



PACIFIC POWER UTILITIES

Benchmarking

Report

2019 Fiscal Year

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Summary Report

2019 Fiscal Year

PREPARED BY THE PACIFIC POWER ASSOCIATION (PPA)

OCTOBER 2020

1. INTRODUCTION

1.1 Benchmarking Overview

The 2019 exercise involves data from 15 power utilities compared to 21 for the 2018 Fiscal Year.

Table 1.1 shows the utilities that have participated in the Pacific benchmarking initiative since 2001. This round of benchmarking covered data governance, gender composition of the workforce, and KPI operational and performance data KPIs.

Table 1.1: Utility Participation in Benchmarking 2001, and 2010 - 2019 Data Periods

Utility			Data Period										
			2001	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Acronym	Name	Country / Territory	Year Data Collated										
			2002	2011	2012/13	2013/14	2015	2015	2016	2017	2018	2019	2020
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'Énergie	New Caledonia	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
EPC	Electric Power Corporation	Samoa	✓	✓	✓	✓	✓	✓	✓	✗	✓	✓	✗
EFL	Energy Fiji Limited	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	✓	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗
NUC	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)	✓	✗	✓	✓	✓	✗	✓	✓	✓	✓	✓
SP	Solomon Power	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	22	20	23	18	21	22	15

2. GOVERNANCE

2.1 Key Governance Results

The Governance data for the 2019 benchmarking period has not changed compared to 2018 or earlier benchmarking periods for that matter, as there has been no significant government policy changes in the various Pacific Islands and Territories. This situation is also reflected in the governance KPIs.

Table 2.1: Quality Standards and Regulatory Structures of Utilities

Utility	Power Quality Standards	Self-Regulated or Externally Regulated	Public or Private Ownership
ASPA	None	Self	Public
CPUC	US	Self	Public
CUC	US	External	Public
EDT	concession contract	External	Private
EEC	EN50160	External	Private
EPC	AUS/NZ	External	Public
EFL	AUS/NZ	External	Public
KAJUR	None	Self	Public
KUA	KUA	Self	Public
MEC	None	Self	Public
PPL	-	External	Public
PPUC	JIS,NEC	Self	Public
PUB	-	External	Public
PUC	-	Self	Public
SP	-	Self	Public
TAU	NZ Standard	External	Public
TEC	AUS & NZ	Self	Public
TPL	TPL Standard	External	Public
UNELCO	Concession Contract	External	Private
YSPSC	NEC	Self	Public

2.2 Governance Analysis

The composite governance score introduced in the 2012 Fiscal Year Report has again been utilised in 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. The composite score is comprised of the same weighted indicators as the 2012 Fiscal Year Report, determined from relevant responses in the governance questionnaire using a governance scorecard (Table 2.2).

Table 2.2: 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 utilities which provided sufficient responses to enable the weightings to be calculated are represented in Figure 2.1.

Figure 2.1: Composite Governance Score for 2019 FY

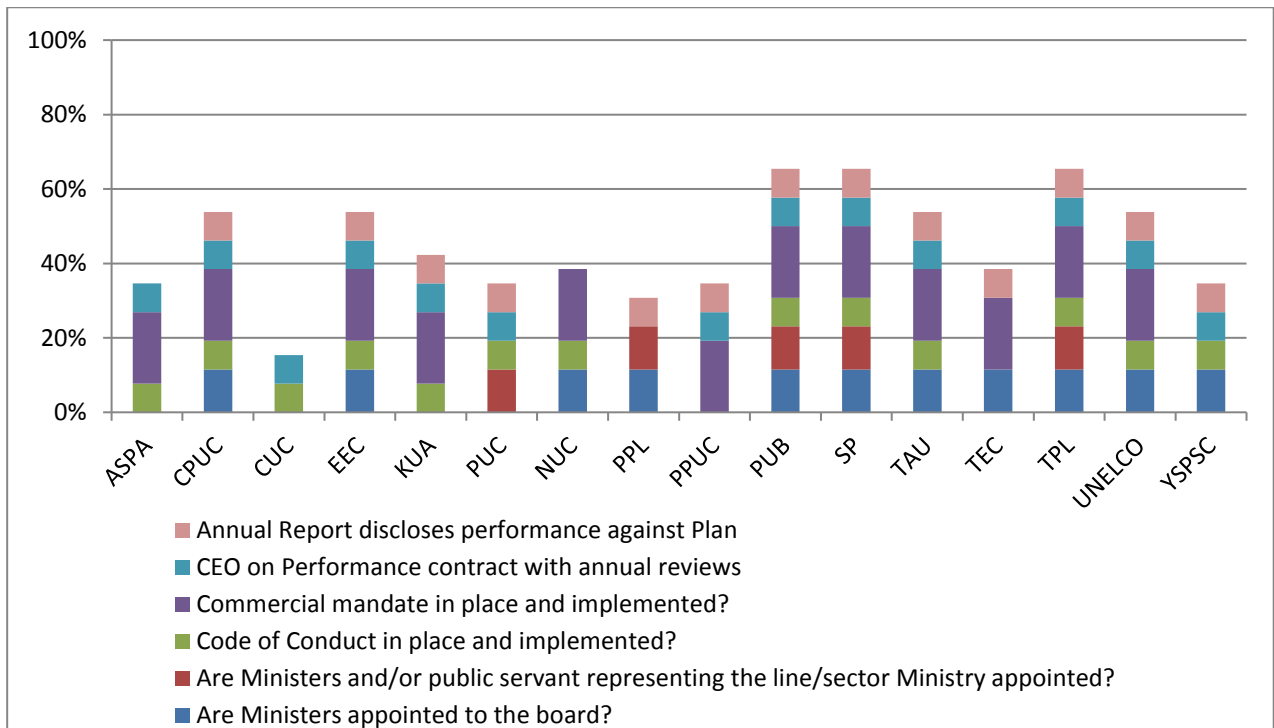
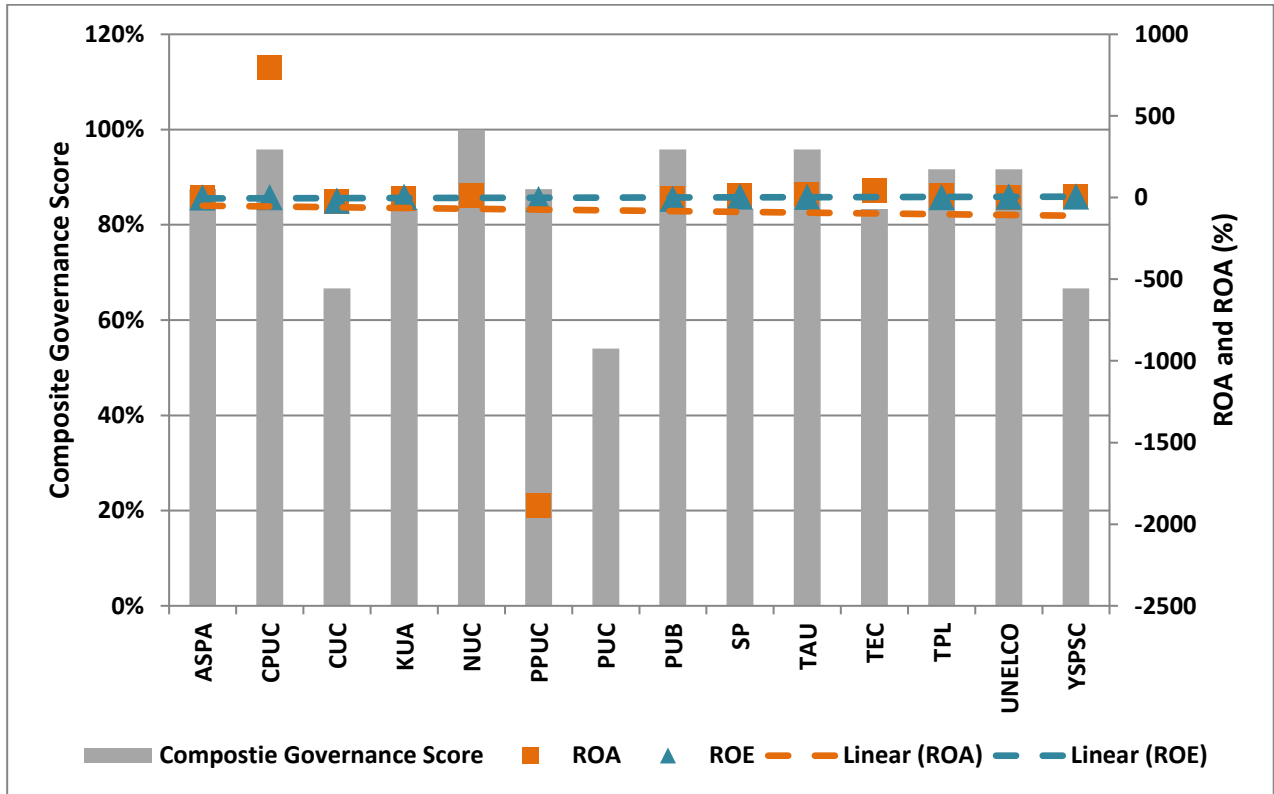


Figure 2.2: 2019 FY Composite Governance Score compared with ROE and ROA



3. GENDER

Overall, the number of females employed as a proportion of total staffing in the Pacific power utilities has slightly increased from previous years, 19% in 2019 as compared with 18.2% in the 2018 FY.

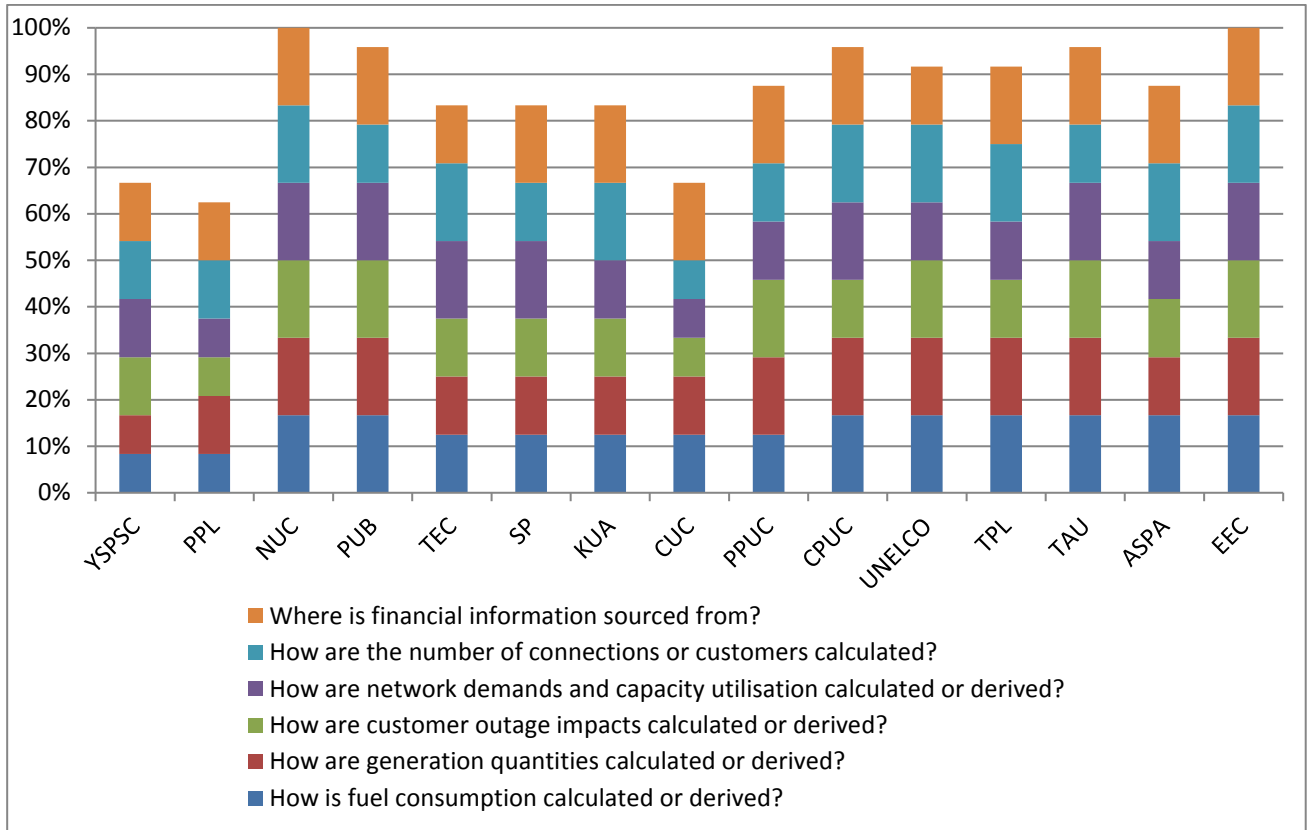
Table 3.1: Key Gender Statistics

Workforce male/female role	Regional average
Total staff (male)	81%
Total staff (female)	19%
Technical staff (male)	94.2%
Technical staff (female)	5.8%
Senior staff (male)	74.5%
Senior staff (female)	25.5%
Senior female staff as a proportion of total staff by role	
Finance	29.7%
Procurement / Supply	8.6%
Human Resources	13.3
PR/Cust Service/Comms	27.3%
Admin	10.2%
Other	10.9%

4. DATA RELIABILITY

Figure 4.2 aggregates the reliability scores submitted by each of the utilities in order to rank the relative reliability of the data that was submitted. These aggregate scores have furthermore been utilised as a weighting in this reporting in calculating the Composite Indicator for the 2019 FY.

Figure 4.2: Breakdown of Reliability Grades Assessment by Utility



5. KPI RESULTS

5.1 Introduction

This section provides performance results for the 15 (2019 FY) and 22 (2018 FY) utilities that participated in each relevant reporting year. The results from the previous 2017 FY reported have also been included for further longitudinal comparison. The results are comprised of 46 KPIs, with each indicator graphically presented with both the regional average (arithmetic mean) and median (middle) values.

An indication of utility size is also provided via a colour coding of red, orange or green as determined by utility size in accordance with the PPA's membership level categorisations: green indicates an annual peak load of less than 5MW (small); orange indicates an annual peak load of between 5MW and 30MW (medium); and red indicates an annual peak load of 30MW or greater (large). In order to facilitate comparison of results by size, all graphs are shown in the order of minimum to maximum demand. Table 5.1 furthermore provides an overview of some key characteristics of the participating utilities, including the applicable colour coding.

Table 5.1: Utility Key Characteristics

Utility and colour code	Peak Demand (MW) 2019	Size Category (S / M / L)	Outer Islands Serviced (Y/N)
ASPA	24.9	Medium	Yes
CPUC	2.94	Small	Yes
CUC	47.6	Large	Yes
EDT		Large	Yes
EEC	88.96	Large	Yes
EPC		Medium	Yes
EFL		Large	Yes
KAJUR		Small	No
KUA	1.29	Small	No
MEC		Medium	Yes
NUC	5.03	Small	No
PPL	255.6	Large	Yes
PPUC	12.8	Medium	Yes
PUB	4.9	Small	No
PUC	6.15	Medium	No
SP	16	Medium	Yes
TAU	5.13	Small	No
TEC	1.42	Small	Yes
TPL	10.43	Medium	Yes
UNELCO	12.4	Medium	Yes
YSPSC	1.85	Small	Yes

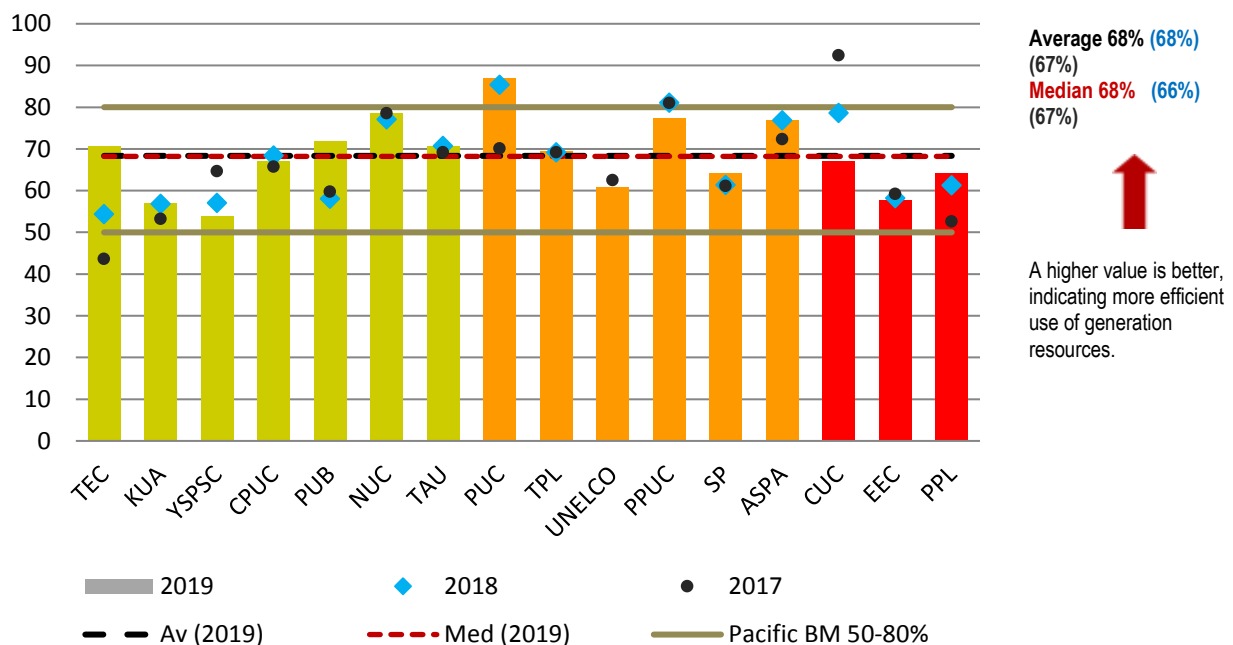
5.2 Generation Indicators

(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 future, demand management should play an increasingly important part in Pacific power sector policies.”¹

Figure 5.1 shows that LF has remained stable over the last three years, with a current average of 68 %. Only one utility has reported achieving higher than Pacific benchmarking standard of 80% (i.e. PUC). Remaining utilities that took part in this year’s survey are within PPA’s benchmarking requirements.

Figure 5.1: Load Factor (%) 2019 (2018) (2017)



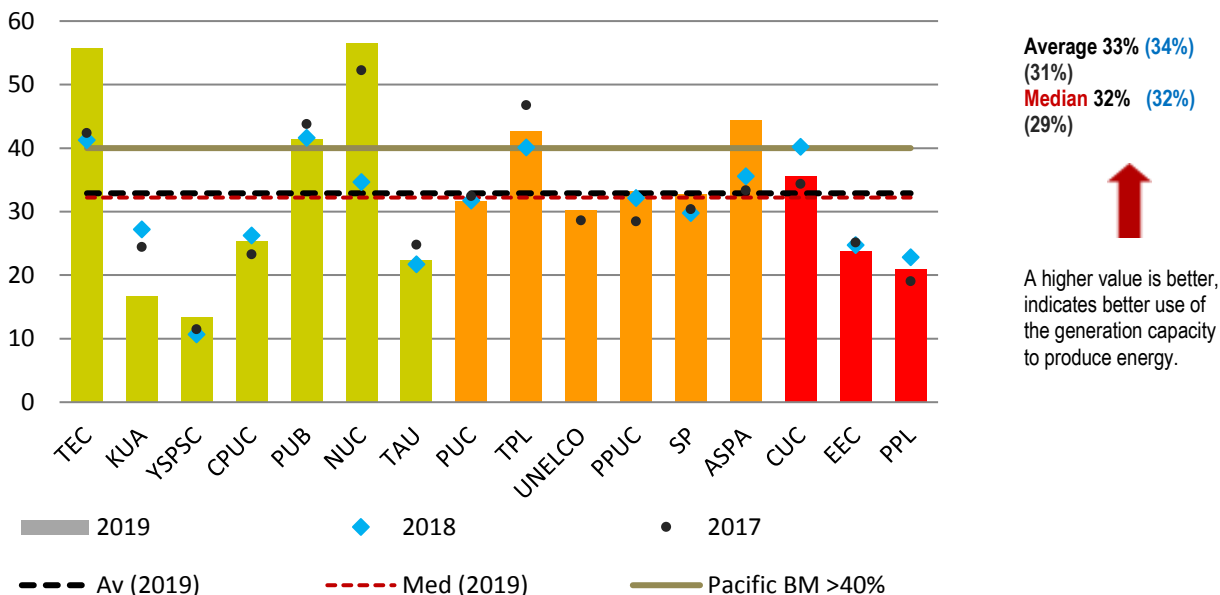
(ii) Capacity Factor

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. It also suggests over-investment in generation capacity. 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 2017 and 2019, with an average of 32%. This is below the Pacific benchmark of over 40%. However following utilities TEC, NUC, TPL, PUB and ASPA have achieved a capacity factor above 40 percent. No strong correlation exists between utility size and the CF results.

¹ PPA and ADB, *Pacific Power Utilities*, pp. 5-1.

Figure 5.2: Capacity Factor (%) 2019 (2018) (2017)



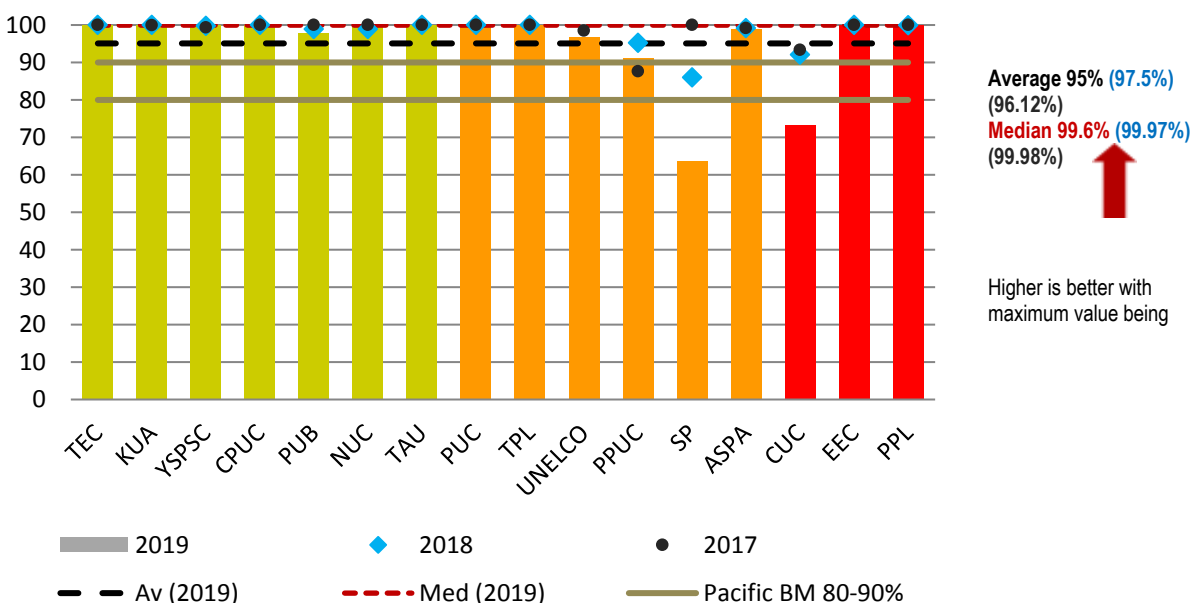
A higher value is better, indicates better use of the generation capacity to produce energy.

(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 AF's between 70% and 90%². Newer plants, and those that are well-maintained, tend to have significantly higher AF's.

As shown in Figure 6.3, the 2019 average and median AF are 95% and 99.6% respectively, a decrease is noticed from the results of 97.5% and 99.97% in 2018. As for the 2019 round, utilities that did not provide all the information required to determine continuous capacity were excluded.

Figure 5.3: Availability Factor (%) 2019 (2018) (2017)



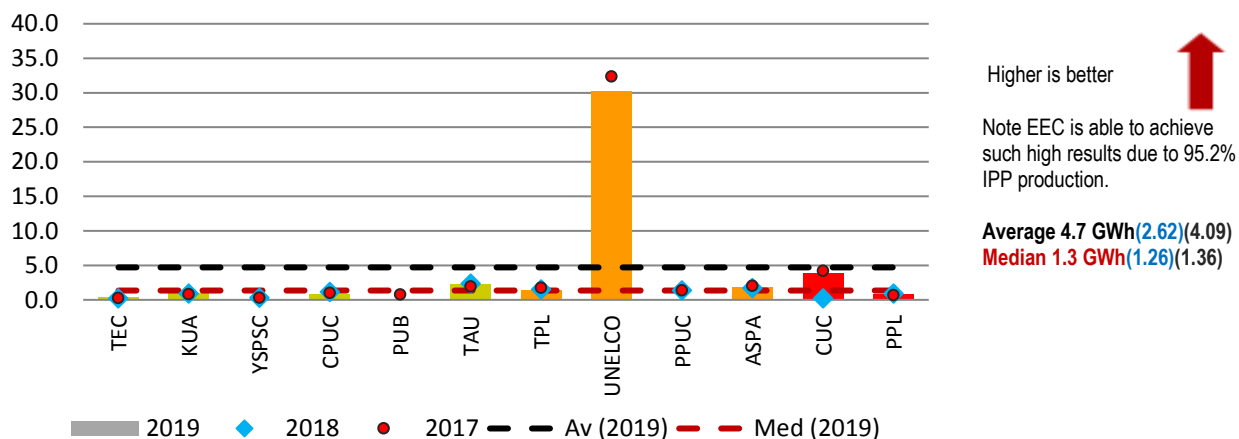
Higher is better with maximum value being

²http://en.wikipedia.org/wiki/Availability_factor

(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.

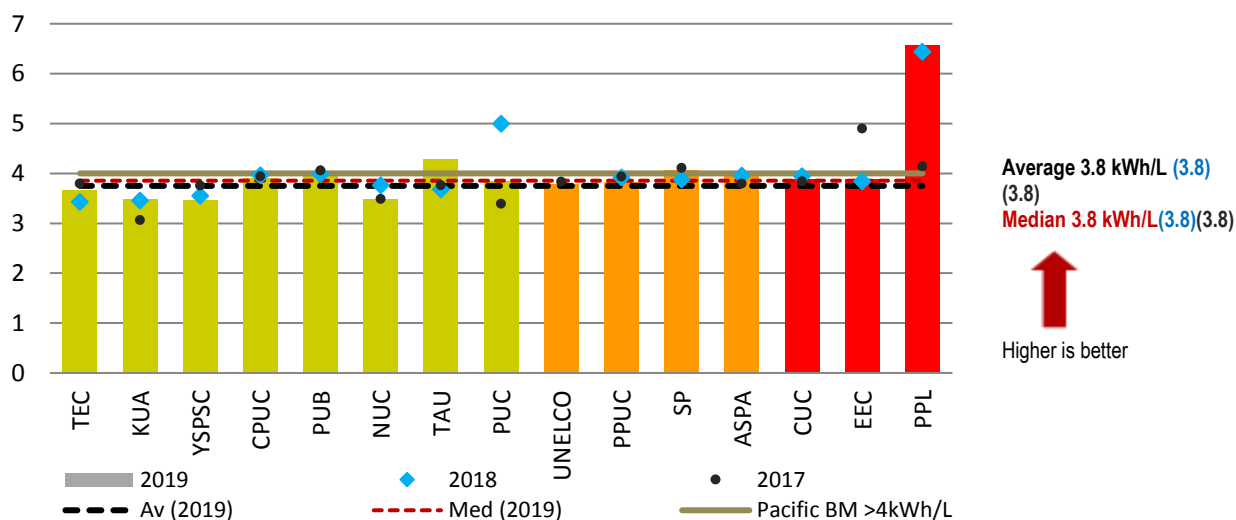
Figure 5.4: Generation Labour Productivity (GWh/FTE Generation Employee) 2019 (2018) (2017)



(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 Independent Power Producers (IPPs). Furthermore, non-diesel generation is not factored into this indicator.

Figure 5.5: Specific Fuel Consumption (kWh/L) 2019 (2018) (2017)

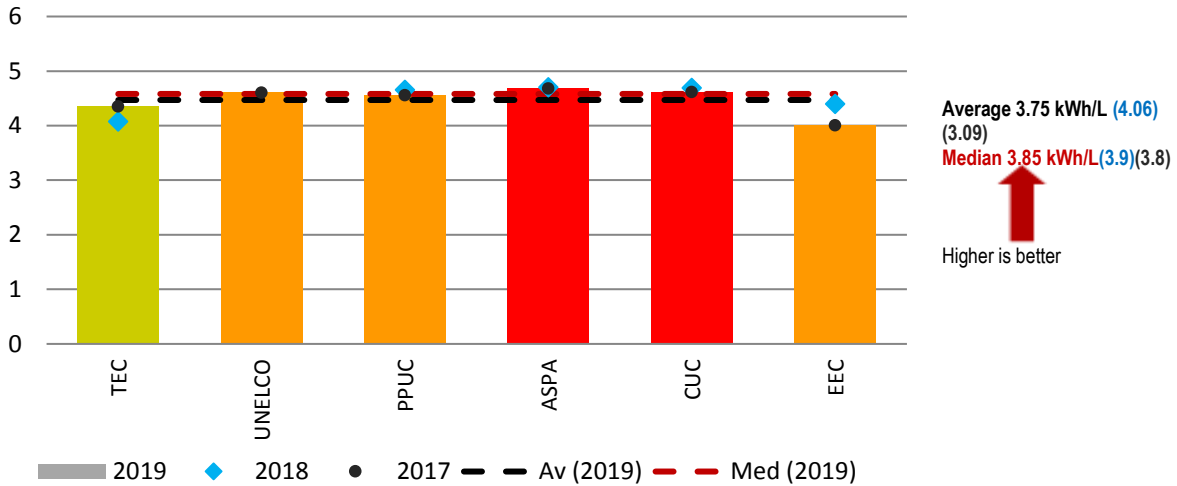


Since most PICT utilities use small high-speed diesel generators, the benchmark values for 2019 are considered reasonable. However, as fuel accounts for the highest cost in power utility generation, improvements in the specific fuel consumption are highly desirable.

(vi) Specific Fuel Consumption (kWh/kg)

In 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.

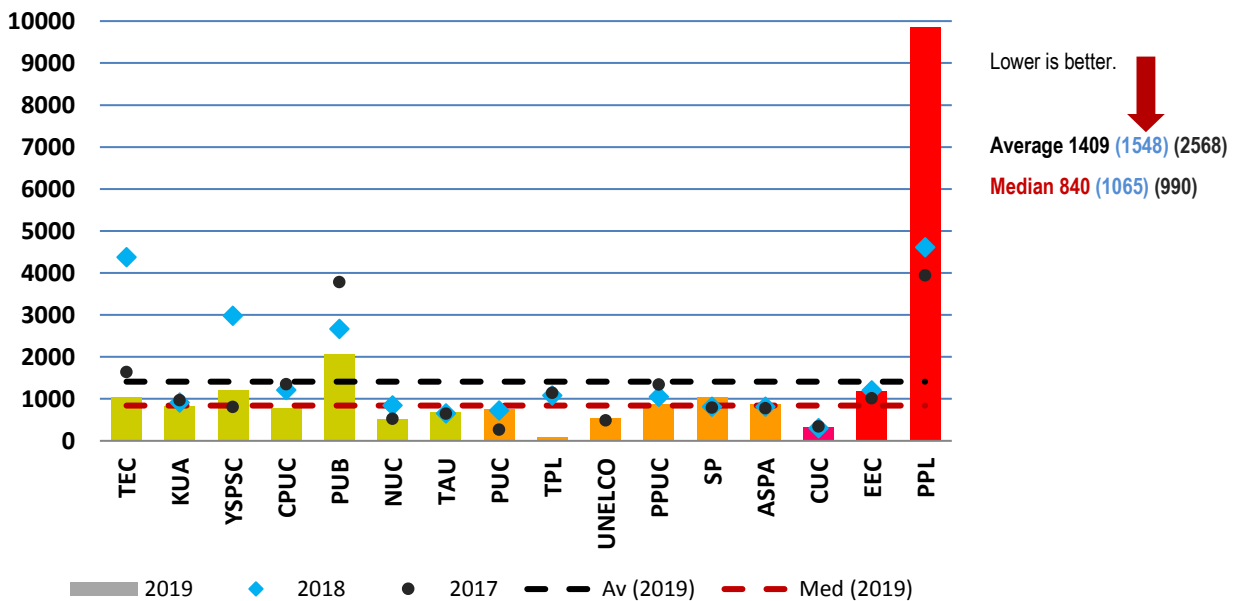
Figure 5.6: Specific Fuel Consumption (kWh/kg) 2019 (2018) (2017)



(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.

Figure 5.7: Lubricating Oil Consumption Efficiency (kWh/litre) 2019 (2018) (2017)

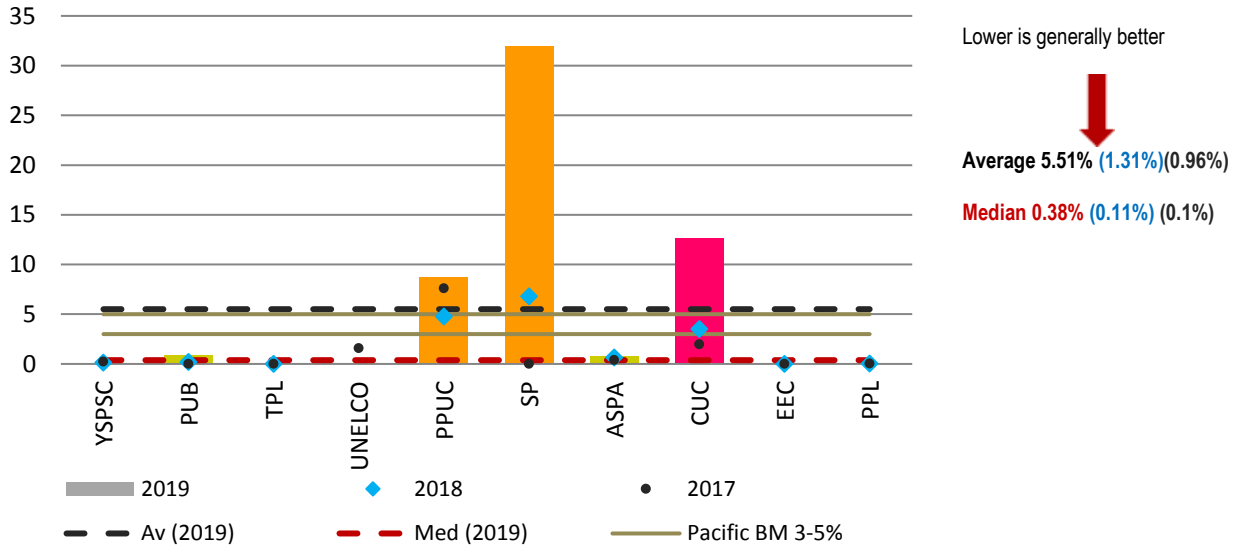


(viii) Forced Outage

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 2019 is 5.51% and the median is 0.4% (refer Figure 5.8). While utilities are improving in providing outage data, information gaps remain. This requires attention in the coming year.

Figure 5.8: Forced Outage (%) 2019 (2018) (2017)

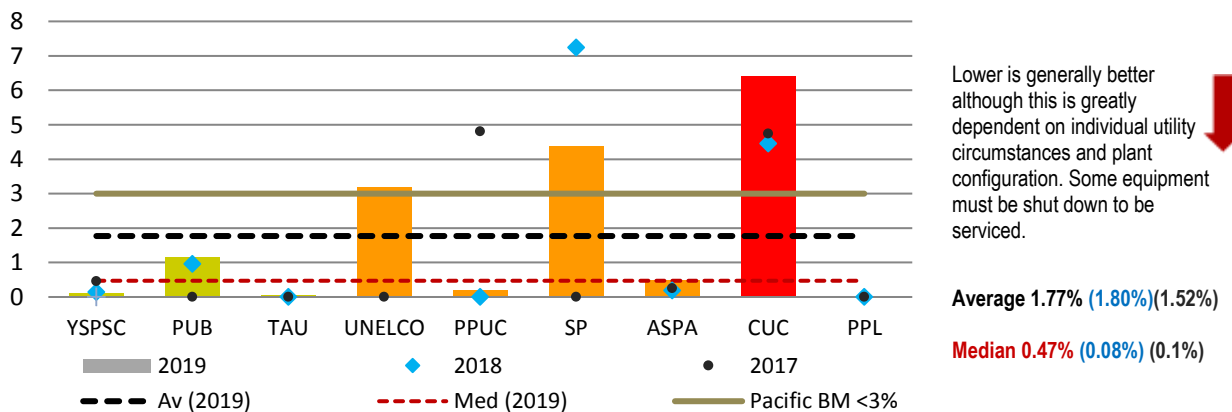


(ix) Planned Outage

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. 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.

As Figure 5.9 shows, planned outages reduced from 1.80% on average to 1.77%. 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 few utilities. This reinforces the need to ensure accurate record-keeping and regular review of maintenance regimes.

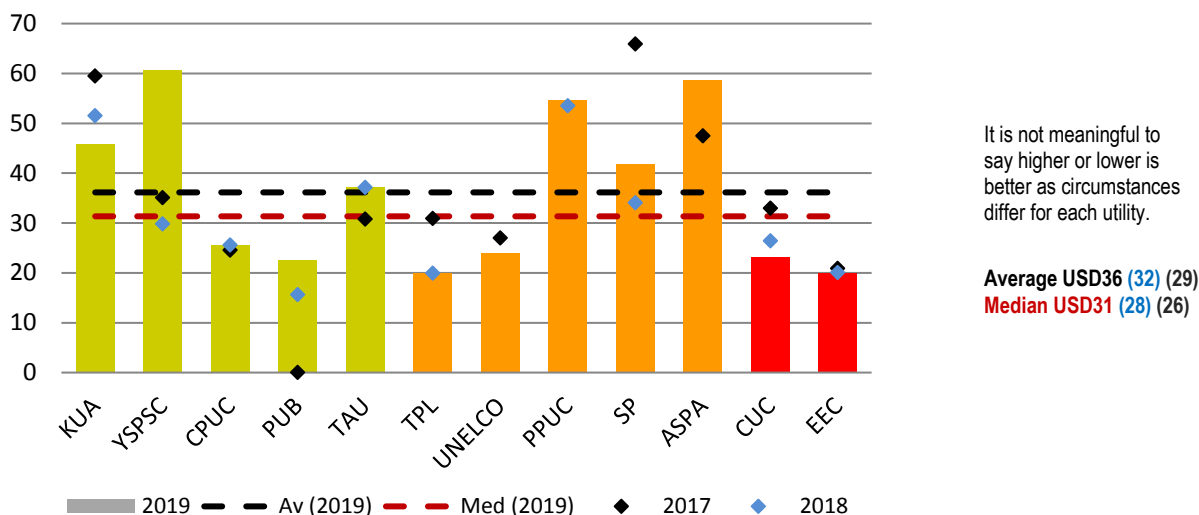
Figure 5.9: Planned Outage (%) 2019 (2018) (2017)



(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 2019, shown in Figure 5.10, the reported average was USD36 per MWh with a median of USD31. Comparisons with the 2018 dataset show a significant increase in both the indicator average and median.

Figure 5.10: Generation O&M Costs (USD per MWh) 2019 (2018) (2017)

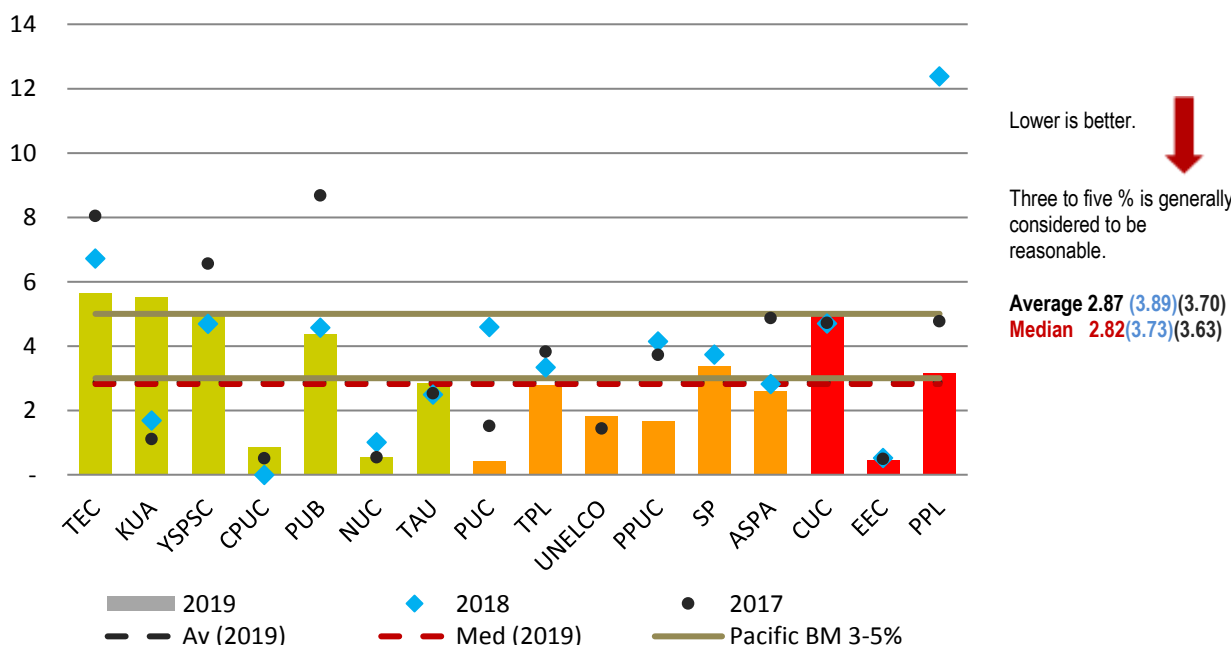


It is not meaningful to say higher or lower is better as circumstances differ for each utility.

(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 2019 was 2.87% and the median was 2.82%, compared to 3.89% and 3.73% respectively in 2018. The data indicates that overall station usage has slightly increased. Only KUA and CUC notable improvements since the previous year. This may be a result of energy efficiency measures being taken by power utilities. The direct savings made by the utilities as a result of improvement in this indicator are a positive result.

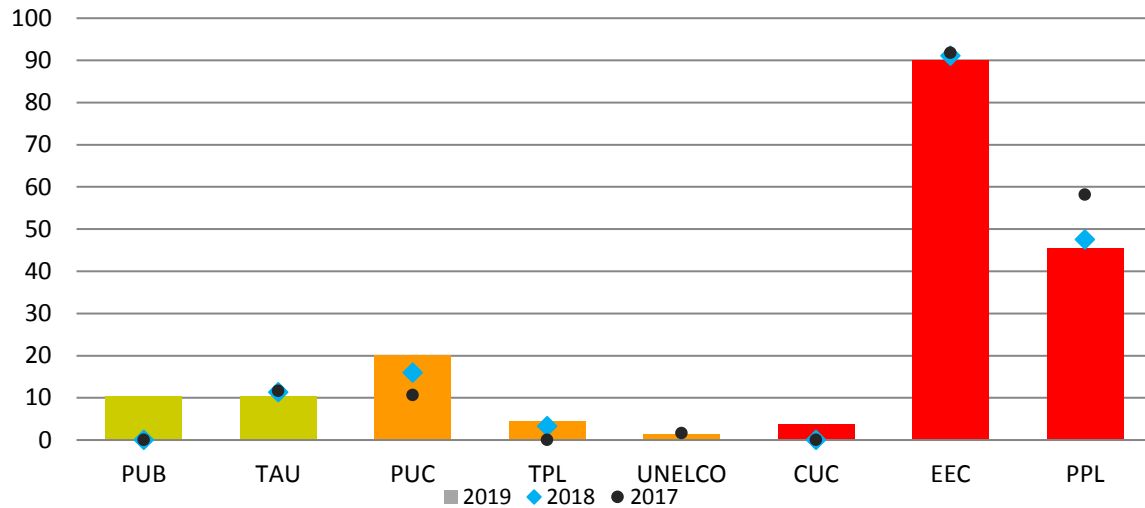
Figure 5.11: Station Energy (Auxiliaries) Use for Pacific Utilities (%) 2019 (2018) (2017)



(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 facing³

Figure 5.12: IPP Generation (%) 2019 (2018) (2017)

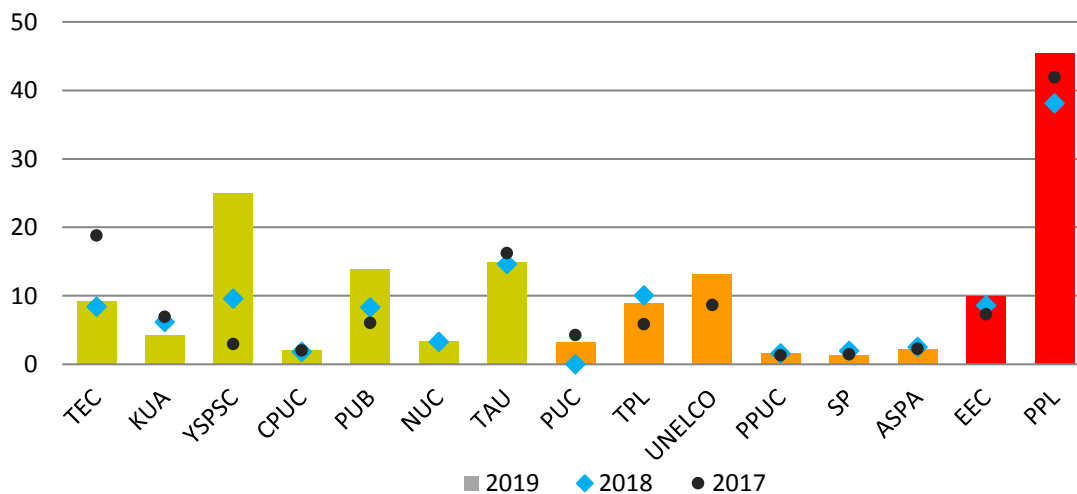


(xiii) Renewable Energy to Grid

The 2019 analysis provides renewable energy share for both the main grid and across all grids. The 2019 analysis presented renewable energy share for all grids, and the 2010 analysis for the main grid only. The data is represented in Figures 5.13.

It can be seen that PUB, TAU, PUC, EEC and PPL have total renewable energy above 10%. The majority of renewable energy continues to come from the larger hydro facilities.

Figure 5.13: Renewable Energy Generation - All Utilities, Main Grid (%) 2019 (2018) (2017)



³Though 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

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).

Table 5.2: Transmission Indicators 2019, 2018

Utility	Transmission Losses (%)		Transmission Reliability (Outages/100km)		Transmission SAIDI (min/cust)				Transmission SAIFI (events/cust)			
	2018	2019	2018	2019	Unplan.	Planned	Unplan.	Planned	Unplann.	Planned	Unplann.	Planned
					2018	2019	2018	2019	2018	2019		
EDT	0.81	-	3.4	-	0	0	-	-	0	-	-	-
EFL	43	-	0	-	0	0	-	-	-	-	-	-
GPA	-	-	-	-	-	-	-	-	-	-	-	-
PPL	6.1	-	25	-	2.2	30.33	-	-	-	-	-	-

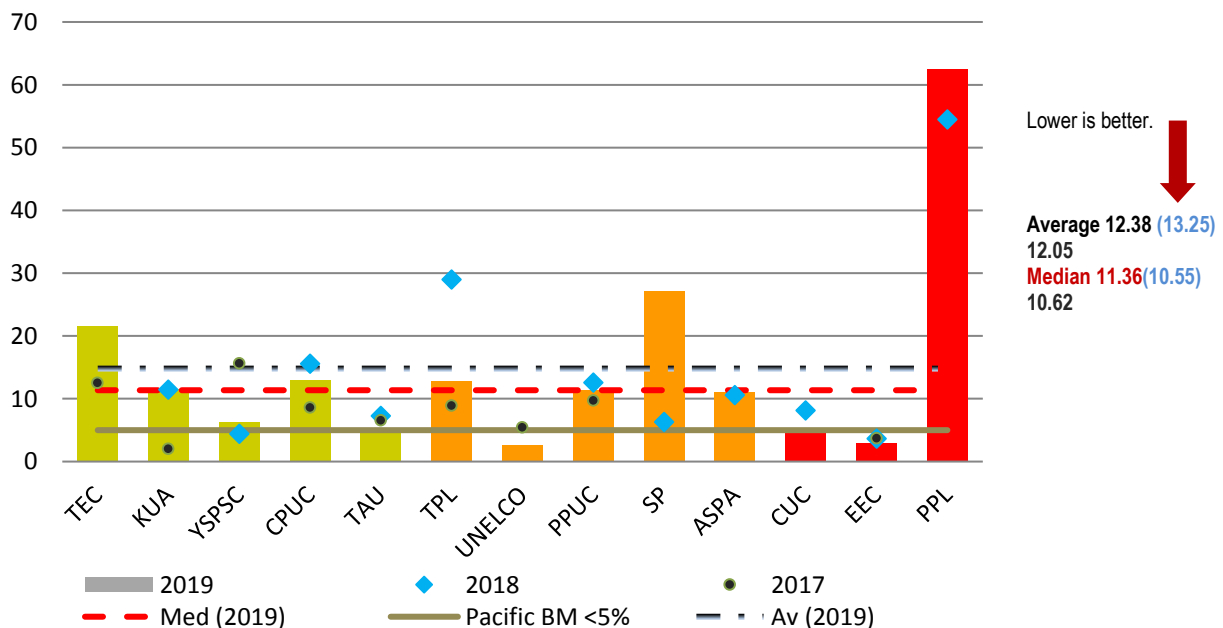
Of the 15 Pacific power utilities participated in 2019 benchmarking survey, four utilities have transmission networks: GPA, PPL, EFL and EDT. Transmission KPIs were not presented in previous benchmarking reports due to the limited data provided. It still remains inadequate for drawing firm conclusions and attention will be needed to improve data quality for the next round of benchmarking.

5.4 Distribution Indicators

(i) Network Delivery Losses

Network delivery losses are defined as the net generation minus electricity sold, divided by the electricity sold, expressed as a percentage. It was not reported previously due to inadequate data.

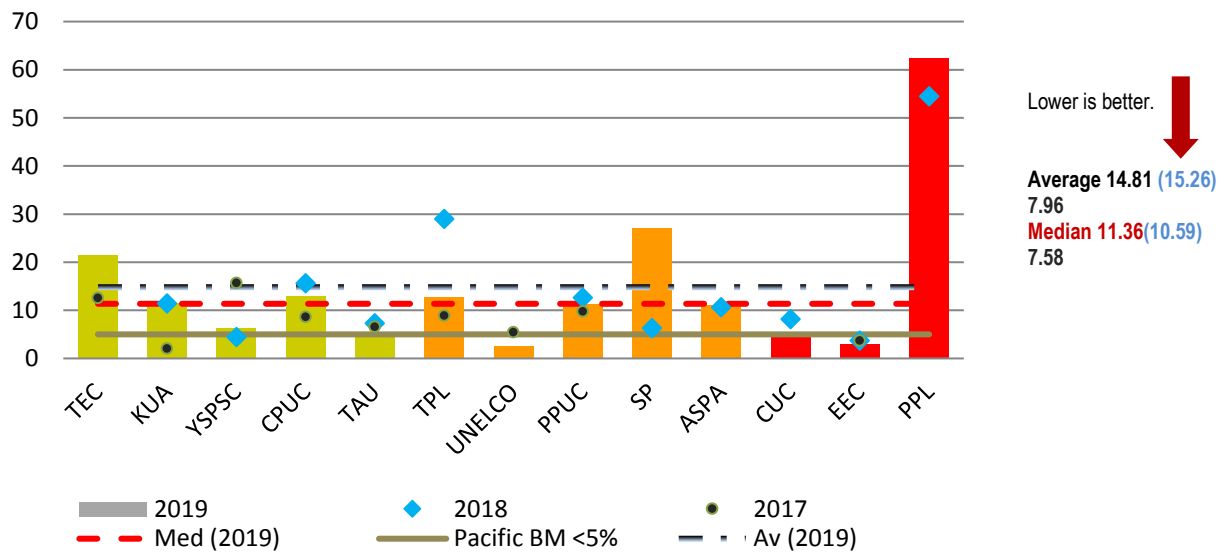
Figure 5.14: Network Delivery Losses (%) 2019 (2018) (2017)



(ii) Distribution Losses

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.

Figure 5.15: Distribution Losses Reported by Utilities (%) 2019 (2018) (2017)

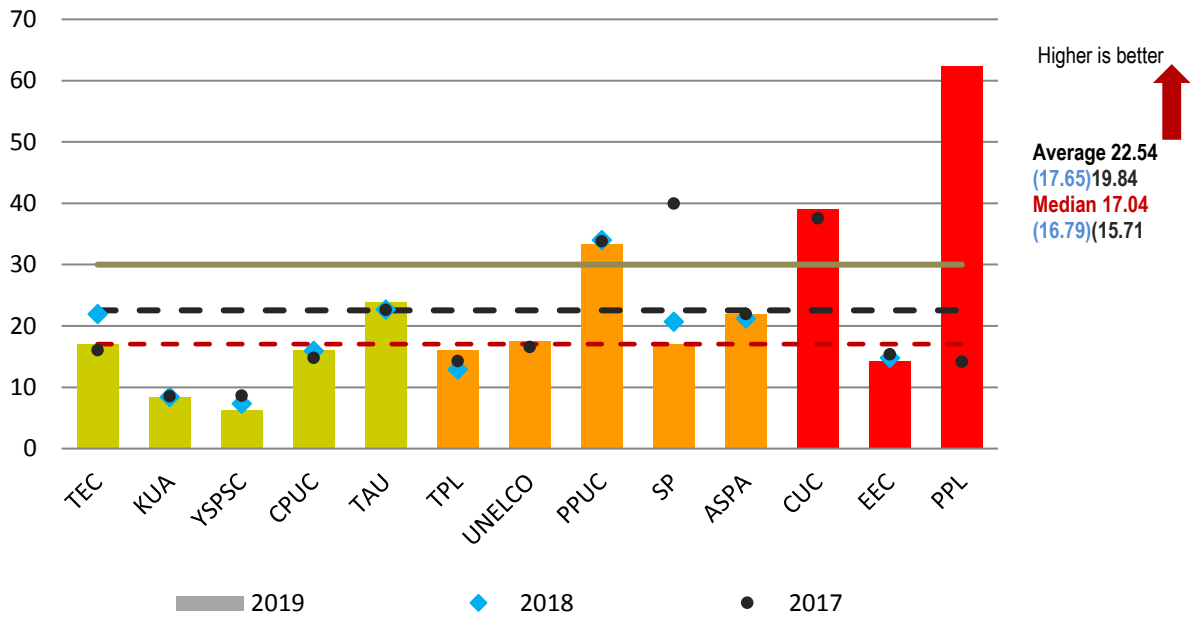


(iii) Distribution Transformer Utilisation

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 22%. This has increased from 18% in 2018. 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.

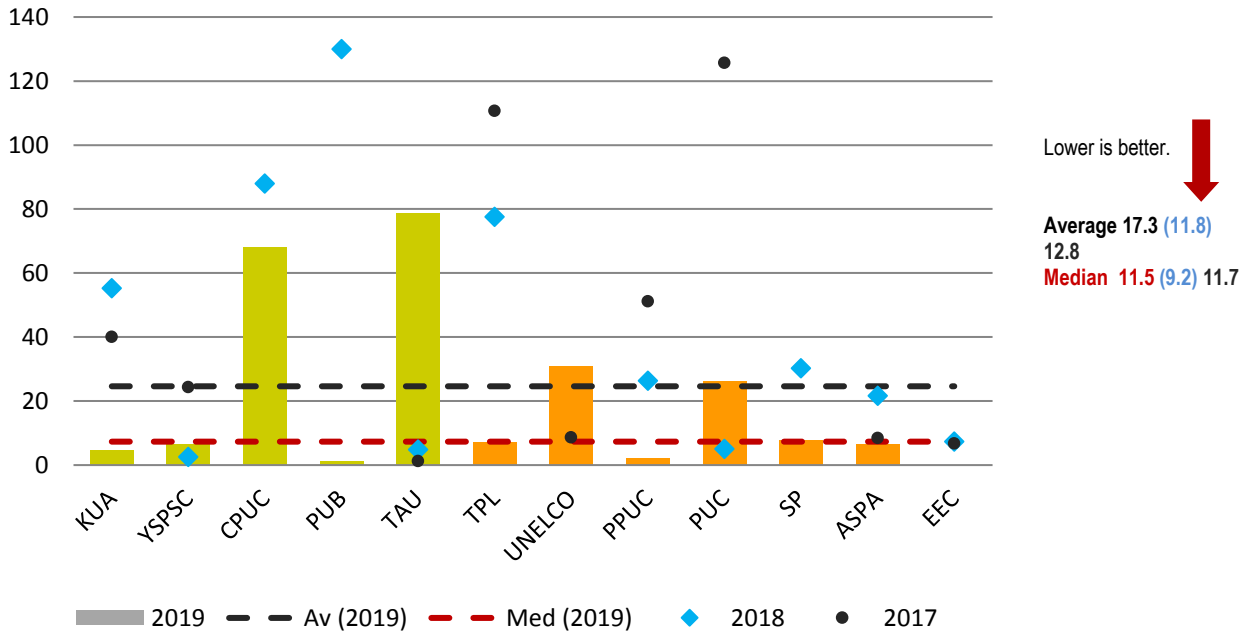
Figure 5.16: Distribution Transformer Utilisation (%) 2019 (2018) (2017)



(iv) Distribution Reliability

This indicator looks at forced outage events per 100km of distribution line as a way of measuring their liability of the distribution network.

Figure 5.17: Distribution Reliability (Events per 100 km) 2019 (2018) (2017)

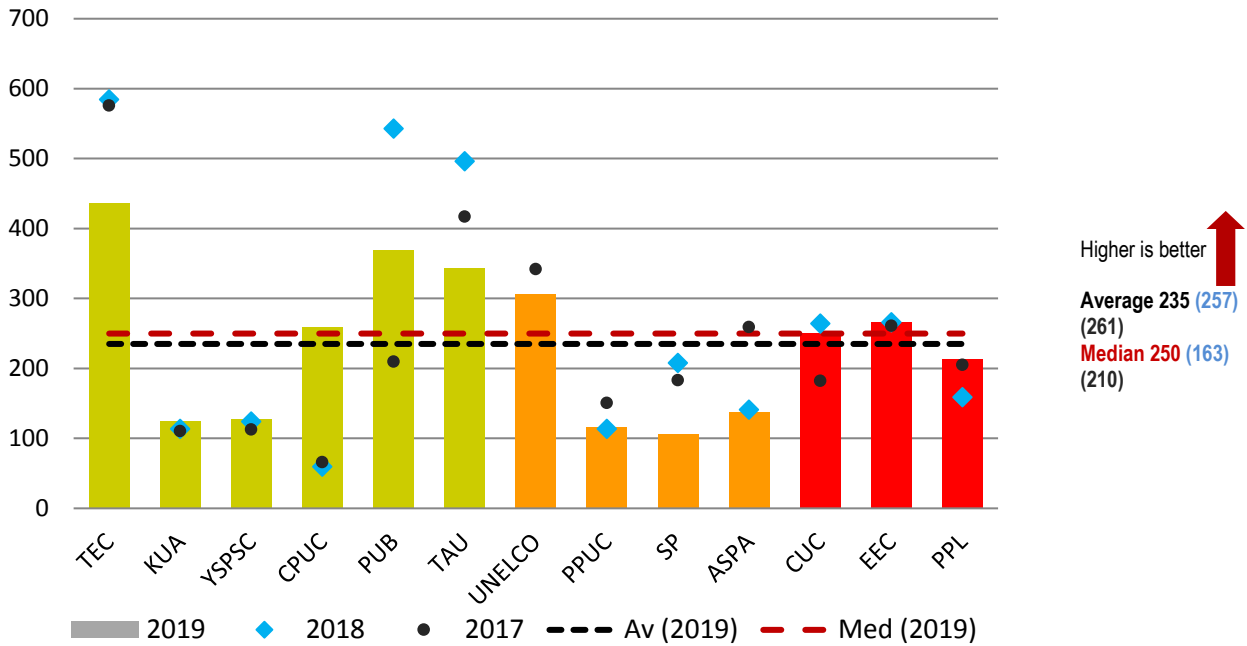


(v) Customers per Distribution Employee

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).

Figure 5.18 shows that, in 2019, there were on average 235 customers for each FTE utility employee working on distribution, a deterioration from 256 in 2018. 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.

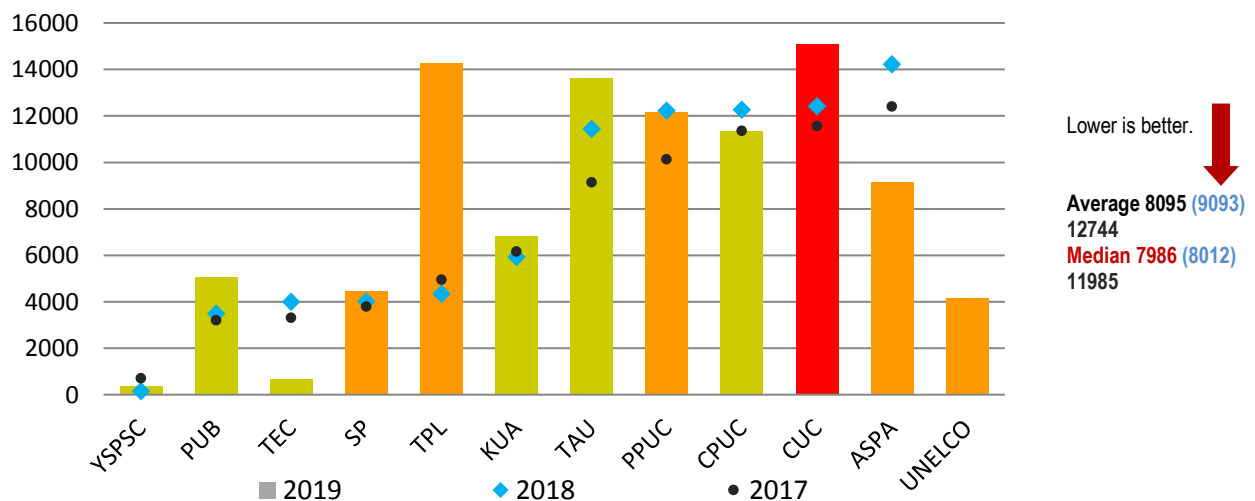
Figure 5.18: Customers per Distribution Employee 2019 (2018) (2017)



(vi) Distribution O&M Cost

The Distribution Operations and Maintenance O&M costs is the total expenses incurred in the operations and maintenance of the distribution network, expressed in the local currency. This includes all vehicle operating costs and all other costs related to distribution operations.

Figure 5.19: Distribution O&M Cost 2019 (2018) (2017)

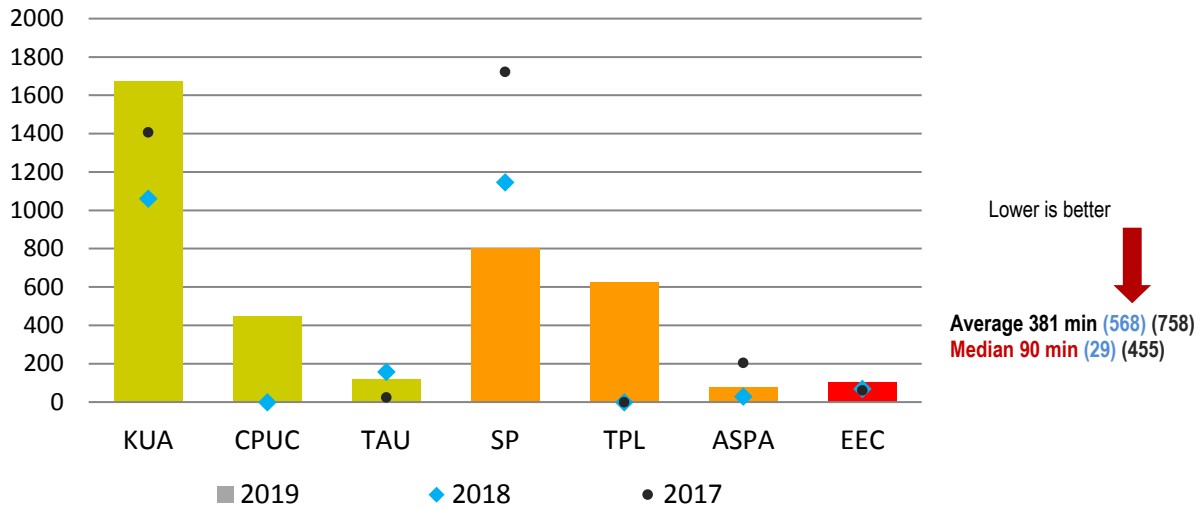


5.5 SAIDI and SAIFI

(i) System Average Interruption Duration Index (SAIDI)

Here SAIDI has been shown as combined SAIDI for generation, transmission and distribution. The average and median are 381 min and 90 min respectively. The trend for the indicator over the last three years is inconclusively showing great variability, which could reflect varying accuracy in the data rather than change in the level of service (Figure 5.20).

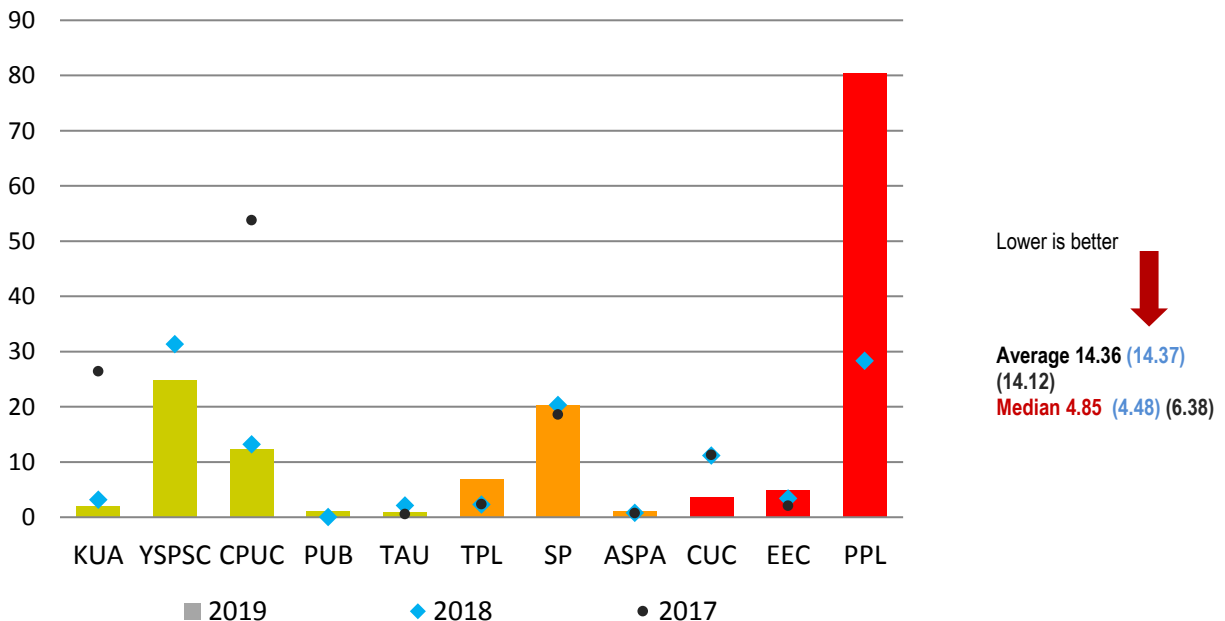
Figure 5.20: SAIDI Interruptions (Minutes per Customer) 2019 (2018) (2017)



(ii) System Average Interruption Frequency Index (SAIFI)

Here SAIFI has been shown as combined SAIFI for generation, transmission and distribution. The average and median are 14.36 and 4.85 respectively.

Figure 5.21: SAIFI Interruption Frequency (Interruptions per Customer) 2019 (2018) (2017)



5.6 Demand Side Management

Table 5.6 summarises the responses received from utilities in 2018 and 2019 to DSM questions.

Table 5.6: Utility Demand Side Management Efforts in 2018 and 2019

Response from utilities	2018	2019
Number of responses	21	15
DSM activities reported	14	7
Ave. FTE Staff assigned to DSM	0.001	0
Ave. Budget for DSM (USD)	110,114	780,855

5.7 Financial Indicators

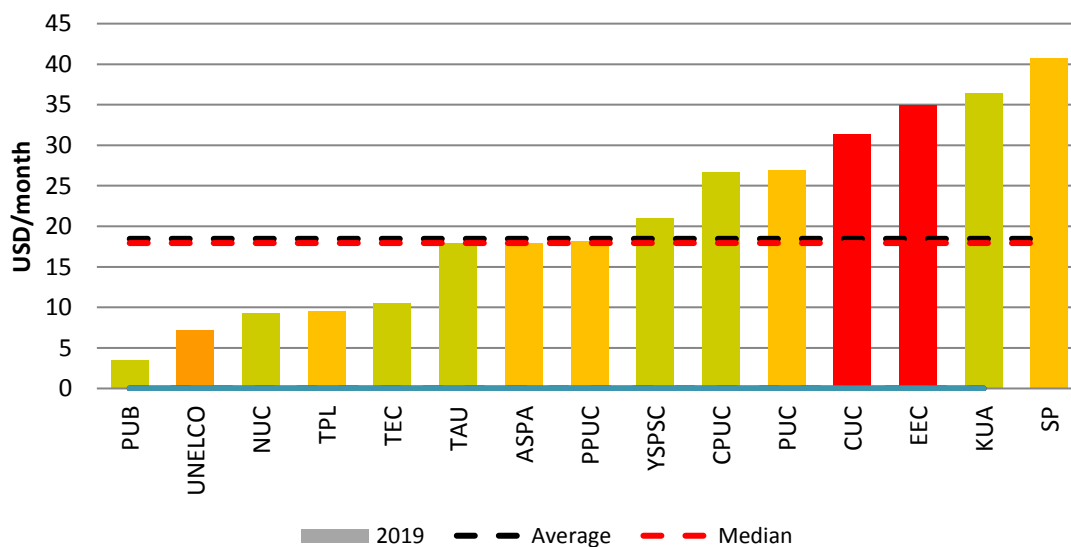
(i) Tariff Analysis

General

Conducting tariff analysis of Pacific utilities is highly complex due to the different tariff schedules and structures for the total 21 Pacific power utilities. In 2019 only 15 utilities participated in the annual benchmarking survey. Figure 5.22 show their tariff in an ascending order.

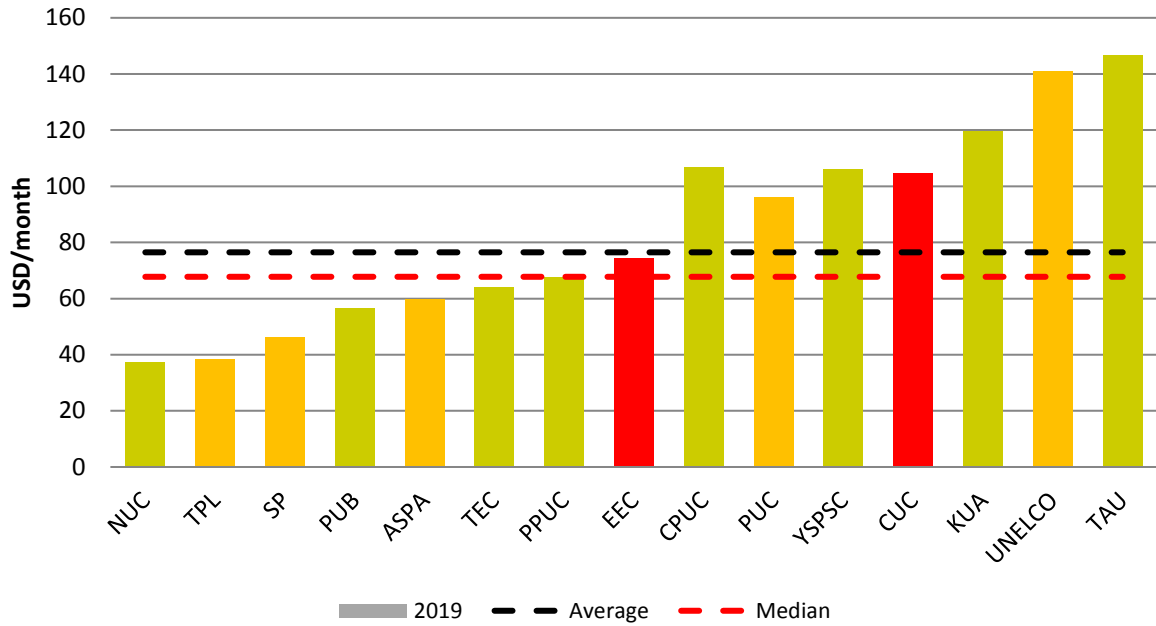
Domestic - 50kWh/month

Figure 5.22: Domestic Consumer Cost (USD per month) 2019 for 50kWh Consumption



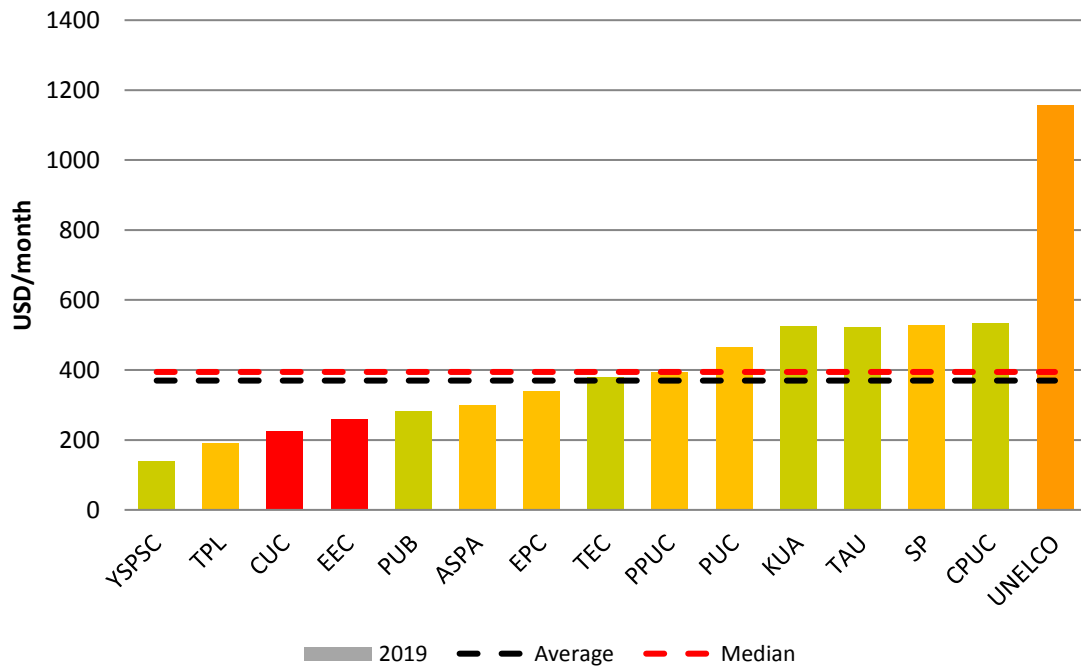
Domestic - 200kWh/month

Figure 5.23: Domestic Consumer Cost (USD per month) 2019 for 200kWh Consumption



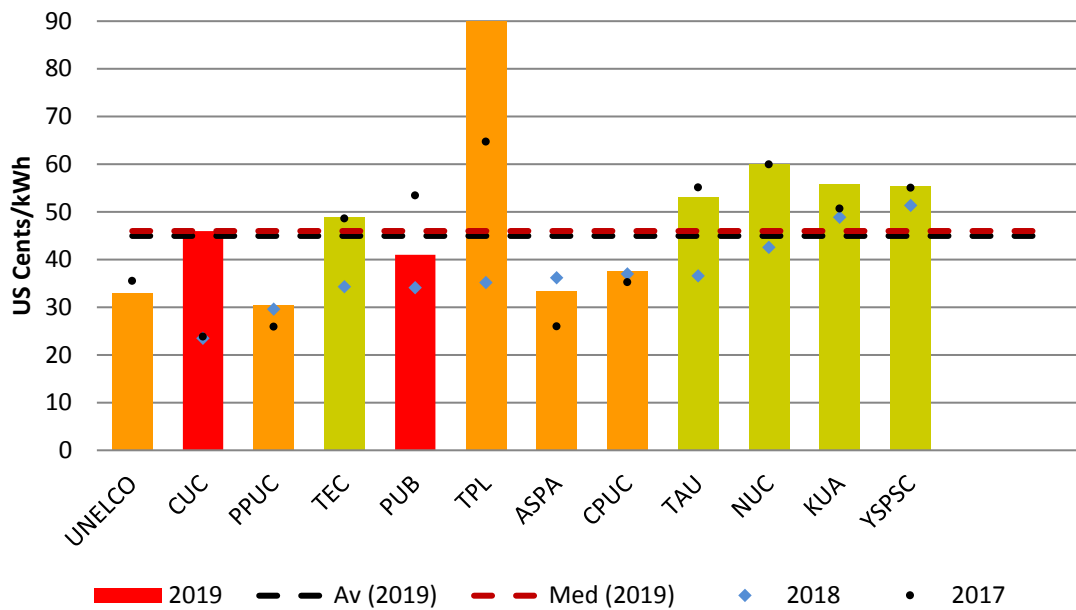
Commercial - 1000kWh/month

Figure 5.24: Commercial Consumer Cost (USD per month) 2019 for 1000kWh Consumption



(iv) Average Supply Costs

Figure 5.25: Average Supply Costs (US Cents/kWh) 2019 (2018) (2017)



The large utilities have the lowest average supply cost. This is related to their relative size, as well as the benefit of hydropower resources.

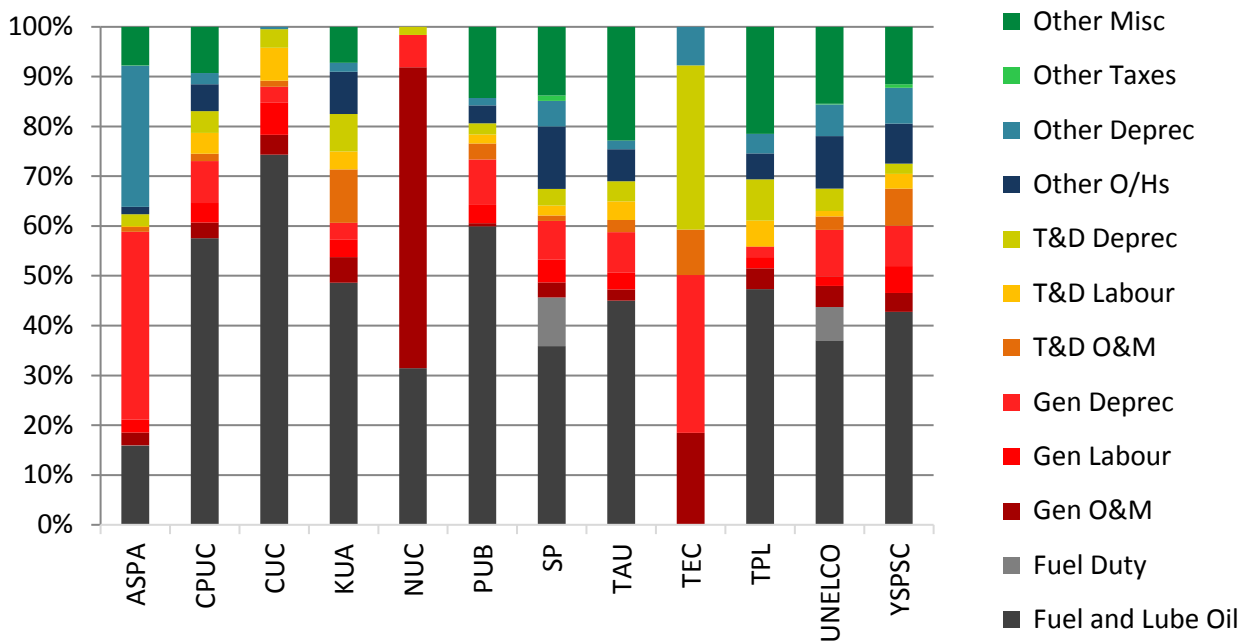
The medium-sized utilities are quite consistently represented in the middle of the cost spectrum with large utilities having lower average costs and small utilities having a higher average costs, as would be expected.

(iv) Utility Cost Breakdown

The 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 depreciation, transmission and distribution O&M, labour and depreciation, and other overhead expenditure, duty, taxes and miscellaneous costs. The percentage contributions of each component are presented for the utilities that reported sufficient data in Figure 5.26 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

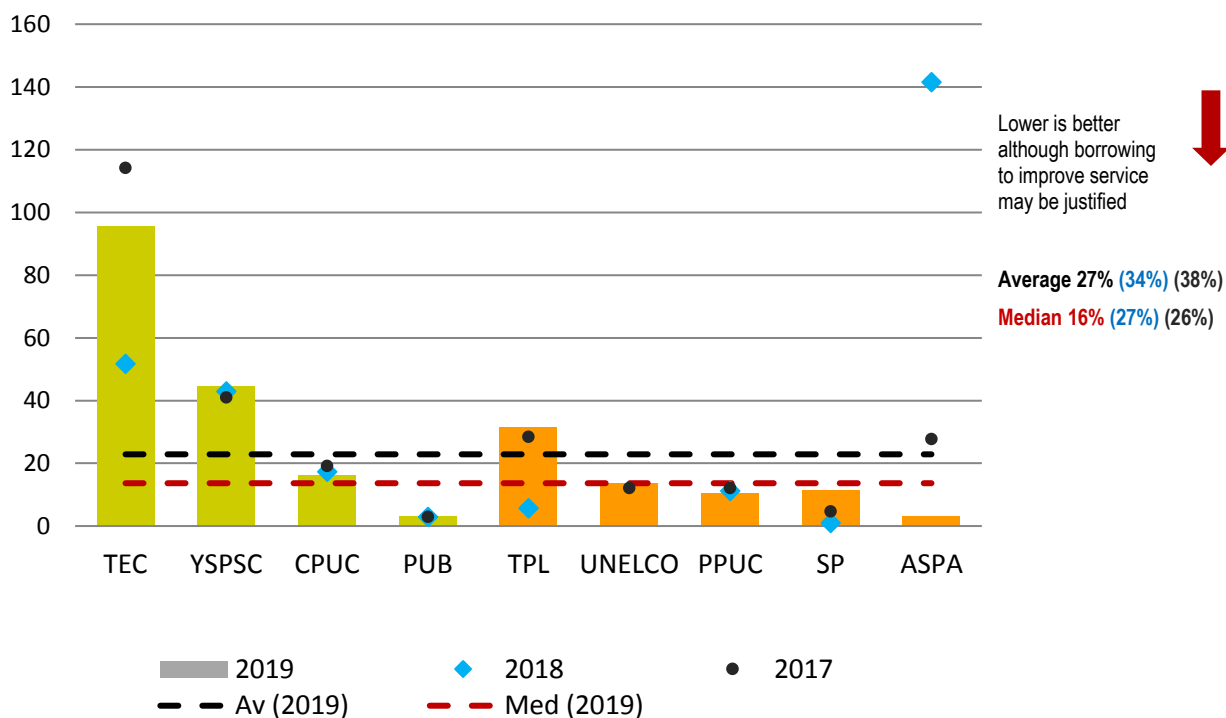
Figure 5.26: Utility Cost Breakdown (%) 2019



(v) Debt to Equity Ratio

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.

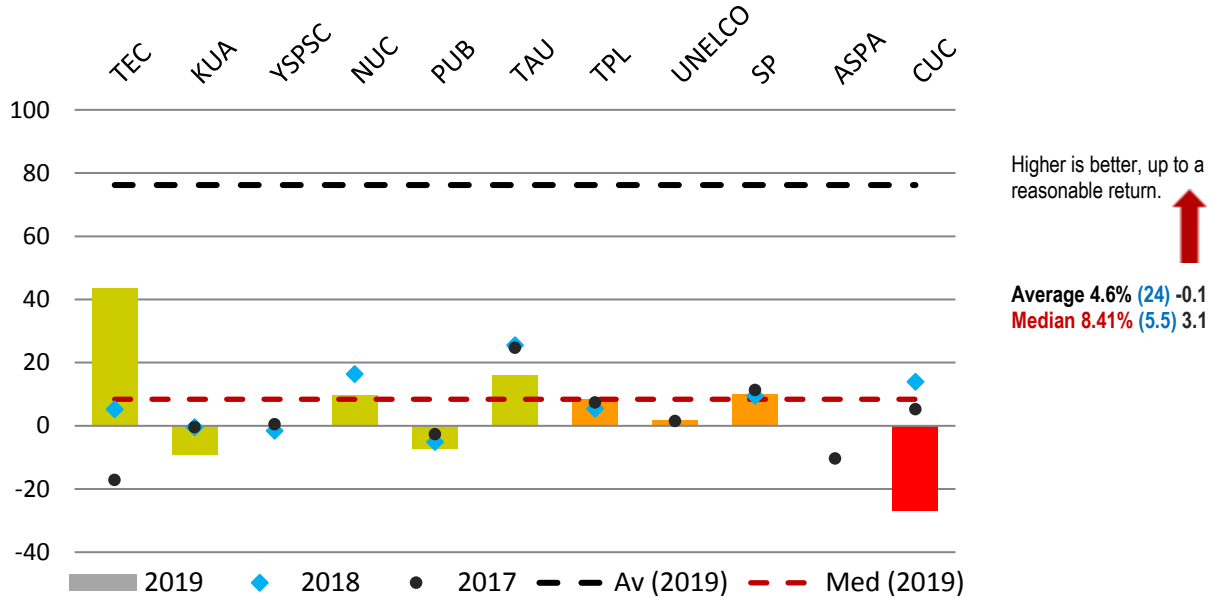
Figure 5.27: Debt to Equity Ratio (%) 2018 (2017) (2016)



(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 5.28.

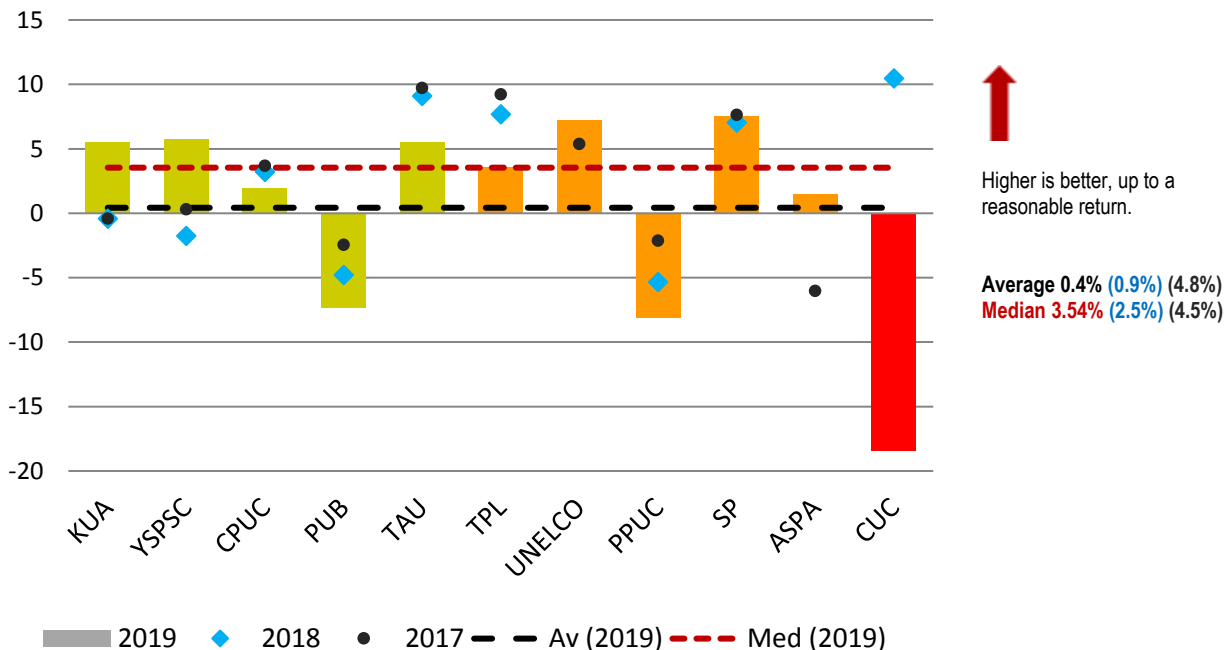
Figure 5.28: Rate of Return on Total Operating Assets in 2019 (2018) (2017) (%)



(vii) Return on Equity

ROE measures financial returns on owners' funds invested. Results for ROE are shown in Figure 5.29. Some outlying values have been disregarded as their accuracy is not credible. As Figure 5.29 shows, overall performance has deteriorated with a reduction in average return from 0.9% in 2018 to 0.4% in 2019.

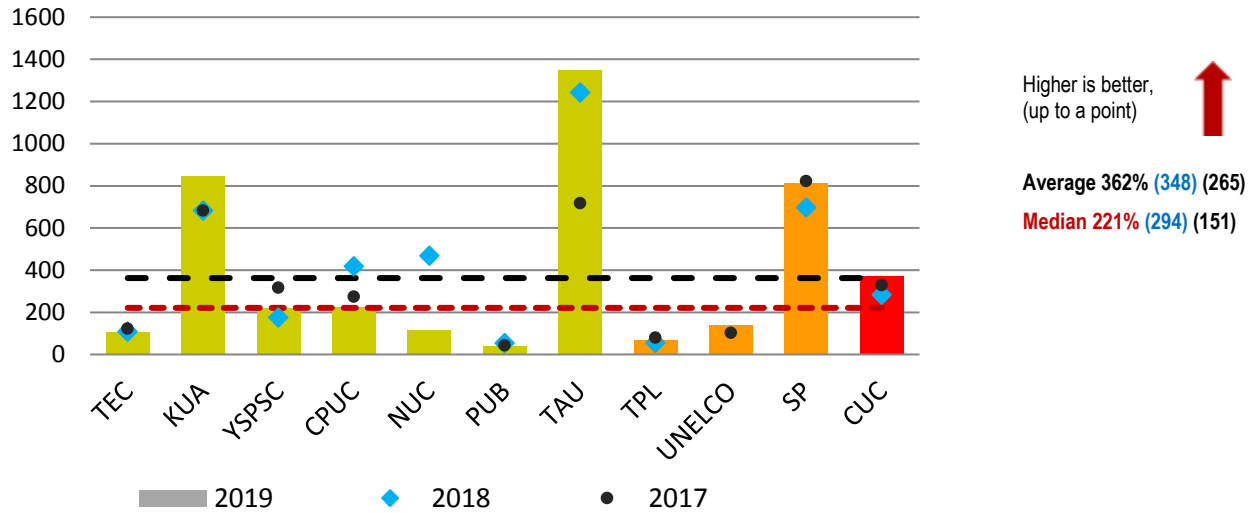
Figure 5.29: Return on Equity (%) 2019 (2018) (2017)



(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 2019, as illustrated in Figure 5.30, the reported average current ratio has increased significantly to 362%, with a median value of 221%.

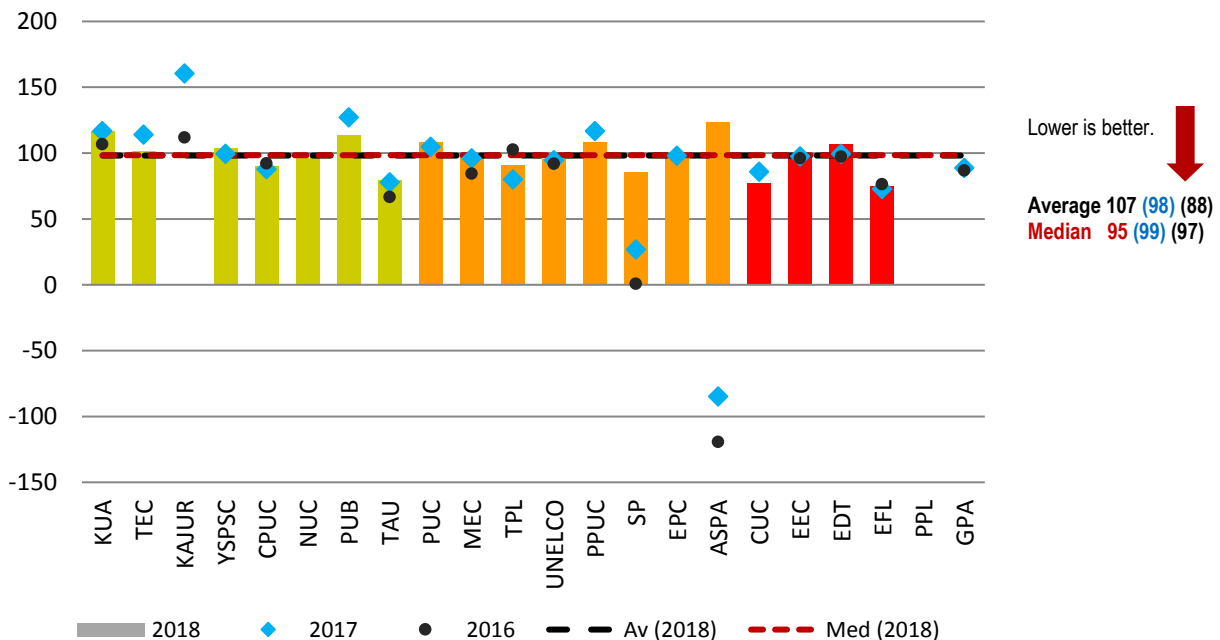
Figure 5.30: Reported Current Ratio (%) 2019 (2018) (2017)



(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 95.47 in 2019. As shown in Figure 5.31, seven utilities have an operating ratio above 100 and eight utilities have an operating ratio below 100.

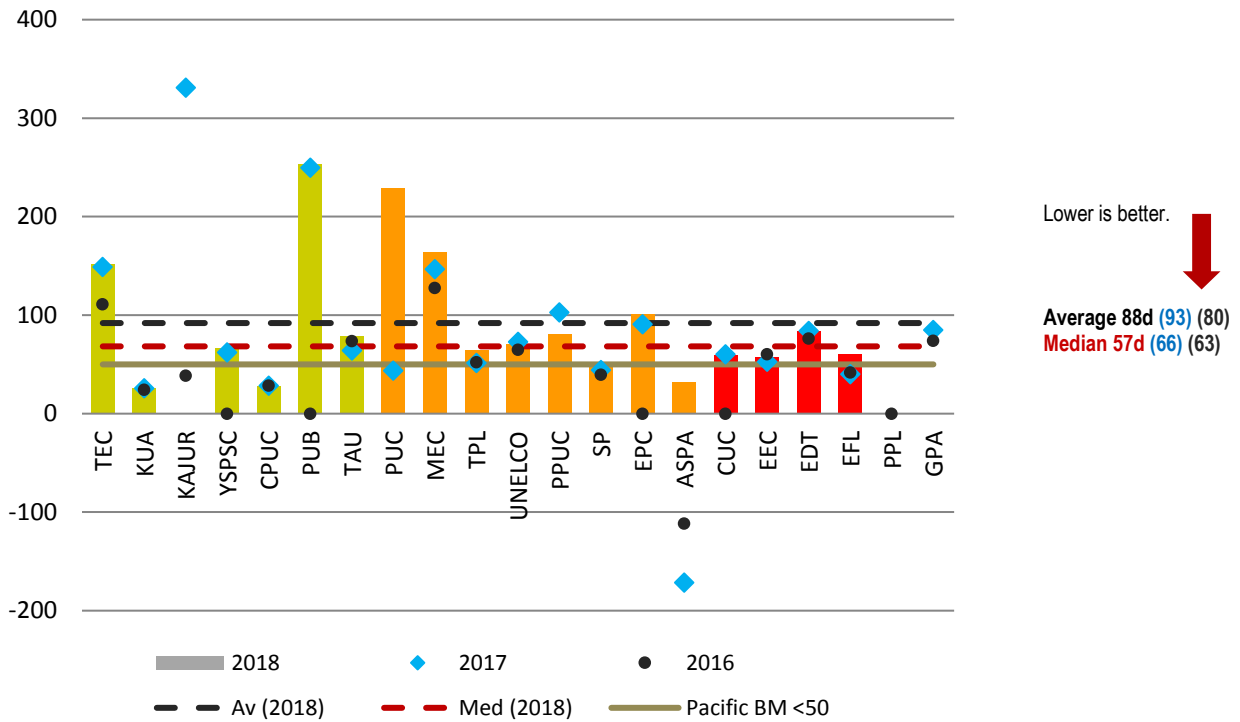
Figure 5.31: Operating Ratio in 2019 (2018) (2017)



(ix) Debtor Days

This indicator measures how long it takes, on average, for the utility to collect debts. In 2019, the Pacific average was 88 days compared to the Pacific benchmark of 50.

Figure 5.32: Reported Debtor Days (Days) 2019 (2018) (2017)

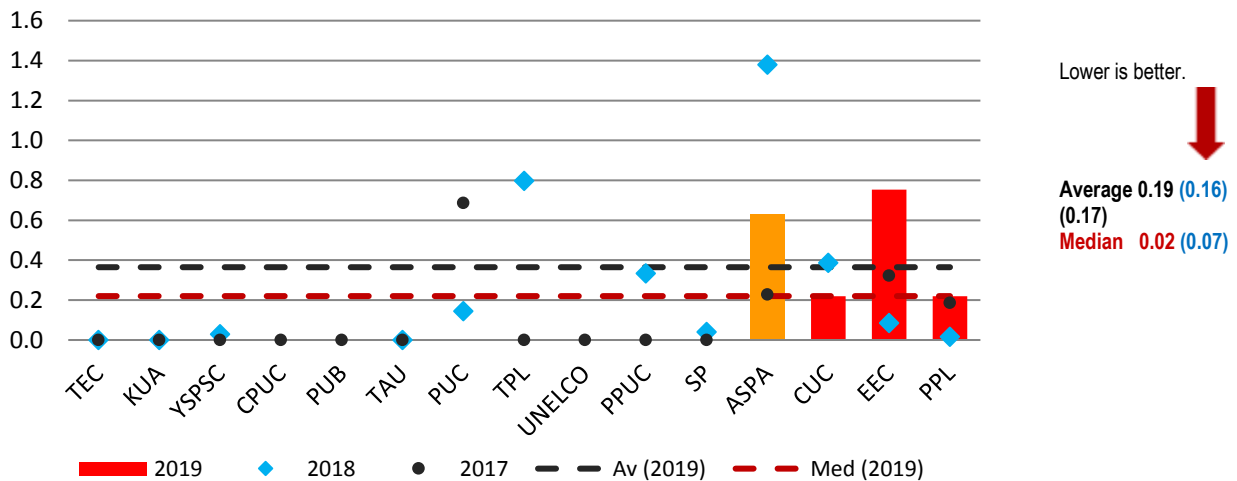


5.8 Human Resources and Safety Indicators

(i) Lost Time Injury Duration Rate

The average for 2019FY was 0.36 days per FTE employee, compared to 0.23 for 2018FY (refer Figure 5.33). The median was 0.22 days per FTE employee compared to 0.12 in 2018. The results are variable and not sufficient enough 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

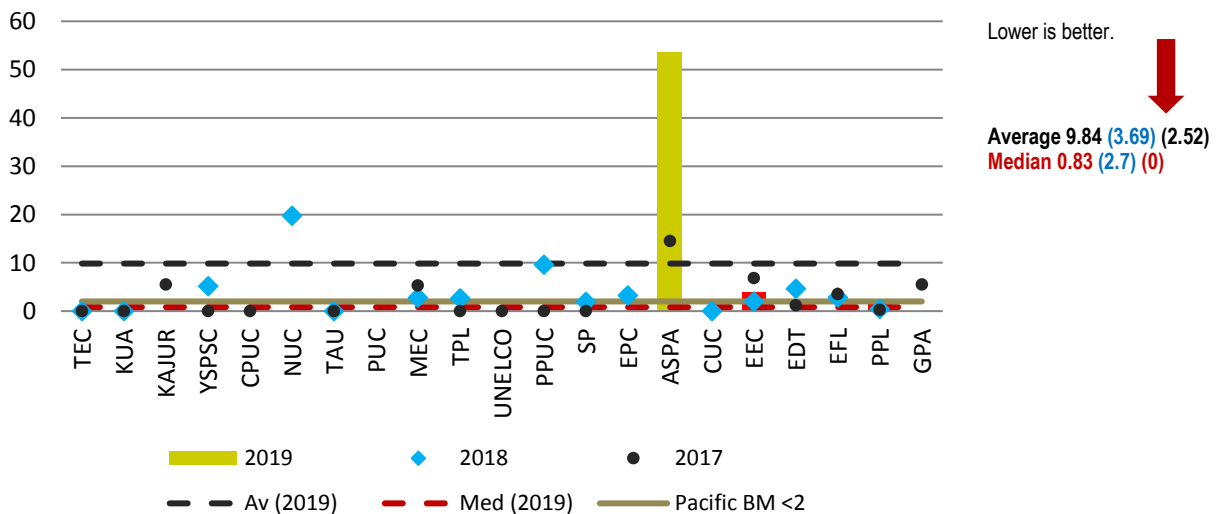
Figure 5.33: LTIDR (Days per FTE Employee) 2019 (2018) (2017)



(ii) Lost Time Injury Frequency Rate

The average for 2019 is 9.84 and the median 0.83. This has significantly risen from results recorded in 2018FY. APSA and EEC have frequency rates above pacific benchmark indicating a need for improved safety management.

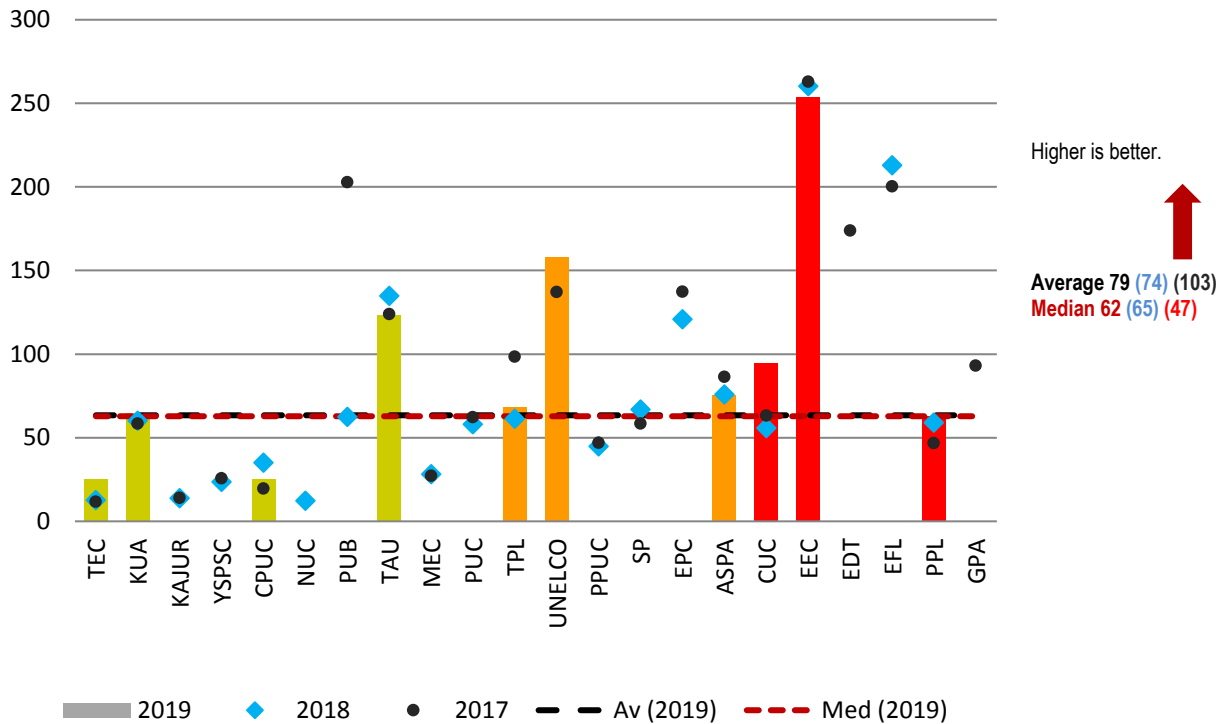
Figure 5.34: LTI Frequency Rate (Number of Incidents per Million Hours) 2019 (2018) (2017)



(iii) Overall Labour Productivity

The average productivity reduced in 2019, compared to results from 2018FY (refer Figure 5.35). Labour productivity now averages 63 customers per FTE employee, with a median of 63. A higher productivity is expected of larger utilities that operate with some economies of scale.

Figure 5.35: Overall Labour Productivity 2019 (2018) (2017) (Customers per FTE Employee)



5.9 Overall Composite Indicator

The overall composite indicator of utility performance developed in 2011 has been used again this year to rank comparative performances between utilities. Where gaps existed in the data submitted by some utilities it was not possible to calculate an aggregate score.

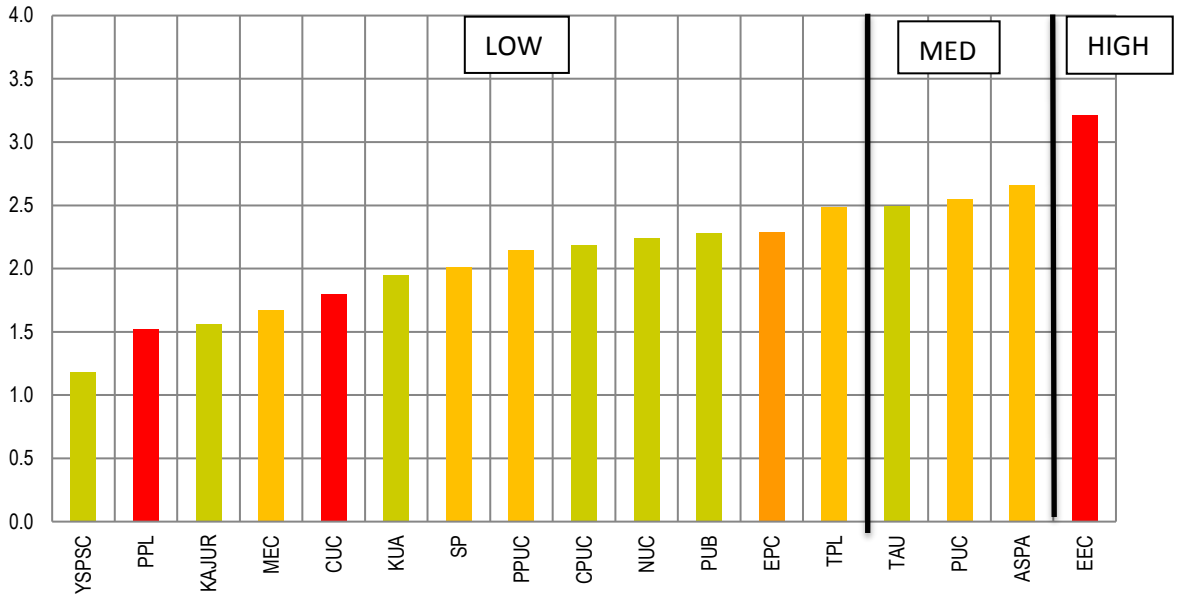
The overall composite indicator is a simple indicator that equally weights generation efficiency, capacity utilisation, system losses and overall labour productivity, as derived from quantitative scores on a scale up to 4.0. Overall, this was considered to be a valid assessment of technical performance.

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%)
Final score weighted in terms of comparative data reliability	

Table 5.4: Composite Indicator Components for 2018FY

Results are summarised in Figure 5.36. The scores for previous years have not been shown this year as the components of the indicator have changed (data reliability weighting now incorporated). Only data for those utilities with sufficient data for the 2019 FY have been shown.

Figure 5.36: Composite Technical Indicator 2019



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Table G.1: KPIs 2018 (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	76.928	35.550	99.182	1.712	3.953	4.705	808.920	0.628	0.190	232.450	2.827	2.542	0.000
CPUC	68.420	26.198	99.999	1.113	3.958		1207.430	0.001	0.000	25.545	0.001	1.828	0.000
CUC	78.648	40.195	92.044	0.203	3.940	4.691	305.123	3.509	4.447	26.413	4.699	0.000	0.000
EDT	63.490	29.938	100.000	4.434	4.663	4.752	732.389	0.000	0.000	57.031	2.843	37.304	2.485
EEC	58.243	24.687	100.000	16.672	3.838	4.397	1200.000	0.000	0.000	20.048	0.523	8.633	91.044
EPC	56.682	29.105	96.535	1.629	4.069		2638.807	1.282	2.183	20.045	3.410	45.965	12.848
EFL	64.354	60.934	100.000	7.906	0.005	4.701	1113.287					61.862	3.242
KAJUR	87.277	49.769	100.000	0.340	3.443		1536.436				3.977	0.000	0.000
KUA	56.854	27.177	99.974	0.913	3.452		912.284	0.012	0.014	51.521	1.691	6.181	0.000
MEC	79.945	43.651	82.557	3.774	3.774	4.493	715.019	4.303	13.140	43.840	6.312	0.985	0.000
NUC	77.137	34.646	98.940	0.705	3.762	4.478	842.090	0.624	0.436	17.176	1.011	3.286	0.000
PPL	61.291	22.805	99.962	0.886	6.439	8.061	4613.983	0.038	0.000		12.381	38.109	47.552
PPUC	81.131	32.093	95.252	1.346	3.914	4.659	1049.694	4.748	0.000	53.520	4.145	1.610	0.000
PUB	58.070	41.613	98.863	658.306	3.984		2664.571	0.179	0.958	15.647	4.571	8.335	0.000
PUC	85.427	31.699	100.000	#DIV/0!	4.990	49.969	721.239	0.000	0.000	284.154	4.590	0.004	15.910
SP	61.384	29.769	85.989	1.167	3.873		810.860	6.772	7.239	34.027	3.734	1.960	0.000
TAU	70.788	21.692	100.000	2.325	3.680		655.559	0.000	0.000	37.128	2.496	14.661	11.298
TEC	54.447	41.258	100.000	0.212	3.425	4.077	4374.544				6.719	8.442	0.000
TPL	69.239	40.083	99.992	1.493	4.369		1079.657	0.008		19.895	3.342	10.054	3.257
UNELCO	58.791	28.499	92.292	65.900	3.878	4.705	476.198	5.566	2.142	22.479	2.169	10.894	1.583
YSPSC	57.080	10.649	99.747	0.306	3.551		2976.341	0.114	0.139	29.807	4.694	9.601	0.000

Table G.2: KPIs 2018 (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
	%	%	%	%	%	Y/N	%	%		events/100km	%	US\$/km
ASPA	96.903	0.000	0.000	0.000	0.000	No	10.593	10.593	140.943	21.648	21.201	14217.698
CPUC	98.182	0.000	0.000	0.000	0.000	yes	15.583	15.583	59.282	87.901	15.946	12264.655
CUC	100.000	0.000	0.000	0.000	0.000	Yes	8.134	8.134	264.032	22.192		12418.960
EDT	1.452	64.731	0.000	0.000	0.000	Yes	5.649	4.878	397.701	0.000		10089.344
EEC	0.000	0.000	0.000	0.015	0.000	Yes	3.665	3.665	265.841	7.350	14.784	26839.001
EPC	54.035	0.000	0.000	0.000	0.000	Yes	9.895	9.895	443.117	6.588	8.705	1426.247
EFL	7.148	30.990	0.000	0.000	0.000	Yes	10.504		399.589			
KAJUR	100.000					No	32.324	32.324	95.577		19.315	0.000
KUA	93.819	0.000	0.000	0.000	0.000	No	11.424	11.424	113.313	55.233	8.431	5934.431
MEC	99.015					No	15.846	15.846	163.182	21.931	13.920	20231.554
NUC	96.713	0.000	0.000	0.000	0.000	No	22.847	22.847	82.013	252.055	17.640	29955.118
PPL	14.339	17.226	0.000	0.000	30.326	Yes	22.336	54.456	158.838	546.316		0.000
PPUC	98.390	0.000	0.000	0.000	0.000	No	12.591	12.591	113.317	26.374	33.988	12223.335
PUB	100.000					Yes	10.180	10.180	542.804	130.000	0.029	3489.036
PUC	80.379	0.000	0.000	0.000	0.000	Yes	-6.092	-6.092	148.392	4.984	42.919	2400.068
SP	97.061	0.000	0.000	0.000	0.000	No	6.316	6.316	207.925	30.183	20.657	4016.187
TAU	85.339	0.000	0.000	0.000	0.000	Yes	7.279	7.279	496.167	4.831	22.652	11439.607
TEC	91.450	0.000	0.000	0.000	0.000	No			584.600	0.000	21.958	3996.681
TPL	93.093					Yes	28.967	28.967	159.312	77.561	12.892	4347.482
UNELCO	87.523	0.000	1.223	0.000	0.000	Yes	5.574	5.574	361.430	6.616	16.575	3449.419
YSPSC	99.996	0.000	0.000	0.000	0.000	Yes	4.396	4.396	124.220	2.562	7.320	153.271

Table G.3: KPIs 2018 (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	23.678	5.075	0.769	0.631	0.139	0.000	0.000	0.000	0.000	0.000	0.000	28.753	0.769
CPUC	0.001	0.001	8.074	5.972	2.102	0.000	0.000	0.000	5.120	5.120	0.000	0.001	13.194
CUC	1033.655	311.824	11.125	8.028	3.097	160.961	156.524	4.436	0.000	0.000	0.000	1506.440	11.125
EDT													
EEC	41.104	22.056	2.882	2.413	0.470	6.015	6.015	0.000	0.513	0.513	0.000	69.175	3.395
EPC	1155.089	230.158	10.357	9.563	0.795	54.218	52.805	1.413	1.299	1.296	0.003	1439.465	11.657
EFL	0.001	0.001	0.010	4.482	2.263	2.218						0.011	4.482
KAJUR													
KUA	752.844	0.000	1.039	1.039	0.000	308.616	145.554	163.062	2.077	1.039	1.039	1061.459	3.116
MEC	697.576	853.964	7.013	5.464	1.549	735.573	561.421	174.152	6.069	5.020	1.049	2287.113	13.083
NUC	1.266	1.266	95.646	47.823	47.823	2.532	1.266	1.266	1.659	1.659	0.000	5.065	97.305
PPL	0.078	0.078	4.131	2.305	1.826	0.084	0.082	0.001	24.176	23.231	0.945	0.174	28.307
PPUC	0.054	0.035	0.001	0.001	0.000	0.005	0.005					0.094	0.001
PUB	0.114	0.015				0.276	0.114	0.162	0.000	0.000	0.000	0.406	0.000
PUC	0.002	0.001	0.896	0.563	0.333	0.043	0.014	0.029	0.971	0.883	0.088	0.046	1.867
SP	692.349	150.074	14.052	11.993	2.060	304.474	304.474	0.000	6.241	6.241	0.000	1146.898	20.294
TAU	46.710		0.972	0.972	0.000	111.411	111.411	0.000	1.118	1.118	0.000	158.121	2.090
TEC													
TPL	0.024	0.010	1.414	0.752	0.662	0.008	0.008	0.000	0.888	0.888	0.000	0.043	2.302
UNELCO	0.004	0.020	0.000	0.000	0.000	0.005	0.005	0.000	0.000	0.000	0.000	0.030	0.000
YSPSC	387.888	249.631	7.274	6.213	1.062	1309.700	590.842	718.858	24.071	17.050	7.021	1947.218	31.345

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Table G.4: KPIs 2018 (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	%	%	%	%	%	%	%	%	
ASPA	Yes	132846	0.000	236.000	None	1.380	53.567	75.894	96.744	69.420	0.000	31.531	29.863	16.786	21.820	0.000	self regulated
CPUC	No	0	0.000	0.000				34.940	20.216	70.150	0.000	23.934	52.278	0.000	17.872	0.001	self regulated
CUC	No	0	0.003	0.000		0.385	0.000	55.713	59.103	6.529		2.412	4.353		1.659		externally regulated
EDT	Yes	0	0.002	0.000	n concession contrac	0.150	4.690		102.683	80.276	10.695	25.844	16.631	45.614	1.143	0.073	externally regulated
EEC	Yes	148322	0.001	0.000	EN 50160	0.084	1.977	260.102	62.000	67.804	0.000	37.032	25.357	36.435	0.000	1.339	externally regulated
EPC	Yes	0	0.000	0.000	AS/NZ 3000/2007	0.123	3.247	120.710	115.444	82.020	0.000	29.038	34.202	4.054	35.831	0.000	externally regulated
EFL	Yes	0	0.001	0.000	AS/NZS	0.116	2.855	212.903		77.445	101.500	28.307	46.203	24.193	2.215		externally regulated
KAJUR	Yes	0	0.000	0.000	None			13.741	92.273	48.696	0.000	51.305	33.338	15.357	0.000	2.641	externally regulated
KUA	Yes	0	0.000	0.000	KUA	0.000	0.000	60.023	126.772	60.610	0.000	38.357	32.502	4.041	24.067	\	self regulated
MEC	No	0	0.000	0.000	none	0.122	2.787	28.139	98.422	49.722	0.000	49.325	33.072	0.000	15.708	0.000	externally regulated
NUC	Yes	125878	0.001		none	0.012	19.804	12.267	173.528	50.200	2.545	32.593	33.088	3.519	13.592	2.699	externally regulated
PPL	Yes	184600	0.003	406.810	None	0.016	0.498	58.951	9.222	168.866	0.000	18.135	54.109	18.323	9.036	0.497	externally regulated
PPUC	Yes	25000	0.003	0.000	JIS, NEC	0.333	9.653	44.846	89.734	58.959	17.385	23.656	33.627	20.682	4.650	0.000	self regulated
PUB	No							62.362	60.393	50.369	0.000	49.631	21.179	29.190	0.000	16.663	externally regulated
PUC	Yes	0	0.001	0.000	US.NEC	0.144	1893.939	58.091	69.000	103.388	0.000	95.384	66.547	36.840	0.000	3.361	self regulated
SP	No	0	0.000	0.000		0.039	1.913	66.754	10.914	77.947	0.000	22.903	59.292	18.655	0.000	0.827	self regulated
TAU	Yes	44037	0.004	0.000	NZ Standards	0.000	0.000	134.741	100.000	65.628	10.312	34.372	38.511	27.118	0.000	0.000	externally regulated
TEC	Yes	0	0.001	0.000	AUS/NZ	0.000	0.000	12.644	97.680	50.749	10.692	10.692	41.788	0.000	20.565	18.764	self regulated
TPL	Yes	0	0.002	0.000	TPL Power	0.796	2.701	61.171	97.736	76.322	0.000	53.490	65.292	0.000	0.000	154.254	externally regulated
UNELCO	No	0	0.000	0.000	0.000	0.000	0.000	166.041	28.500	60.816	10.186	25.701	23.937	34.920	0.305	0.978	externally regulated
YSPSC	No	0	0.000	0.000		0.029	5.181	23.605	66.757	75.254	5.297	26.336	45.147	28.383	0.000	5.495	self regulated

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Table G.6: KPIs 2018 (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	123.4	141.5	-1109.0	64.7	724.7	32.1	36.2	32.8	0.0	39.6	5.7	6.7	2.7	1.6	1.5	6.3	0.4	0.0	2.7
CPUC	90.3	17.3	590.6	3.2	418.8	28.3	37.0	57.7	0.0	3.2	3.7	8.9	2.2	4.1	4.8	5.1	2.2	0.0	8.2
CUC	77.4	0.0	13.9	10.5	283.0	59.2	23.5	70.8	0.0	11.9	0.0	2.5	5.9	0.0	2.5	0.0	0.7	0.0	5.6
EDT	106.6	6.4	1.3	6.7	37.3	83.6	39.0	38.7	0.0	11.4	10.2	5.6	5.5	7.0	1.3	7.4		1.6	11.3
EEC	97.3	0.4	260.4	10.1	96.9	57.5	32.3	5.1	0.0	2.2	0.1	2.1	21.1	45.9	16.9	3.2	3.5	0.0	0.0
EPC	99.4	33.5	1.4	1.8	367.2	100.7	29.5	46.9	7.0	4.1	3.0	10.6	4.3	3.5	7.9	4.0	1.4	0.0	7.2
EFL	74.7	37.4	8.6	7.9	316.8	60.0	12.4	48.2	0.0	12.3	1.3	8.4	9.3	2.3	4.8	10.4	2.0	0.0	1.0
KAJUR																			
KUA	116.9	0.0	-0.5	-0.4	681.6	26.0	48.8	46.5	0.0	7.3	3.4	4.0	9.6	4.8	7.5	8.3	0.9	0.0	7.6
MEC	98.4	40.9	0.4	-2.0	156.8	163.9	34.6	47.8	0.0	5.6	8.5	5.7	2.4	3.2	0.4	5.5	1.0	0.8	19.3
NUC	95.7	47.6	16.4	24.4	468.5	61.0	42.6	47.9	0.0	3.8	2.4	5.0	3.8	1.8	4.0	12.1	5.9	0.0	13.3
PPL																			
PPUC	108.2	11.2	-1060.4	-5.4	305.7	80.6	29.6	49.8	0.0	12.9	4.0	6.4	5.6	2.3	2.2	4.5	2.3	0.0	10.0
PUB	113.5	2.9	-5.1	-4.8	53.3	253.6	34.1	60.1	0.0	0.5	3.5	9.4	3.3	1.8	1.7	3.5	1.6	0.0	14.8
PUC	108.0	2.9	19.4	1.5	75.9	229.1	42.0	37.9	0.0	4.3	42.3	3.9	2.6	0.6	1.8	1.5	0.2	0.0	4.9
SP	85.1	1.0	9.5	7.0	696.9	50.0	54.0	48.5	0.0	2.1	3.8	5.2	0.9	1.8	2.7	9.0	6.6	1.3	18.1
TAU	79.4	0.0	25.5	9.1	1242.1	78.5	36.6	45.3	0.0	6.1	3.8	7.1	5.6	3.7	5.0	9.9	0.6	0.0	12.9
TEC	101.7	51.7	5.3	-36.0	108.4	151.3	34.3	0.0	0.0	0.0	0.0	17.1	6.3	5.1	0.0	71.5	0.0	0.0	0.0
TPL	90.4	5.7	5.5	7.7	55.9	64.6	35.2	52.3	4.7	6.0	1.6	3.1	1.7	3.4	9.7	2.6	6.1	0.0	9.0
UNELCO	95.0	9.8	1.4	5.8	112.2	70.4	34.3	38.5	6.7	3.5	1.4	4.7	2.0	1.1	4.1	8.2	0.1	0.1	17.9
YSPSC	103.5	42.9	-1.6	-1.8	174.6	66.3	51.3	48.5	0.0	2.6	2.8	6.2	1.9	2.8	1.8	13.3	8.6	0.0	11.4

Currency Conversion Table

Table E.1: Currency Conversion Table for 2017 and 2018 Data

Pacific Utilities	Country	Local Currency	2018				2017			
			Benchmarking Period Start	Benchmarking Period End	Multiplier to Convert to USD (Ave. Rate)	End Fiscal Year Conversion	Benchmarking Period Start	Benchmarking Period End	Multiplier to Convert to USD (Ave. Rate)	End Fiscal Year Conversion
ASPA	American Samoa	USD	1-Oct-17	30-Sep-18	1	1	0	1-Oct-16	30-Sep-17	1
CPUC	Chuuk, FSM	USD	1-Oct-17	30-Sep-18	1	1	0	1-Oct-16	30-Sep-17	1
CUC	Saipan, Northern Marianas	USD	1-Oct-17	30-Sep-18	1	1	0	1-Oct-16	30-Sep-17	1
EDT	French Polynesia	XPF	1-Jan-18	31-Dec-18	0.009259	0.00959969	-0.00034069	1-Jan-17	31-Dec-17	0.009456
EEC	New Caledonia	XPF	1-Jan-18	31-Dec-18	0.009259	0.00959969	-0.00034069	1-Jan-17	31-Dec-17	0.009456
EEWF	Wallis and Fortuna	XPF	1-Jan-18	31-Dec-18	0.009259	0.00959969	-0.00034069	1-Jan-17	31-Dec-17	0.009456
ENERCAL	New Caledonia	XPF	1-Jan-18	31-Dec-18	0.00928	0.00959969	-0.00031969	1-Jan-17	31-Dec-17	0.009456
EPC	Samoa	WST	1-Jul-17	30-Jun-18	0.421455	0.383599997	0.037855004	1-Jul-16	30-Jun-17	0.390671
FEA	Fiji	FJD	1-Jan-18	31-Dec-18	0.477356	0.46667214	0.01068386	1-Jan-17	31-Dec-17	0.483444
GPA	Guam	USD	1-Oct-17	30-Sep-18	1	1	0	1-Oct-16	30-Sep-17	1
KAJUR	Kwajalein Atoll, Marshall Islands	USD	1-Oct-17	30-Sep-18	1	1	0	1-Oct-16	30-Sep-17	1
KUA	Kosrae, FSM	USD	1-Oct-17	30-Sep-18	1	1	0	1-Oct-16	30-Sep-17	1
MEC	Marshall Islands	USD	1-Oct-17	30-Sep-18	1	1	0	1-Oct-16	30-Sep-17	1
NPC	Niue	NZD	1-Oct-17	30-Sep-18	1	1	0	1-Oct-16	30-Sep-17	1
NUC	Nauru	AUD	1-Jul-17	30-Jun-18	0.7777	0.676656578	0.101043422	1-Jul-16	30-Jun-17	0.712008
PPL	Papua New Guinea	PGK	1-Jul-17	30-Jun-18	0.72825	0.740456021	-0.01220602	1-Jul-16	30-Jun-17	0.766637
PPUC	Palau	USD	1-Jan-17	31-Dec-18	0.313942	0.307666233	0.006275767	1-Jan-16	31-Dec-17	0.307036
PUB	Kiribai	AUD	1-Oct-17	30-Sep-18	1	1	0	1-Oct-16	30-Sep-17	1
PUC	Pohnpei, FSM	USD	1-Jan-17	31-Dec-18	0.743623	0.704577618	0.039045382	1-Jan-16	31-Dec-17	0.766637
SP	Solomon Islands	SBD	1-Oct-17	30-Sep-18	1	1	0	1-Oct-16	30-Sep-17	1
TAU	Cook Islands	NZD	1-Jan-18	31-Dec-18	0.125486	0.124551398	0.000934602	1-Jan-16	31-Dec-17	0.125203
TEC	Tuvalu	AUD	1-Jul-17	30-Jun-18	0.667932	0.676656578	-0.00872458	1-Jul-16	30-Jun-17	0.712008
TPL	Tonga	TOP	1-Jan-17	31-Dec-18	0.743623	0.704577618	0.039045382	1-Jan-17	31-Dec-17	0.766637
UNELCO	Vanuatu	VUV	1-Jul-17	30-Jun-18	0.440377	0.43129487	0.00908213	1-Jul-16	30-Jun-17	0.438979
YSPSC	Yap, FSM	USD	1-Jan-17	31-Dec-18	0.009203	0.008775503	0.000427497	1-Jan-17	31-Dec-17	0.009251

Electricity Tariff Tables

Table F.1: Electricity Tariff Table (Local Currency)

Currency Conversion		TOTAL COST TO CONSUMER FOR SET kWh/mth, incl base charge, taxes,etc (IN LOCAL CURRENCY)															
Conversion Factor for each currency		DOMESTIC / RESIDENTIAL										COMMERCIAL / BUSINESS					
Pacific Utilities	Country	Local Currency	kWh/mth:	50	100	200	500	1000	2000	3000	10000	flat rate	1000	3000	10000	50000	
Flat rate																	
ASPA	American Samoa	USD	0.29774	14.89	29.77	59.55	148.87	297.74	595.48	893.22	2977.40		272.34	807.02	2678.40	13372.00	
CPUC	Chuuk, FSM	USD	0.5328	26.64	53.28	106.56	266.40	532.80	1065.60	1598.40	5328.00	0.5629	562.90	1688.70	5629.00	28145.00	
CUC	Siapan, Northern Marianas	USD	0.021 0.097 0.158	31.40	55.80	104.60	102.25	224.10	461.30	821.30	2954.20	0.25970	259.70	779.10	2597.00	12985.00	
EDT	French Polynesia	XPF	22.55 37.05	2104.00	3296.00	5682.00	21509.00	45306.00	94263.00	147328.00	392728.00	33.8000	48924.00	135811.00	392728.00	1802672.00	
EEC	New Caledonia	XPF		3642.00	4934.00	7746.00	14146.00	27016.00	48811.00	92161.00	167583.00		15205.00	63157.00	162125.00	2052268.00	
EPC	Samoa	WST	0.886	44.40	88.70	177.30	443.10	886.10	1772.10	2658.10	8860.10	0.79	794.10	2382.10	7940.10	39700.10	
EFL	Fiji	FJD	0.331 0.331	16.55	33.10	66.20	165.50	331.00	662.00	993.00	3310.00	0.40	399.00	1197.00	3990.00	20615.02	
KAJUR	Kwajalein Atoll, Marshall Islands	USD	0.346	17.30	34.60	69.20	173.00	346.00	692.00	1038.00	3460.00	0.406	406.00	1218.00	4060.00	20300.00	
KUA	Kosrea, FSM	USD		36.40	57.80	119.60	275.00	524.00	1017.00	1510.00	4871.00		492.00	1483.00	4914.00	24049.00	
MEC	Marshall Islands	USD	0.346	17.30	34.60	69.20	173.00	346.00	692.00	1038.00	3460.00	0.406	406.00	1218.00	4060.00	20300.00	
NUC	Nauru	AUD		12.50	25.00	50.00	175.00	425.00	925.00	1425.00	4925.00	0.70	700.00	2100.00	7000.00	35000.00	
PPL	Papua New Guinea	PGK		45.25	85.41	165.74	406.73	808.38	1611.68	2414.98	8038.03	0.9356	953.60	2824.00	9374.00	46798.00	
PPUC	Palau	USD		18.20	33.40	67.50	180.90	394.40	821.40	1248.40	4237.40		438.00	1292.00	4281.00	21361.00	
PUB	Kiribai	AUD	0.1 0.40	5.00	10.00	80.00	200.00	400.00	800.00	1200.00	4000.00	0.55	550.00	1650.00	5500.00	27500.00	
PUC	Pohnpei, FSM	USD	0.4592	26.96	49.92	95.84	233.60	463.20	922.40	1381.60	4596.00	0.4592	459.20	1377.60	4592.00	22960.00	
SP	Solomon Islands	SBD	6.4686	327.71	228.55	369.05	3631.20	4236.20	8256.20	20706.20	68516.20	6.9530	6416.20	18751.47	58721.47	287121.47	
TAU	Cook Islands	NZD		26.50	62.60	216.60	374.60	769.60	1559.60	2349.60	7879.60	0.77	790.00	2330.00	7720.00	38520.00	
TEC	Tuvalu	AUD		15.00	34.50	90.50	258.50	538.50	1098.50	1658.50	5578.50	0.56	560.00	1680.00	5600.00	28000.00	
TPL	Tonga	TOP	0.4435	22.18	44.35	88.70	221.75	443.50	887.00	1330.50	4435.00	same as dor	443.50	1330.50	4435.00	22175.00	
UNELCO	Vanuatu	VUV	164.31	931.00	3768.00	13254.00	33135.00	66270.00	132540.00	198810.00	662700.00	47.65	47650.00	115020.00	383400.00	1917000.00	
YSPSC	Yap, FSM	USD	0.4507	21.06	63.48	105.90	117.17	139.70	184.77	229.84	545.33		455.70	1595.90	5308.00	26520.00	

Cont'

Table F.2: Electricity Tariff Table (USD)

TOTAL COST TO CONSUMER FOR SET kWh/mth, incl base charge, taxes,etc (CONVERTED TO USD)													
Conv Factor to USD	DOMESTIC / RESIDENTIAL								COMMERCIAL / BUSINESS				
	50.00	100.00	200.00	500.00	1000.00	2000.00	3000.00	3000+	1,000	3,000	10,000	50,000	
1	14.89	29.77	59.55	148.87	297.74	595.48	893.22	2977.40	272	807	2678	13372	
1	26.64	53.28	106.56	266.40	532.80	1065.60	1598.40	5328.00	563	1689	5629	28145	
1	31.40	55.80	104.60	102.25	224.10	461.30	821.30	2954.20	260	779	2597	12985	
0.00959969	20.20	31.64	54.55	206.48	434.92	904.90	1414.30	3770.07	470	1304	3770	17305	
0.00959969	34.96	47.36	74.36	135.80	259.35	468.57	884.72	1608.74	146	606	1556	19701	
0.383599997	17.03	34.03	68.01	169.97	339.91	679.78	1019.65	3398.73	305	914	3046	15229	
0.46667214	7.72	15.45	30.89	77.23	154.47	308.94	463.41	1544.68	186	559	1862	9620	
1	17.30	34.60	69.20	173.00	346.00	692.00	1038.00	3460.00	406	1218	4060	20300	
1	36.40	57.80	119.60	275.00	524.00	1017.00	1510.00	4871.00	492	1483	4914	24049	
1	17.30	34.60	69.20	173.00	346.00	692.00	1038.00	3460.00	406	1218	4060	20300	
0.740456021	9.26	18.51	37.02	129.58	314.69	684.92	1055.15	3646.75	518	1555	5183	25916	
0.307666233	13.92	26.28	50.99	125.14	248.71	495.86	743.01	2473.03	293	869	2884	14398	
1	18.20	33.40	67.50	180.90	394.40	821.40	1248.40	4237.40	438	1292	4281	21361	
0.704577618	3.52	7.05	56.37	140.92	281.83	563.66	845.49	2818.31	388	1163	3875	19376	
1	26.96	49.92	95.84	233.60	463.20	922.40	1381.60	4596.00	459	1378	4592	22960	
0.124551398	40.82	28.47	45.97	452.27	527.62	1028.32	2578.99	8533.79	799	2336	7314	35761	
0.676656578	17.93	42.36	146.56	253.48	520.75	1055.31	1589.87	5331.78	535	1577	5224	26065	
0.704577618	10.57	24.31	63.76	182.13	379.42	773.98	1168.54	3930.49	395	1184	3946	19728	
0.43129487	9.56	19.13	38.26	95.64	191.28	382.56	573.84	1912.79	191	574	1913	9564	
0.008775503	8.17	33.07	116.31	290.78	581.55	1163.11	1744.66	5815.53	418	1009	3365	16823	
1	21.06	63.48	105.90	117.17	139.70	184.77	229.84	545.33	456	1596	5308	26520	

