
PACIFIC POWER UTILITIES

# Benchmarking Report

## 2019 Fiscal Year

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More information on this report can be obtained from:

Pacific Power Association
Naibati House
Goodenough Street
Suva, Fiji
Tel: +679 3306 022
Email: ppa@ppa.org.fj
website: http://www.ppa.org.fj

PACIFIC POWER

# Benchmarking

# 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'Energie | 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**

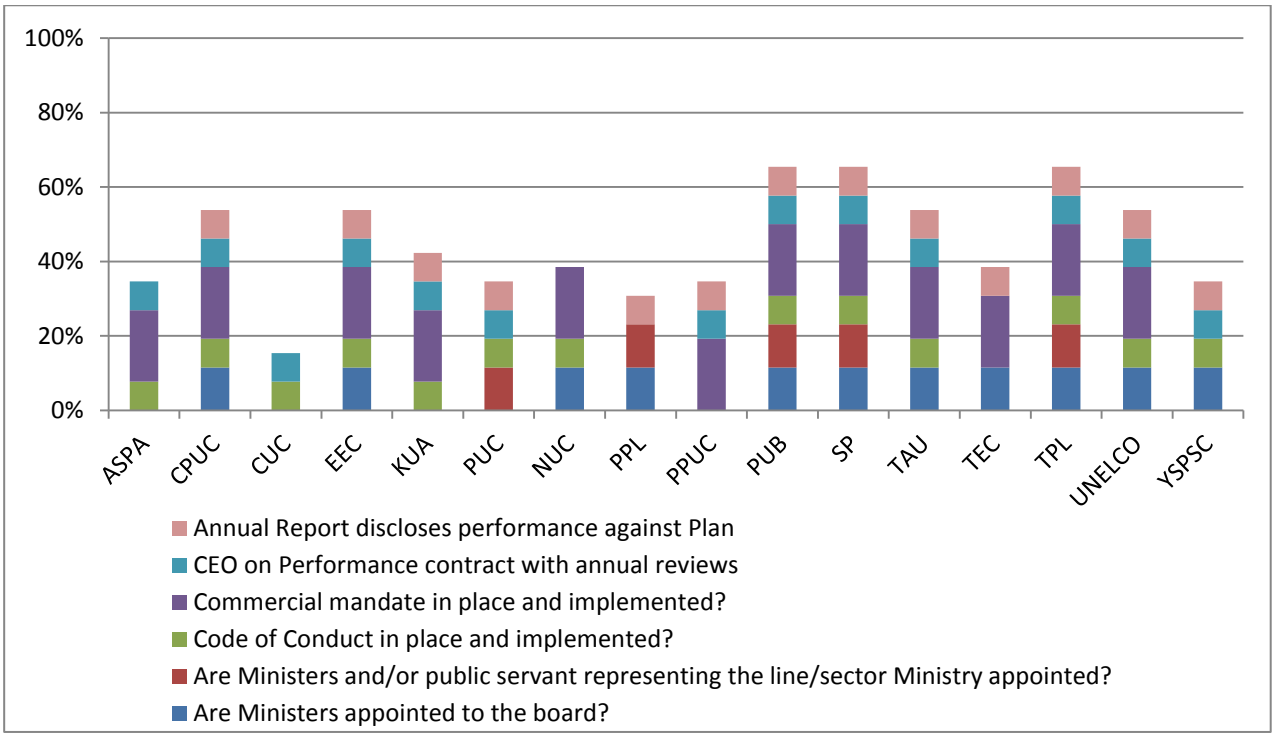
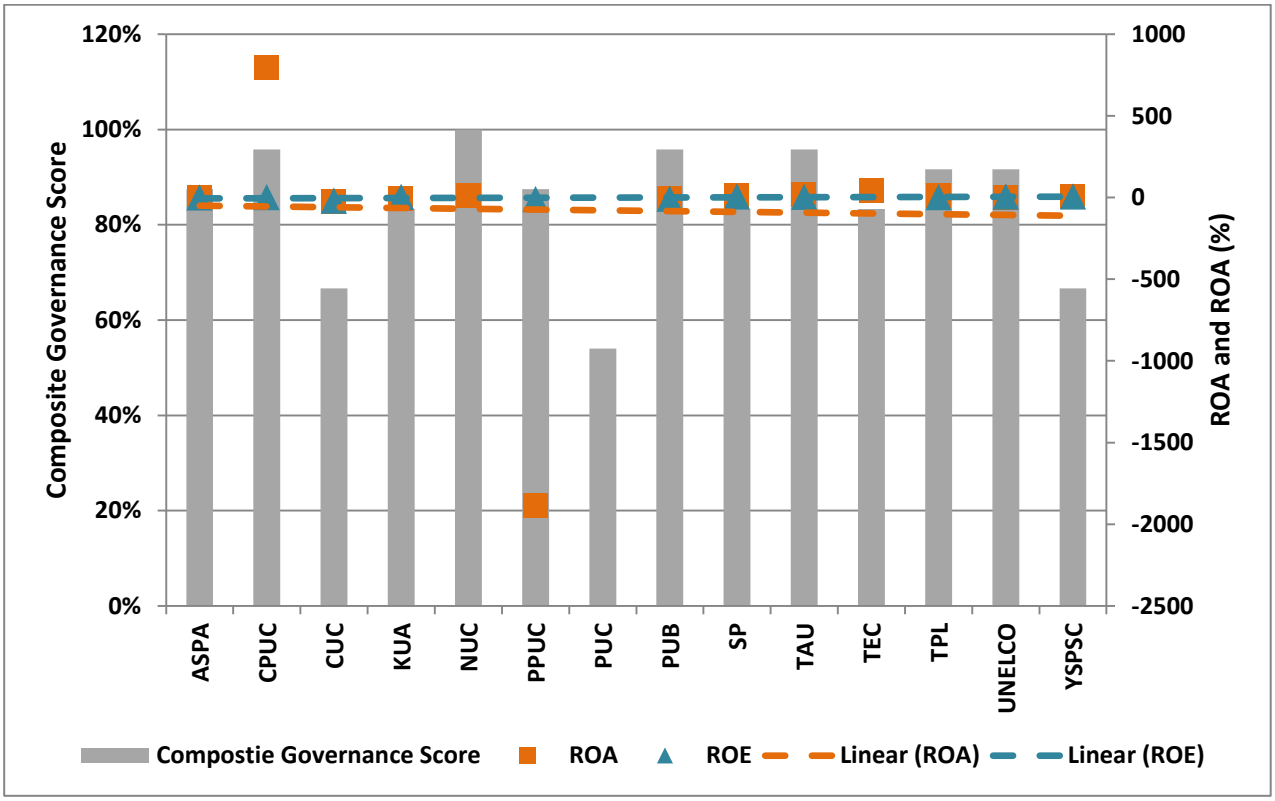


**Figure 2.2: 2019 FY Composite Governance Score compared with ROE and ROA**



# 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.

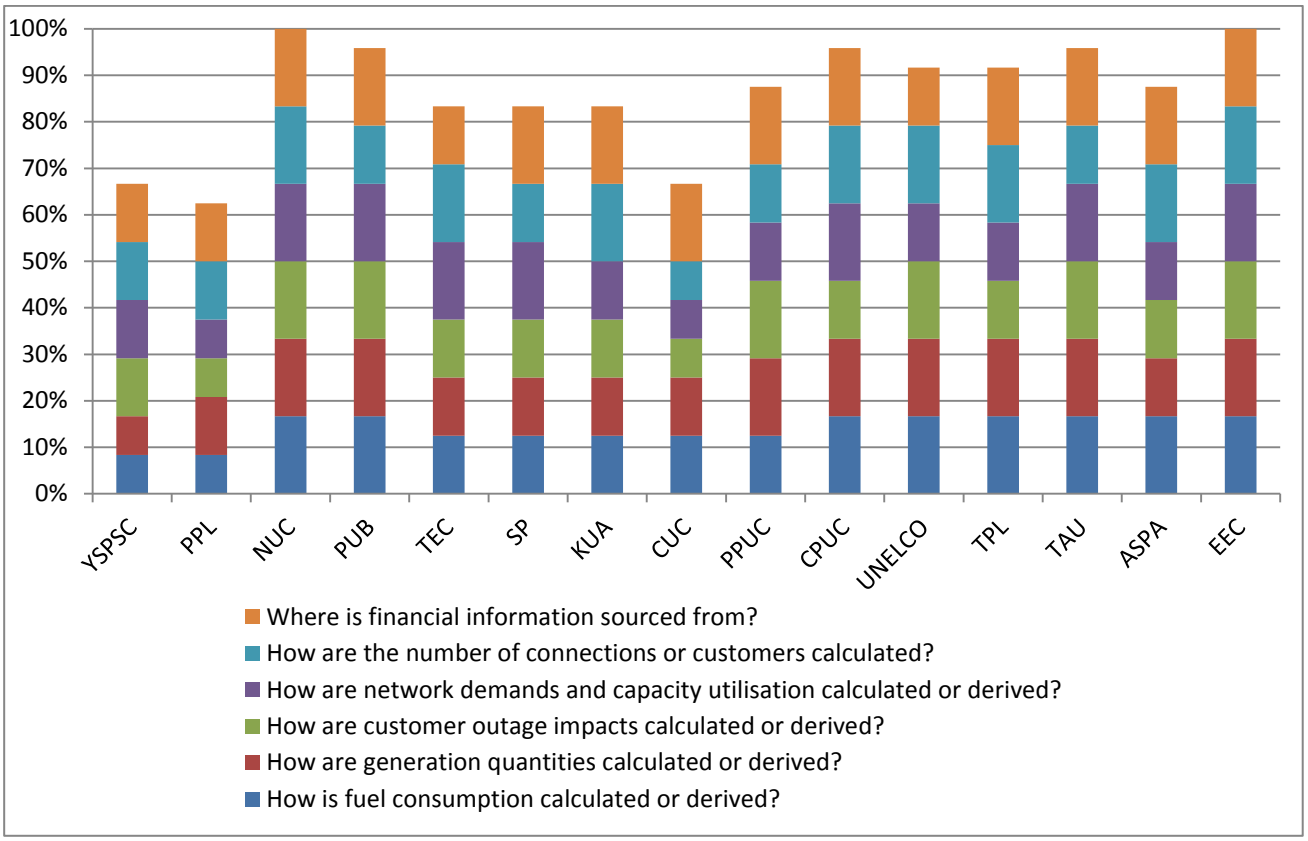
**Table 3.1: Key Gender Statistics**

| 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 |

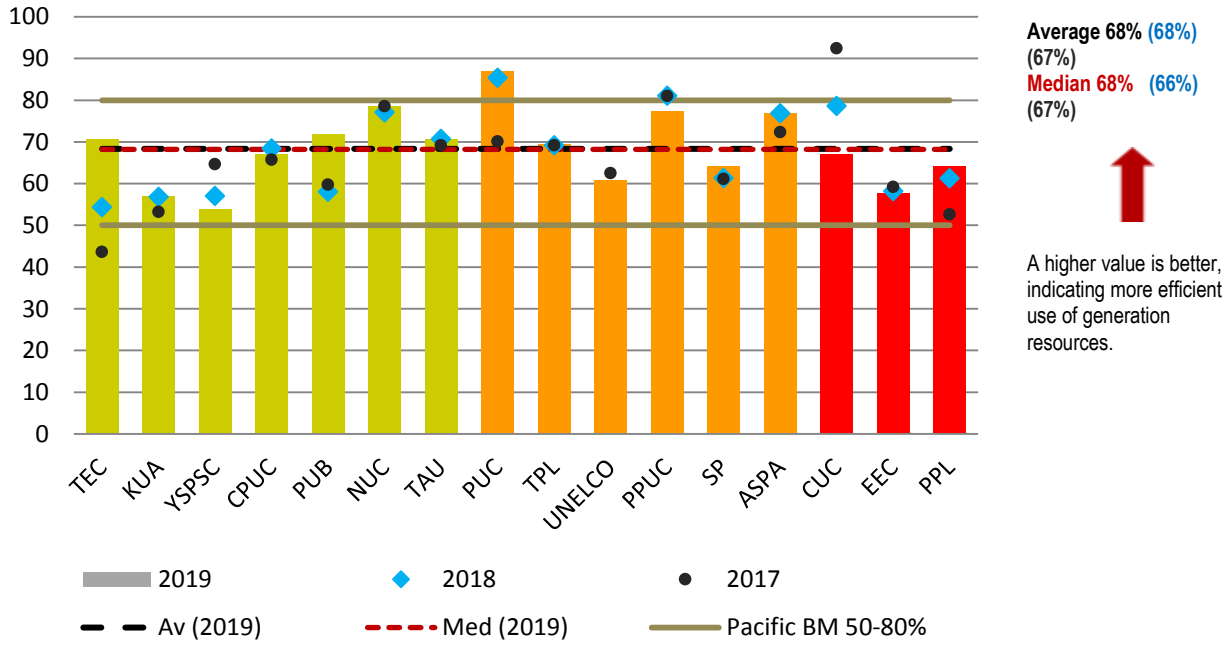
# 5.2 Generation Indicators

## (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)**



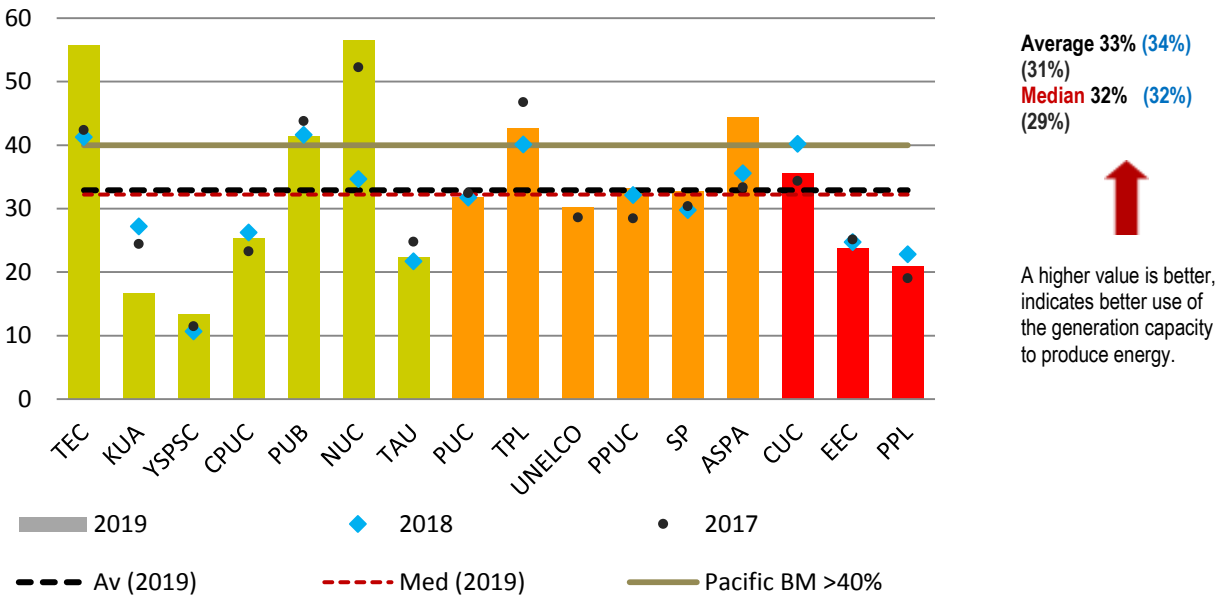

## (ii) Capacity Factor

**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)**

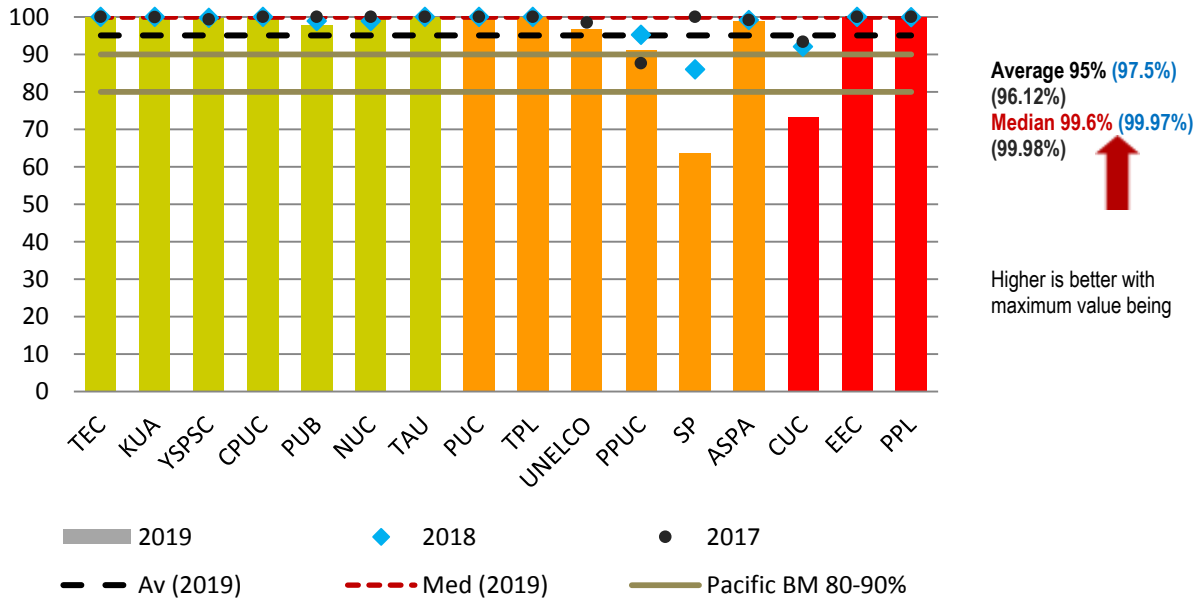



## (iii) Availability Factor

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)**

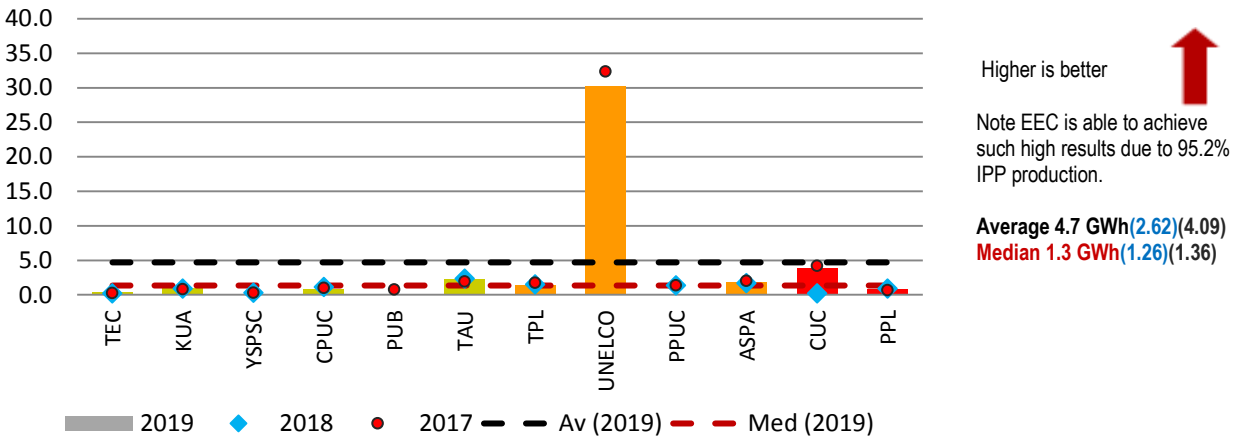



[2]http://en.wikipedia.org/wiki/Availability_factor

## (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.

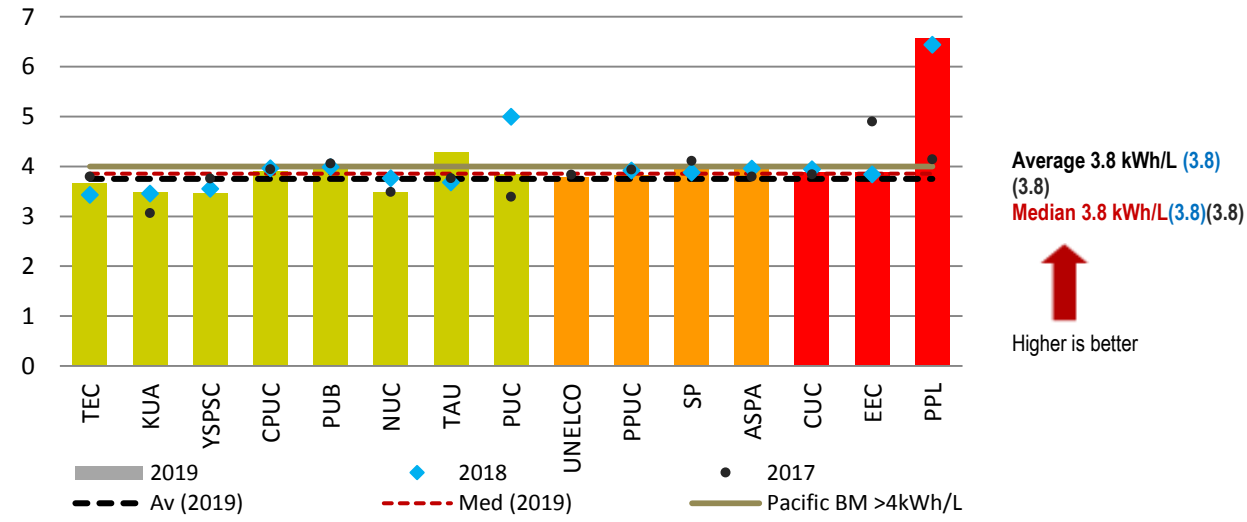
**Figure 5.4: Generation Labour Productivity (GWh/FTE Generation Employee) 2019 (2018) (2017)**




## (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)**

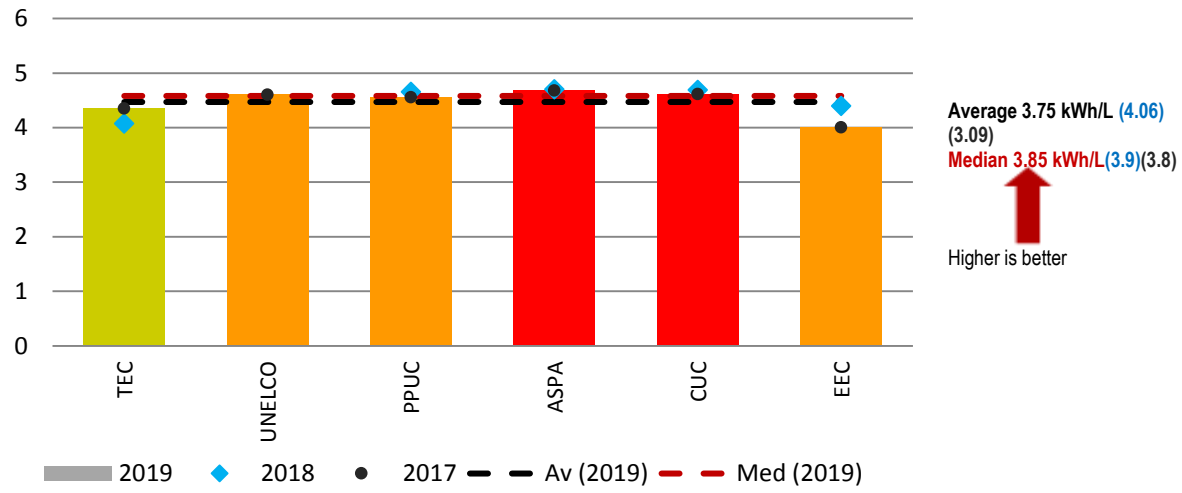


Since most PICT utilities use small high-speed diesel generators, the benchmark values for 2019 are considered reasonable. However, as fuel accounts for the highest cost in power utility generation, improvements in the specific fuel consumption are highly desirable.

## (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.

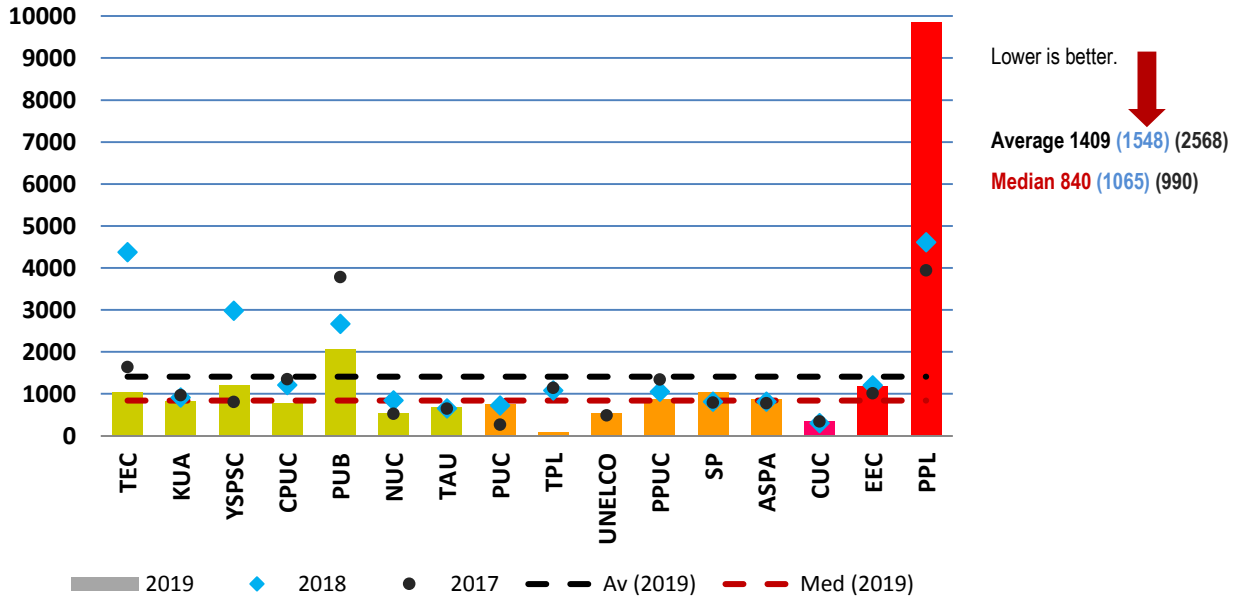
**Figure 5.6: Specific Fuel Consumption (kWh/kg) 2019 (2018) (2017)**




## (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)**

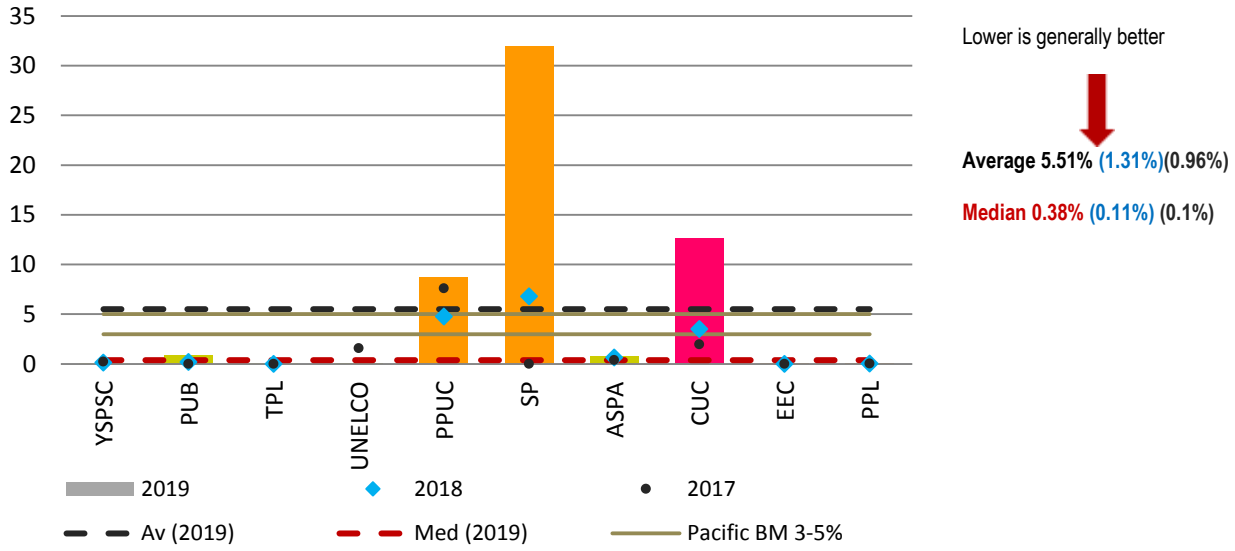


## (viii) Forced Outage

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 5.5% 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)**

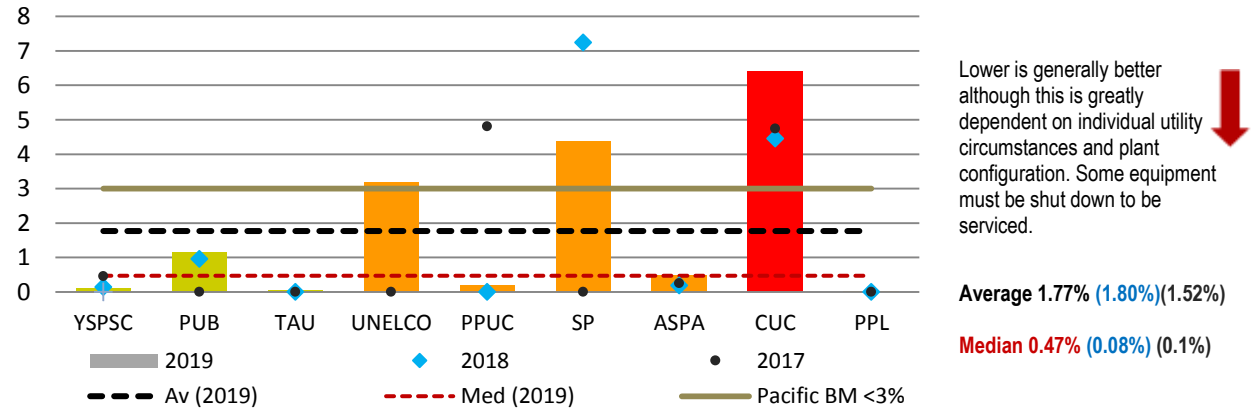



## (ix) Planned Outage

**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.

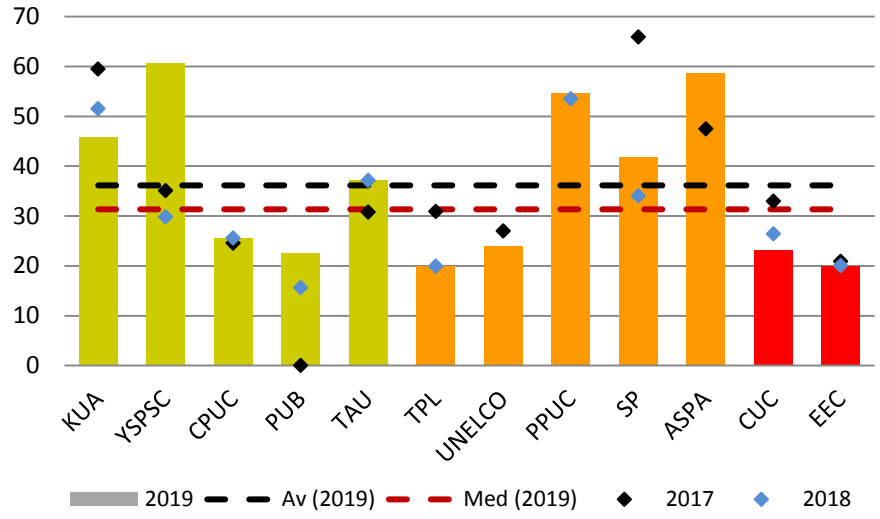
**Figure 5.9: Planned Outage (%) 2019 (2018) (2017)**



## (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)**



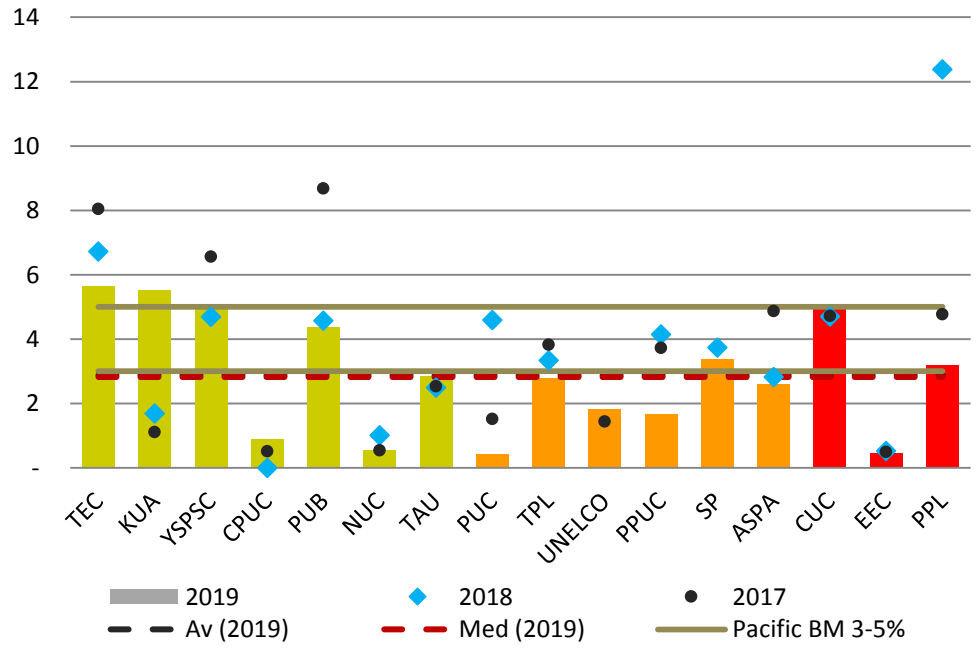

It is not meaningful to say higher or lower is better as circumstances differ for each utility.

**Average USD36 (32) (29)**
**Median USD31 (28) (26)**

## (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)**




Lower is better.

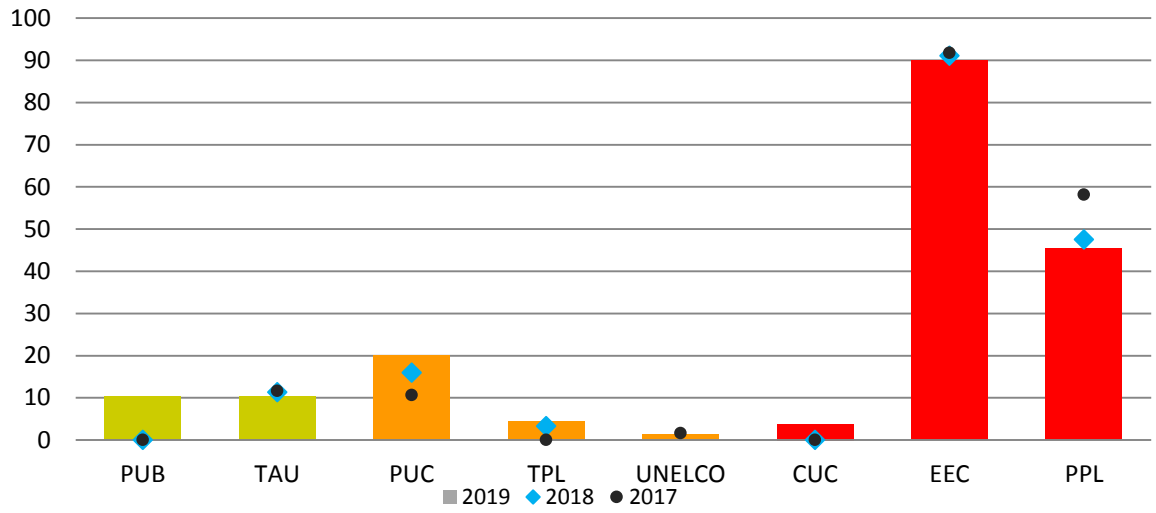
Three to five % is generally considered to be reasonable.

**Average 2.87 (3.89)(3.70)**
**Median 2.82(3.73)(3.63)**

## (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[3]

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

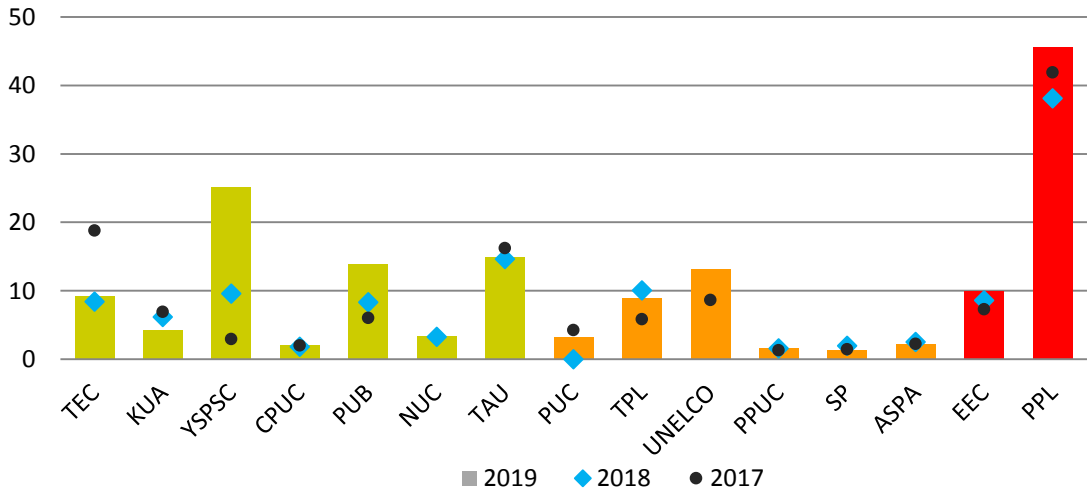



## (xiii) Renewable Energy to Grid

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)**




[3]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

# 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) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Unplan. | Planned | Unplan. | Planned | Unplann. | Planned | Unplann. | Planned |
| | 2018 | 2019 | 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 | - | - | - | - | - | - |

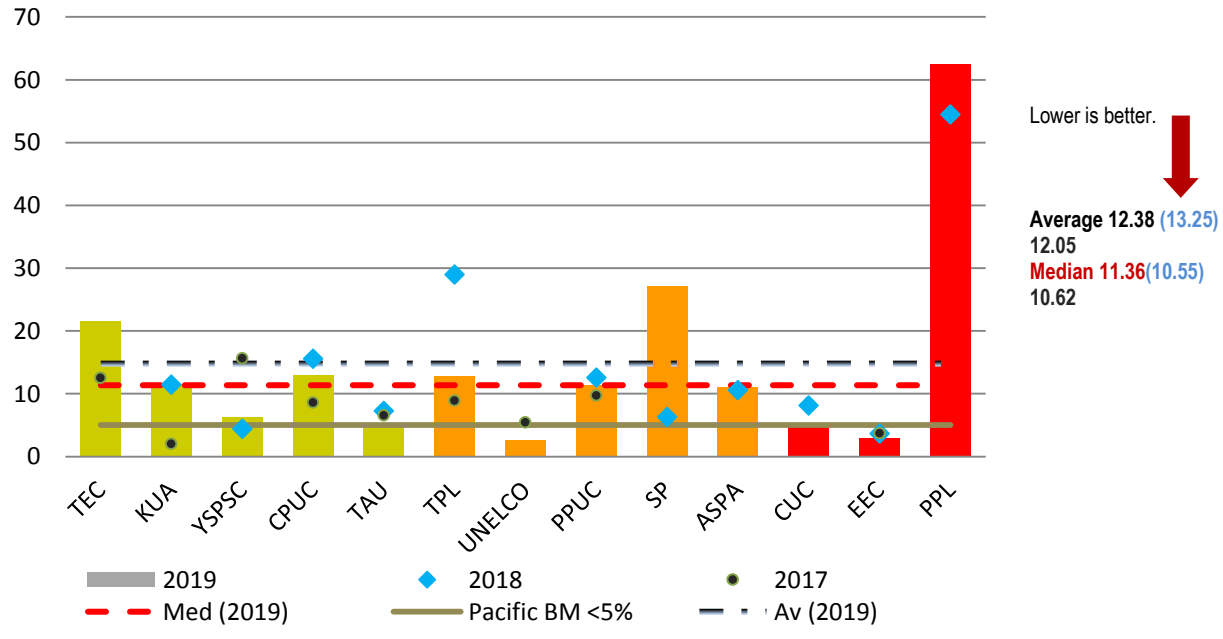
Of the 15 Pacific power utilities participated in 2019 benchmarking survey, four utilities have transmission networks: GPA, PPL, EFL and EDT. Transmission KPIs were not presented in previous benchmarking reports due to the limited data provided. It still remains inadequate for drawing firm conclusions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

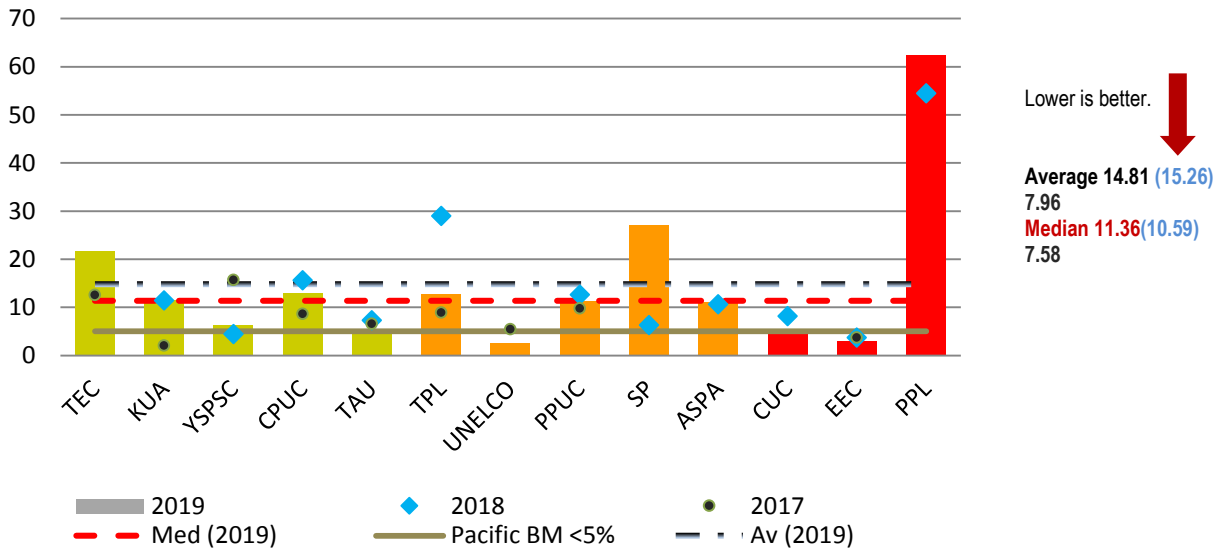
**Figure 5.14: Network Delivery Losses (%) 2019 (2018) (2017)**



## (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)**

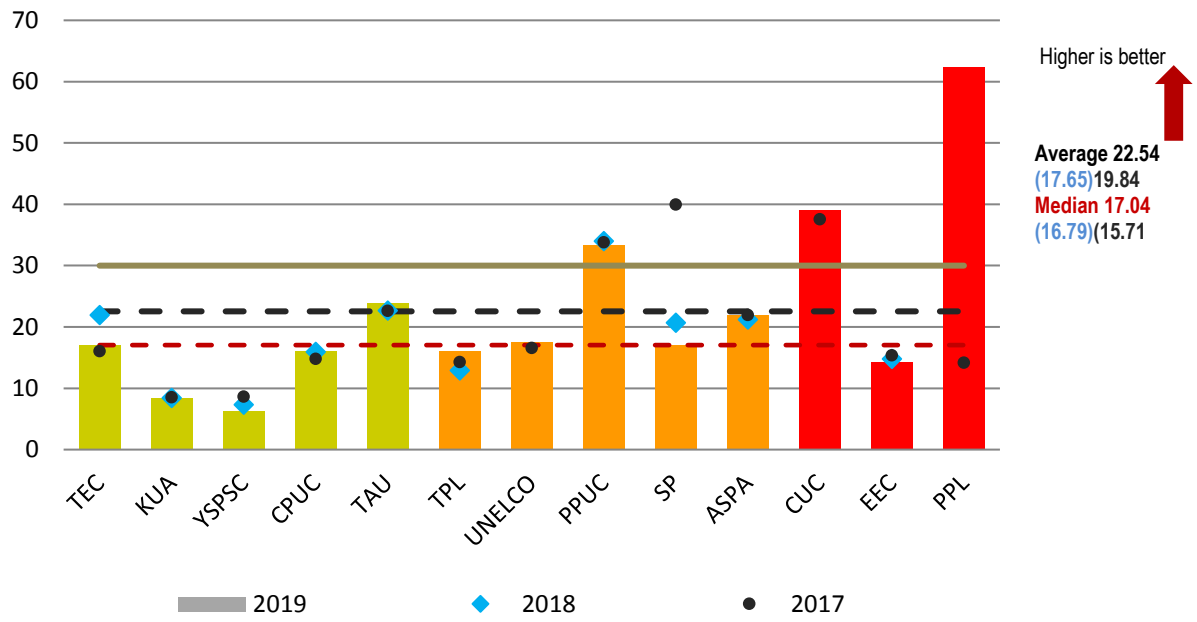



## (iii) Distribution Transformer Utilisation

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)**

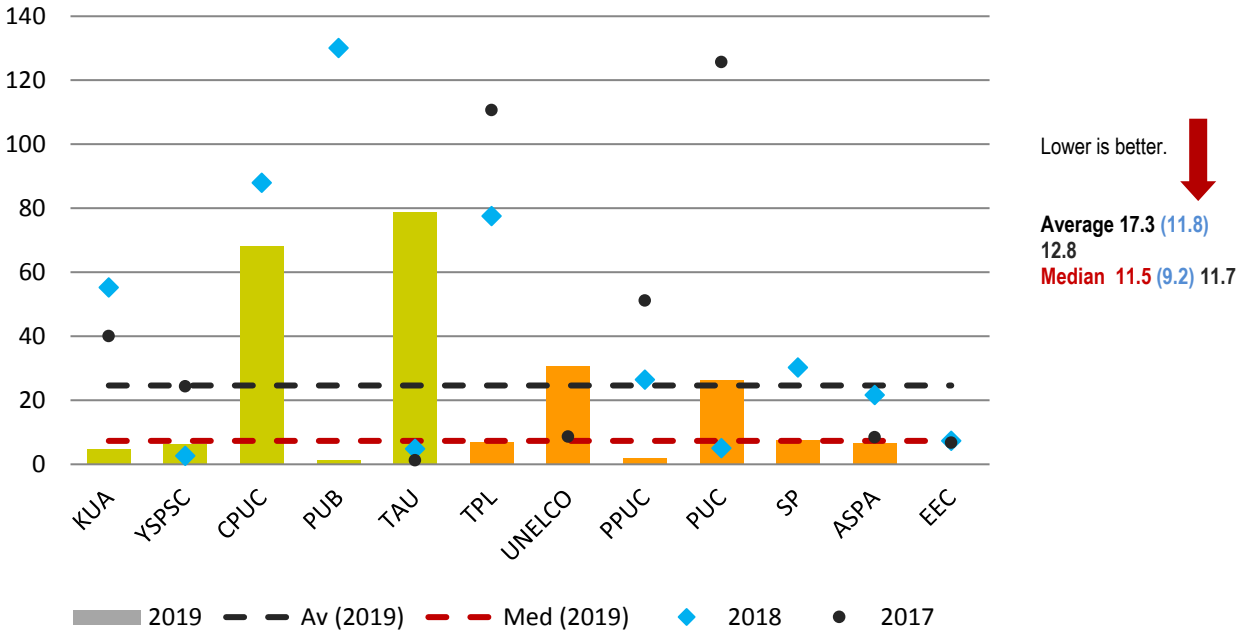



## (iv) Distribution Reliability

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

The average and median are 67% and 24% respectively (refer Figure 6.17). 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) 2019 (2018) (2017)**

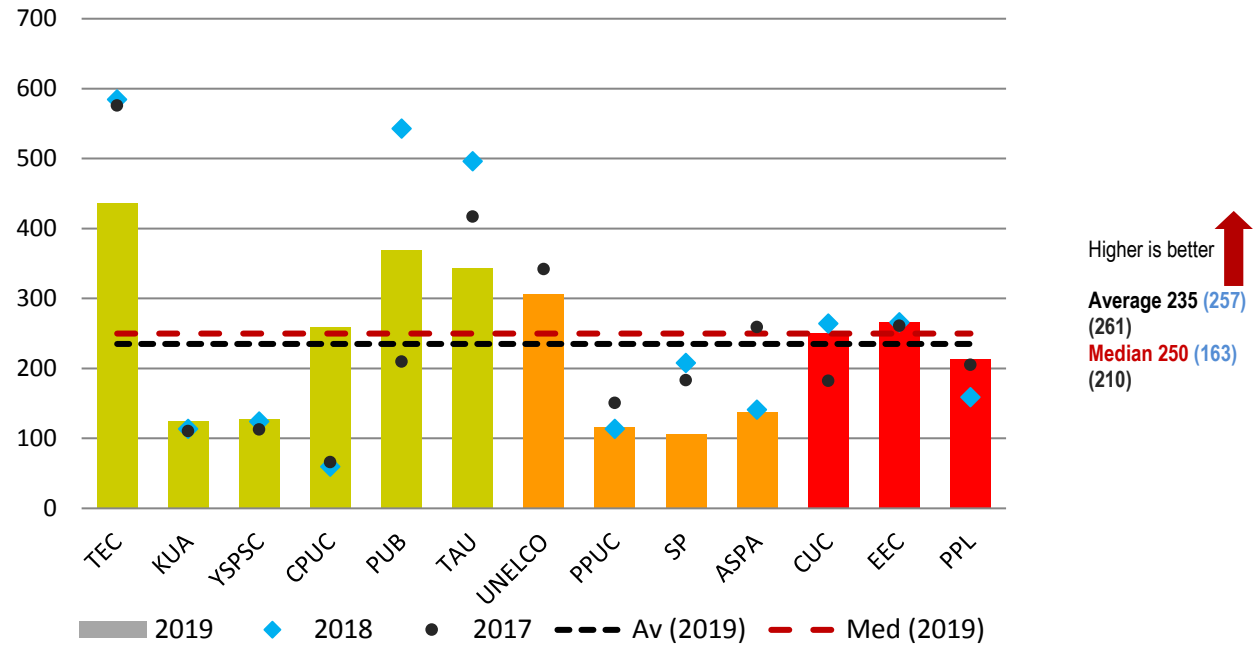


## (v) Customers per Distribution Employee

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.

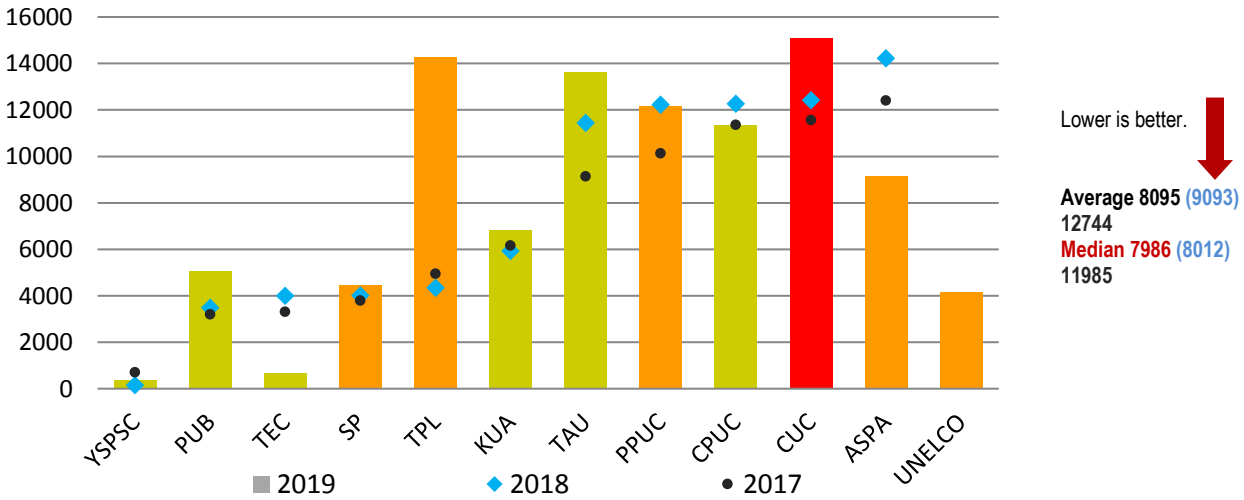
**Figure 5.18: Customers per Distribution Employee 2019 (2018) (2017)**




## (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)**

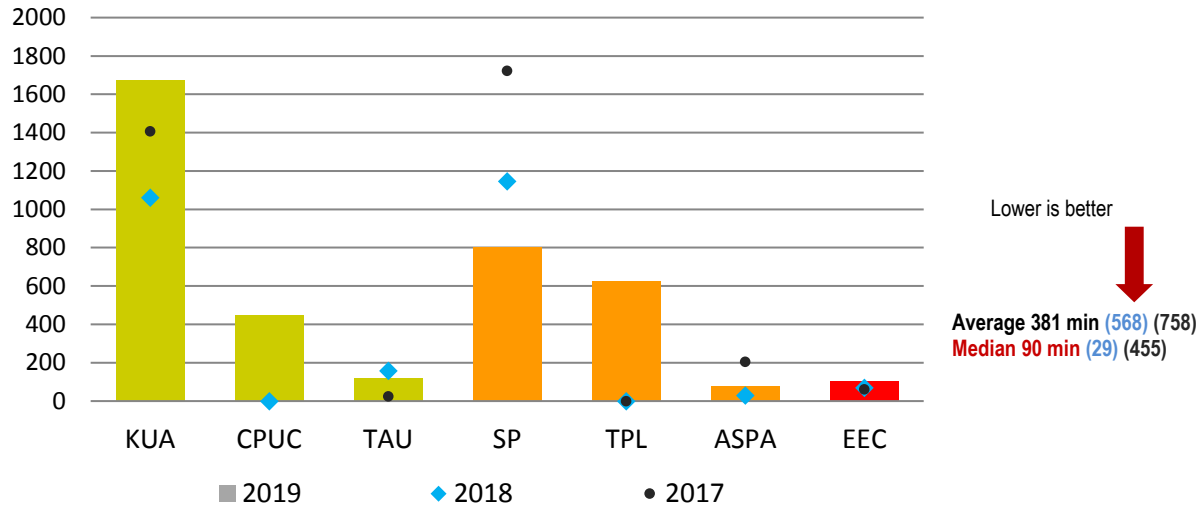


# 5.5 SAIDI and SAIFI

## (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).

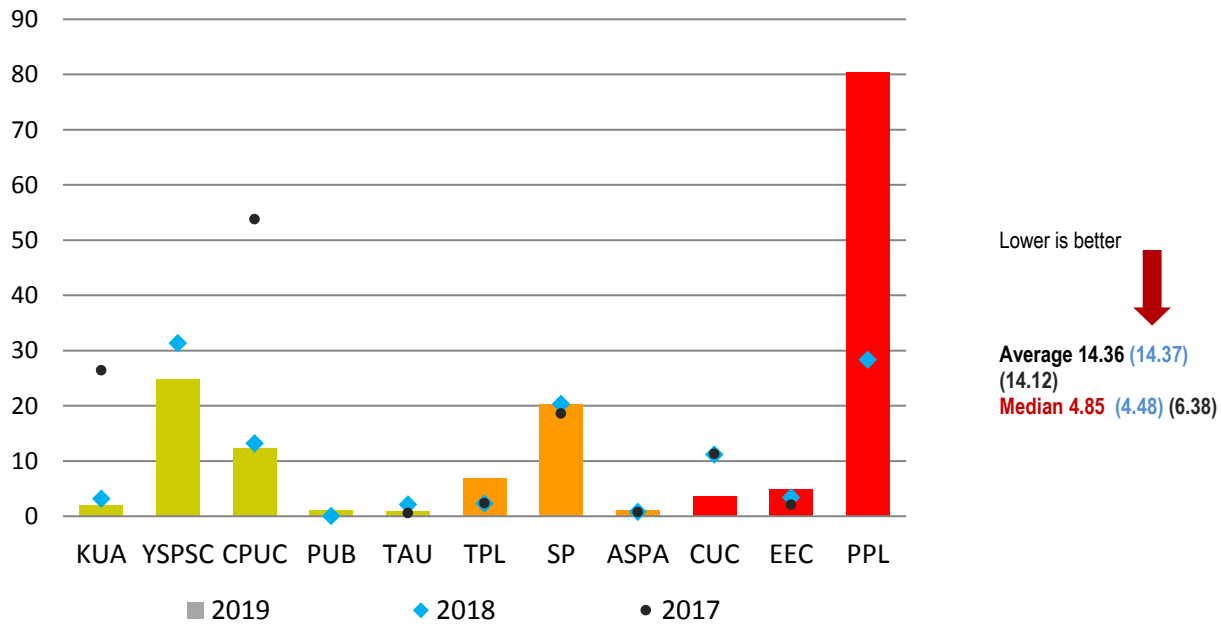
**Figure 5.20: SAIDI Interruptions (Minutes per Customer) 2019 (2018) (2017)**




## (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

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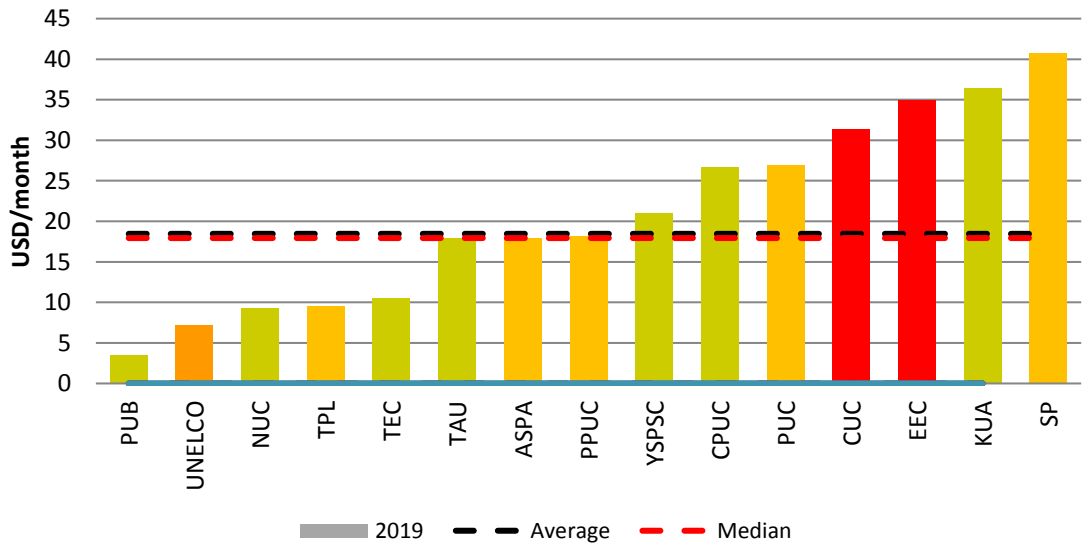
## (i) Tariff Analysis

### 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.

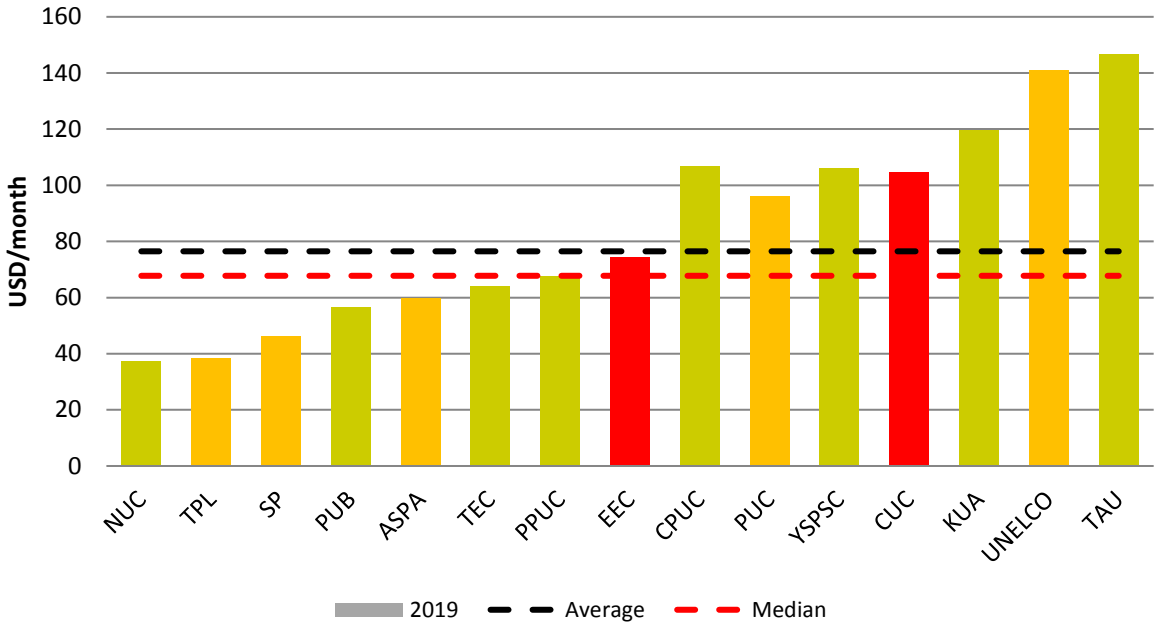
### Domestic - 50kWh/month

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



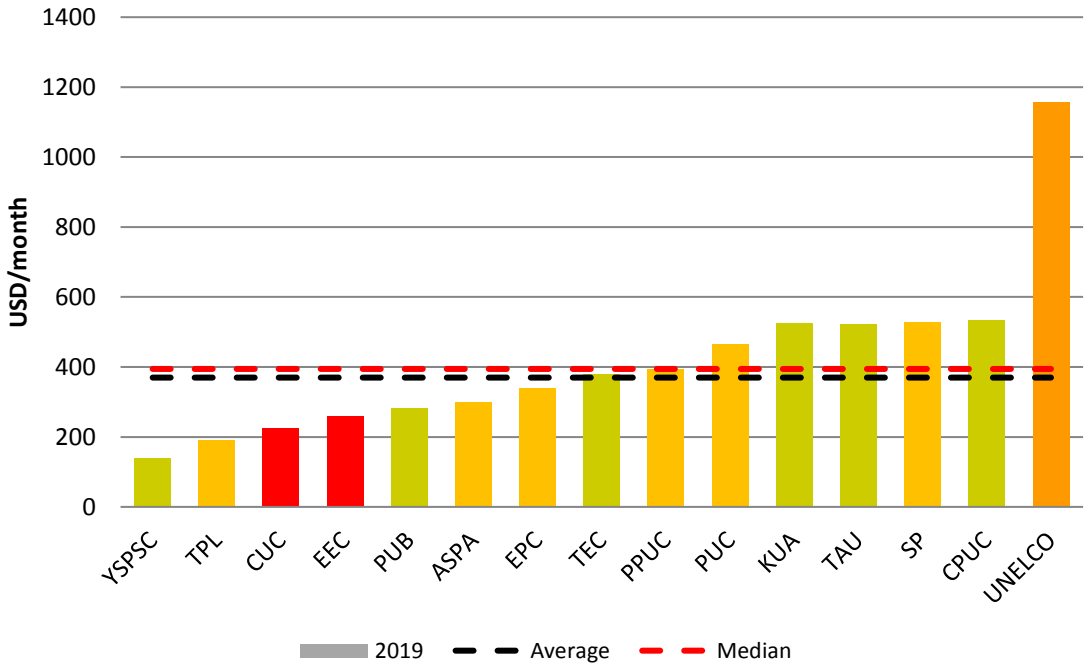
## Domestic - 200kWh/month

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



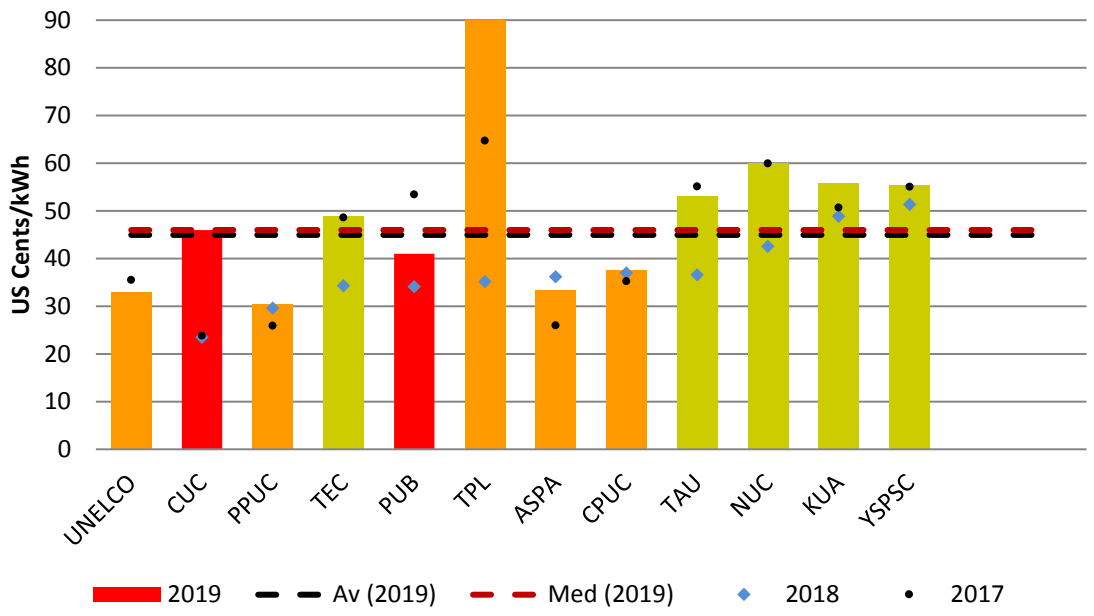

## Commercial - 1000kWh/month

**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)**



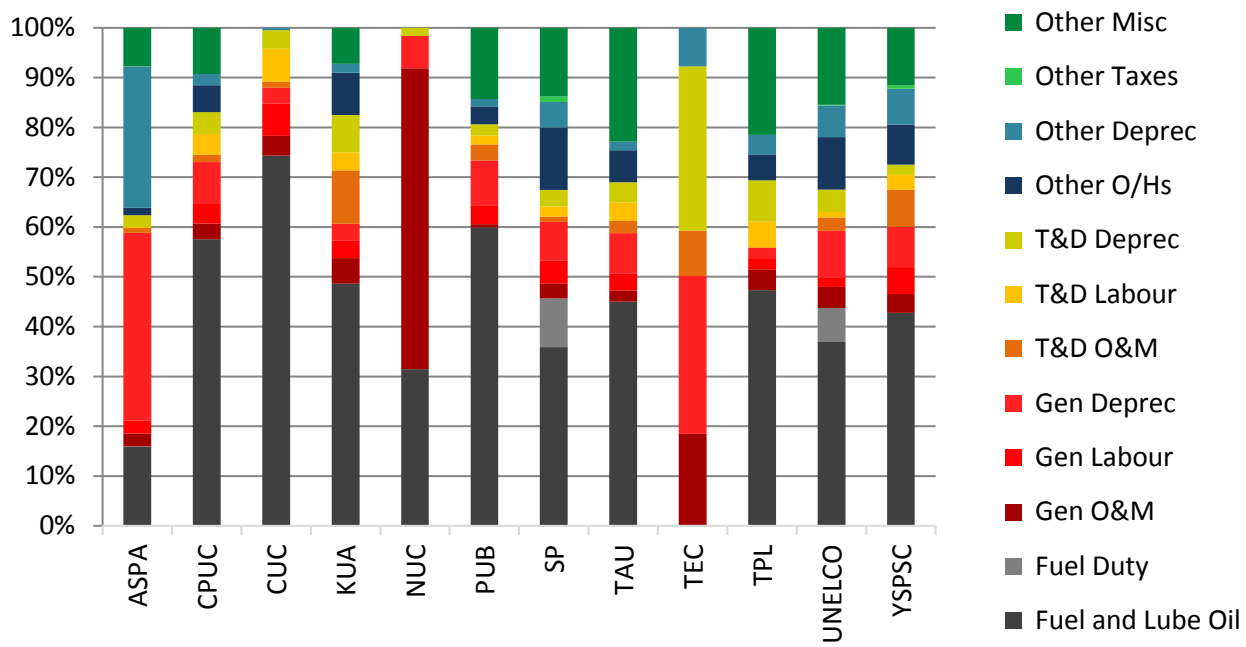

The large utilities have the lowest average supply cost. This is related to their relative size, as well as the benefit of hydropower resources.
The medium-sized utilities are quite consistently represented in the middle of the cost spectrum with large utilities having lower average costs and small utilities 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 deprecation, 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

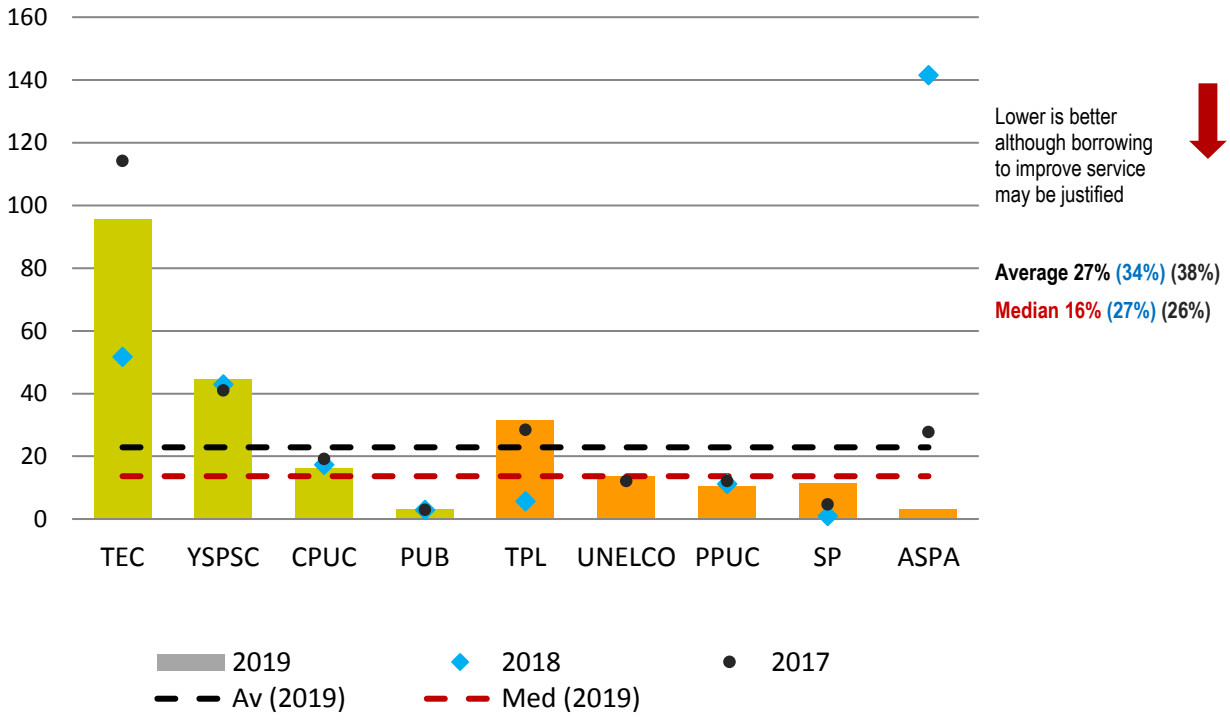
**Figure 5.26: Utility Cost Breakdown (%) 2019**




## (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.

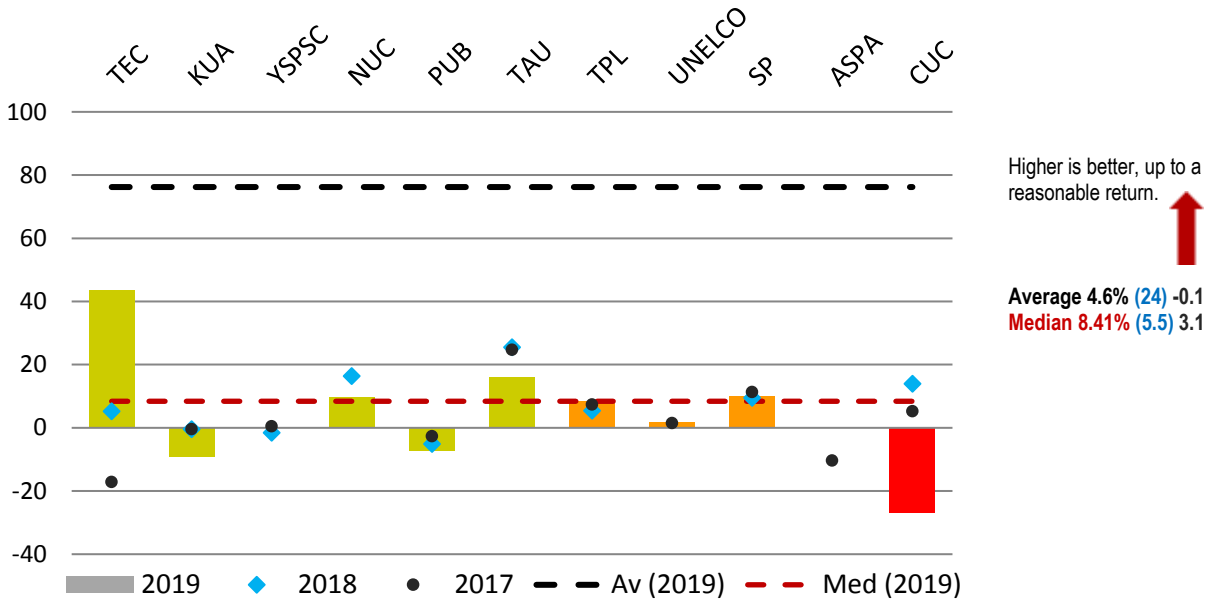
**Figure 5.27: Debt to Equity Ratio (%) 2018 (2017) (2016)**



## (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.

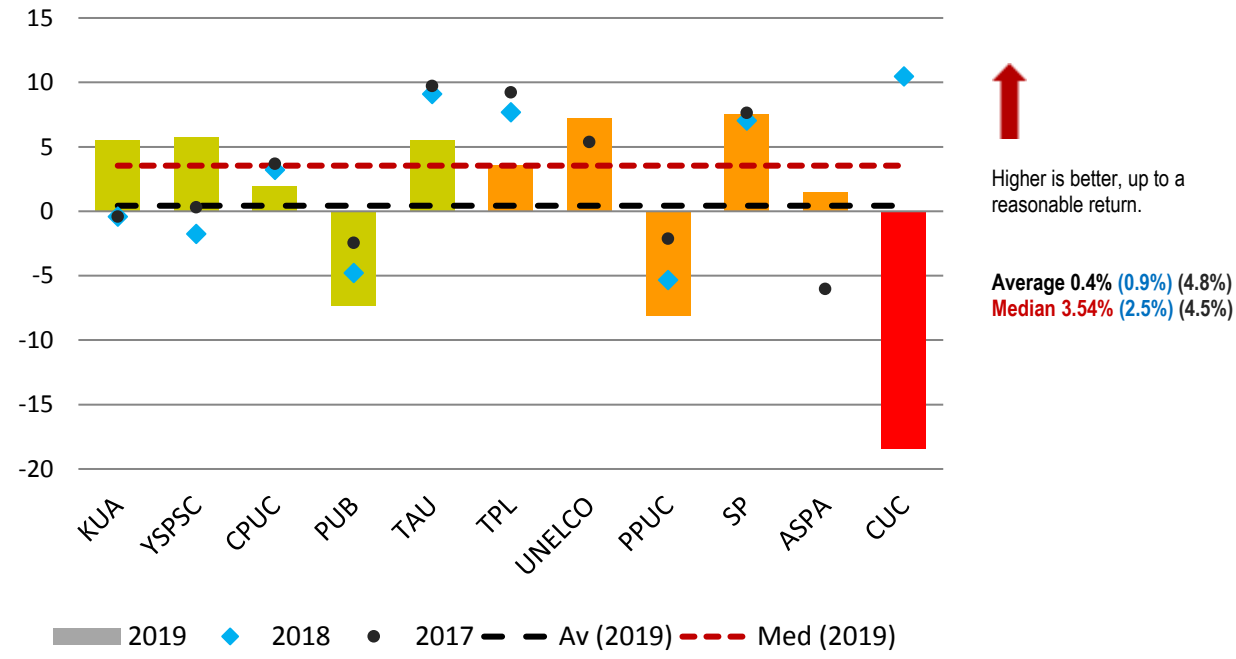
**Figure 5.28: Rate of Return on Total Operating Assets in 2019 (2018) (2017) (%)**




## (vii) Return on Equity

ROE measures financial returns on owners' funds invested. Results for ROE are shown in Figure 6.29. 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.

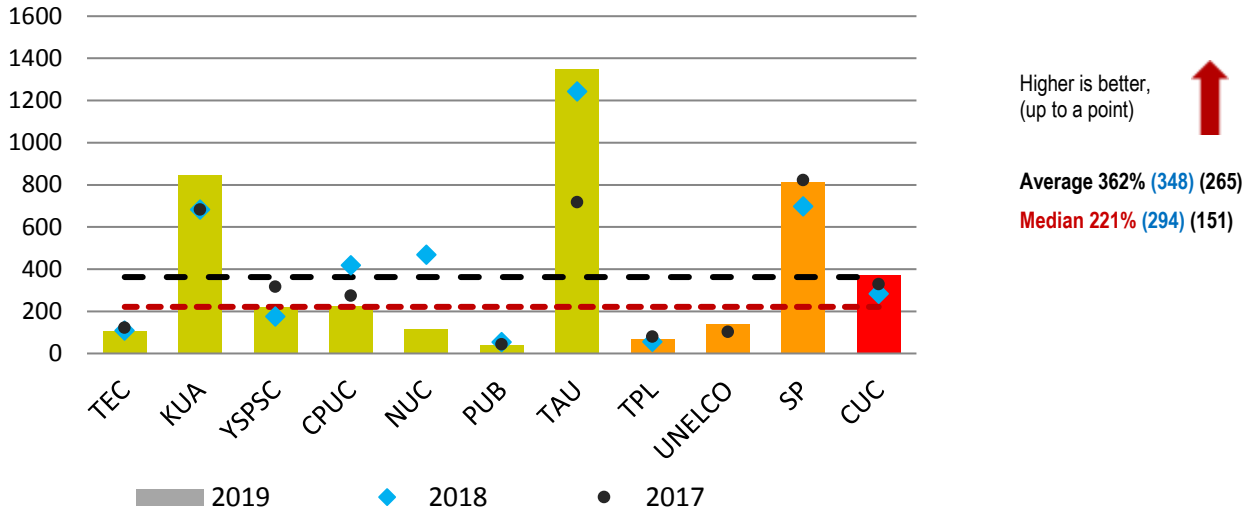
**Figure 5.29: Return on Equity (%) 2019 (2018) (2017)**



## (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%.

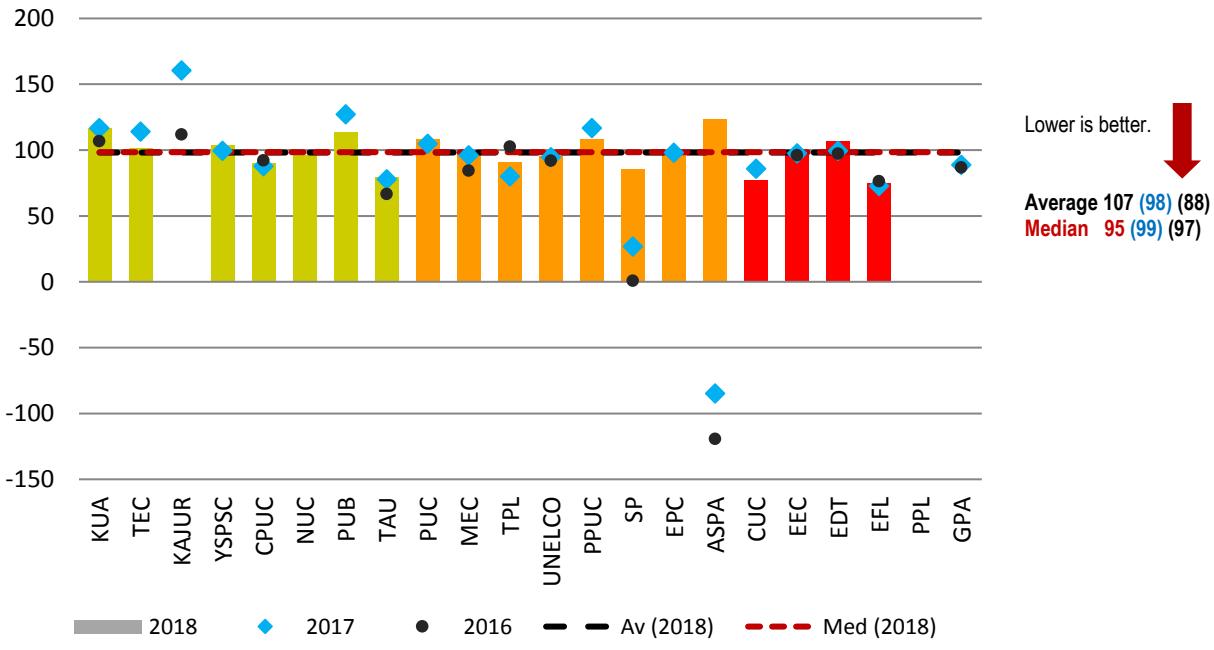
**Figure 5.30: Reported Current Ratio (%) 2019 (2018) (2017)**




## (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 above100 and eight utilities have an operating ratio below 100.

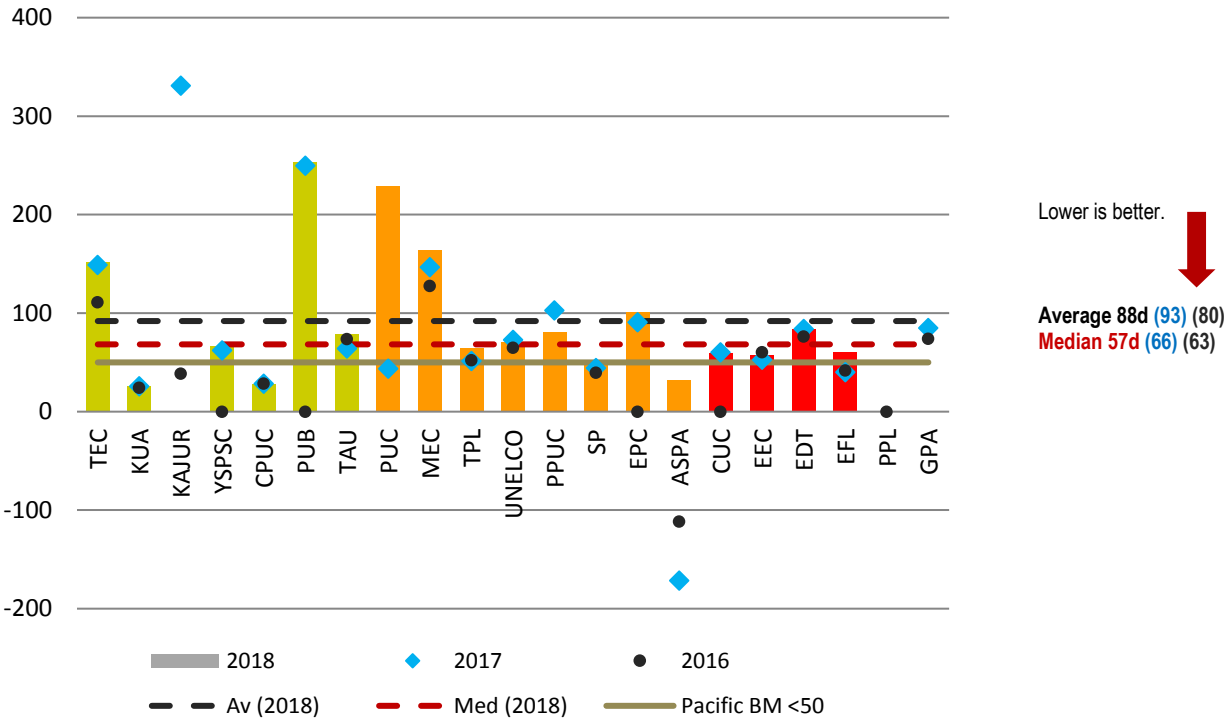
**Figure 5.31: Operating Ratio in 2019 (2018) (2017)**



## (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)**

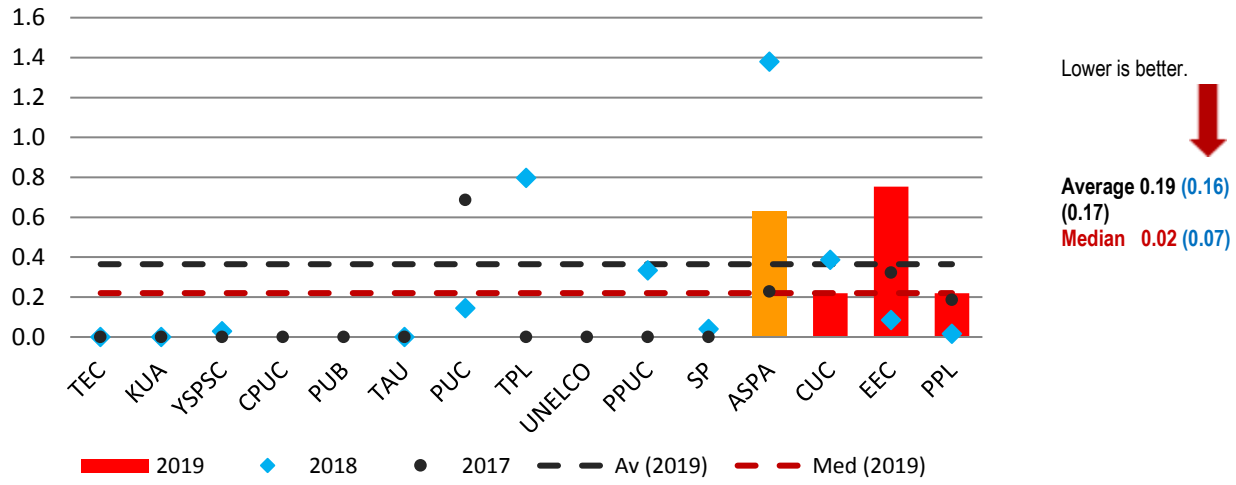


# 5.8 Human Resources and Safety Indicators

## (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

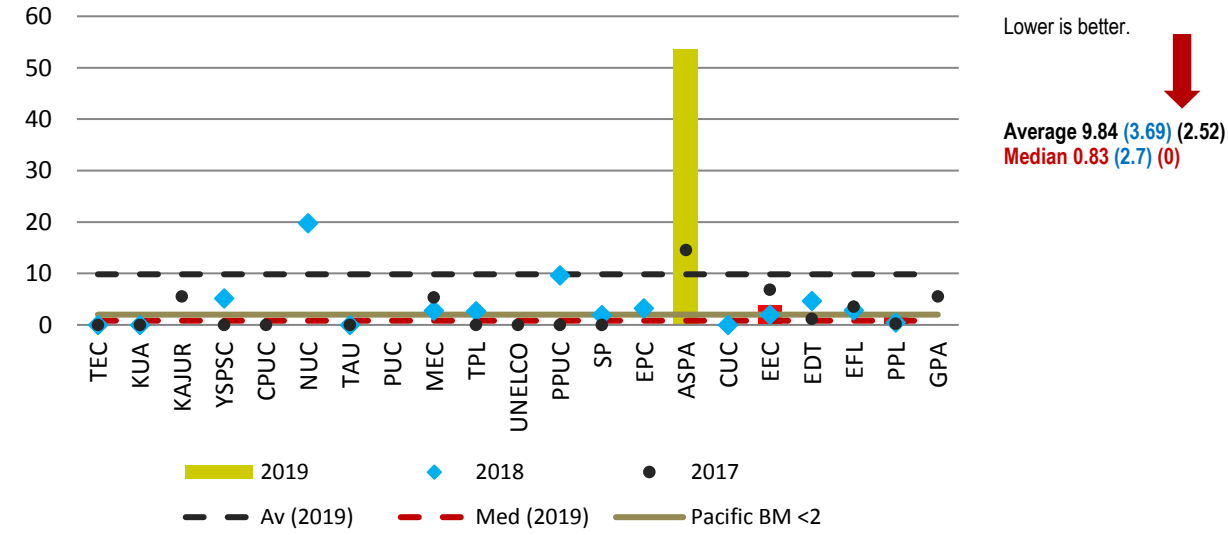
**Figure 5.33: LTIDR (Days per FTE Employee) 2019 (2018) (2017)**




## (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.

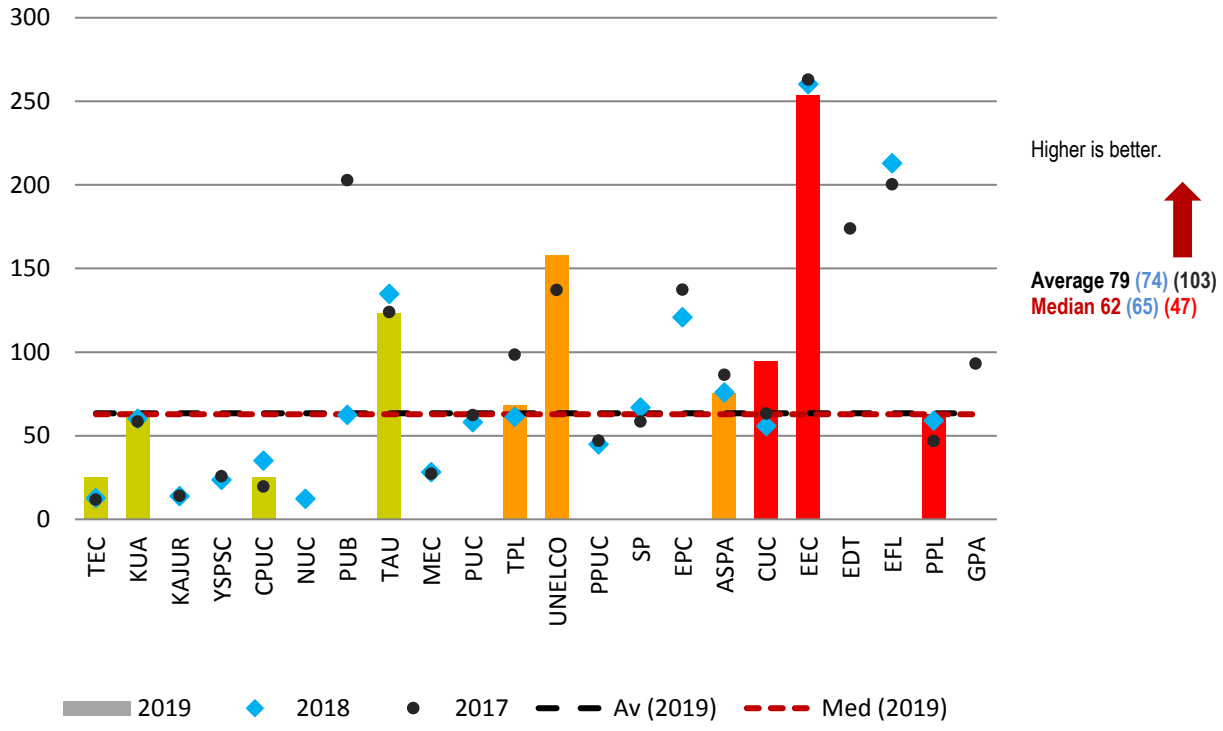
**Figure 5.34: LTI Frequency Rate (Number of Incidents per Million Hours) 2019 (2018) (2017)**



### (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.

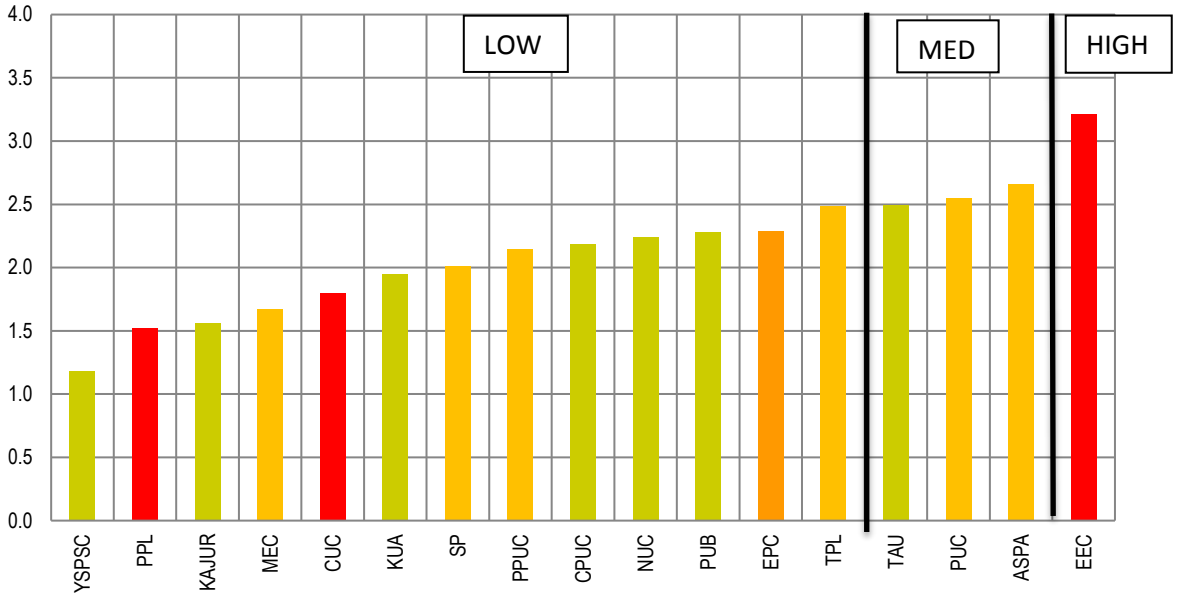
The overall composite indicator is a simple indicator that equally weights generation efficiency, capacity utilisation, system losses and overall labour productivity, as derived from quantitative scores on a scale up to 4.0. Overall, this was considered to be a valid assessment of technical performance.

| 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**



## PPA Member Utilities in 2019

**AMERICAN SAMOA POWER AUTHORITY**
P O Box PPB, Airport Road,Pago Pago,
American Samoa 96799
Tel: + 1 (684) 2841234/1236 Fax: + 1 (684) 699 7067
Email: wallon@aspower.com
Acting Executive Director: Mr. Wallon Young
Website: www.aspower.com

**CHUUK PUBLIC UTILITY CORPORATION**
P O Box 910, Weno, Chuuk, FSM 96942
Tel: + (691) 330 2400/ 2401
Email: Kembo.mida@cpuc.fm
CEO: Mr. Kasio Kemba Mida Jr.
Website: www.cpuc.fm

**COMMONWEALTH UTILITIES CORPORATION**
P O Box 501220 CK, 3rd Floor, Joeten Dandan Building, Saipan,
MP 96950-1220
Tel: + 1 (670) 235-6090 Fax: + 1 (670) 235 5131
Email: gary.camacho@cucgov.net ; cc:bettydiaz@cucgov.org
CEO: Mr. Gary P.Camacho
Website: www.cucgov.org

**ELECTRICITE' DE TAHITI**
BP 8021, Faaa, Tahiti, French Polynesia
Tel: + (689) 40867786 Fax: + (689) 83 44 39
Email: gregoire.de.chillaz@edt.engie.com
CEO: Mr. Grégoire de Chillaz,
Website: www.edt.pf (in French)

**ELECTRICITE ET EAU DE CALEDONIE**
15 rue Jean Chalier PK4,
BP F3 – 98848 Noumea Cedex,
New Caledonia
Tel: + (687) 46 36 36 Fax: + (687) 46 35 10
Email: philippe.mehrenberger@eec.nc
COO: Mr. Philippe Mehrenberger
Website: www.eec.nc (in French)

**ELECTRICITE ET EAU DE WALLIS ET FUTUNA**
BP 28 – 98 600 – Mata'Utu
Wallis and Futuna Islands
Tel: + (681) 72 1501 Fax: + (681) 72 2215
Email: filomena.filitika@eewf.engie.com
CEO: Mr. David Eyssartier

**ELECTRIC POWER CORPORATION**
P O Box 2011, Apia, Samoa
Tel: + (685) 65 400 Fax: + (685) 23 748
Email: leiat@epc.ws
CEO: Tologatā Galumalemana Lupematasila
Tagaloatele Tile Leī'a Tuimalealiifano
Website: www.epc.ws

**ENERCAL** (Societe Neo-CaledonenneD'Energie)
87,av. Du General De Gaulle, BP,
C1 98848 Noumea, New Caledonia
Tel: + (687) 250 250 Fax: + (687) 250 253
Email: jm.deveza@enercal.nc
CEO: Mr. Jean-Michel Deveza

**FIJI ELECTRICITY AUTHORITY**
Private Mail Bag, Suva, Fiji Islands
Tel: + (679) 322 4310 Fax: + (679) 331 1074
Email: hasmukh@fea.com.fj
CEO: Mr. Hasmukh Patel
Website: www.fea.com.fj

**GUAM POWER AUTHORITY**
P O Box 2977, Agana, Guam 96910
Tel: +1 (671) 648 3225/3180/3000
Fax: +1 (671) 648 3290
Email: gpagm@ite.net
CEO: Mr. John Benavente, General Manager
Website: www.guampowerauthority.com

**KOSRAE UTILITIES AUTHORITY**
P O Box KUA, Kosrae, FSM 96944
Tel: + (691) 370 3799 / 3344 Fax: + (691) 370 3798
Email: kua@mail.fm
CEO: Mr. Fred Skilling

**KWAJALEIN ATOLL JOINT UTILITY RESOURCES**
P O Box 5819, Ebeye, Marshall Islands 96970
Tel: + (692) 329 3799/3798 Fax: + (692) 329 6722
Email: romeo.afred13@gmail.com
CEO: Mr. Romeo Alfred

**MARSHALLS ENERGY COMPANY**
P O Box 1439, Majuro, MH
Marshall Islands 96960
Tel: + (692) 625 3827/3828/3829/3507 Fax: + (692) 625 5886
Email: jack.chonggum@mecrmi.net
CEO: Mr. Jack Chong Gum
Website: www.mecrmi.net

**NAURU UTILITIES CORPORATION**
Aiwo District, Nauru
Tel: + (674) 557 4038 Fax: + (674) 444 3521
Email: abraham.simpson@nuc.com.nr
CEO: Mr. Abraham Simpson (CEO)
Website: www.nuc.com.nr

**NIUE POWER CORPORATION**
P O Box 29, Alofi, NIUE
Tel: + (683) 4119 Fax: + (683) 4385
Email: Andre.Siohane@mail.gov.nu
CEO: Mr. Andre Siohane, (Director General)

**PALAU PUBLIC UTILITIES CORPORATION**
P O Box 1372, Koror, Palau 96940
Tel: + (680) 488 3870/72/77 Fax: + (680) 488 3878
Email: g.decherong@ppuc.com
Acting CEO: Mr. Gregory Decherong

**PNG POWER LTD**
P O Box 1105, Boroko 111,
National Capital District, Papua New Guinea
Tel: + (675) 324 3111/3332 Fax: + (675) 3250 008/3877
Email: CBlacklock@pngpower.com.pg
CEO: Ms. Carolyn Blacklock(Acting MD)

**POHNPEI UTILITIES CORPORATION**
P O Box C, Kolonia, Pohnpei, FSM 96941
Tel: + (691) 320 2374 Fax: + (691) 320 2422
Email: pucagmpower@mail.fm or nanson@mpuc.fm
CEO: Mr. Nixon Anson (Acting CEO)
Website: www.puc.fm

**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 or Executivesecretary@yapspsc.org
CEO: Mr. Faustino Yangmog

**PUBLIC UTILITIES BOARD**
P O Box 443, Betio, Tarawa, Kiribati
Tel: + (686) 26 292 Fax: (686) 26 106
Email: ceo@pub.com.ki
CEO: Mr. Wayne Breadly (Acting)

**SOLOMON POWER**
P O Box 6, Honiara, Solomon Islands
Tel: + (677) 30 495 Fax: + (677) 39 472
Email: Pradip.Verma@solomonpower.com.sb
CEO: Mr. Pradip Verma
Website: www.solomonpower.com.sb

**TE APONGA UIRA O TUMU-TE-VAROVARO**
P O Box 112, Rarotonga, Cook Islands
Tel: + (682) 20 054 Fax: + (682) 21 944
Email: atimoti@electricity.co.ck
CEO: Mr. Apii Timoti

**TONGA POWER LIMITED**
P O Box 429, Nuku'alofa, Kingdom of Tonga
Tel: + (676) 27 390 Fax: + (676) 23 047
Email: schen@tongapower.to
CEO: Mr. Setitaia Chen
www.tongapower.to

**TUVALU ELECTRICITY CORPORATION**
P O Box 32, Funafuti, Tuvalu
Tel: + (688) 20 352/358 Fax: + (688) 20 351
Email: mafaluloto2@gmail.com
CEO: Mr. Mafalu Lotolua

**UNELCO VANUATU LIMITED**
P O Box 26, Port Vila, Vanuatu
Tel: + (678) 26 000 Fax: + (678) 25 011
Email: marc.perraud@engie.com.
CEO: Mr. Mark Perraud
Website: www.unelco.engie.com

**Table G.1: KPIs 2019 (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** | 76.9 | 44.3 | 98.82 | 1.78 | 3.93 | 4.68 | 862 | 0.71 | 0.47 | 58.61 | 2.60 | 2.20 | - |
| **CPUC** | 67.0 | 25.3 | 100.00 | 0.75 | 3.90 | - | 771 | - | - | 25.55 | 0.87 | 2.07 | - |
| **CUC** | 67.07 | 35.49 | 73.21 | 3.83 | 3.88 | 4.62 | 331.00 | 12.66 | 6.41 | 23.11 | 4.99 | - | 3.80 |
| **EDT** | | | | | | | | | | | | | |
| **EEC** | 57.6 | 23.81 | 100 | - | 3.46 | 4.00 | 1169.00 | 0.0020 | - | 20.05 | 0.45 | 9.91 | 90.07 |
| **EPC** | | | | | | | | | | | | | |
| **EFL** | | | | | | | | | | | | | |
| **GPA** | | | | | | | | | | | | | |
| **KAJUR** | | | | | | | | | | | | | |
| **KUA** | 56.940 | 16.640 | 100.000 | 0.940 | 3.476 | - | 821.000 | - | - | 45.780 | 5.530 | 4.290 | - |
| **MEC** | | | | | | | | | | | | | |
| **NUC** | 78.580 | 56.470 | 100.000 | - | 3.487 | - | 522.000 | - | - | 324.700 | 0.540 | 3.350 | - |
| **PPL** | 64.210 | 20.880 | 99.950 | 0.820 | 6.56 | | 36956.241 | 0.044 | 0.009 | | 3.170 | 38.56 | 45.490 |
| **PPUC** | 77.230 | 33.170 | 91.080 | 220.340 | 3.827 | 4.556 | 859.000 | 8.727 | 0.192 | 54.600 | 4.270 | 1.660 | - |
| **PUB** | 71.740 | 41.360 | 97.980 | 724.520 | 3.999 | | 2053.000 | 0.865 | 1.154 | 22.480 | 4.360 | 13.880 | - |
| **PUC** | 86.930 | 31.690 | 100.000 | - | 3.830 | - | 752.000 | - | - | - | 0.420 | 3.290 | 19.970 |
| **SP** | 64.060 | 32.747 | 63.675 | | 4.050 | #DIV/0! | 1033.251 | 31.959 | 4.366 | 41.892 | 3.377 | 1.380 | |
| **TAU** | 70.660 | 22.360 | 100.000 | 2.280 | 3.717 | - | 673.000 | - | - | 37.130 | 2.850 | 14.910 | 10.320 |
| **TEC** | 70.550 | 55.660 | 100.000 | 0.340 | 3.657 | 4.354 | 10310.000 | - | - | - | 5.650 | 9.170 | - |
| **TPL** | 69.350 | 42.720 | 99.950 | 1.350 | 0.004 | - | 0.902 | 0.047 | - | 19.890 | 2.790 | 8.900 | 4.340 |
| **UNELCO** | 60.790 | 30.190 | 96.820 | 30.230 | 3.780 | 4.606 | 529.000 | 0.007 | 3.178 | 23.940 | 1.820 | 13.200 | 1.410 |
| **YSPSC** | 53.760 | 13.360 | 99.880 | 274.430 | 3.467 | - | 1203.000 | 0.035 | 0.089 | 60.660 | 4.920 | 25.060 | - |

**Table G.2: KPIs 2019 (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** | 97.800 | - | - | - | - | No | 11.000 | 11.000 | 138.230 | 7.620 | 21.950 | 9164.250 |
| **CPUC** | 97.930 | - | - | - | - | Yes | 12.940 | 12.940 | 67.410 | 63.65 | 16.010 | 11328.75 |
| **CUC** | 100.000 | - | - | - | - | Yes | 5.130 | 5.130 | 249.890 | - | 34.340 | - |
| **EDT** | | | | | | | | | | | | |
| **EEC** | 1.860 | - | 0.070 | 0.02 | - | Yes | 3.010 | 3.010 | 265.690 | 6.55 | 14.230 | - |
| **EPC** | | | | | | | | | | | | |
| **EFL** | | | | | | | | | | | | |
| **GPA** | | | | | | | | | | | | |
| **KAJUR** | | | | | | | | | | | | |
| **KUA** | - | 96 | - | - | - | No | 11.480 | 11.480 | 124.330 | - | 8.370 | - |
| **MEC** | | | | | | | | | | | | |
| **NUC** | 96.800 | - | - | - | - | Y/N | 27.630 | - | - | - | - | - |
| **PPL** | 42.300 | 15.320 | - | - | - | Yes | 26.010 | 62.44 | 213.260 | - | - | - |
| **PPUC** | 98.340 | - | - | - | - | No | 11.360 | 11.360 | 116.750 | 30.810 | 33.290 | 12173.110 |
| **PUB** | 100.000 | - | - | - | - | Yes | 2.070 | - | 369.090 | - | 0.030 | - |
| **PUC** | 56.770 | - | - | - | - | Y/N | | | | - | | - |
| **SP** | 98.355 | | | | | No | 27.086 | 27.09 | 105.511 | 26.190 | 17.039 | 4443.912 |
| **TAU** | 85.090 | - | - | - | - | Yes | 4.810 | 4.810 | 343.550 | - | 23.830 | - |
| **TEC** | 79.890 | - | - | - | - | No | 21.560 | 21.560 | 436.300 | - | 16.970 | 685.500 |
| **TPL** | 0.090 | - | - | - | - | No | 12.760 | 12.760 | - | 78.740 | 16.140 | 14289.360 |
| **UNELCO** | 83.420 | - | 0.220 | - | - | Yes | 2.570 | 2.570 | 305.770 | 7.030 | 17.460 | 4138.960 |
| **YSPSC** | 100.000 | - | - | - | - | Yes | 6.320 | 6.320 | 128.170 | 4.600 | 7.180 | 358.660 |

**Table G.3: KPIs 2019 (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** | 75.373 | - | 1.023 | 1.023 | - | - | - | - | - | - | - | 75.373 | 1.023 |
| **CPUC** | 324.831 | 62.416 | 8.121 | 5.993 | 2.128 | 61.875 | 49.500 | 12.375 | 4.125 | 2.062 | 2.062 | 449.122 | 12.246 |
| **CUC** | | | 3.325 | 1.138 | 2.187 | 0.005 | 0.005 | | 0.223 | 0.223 | | | 3.547 |
| **EDT** | | | | | | | | | | | | | |
| **EEC** | 38.000 | 36.000 | 3.612 | 2.704 | 0.908 | 31.000 | 31.000 | - | 1.233 | 1.233 | - | 105.000 | 4.845 |
| **EPC** | | | | | | | | | | | | | |
| **EFL** | | | | | | | | | | | | | |
| **GPA** | | | | | | | | | | | | | |
| **KAJUR** | | | | | | | | | | | | | |
| **KUA** | 1198.671 | 473.129 | 1.981 | 0.990 | 0.990 | - | - | - | - | - | - | 1671.799 | 1.981 |
| **MEC** | | | | | | | | | | | | | |
| **NUC** | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **PPL** | 0.183 | 0.019 | 51.901 | 49.233 | 2.668 | 0.237 | 0.231 | 0.006 | 28.549 | 28.052 | 0.496 | 0.439 | 80.449 |
| **PPUC** | 0.060 | 0.019 | 0.003 | 0.003 | 0.001 | 0.009 | 0.009 | | 0.000 | 0.000 | | 0.088 | 0.004 |
| **PUB** | 0.019 | 0.475 | 0.044 | 0.035 | 0.008 | 0.544 | 0.070 | 0.475 | 1.010 | 1.000 | 0.010 | 1.038 | 1.054 |
| **PUC** | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **SP** | 569.786 | 231.161 | 20.330 | 17.365 | 2.965 | 0.000 | | | | | | 800.946 | 20.330 |
| **TAU** | 118.215 | | 0.945 | 0.945 | - | - | - | - | - | - | - | 118.215 | 0.945 |
| **TEC** | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **TPL** | 480.650 | 52.535 | 4.008 | 3.623 | 0.385 | 92.267 | 92.267 | - | 2.787 | 2.787 | | 625.451 | 6.795 |
| **UNELCO** | 0.007 | 0.027 | 0.000 | 0.000 | 0.000 | 0.003 | 0.003 | - | 0.000 | 0.000 | | 0.037 | 0.000 |
| **YSPSC** | 0.202 | 0.276 | 14.196 | 8.867 | 5.329 | 0.319 | 0.091 | 0.228 | 10.541 | 5.750 | 4.792 | 0.797 | 24.737 |

**Table G.4: KPIs 2019 (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 | - | - | - | None | 0.630 | 53.570 | 75.290 | 95.320 | 69.720 | | 31.330 | 29.060 | 17.210 | 22.400 | | self |
| **CPUC** | No | - | - | - | None | - | - | 25.150 | 21.880 | 68.390 | - | 26.230 | 50.940 | - | 17.450 | 5.370 | self |
| **CUC** | No | - | 0.000 | - | RUL | 0.220 | - | 94.470 | 57.340 | 76.210 | - | 28.890 | 52.600 | - | 18.510 | - | external |
| **EDT** | Yes | | | | | | | | | | | | | | | | external |
| **EEC** | Yes | 140855 | 0.000 | - | EN 50160 | 0.100 | 3.820 | 253.880 | 60.000 | 68.010 | - | 37.300 | 25.370 | 36.580 | - | 1.420 | external |
| **EPC** | | | | | | | | | | | | | | | | | |
| **EFL** | | | | | | | | | | | | | | | | | |
| **GPA** | | | | | | | | | | | | | | | | | |
| **KAJUR** | | | | | | | | | | | | | | | | | |
| **KUA** | Y/N | | | | KUA | | | 64.610 | 161.590 | 61.660 | | 38.340 | 32.720 | 3.890 | 25.050 | | self |
| **MEC** | No | | | | none | | | | | | | | | | | | external |
| **NUC** | Y/N | | | | ASNZ | | | | | 48.920 | | 51.080 | 36.080 | 2.700 | 10.130 | | |
| **PPL** | Yes | 600000 | 0.000 | 407 | None | 0.220 | 1.650 | 62.840 | | 184.540 | | 12.680 | 60.070 | 15.730 | 10.970 | 0.550 | external |
| **PPUC** | Yes | 25000 | 0.000 | | JIS, NEC | 59.000 | 1621.620 | | 89.780 | 59.850 | 16.410 | 23.730 | 32.600 | 22.120 | 5.130 | | self |
| **PUB** | No | | | | 0.000 | | | | 95.480 | 56.910 | | 43.100 | 28.250 | 28.660 | | | self |
| **PUC** | Yes | | 0.000 | | NEC | | | | | | | | | | | | |
| **SP** | No | | | | | 0.054 | | | | | | | | | | | self |
| **TAU** | Yes | | 0.000 | | 0.000 | - | - | 123.050 | 100.000 | 65.000 | 10.500 | 35.000 | 38.900 | 26.100 | | | external |
| **TEC** | Yes | | 0.000 | No | AUS/NZ | - | - | 25.500 | 81.000 | 52.360 | | 39.980 | 25.510 | | 22.770 | 22.210 | self |
| **TPL** | Yes | 15000 | 0.000 | No | Tonga Grid Code | - | - | 68.480 | | 66.340 | | 43.160 | 56.840 | | | 9.480 | external |
| **UNELCO** | No | | | | 0.000 | - | - | 158.110 | 29.610 | 59.590 | 10.180 | 22.340 | 23.770 | 33.890 | 0.270 | 0.970 | |
| **YSPSC** | Y/N | - | - | - | 0.000 | - | - | | 68.420 | 2790.350 | - | 26.580 | 44.360 | 2683.740 | - | 6.270 | self |

**Table G.6: KPIs 2019 (Financial and Utility Cost Breakdown)**

| Utility | Financial | | | | | | |
|---|---|---|---|---|---|---|---|
| | 39 | 40 | 41 | 42 | 43 | 44 | 45 |
| | Operating Ratio | Debt to Equity Ratio | Rate of Return on Assets | Return on Equity | Current Ratio | Debtor Days | Average Supply Cost |
| | | % | % | % | | days | USc/kWh |
| ASPA | 341.89 | 2.9800 | | 1.460 | 140.4 | 31.4 | 33 |
| CPUC | 84.20 | 16.2 | 792.0 | 1.94 | 224.8 | 32.5 | 38 |
| CUC | 149.32 | - | -26.70 | -18.40 | 374.01 | 129.93 | 45.99 |
| EDT | | | | | | | |
| EEC | - | - | - | - | - | - | - |
| EPC | | | | | | | |
| EFL | | | | | | | |
| GPA | | | | | | | |
| KAJUR | | | | | | | |
| KUA | 123.7 | - | -9.1 | 5.5 | 847.8 | 28.9 | 56 |
| MEC | | | | | | | |
| NUC | 97.2 | | 9.5 | | 118.4 | | 60 |
| PPL | | | | | | | |
| PPUC | 110.8 | 10.4 | -1888.9 | -8.1 | 340.1 | 107.6 | 30 |
| PUB | 118.2 | 3.18 | -7.35 | -7.32 | 39.5 | 257.2 | 40.99 |
| PUC | | | | | | | |
| SP | 17.61 | 11.32 | 10.0 | 7.5 | 813.1 | 44.8 | 5 |
| TAU | 80.7 | - | 16.1 | 5.5 | 1350.9 | 70.9 | 53 |
| TEC | 83.5 | 95.36 | 43.6 | | 108.1 | 201.3 | 49 |
| TPL | 93.2 | 31.3 | 8.4 | 3.5 | 67.8 | 53.6 | 90 |
| UNELCO | 93.7 | 13.7 | 1.7 | 7.2 | 138.0 | 57.1 | 33 |
| YSPSC | 110.8 | 44.4 | 3.9 | 5.8 | 221.1 | 74.0 | 55 |

**Table G.6: KPIs 2019 (Financial and Utility Cost Breakdown)**

| Utility | Utility Cost Breakdown | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 46.1 | 46.2 | 46.3 | 46.4 | 46.5 | 46.6 | 46.7 | 46.8 | 46.9 | 46.1 | 46.11 | 46.12 |
| | 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 |
| | % | % | % | % | % | % | % | % | % | % | % | % |
| **ASPA** | 15.9 | 0 | 2.6 | 2.6 | 37.7 | 1.0 | 0.2 | 2.4 | 1.5 | 28.3 | 0.1 | 7.8 |
| **CPUC** | 57.5 | - | 3.2 | 3.9 | 8.5 | 1.5 | 4.2 | 4.3 | 5.4 | 2.3 | - | 9.2 |
| **CUC** | 74.31 | - | 3.98 | 6.43 | 3.24 | 1.19 | 6.67 | 3.70 | - | 0.47 | - | - |
| **EDT** | | | | | | | | | | | | |
| **EEC** | - | - | - | - | - | - | - | - | - | - | - | - |
| **EPC** | | | | | | | | | | | | |
| **EFL** | | | | | | | | | | | | |
| **GPA** | | | | | | | | | | | | |
| **KAJUR** | | | | | | | | | | | | |
| **KUA** | 48.6 | - | 5.1 | 3.4 | 3.4 | 10.7 | 3.6 | 7.5 | 8.5 | 1.8 | - | 7.2 |
| **MEC** | | | | | | | | | | | | |
| **NUC** | 31.5 | | 60.4 | | 6.5 | | | 1.6 | | | - | |
| **PPL** | | | | | | | | | | | - | |
| **PPUC** | 50.8 | | 12.1 | 4.3 | 7.4 | 5.6 | 2.2 | 2.4 | 4.5 | 0.9 | - | 9.8 |
| **PUB** | 59.9 | | 0.6 | 3.7 | 9.1 | 3.2 | 1.8 | 2.2 | 3.7 | 1.47 | - | 14.3 |
| **PUC** | | | | | | | | | | | - | |
| **SP** | 35.9 | 9.8 | 3.0 | 4.6 | 7.8 | 1.0 | 2.0 | 3.4 | 12.5 | 5.1 | 1.1 | 13.8 |
| **TAU** | 45.0 | | 2.3 | 3.3 | 8.2 | 2.4 | 3.8 | 4.0 | 6.5 | 1.7 | | 22.8 |
| **TEC** | | | 18.5 | | 31.7 | 9.1 | | 33.0 | | 7.7 | | |
| **TPL** | 47.3 | | 4.2 | 2.3 | 2.1 | 0.0 | 5.2 | 8.3 | 5.2 | 4.0 | | 21.5 |
| **UNELCO** | 37.0 | 6.7 | 4.2 | 2.0 | 9.3 | 2.7 | 1.1 | 4.5 | 10.6 | 6.3 | 0.1 | 15.4 |
| **YSPSC** | 42.8 | - | 3.8 | 5.4 | 8.1 | 7.4 | 3.0 | 2.0 | 8.1 | 7.2 | 0.8 | 11.5 |

# Currency Conversion Table

**Table E.1: Currency Conversion Table for 2019 and 2018 Data**

| | | | 2018 | | | | | 2019 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Pacific Utilities | Country | Local Currency | 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-18 | 30-Sep-19 | 1 |
| CPUC | Chuuk, FSM | USD | 1-Oct-17 | 30-Sep-18 | 1 | 1 | *0* | 1-Oct-18 | 30-Sep-19 | 1 |
| CUC | Saipan, Northern Marianas | USD | 1-Oct-17 | 30-Sep-18 | 1 | 1 | *0* | 1-Oct-18 | 30-Sep-19 | 1 |
| EDT | French Polynesia | XPF | 1-Jan-18 | 31-Dec-18 | 0.009259 | 0.00959969 | *-0.00034069* | 1-Jan-19 | 31-Dec-19 | 0.00938 |
| EEC | New Caledonia | XPF | 1-Jan-18 | 31-Dec-18 | 0.009259 | 0.00959969 | *-0.00034069* | 1-Jan-19 | 31-Dec-19 | 0.00938 |
| EEWF | Wallis and Fortuna | XPF | 1-Jan-18 | 31-Dec-18 | 0.009259 | 0.00959969 | *-0.00034069* | 1-Jan-19 | 31-Dec-19 | 0.00938 |
| ENERCAL | New Caledonia | XPF | 1-Jan-18 | 31-Dec-18 | 0.00928 | 0.00959969 | *-0.00031969* | 1-Jan-19 | 31-Dec-19 | 0.00938 |
| EPC | Samoa | WST | 1-Jul-17 | 30-Jun-18 | 0.421455 | 0.383599997 | *0.037855004* | 1-Jul-18 | 30-Jun-19 | 0.377029 |
| FEA | Fiji | FJD | 1-Jan-18 | 31-Dec-18 | 0.477356 | 0.46667214 | *0.01068386* | 1-Jan-19 | 31-Dec-19 | 0.461783 |
| GPA | Guam | USD | 1-Oct-17 | 30-Sep-18 | 1 | 1 | *0* | 1-Oct-18 | 30-Sep-19 | 1 |
| KAJUR | Kwajalein Atoll, Marshall Islands | USD | 1-Oct-17 | 30-Sep-18 | 1 | 1 | *0* | 1-Oct-18 | 30-Sep-19 | 1 |
| KUA | Kosrea, FSM | USD | 1-Oct-17 | 30-Sep-18 | 1 | 1 | *0* | 1-Oct-18 | 30-Sep-19 | 1 |
| MEC | Marshall Islands | USD | 1-Oct-17 | 30-Sep-18 | 1 | 1 | *0* | 1-Oct-18 | 30-Sep-19 | 1 |
| NPC | Niue | NZD | 1-Oct-17 | 30-Sep-18 | 1 | 1 | *0* | 1-Oct-18 | 30-Sep-19 | 1 |
| NUC | Nauru | AUD | 1-Jul-17 | 30-Jun-18 | 0.7777 | 0.676656578 | *0.101043422* | 1-Jul-18 | 30-Jun-19 | 0.670404 |
| PPL | Papua New Guinea | PGK | 1-Jul-17 | 30-Jun-18 | 0.72825 | 0.740456021 | *-0.01220602* | 1-Jul-18 | 30-Jun-19 | 0.715129 |
| PPUC | Palau | USD | 1-Jan-17 | 31-Dec-18 | 0.313942 | 0.307666233 | *0.006275767* | 1-Jan-18 | 31-Dec-19 | 0.293307 |
| PUB | Kiribai | AUD | 1-Oct-17 | 30-Sep-18 | 1 | 1 | *0* | 1-Oct-18 | 30-Sep-19 | 1 |
| PUC | Pohnpei, FSM | USD | 1-Jan-17 | 31-Dec-18 | 0.743623 | 0.704577618 | *0.039045382* | 1-Jan-18 | 31-Dec-19 | 0.721305 |
| SP | Solomon Islands | SBD | 1-Oct-17 | 30-Sep-18 | 1 | 1 | *0* | 1-Oct-18 | 30-Sep-19 | 1 |
| TAU | Cook Islands | NZD | 1-Jan-18 | 31-Dec-18 | 0.125486 | 0.124551398 | *0.000934602* | 1-Jan-18 | 31-Dec-19 | 0.120274 |
| TEC | Tuvalu | AUD | 1-Jul-17 | 30-Jun-18 | 0.667932 | 0.676656578 | *-0.00872458* | 1-Jul-18 | 30-Jun-19 | 0.670404 |
| TPL | Tonga | TOP | 1-Jan-17 | 31-Dec-18 | 0.743623 | 0.704577618 | *0.039045382* | 1-Jan-18 | 31-Dec-19 | 0.721305 |
| UNELCO | Vanuatu | VUV | 1-Jul-17 | 30-Jun-18 | 0.440377 | 0.431294887 | *0.00908213* | 1-Jul-18 | 30-Jun-19 | 0.428383 |
| YSPSC | Yap, FSM | USD | 1-Jan-17 | 31-Dec-18 | 0.009203 | 0.008775503 | *0.000427497* | 1-Jan-18 | 31-Dec-19 | 0.00893 |

# Electricity Tariff Tables

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

| Currency Conversion | | | | | | TOTAL COST TO CONSUMER FOR SET kWhs/mth, incl base charge, taxes,etc (IN LOCAL CURRENCY) | | | | | | | | | DOMESTIC / RESIDENTIAL | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conversion Factor for each currency | | | | | | | | | | | | | | | COMMERCIAL / BUSINESS | | | |
| Pacific Utilities | Country | Local Currency | | | kWh/mth: | 50 | 100 | 200 | 500 | 1000 | 2000 | 3000 | 10000 | | 1000 | 3000 | 10000 | 50000 |
| | | | | | Flat rate | | | | | | | | | 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 kWhs/mth, incl base charge, taxes,etc (CONVERTED TO USD) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | DOMESTIC / RESIDENTIAL | | | | | | | | COMMERCIAL / BUSINESS | | | |
| Conv Factor to USD | 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 |