **The CEOs and second-in-charge are all male.**
- **Senior managers reporting directly to the CEOs comprise 26% female and 74% male.**
- **Benchmarking Liaison Officers during this round of benchmarking consisted of four females and 17 males.**

3.1 Introduction

Gender dimensions were incorporated into this year's Benchmarking Project to raise awareness about gender equality in the power sector, including the involvement of men and women in decision-making roles in the utilities. Furthermore, a focused effort was made to ensure that both male and female Benchmarking Liaison Officers had access to information, support and leadership opportunities in the course of the project and at the Benchmarking Workshop.

3.2 Gender Composition

Overall, the staffing of power utilities in the Pacific is composed of 23% female and 77% male (see Fig 3.1). In technical positions, there is a strong gender imbalance with 93% male staff and 7% female staff (see Fig 3.2). Results such as these reflect a general trend in utility services internationally whereby the female participation rate for total staffing in the 'electricity, gas and water supply' sectors in Australia is, for example, currently slightly less than the Pacific utilities at 21%.[17]

Figure 3.1: Gender Distribution of Total Power Utility Employees

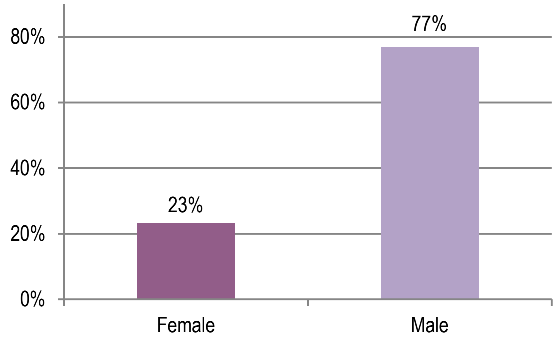
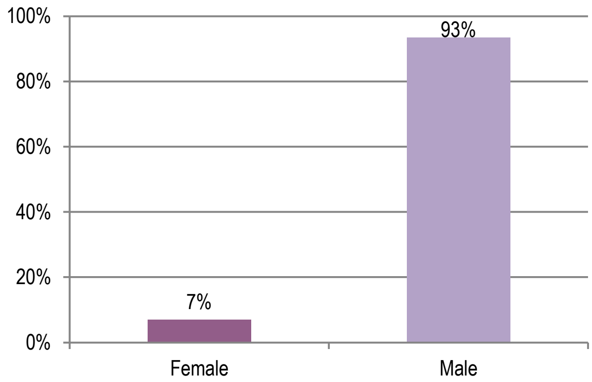


Figure 3.2: Gender Distribution of Technical Staff



17 Australian Government Department of Employment. *Employment by Industry by Gender*, November 2014. http://lmip.gov.au/default.aspx?LMIP/LFR_SAFOUR/LFR_IndustryGender.

Among the 13 utilities that provided data on gender, all had male CEOs or General Managers and the second-in-charge position was also filled by a male in every case. Without further investigation it is impossible to say if this is attributed to culture, educational opportunities, career preferences, recruitment practices or other factors. Of the staff reporting directly to the CEO or General Manager, 26% were female and 74% male, as shown in Figure 3.3. As Figure 3.4 shows, among females reporting directly to CEOs, 7% were in finance, 5% in administration, 4% in public relations, customer service or communications, 3% in procurement, 2% in human resources, and 6% were made up of 'Other' (including Business Officer, Finance Strategist and Executive Secretary). The role of Personal Assistant or Secretary to the CEO was filled by a female in ten out of eleven cases.

Figure 3.3: Gender Distribution of Senior Managers Reporting Directly to CEO

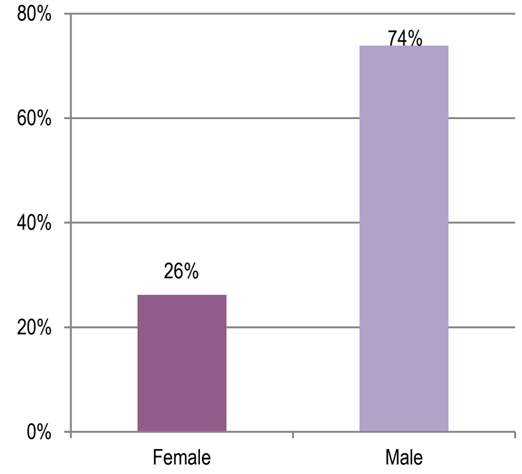
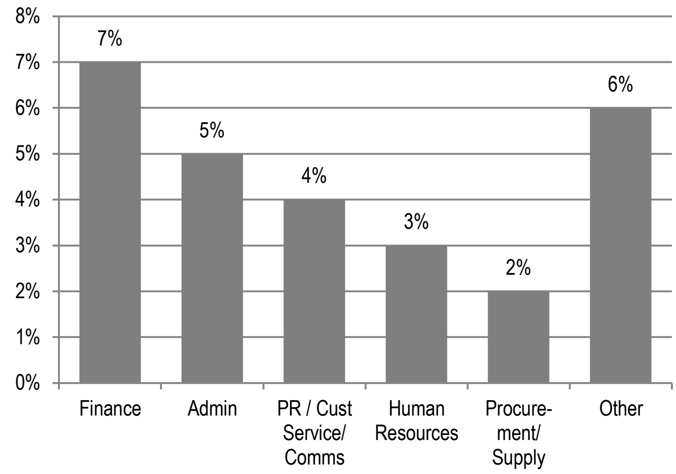


Figure 3.4: Roles of Women Reporting Directly to CEO



It is important to note that the survey only requested quantitative data on gender composition. Qualitative data is required to ascertain any issues that underpin the results. The full table of results is provided in Appendix C.

3.3 Benchmarking Liaison Officers

Of the 21 utilities that participated in this round of benchmarking, four of the Benchmarking Liaison Officers were female and 17 were male. The women represented the Cook Islands, Guam, Samoa and Vanuatu. Both men and women were actively involved in the benchmarking work, including the participation of two of these women at the Engineer's Workshop in July.

4 DATA RELIABILITY

- **Data reliability is high in the areas of customer connections and financial information.**
- **Further work is required to develop data quality of customer outage impacts and network demands.**

4.1 Introduction

Data reliability self-assessment was introduced to the benchmarking exercise in 2012. Participating utilities are asked to provide a self-assessed reliability grade for six key components of the primary data, as set out in Table 4.1. This was intended to help better understand data quality issues and encourage improvements in data reliability. It also is important when considering relative performance, as one needs to take into account the credibility of results before drawing any conclusions.

Table 4.1: Key Data Component Reliability Assessment Questions

Question	Description
(i)	How is fuel consumption calculated or derived?
(ii)	How are generation quantities calculated or derived?
(iii)	How are customer outages impacts calculated or derived?
(iv)	How are network demands and capacity utilisation calculated or derived?
(v)	How is the number of connections or customers calculated?
(vi)	Where is financial information sourced from?

The general reliability expectations of each grade, as provided to the respondents, are provided below in Table 4.2.

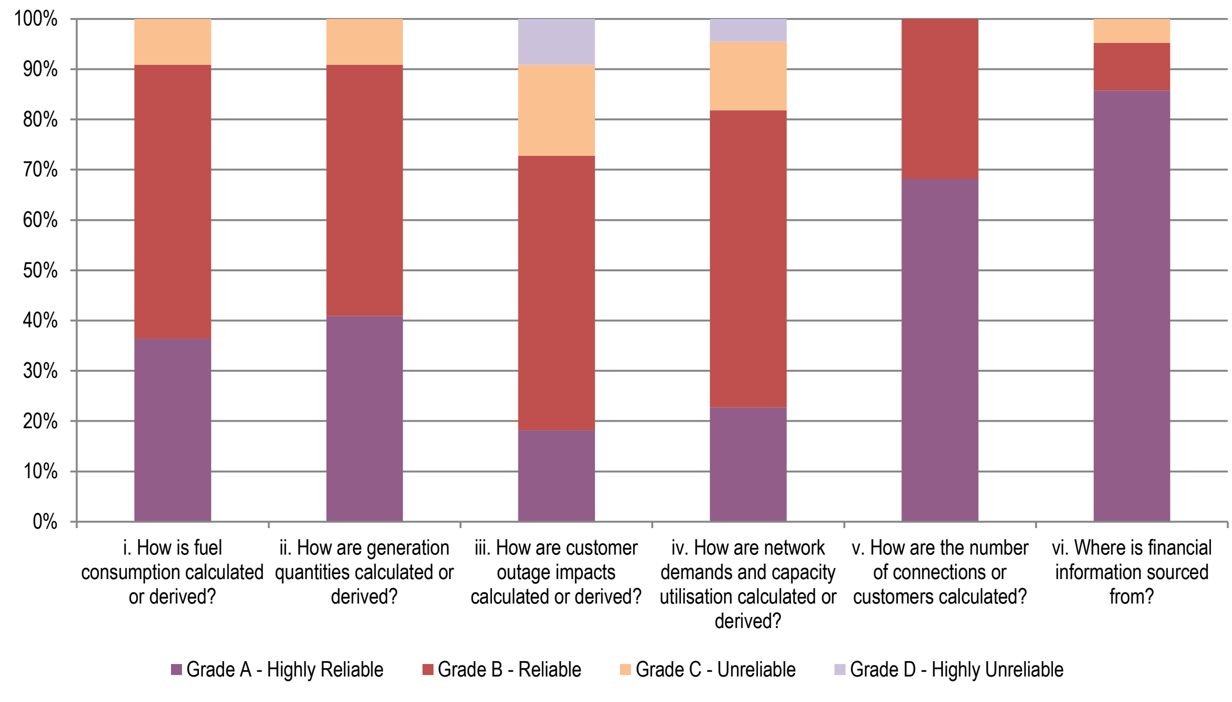
Table 4.2: Grading Schema

Question	Description	
A	Highly Reliable	Data is based on sound records, procedures, investigations or analyses that are properly documented and recognised as the best available assessment methods. Effective metering or measurement systems exist.
B	Reliable	Generally as in Category A, but with minor shortcomings, e.g. some of the documentation is missing, the assessment is old or some reliance on unconfirmed reports; or there is some extrapolation made (e.g. extrapolations from records that cover more than 50 % of the utility system).
C	Unreliable	Generally as in categories A or B, but data is based on extrapolations from records that cover more than 30 % (but less than 50 %) of the utility system.
D	Highly Unreliable	Data is based on unconfirmed verbal reports and/or cursory inspections or analysis, including extrapolations from such reports/inspections/analysis. There are no reliable metering or measurement systems.

4.2 Data Reliability Self-Assessment

The aggregated data reliability self-assessment results from the current round of benchmarking are presented in Figure 4.1. 'Grade A' represents highly reliable data, 'Grade B' reliable data, 'Grade C' unreliable data and 'Grade D' highly unreliable data.

Figure 4.1: Reliability Grades Assessment by Key Data Component



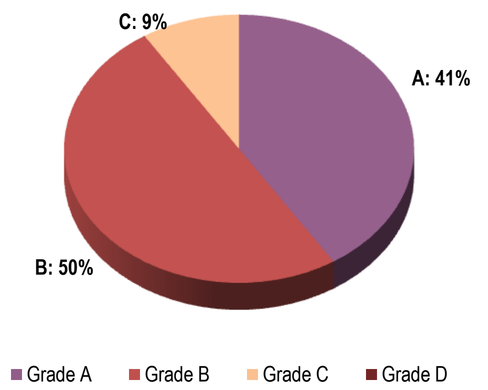
Overall, 73 to 100% of utilities reported that their data was reliable or highly reliable across the six categories. This is an improvement from the previous round where 55 to 95% of utilities obtained this result across the six categories. At the same time, there is room for further improvement. This includes the data on customer outage impacts, network demand and capacity utilisation. Customer outage impact data was reported unreliable or highly unreliable by 27% of utilities, while 18% reported network demand and capacity utilisation information unreliable or highly unreliable. This indicates more work is required in these two areas to develop data integrity for the purpose of effective benchmarking. The graph shows that customer outage impacts followed by network and capacity utilisation are the key areas where some utilities are struggling to provide reliable data.

An aggregate data reliability grade was derived for each utility after quantifying and equally weighting the grade for each key component. The aggregate score for each utility is shown in Table 4.3. The overall proportion of utilities with each aggregate score (Grade A, Grade B, Grade C, Grade D) is presented by the pie chart in Figure 4.2. There it can be noted that 91% of utilities had an overall score of Grade A or Grade B (that is Highly Reliable or Reliable), a very positive result; and 9% of utilities had overall Unreliable data. None of the utilities had an overall result of Highly Unreliable.

Table 4.3: Aggregate Data Reliability Grade 2012 (2011)

Aggregate Grade	2011 data	2012 data
A	ASPA, CUC, EDT, FEA, GPA, KUA, PPUC, PPL, TPL, UNELCO	ASPA, EEC, FEA, GPA, TAU, TEC, TPL, UNELCO
B	CPUC, EPC, KAJUR, MEC, PUB, PUC, SIEA, TEC, YSPSC	CPUC, CUC, EDT, EPC, KAJUR, KUA, MEC, PPUC, PUB, SIEA, YSPSC
C	NUC	NUC, PUC
D	(None in category)	(None in category)

Figure 4.2: Utility Aggregate Score (%)



The full set of self-assessment scores for each utility is provided in Appendix D.

Several observations made in the course of data reliability data collection and analysis is provided below:

- When utilities were asked to provide justification for their scores, the grades were often downgraded as more careful consideration went into understanding and evaluating each data area.
- The data reliability assessment components are best completed by the relevant departments. When the Benchmarking Liaison Officer completes the assessment on behalf of each department involved a less accurate score is obtained, as they might have a limited understanding of data issues in areas outside of their expertise.
- Some utilities scored Grade A or Grade B for area that they did not provide adequate or usable data for, such as customer outages. The low reliability grades of customer outages is in line with experience, where utilities are still struggling to monitor, record and report customer outages.
- A relatively high confidence with financial information sources is at odds with experience of populating the questionnaires. This is potentially a result of misperception of quality in financial data, particularly when judged by someone from a department external to Finance.

With an ongoing commitment to benchmarking, it is crucial that the quality of information improves progressively. While the assessment tool undoubtedly remains somewhat subjective, its use emphasises the critical nature of data accuracy and reliability.

5 KPI RESULTS

- **46 KPIs are presented in this chapter covering operational and financial areas.**
- **Financial data has been fully disclosed for the first time in this report.**
- **The composite indicator provides an overall indicator of technical performance.**
- **Data accuracy has improved over the last three years, explaining some of the apparent decline in performance indicators.**

5.1 Introduction

This section provides performance results for 2012 financial year operations in a series of graphs comparing the participating utilities. Each indicator is presented with both average (arithmetic mean) and median (middle) values, and a comparison of results with those of 2011 and 2010 where available. If a Pacific benchmark was agreed by utility CEOs in 2002, this is also provided.

The graphs in this report use a black broken line to mark out average values and a red broken line to mark out median values. Colour-coded labels are also included beside the graphs. Red arrows indicate the direction of improved performance for a particular indicator. Blue arrows indicate the direction of the trend between 2011 and 2012. A blue diamond denotes the 2011 results. Grey dots represent 2010 results. An unbroken brown line shows represents the Pacific benchmark.

An indication of utility size is provided via colour coding in shades of purple. Pale purple indicates annual peak load of less than 5MW (small); the medium tone indicates annual peak load of 5MW of greater and less than 30MW (medium); the darkest tone indicates an annual peak load of 30MW or greater (large). This corresponds to PPA's membership level categorisations. In order to facilitate comparison of results by size, all graphs are shown in the order of minimum to maximum demand. In each graph, utilities are presented from the smallest on the left to the largest on the right, as determined by peak load. The colour code of each utility is presented in Table 5.1.

To further inform comparative analysis of results, Table 5.1 provides an overview of some key characteristics of the participating utilities. The characteristics included are peak demand and size category, Independent Power Producers (IPP) percentage, renewable energy percentage, whether outer islands are serviced by the utility, and the data reliability score derived from the utility self-assessment. In addition, further background information for each utility is provided in the Appendix F. It is important that any conclusions closely consider the similarities and differences of operating conditions of other utilities. There are a total of 21 utilities represented in the 2012 results. Due to a data period realignment that took place at the start of this benchmarking round, four utilities had submitted for the eligible period (from July 2011 to December 2012) in the previous round, and these results were reused.

A total of 46 KPIs are presented. A table of these indicators and how they are calculated is provided below in Appendix E. The table also states whether the indicator was calculated for the main grid only or for all grids combined. Indicators not previously reported are marked.

A significant change in this year's report is the disclosure of the financial results of all utilities, as was agreed at the 23rd PPA Annual Conference in Tahiti in July 2014.[18]

18 PPA Conference, CEOs benchmarking meeting, 7th July 2014. CEOs were given the opportunity to review the draft KPI results and provide comments.

Table 5.1: Utility Key Characteristics

Utility and colour code	Peak Demand (MW)	Size Category (S / M / L)	IPP[19] (%)	Households with connections (%)	Outer Islands Serviced (Y/N)	RE[20] (%)	Public or Private Ownership	Data Reliability (Hi/Med/Low)
ASPA	22.6	Medium	0.0	97	Yes	0.7	Public	High
CPUC	2.5	Small	0.0	80	Yes	0.0	Public	Med
CUC	41.5	Large	17.9	99	Yes	0.0	Public	Med
EDT	118.7	Large	1.4	98	Yes	25.9	Private	Med
EEC	100.2	Large	95.2	63	Yes	4.8	Private	High
EPC	20.3	Medium	0.0	97	Yes	41.3	Public	Med
FEA	150.8	Large	1.9	82	Yes	63.5	Public	High
GPA	258.0	Large	37.5	99	No	0.0	Public	High
KAJUR	2.0	Small	0.0		No	0.0	Public	Med
KUA	1.1	Small	0.0	77	No	0.0	Public	Med
MEC	8.8	Medium	0.0	42	Yes	0.3	Public	Med
NPC	0.6	Small			No	0.0	Public	-
NUA	3.5	Small	0.0	100	No	0.2	Public	Low
PPL	196.0	Large			Yes	58.0	Public	-
PPUC	12.0	Medium	0.0	95	Yes	6.1	Public	Med
PUB	4.9	Small	0.0	41	No	0.0	Public	Med
PUC	6.6	Medium	0.0	96	No	0.0	Public	Low
SIEA	14.2	Medium	0.0	12*	Yes	0.0	Public	Med
TAU	4.5	Small	0.0	100	No	1.1	Public	High
TEC	1.0	Small	0.0		Yes	1.3	Public	High
TPL	9.2	Medium	0.0		Yes	0.0	Public	High
UNELCO	11.4	Medium	0.0	21	Yes	13.8	Private	High
YSPSC	2.3	Small	0.0	57	Yes	0.2	Public	Med

Notes: * value approximated by utility

5.2 Generation Indicators

(i) Load Factor

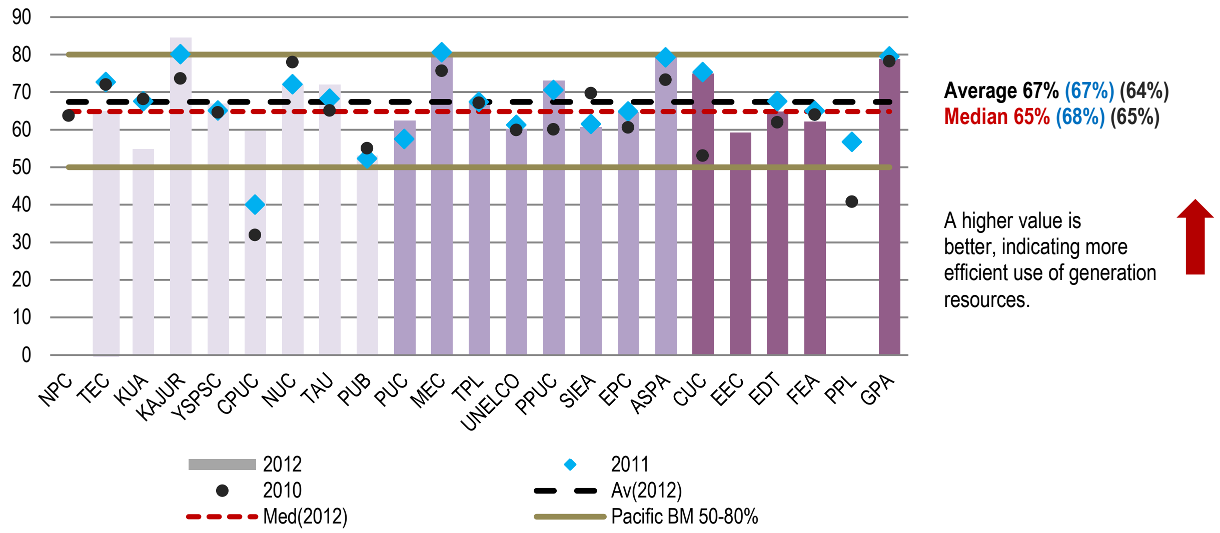
Load factor (LF) measures the effectiveness of the use of utility generation resources. It is the ratio of system average power generated to peak power demand over a period of time. A lower LF indicates greater fluctuation in the use of generators throughout the reporting period, sometimes (but not necessarily) resulting in higher losses. A high LF is a good result implying a relatively flat demand for electricity and relatively constant and efficient utilisation of generators, transformers and related equipment operating at efficient levels. Utility CEOs selected "a high benchmark of 80% indicating that in the future, demand management should play an increasingly important part in Pacific power sector policies".[21]

19 IPP, based on 2012 data responses
20 Renewable Energy (RE)
21 PPA and ADB, *Pacific Power Utilities,* p. 5-1.

Figure 5.1 shows that LF has remained fairly stable over the last three years; with a current average of 67%.There is no apparent correlation between utility size and LF. Three utilities are achieving the upper limit of the Pacific benchmark (i.e. 80%). Among the rest of the utilities, all are within the range 50 - 80%. These two factors indicate that the Pacific benchmark ought to be reviewed.

Load Factor has remained fairly stable over the last three years, with a current average of 67%.

Figure 5.1: Load Factor (%) 2012(2011) (2010)



(ii) Capacity Factor

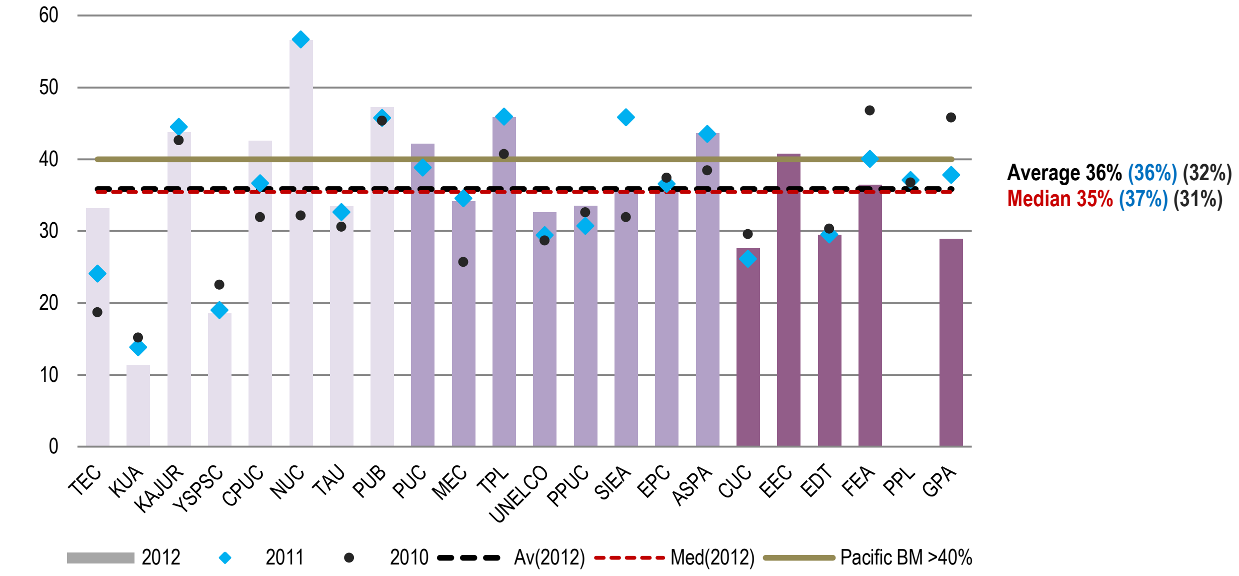
Capacity factor (CF) is also an indicator of effectiveness in relation to the use of generation resources. It is a similar measure to LF. Where LF measures average power as a percentage of maximum demand, CF measures average power demand as a percentage of installed capacity. A lower CF means that there is adequate reserve capacity to meet future load growth or demand when some generation is shut down for maintenance or down due to faults.

Capacity Factor has remained generally stable with an average of 36%.

A higher CF means demand is closer to available capacity, which can cause difficulties in scheduling maintenance of generating plants. Furthermore, available capacity may not meet future load increases. Improving the CF can require major capital investment in new generating plants. Utilities with a CF of nearly 100% tend to have an inadequate capacity to meet demand, which can result in power rationing.

As shown in Figure 5.2, the CF has remained generally stable between 2010 and 2012, with an average of 36%. This is below the Pacific benchmark of over 40%. However, some utilities like TEC, CPUC, PUC, PPUC and CUC have seen notable improvements. The CF of KAU, SIEA, FEA and GPA has declined. There continues to be a wide variation in results. No strong correlation exists between utility size and the CF results.

Figure 5.2: Capacity Factor (%) 2012 (2011) (2010)



(iii) Availability Factor

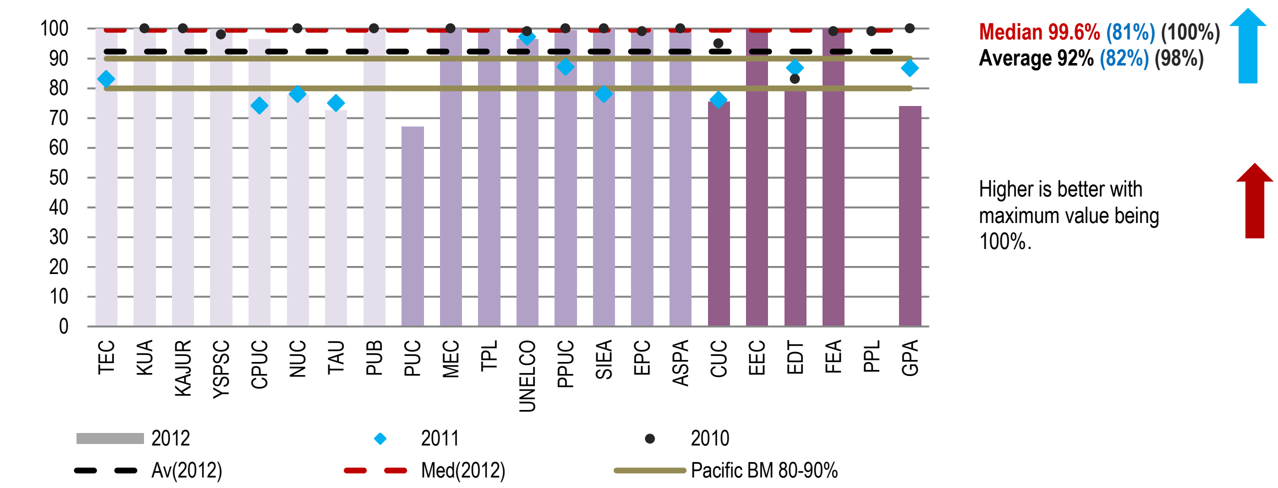
The **availability factor** (AF) is a measure of a power plant to perform its operational function. The availability of a power plant varies depending on outages due to failure or maintenance. Plants that run less frequently (e.g. plants brought on line for meeting peak demand only) have a higher AF because they are generally in good operating condition. Plants that frequently experience breakdowns have a low AF. Thermal power stations generally have AFs between 70% and 90%[22]. Newer plants, and those that are well-maintained, tend to have significantly higher AFs.

The Pacific benchmark set by utility CEOs is 90% and typical international practice of 65%."[23] In 2010, the results reported by utilities averaged 98%, but were not considered credible since they failed to take into account forced outages, planned outages and plant de-rating. In 2011, as far as possible, the AF was based on firm continuous capacity.

As shown in Figure 5.3, the 2012 average and median AF are 88% and 99.6% respectively, a noticeable improvement on the results of 82% and 83% in 2011.[24] As for the 2011 round, utilities that did not provide all the information required to determine continuous capacity were excluded. Some utilities continue to struggle to provide capacity out of service hours due to forced, planned and especially de-rated events.[25]

The 2012 average and median Availability Factor of 93% and 99.6% are noticeably improved from the results in 2011.

Figure 5.3: Availability Factor (%) 2012 (2011) (2010)



22 http://en.wikipedia.org/wiki/Availability_factor.
23 PPA and ADB, Pacific Power Utilities, p. 5-2.
24 It should be noted that some utilities do not have the records available for the de-ratings and are simply reporting the nameplate ratings.
25 In a de-rated event, a generator's capacity is reduced from its full rated capacity for a period of time.

(iv) Generation Labour Productivity

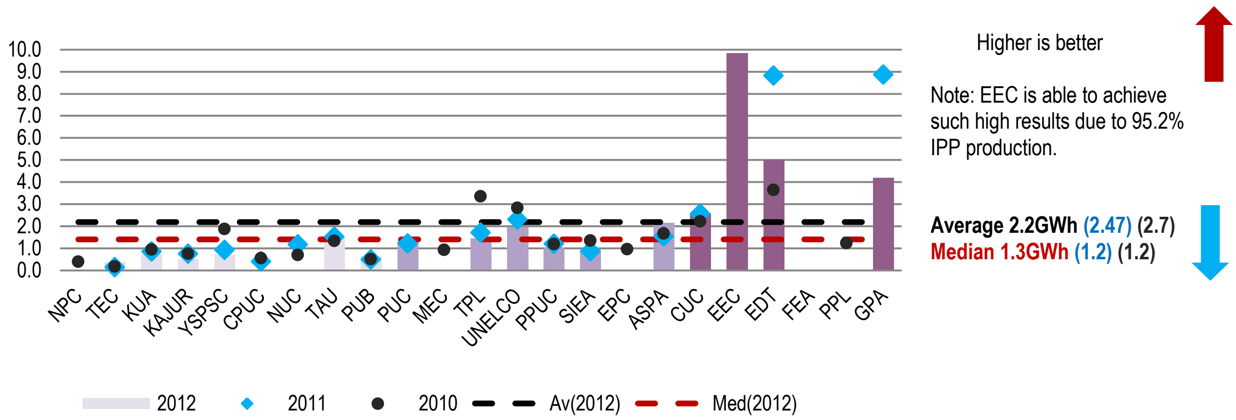
Generation labour productivity is a measure of the services produced per employee, i.e. productivity of staff engaged to operate and maintain generating plants. It is a ratio of total electricity generation to the number of full-time equivalent (FTE) employees who operate and maintain the system's generating plant. For power utilities, the indicator of service has traditionally been the amount of electricity generated per employee, but this may change over time as Pacific utilities provide more energy efficiency services to customers.

Smaller utilities will tend to have lower generation productivity due to the low level of generated GWh but a high number of semi-skilled staff required for operating and maintaining the generating plant regardless of utility size. The results presented in order of increasing maximum peak demand in MW are consistent with this expectation and show a linear trendline.

In 2000, the reported productivity per FTE generation employee was 3GWh. This is extremely low, especially when considering international best practice of 22GWh (though noting unique attributes of the Pacific region). Figure 5.4 shows that generation labour productivity has continued to decline to 2.47GWh per FTE generation employee in 2011 and 2.2GWh per FTE generation employee in 2012. With labour costs accounting for the next highest operational cost after fuel, this is an area where regional improvement is needed.

Results for generation labour productivity have continued to decline and indicate this is an issue that needs attention for regional improvement.

Figure 5.4: Generation Labour Productivity (GWh/FTE Generation Employee) 2012 (2011) (2010)



(v) Specific Fuel Consumption (kWh/L)

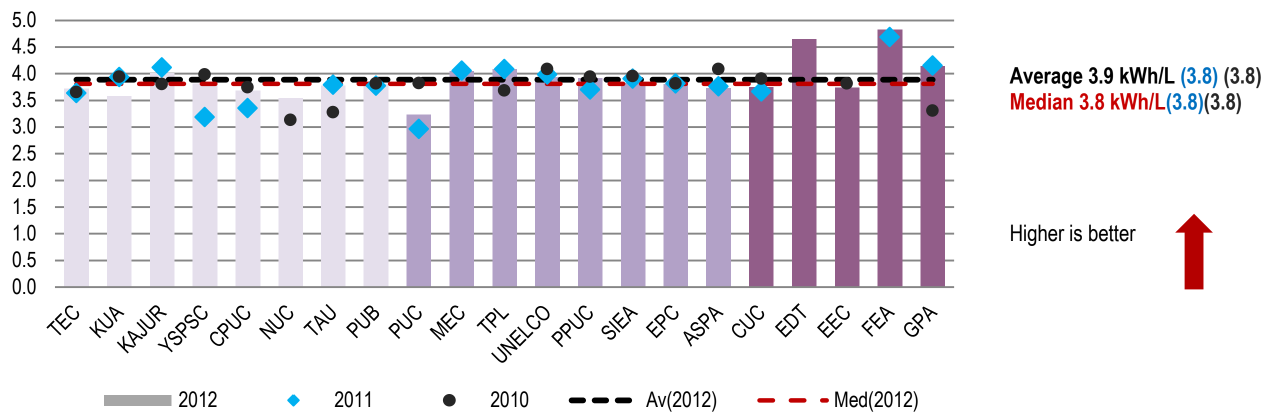
Specific fuel consumption (SFC) is a measure of the efficiency of fuel use for power generation, often reported in kWh/litre or kWh/gallon. It is a key performance indicator because fuel accounts for the overwhelming bulk of generation costs in a typical PPA–member diesel based power utility. Importantly, SFC refers to the efficiency of utility generation only – it does not include purchased energy from IPPs. Furthermore, non-diesel generation is not factored into this indicator.

Currently KAJUR, MEC, TPL, EDT, FEA and GPA are achieving fuel consumption over the Pacific target, with EDT and FEA achieving 4.65 and 4.83 kWh per litre.

SFC results (in kWh/L) are shown in Figure 5.5. Only generation by fuel based generation is counted in this indicator. The Pacific benchmark was set at 4.0kWh per litre in 2002. The 2012 average and median is 3.9kWh and 3.8kWh per litre respectively, remaining very consistent for the past three years. Eight utilities have improved in their result since 2011, namely, TEC, YSCSP, CPUC, PUC, PPUC, CUC and FEA. Currently KAJUR, MEC, TPL, EDT, FEA and GPA are achieving fuel consumption over the Pacific target of 4.0kWh per litre, with EDT and FEA clearly performing at a high level with 4.65 and 4.83 kWh per litre respectively[26]. New low and medium speed engines should achieve 4.0-5.0kWh per litre.

26 It is notable that both FEA and EEC use Bunker Oil for fuel generation.

Figure 5.5: Specific Fuel Consumption (kWh/L) 2012 (2011) (2010)



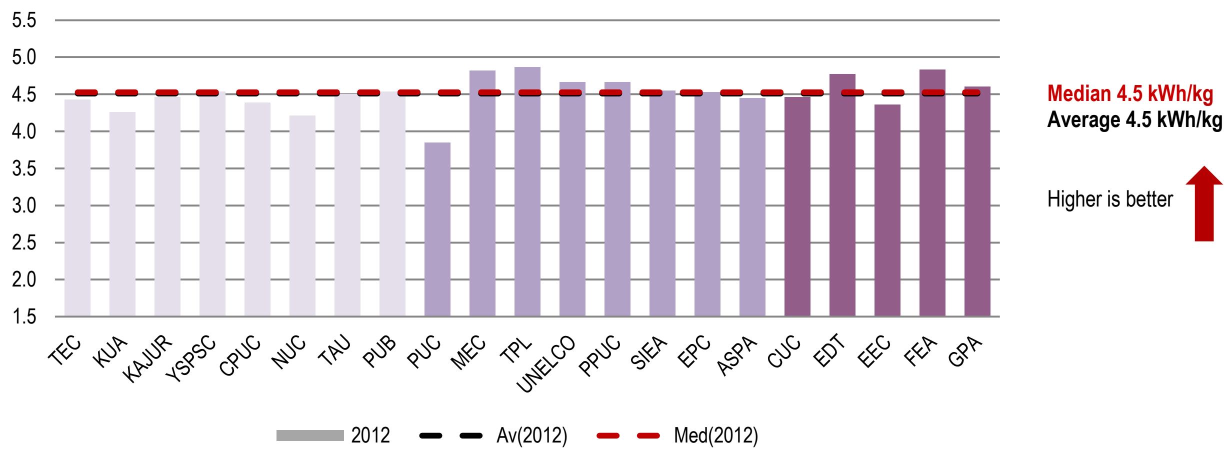
Since most PICT utilities use small high-speed diesel generators, the benchmark values for 2011 are considered reasonable. However, as fuel accounts for the highest cost in power utility generation, improvements in the specific fuel consumption are highly desirable.

(vi) Specific Fuel Consumption (kWh/kg)

In technical specifications fuel efficiency is generally reported in kilograms (kg) of fuel per kWh of power produced. This takes into consideration the different densities and energy content of lighter and heavier petroleum fuels. The type of fuel used thus has a bearing on SFC. SFC by weight was introduced in the 2012 benchmarking round. The results are shown in Figure 5.6. Very few utilities provided fuel by weight data. For the remainder a standard conversion table was used to convert litres to kilograms. Average SFC by weight is 4.5kWh/kg. TPL, FEA, MEC, FEA and EDT have the best results, at over 4.8kWh/kg.

SFC by weight was introduced in the 2012 benchmarking round. Average SFC by weight is 4.5kWh/kg.

Figure 5.6: Specific Fuel Consumption (kWh/kg) 2012



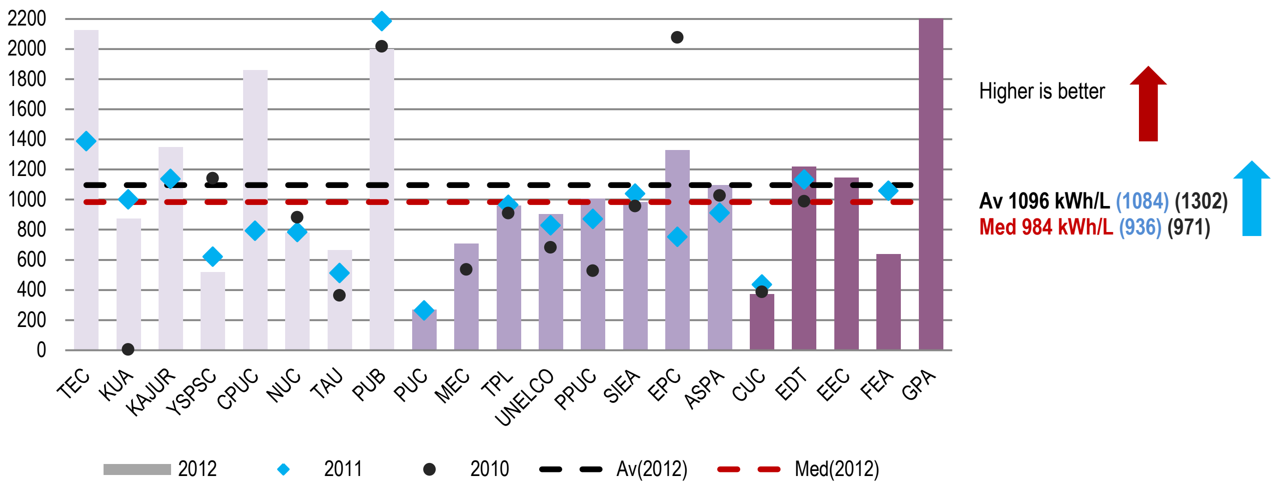
(vii) Lubricating Oil Consumption

In addition to SFC, petroleum-fuelled generation efficiency can also be assessed via the number of kWh generated per litre of lubricating oil consumed. The benchmark varies according to the size and condition of the engine. Lower lubricating oil efficiency can be attributed to poor maintenance, e.g. due to worn piston rings. Reasonable values are about 500–700 kWh per litre for a 1 MW engine and 1,000–1,300 kWh per litre for a 4–5 MW engine.

Average fuel oil consumption improved slightly to an average of 1096 kWh/L in 2012.

As Figure 5.7 shows, the average consumption has improved slightly from an average and median of 1084 kWh per litre and 936 kWh per litre in 2011 to 1096 and 984 kWh per litre in 2012. GPA, TEC, PUB and CPUC have the highest consumption efficiency. YSPSC, PUC, TAU, CUC and FEA show the lowest efficiency as measured by this indicator.

Figure 5.7: Lubricating Oil Consumption Efficiency (kWh/litre) 2012 (2011) (2010)[27]

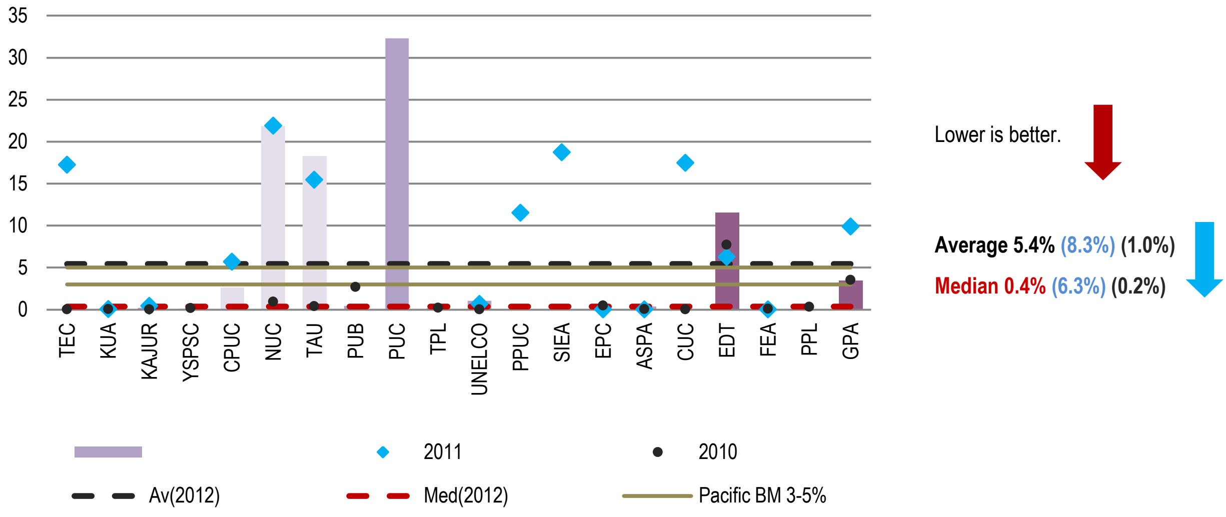


(viii) Forced Outage

A **forced outage** is an unplanned outage (or generator downtime) that has been forced on the utility. Unplanned outages are attributable to problems with generators that compelled the utility to take them out of service. Based on the data provided, the average forced outage rate for 2012 is 5.4% and the median is0.4% (refer Figure 5.8). While utilities are improving in providing outage data, information gaps remain. This requires attention in the coming year.

While utilities are improving in providing outage data, information gaps remain.

Figure 5.8: Forced Outage (%) 2012 (2011) (2010)



(ix) Planned Outage

Planned or scheduled outages measure the proportion of downtime for planned maintenance or other activities requiring equipment to be shut down. It is a scheduled loss of generating capacity as a percentage of installed capacity to generate energy.

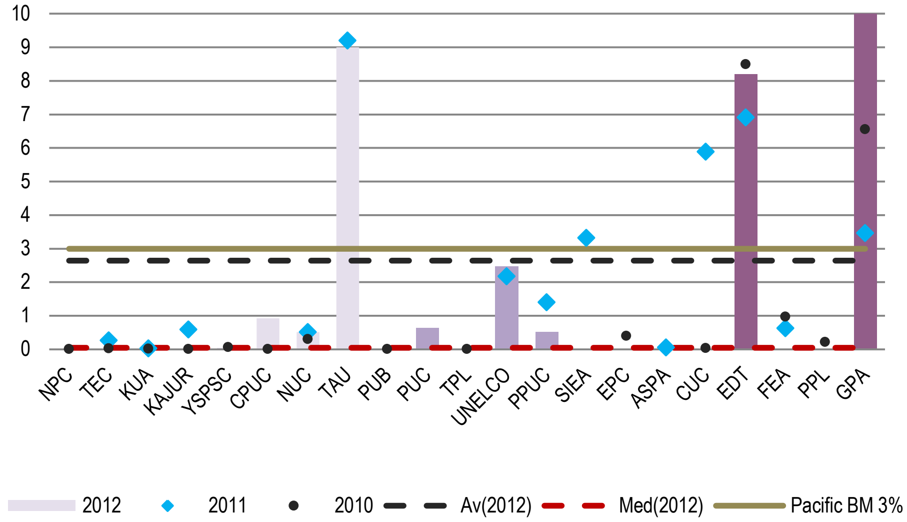
Efforts to review maintenance regimes and their effectiveness continue to be appropriate.

Planned maintenance of generating equipment is often lacking in Pacific utilities, due to insufficient reserve capacity to allow the shutdown of generators due for scheduled maintenance, a lack of spare parts, or lack of funds for major contracted service work. When maintenance intervals are extended, the probability that generators will break down increases. The circumstances and plant configuration for each utility will have a major impact on the planned outage rate.

27 Some variations exist in 2011 and 2010 averages and medians due to elimination of outliers.

As Figure 5.9 shows, planned outages reduced from 3.9% on average to 2.6%. On the face of it, this is a good result and it brings the average within the Pacific benchmarking target. However, inadequate data was provided by 10 out of 20 utilities. This reinforces the need to ensure accurate record-keeping and regular review of maintenance regimes.

Figure 5.9: Planned Outage (%) 2012 (2011) (2010)



Lower is generally better - although this is greatly dependent on individual utility circumstances and plant configuration. Some equipment must be shut down in order to be serviced.

Average 2.64% (3.9%) (1.0%)
Median 0.04% (1.8%) (0.1%)

(x) Generation Operations and Maintenance (O&M) Costs

The indicator used is the expenditure on O&M of generating equipment per MWh generated, expressed in USD.

For operations during 2012, shown in Figure 5.10, the reported average was USD47 per MWh with a median of USD40. Comparisons with the 2011 dataset show a significant decrease in both the indicator average and median. The large variability in results between consecutive years suggests there may be a lack of consistent allocation of costs or other financial data collection issues. However, the data set received appeared complete and comprehensive and reporting may have been refined since the previous round.

Comparisons with the 2011 dataset show a significant decrease in both the O&M average and median scores.

Figure 5.10: Generation O&M Costs (USD per MWh) 2012 (2011)

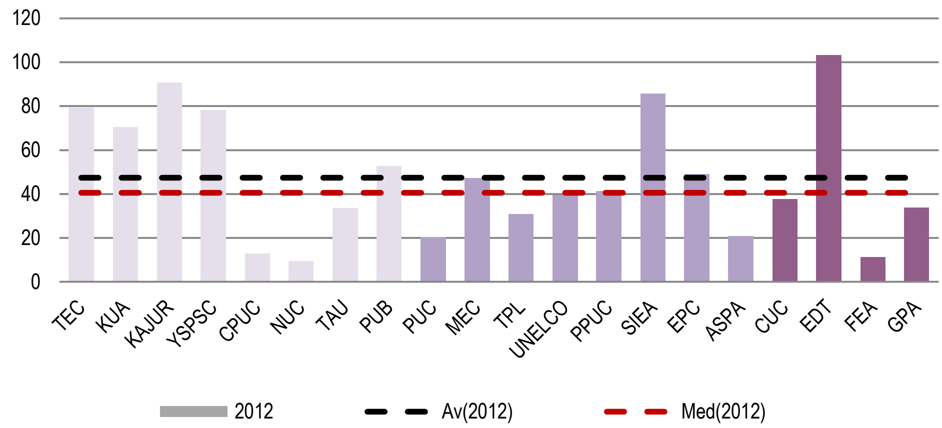


Figure 5.10 is based on data from 21 utilities, ranging from 9 to 336 USD.

It is not meaningful to say higher or lower is better as circumstances differ for each utility.

Average USD47 (214) (148)
Median USD40 (132) (71)

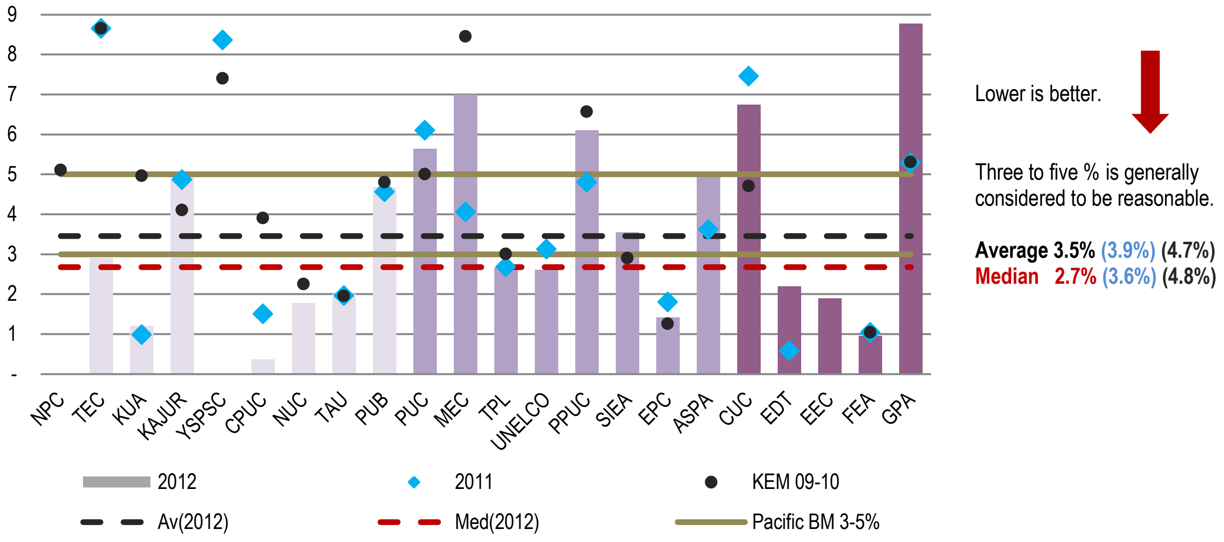
(xi) Power Station Usage / Station Auxiliaries

A generating station's use of electricity is indicated by the percentage of MWh generation used internally for auxiliary systems. Three to five % is considered to be acceptable, and lower is better. As shown in Figure 5.11, the average reported value for 2012 was 3.5% and the median was 2.7%, compared to 3.9% and 3.6% respectively in 2011.

The average reported value for 2012 was 3.5% compared to 3.9% in 2011.

In considering these results it should be noted that data reliability has been a concern for most utilities in this indicator throughout each benchmarking round. Subsequent benchmarking rounds should therefore be able to more accurately reflect performances changes. This being considered, more consistent and/or narrow margins of consistent improvement can be recognised as more genuinely reflecting performance improvements, such as with TPL and FEA.

Figure 5.11: Station Energy (Auxiliaries) Use for Pacific Utilities (%) 2012 (2011) (2009-2010, KEMA)



(xii) IPP Generation

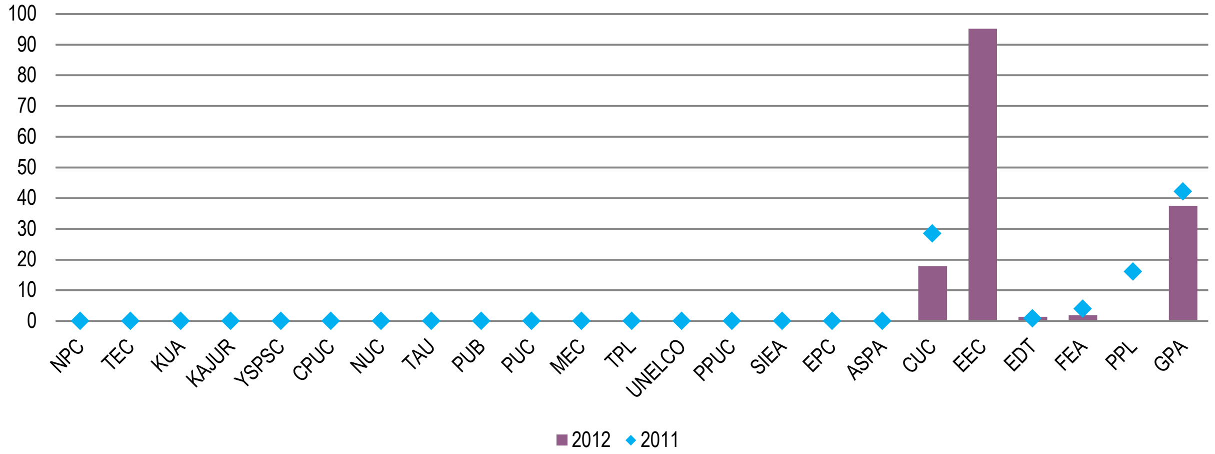
In an effort to manage the challenges faced by Pacific Island power utilities, IPPs are engaged by some utilities as a part of the solution. There is now widespread acceptance based on experience in other parts of the world that 'contracting out' power generation to other parties can produce better results than continuing utility ownership and control. As a result, power utilities across the Pacific are increasingly exploring IPP arrangements to help address the challenges they are facing[28]

Six power utilities, all large in size with peak demand greater than 30MW, have IPP generation arrangements (taking PPL's result from the last round) (refer to Figure 5.12). The percentage of IPP generation ranges from 1 to 95%. EEC's generation is overwhelmingly from IPPs at 95.2%. This is followed by GPA at 37% and CUC at 18%. EEC's predominant IPP generation has a significant impact on the utility's performance in other areas, such as labour productivity and availability factor. There are notably no examples of IPP arrangements for the small and medium utilities.

Six power utilities, all those of large size, have IPP generation arrangements ranging from 1 to 95%.

[28] Though the benefits of IPPs are noted, entering IPP contract arrangements are not without risk, and there are many international examples where contracts have failed, ultimately resulting in higher prices, less reliable supply and acrimonious disputes. To outsource power generation to IPPs, the framework for the arrangement needs to be set up and carefully managed. Source: Castalia, *Guidance Note for Pacific Power Utilities on Procuring Independent Power Producers (IPPs)*, July 2014.

Figure 5.12: IPP Generation (%) 2012 (2011)



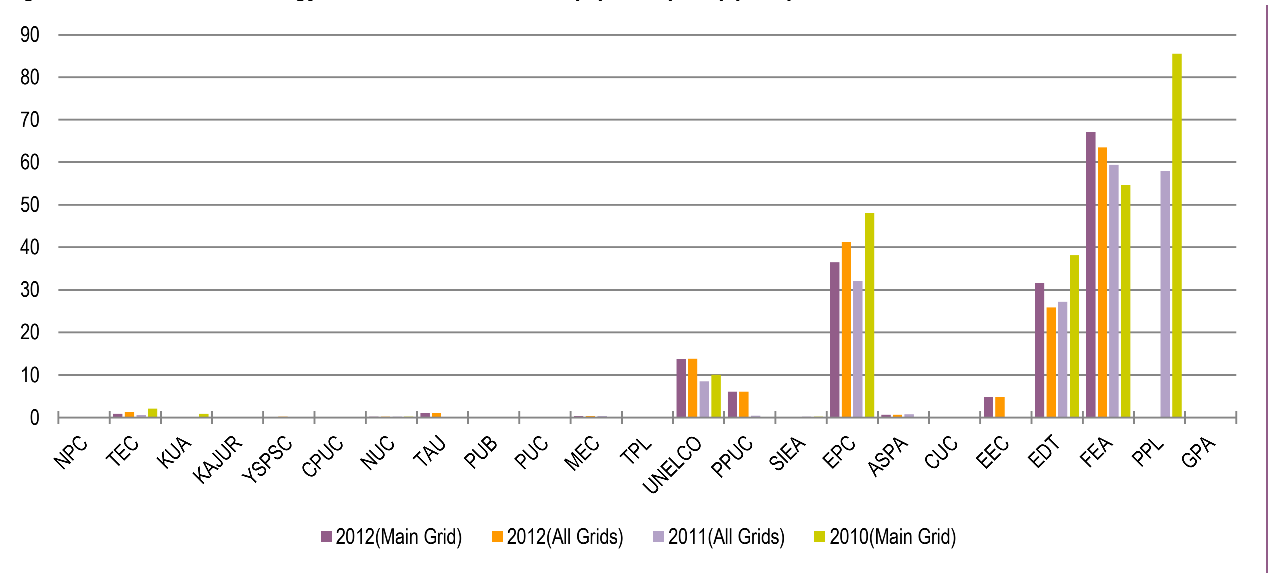
(xiii) Renewable Energy to Grid

The 2012 analysis provides renewable energy share for both the main grid and across all grids. The 2011 analysis presented renewable energy share for all grids, and the 2010 analysis for the main grid only. In 2010, renewable energy accounted for 22% of generation, 97% of which was from hydropower and concentrated in the EDT, EPC, FEA and PNGP. Small amounts of other renewable sources, including solar photovoltaic (PV), wind, bio-energy and bio-fuel generation were also reported.

Figure 5.13 shows the renewable energy proportion for the main grid and across all grids for each utility in 2012. The available historical data of renewable energy percentage for the main grid in 2011 and renewable energy across all grids in 2010 is also shown. It can be seen that UNELCO, EPC, EDT, FEA and PPL have total renewable energy above 10%. The majority of renewable energy continues to come from the larger hydro facilities, though 17 of the 22 participating utilities still produce 98% or more of their electricity from petroleum fuel.

17 of 22 utilities rely on petroleum fuel to meet 98% or more of their electricity demand.

Figure 5.13: Renewable Energy Generation - All Utilities (%) 2012 (2011) (2010)



TEC, YSPSC, NUC, TAU, MEC, PPUC, ASPA and EEC have small contributions of renewable energy generation shown for 2012 data. Renewable installations that have been commissioned recently and which did not contribute energy in this reporting period include one MW solar PV installations in both Tonga and American Samoa.

5.3 Transmission Indicators

(i) Transmission (General)

For the purpose of the benchmarking exercise, the transmission network is defined as equipment operating at a voltage greater than 33kV. For utilities that have a transmission network, the benchmarking questionnaire requested data to determine transmission losses and outage statistics as a measure of transmission system reliability. System reliability has been tracked based on transmission reliability (outage events per kilometre) and average transmission outage duration (in hours). In the 2012 round, this was expanded to include transmission (planned and unplanned) SAIDI[29] and SAIFI.[30]

Table 5.2: Transmission Indicators 2012 (2011)

Utility	Transmission Losses (%)		Transmission Reliability (Outages/100km)		Transmission SAIDI (min/cust)		Transmission SAIFI (events/cust)	
					Unplanned	Planned	Unplanned	Planned
	2011	2012	2011	2012	2012	2012	2012	2012
EDT		1.6	13.0	2.3	97.1	0	1.6	0
FEA		?	4.3	15.9	0	0	6.3	0
PPL			23.3					
GPA	5	0.2	126.6	16.3	60.9	0	8	0
Average	5	0.9	41.8	11.5	52.7	0.0	5.3	0.0
Median	5	0.9	18.2	15.9	60.9	0.0	6.3	0.0
Good Responses	1	2	4	3	3	3	3	3

Of the 25 Pacific power utilities, four utilities have transmission networks: GPA, PPL, FEA and EDT. Transmission KPIs were not presented in previous benchmarking reports due to the limited data provided. Though data was improved this year, it still remains inadequate for drawing firm conclusions and attention will be needed to improve data quality for the next round of benchmarking. The results are shown above in Table 5.2. Transmission losses averaged 11.5% compared to 41.8% the previous year, with the median in 2012 15.9% compared to 18.2% the year before. SAIDI and SAIFI indicators were provided by three of the four utilities. SAIDI averaged 52.7 minutes per customer, while SAIFI averaged a total of 5.3 events per customers. In both cases this was wholly attributed to unplanned outages as no planned outages were reported.

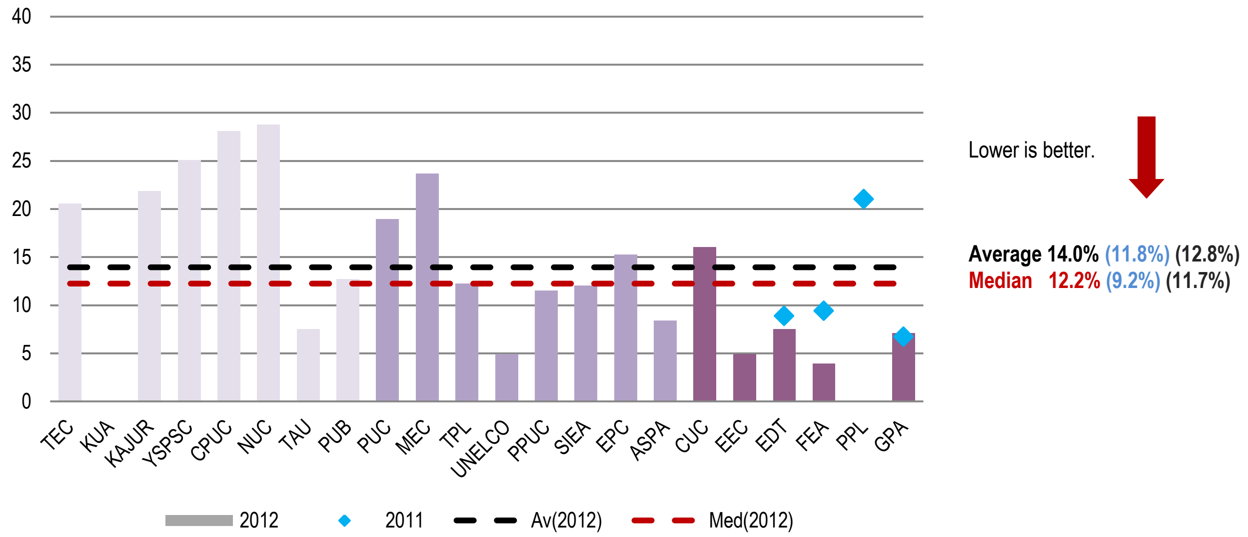
5.4 Distribution Indicators

(i) Network Delivery Losses

Network delivery losses are defined as the net generation minus electricity sold, divided by the net generation, expressed as a percentage. It was not reported previously due to inadequate data. However this year the data was much improved, with 21 good responses received compared with four last year. The results are shown in Figure 5.14. This represents an increase from 2011 but the values for the four utilities that submitted data last year have all reduced, and the increase is instead representative of a broader set of responses. The average of 14% and 12.2% is comparable to the KEMA[31] system losses reported in 2010 with a 12.8% average and 11.7% median based on data from 19 utilities.

29 System Average Interruption Duration Average (SAIDI).
30 System Average Interruption Frequency Average (SAIFI).
31 KEMA was a consulting company; now called DNV GL.

Figure 5.14: Network Delivery Losses (%) 2012 (2011)



There appears to be a direct correlation between high network delivery losses and size of utility with small utilities having noticeably higher losses. Assisting utilities to quantify the cost of system losses and understand the pay back of improvement initiatives could help in reducing system losses for the region.

(ii) Distribution Losses

Distribution losses reported in 2012 remained high and deserve increased attention in many of the utilities.

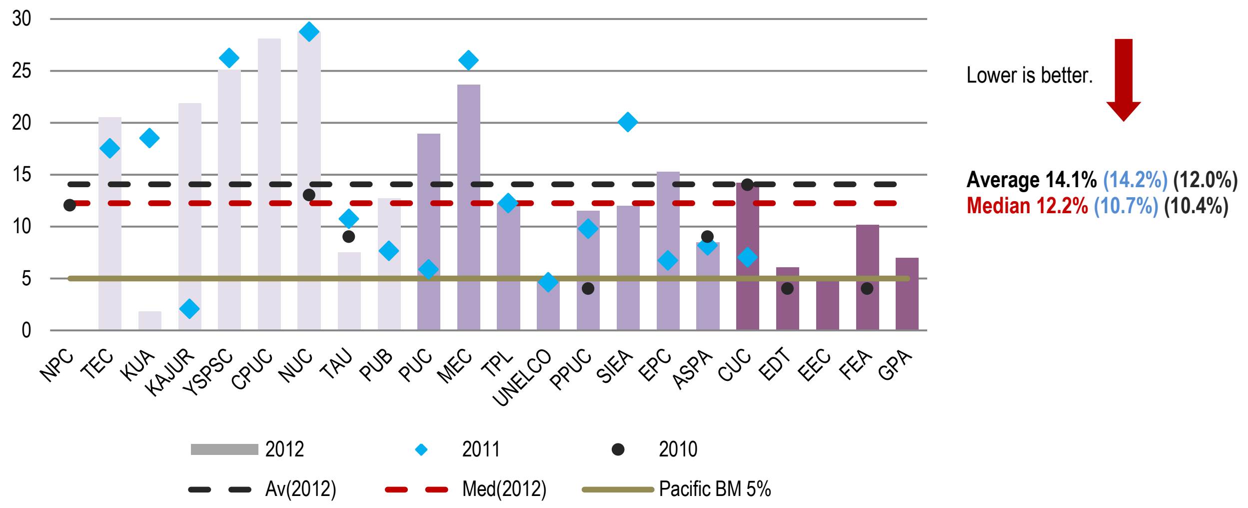
Distribution losses are those that occur from the high voltage (HV) substations to the consumer meters. For those utilities without HV transmission grids, distribution losses are those from circuit breakers of feeders inside power plants to consumer meters. These losses may be either technical or non-technical losses. Technical losses are mainly caused by imbalances in the distribution system and/or too high resistance in the system. These depend on distribution voltages, sizes and kinds of conductors or cables used, transformer types, condition and loading, and the wire sizes of service feeds to consumers' meters. Non-technical losses are those attributable to electricity used by a consumer but not paid for, including theft, computer programming errors, unmetered, metering errors, etc.

This category should not include the use of electricity within the utility itself (power station use, other facility use), free provision of street lighting, or electricity provided to the water, waste management or sewerage section of the utility, but not paid for. These are financial, not non-technical, losses.

For utility operations in 2001, the report of 2002 stated that "Pacific distribution losses on average at 12% are far too high (compared with the regional and international benchmarkof5%)" and noted this as a priority area for improvement.[32] The reported distribution losses in 2012, as shown in Figure 5.15, remained high and in fact deteriorated to 14%, with a median value of 12.2%. As for network distribution losses, smaller utilities appear to have higher losses. This may be related to poor management of systems and processes and/or poor cash flow leading to inadequate maintenance of the system.

32 PPA and ADB, *Pacific Power Utilities,* p. 7-2.

Figure 5.15: Distribution Losses Reported by Utilities (%) 2012 (2011) (2010)



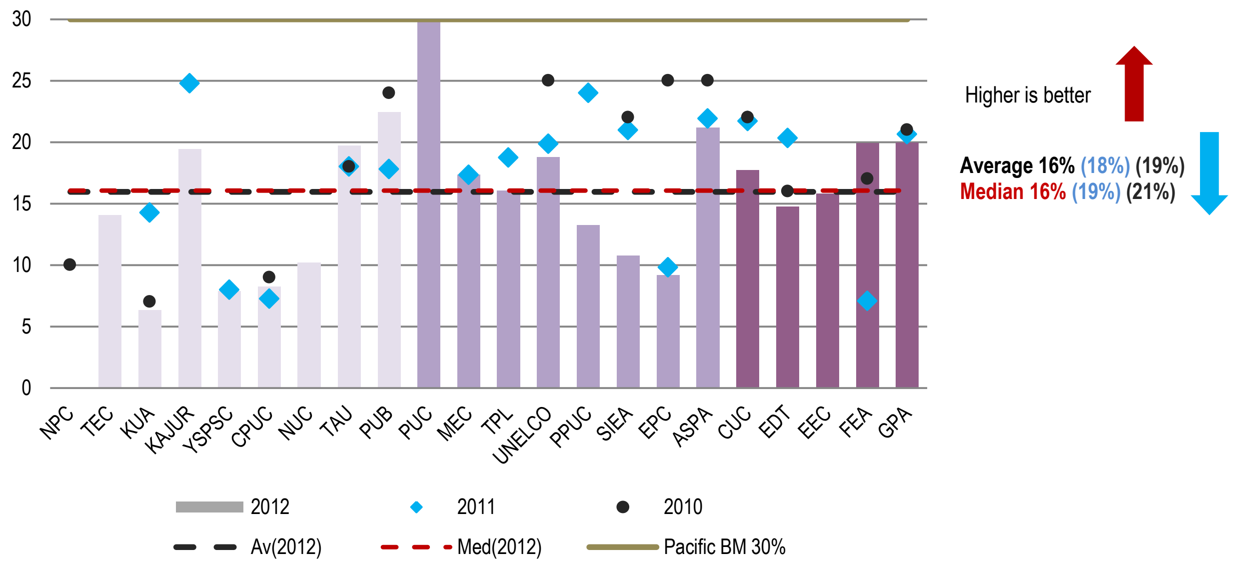
(iii) Distribution Transformer Utilisation

Distribution transformer utilisation has declined from 18% in 2011 to 16% in 2012.

This indicator measures the transformer average load against the transformer capacity in megavolt amperes (MVA), i.e. the energy used by customers connected to the transformers as a percentage of distribution transformer capacity. High utilisation implies an efficient capital expenditure process for investing in distribution transformer capacity to meet the demands of customers. This process takes into consideration demand, demand growth and contingency requirements to improve supply security and reliability.

As seen in Figure 5.16, on average, transformer utilisation in Pacific utilities is low and currently stands at 16%. This has declined from 18% in 2011 and 19% in 2010. In 2002 a regional goal of 30% was set. The report noted that "this can only be achieved in the long term because of the long lead times required to improve usage of capital assets."[33] However, PUC is achieving the Pacific target of 30% and TAU, PUB and FEA have seen improvements since last year.

Figure 5.16: Distribution Transformer Utilisation (%) 2012 (2011) (2010)



33 PPA and ADB, *Pacific Power Utilities*, p. 7-1.

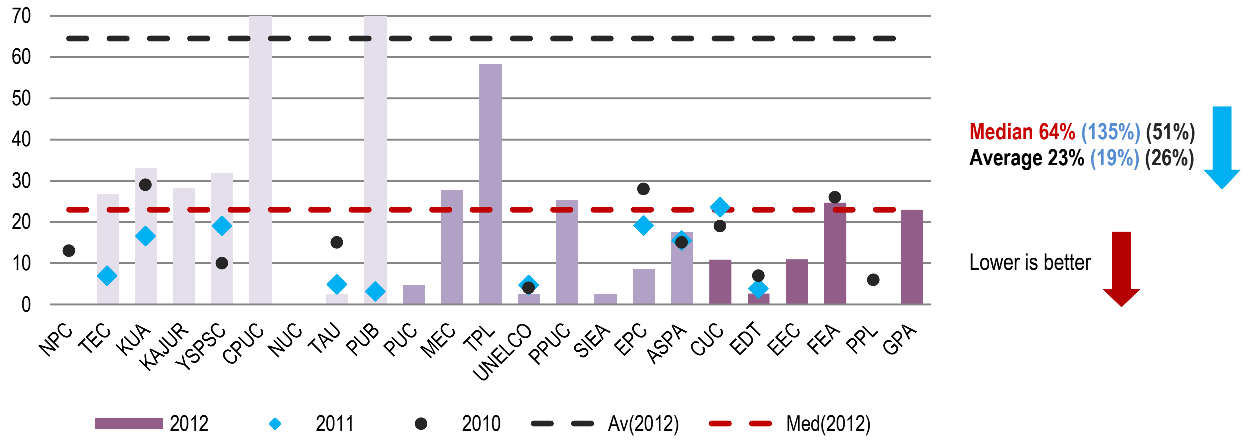
(iv) Distribution Reliability

This indicator looks at forced outage events per 100km of distribution line as a way of measuring the reliability of the distribution network. The average and median are 64% and 23% respectively (refer Figure 5.17).

Overall, distribution reliability results are mixed, with a decline in the average but improvement in the median.

Disregarding two outlying values (CPUC 618% and PUB 393%) brings this to 18 and 20 events respectively. Comparing to 2011 results, the average and median were 135% and 19% respectively, indicating high outlying values. Ongoing maintenance to preserve the condition of infrastructure is key to improving customer service which is reflected by this indicator.

Figure 5.17: Distribution Reliability (Events per 100 km) 2012 (2011) (2010)



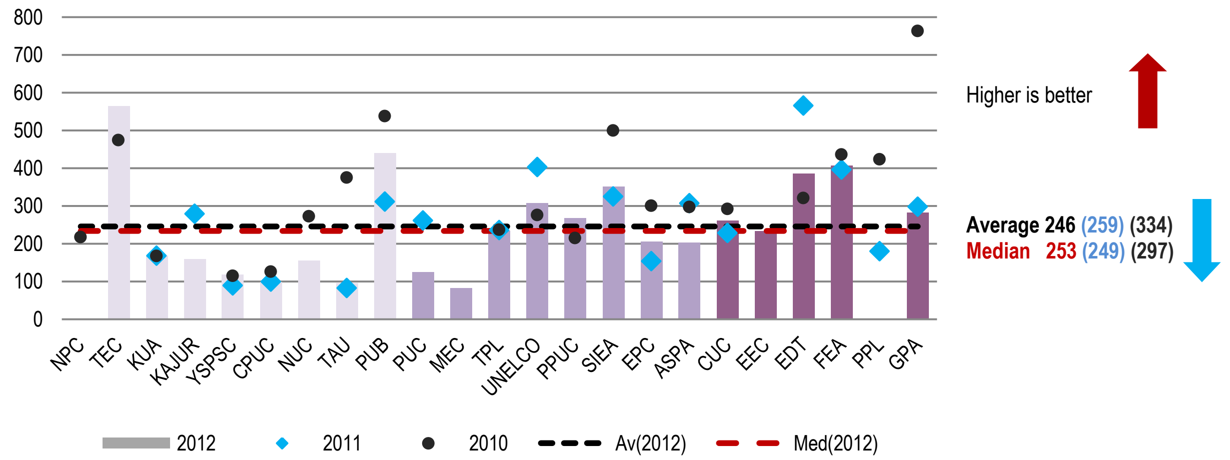
(v) Customers per Distribution Employee

The number of customers per distribution employee is another indicator of labour productivity. The benchmark survey did not require total labour hours (including contractors) to be taken into account for this indicator, whereas it was taken into account for total labour productivity (see Figure 5.34).

Customers per distribution employee declined further, from 259 in 2011 to 246 in 2012.

Figure 5.18 shows that, in 2012, there were on average 246 customers for each FTE utility employee working on distribution, deterioration from 259 in 2011 and 334 in 2010. Some utilities, such as PUB, EPC, CUC and SIEA showed some improvements. Overall, however, this is an area of concern for the region and needs to be addressed. Significant variance occurred in this indicator during assessments over the three reporting years, which suggests that data accuracy has progressively improved over the last three years.

Figure 5.18: Customers per Distribution Employee 2012 (2011) (2010)



5.5 SAIDI and SAIFI

(i) System Average Interruption Duration Index (SAIDI)

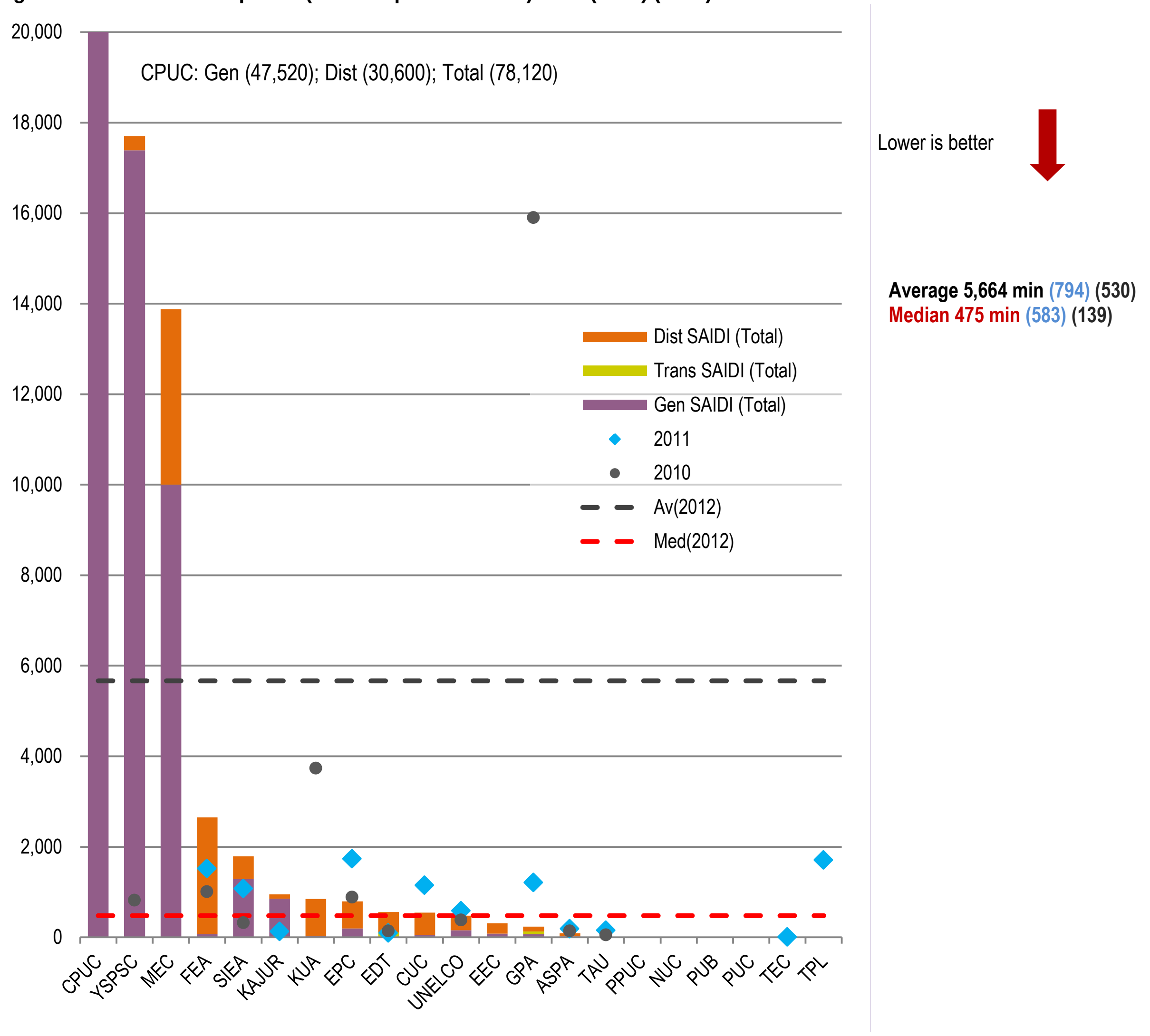
SAIDI is an internationally recognised reliability indicator measuring the average duration of interruptions per customer within a measurement period (typically one year). In the 2002 report, SAIDI was considered to be:

> "A priority area for improvement considering that current performance is not good (average of 592 minutes per year compared to [the] Pacific benchmark of 200) and customers typically rank reliability of supply as very important."[34]

Here SAIDI has been shown for generation, transmission and distribution. The average and median are 5,664 min (94.4 hours or approximately 4 days) and 475min (8 hours) respectively. Note that for 2011 and 2010 transmission outages were not included, though transmission SAIDI reported by EDT and GPA are relatively small. The big increase in SAIDI from 2011 to 2012 is more likely to be reflective of improved data collection than actual deterioration of services (Figure 5.19).

More utilities are submitting data for SAIDI indicators, and data quality is improving. However, continued improvement is required before confident assertions can be made.

Figure 5.19: SAIDI Interruptions (Minutes per Customer) 2012 (2011) (2010)



34 PPA and ADB, *Pacific Power Utilities*, p. 7-2.

In 2010 it was noted that SAIDI tends to be estimated or only measured in part, so the reported results for some utilities were unlikely to be indicative of actual performance.[35] Through initiatives such as the PPA Conference Engineers' Benchmarking Workshop, site visits and the production of the Benchmarking Manual, understanding of this indicator and its importance is developing. This is being seen through more utilities submitting data for the SAIDI (and SAIFI) indicators and in the quality of the data provided. Whereas outages were previously estimated, there is an increase in the number of utilities recording the time of the outage (to the minute) and using this in SAIDI calculations.

It should be noted that several larger utilities, have implemented detailed processes for capture of reliability performance data. Data confidence and reliability is higher in these cases.

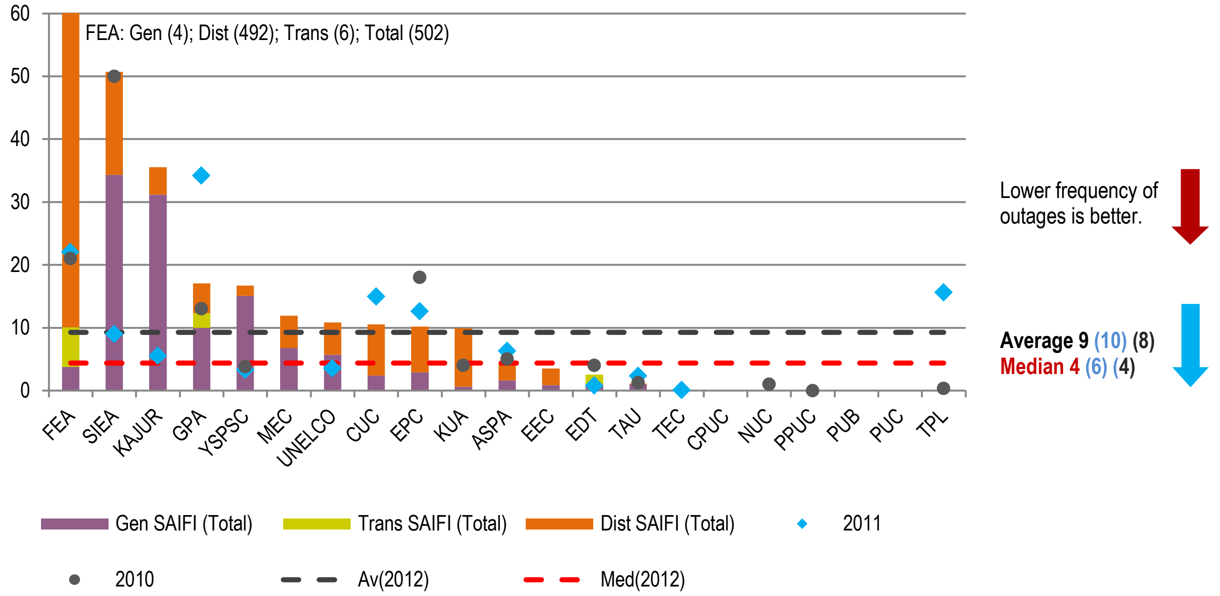
(ii) System Average Interruption Frequency Index (SAIFI)

The SAIFI is also used as a reliability indicator, measuring the average number of interruptions per customer. In 2000, the reported average was 19 compared to a regional benchmark of 10 and international best practice of 0.9. As for SAIDI, reporting issues seen in the Pacific also affect SAIFI. The low data reliability score of customer outage impacts is due to many utilities not having accurate records of how many customers are affected by failure of the system at given points, thus impacting on SAIFI which requires knowledge of the number of customers affected by each outage in order to be accurately calculated.

Referring to Figure 5.20, and ignoring the outlier FEA, combined SAIFI has an average of 9 outages per customer per year, with a median of 4. This is a slight improvement in performance to last year. As for SAIDI, changes in performance are likely to be reflective of increased data quantity and quality than previous benchmarking rounds. Until the utilities collectively lift accuracy of SAIFI reporting, the conclusions that can be drawn from analysing the results are limited. However, this does not at all negate the usefulness of utilities tracking their own SAIFI indicators and setting targets for data collection, recording and overall service performance.

Until the utilities collectively lift accuracy of SAIFI reporting, the conclusions that can be drawn from the results are limited.

Figure 5.20: SAIFI Interruption Frequency (Interruptions per Customer) 2012 (2011) (2010)



35 PPA and PRIF. *Performance Benchmarking for Pacific Power Utilities – Benchmarking Report*. December 2011, p. 39.

5.6 Demand Side Management

The engagement of utilities in Demand Side Management (DSM) initiatives indicates a proactive approach to changing consumer behaviours and reducing demand for electricity[36]. It can be applied to reducing unbilled electricity such as power station or head office use, or to reducing domestic, commercial or industrial consumers, to reduce the load being placed on the generators to change the demand profile and achieve a demand that can be met with more efficient operation. Table 5.3 summarises the responses received from utilities in 2012 and 2011 to DSM questions.

Only two of the 13 utilities that reported engaging in DSM activities linked such activities to a MWh saving.

Table 5.3: Utility Demand Side Management Efforts in 2011 and 2012

Response from utilities	2011	2012	Comments 2012
Number of responses	13	21	All participating utilities responded
DSM activities reported	8	13	
Staff assigned to DSM	2	0	FTE
Budget for DSM	3	4	
DSM MWh saving	2	2	Only one quantified saving: TAU: 577MWh

The DSM section of the spreadsheet was completed by all 21 utilities this year, compared to 13 utilities last year. This is likely due to the modifications that were made to the benchmarking questionnaire making it easier for respondents to fill in, as was recommended in the previous round. There has also been a noted increase in the number of demand side activities being reported by utilities. Utilities are focusing attention on DSM as they work towards achieving ambitious renewable energy generation targets.

Of the 13 utilities that reported engaging in DSM activities, only two of them linked it to a MWh saving, with just one of them quantifying the saving. Measuring effectiveness of DSM activities by quantifying the savings is critical to evaluating the benefit being gained by the initiatives, and justifying their continuation, and is highly recommended for the utilities.

5.7 Financial Indicators

(i) Introduction

At the 23rd PPA Annual Conference in Tahiti in July 2014[37], CEOs agreed unanimously to full disclosure of financial indicators in the 2013 report[38]. CEOs were provided one week to review reported results in draft form in July and to provide any comments to the PPA, for consideration in the final report. It is believed this greater transparency will increase the usefulness of benchmarking financial KPIs, as it will allow utilities to enter into dialogue about how they are achieving the reported values. This will further drive performance. As stated earlier, any comparison ought to take into account the differing circumstances that each utility has, some of which are presented in Chapter 1 in Table 1.2 and 1.3.

It should be noted that financial reporting is in many cases not indicative of actual utility costs. In some PICTs, equipment and services provided by donor grants are not included or costed in the asset base. Some utilities use accounting methods and principles that are in accordance with recognised international standards, while others have not yet commenced doing so. Some utilities provide independently audited accounts but others do not. Of those that do, at the time of writing, a number of the accounts on which these indicators are based have either not been subjected to audit or have not yet been approved. The basis for asset valuations also varies significantly amongst utilities, if they are in fact performed. Therefore, financial data should be considered indicative only.

Where utilities are multifunctional, (that is, where they also provide other services such as water or sewerage treatment), they were instructed to reasonably apportion costs between services to only provide energy service costs for this study. Financial data provided by utilities has been converted to US dollars for the purpose of comparison. The methodology for conversion used the year average rate for the utilities reporting period. More details are provided in Appendix G.

36 PPA and PRIF. *Power Benchmarking Manual: Performance Benchmarking for Pacific Power Utilities.* September 2012. Asian Development Bank: Sydney, p. 62.
37 PPA Conference, CEOs benchmarking meeting, 7th July 2014.
38 CEOs were provided opportunity to review the reported results in draft form in July and to provide any comments for consideration in the final report.

(ii) Tariff Analysis

General

As has been noted in previous benchmarking reports, conducting tariff analysis of Pacific utilities is highly complex due to the different tariff schedules and structures for the total 25 Pacific power utilities. During this benchmarking round, PPA carried out an analysis of 2012 tariffs for domestic and commercial (or industrial) consumers. This involved calculating the total cost paid by the consumers in a month including service charges and any other fees. The analysis for domestic consumers was based on monthly usage of 50kWh, 100kWh, 200kWh, 500kWh, 1000kWh, 2000kWh, 3000kWh and 10000kWh. For commercial or industrial usage the costs were analysed at monthly usage of 1000kWh, 3000kWh, 10,000kWh, 50,000kWh. These categories were selected, after reviewing the tariff schedules, to reflect the different points at which tariffs alter in different schedules. As well as providing the total monthly charge to the consumer, the total cost was then divided by the monthly kWh consumption to provide an equivalent consumer cost per kWh.

Due to the extent of the analysis undertaken, only a subset of the results is provided here and a full table of results is provided in Appendix H. Those detailed below are the:

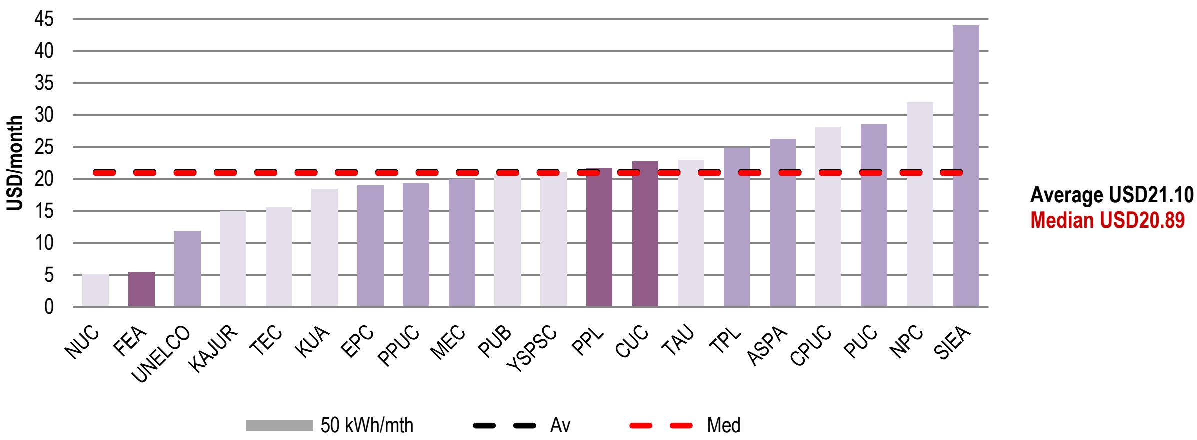
- total monthly charge to domestic consumers for 50kWh/month usage (Figure 5.21)
- total cost and equivalent per kWh rate for domestic consumers for consumption of 200kWh/month (Figure 5.22), and
- total cost and the equivalent per kWh rate for commercial consumer's 1000kWh/month usage (Figure 5.23).

The analysis of this indicator included 20 of the utilities. Some of the utilities were excluded due to difficulty in interpreting tariff schedules or because information required for calculating the charge was not provided. As previously noted, “the price charged by a utility does not, of course, necessarily correlate with costs for the same utility. Most Pacific utilities charge consumers less than the full cost of supply”.[39]

Domestic - 50kWh/month

Reflective of a lifeline tariff, Figure 5.21 shows the total cost paid by a domestic consumer for a minimal usage of 50kWh per month. The average and median are USD21.10 and USD20.89 respectively. NUC and FEA offer the lowest cost, just over USD5 for this usage, whereas consumers in the Solomon Islands pay USD44 for the same consumption. There is no clear relationship between the size of the utility and the amount consumers pay.

Figure 5.21: Domestic Consumer Cost (USD per month) 2012 for 50kWh Consumption

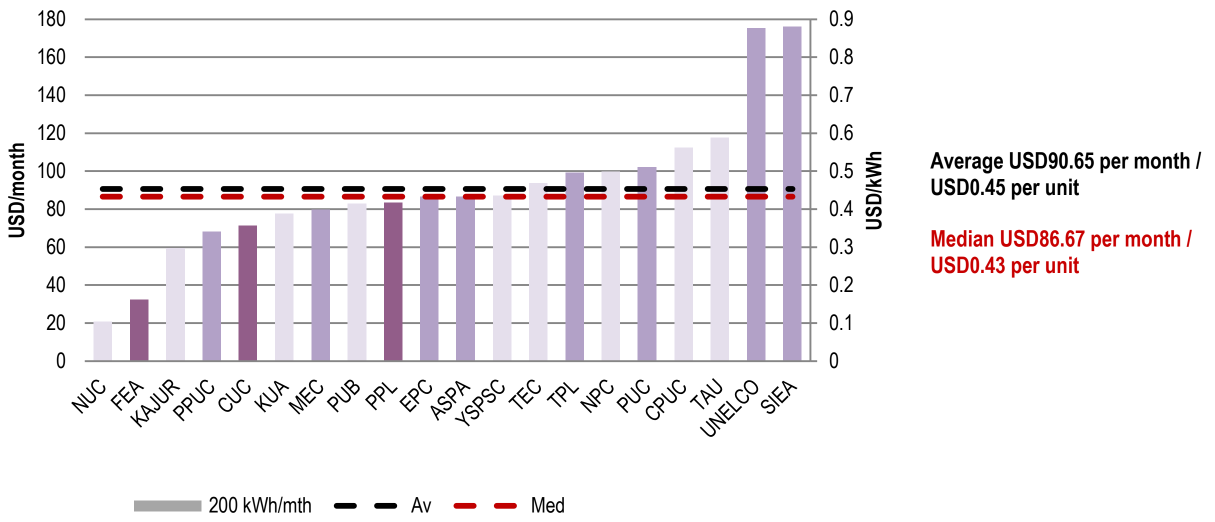


39 PPA and PRIF. *Performance Benchmarking for Pacific Power Utilities – Benchmarking Report*. December 2011, p.40.

Domestic - 200kWh/month

Figure 5.22 presents the cost for domestic monthly consumption of 200kWh. It is expressed on the left hand y-axis as a monthly total charge in USD, and on the right hand y-axis as an equivalent per KWh unit charge factoring in monthly service fee, taxes and charges.

Figure 5.22: Domestic Consumer Cost (USD per month) 2012 for 200kWh Consumption

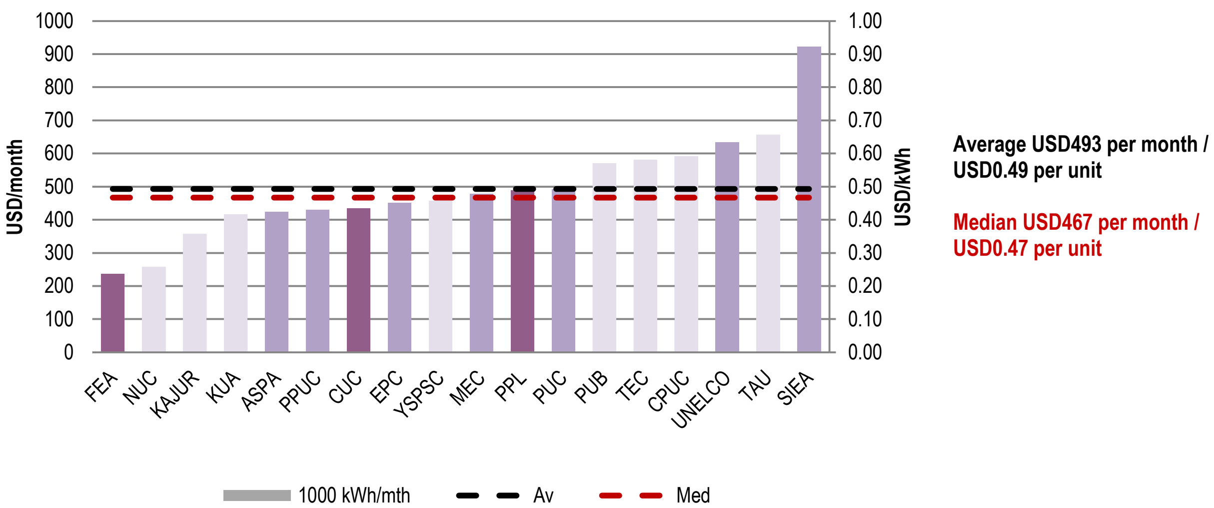


The average and median are USD90.65 and USD86.67 for total monthly charge and USD0.45 and USD0.43 for equivalent charge per kWh, factoring in all costs. NUC has the lowest rates at USD20.65 and USD0.10 and UNELCO and SIEA the highest rates for this consumption point with SIEA consumers paying USD176.16 in a month and equivalent per kWh charge of USD0.88. Again, the size of the utilities appears to have no bearing on the outcome of pricing.

Commercial - 1000kWh/month

Figure 5.23 presents the cost for commercial monthly consumption of 200kWh. It is expressed on the left hand y-axis as a monthly total charge in USD, and on the right hand y-axis as an equivalent per KWh unit charge factoring in monthly service fee, taxes and charges.

Figure 5.23: Commercial Consumer Cost (USD per month) 2012 for 200kWh Consumption



The average and median are USD493 and USD467 for total monthly charge and USD0.49 and USD0.47 for equivalent charge per kWh, factoring in all costs. FEA has the lowest commercial rates at this consumption level, at USD236 and USD0.24 and SIEA had the highest rate with commercial consumers paying USD922 in a month and equivalent per kWh charge of USD0.92.

Again, size of the utility appears to have no bearing on the outcome. There is some variation between the relative positions among other utilities for commercial as compared to domestic rates.

Note that the equivalent per unit charge is similar for commercial 1000kWh/month usage, and domestic 200kWh/month usage. This is due to the efficiencies afforded by commercial utilities and that service charges are shared over a greater number of consumption units.

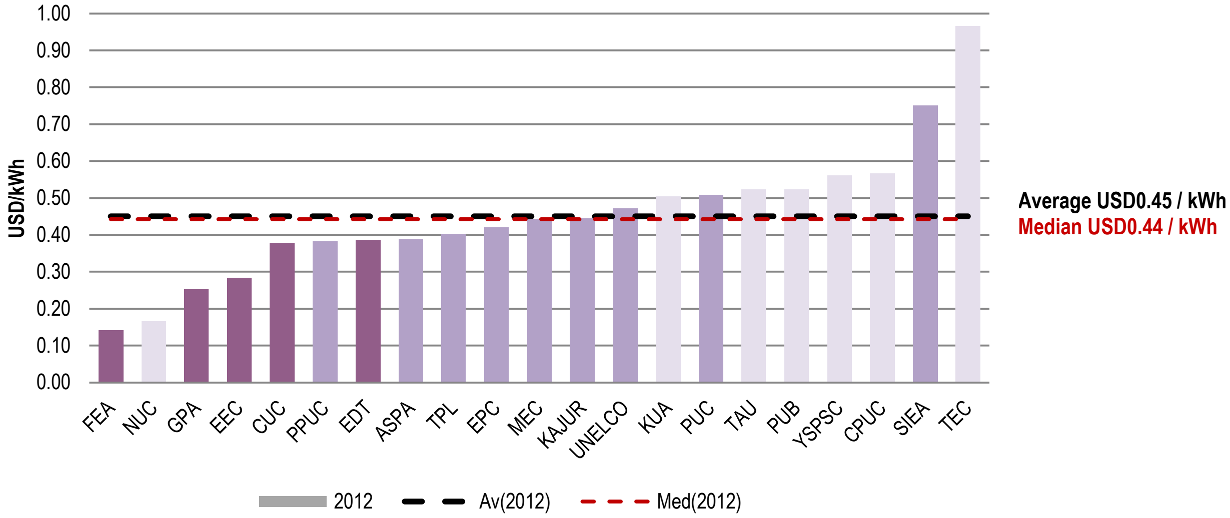
(iv) Average Supply Costs

The average supply costs for 2012 are represented below in Figure 5.24. This is the unit cost of supplying electricity and is calculated by taking the total operating expenses and dividing by the total electricity sold.

Smaller utilities have higher supply costs than larger utilities.

In Figure 5.24, the utilities are shown in order of lowest to highest average supply costs, from left to right. There is an obvious correlation between utility size and average supply costs, with small utilities having higher supply costs per unit, as would be expected due to their inability to harness efficiencies from economies of scale. NUC is the one exception with the second lowest average supply cost. This is due to grants received from donors to cover a number of costs including fuel, so the true expense is not represented in the average supply cost, but only the expense incurred by the utility. This may also be true of other utilities, as has been noted in the introduction to this Section (5.7).

Figure 5.24: Average Supply Costs (USD/kWh) 2012



The large utilities have the lowest average supply cost. This is related to their relative size, as well as the benefit of hydropower resources for FEA and EDT. Consistent with the tariff analysis results, SIEA has among the highest average supply costs. Inconsistent with tariff rates is TEC which is reported to have the highest supply costs though it has mid-to-low tariff rates in comparison to the other Pacific power utilities. The medium-sized utilities are quite consistently represented in the middle of the cost spectrum with large utilities having lower average costs and small utilities having a higher average costs, as would be expected.

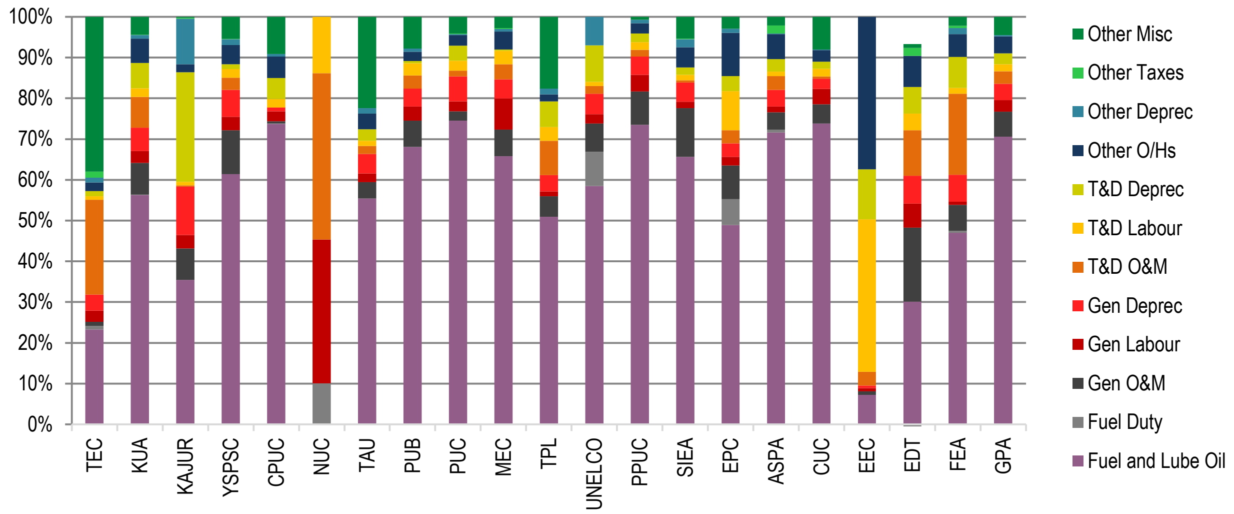
(iv) Utility Cost Breakdown

The previous benchmarking round sought a more detailed breakdown of key utility costs to assess and report on overall cost structure. The cost categories for which information was collected included hydrocarbon based fuel and lubrication costs, duty on fuel and lubricating oil, generation O&M, labour and deprecation, transmission and distribution O&M, labour and depreciation, and other overhead expenditure, duty, taxes and miscellaneous costs. This was continued in this year's benchmarking round. The percentage contributions of each component are presented for the utilities that reported sufficient data in Figure 5.25 below.

Other than the fact that fuel and lubricating oil costs dominate, as expected, with fuel duty regimes varying significantly, cost structures will vary with system topology, fuel mix and the other characteristics of the service area, customer base and organisational structure. NUC's fuel costs which are paid by a donor result in a different cost structure compared to other utilities. The other noticeably different cost structure is that of EEC which, as was stated earlier, has 95% IPP generation. Excluding NUC and EEC, fuel and related duty accounts for between 24 and 75% of total costs, with a median of 66% - very similar to last year's median of 65%.

The utility cost breakdown for each utility is an important factor when considering which KPIs to focus on for improvement. In this regard it should be noted that some utilities receive grant funding which needs to be included in subsequent benchmarking rounds in order to improve utility comparison.

Figure 5.25: Utility Cost Breakdown (%) 2012



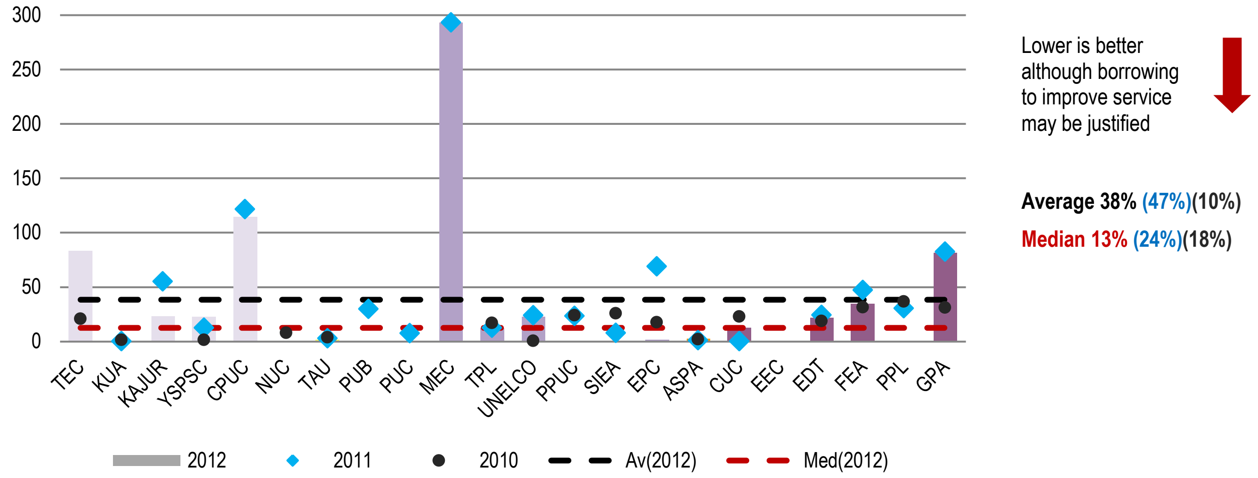
(v) Debt to Equity Ratio

Debt to equity is low at 38% compared to a regional benchmark of 50%.

The indicator used for the level of utility debt is the ratio of long term debt to equity, plus long term debt, expressed as a percentage (debt / (debt + equity)). Borrowing to improve services may be justified, but a high debt-to-equity ratio places a utility in a vulnerable position.

In 2001 Pacific utilities generally had low levels of debt,[40] with an average ratio of 26% compared to a regional and international benchmark of a maximum of 50%. The 2012 average debt to equity ratio is 38%, with a median of 12%. As can be seen in Figure 5.26, debt to equity rates have varied over the benchmarking years.

Figure 5.26: Debt to Equity Ratio (%) 2012(2011) (2010)[41]



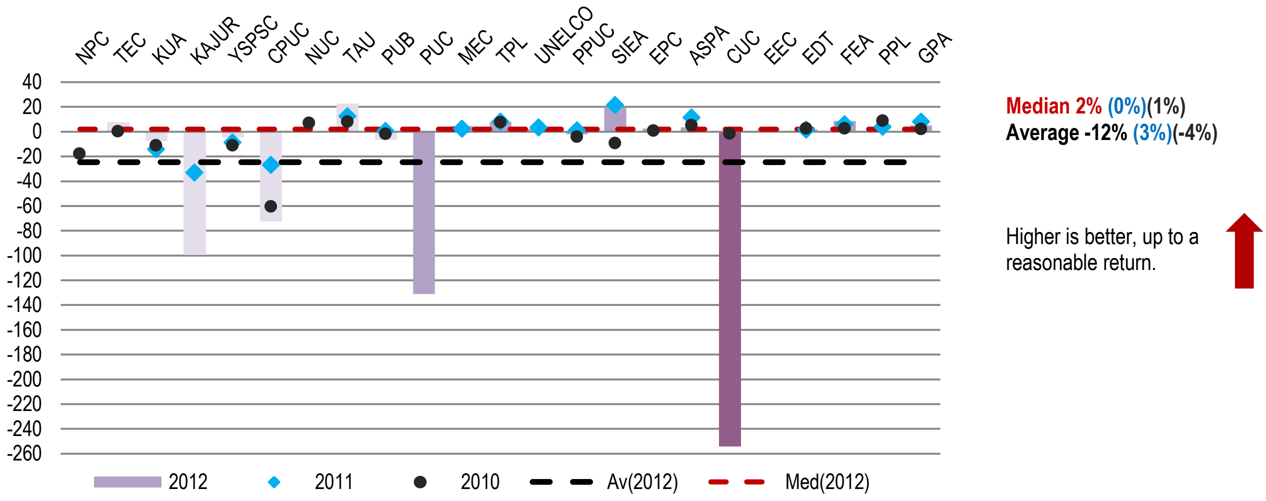
40 In some instances, it is important to note that a low debt equity ratio can also be a negative, as it can mean that a corporatized entity has under invested in assets.

41 Average and median values taken from the data set differ from those reported in the 2012 report. This probably results from the elimination of outliers. The values from the full data set are used in this case.

(vi) Rate of Return on Assets

The Rate of Return on Assets (RORA) is the return generated from the investment in the assets of the business. ROA indicates how efficient management is at using its assets to generate earnings. Pacific power utilities generally do not earn commercial rates of return, and this is reflected in Figure 5.27. The Pacific benchmark has a target of a positive rate of return. Twelve utilities are currently achieving this, with TAU and SIEA reporting the highest rates of approximately 20%. In 2012 the average RORA was minus 25%, with a median of 2%. This is skewed by an extreme value of minus 254% for CUC. Excluding this value the average is minus 12%. This represents a decline since the previous year where the average was 3%. It is noteworthy however, that 12 of the utilities are earning positive RORA, with TEC, TAU, TPL, SIEA and FEA earning a RORA of over 8%.

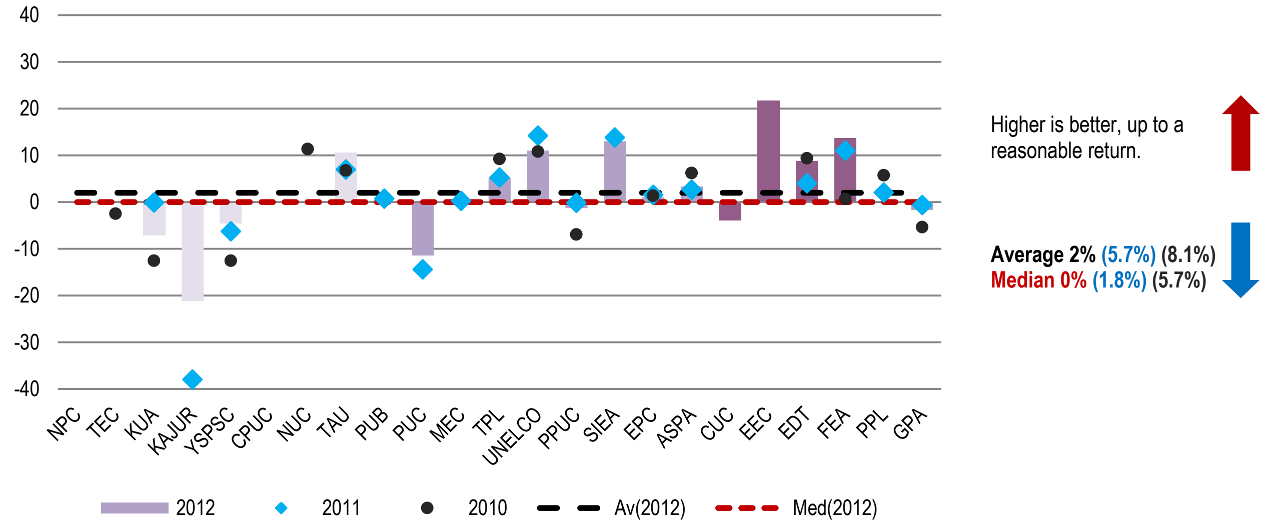
Figure 5.27: Rate of Return on Total Operating Assets in 2012 (2011) (2010) (%)



(vii) Return on Equity

ROE measures financial returns on owners' funds invested. Results for ROE are shown in Figure 6.28. Some outlying values have been disregarded as their accuracy is not credible. As Figure 5.28 shows, overall performance has deteriorated with a reduction in average return from 5.7% in 2011 to 2% in 2012 and a reduction in the median from 1.8% to 0%. Five utilities have a ROE of over 10%. Seven utilities show a negative return up to minus 21%. A high variability is seen between the results of previous and current years.

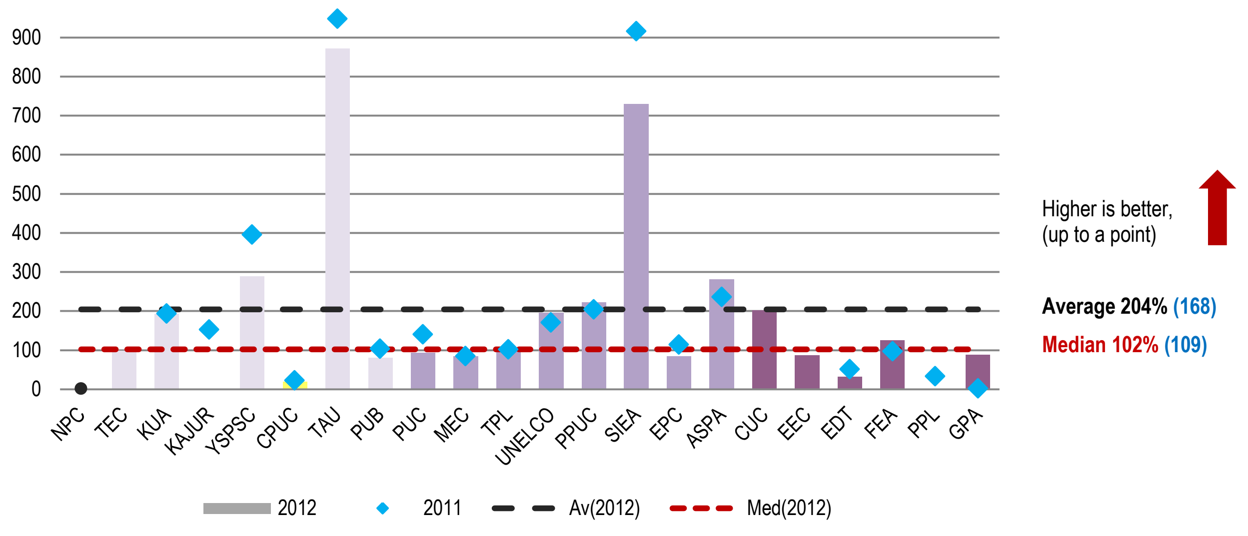
Figure 5.28: Return on Equity (%) 2012 (2011) (2010)



(viii) Current Ratio

The current ratio measures the ability of business to pay its creditors within the next 12 months, i.e. the ability of the utility to meet its current liabilities from current assets. In 2011, as illustrated in Figure 5.29, the reported average current ratio has reduced significantly to 154%, with a median value of 102%. TAU and SIEA have very high current ratios due to the high value of current assets as compared to current liabilities.

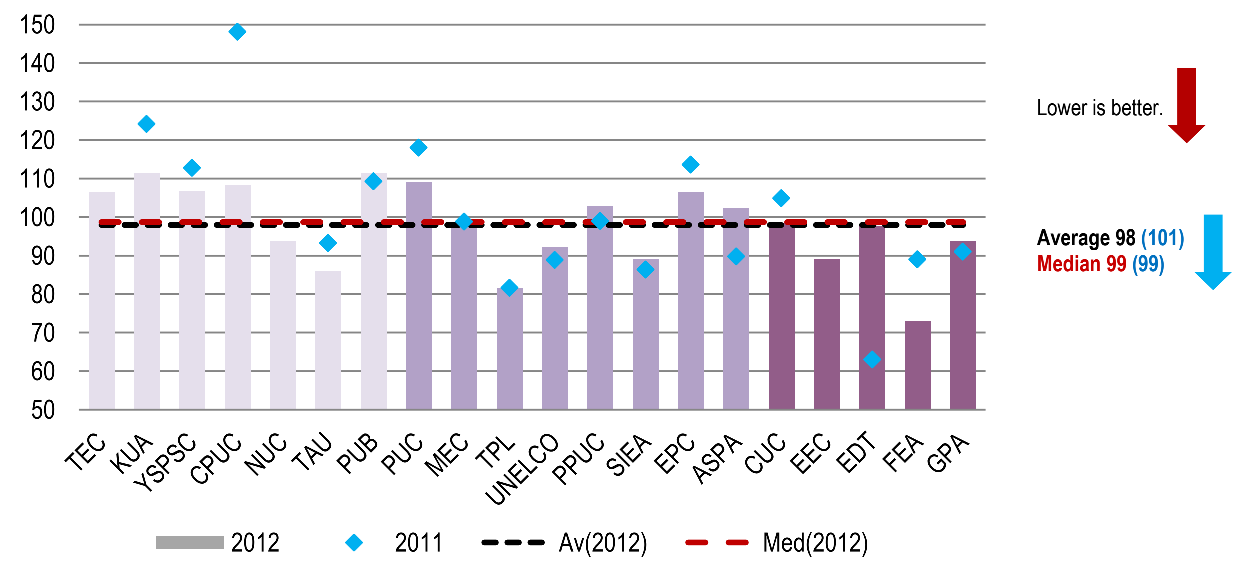
Figure 5.29: Reported Current Ratio (%) 2012 (2011)



(viii) Operating Ratio

The operating ratio is a measure of how efficiently a business is operating, in this case, providing electricity service. A smaller operating ratio indicates a more efficient operation, and an operating ratio below 100 indicates a profitable operation. An operating ratio above 100 indicates that it is costing an organisation more to produce the service than is being returned by the revenue, which is often the case in Pacific power utilities, as indicated by a median value of 101 in 2012. As shown in Figure 5.30, eleven utilities have an operating ratio below 100 and nine utilities have an operating ratio above 100.[42] The average was 98, down slightly from 2011, indicating a slight improvement in performance.

Figure 5.30: Operating Ratio in 2012 (2011)

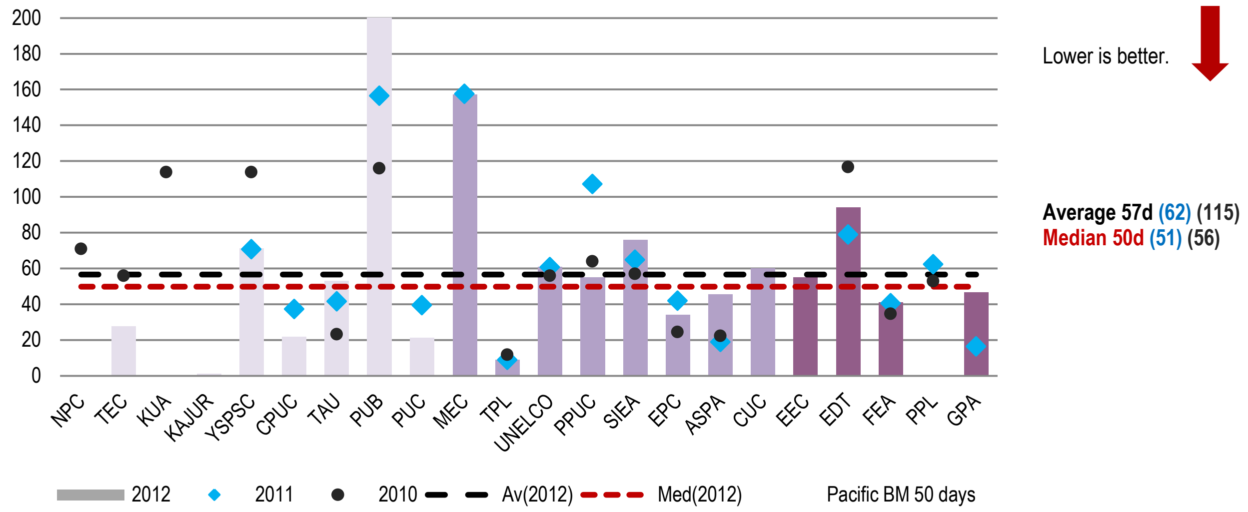


42 An extreme high value for KAJUR has been excluded.

(ix) Debtor Days

This indicator measures how long it takes, on average, for the utility to collect debts. In 2001, the Pacific average was 79 days compared to the Pacific benchmark of 50. In 2012 (refer to Figure 5.31), debtor days improved from 63 days to 57 days, with a median of 50 days. CPUC, PUC, PPUC and EPC have made notable improvements in reducing debtor days. YSPSC, PUB, MEC SIEA and EDT have the highest debtor days and well exceed the average.

Figure 5.31: Reported Debtor Days (Days) 2012 (2011) (2010)

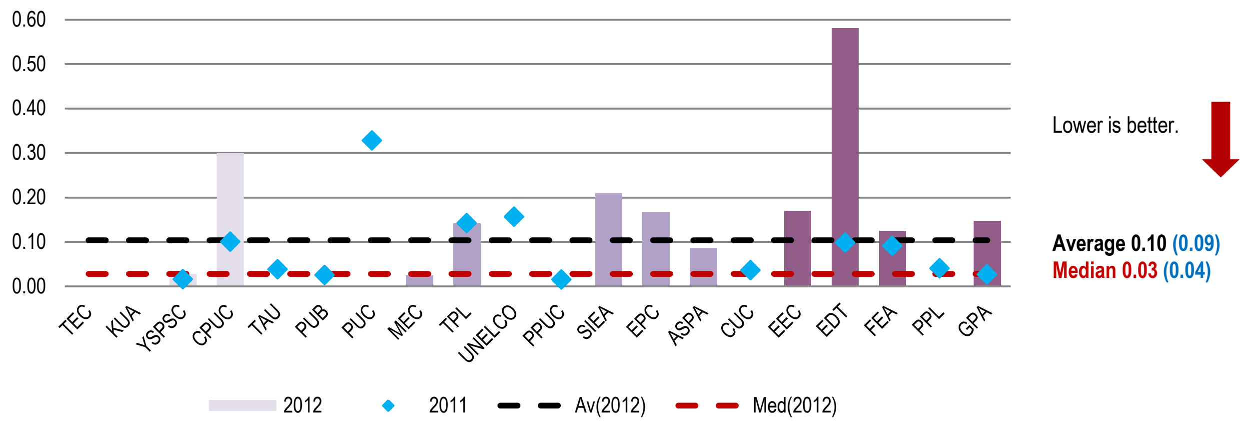


5.8 Human Resources and Safety Indicators

(i) Lost Time Injury Duration Rate

Lost Time Injury (LTI), as based on the Australian Standard AS18851, refers to an incident where an employee is absent from work for one day or one shift due to injury incurred during the course of their work. The indicator Lost Time Injury Duration Rate (LTIDR) measures the average number of days or shifts lost to injury for employees (excluding contractors) during the reporting period. When a staff member is away due to injury there is a cost to the utility in payment of salary and additional benefits, as well as the loss in productivity.

Figure 5.32: LTIDR (Days per FTE Employee) 2012 (2011) (2010)

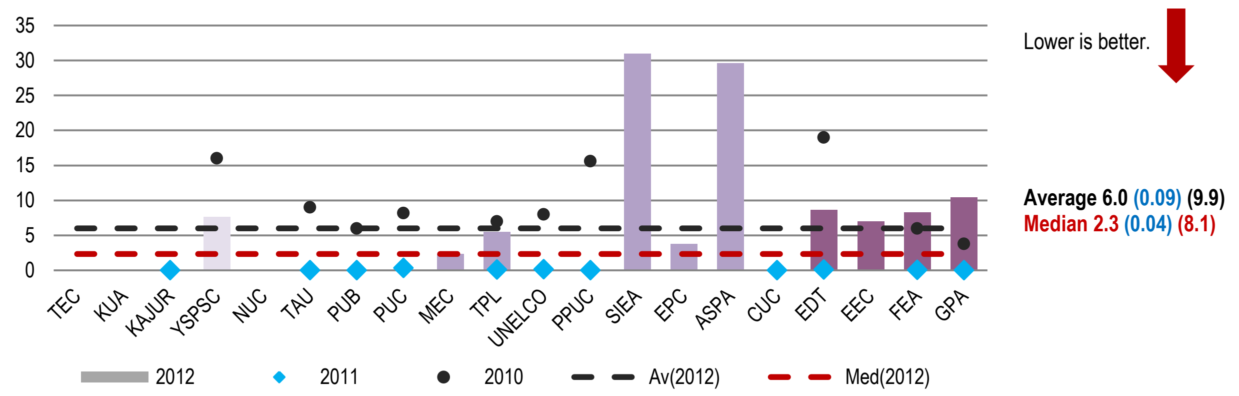


The average for 2012 is 0.10 days per FTE employee, compared to 0.09 last year (refer Figure 5.32). The median is 0.03 days per FTE employee compared to 0.04 last year. The results are not sufficient for drawing any strong conclusions. Numerous utilities did not answer the question indicating the information was not available. Recording the details of any injury incurred at work, and any subsequent leave taken, is essential to sound human resource management.

(ii) Lost Time Injury Frequency Rate

This indicator measures the number of LTIs for each one million hours worked. The average for 2012 is 6.0 and the median 2.3. This has risen since 2011, possibly because of improved response rate and more accurate reporting rather than a drastic reduction in safety performance. SIEA and ASPA have extremely high LTI frequency rates indicating the urgent need for improved safety management.

Figure 5.33: LTI Frequency Rate (Number of Incidents per Million Hours) 2012 (2011) (2010)

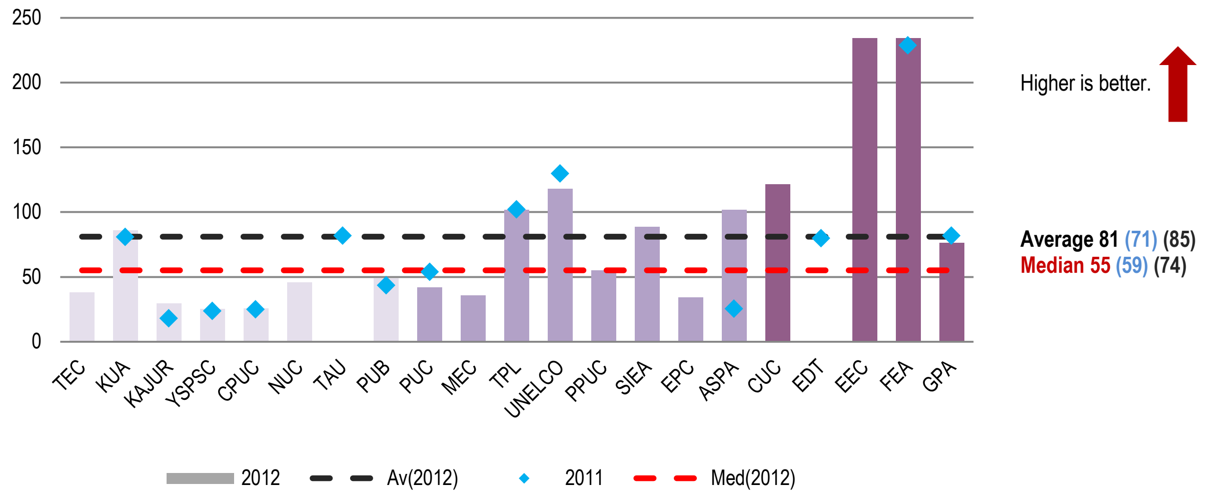


(iii) Overall Labour Productivity

Overall Labour Productivity is measured by the number of customers per total FTE utility employee. In 2010, there were on average 85 customers per employee, with a median value of only 74, and the observation was made that "productivity appears to be quite low compared to similar sized island utilities elsewhere".[43]

The productivity declined in 2011, recovering on average in 2012 (refer Figure 5.34). Labour productivity now averages 81 customers per FTE employee, with a median of 55. A higher productivity is expected of larger utilities that operate with some economies of scale. KAU, TPL, UNELCO SIEA and CUC have favourable performance as compared to expectations, while EPC and GPA show relatively low productivity considering their size characteristics.

Figure 5.34: Overall Labour Productivity 2012 (2012) (Customers per FTE Employee)



Another factor that affects productivity is the geography of the country. Where multiple islands are serviced by the power utility, it is expected that labour required to service to smaller outer island populations will have a negative impact on the overall labour productivity driving it downwards (Refer Table 5.1).

However, this factor alone does not explain the results above, with some of the utilities that service outer islands (such as TPL, SIEA and CUC) having relatively higher productivity while other utilities that only service one island, with higher peak demand (such as GPA) having labour productivity below the trendline. As a further basis of comparison, the 2012 CARILEC benchmarking study reported utilities averaging 168 customers per employee – although these results ranged as widely as from a low of 73 up to 365 customers per employee for the 16 utilities recorded.[44]

43 PPA and PRIF. *Performance Benchmarking for Pacific Power Utilities – Benchmarking Report*. December 2011, p. 49.
44 KEMA Benchmark Study of Caribbean Utilities (Ninth Update – Year 2012), July 2013.

5.9 Overall Composite Indicator

An overall composite indicator of utility performance was developed in 2011. Data limitations meant that it was not possible to include financial data in the composite. Even for technical data, there were significant gaps in the data submitted by some utilities. A simple indicator that equally weighted generation efficiency, capacity utilisation, system losses and overall labour productivity was derived, with quantitative score on a scale up to 4.0. Overall, this was considered to be a valid assessment of technical performance.

The omission of financial data in particular was perceived as a significant limitation seeing composite indicators generally require a more balanced mix of indicators across key aspects of utility performance, including financial and key service criteria (like supply reliability).The composite indicator was reviewed in 2012 but, due to the limitations of the data available, it remained unchanged. For 2012, the utilities have again been evaluated by measuring the composite indicator based on the same four equally-weighted components identified in 2010, namely:

	Components of Composite Indicator (Maximum score 4.0)
▪	**Generation efficiency:** specific fuel consumption (25%)
▪	**Efficient utilisation of assets:** capacity factor (25%)
▪	**System losses:** network delivery losses (25%)
▪	**Overall labour productivity:** customers per full time utility employee (25%)

Results are summarised in Figure 5.36. The scores for 2011 and 2010 are also shown, illustrating some movement in rankings and distribution. EDT has the highest overall score of approximately 3.4, and one of only two utilities in the 'High' category, including FEA with a score of approximately 3.2. The next ranking utility is EEC, ASPA, TPL, PUB, UNELCO, TAU and GPA which follow with scores of 2.5 and above.

In general, the overall results have declined since the previous two years. It is proposed that the constitution of the composite indicator continues to be reviewed as the validity of the dataset improves. Improvements in data quality may also permit more sophisticated approaches to relative performance evaluation in future.

Figure 5.35: Composite Technical Indicator 2012 (2011) (2010)

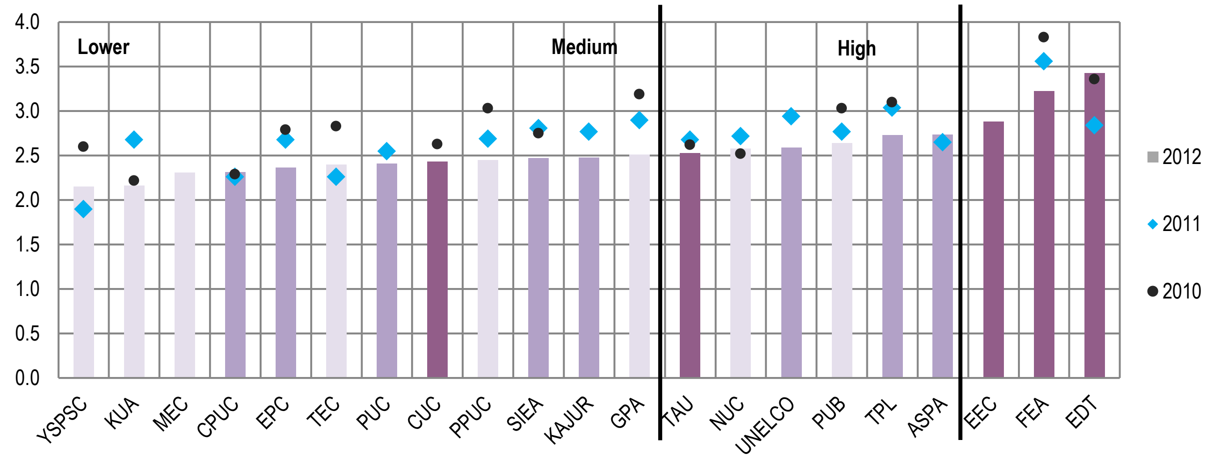
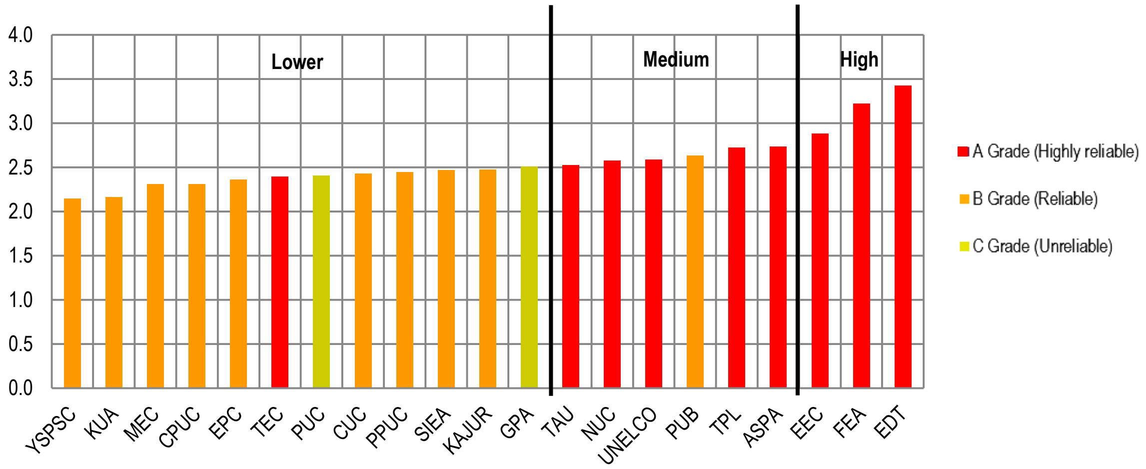


Figure 5.36 shows the same composite indicator grading and the associated aggregate data reliability score. From the graph a link between performance and data reliability can be seen, with the A Grade data reliability scores corresponding mainly to the higher performing utilities and the C Grade scores being found among the utilities that scored in the lower category. It is proposed that the constitution of the composite indicator continues to be reviewed as the validity of the dataset improves. Improvements in data quality may also permit more sophisticated approaches to relative performance evaluation in future.

Figure 5.36: Composite Technical Indicator and Data Reliability Aggregate Score 2012



6 COMPARING RESULTS

- **Lube oil consumption, power station usage, debt to equity ratio and debtor days have clearly improved.**
- **A decline in performance has been observed in labour productivity, transformer utilisation, return on equity, operating ratio, and (consequently) in the overall composite indicator.**
- **CARILEC provides the best cross-regional comparison. CARILEC utility performance leads the Pacific overall; however, the difference is marginal in several indicators, such as load factor and power station usage.**

6.1 Introduction

In this chapter of the report a review is made of the results presented in Chapter 5, highlighting the performance indicators that are improving, stable or declining. The overall 2012 results are compared with that of previous years, and with other regions that possess similar characteristics.

6.2 Comparing 2001, 2010, 2011 and 2012 Results

Table 6.1 provides a summary of the 2012 KPI results, highlighting in which indicators utilities have improved overall, remained stable or declined in performance since the previous benchmarking round. The table shows that five indicators have clearly improved, five have clearly declined and the performance in six indicators has remained stable overall.[45] Lube oil consumption, power station usage, distribution O&M, debtor days and lost time frequency rates have clearly improved. A decline in performance has been observed in labour productivity, customers per distribution employee, transformer utilisation, return on equity and consequently in the overall composite indicator. Other indicators including load factor, capacity factor, specific fuel oil consumption, distribution losses, SAIFI, and operating ratio have remained fairly stable.

Table 6.1: Summary of Indicator Trends 2012[46]

Improved	Stable	Declined
Lube oil consumption (kWh/litre)	Load factor (%)	Generation labour productivity (GWh/FTE employee)
Power Station Usage (%)	Capacity factor (%)	Customers per dist. employee
Distribution O&M	Specific fuel oil consumption (kWh/ litre)	Transformer utilisation (%)
Debtor days (days)	Distribution losses (%)	Return on equity (%)
Lost Time Injury Freq. Rate	SAIFI (interruptions/cust.)	Composite Indicator
	Operating ratio (%)	

45 Some KPIs do not clearly fit into the three categories as performance is rated according to a combination of factors and not just the KPI result alone. Also, some results are inconclusive with the average having declined while the median increased or vice versa. Where results are not clearly improved, stable or declined, the KPIs have been excluded from Table 7.1.

46 Results of KPIs that are not included in the table were inconclusive.

Table 6.2 compares the average results of the current exercise (2012 data) with that of the previous periods (i.e. 2001, 2010 and 2011) and shows the trends over time. In the case that the result is inconclusive, this is stated. Where an increase or decrease has been observed but it cannot be said if this represents an improvement or decline in performance, 'increase' or 'decrease' is simply stated. For new indicators where no comparative data is available, or where previous data is unreliable, the 'Trend' column is left blank.

In summary of the generation indicators, the areas of load factor, capacity factor, specific fuel oil consumption and operating ratio have remained fairly stable. Availability factor values have improved but low confidence is placed in the comprehensiveness of out-of-service data provided. Lube oil consumption and power station usage have both improved. Forced outage and planned outage have also reportedly improved but again, data quality is an issue. The increase in averages may simply reflect an improvement in the number of utilities reporting and the quality of the data they are reporting. Generation labour productivity has declined overall, and is a key area of concern. Generation operations and maintenance has decreased significantly to very low levels, indicating a neglect of adequate maintenance practices for generation plant and equipment.

Transmission indicators appear to have improved in data quality. However, due to poor data from the previous year, it is impossible to draw any clear conclusions regarding performance trends. In the area of distribution, network delivery losses have declined, as has transformer utilisation.

Distribution losses are mainly stable, though the median has gone up by about 1.5%. Labour productivity (as represented by customers per distribution employee) has declined overall, though the median has improved slightly. Distribution operations and maintenance has increased by a considerable margin.

The SAIDI indicator increased, representing a decline in performance; however, SAIFI remains stable by comparison. It is important to note here that the quality of the data is improving and the result probably reflects the improvement in data quality and the number of utilities represented in the results.

In the area of financial indicators, debt-to-equity ratio has improved, as has debtor days. Return on equity has declined, however. Results for rate of return on assets and current ratio are inconclusive.

There has been an improvement in lost time injury reporting, though more work is needed in this area. Overall labour productivity has continued to decline, and signifies another area for performance improvement efforts. The composite indicator of technical factors has declined in general across the utilities.

6.3 Comparing Pacific Results to Other Small Utilities

In response to the request from utility CEOs, there has been an attempt to compare Pacific performance to those utilities that share PICT characteristics: small, remote locations and (for most utilities) extreme dependence on petroleum fuel. An appropriate benchmark set is represented by the following group of small island utilities. There are two sources for this information:

Comparison to Other Small Island Utilities

Benchmark Study of Caribbean Utilities, Final Report Ninth Update – Year 2012):[47] 17 utilities participated and are represented in the results. Like the PICTs, the majority of CARILEC members rely overwhelming on petroleum fuel and are small, island utilities.[48] The smallest participating CARILEC utility, Anguilla Electricity, has maximum demand of 13.58MW in 2012 which is equivalent to a medium size PPA utility. In general, they have higher electricity coverage and better maintenance budgets than PPA members and the countries have considerably higher per capita GDPs. As there have now been 10 Caribbean regional benchmarking exercises from 2002 to 2012, the utilities are increasingly familiar with the approach, so data collection and reporting are probably better than in the Pacific.

Small Island Systems Second Benchmarking Report of the Network of Experts of Small Island System Managers (NESIS). The last benchmarking report sourced from NESIS was prepared in 2009,[49] based mostly on 2006 data and covering island utilities associated with the European utility association, Eurelectric. The study covers 17 utility groups operating in 73 islands. The 17 groups include GDF-SUEZ Energy Services within which EDT Polynésie Française, EEC Nouvelle Calédonie, EEWF Wallis et Futuna and UNELCO Vanuatu were included as one group. Also included were utilities of high-income islands such as Malta, Jersey, Guernsey, Cyprus and the Isle of Man. Nonetheless despite having higher population densities and differing development statuses, like utilities of the PICTs, these are mostly small, remote, high-cost, petroleum-dependent operations and therefore provide a basis for ongoing comparison into the future. A university joint venture was expected to work with NESIS on an update in 2013 though investigation into this did not confirm or source an update.

47 Caribbean Electric Utility Services Corporation (CARILEC) and KEMA, *Benchmark Study of Caribbean Utilities (Ninth Update – Year 2012),* Final Report, July 2013.
48 Trinidad & Tobago and Belize have local gas and oil resources respectively that they utilise for power production.
49 Network of Experts of Small Island System Managers (NESIS), *Small Island Systems Second Benchmarking Report of the Network of Experts of Small Island System Managers – 2004, 2005, 2006 Data* (14 April 2009).

Table 6.2: Comparison of 2012 Results with 2001, 2010 and 2011

Key Indicators		2001 Results		Goals	International Best Practice	2010 Results		2011 Results		2012 Results		Trend
		Av	Med	2002	(2002 report)	Av	Med	Av	Med	Av	Med	
Generation												
Load factor (%)	↑ better	67	66	50-80	50-80	64	65	67	68	67	65	stable
Capacity factor (%)	↑ better	34	33	> 40	35-65	32	31	36	37	36	35	stable
Availability factor (%)	↑ better	93	97	80-90	10-65	98	100	82	81	92	99.6	improved*
Generation labour productivity (GWh/FTE employee)	↑ better					2.7	1.2	2.5	1.2	2.2	1.3	declined
Specific fuel oil consumption (kWh/ litre)	↑ better	3.8	3.7	4	Over 4	3.8	3.8	3.8	3.8	3.9	3.8	stable
Specific fuel oil consumption (kWh/ kg)	↑ better									4.5	4.5	
Lube oil consumption (kWh/litre)	↑ better	N/A	N/A	N/A	No standard	1302	971	1084	936	1096	984	improved
Forced outage factor (%)	↓ better	7.9	3.2	5-14	0	1	0.2	8.3	6.3	5.4	0.4	improved*
Planned outage factor (%)	↓ better	4.3	3.9	3	3	1	0.1*	3.9	1.8	2.64	0.04	improved*
O&M (USD per MWh)	varies	58	14	18		148*	71*	214*	132*	47	40	decreased
Power Station Usage (%)	↓ better				3-5	4.7	4.8	3.9	3.6	3.5	2.7	improved
Renewable energy to grid (%)	varies	N/A	N/A	N/A	No standard	22% main grid*		26% of all grids*				
Transmission												
Transmission losses (%)	↓ better	8	N/A	5	5			5*	5*	0.9*	0.9*	
Transmission reliability (outages/100km)	↓ better							41.8	18.2	11.5*	15.9*	improved*
Transmission SAIDI (min/cust) Unplanned	↓ better									52.7	60.9	
Planned	↓ better									0	0	
Transmission SAIFI (events/cust) Unplanned	↓ better									5.3	6.3	
Planned	↓ better									0	0	
Distribution												
Network delivery losses (%)	↓ better					12.8	11.7	11.8	9.2	14.0	12.2	*
Distribution losses (%)	↓ better	12*	N/A	5	5	12	10.4	14.2	10.7	14.1	12.2	stable
Transformer utilisation (%)	↑ better	18	18	30	50	19	21	18	19	16	16	declined
Distribution reliability (events per 100km)	↓ better					51	26	135	19	64	23	*
Customers per dist employee	↑ better	242	224	240	350	334	297	259	249	246	253	declined
Distribution O&M (USD/km)	↑ better							5846	4648	8662	5574	improved
SAIDI and SAIFI												
SAIDI (mins/customer)	↓ better	592	33	200	47	530*	139*	794*	583*	5664	475	increased
SAIFI (interruptions/cust)	↓ better	19	8	10	0.9	8*	4*	10*	6*	9	4	stable
Financial												
Ave. supply cost (USD/kWh)										0.45	0.44	
Debt to equity ratio (%)	↓better	26	N/A	< 50	< 50	10	18	47	24	38	13	*
Rate of return on assets (%)	↑ better	-16.8	-	> 0	> 10	-4	1	3	0	-12	2	*
Return on equity (%)	↑ better					5.7	5.7	8.1	5.7	2	0	declined
Current ratio (%)	↑ better			>100				168	109	204	102	*
Operating ratio (%)	↓ better			<100				100	99	98	99	stable
Debtor days (days)	↓ better	79	51	< 50	30	115	56	62	51	57	50	improved
Human Resources and Safety												
Lost Time Injury Duration Rate (days / FTE employee)	↓ better							0.09*	0.04*	0.1	0.03	*
Lost Time Injury Freq Rate (number of incidents per million hours)	↓ better							10	6.3	6.0	2.3	improved
Labour Productivity (customers per employee)	↑ better					85	74	71	59	81	55	*
Technical Composite												
Composite Indicator	↑ better	NA	N/A	NA	Not defined	2.8	2.8	2.7	2.7	2.6	2.5	declined

Notes: 1. (*) = questionable result

Table 6.3 compares Pacific performance with CARILEC and NESIS results using the most recent reports available. However, there are fewer common indicators available than expected. Only those indicators where there is a comparison are shown. Some of these comparisons are only indicative as the definitions of some indicators differ.

Table 6.3: Comparison of Key Indicators for Pacific and Other Small Utilities

Indicator	Pacific		CARILEC	NESIS		
Data for operational year	2012		2012	2006		
No. of participating utilities	21		17	17 groups; 73 islands		
Utility characteristics	Most small, remote & oil dependent; most 100% Govt-owned. Range of 900 -150,000+ customers, with median of 8,300		Most small, remote & oil dependent; higher GDP/capita than PICs; Govt, private & mixed ownership	EU-linked; higher GDP/capita than PIC; Govt, private & mixed ownership. Islands are listed in 3 categories below.(14 of 21 PICTs<100 GWh)		
Generation	**Average**	**Median**	**Average**	**> 1000 GWh**	**< 1000 GWh**	**< 100 GWh**
Load factor (%)	67	65	69			
Capacity (utilisation) factor (%)	36	35	42			
Availability factor (%)	92	99.6	80			
O&M (USD per MWh)	47	40	278			
Power Station Usage (%)	3.5	2.7	3.1			
Distribution						
Network delivery (sys energy) losses (%)	17.3	11.5	10.7	9.7	6.9	9
Distribution (energy grid) losses (%)	14.1	12.2	8.5			
SAIDI and SAIFI						
SAIDI (hours/customer)	94	8	158	3	1.3	5.2
SAIFI (interruptions/cust)	9	4	4.3			
Financial						
Average supply cost (USD/kWh)	0.45	0.44	0.33			
Rate of return on assets (%)	-12	2	5.2			

Notes: **1.***From KEMA supply side loss reports. **2.****PICT data are comparable to the region's total system losses and presumably wrongly reported **3.** SAIFI & SAIDI: Data insufficient for benchmarking & some are inconsistent for CARILEC (and probably PICTs). **4.*****Generation costs for NESIS & APPA include purchased electricity; NESIS costs based on €1.0 = US$1.25 in 2006. **5.+**PICTs based on 200 kWh per m for households, 500 kWh per m commercial; CARILEC 100 & 2000 respectively. **6.** (**?**) indicates data may not be sufficiently reliable for meaningful comparisons.

CARILEC leads the Pacific in most of the KPIs; however the difference is marginal in several indicators, such as load factor and power station usage. The gap between Pacific and Caribbean load factor reduced due to a drop in the Caribbean average. Overall, the Pacific average is slightly less than that of the CARILEC group. Capacity factor remained stable for both regions, with the Pacific average 6% lower than that of the Caribbean average. Availability factor for the Pacific is questionable and so no conclusion can be drawn regarding comparative performance. Operations and maintenance expenditure of the Pacific dropped dramatically in 2012, and a huge gap is apparent between the Pacific expenditure and that of the CARILEC group. Network delivery losses have increased in the Pacific and are higher than that of the CARILEC and NESIS groups by a considerable margin.

SAIDI figures are better; however, SAIFI indicators are higher in the Pacific than in the Caribbean and NESIS group. In the Caribbean, benchmarking is in its tenth consecutive year and so utilities are more advanced in their data collection and reporting, and presumably in their response to service reliability data. This may present an opportunity to learn from the CARILEC group on how to improve service reliability data collection and reporting, and service reliability itself through performance improvement initiatives.

Average supply cost for electricity is approximately 25% less in the Caribbean. The closer proximity of Caribbean states to major international centres could be a contributing factor in this result. Likewise, the Caribbean is achieving 5.2% rate of return on assets, compared to a negative average in the Pacific of minus twelve. The median in the Pacific is 2%.

There exists a large potential to learn from the Caribbean states on how they have achieved improvement in all stages of the benchmarking process from data collection to reporting and performance improvement initiatives. The PPA and CARILEC have an ongoing relationship through which they might explore knowledge sharing between the two groups.

7 DISCUSSION

- **Online data submission is a means for standardising data collection and validation, providing potentially immediate results.**
- **Disclosure of financial information will enhance the usefulness of the data.**
- **Regional comparison of results is useful for highlighting and prioritising issues.**
- **Sustainability requires capacity building development.**

7.1 Introduction

This third consecutive benchmarking round has built on the experience of previous rounds. There has been considerable improvement in the process including data collection, validation and reporting. The key discussion points from the current round of benchmarking are summarised below.

7.2 Data Collection and Validation

(i) Benchmarking Manual

The Power Benchmarking Manual is an essential supplementary aide and tool for utility staff to participate in benchmarking. The Manual was last updated in August 2014, and is available on the PPA website at: www.ppa.org.fj and the PRIF website at: www.theprif.org/key-documents.

The Manual provides step-by-step support for completing the questionnaire and understanding what the individual KPIs represent and how they are calculated. The process of developing PIPs is introduced. The Appendix provides templates for recording power interruptions (for the calculation of SAIDI and SAIFI) and a template for recording lost time injuries. Greater use of the Manual by CEOs, Benchmarking Liaison Officers and head of departments will further improve data consistency and enhance understanding, empowering utilities to enhance the way results are utilisation in decision making and to drive improvement.

(ii) Online Data Submissions

Currently the benchmarking data collection is done using Microsoft Excel spreadsheets and Word documents. The task of reviewing, validating and analysing the data is labour intensive. Online data submission has been raised previously as a means for standardising data collection and providing inbuilt explanation and data validation and potentially immediate results. During conversations with delegates at the PPA Annual Conference, they expressed support for the development of an online data entry tool for submitting data. It was suggested that this platform could be used by utilities to enter data on a monthly basis for internal use as well as well as for the annual PPA benchmarking. The PPA Secretariat is following up on options available for the development of an online platform for data submissions.

(iii) Pacific Regional Data Repository

PICT Energy Ministers have approved a regional initiative for a central data repository for the keeping of Energy Sector data, called the Pacific Regional Data Repository[50] (PRDR) of which the benchmarking data will form a part. The SPC will be the interim host of the central data repository, which has been developed around the following parameters:

50 For more information go to: http://prdrse4all.spc.int/prdrse4all/about.

- focus on raw / primary data with no attempt to provide analysis, verification or comment
- obtain data directly from the source, to avoid time lag which affects the relevance of the data
- work within existing structures, and not attempt to duplicate existing efforts
- focus on data collection and distribution only, and
- support financial sustainability.

The PPA benchmarking will be the primary supply of power utility sector data for the data repository, reinforcing SPC as a key stakeholder and beneficiary of the benchmarking exercise. This is a key factor when considering strategies for how to establish and maintain the benchmarking exercise as self-sustaining.

7.3 Reporting

(i) Changes to Presentation of Results

Changes have been made to the way results are presented in this report, with graphs showing utilities by order of increasing size (left to right) for all indicators, and colour coded according to small, medium and large categories. This facilitates a quick analysis and understanding of the impact that size has on the performance in any indicator. For some indicators such as load factor, capacity factor and availability factor it was obvious that size was not impacting significantly on performance, and so meaningful comparison can be made with any other utility. In other indicators, such as generation labour productivity, a clear correlation exists between size and productivity, so comparison should only be with those utilities of similar size.

(ii) Disclosure of Financial Information

The agreement of PPA utility CEOs to allow for disclosure of the financial benchmarking data in this Report is a major development in the Pacific benchmarking, and will greatly increase the usefulness of the financial data. As was noted at the CEO's meeting at the PPA conference on 7th July, having access to such information will allow dialogue between utilities to share information on how they are achieving their results.

(iii) Distribution of Benchmarking Report

It is important that those involved in collecting the benchmarking data have opportunity to review the Benchmarking Report once it is released. Reviewing the final report provides the value of context and feedback on the data that has been provided by the utility, adding meaning to the exercise, and acknowledging their inputs.

The Benchmarking Reports are available on the PPA website at: http://www.ppa.org.fj/publication-report/. All participants are encouraged to access and review the report.

7.4 Evaluating the Results

(i) Comparison of 2012 Results with Previous Years

Comparison of utility operations for 2012, 2011, 2010 and 2000 is presented in Table 6.2 and Table 6.1 summarises which indicators have improved, declined and remained stable. Improvements have been seen in several KPI areas: lubricating oil consumption, power station usage, distribution O&M, debtor days and lost time frequency rates lubrication oil consumption efficiency, power station (auxiliary) usage, debt to equity ratio and debtor days, indicating that effectiveness of initiatives targeting these improvements continued.

Load factor, capacity factor, specific fuel oil consumption, distribution losses, SAIFI, and operating ratio have remained fairly stable since the preceding year. However, any improvement that can be made, particularly in improving load factor and specific fuel oil consumption or reducing distribution losses, will result in ultimate savings.
Productivity (as represented by generation labour productivity), customers per distribution employee and overall labour productivity have declined further and present a priority area to focus improvement plans. Skills training and potentially remote monitoring of isolated systems could play a part. Incentivising performance with bonuses based on the utility achieving performance goals is also likely to improve output and enhance productivity.

Transformer utilisation has dropped further. This may be related to reduced demand and also low population density affecting lead times for usage of assets in terms of network extension. Due to the often prohibitive cost of replacing distribution transformers outright, correct sizing of transformers ought to be a priority when designing and installing new plant.

Declines in return on equity highlights that utilities' may be struggling to run their operations achieving a net positive result. The overall decline in the composite indicator (refer to Figure 5.36) is consistent with the overall results.

(ii) Comparing KPI Results Across Regions

As noted in Chapter 6, the CARILEC group of Caribbean countries provides the most relevant regional comparison for Pacific island power utilities. While acknowledging there are also differences, the Caribbean having higher electricity coverage overall, better maintenance budgets and higher GDPs, nonetheless, there are enough similarities to make a comparison meaningful. Comparison of Pacific with Caribbean indicators in Table 6.2 shows that the Caribbean lead the Pacific on most indictors (where indicators from benchmarking are common), though the margin is not beyond reach for the Pacific in many of the performance measures. The PPA and CARILEC already have an established relationship and share information and collaborate on areas such as benchmarking. There is a potential opportunity for the Pacific utilities to learn from the CARILEC group how they have achieved improvements in data collection, validation and interpretation and addressing of results.

7.5 Capacity Development

(i) Capacity Building

A key issue for the sustainability of benchmarking is ensuring that capacity building support provided is appropriate and adequate for the requirements of the data collection exercise and the long-term sustainability of the benchmarking process. Capacity building was a primary focus of this benchmarking round. Firstly, this involved supporting the PPA Secretariat to progress in the transition to managing the benchmarking process independent of PRIF assistance. Secondly, it involved building the capacity of Pacific power utilities to undertake data collection and validation, interpret benchmarking results and formulate and action PIPs.

(ii) Benchmarking Workshop

The Benchmarking Workshop was held on 11 July 2014, during the 23rd Annual PPA Conference in Tahiti, French Polynesia. The workshop objectives were to report on preliminary findings of the benchmarking exercise and supporting utilities in sharing information and developing PIPs. It was well attended, with 18 attendees from 14 utilities[51]. The feedback received through feedback forms attested to the positive and valuable experience of the Benchmarking Liaison Officers who highly appreciated the opportunity to attend, to further develop their skills in benchmarking, have opportunity to discuss issues with personnel from other utilities and complete activities to develop their understanding, for example in the calculation of SAIDI and SAIFI.

51 In addition to power utility staff, there were also attendees from government, regional agencies and alliance partners, totalling 22 persons.

8 RECOMMENDATIONS

- **Key areas for performance improvement include labour productivity, knowledge of outages, safety reporting, financial performance, losses and transformer utilisation.**
- **Performance-based contracts that are integrated into the Performance Improvement Plans are highly recommended.**

8.1 Data Collection

(i) Benchmark Calendar

In order to maximise the relevance of the date, as well as to avoid confusion, a benchmarking round should be collecting data of the most recent financial year of a utility. This involves catching up on one year of benchmarking data collection. The proposed schedule for the next four years of benchmarking is provided below.

Table 8.1: Benchmarking Schedule 2014 to 2017

	Start of Benchmarking Period	End of Benchmarking Period	Timing of Benchmarking Exercise	Data Collection Completed By:
Current Benchmarking Round	July 2011	Dec 2012	Nov 2013 to Aug 2014	May 2014
Next Benchmarking Round (2014)	July 2012	Dec 2013	Sept 2014 to Mar 2015	Nov 2014
2015 Benchmarking	July 2013	Dec 2014	Apr 2015 to Sept 2015	May 2015
2016 Benchmarking	July 2014	Dec 2015	Apr 2016 to Sept 2016	May 2016
2017 Benchmarking	July 2015	Dec 2016	Apr 2017 to Sept 2017	May 2017

It is recommended that the next round of benchmarking data collection commence immediately and be completed by November 2014, with the final results presented in March 2015. The following benchmarking round would then commence from April 2015 as per the schedule that was proposed last year (refer to Table 8.1). Two years of benchmarking data could potentially be presented at the next PPA conference, and further support from the PRIF Partners could span the two rounds, with data analysis commencing in January 2015 for the 2014 round and data analysis for the 2015 round taking place in June 2015, with the final report completed in September 2015.

(ii) Online Platform for Data Entry and Validation

As was noted previously, web-based implementation of benchmarking is a more effective tool for data capture, validation, presentation and reporting. Advantages include improved data quality with error checking, convenient data entry and management of time-series data, flexible and immediate feedback and reporting, multi-level security and 24/7 access. To support the long-term sustainability of the benchmarking project and facilitate PPA's management of the process moving from Excel spreadsheets submitted by email to an online platform for data entry is considered essential. This will have a significant impact in reducing the input time demands for data collection and validation, analysis and reporting as many of the functions involved can be automated.

The information provided in the Benchmarking Manual can be integrated into the online data submission platform, so that 'Quick Helps' are available at each point of the data entry, providing explanation of the data input being requested and even worked examples. With inbuilt auto-checking the software can alert the user when data entered appears problematic, and have them review the entry again. An almost instant presentation of the calculated indicators will also enhance engagement and the immediate feedback will empower management's decision making. Access to the data can also be controlled through this mechanism.

Implementation itself needs to consider hosting responsibilities, although there are many internet providers that can offer adequate service levels, both in Fiji and elsewhere. PPA has a revamped website that can in the future be used as the platform for the online data submission. The process of investigating options for hosting the online platform, developing technical specifications, and seeking estimates for hosting of the online platform should start now. This will clarify the internal resources that PPA will require for administration. For a well implemented solution the amount of management required is expected to be minimal.

8.2 Performance Improvement

(i) Performance Improvement Areas

Recommendations for performance improvement have not changed significantly from previous years. The key areas that require attention on a regional scale are low labour productivity, poor knowledge of customer outages and poor safety reporting, poor financial performance, and high losses.

Low Labour Productivity, (as represented by generation labour productivity, customers per distribution employee and overall labour productivity) is a key concern, noting that productivity has been steadily declining over the past two years. A regional program is recommended to address the issue. Recommendations echo those of the previous two benchmarking reports, which involves firstly ascertaining the reasons for poor labour productivity, whether it be poor skill level, poor management, social issues, high turn-over, low levels of automation, poor technical training or investment or other reasons.

Where outer islands are involved, the serious consideration as to what extent SCADA[52] and telecommunications can improve labour productivity needs to be investigated. As highlighted last year, technical skills of senior management teams are crucial to the success of Pacific utilities.

Poor knowledge of outages and customer experience across utilities: Though SAIDI and SAIFI data collection is improving, it remains inadequate for drawing conclusion. Continued efforts are required to develop utility understanding in how to record outages, monitor system health and track the effectiveness of staff response. This will assist decision-making on maintenance and capital works. Utilities need to track service reliability performance internally on a monthly or quarterly basis to heighten awareness on the service being delivered to the customer.

Poor safety and incident reporting continues to be an issue. Currently, the safety management systems of many utilities are immature and, in many cases, non-existent. Lost Time Injuries are not being recorded in many utilities. This is also indicative of a contributing factor to poor labour productivity with return to work not being closely managed in many cases. As emphasised by the Chairman of the PPA at the recent PPA conference, safety needs to be of utmost priority in the management of utility operations. A program to heighten awareness of the importance of safety across the region is recommended.

Poor financial performance: Indicators such as operating ratio show that approximately half of the utilities are struggling to achieve a positive return. Tariff setting continues to be at odds with the cost for producing electricity in many cases, that is, it is not sufficient to cover costs. Improvements in operational efficiencies and labour productivity will improve the situation. It is hoped the benchmarking reports will help to raise understanding and awareness of the impact low tariff setting has on power utility operations and, ultimately, the quality of service provided in the country.

High losses: Despite remaining stable, distribution losses are high at 14% and network delivery losses of 14% also are high. Reduction in losses will result in direct savings and will have a direct impact on the ‘bottom line’ for a utility. Technical losses normally require changes to asset design or operation, or replacement of major infrastructure. Non-technical loss reductions are often easier to manage through addressing metering issues and customer behaviour.

Transformer utilisation has dropped further from the 2012 benchmarking round and the Pacific average is at 16%. This may be related to reduced generation demand. Due to the often prohibitive cost of replacing distribution transformers, correct sizing of transformers ought to be a priority when designing and installing new plant.

52 Supervisory control and data acquisition

(ii) Performance Improvement Plans

The Pacific power utilities have become familiar with the concept of developing PIPs through the benchmarking project site visits and workshops over the past three years. Benchmarking Liaison Officers presented at the 2014 workshop on areas that had been identified for improvement within their utility and how the improvements are being pursued and, for some of them, results already being realised.

Utility CEOs are encouraged to review the benchmarking results and adopt PIPs for their utilities that address their priority areas.

(iii) Performance Based Contracts and Bonuses

Performance-based contracting is recommended as a means for unifying utility staff and driving performance through incentivised reward structure. Performance-based contracts have the following elements:

- a clear set of objectives and indicators
- systematic efforts to collect data on the progress of the selected indicators, and
- consequences, either rewards or sanctions for the contractor, that are based on performance.[53]

Performance-based contracts are powerful for integrating the PIP into the focus and output of utility staff. In organisations that have implemented performance-based contracts, such as FEA, the results have been markedly positive.

8.3 Knowledge Sharing

There is opportunity for utilities to assist each other through the sharing of tools and processes for adoption in other Pacific nations as comfort level increase in the sharing of data.

(i) Communities of Practice and Webinars

The annual PPA Conference provides opportunity for CEOs and Benchmarking Liaison Officers and other participants to discuss progress, share ideas and seek input from others with specific problem areas in their utility performance. Observation and feedback from the Benchmarking Workshop showed that participants valued the networking opportunity afforded by the meeting. They shared information about areas where progress had been made in their utilities and asked for input to specific areas that were yet to be resolved. Utilities vary in their progress in benchmarking and performance in different KPI areas.

The development of an online Community of Practice (CoP) will facilitate the continuation of this collaboration. A CoP will provide CEOs opportunity to discuss managerial issues of benchmarking and for Benchmarking Liaison Officers and other staff involved in providing data for the benchmarking exercise to ask questions, share experiences and resources. Following on, the communities of practice could be used to organise online forums or 'webinars' (seminars using the internet, including video conferencing or presentation delivery) or other web-based training for those utilities with good internet connectivity.

(ii) Learning from Caribbean Region

The Caribbean region has the greatest level of similarity to the Pacific through the commonly-shared challenges of remote, small island communities, highly dependent on imported petroleum for electricity production. The CARILEC utilities have the benefit of over 10 years of benchmarking experience, having started the benchmarking exercise and continuing it annually since 2002. CARILEC lead the Pacific in most indicators; however, the margin is not excessive.

There exists potential to learn from the Caribbean utilities how they have been able to achieve improvements to both benchmarking process and utility performance. A research assignment to determine if there is sufficient material and value to develop a publication of case studies is recommended as a means of sharing the experience of the two groups. Inviting key people from the CARILEC to be a part of the communities of practice is another way recommended to increase knowledge sharing between the two regions.

53 *Performance-Based Contracting for Health Services in Developing Countries: A Toolkit*, World Bank, 2008, p. 9.

(iii) Benchmarking Liaison Officers Exchange

A challenge faced by many small Pacific Island countries is that there is a small pool of adequately-qualified people to assume technical and managerial roles in the power utilities. The strategy to appoint a Benchmarking Liaison Officer to coordinate data inputs at each utility has been effective in strengthening engagement of the utilities. The Benchmarking Liaison Officers are afforded opportunity to attend the Benchmarking Workshop and participate in capacity development initiatives. One issue, however, is the retention of Benchmarking Liaison Officers. Often, training and skills development opens more growth opportunities abroad. A program of professional development, involving the clear creation of a career path for Benchmarking Liaison Officers, and involving exchange or secondment to other utilities to learn new methods of doing things is recommended to help develop and retain Benchmarking Liaison Officers from the different utilities.

8.4 Capacity Building

(i) Benchmarking Training and Workshops

For the past three years, the Benchmarking Workshop has focused on developing the skills of Benchmarking Liaison Officers in benchmarking. The feedback received is that the workshops are a positive learning experience for the attendees and, though progress is gradual, advancement can be observed through more comprehensive responses to benchmarking questionnaires and clear performance progress of some utilities. For future workshops it is recommended to schedule more of the time for guided discussion on topics of interest to the participants.

At the PPA Conference, the CEOs indicated that training is needed in how to interpret benchmarking results, develop a response/business case, and carry out appropriate action (including applying for loans or funding). This represents a maturing in the stage of benchmarking in the Pacific and is a positive step towards utility ownership of the benchmarking results and exercise. Supporting this training initiative is highly recommended.

(ii) Mentoring

There is a range of progress that is observed among the utilities in both data collection and reporting processes and in the application of benchmarking results for performance improvement. The dynamic exchange between CEOs and between Benchmarking Liaison Officers demonstrates the benefit that the utilities can provide to each other by sharing what has worked for them. It is recommended that the PPA establish a mentoring programme between utilities to “tap into” the experience of utilities in the area of benchmarking. The PPA Secretariat could help to identify suitable mentor - mentee relationships, for utilities that are eager to participate, provide some guidelines for mentoring and establish the connections. Maintaining the relationship will then become the responsibility of the mentor - mentee pair, with the mentee encouraged to initiate discussions with the mentor.

APPENDICES

Appendix A: PPA Member Utilities in 2015

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YAP STATE PUBLIC SERVICE CORPORATION P O Box 667, Colonia, Yap, FSM Tel: + (691) 350 4427 Fax: + (691) 350 4518 (Power plant) Email: sapthiy@gmail.com CEO: Mr. Faustino Yangmog	

Updated 10 June 2015

Appendix B: Governance Responses

Table B.1: Governance Responses

Utility	Board Composition				Conflict of Interest		Commercial Mandate	
	How are Directors appointed	Are Ministers or public servants appointed to the Board?	If so, is the Minister and/or public servant representing the line/sector ministry?	Is the CEO of the utility or other senior management on the Board?	Conflict of interest policy and a code of conduct?	Is it fully implemented?	Clearly defined commercial mandate?	Is it fully impleme-nted?
ASPA	5 Directors, appointed by Governor, confirmed by legislature	No	No	No	Yes	Yes	No, it is a non-profit and revenue goes back to the service	NA
CPUC	Recommendations put forward by state Governor to be approved by state legislature.	May be appointed but at present are not	No	CEO ex-officio member	Yes	Yes	Yes	Yes
EDT (Tahiti)	Members of the Board nominated by the shareholders of the utility company which is a private company affiliated to GDF-SUEZ group	Yes	Yes, but no voting rights	Yes, CEO and senior managers	Yes	Yes	Current concession agreement does not have commercial KPIs	NA
EEC	Board is composed of shareholder or person representing shareholder, senior management and CEO	No	NA	CEO is President of the Board	Yes	Yes	Concession contract - renumerated on a rate applied to the net value of its investments	NA
EPC	7 Board members selected by independent committee appointed by Cabinet - Positions advertised, shortlist best candidates and make recommendation to Cabinet	Yes	Yes	GM, MoF representative and Board Secretary are ex-officio members	Yes	Yes	Yes	
FEA	Ministry of Public enterprises makes appointments upon recommendations from the line Ministry	No	Permanent Secretary of the Ministry of Finance is ex-offico member	CEO is ex-officio member	Yes	Yes	Yes	Yes
GPA	5 Commissioners elected by voters of Guam in a General Election	No	na	No	Yes	Yes	No	NA
KUA	5 members; 4 represent different municipalities of Kosrae - State Governor appoints, and confirmed by state legislature	No, Director of DCTI was ex-offico appointment but ammended	No	CEO not a member but attends Board meetings	Yes	Yes	Commercial practices within KUA policies - law states not a profit-making operation - current rates do not cover investments or improvements	NA
KAJUR	Nominated by Cabinet and appointed by the President	Minister of Public works chairs the Board	Yes	Yes, but no voting rights	No	na	No	NA
MEC	Cabinet appoint Board of Directors	Yes	Yes	No	Board Governance Manual developed	Not yet effectively implemented	Utility operates as an essential service provided by the Government	NA
PUB	List of appointees reviewed by SOEMAU - Criteria were approved last year - Appointed by Ministers of MoF and MPWU with guidance from SOEMAU governed by SOE Act recently enacted May 2013	No	NA	CEO is Secretary of the Board - no other senior management on Board	Yes	Yes	Yes	No
PUC	Governor appoints with advice and consent of state legislature	4 public sector, 3 private	Unspecified	No	Yes	Yes	Yes	Yes

Utility	Board Composition				Conflict of Interest		Commercial Mandate	
	How are Directors appointed	Are Ministers or public servants appointed to the Board?	If so, is the Minister and/or public servant representing the line/sector Ministry?	Is the CEO of the utility or other senior management on the Board?	Is there a policy on Conflict of Interest and a Code of Conduct?	Are they fully implemented?	Is there a clearly-defined commercial mandate?	Is it fully impleme-nted?
TAU	Directors are appointed via Cook Islands Investment Corporation (CIIC) and Government	Yes, ex-officio. Currently Minister of Energy.	Yes	CEO ex-officio member	Yes	Yes	Yes	Yes
TEC	Positions advertised, Cabinet make appointment of Directors - appointed for 2 years	No public servants	NA	CEO is secretary of the Board	Yes	No, yet to be implemented	Yes	No
TPL	Positions are advertised, and recruited - Ministry also has a list of potential candidates - Minister selects candidate, 3 year term - recommendations are approved by the Cabinet	Not more than 1 public servant, no Ministers	Unspecified	Unspecified	Yes	Yes	Yes	Yes
UNELCO	Directors appointed by shareholders	Yes	Yes, but no voting rights	Yes, CEO and senior managers	Yes	Yes	Yes	Yes
YSPSC	Governor appoints with advice and consent of state legislature	None currently on Board but can be appointed by the Governor with the consent of the legislature	Yes	No	Yes	Yes	No	NA

Table B.2: Governance Responses (Cont.)

Utility	CEO Performance		Planning		Audit		Annual Reports			
	Is the CEO on a performance-based contract?	How often is it reviewed?	Does the Board develop a forward looking plan, with financial operational and capital expenditure project?	What period does it cover?	Does the company have an Internal Auditor?	Does Internal Auditor report directly to the Board or through CEO?	Is an audited Annual Report published?	Is it produced within three months after end of financial year?	Does it report on progress against the targets in the Business Plan?	Is the Annual Report publically available?
ASPA	Yes, 2 year contract	Annually	Yes, bi-annually	2 years	No, external auditor	NA	Yes	No, 6 months	NA	Yes
CPUC	No	Annually	Yes, annually	5 years	No, CFO fulfils this role	Reports through CEO but can be approached by Board	Yes	No, 9 months	Yes	Yes
EDT (Tahiti)	Yes	Bi-annually	Yes, bi-annually	5 years	Yes	To administration and financial department, VP and also to the CEO depending on subject	Yes	Yes	Yes	Yes
EEC	Yes	Annually	Yes	4 years updated yearly	Yes	Through CEO	Yes	No, 6 months	Unspecified	Yes
EPC	Yes, 3 year contract	Annually	Yes, annually	3 years	Yes	Direct to Audit Committee	Yes	Yes	Yes	Yes
FEA	Yes	Annually	Yes, annually	3 years	Yes	Administratively reports to CEO, but functionally to the Board	Yes	Yes for draft. Final within 5 months	Yes	Yes
GPA	Not contractual	Annually	Yes, annually	5 years	Yes	To Board	Yes	No, 6-8 months	No, but included in quarterly reports	Yes
KUA	Yes	Annually	Yes, annually	5 years	N, internal financial controller, and external auditor	NA	Yes	Yes	Yes	Yes
KAJUR	No	NA, 3 year contract	No		Yes	To CEO	Yes	No	No	Yes
MEC	Yes, 5 year contract	Annually	Yes	5 years	Yes	To Board of Directors	Yes	Yes	Yes	Yes
PUB	Yes but could be more strict	Annually	Yes	3 years	No	NA	Yes	Yes	No	Yes
PUC	Yes	Annually	Yes, but not up-to-date		No	NA	Yes	From 6 to 9 months	n/a	Yes
SIEA	Yes	3 Years	Yes, annually	3-5 years	Yes	Through CEO, or direct if required	Yes	Yes	Yes	Yes
TAU	Yes	Annually	Yes	5 years	Yes	Through CEO	Yes	Yes	Yes	Yes
TEC	Yes, but needs strngthening	Annually	Yes	3 years	No	NA	yes	4 months	Reports only on progress	Yes
TPL	Yes	Annually	Yes	7 years / 10 year forecast	Internal compliance dept	Through CEO	Yes	Yes	For shareholder, a 6 monthly performance report. For the regulator, an Annual Report, not published.	Yes
UNELCO	Yes	Annually	Yes, annually	5 years	Yes	To Board of Directors	Yes	Yes	Yes	Yes, upon request
YSPSC	No	NA	Yes	Fiscal year planning	Yes	Through CEO	Yes	Yes	Yes	Yes

Appendix C: Gender Responses

Table C.1: Employee Gender Composition

Utilities	1st in Charge (CEO/GM etc.) Male/Female	2nd in Charge (Assistant GM, Deputy etc.) Male/Female	No. of Senior Staff Reporting Directly to CEO			No. of Roles Held by Female Senior Staff Reporting Directly to CEO						'Other' (Description)
			TOTAL	Male	Female	Finance	Procurement/ Supply	Human Resources	Customer Service/PR/ Comms.	Admin	Other	
ASPA	M	M	21	11	10	1	1	0	1	1	1	Financial Strategist
CPUC	M	M	3	3	0							
FEA	M	N/A	13	9	4	0	0	0	1	1	2	Other SBA's CEO, Commercial, Customer Services, Finance, Human Resources, ICT, Major Projects & System Planning & Control
KUA	M	VACANT	5	5	0	1	1	0	0	0	0	Operation Manager
NUC	M		6	5	1	0	0	1	0	0	0	HR and Admin (same person)
PPL	M	M	13	12	1	0	0	0	0	0	1	
PPUC	M	N/A	7	5	2	1					1	Business Office
PUC	M	3M's & 1F	4	3	1	0	0	0	0	1		
TAU	M	N/A	6	4	2	1		1				
TEC	M	M	5	4	1	1						
TPL	M	M	9	8	1	1		1	1			
UNELCO	M		8	5	3				1	2		
YSPSC	M	M	7	5	2	1					1	Executive Secretary

Utilities	Total Number of Staff			Total Number of Technical Staff (Gen, Transm, Dist Depts)			PA / Secretary (M/F)	Comments
	Total	M	F	Total	M	F		
ASPA	487	385	102	120	112	8	F	ASPA, a Multi-function Utility (Electric,Water,WasteWater and Solid Waste)
CPUC	65	58	7	37	37	0	F	
FEA	381	292	89	321	314	7	F	702 excluding 9 EMG
KUA	13	13	0	2	2	0		
NUC	132	103	29	102	94	8	F	Female technical staff undertake adminstrative work, as well as normal technical duties; although only 2 or 3 actually do technical work.
PPL	1530	1282	248	1165	1050	115	F	Information extracted from Establishment Report dated 23.05.2014
PPUC	241	29	212	186	186		F	186 Technical staff include Water & Wastewater Operators, Plumbers, and Mechanical, Electrical and Civil Engineers
PUC	129	119	10	93	93	0	F	
TAU	50	38	12	31	29	2	F	
TEC	49	43	6	16	16	0	nil	
TPL	161	125	36	58	54	4	F	
UNELCO	106	76	30	53	50	3	F	
YSPSC	67	60	7	45	44	1	M	These figures do not account for personnel in the Water Dept.

Appendix D: Data Reliability Self-Assessment Responses

Table D.1: Data Reliability Self-Assessment Responses 2012

Utility	ASPA	CPUC	CUC	EDT	EEC	EPC	FEA	GPA	KAJUR	KUA	MEC	NUC	PPUC	PUB	PUC	SIEA	TAU	TEC	TPL	UNELCO	YSPSC
Key Data Component	American Samoa	Chuuk FSM	Saipan CNMI	Tahiti	New Caledonia	Samoa	Fiji	Guam	Ebeye RMI	Kosrae FSM	Majuro RMI	Nauru	Palau	Kiribati	Pohnpei FSM	Solomon Islands	Cook Islands	Tuvalu	Tonga	Vanuatu	Yap FSM
Fuel Consumption	A	B	B	B	A	B	A	A	B	B	B	C	B	C	B	B	A	A	A	A	B
Generation Quantities	A	B	B	B	A	B	A	A	B	B	B	C	B	C	B	B	A	A	A	A	B
Customer Outage Impacts	B	C	B	B	A	B	A	A	C	B	C	D	B	C	D	B	A	B	B	B	B
Network Demand & Capacity	A	B	B	B	A	B	B	B	A	C	B	C	B	B	D	C	A	B	B	B	B
No of Customers & Connections	A	A	A	A	A	B	A	A	B	B	A	B	B	A	B	B	A	A	A	A	A
Financial Information Sources	A	A	A	A	A	A	A	A	B	A	A	C		A	A	A	A	A	A	A	B
OVERALL	A	B	B	B	A	B	A	A	B	B	B	C	B	B	C	B	A	A	A	A	B

Appendix E: KPI Calculations

Table E.1: Key Performance Indicators 2012[1]

	KPIs	Definition	Main Grid / All Grids
	Generation		
1	Load Factor (%)	Gross Generation (MWh) * 100 Maximum Demand (MW) * 8,760h	Main
2	Capacity Factor (%)	Gross Generation (MWh) * 100 Total Installed Generation Capacity (MW) * 8,760h	Main
3	Availability Factor (%)	Total Installed Gen Capacity * 8,760h - Total Capacity Out Of Service (MWh) * 100 Total Installed Generation Capacity (MW) * 8,760h	Main
4	Generation Labour Productivity (GWh/FTE generation employee)	Total Utility Generation (MWh) / 1000 Number of FTE Generation Employees	Main
5	Specific Fuel Oil Consumption (kWh / litre)	Total Fuel Oil Generation (kWh) Total Fuel Usage (L)	Main
6	*Specific Fuel Oil Consumption (kWh / kg)	Total Fuel Oil Generation (kWh) Total Fuel Usage (kg)	Main
7	Lube Oil Consumption (kWh / litre)	Total Fuel Oil Generation (kWh) Total Lubricants Used in Generation (L)	Main
8	Forced Outage (%)	MWh out of service due to forced outages and derated events * 100 Total Installed System Generation Capacity * 8,760h	Main
9	Planned Outage (%)	MWh out of service due to planned outages events * 100 Total Installed System Generation Capacity * 8,760h	Main
10	O&M Cost (USD / MWh)	Total Generation Operation and Maintenance Costs (USD) Total Utility Generation (MWh)	All
11	Power Station Usage (%)	Power Station Usage (Station Auxiliaries) (MWh) * 100 Total Utility Generation (MWh)	Main
12	IPP Energy Generation (%)	Total IPP Generation Purchased (MWh) * 100 Gross Generation	Main
13	Renewable Energy to Grid (%)	Total Renewable Energy Generation (MWh) * 100 Gross Generation (MWh)	Main and All
	Transmission**		
14	Transmission Losses (%)	[Net Generation (MWh) - Electricity Delivered to Dist Network (MWh)] * 100 Net Generation (MWh)	Main
15	Transmission Reliability (Outages / 100km)	Number of Transmission Outage Events (events) * 100 Length of Transmission (km)	Main
16	*Transmission SAIDI; Unplanned, Planned (min/customer)	Total Customer Interruption Duration Interrupted (cust mins) Average Number of Customer Connections	Main
17	*Transmission SAIFI; Unplanned, Planned (events/customer)	Total Customer Interruptions (mins) Average Number of Customer Connections	Main

[1] Net Generation = Gross Generation - Power Station Usage.

	Distribution		
18	**Network Delivery Losses (%)**	[Net Generation (MWh) - Electricity Sold (MWh)] * 100 / Net Generation (MWh)	Main
19	**Distribution Losses (%)**	[Electricity Delivered to Dist Network (MWh) - Electricity Sold (MWh)] * 100 / Electricity Delivered to Distribution Network (MWh)	Main
20	**Distribution Transformer Utilisation (%)**	Electricity Sold (MWh) * 100 / Total Distribution transformer Capacity (MVA)	Main
21	**Distribution Reliability (events per 100 km of dist line)**	Number of Distribution Forced Outage Events * 100 / Length of Distribution Line (km)	Main
22	**Customers per Distribution Employee**	Average Number of Customer Connections / Average Number of Distribution and Customer Service Employees	Main
	SAIDI and SAIFI		
23	**Total Interruption Duration SAIDI (min per customer)**	Sum of Generation, Transmission and Distribution SAIDI	Main
24	**Total Interruption Frequency SAIFI (events per customer)**	Sum of Generation, Transmission and Distribution SAIFI	Main
	Demand Side Management (DSM)		
25	**Actively Engaged in DSM (Y/N)**		All
26	**Staff Assigned to DSM**	Number of Staff	All
27	**Budget for DSM (USD)**		All
28	**DSM MWh Saving**		All
	Corporate / Financial		
32	**Tariff Analysis - Domestic 50kWh**	Based on tariff schedules	-
33	**Tariff Analysis - Domestic 200kWh**	Based on tariff schedules	-
34	**Tariff Analysis - Commercial 1000kWh**	Based on tariff schedules	-
35	**Average Supply Costs (USD / MWh)**	Total Operating Expenses (USD) / Electricity Sold (MWh)	All
36	**Utility Cost Breakdown (%)**	Proportionate Costs (%)	All
37	**Operating Ratio (%)**	(Total Operating Expenses + Total Depreciation) * 100 / Total Operating Revenue	All
38	**Debt to Equity Ratio (%)**	Long Term Debt (Non-Current Liability) * 100 / Equity + Long Term Debt (Non-Current Depreciation)	All
39	**Rate of Return on Assets (%)**	Earnings Before Interest and Tax (Operating Profit) * 100 / Average Non-Current Assets	All
40	**Return on Equity (%)**	Profit After Tax (Earnings After Tax) * 100 / Equity	All
41	**Current Ratio**	Current Assets * 100 / Current Liabilities	All
42	**Debtor Days (days)**	Debtors (Receivables at Period End) / Total Operating Revenue	All
	Safety and Human Resources		
43	**Lost Time Injury Duration Rate (days per FTE employee)**	Total Days Lost to Work During Period (days) / Total Number of Employees	All
44	**Lost Time Injury Frequency Rate (number of incidents per million hours)**	Number of Lost Time Injuries During Period (LTIs) * 1 000 000 h / Total Hours Worked (Hours)	All
45	**Labour Productivity (customers per employee)**	Average Number of Customers (customers) * 100 / FTE Utility	All
	Composite Indicator		
46	**Composite**	Equal proportions (Fuel Oil Consumption (kWh/litre) / Capacity Factor / Network Delivery Losses / Overall Labour Productivity)	Combined

* New KPIs

Appendix F: Data Tables

Table F.1: KPIs 2012 (Generation)

Utility	1	2	3	4	5	6	7	8	9	10	11	12	13
	Load Factor	Capacity Factor	Availability Factor	Generation Labour Productivity	Specific Fuel Oil Consumption (volume)	Specific Fuel Oil Consumption (weight)	Lube Oil Consumption	Forced Outage	Planned Outage	Generation O&M Costs	Power Station Usage	RE to Grid	IPP Energy Generation
	%	%	%	GWh/FTE gen employee	kWh/L	kWh/kg	kWh/L	%	%	US$/MWh	%	%	%
ASPA	79.70	43.59	99.64	2.16	3.73	4.44	1099	0.36	0.00	20.93	4.95	0.69	
CPUC	59.62	42.59	96.44	n.a	3.68	4.39	1859	2.64	0.92	12.85	0.37	0.00	
CUC	74.97	27.67	75.56	2.54	3.75	4.46	372			37.81	6.74	0.00	17.85
EDT	64.79	29.48	80.27	5.02	4.65	4.77	1220	11.54	8.20	103.14	2.20	31.68	1.45
EEC	59.20	40.80	99.99	9.84	3.74	4.36	1147	0.00	0.00	36.92	1.90	4.83	95.16
EPC	64.62	35.46	100.00	0.50	3.80	4.53	1329	0.00	0.00	49.08	1.42		
FEA	62.17	36.50	100.00	0.61	4.83	4.83	639	0.00	0.00	11.25	0.96	67.10	1.93
GPA	78.82	28.92	73.97	4.21	4.14	4.60	2205	3.45	22.58	33.86	8.78	0.00	37.49
KAJUR	84.50	43.80	99.79	0.52	4.02	4.46	1349	0.21	0.00	90.62	4.96	0.00	
KUA	54.84	11.41	99.95	0.73	3.58	4.26	873	0.03	0.02	70.52	1.21	0.00	
MEC	80.53	34.20	100.00	1.24	4.05	4.82	709	0.00	0.00	47.33	7.00	0.28	
NUC	72.01	56.63	77.61	n.a	3.54	4.21	782	21.87	0.51	9.48	1.78	0.23	
PPUC	73.07	33.56	99.48	1.03	3.92	4.66	1006	0.00	0.52	41.44	6.10	0.39	
PUB	53.09	47.25	99.54	0.64	3.81	4.54	2001	0.46	0.00	52.74	4.68	0.00	0.00
PUC	62.46	42.19	67.06	1.34	3.23	3.85	270	32.30	0.64	20.39	5.65	0.00	
SIEA	60.62	35.52	100.00	0.93	3.82	4.55	984			85.65	3.55	0.00	
TAU	71.97	33.48	72.68	1.55	3.78	4.50	667	18.31	9.00	33.52	2.00	1.10	0.00
TEC	64.23	33.18	99.93	0.37	3.72	4.43	2125	0.07	0.00	79.48	2.92	0.90	
TPL	67.34	45.90	99.82	1.47	4.08	4.86	963	0.16	0.02	30.74	2.68	0.00	
UNELCO	60.15	32.66	96.46	1.94	3.94	4.66	903	1.07	2.47	39.54	2.61	13.75	
YSPSC	66.99	18.57	99.88	0.73	3.81	4.54	520	0.08	0.04	78.36	0.01	0.00	

Table F.2: KPIs 2012 (Generation, Distribution)

Utility	13a	13b	13c	13d	13e	14	18	19	20	21	22	23
	Distillate Generation	Heavy Fuel Oil Generation	Biofuel Generation	Mixed Fuel Generation	LNG Generation	Enabling Framework for Private Sector	Network Delivery Losses	Distribution Losses	Customers per Distribution Employees	Distribution Reliability	Distribution Transformer Utilisation	Distribution O&M Cost
	%	%	%	%	%							
ASPA	99.3	0.0	0.0	0.0	0.0	No	8.44	8.4	204	17.5	21.2	9,410
CPUC	100.0	0.0	0.0	0.0	0.0	Yes	28.07	28.1	100	618.3	8.2	3,813
CUC	100.0	0.0	0.0	0.0	0.0	Yes	16.05	14.2	262	10.9	17.7	5,171
EDT	0.3	68.0	0.0	0.0	0.0	Yes	7.52	6.0	386	2.6	14.7	15,506
EEC	0.0	0.0	0.0	0.0	0.0	Yes	4.9	4.9	234	11.0	15.8	11,297
EPC	63.5	0.0	0.0	0.0	0.0	Yes	15.26	15.3	206	8.6	9.2	23,267
FEA	13.4	16.8	0.0	0.0	0.0	Yes	3.95	10.2	408	24.7	19.9	3,062
GPA	1.7	98.3	0.0	0.0	0.0		7.14	7.0	283	23.0	19.9	19,561
KAJUR	0.0	100.0	0.0	0.0	0.0	No	21.88	21.9	161	28.2	19.4	7,774
KUA	115.6	0.0	0.0	0.0	0.0	No	1.82	1.8	169	33.1	6.4	3,640
MEC	99.7	0.0	0.0	0.0	0.0	No	23.66	23.7	82	27.8	17.3	26,818
NUC	99.8	0.0	0.0	0.0	0.0	No	28.75	28.7	155	0.0	10.2	6,003
PPUC	100.0	0.0	0.0	0.0	0.0	Yes	11.52	11.5	269	25.3	13.2	5,078
PUB	100.0	0.0	0.0	0.0	0.0	No	12.71	12.7	440	393.1	22.4	4,703
PUC	100.0	0.0	0.0	0.0	0.0	No	18.96	19.0	125	4.7	32.2	2,009
SIEA	100.0	0.0	0.0	0.0	0.0	No	12.01	12.0	351	2.4	10.8	79
TAU	100.0	0.0	0.0	0.0	0.0	Yes	7.53	7.5	97	2.4	19.7	5,977
TEC	99.1	0.0	0.0	0.0	0.0	Yes	20.56	20.6	565	26.9	14.1	394,689
TPL	100.0	0.0	0.0	0.0	0.0	Yes	12.24	12.2	236	58.3	16.1	15,542
UNELCO	86.3	0.0	4.8	0.0	0.0	Yes	4.93	4.9	309	2.6	18.8	1,578
YSPSC	100.0	0.0	0.0	0.0	0.0	No	25.09	25.1	119	31.8	7.9	2,961

Table F.3: KPIs 2012 (Generation and Distribution, SAIDI & SAIFI)

Utility	24a	24b	25a	25b	25c	25d	25e	25f	25g	25h	25i	25j	25k
	Dist Related SAIDI (Unplanned)	Dist Related SAIDI (Planned)	Dist SAIFI (Total)	Dist Related SAIFI (Unplanned)	Dist Related SAIFI (Planned)	Gen SAIDI (Total)	Gen Related SAIDI (Unplanned)	Gen Related SAIDI (Planned)	Gen SAIFI (Total)	Gen Related SAIFI (Unplanned)	Gen Related SAIFI (Planned)	Total SAIDI (Gen and Dist)	Total SAIFI (Gen and Dist)
	mins per customer	mins per customer	events per customer	events per customer	events per customer	mins per customer	mins per customer	mins per customer	events per customer	events per customer	events per customer	mins per customer	events per customer
ASPA	62	5	2.8	2.7	0.0	21	21	0	1.6	1.6	0.0	88	4.4
CPUC	10860	19740	0.0	0.0	0.0	47520	40440	7080	0.0	0.0	0.0	78120	0.0
CUC	283	209	8.2	4.4	3.7	53	53	0	2.4	2.4	0.0	545	10.5
EDT	82	372	0.0	0.0	0.0	10	10	0	0.9	0.9	0.0	464	0.9
EEC	137	93				78	60	18				308	0.0
EPC	315	279	7.3	6.1	1.2	197	197	0	2.9	2.9	0.0	791	10.2
FEA	2110	478	492.4	14.8	477.6	65	65	0	3.8	3.8	0.0	2652	496.2
GPA	101	3	4.8	4.7	0.1	68	68	0	10.0	10.0	0.0	172	14.8
KAJUR	87	7	4.4	4.3	0.1	857	845	12	31.2	30.7	0.5	951	35.5
KUA	699	115	9.3	7.8	1.4	31	31	0		0.6		845	
MEC	3175	707	5.1	4.4	0.7	10002	9884	119	6.8	6.1	0.7	13884	11.9
NUC	0	0	0.0	0.0	0.0	0	0	0	0.0	0.0	0.0	0	0.0
PPUC	0	0	0.0	0.0	0.0	0	0	0	0.0	0.0	0.0	0	0.0
PUB	0	0	0.0	0.0	0.0	0	0	0	0.0	0.0	0.0	0	0.0
PUC	0	0	0.0	0.0	0.0	0	0	0	0.0	0.0	0.0	0	0.0
SIEA	453	48	16.4	12.7	3.7	1289	1265	24	34.3	31.5	2.9	1789	50.7
TAU	0	0	0.2	0.2	0.0	0	0	0	0.9	0.9	0.0	0	1.1
TEC	0	0	0.0	0.0	0.0	0	0	0	0.0	0.0	0.0	0	0.0
TPL	0	0	0.0	0.0	0.0	0	0	0	0.0	0.0	0.0	0	0.0
UNELCO	51	266	5.2	2.2	3.0	158	124	34	5.7	4.7	1.0	475	10.9
YSPSC	312	5	1.6	1.5	0.1	17388	16847	540	15.1	14.1	1.0	17704	16.7

Table F.4: KPIs 2012 (DSM, HR and Safety, Customer)

Utility	26	27	28	29	30	31	32	33	34	35	36a	36b	36c	36d	36e	37	38
	DSM Initiatives	DSM Budget	DSM FTE Empl	DSM MWh Savings	Power Quality Standards	Lost Time Injury Duration	Lost Time Injury Freq Rate	Labour Productivity	Service Coverage	Productive Electricity Usage	Lifeline Tariff Usage	Domestic Usage	Commercial Usage	Industrial Usage	Other Usage	Customer Unbilled Electricity	Self-Regulated or Externally Regulated
		USD	FTE empl	MWh		days	injuries per million hrs worked	customers/ FTE empl	%	%	%	%	%	%	%	%	self / ext
ASPA	No		0	0	NEC,NESC,RUS	0.09	29.6	102	97.8	70.3	0.0	29.7	28.2	16.3	25.9	0.0	self
CPUC	Yes		0	No	USA NEC50	0.30	102.9	26	79.6	72.5	0.0	22.6	54.3	0.0	18.2	4.9	self / ext
CUC	Yes		0	n.a.	US			121	64.6	96.5	0.6	25.6	73.8		22.7	2.9	ext
EDT	Yes	9,810	0	Yes	None	0.58	8.6		98.2	64.7	8.3	27.0	17.7	46.9	0.0	0.0	ext
EEC	Yes	109,000	0	0	EN50160	0.17	7.0	896	62.7	63.9	0.0	36.1	25.8	38.1	0.0	1.4	ext
EPC	Yes		0	No	AS/NZ 3000/2007	0.17	3.7	34	97.0	71.0	0.0	29.0	43.5	6.0	21.5	0.0	ext
FEA	Yes	84,330	0	0	FEA Grid Code under AS	0.12	8.2		82.1	72.5	1.8	27.5	44.6	26.2	1.7	0.0	self
GPA	Yes		0	No	US Standard	0.15	10.4	76	100.0	69.9	12.6	16.7	35.9	22.0	12.0	0.7	ext
KAJUR	No							29	102.8	49.6	0.0	50.4	31.0	0.0	18.6	9.3	ext
KUA	Yes		0	0	0.00	0.00	0.0	86	76.6	33.9	39.3	0.0	27.3	6.5	0.0	29.2	self
MEC	No		0	n.a	No	0.02	2.3	36	41.5	63.8	10.3	36.2	42.7	0.0	21.1	30.5	self
NUC	Yes		0	0	None	0.00	n.a	46	100.0	47.6	0.0	52.4	35.6	4.9	7.1	3.2	self
PPUC	Yes		0	0	US AND JAPAN	0.00	0.0	55	95.0	70.8	0.0	29.2	39.1	31.7	0.0	3.2	self
PUB	No		0	0	0.00	0.00	0.0	n.a	40.7	84.4	0.0	49.7	16.1	34.1	34.1	14.6	ext
PUC	No		0	0	NONE	0.00	0.0	42	96.0	43.8	0.0	56.2	23.6	0.0	20.2	2.9	ext
SIEA	No		0	0	none	0.21	30.9	89	12.0	69578.3	0.0	?	?	?	?	4.2	self
TAU	Yes	112,714	0	577	NZ Standard	0.00	0.0	100	99.9	67.7	9.5	22.6	39.3	28.3	0.0	2.6	self
TEC	Yes		0	No	AS and NZS	0.00	0.0		120.1	58.3	0.0	40.8	33.2	25.1	0.0	13.7	self
TPL	Yes		0	0	0.00	0.14	5.5	102	113.5	39.3	0.0	60.4	39.3	0.0	0.0	0.0	ext
UNELCO	No		0	0	Concession contract	0.00	0.0	118	21.6	66.7	6.7	26.6	24.3	42.0	0.4	1.1	ext
YSPSC	No		0	0	NEC	0.03	7.6	25	57.1	72.3	6.8	25.6	45.4	0.0	27.0	7.8	self

Table F.5: KPIs 2012 (Transmission)

Utility	15	16	17a	17b	17c	17d	17e	17f		
	Transmission Losses	Transmission Reliability	Trans SAIDI (planned)	Trans SAIDI (unplanned)	Trans SAIDI Total	Trans SAIFI (unplanned)	Trans SAIFI (planned)	Trans. SAIFI Total	Total SAIDI (Gen Dist Tran)	Total SAIFI (Gen Dist Tran)
	%	outage/s100km	min per cust	min per cust	min per cust	events/cust	events/cust	events/cust	min per cust	events per cust
EDT	1.6	2.3	97.1	0.0	97.1	1.6	0.0	1.6	561.2	2.5
FEA	?	15.9	0.0	0.0	0.0	6.3	0.0	6.3	2651.8	502.5
GPA	0.2	16.3	60.9	0.0	60.9	2.3	0.0	2.3	232.7	17.1

Table F.6: KPIs 2012 (Financial and Utility Cost Breakdown)

Utility	Financial							Utility Cost Breakdown											
	39	40	41	42	43	44	45	46.1	46.2	46.3	46.4	46.5	46.6	46.7	46.8	46.9	46.1	46.11	46.12
	Operating Ratio	Debt to Equity Ratio	Rate of Return on Assets	Return on Equity	Current Ratio	Debtor Days	Average Supply Cost	Fuel and Lube Oil	Fuel Duty	Gen O&M	Gen Labour	Gen Deprec	T&D O&M	T&D Labour	T&D Deprec	Other O/Hs	Other Deprec	Other Taxes	Other Misc
		%	%	%		days	USc/kWh	%	%	%	%	%	%	%	%	%	%	%	%
ASPA	102.4	2.7	3.5	3.3	280.9	45.8	38.8	71.7	0.7	4.3	1.4	4.1	3.4	1.1	3.0	6.1	0.2	2.0	2.1
CPUC	108.2	114.2	-72.5	100.0	19.2	21.7	56.6	73.8	0.1	0.5	2.4	0.9	0.0	2.1	5.1	5.3	0.6	0.0	9.1
CUC	98.5	12.5	-254.4	-3.9	201.7	60.2	37.7	73.8	0.0	4.7	3.8	2.5	0.6	1.9	1.7	2.8	0.2	0.0	8.0
EDT	97.7	21.8	2.0	8.7	32.8	94.0	38.7	34.8	-7.7	21.0	6.8	7.9	12.9	4.7	7.5	8.8	0.0	2.3	1.1
EEC	89.1	0.0	1.7	21.7	87.1	55.0	28.3	7.3	0.0	0.8	0.8	0.7	3.4	37.4	12.3	37.4	0.0	0.0	0.0
EPC	106.4	1.6	2.4	1.0	84.2	34.1	42.0	48.9	6.4	8.3	2.1	3.3	3.2	9.6	3.7	10.6	1.0	0.0	2.9
FEA	73.1	34.7	8.8	13.7	125.4	41.3	14.1	47.1	0.4	6.4	0.8	6.6	19.9	1.4	7.6	5.6	1.5	0.6	2.2
GPA	93.6	81.7	5.2	-1.7	87.9	46.5	25.3	70.6	0.0	6.1	2.8	4.0	3.1	1.7	2.7	4.1	0.4	0.0	4.5
KAJUR	247.2	23.2	-99.4	-21.1	2113.1	1.3	44.4	35.4	0.1	7.7	3.3	11.9	0.3	0.8	26.9	2.0	11.2	0.2	0.2
KUA	111.4	0.0	-7.4	-7.1	193.0	0.0	50.4	56.3	0.0	7.8	3.0	5.7	7.6	2.1	6.2	6.0	0.9	0.1	4.4
MEC	98.8	293.1	4.6	0.2	84.7	157.4	44.3	65.8	0.0	6.6	7.6	4.7	3.7	3.3	0.3	4.4	0.6	0.3	2.7
NUC	93.8	n.a	n.a	n.a	n.a	0.0	16.6	0.0	10.1	0.0	35.3	0.0	40.8	13.8	0.0	0.0	0.0	0.0	0.0
PPUC	102.8	0.0	-2.1	-1.3	222.4	55.1	38.3	73.5	0.0	8.2	4.1	4.4	1.6	1.9	2.1	2.5	0.9	0.0	0.7
PUB	111.4		-6.8		80.9	200.4	52.3	68.1	0.0	6.4	3.5	4.4	3.2	3.0	0.6	2.3	0.8	0.0	7.8
PUC	109.1	0.0	-131.2	-11.5	93.9	21.4	50.8	74.5	0.0	2.3	2.5	6.1	1.4	2.4	3.7	2.6	0.2	0.1	4.1
SIEA	89.1	0.0	19.5	13.0	730.8	76.1	75.1	65.6	0.0	12.0	1.6	4.7	0.5	1.4	1.8	4.9	2.0	0.2	5.3
TAU	85.9	1.3	22.8	10.5	871.8	53.0	52.3	55.4	0.0	4.1	2.1	4.8	2.0	1.2	2.8	3.9	1.3	0.0	22.4
TEC	106.6	83.5	8.1	53.4	97.6	27.9	96.6	23.3	0.9	1.0	2.7	4.0	23.3	0.9	1.2	2.2	1.2	1.5	38.0
TPL	81.7	12.3	8.0	5.2	101.9	8.8	40.3	51.0	0.0	5.0	1.1	4.0	8.4	3.4	6.3	1.8	1.4	0.0	17.6
UNELCO	92.2	22.9	2.3	11.0	196.3	61.1	47.2	58.5	8.4	6.9	2.3	5.0	1.9	1.0	9.0	0.0	7.0	0.0	0.0
YSPSC	106.8	22.9	-4.7	-4.6	289.3	71.2	56.2	61.4	0.0	10.8	3.3	6.6	3.0	2.1	1.2	4.7	1.4	0.1	5.4

Appendix G: Currency Conversion Table

Table G.1: Currency Conversion Table for 2012 Data

Pacific Utilities	Country	Local Currency	Benchmarking Period Start	Benchmarking Period End	List Conversion Multiplier to Convert to USD	Average Rate
ASPA	American Samoa	USD	01-Oct-11	30-Sep-12	1.0000	
CPUC	Chuuk, FSM	USD	01-Oct-11	30-Sep-12	1.0000	
CUC	Siapan, Northern Marianas	USD	01-Jan-12	31-Dec-12	1.0000	
EDT	French Polynesia	XPF	01-Jan-12	31-Dec-12	0.0111	0.0109
EEC	New Caledonia	XPF	01-Jan-12	31-Dec-12	0.0111	0.0109
EEWF	Wallis and Fortuna	XPF	01-Jan-12	31-Dec-12	0.0111	0.0109
ENERCAL	New Caledonia	XPF	01-Jan-12	31-Dec-12	0.0111	0.0109
EPC	Samoa	WST	01-Jul-11	30-Jun-12	0.4383	0.4430
FEA	Fiji	FJD	01-Jan-12	31-Dec-12	0.5700	0.5622
GPA	Guam	USD	01-Oct-11	30-Sep-12	1.0000	
KAJUR	Kwajalein Atoll, Marshall Islands	USD	01-Oct-11	30-Sep-12	1.0000	
KUA	Kosrea, FSM	USD	01-Oct-11	30-Sep-12	1.0000	
MEC	Marshall Islands	USD	01-Oct-11	30-Sep-12	1.0000	
NPC	Niue	NZD	01-Oct-11	30-Sep-12	0.8309	0.7989
NUC	Nauru	AUD	01-Jul-11	30-Jun-12	1.0161	1.0327
PPL	Papua New Guinea	PGK	01-Jan-12	31-Dec-12	0.5000	0.5062
PPUC	Palau	USD	01-Oct-11	30-Sep-12	1.0000	
PUB	Kiribai	AUD	01-Jan-12	31-Dec-12	1.0374	1.0359
PUC	Pohnpei, FSM	USD	01-Oct-11	30-Sep-12	1.0000	
SIEA	Solomon Islands	SBD	01-Oct-11	30-Sep-12	0.1482	0.1474
TAU	Cook Islands	NZD	01-Jul-11	30-Jun-12	0.7964	0.8051
TEC	Tuvalu	AUD	01-Jan-12	31-Dec-12	1.0374	1.0359
TPL	Tonga	TOP	01-Jul-11	30-Jun-12	0.5580	0.5861
UNELCO	Vanuatu	VUV	01-Jan-12	31-Dec-12	0.0111	0.0110
YSPSC	Yap, FSM	USD	01-Oct-11	30-Sep-12	1.0000	

Appendix H: Electricity Tariff Tables

Table H.1: Electricity Tariff Table[1,2] (Local Currency)

TOTAL COST TO CONSUMER FOR SET kWh/mth, incl base charge, taxes,etc (IN LOCAL CURRENCY)														
		DOMESTIC / RESIDENTIAL									COMMERCIAL / BUSINESS			
Pacific Utilities	Local Currency	50	100	200	500	1000	2000	3000	10000		1000	3000	10000	50000
ASPA	USD	26	46	87	208	410	814	1218	4046		423	1249	4141	20667
CPUC	USD	28	56	112	281	562	1124	1686	5620		592	1776	5920	29600
CUC	USD	23	39	71	169	375	798	1278	4634		434	1281	4246	21186
EPC	WST	43	94	195	500	1008	2024	3040	10152		1016	3048	10160	50800
FEA	FJD	9	23	58	162	336	685	1382	3820		420	1260	4200	21700
KAJUR	USD	15	30	60	149	298	596	894	2980		358	1074	3580	17900
KUA	USD	18	37	78	200	404	822	1240	4166		417	1273	4269	20989
MEC	USD	20	40	80	199	408	826	1244	4170		478	1434	4780	23900
NPC	NZD	40	65	125	335	685	1385	2085	6985					
NUC	AUD	5	10	20	70	170	370	570	1970		250	750	2500	12500
PPL	PGK	43	83	165	409	817	1631	2446	8149		967	2865	9507	47463
PPUC	USD	19	36	68	166	358	742	1126	4129		429	1287	4290	21450
PUB	AUD	20	40	80	200	400	800	1200	4000		550	1650	5500	27500
PUC	USD	29	53	102	249	495	985	1476	4909		491	1472	4905	24525
SIEA	SBD	299	598	1195	2988	5976	11951	17927	59756		6253	18758	62526	312630
TAU	NZD	29	66	146	398	818	1658	2498	8378		815	2435	8105	40505
TEC	AUD	15	35	91	259	539	1099	1659	5579		560	1680	5600	28000
TPL	TOP	42	85	170	424	849	1697	2546	8486				.	
UNELCO	VUV	1070	4332	15930	38787	76882	153071	229260	762584		57547	167099	550533	2741583
YSPSC	USD	21	45	87	219	444	895	1345	4500		456	1516	5228	26440

[1] Tariff review was carried out by PPA.
[2] Some utilities were not represented in tariff tables were due to difficulty in understanding or interpreting application or tariff, or due to missing information (such as a variable fuel component).

Table H.2: Electricity Tariff Table (USD)

TOTAL COST TO CONSUMER FOR SET kWhs/mth, incl base charge, taxes, etc (CONVERTED TO USD)													
	DOMESTIC / RESIDENTIAL								COMMERCIAL / BUSINESS				Comments
Pacific Utilities	50	100	200	500	1000	2000	3000	10000	1,000	3,000	10,000	50,000	
ASPA	26.20	46.40	86.81	208.02	410.03	814.06	1218.09	4046.30	423	1249	4141	20667	Commercial based on small general 3PHSE
CPUC	28.10	56.20	112.40	281.00	562.00	1124.00	1686.00	5620.00	592	1776	5920	29600	Based on 8 Feb 2012 announcement
CUC	22.74	38.96	71.41	168.76	374.70	798.20	1277.70	4634.20	434	1281	4246	21186	2 Feb 2012 sched of charges, lifeline applied up to 500KWh
EPC	19.00	41.51	86.52	221.54	446.59	896.68	1346.76	4497.38	450	1350	4501	22504	0.86 applied up to 50kWh for domestic
FEA	5.32	12.88	32.47	91.23	189.17	385.04	776.78	2147.87	236	708	2361	12200	
KAJUR	14.90	29.80	59.60	149.00	298.00	596.00	894.00	2980.00	358	1074	3580	17900	Life line rate was stated but without any indication as to the KWh
KUA	18.40	36.80	77.60	200.00	404.00	822.00	1240.00	4166.00	417	1273	4269	20989	Rate was quoted from Resolution 2008-30-4
MEC	19.90	39.80	79.60	199.00	408.00	826.00	1244.00	4170.00	478	1434	4780	23900	
NPC	31.96	51.93	99.86	267.63	547.25	1106.48	1665.71	5580.32					No commercial rate stated on notice issue 8 Nov 2008
NUC	5.16	10.33	20.65	72.29	175.56	382.10	588.64	2034.42	258	775	2582	12909	Tariff rate 2011
PPL	21.60	42.22	83.46	207.18	413.38	825.78	1238.19	4124.99	489	1450	4812	24026	Commercial uses "general supply customers"
PPUC	19.30	35.60	68.20	166.00	358.00	742.00	1126.00	4129.00	429	1287	4290	21450	
PUB	20.72	41.44	82.87	207.18	414.36	828.72	1243.08	4143.60	570	1709	5697	28487	
PUC	28.53	53.05	102.10	249.25	494.50	985.00	1475.50	4909.00	491	1472	4905	24525	Fuel charge 0.3905 as advised by PUC in email
SIEA	44.04	88.08	176.16	440.40	880.80	1761.61	2642.41	8808.03	922	2765	9216	46082	
TAU	22.95	53.30	117.71	320.59	658.73	1335.02	2011.30	6745.29	656	1960	6525	32611	
TEC	15.54	35.74	93.75	267.78	557.83	1137.94	1718.04	5778.77	580	1740	5801	29005	
TPL	24.87	49.74	99.47	248.68	497.36	994.73	1492.09	4973.64					No commercial rate stated
UNELCO	11.77	47.65	175.24	426.66	845.70	1683.78	2521.86	8388.43	633	1838	6056	30157	Used business licence holder LV for commercial
YSPSC	21.06	44.77	87.19	218.58	443.93	894.63	1345.33	4500.23	456	1516	5228	26440	