Performance Improvement Plans

Value of Benchmarking

- Ultimately, the value of benchmarking is in utilising the results to develop and implement an action plan that will lift performance.
- Areas of priority and KPI performance targets will be different for each utility.
- For example your board area of focus this year could be:
- Improve percentage of renewable energy
- Reduce operational costs
- Lift financial performance

Approach to select KPIs

- Alignment with utility strategy/focus

- Least cost option

- Risk Assessment

- Improving data collection and reporting

Your Benchmarking exercises and data collection will provide utility managers with tools necessary for developing improvement initiatives.

Where data collection and storage are seem to be inadequate, setting up data recording system will be a positive first step.

Improvement Planning Template

- KPIs that relate to the focus areas need to be identified

- Targets set for improvement and then strategic initiatives developed and implemented to achieve the target set.

- Priority Improvement Plan Template

Priority Improvement Plan			
Priority KPI	Current Benchmarking	Target	Improvement Initiatives
KPI A	Eg. Reduce SAIDI	250	Extensive VM, allocate additional men power , etc
KPI B			
KPI C			
……			

Examples of Improvement

- Each utility will need to consider the initiatives that will best address the KPIs they are targeting within their own context.

Improvement Plan Initiatives

KPI#	Indicator Name **Generation**	Value	Unit	Improvement Initiative
1	Load Factor		%	▪ Implement measures to shift demand from peak to off peak e.g. Tariffs, DSM initiatives
2	Capacity Factor		%	▪ Review/set spinning reserve policy/operational policy ▪ Improve generation reliability to enable less standby capacity
3	Availability Factor		%	▪ Preventative maintenance ▪ Improve planned outage to reduce forced outages
4	Generation Labour Productivity		GWh/FTE gen. emp	▪ HR management strategies
5	Specific Fuel Oil Consumption		kWh/L	▪ Engine Maintenance ▪ Review generation dispatch policy
6	Lub Oil Consumption		kWh/L	▪ Check quality of oil

Improvement Plan Initiatives

KPI#	Indicator Name **Generation cont'**	Value	Unit	Improvement Initiative
7	Forced Outage		%	▪ Maintenance Plan ▪ Regular Inspections/Test to detect need for maintenance
8	Planned Outage		%	▪ Incentivise Employee Performance, ▪ Templates/Recording System ▪ Publicise data
9	Generation O&M Costs		USD/MWh	▪ Review Staffing Requirements ▪ Address losses ▪ Reduce unbilled usages
10	Power Station Usage		%	▪ Employ DSM activities in Power Station
11	Renewable Energy to Grid		%	▪ Conduct a resource review on renewable energy options ▪ Progress with studies already completed

Improvement Plan Initiatives

KPI#	Indicator Name **Generation cont'**	Value	Unit	Improvement Initiative
12	IPP Energy Generation		%	▪ Consider IPP agreements
13a	Distillate Generation, HFO, Biofuel, etc.			▪ Review fuel mix ▪ Consider RE options.
14	Enable Framework for Private Sector			▪ Develop enabling environment

Improvement Plan Initiatives

KPI#	Indicator Name **Transmission**	Value	Unit	Improvement Initiative
15	Transmission Losses		%	▪ Redesign of transmission network ▪ Consider installing capacitors
16	Transmission Reliability		Outage events/km	▪ Preventative maintenance
17	Average Transmission Outage Duration		h	▪ Preventative maintenance

Improvement Plan Initiatives (Distribution)

KPI#	Indicator Name	Value	Unit	Improvement Indicator
18	Network Delivery Losses		%	▪ Phase Balancing ▪ Proper Design and Planning
19	Distribution Losses		%	▪ Determine proportion of technical & non-technical losses ▪ Address issues of theft, faulty meters, lack of metering
20	Customers per Distribution Employees		Cust/distributi on employee	▪ Human Resources Management Plan ▪ Increase customer connection
21	Distribution Reliability		Events/100 km	• Preventive maintenance
22	Distribution Transformer Utilisation		%	• Ensure adequate planning for distribution expansion • Correct sizing if new transformers
23	Distribution O&M Cost		USD/km	▪ Review staffing requirements ▪ Address losses ▪ Reduce unbilled usage# ▪ Consider automation ▪ Fault locators

Improvement Plan Initiatives (Distribution)

KPI#	Indicator name	Value	Unit	Improvement Indicator
24	SAIDI		%	- Preventive Maintenance - Review/improve network redundancy - Automate switching - Improved recording of outage data
25	SAIFI		%	- Preventive Maintenance - Review/improve network redundancy - Automate switching - Improved recording of outage data

Demand Side Management

KPI#	Indicator Name	Value	Unit	Improvement Initiative
26	DSM Initiatives			
27	DSM Budget		USD	▪ Set DSM Budget ▪ Link Budget to expected outcomes ▪ Reward employees for successful implementation/performance based remuneration/bonuses
28	DSM FTE Employees		#	
29	DSM MWh Savings		MWh	
30	Power Quality Standards			

Human Resources / Safety

KPI#	Indicator Name	Value	Unit	Improvement Initiative
31	Lost Time Injury Duration		days	• HR management plan
32	Lost Time Injury Frequency Rate			▪ Safety Initiatives ▪ Use Safety Standards ▪ PPE ▪ Training and awareness
33	Labour Productivity		%	▪ Performance Based Remuneration

Customers / General

KPI#	Indicator Name	Value	Unit	Improvement Initiative
34	Service Coverage		%	
35	Productive Electricity Usage		%	
36a	Lifeline Tariff Usage , Domestic Usage, Industrial, etc			
37	Customer Unbilled Electricity		%	▪ Install/repair meters ▪ Prepaid meters ▪ Implement DSM activities for legitimate unbilled customers
38	Self Regulated or Externally Regulated			

Financial Indicators

KPI#	Indicator Name	Value	Unit	Improvement Initiatives
39	Operating Ratio			• Reduce costs • Increase revenue
40	Debt to Equity Ratio		%	
41	Rate of Return on Assets		%	• Increase profit
42	Return on Equity		%	• Increase profit
43	Current Ratio		%	• Maintain sufficient current assets to cover liabilities
44	Debtors Days		Days	• Incentivise payment by Due date • Ensure access to pay bill is easy • Pre-paid meters
45	Average Supply Cost		US cen/kWh	• Cost management • Improve utilisation of assests

Improvement plan

- Once a Priority Improvement Plan has been formed, it is then resourced, planned and implemented

- Regular review of KPIs is helpful (monthly or quarterly review) to pre-empt adjustments

- Improve data collection (data reliability)

Data Component Reliability Assessment Questions

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

Reliability Evaluation

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

Reliability Grading Guidance

Reliability Grade	Description	
i.	How is Fuel consumption calculated or derived?	Related Questionnaire Data input
A	• Accurate records are kept of deliveries, inventory and consumption of oil and fuel type by location, station and unit. • Fuel consumption measurement equipment is temperature compensated. • Monthly fuel consumption measurement is taken for each unit and fuel consumption audits are regularly undertaken and reconciled by unit. • Audits are carried out by both internal and external parties.	
B	• Records are kept of deliveries, inventory and consumption of oil and fuel type by location and station. • Fuel consumption measurement equipment is not temperature compensated. • Fuel consumption measurement is taken for power stations and fuel consumption audits are undertaken and reconciled by power stations. • Audits are carried out by internal and external parties.	9,10

Reliability Grade	Description	Related Questionnaire Data Input
C	• Some records are kept of deliveries, inventory and consumption of oil and fuel type by location and station. • Fuel consumption measurement are done by dip stick. • Fuel consumption audits are only undertaken by an external party annually and reconciled by power stations	
D	• Some records are kept of deliveries, inventory and consumption of oil and fuel type by location and station. • Fuel consumption measurement are done by dip stick. • Fuel consumption audits are rarely undertaken or irregular. • Heavy reliance on fuel supplier information	9,10

Reliability Grading Guidance

Reliability Grade	Description	
i.	How are generation quantities calculated or derived?	Related Questionnaire Data input
A	• Generation quantities are computed on the basis of measurement by station, unit and auxiliary metering at all grid connected generation points, which are calibrated / verified for accuracy regularly. • Generation profiles are monitored continuously and there is an established process for reporting capacity factors. • There is an established process for derating of generators and reporting of all related volumes	2 to 8 inclusive 11 to 17 inclusive
B	• Generation quantities are computed on the basis of measurement by unit and station metering at all grid connected generation points. • Meters may not be calibrated or verified for accuracy. • Reliable generation profiles are available. • More manual processing and interpretation of records may be required than A.	

Reliability Grade	Description	Related Questionnaire Data Input
C	• Reliable and calibrated metering is not available at all grid connected generation points. • Generation profiles are estimated or extrapolated. • Derating information is not routinely recorded.	2 to 8 inclusive 11 to 17 inclusive
D	• Aggregated generation information is available, with limited information available on unit and station profiles and capacity factors. • No reliable calibrated metering systems exist.	

Reliability Grading Guidance

Reliability Grade	Description	
iii.	How are customer outage impacts calculated or derived?	Related Questionnaire Data input
A	• Details of individual HV network or generation outages are available and used to calculate customer impact measures and reliability statistics. • Records of trip times, restoration sequences, and affected customer numbers are available from SCADA, generator, substation, operating or other records. • Outage records are suitable for causal analysis and performance improvement. • An established and auditable process is used for evaluation of outage impacts	11 to 16 inclusive 20,21,24,27,28
B	• Reliable assessment of HV network and generation outages are available, but may require more manual processing of information from source records than in A. • Customer numbers for network segments and affected areas are used to derive reliability statistics but may not be up to date at all times.	

Reliability Grade	Description	Related Questionnaire Data Input
C	Where outage impacts are assessed, they use estimates of outage durations and affected customer numbers. It is likely that not all outages are captured in reporting statistics. Limited processes exist for fault causal analysis and reporting.	11 to 16 inclusive 20,21,24,27,28
D	• Outage analysis may only be performed for large outages, if at all. • Outage details are not recorded consistently or for reporting purposes. • It may be difficult to extract information from generator, substation and operating records. • There are no established processes related to customer outage analysis	

Reliability Grade	Description	
iv.	How are network demands and capacity utilisation calculated or derived?	Related Questionnaire Data input
A	• Calibrated metering equipment is installed at all zone and distribution substations and at consumer's premises for all categories of consumers. • Demand information is captured throughout the network. • Records are up to date and identify installed capacity of lines and transformers. • Billing records and databases reveal regular reading of meters. • Established processes exist and are used for reporting of capacity utilisation, losses and network demand profiles. • Power system analysis software may be in use and routinely undertaken. • Detailed loss breakdowns are regularly updated and available.	4,5,23,26,32
B	• Generally as per A, although processes and systems are not as developed. • Limitations of installed metering and substation equipment will require more manual processing of information. • Asset records are missing information requiring some extrapolation for assessment purposes. • Power system analysis software or studies may be undertaken from time to time	

Reliability Grade	Description	Related Questionnaire Data Input
C	• Metering is not comprehensive enough to allow evaluation of demand and losses easily throughout the network. • There may be significant limitations in the records of installed assets. • Billing records and aggregate consumption information is incomplete.	
D	• Asset records may be well out of date and metering coverage of the network poor. • Major assumptions required for evaluation of utilisation at an aggregate level. • No meaningful loss breakdown possible. No recent power system analysis completed.	4,5,23,26,32

Reliability Grading Guidance

Reliability Grade	Description	
v.	How are the number of connections or customers calculated?	Related Questionnaire Data input
A	• Billing records and databases clearly identify customer specific meters. • Billing processes reveal regular reading of meters and meter readings are the basis for charging consumers. • Databases of electricity connections and meters are complete. • There is a mechanism to identify faulty meters and repair meters. • Processes for installation of new connections, installation of meters and generation of bills based on this are interlinked with a robust process.	
B	• Database/ records reveal the list of customers that have meters installed in their electricity connections. • Meter data and associated customer databases may be limited and the linkage with the billing system harder to demonstrate	43 to 56 inclusive

Reliability Grade	Description	Related Questionnaire Data Input
C	• Records do not reveal the exact number of connections which are metered . • Not all billing is based on metered quantities. • Processes associated with new connections and metering management may not be robust.	
D	• No formalised processes for metering and connection management. • Number of current connections estimated with poor linkages to billing system and database coverage	43 to 56 inclusive

Reliability Grading Guidance

Reliability Grade	Description	
vi.	Where is financial information sourced from?	Related Questionnaire Data input
A	Major budget and functional reporting categories identified and separated. Cost allocation standards for common costs are in place. An accrual based double entry accounting system is practiced. Accounting standards are comparable to commercial accounting standards with clear guidelines for recognition of income and expenditure. Accounting and budgeting manuals are in place and are adhered to. Financial statements have full disclosure and are audited regularly and on time.	59to 83 inclusive
B	Key costs related to generation and distribution are identifiable, although complete segregation is not practiced. Key income and expenditure is recognised based on accrual principles, but accounting standards may not be comparable to commercial accounting standards. Disclosures are complete and are timely and audits undertaken	

| Reliability Grade	Description	Related Questionnaire Data Input
C	Major budget and functional reporting categories are not clearly separated, eg, between electricity power supply costs and costs for other utility functions such as water, sewerage, etc. Limited useful functional reporting and cost allocation principles in place. Audits may have a significant time lag or may be irregular.	59 to 83 inculsive
D	There is no segregation of major budget and functional categories, eg, no clear distinction between electricity power supply costs and costs for other utlity functions such as water, sewerage, etc. A cash-based accounting system may be practiced. There are no clear systems for reporting unpaid expenditure or revenues that are due. Disclosures and reporting may not be timely	

Online Benchmarking Platform

- WB activity under Sustainable Energy Industry Development Project (SEIDP) is to design capacity development plan for increase in data collection, management and knowledge sharing

- Develop a web based benchmarking platform that will be used by utilities allowing to submit correct data and get easy excess to results.

- Preparing TOR in consultation with World Bank experts

- Two primary functions of online benchmarking platform
  - Act as interface for data submission
  - Results visualization

Online Benchmarking Platform

Project Outcomes:

- Develop a web interface for continuous data collection and result visualization

- Develop an online dashboard to customize output for comparison and trending

- Create a database to compare past and current performance

- Train utility and PPA staff to be able to take ownership of the platform.

Layout of Proposed Benchmarking Platform
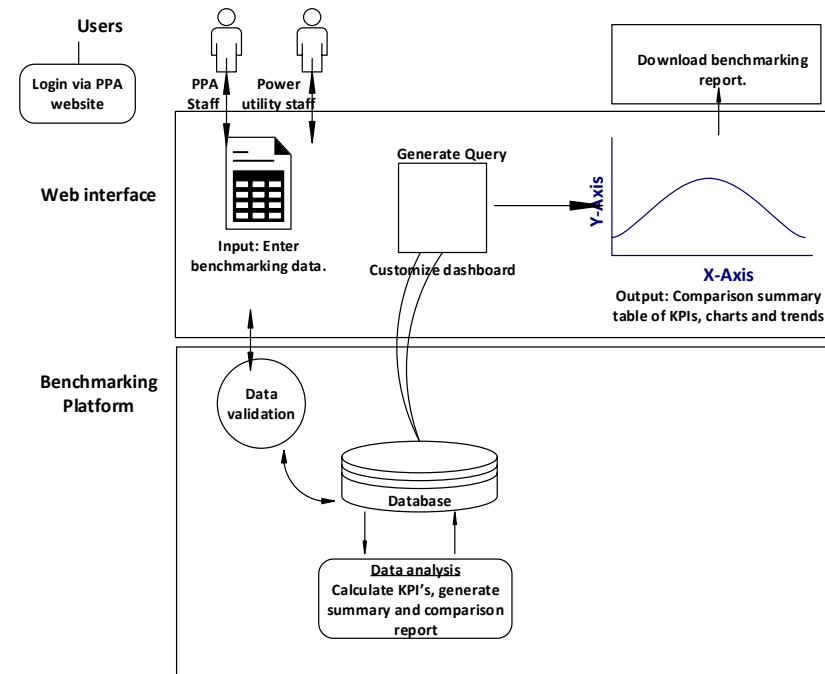
Outcome of Online Benchmarking Platform

- Reduce time and cost of preparing power benchmarking report
- Reduced data validation time
- Able to customize and view benchmarking results online
- Data backup and security
- Benchmarking report made readily available
- Easy to train and communicate with utility liaison officers (provide error notes during data submission)
- How far have we gone into development of PPA's Online Benchmarking Platform
  - At the moment we are evaluating RFP.

VRE Integration Study

- Assessment of the issues that arise when renewable energy installations are connected into the existing power systems

- Small systems with radial feeders may become hard to manage

- Once renewables reach a certain capacity level within the power systems, the systems will also become more operationally complex

- The locations of renewables installations, their geographical relationship to power stations, available capacities of existing lines and/or cables and system configurations are all significant factors

Grid integration and planning studies - locations

Grid Integration & planning studies and SCADA/EMS design	SCADA/EMS design
Tonga	Pohnpei
Samoa	Marshalls
Kosrae	Tuvalu
Yap	
Chuuk	

Continue Benchmarking

- It is important for Pacific power utilities to continue performance benchmarking in order to capitalise on the potential gains identified from PPA annual survey and sustain further on-going improvements in the coming years

- Improvements (performance/ efficiency) will help meet increasing customer expectation, owners and regulators for better power utility performance especially in terms of better prices, service, safety and environmental outcomes

- Recommend utilities to evaluate their overview benchmarking and overtime progress along the line of detail benchmarking.

Thank You