

# *List of key findings of field visits*

CTCN-UNIDO Technical Assistance to  
Solomon Island Water Authority

*Strictly Private  
and Confidential  
Draft*

*September 2019*



# Agenda

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**Key findings** **7**

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**Timeline** **17**

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# Overview

# Aim of Technical Assistance



## Assessment of Energy Efficiency and RE options

- Field visit for measurement
- Identify energy conservation opportunities
- Identify self generation options



## Capacity building through on-job training for Solomon Water

- Prepare training modules and operational modules
- On-the –job hands-on-mentoring on EE and RE implementation



## Detail assessments of shortlisted EE and SGO options for Solomon Water

- Technical analysis
- Financial analysis



## Monitoring of impact

- CTCN Monitoring and evaluation template

## *Pump Stations Covered under Technical Assistance*

Sr. No.	Name of pump station	No. of transfer pumps	No. of borewell pumps
1	Titinge	3 (2 R + 1 S)	4 (2 R)
2	Skyline	3 (1 R + 2 S)	4 (2 R)
3	Tuvaruhu JICA	2 (2 R)	3 (3 R)
4	Tuvaruhu SIWA	2 (1 R + 1 S)	2 (2 R)
5	Kwaibala	2 (1 R + 1 S)	0
6	Borderline	3 (2 R + 1 S)	4 (4 R)
7	Tasahe	3 (2 R + 1 S)	4 (4 R)

*Where, R – Run, S – Standby*

*All operational pumps including standby pumps were tested*

# Activities performed at each pump station

## 1. Understanding operational procedures

- Operational cycle/sequence of transfer pumps and bore pumps
- Working out the water balance

## 2. Conducting pump efficiency assessment

Measurement of following:

- Pump water flow rate
- Suction and discharge pressure
- Power consumption of motor

## 3. Self-generation potential assessment

- Total available area in transfer pump station
- Roof space available
- Effect of shading



# *Key findings*

## ***Key findings***

- 1 Use of in-efficient pumps***
- 2 Use of non-standard or low rating motors i.e. IE1, IE2***
- 3 Over-sized pumps***
- 4 Worn impeller***
- 5 Clogging of bore well screens***
- 6 No calibration of water flow meters and pressure gauges***
- 7 FTL 36W tube lights***
- 8 Energy Management System***
- 9 Low power factor***
- 10 Potential for Solar PV system***

## *In-efficient pumps*

Tuvaruhu SIWA Pump 1			Tuvaruhu JICA Pump 2	
Parameter	Design Details	Operational Details	Design Details	Operational Details
Flow rate (m <sup>3</sup> /h)	65	54.6	58	62.1
Head (m)	50	46	110	106
Efficiency (%)	72	42.3	59	48.2



Approx. annual saving potential  
**SBD 130,000**

Approx. annual saving potential  
**SBD 450,000**



## In-efficient motors

Approx. annual saving potential  
changing all pumps to IE4  
**SBD 600,000**

Pump Station	IE	Pump Station	IE
Titinge	2	Kwaibala	2
Skyline	3	Borderline	3
Tuvaruhu JICA	3	Tasahae	2
Tuvaruhu SIWA1	1	Tuvaruhu SIWA2	2

Motor rating	IE1	IE2	IE3	IE4
7.5 kW	86.0	88.7	90.4	92.6
11 kW	87.6	89.8	91.4	93.3
15 kW	88.7	90.6	92.1	93.9
18.5 kW	89.3	91.2	92.6	94.2
22 kW	89.9	91.6	93.0	94.5
30 kW	90.7	92.3	93.6	94.9
37 kW	91.2	92.7	93.9	95.2

## Oversized pump

Parameter	Design Details	Operational Details	Variation
<b>Titinge Transfer Pumps</b>			
Flow rate (m <sup>3</sup> /h)	64	77.8	-21.6%
Head (m)	108.5	85	21.7%
<b>Skyline Transfer Pumps</b>			
Flow rate (m <sup>3</sup> /h)	64	78.8	-23.1%
Head (m)	83.9	60	28.5%

Approx. annual saving potential in  
Titinge pump station  
**SBD 70,000**

Approx. annual saving potential in  
Skyline pump station  
**SBD 140,000**

## Worn Impeller

## Clogged bore hole screen

**Borderline Transfer Pump1's impeller might be worn out**

Pump	Flow rate (m <sup>3</sup> /h)	Head (m)	Power input (kW)	Operating eff (%)
Pump 1	32.1	32		63.9
Pump 2	53.6	37		74.7
Pump 3	53.1	34		70.1

Switched OFF pump 1, running only 2 and 3 till pump 1 is replaced

**Borderline Bore Pump 03 - Probably screen are clogged**

Pump	Flow rate (m <sup>3</sup> /h)	Head (m)	Power input (kW)	Operating eff (%)
Pump KO1	24.4	40.0		3.0
Pump KO3	4.1	16.6		3.3
Pump KO4	36.1	59.3		3.5

Switched OFF bore pump 3, started realising savings SBD 71475 / year

## Meter calibration

Pump	Water meter (m <sup>3</sup> /day)	Ultrasonic flow meter (m <sup>3</sup> /day)
Skyline Bore 01	843	764
Skyline Bore 04	451	340
Titinge Bore 02	788	732
Titinge Bore 04	580	560
Kwaibala PS	776	575

- Replace meters which have error in reading zero
- Replace meters which are over 5 years without calibration
- Start a meter calibration program
- For better accuracy use proper sized meters



## *Lighting system*

## *Low power factor*

Pump station	Type of fixture	No.	Total Wattage (W)	LED replacement (W)
Titinge	FTL 36W	24	1056	252
Skyline	FTL 36W	24	1056	252
Tuvaruhu JICA	FTL 36W	8	352	126
Tuvaruhu SIWA	FTL 36W	8	352	126
Kwaibala	FTL 36W	4	176	84
Borderline	FTL 36W	24	1056	252
Tasahae	FTL 36W	24	1056	252

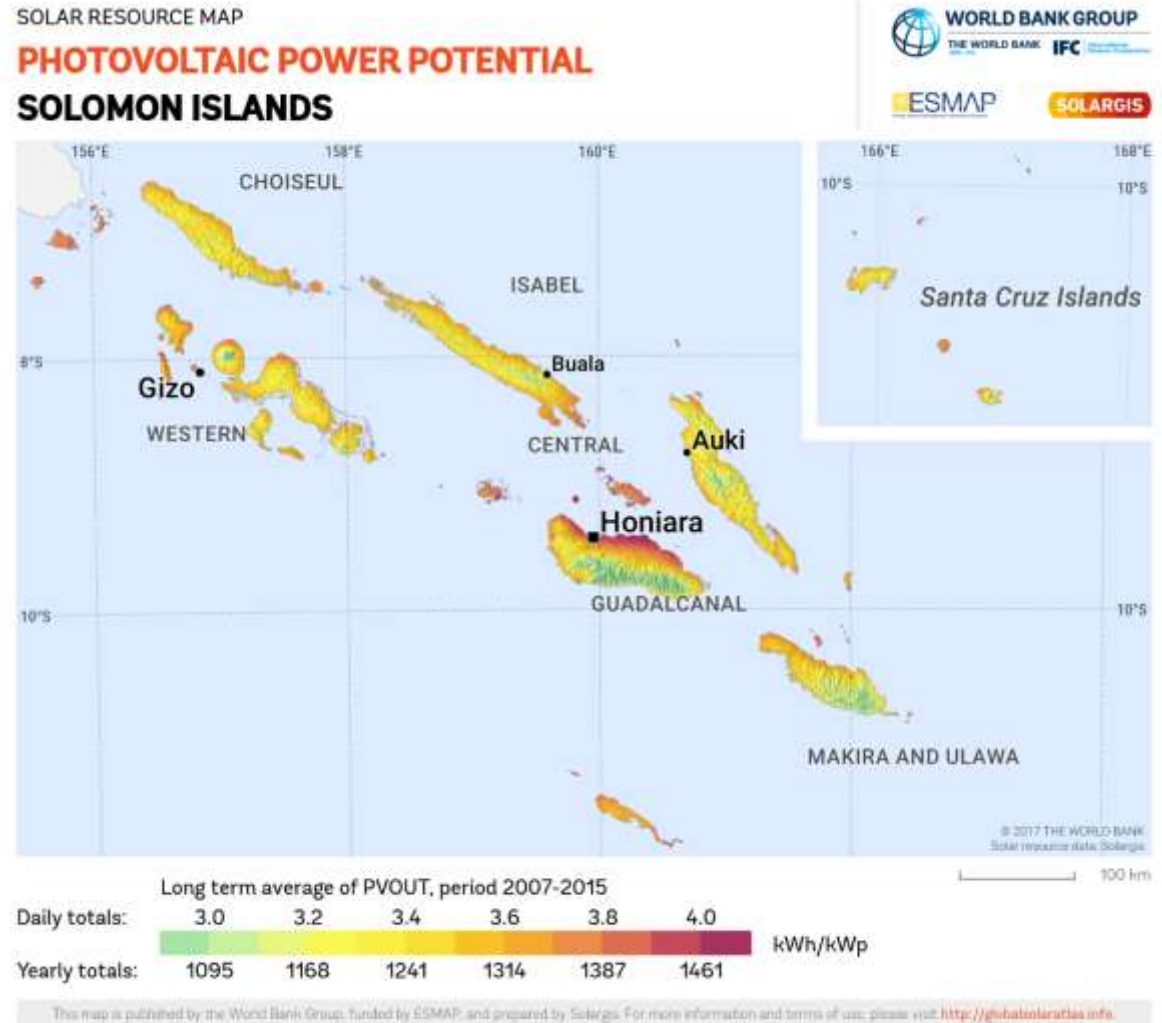
The operating hours of lights is very less. Hence, its suggested to replace FTL with LED once the exiting light fails.

A number of pumps operating at low power factor. E.g. Tasahe overall pump station PF is under 0.75. However, present tariff does not push us to go for PF correction. We will still propose it considering SIEA has floated a tender for tariff re-structuring.

# Solar PV System

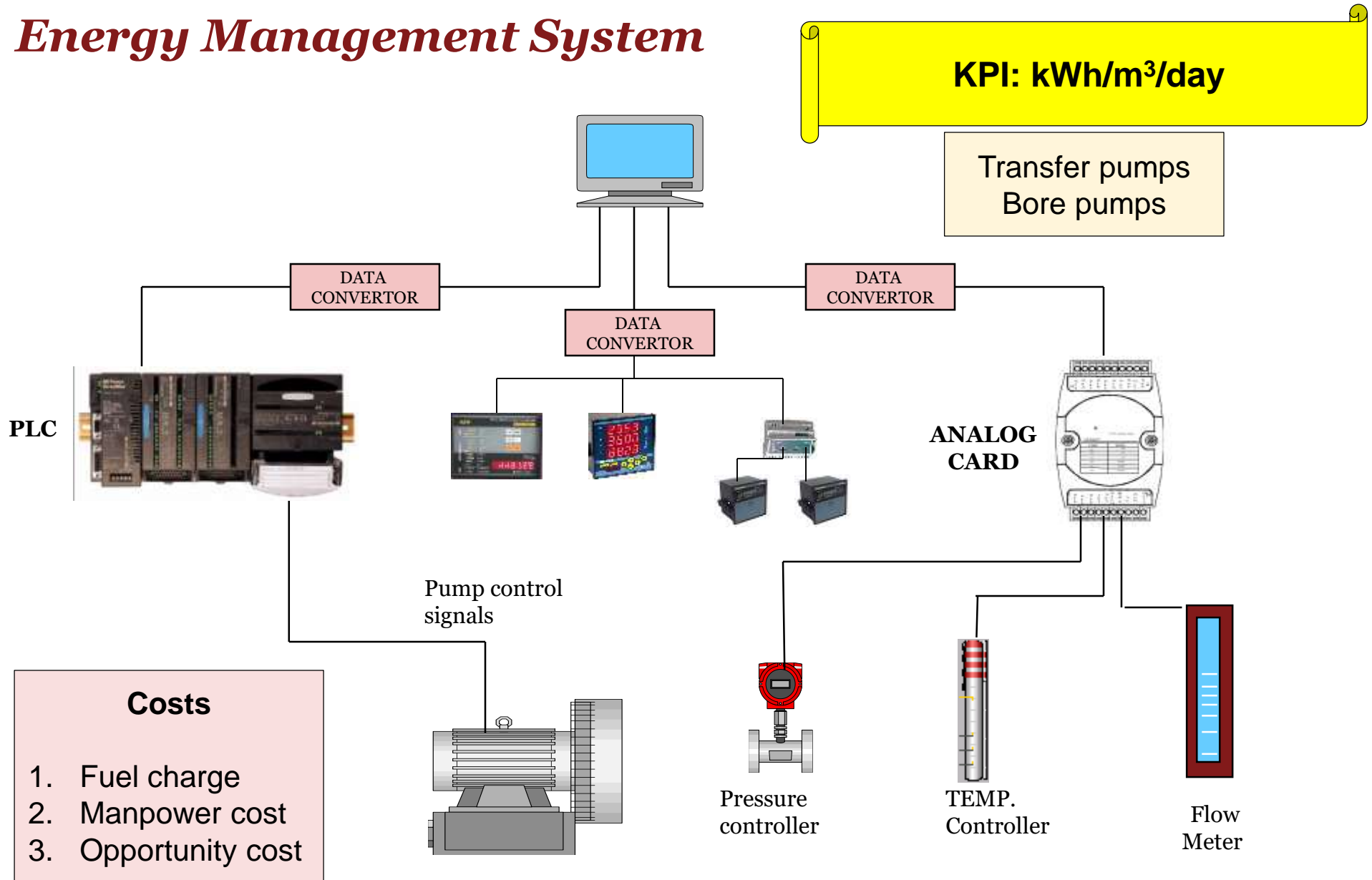
Name of pump station	Tentative Solar PV Potential
Titinge	15 kWp
Skyline	15 kWp
Tuvaruhu JICA	60 kWp
Tuvaruhu SIWA	
Kwaibala	NA
Borderline	15 kWp
Tasahae	15 kWp

Approx. annual generation potential  
**169.2 MWh**



**Issue with tariff structure**

# Energy Management System



# *Timeline*

## *Timeline of deliverables*

<b>Deliverable</b>	<b>Tentative timeline</b>
Detailed feasibility report of 7 pump stations	End of October 2019
Tender documents for EE and RE options	End of November 2019
Training modules and operational manual	Mid December 2019
Third mission to Honiara	January 2020
CTCN Monitoring and evaluation template	January 2020

***PwC CTCN Contract end date: February 2020***

## *Few photos of field visits*



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- Adam
- Shaun
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- Sam
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*Thanks!*

