



## Namamanuca Primary School Solar Project



*Thank you Mainfreight International for contributing to a brighter future for these kids.*



***Supplying power for education and establishing on-going cash flow for the purchase of education resources***

July 2014



## Namamanuca Primary School

Location: Yanuya Island, Fiji.

Google Maps search: Yanuya Island (the school is the red roofed buildings)

Seven teachers provide classes for 141 students from Year 1 to 8. The school draws students from the village and nearby islands. 25 students board at the school's two dormitories during the week. Seven teachers' quarters are located in the school compound.

The school generator delivers a couple of hours power during the day on a needs basis -- like most schools that means turning the generator for carefully monitored periods so as to keep cost to a minimum. The generator runs for an average of four hours each evening to supply power to the teachers' quarters and boarding houses and for night study. Otherwise the teachers and boarders use kerosene lamps for lighting.



**Project photos:**

<https://www.flickr.com/photos/itstimefoundation/sets/72157646156120766/>



## Project Details

The 4600W solar system supplying Namamanuca Primary School includes premium components to withstand island conditions and deliver the objectives of the project for decades<sup>1</sup>.

The design of these systems (AC Coupled<sup>2</sup>) means, whilst initially more expensive, it is a better performing system and allows for lower cost expansion in the future if required. The system exceeds the school's current demand therefore provisioning growing electronic education needs.

The system was installed between 25 and 30 July 2014 and is performing as expected. Major system components include:

28 x Silex 165W panels

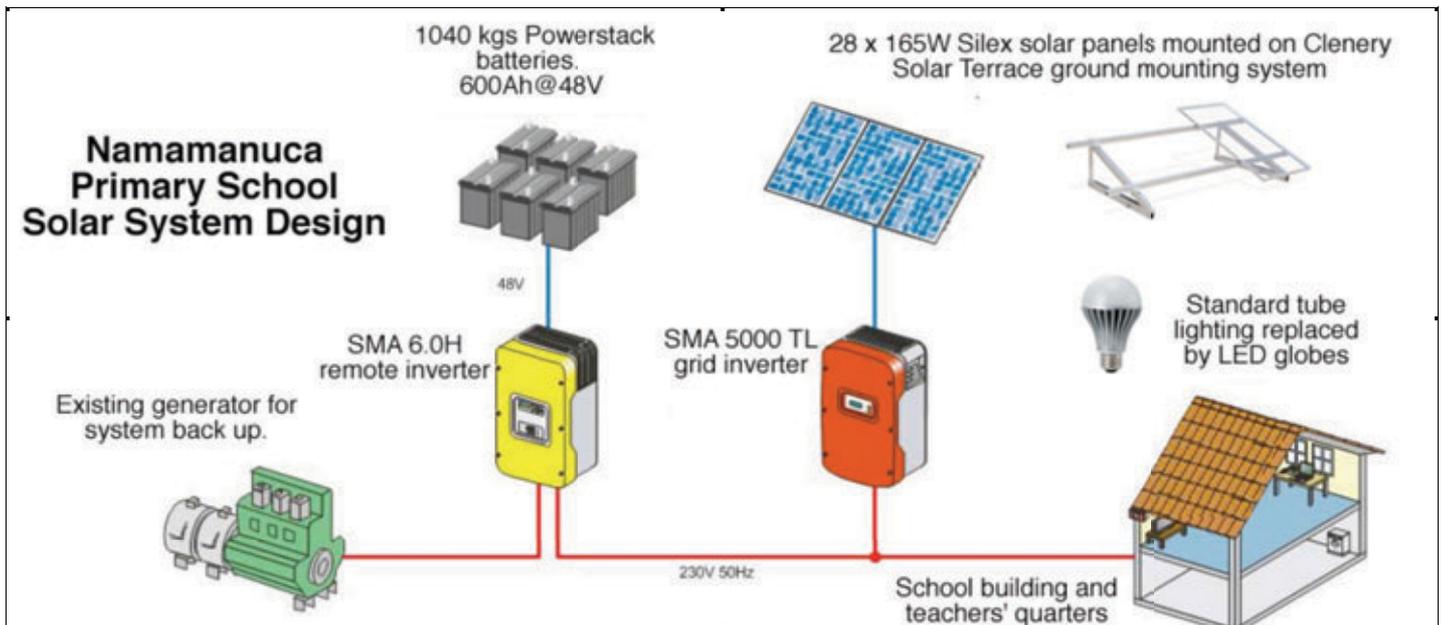
1 x SMA SB 5000TL grid inverter<sup>3</sup>

1 x SMA SI6.0H remote inverter<sup>4</sup>

4 x SB1800 PowerStack 12V 600Ah battery banks<sup>5</sup>

1 x Clenergy Soalr Terrace III ground mounting system<sup>6</sup>

VIRIBRIGHT LED<sup>7</sup> lighting and Clipsal fittings to replace existing tube lighting



<sup>1</sup> With the current system settings and power efficiency strategies target battery life is well in excess of 10 years before needing replacement. It is expected the other components will last well in excess of 20 years.

<sup>2</sup> <http://www.iitime.org/new/accoupling.pdf>

<sup>3</sup> [http://www.sma-australia.com.au/en\\_AU/products/solar-inverters/sunny-boy/sunny-boy-3000tl-4000tl-5000tl-with-reactive-power-control.html](http://www.sma-australia.com.au/en_AU/products/solar-inverters/sunny-boy/sunny-boy-3000tl-4000tl-5000tl-with-reactive-power-control.html)

<sup>4</sup> [http://www.sma-australia.com.au/en\\_AU/products/off-grid-inverters/sunny-island-60h-80h.html](http://www.sma-australia.com.au/en_AU/products/off-grid-inverters/sunny-island-60h-80h.html)

<sup>5</sup> <http://www.electusdistribution.com.au/productResults.asp?CATID=Search+all+Categories&keywords=sb1800&keyfrm=KEYWORD&x=0&y=0>

<sup>6</sup> <http://www.clenergy.com.au/mounting-system.php>

<sup>7</sup> <http://www.viribright.com.au/>      <https://www.clipsal.com>



## LED lighting

In the school, teachers' quarters and dormitories all of the 1200 mm fluoro lighting and most of the 600 mm tubes were removed. These were replaced by new Clipsal supplied batten holders and VIRIBRIGHT LED globes. For low use areas such as bedrooms and bathrooms we replaced 600 mm fluoro tubes with 600mm VIRIBRIGHT LED tubes

This strategy has reduced lighting load by approximately 70%. Along with behaviour change we expect power demand from lighting (the largest load category) to drop by more than 80%. Therefore significantly enhancing the effectiveness of the solar system, the amount of fuel saved and extending battery life.

## Energy efficiency education

Energy usage behaviours by students, staff and their families will influence the effectiveness of the solar system. At the time of installation everyone in the school community was educated about the efficient use of electricity. Posters (see Appendix 2) are installed in all teachers' quarters, dormitories, the office and relevant classrooms.

The school has signed an agreement committing to the energy efficiency strategy (Appendix 1).

## Power rationing strategy

Power stored in the batteries during the day is supplied at night until the batteries are 40% drawn down, at which point the solar system shuts down. If further power is required that evening the generator is used. This strategy is an effective balance between supplying evening power and extending battery life. Generator use is expected to be minimal.

Usually hardwired timers were installed to supply power to the teachers' quarters and dormitories from 5.00 to midnight every day and 11.00 AM to midnight on weekends. Whether or not the batteries supply power for that full evening period largely depends on 1. the community's compliance with energy efficiency strategies 2. Weather conditions -- extended cloudy periods may require limited generator use. **BUT** in this case we are trialling not installing the timers – hence 24 hour power to the quarters. We will make an assessment in two months when we have that period of battery charge data.

## Maintenance

The school puts aside, in a separate account, FJD80 per month to contribute to future maintenance needs.

## Reporting

The school is required to report to Its Time Foundation each school term. See Appendix 3.





## Benefits

The estimated savings are approximated based on current fuel prices and with the assumption that the solar system is supplying 90% of the school's power needs.

- The school now has all day power. Therefore the school now has the opportunity of introducing and strategically expanding electronic education.
- Due to reduced fuel consumption the school will save up to FJD7000 per year. The school has agreed that these savings will be directed to student education resources with a preference for electronic education resources. [Fuel costs approximately FJD8000 each year including the cost of collecting it from the mainland]

Included in the above calculation is that teachers will contribute \$5 per week the school's budget for improving electronic education at the school. Note: that is less than their previous contributions, but they now receive significantly larger periods of electricity access.

**PLUS!** Mr Andrew Turnbull, owner of the nearby Tokoriki Resort (<http://www.tokoriki.com/>), committed to add \$ for \$ to the savings if the school complies to their agreement. So the solar system will deliver near FJD14,000 to the schools electronic learning future. That's a very significant input when you consider the school does not yet have computer education.

- The reduced generator usage will reduce future generator maintenance costs.
- Less use of kerosene lanterns in teachers' quarters reduces fire and health risks. Also additional fuel savings for those individuals.
- Generators often supply 'dirty' power that damages equipment such as computers. The solar system delivers high quality power therefore extending the life of computers and other electronic equipment -- therefore indirectly saving money.
- Prior to the solar system teachers did many of their tasks such as report writing, photocopying in the evenings when the generator was running. They that work is part of their daytime routine.
- The extended power supply to the teachers' quarters enhances the quality of life for teachers and their families.
- As the schools now have the capacity for growing electronic education this may create a greater attraction for quality teachers to stay at the school.
- Over 6000 kgs of carbon dioxide emissions will be abated annually due the replacement of diesel with renewable power.
- We encourage the school to engage students in learning about renewable energy and climate change. We the hope the solar system promotes this objective.





## Funding

There were all sorts of ways we raised money for projects, usually a major event or a single sponsor is the primary contributor. Not in this case and it is very special because the contributions are so diverse. They include Tokoriki Resort guests, donation boxes at Denarau Marina Fiji, Lulus Cafe Fiji, Eastie Beach Cafe Corrimal and Budget Pharmacy Fiji, the crazy principal at Mt Austin school who raffles herself each month to cover another teacher's class, the group of people making regular donations, Michael's winnings from a poker game, the walk-a-thon mob, TGA happy hour, Claremont College kids, Greens Rugby Club grand final bash, instead of flowers at Marie's funeral and all the others who have contributed -- you know who you are.

The kids send you all a huge thank you - **Vinaka vaka levu!**

## Project partners

The generous support of our equipment and service sponsors allowed donated funds to be spent approximately twice over. Direct supporters who supply equipment or services at favourable pricing (some free of charge) include:

Solar panels:	Silex Solar (we believe these donated panels were the last shipped before the Silex Australian panel operation closed)
Mountings:	Clenergy
Batteries:	Tech Brands
LED Lighting:	VIRIBRIGHT
Electrical materials:	Clipsal and Schneider Electric
International freight:	Mainfreight
Installation:	CBS Power Solutions

For other general supporters of Its Time Foundation: <http://iitime.org/supporters/>

See <http://iitime.org/> for general information about Its Time Foundation

Thank you all for enhancing the lives of a generation of children at Namamanuca.



Rob Edwards

Founder, Its Time Foundation

+61 413 734 916 +61 2 8003 4143 [rob.e@iitime.org](mailto:rob.e@iitime.org)



## **Agreement for the acceptance a school solar system by Namamanuca Primary School**

These guidelines insure that the solar system provides the greatest possible benefit for the longest possible time. In accepting the solar system the school management committee agrees to comply with the following.

1. This agreement will be a recurring agenda item at school management committee meetings where compliance to the below points is confirmed.
2. The school will create a new "Maintenance" bank account and deposit FJD80 per month from the money saved on fuel. That will gain interest and be available for future maintenance needs of the solar system. The major maintenance cost to be aware of is replacement of batteries (used correctly the target life will exceed nine years).
3. Other than the maintenance provision, all money the school saves due to reduced generator fuel consumption will be spent only on education resources for the use of students. This will be kept in the school accounts and budgeted as Electronic Education Fund. The committee will discuss each month how this fund will be used to advance computer or other electronic education at the school. Fuel savings are not for expenditure on administrative items or equipment for teachers' personal use.
4. In addition to the above saving teachers will pay \$5 per week to the Electronic Education Fund. This value is less than the current fuel cost to teachers (as reported when the school was surveyed) and teachers will gain greater access to power.
5. Instructions and a card reader will be provided to download a file from the solar inverter once every term with the term solar report. The file is emailed to Its Time Foundation. This data provides a summary of the system's performance.
6. The school and teachers' quarters will adopt a strong energy efficiency policy to minimise the amount of electricity used. This will reduce the need to use the generator to supplement the solar system. Remember: the solar system only provides a limited amount of power!  
  
The energy efficiency policy will include all points listed on the posters provided. The committee will assign a responsible person to report to each committee meeting about how well the energy efficiency policy is being applied in the school and the teachers' quarters.
7. Any new teacher's quarters or school buildings built in the future will be fitted with LED globes (we may assist).
8. Where appropriate take opportunities to teach students about climate change and renewable energy.
9. Where possible support attempts by Its Time Foundation to establish communication between an Australian school and Namamanuca Primary School to gain mutual benefits from sharing learning experiences.
10. Report to the Its Time Foundation, by email, once per term the following:
  - The maintenance and security of the solar system.
  - How the fuel savings are being spent or expected to be spent.
  - The functioning of the energy efficiency policy.
  - Supply a copy of a bank statement for the maintenance account as per item 2.
  - Send a copy of the inverter file (instructions provided at the time of installation).

It is the intention of Its Time Foundation to be available in the future to provide some assistance with regard maintenance needs of the solar system (a proportion of donations has been set aside for this purpose). The Foundation may also be available for other assistance in the future. BUT if the school does not comply with the conditions of this agreement the school will not receive any further assistance from Its Time Foundation.

Signed:

Name:  
On behalf of the school management committee

Date:

Rob Edwards  
Its Time Foundation

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Signed:

Name: SEVANANI  
On behalf of the school management committee

Date: 3/12/13

Rob Edwards  
Its Time Foundation





# **Saving electricity saves money. It is everyone's responsibility**

Turn lights off **every time** you leave the room

Turn all power devices and switches off when not in use

Set computer preferences to maximum power saving

School night study: use as few rooms as is necessary

Use as few corridor and outside lights as is necessary

When replacing lights use only LEDs

Where convenient do electrical activity in the daytime,  
such as photocopying, printing and scanning.

If possible purchase laptops rather than desktop  
computers as they draw less power

No freezers, electric cook tops or air conditioners and  
other heavy load devices. They reduce the capacity of  
the system to deliver power for school and teachers.

**NO POWER SIPHONING** (no extra cords to homes) it  
shortens the life of the batteries and takes opportunities  
from the school! **ONLY THE SCHOOL AND  
TEACHERS HAVE ACCESS TO THE SOLAR POWER**

Appendix 3. Term report supplied to Its Time Foundation at the start of each school term.

## Solar System Report To Its Time Foundation

At the first school committee meeting of each term save a copy of this document and complete the questions.

Email it to reports@iitime.org or mail to PO Box 1003 Wollongong DC NSW Australia

If possible complete this document using the Word template provided on the USB drive; otherwise a hard copy is fine. Include also the card report downloaded from the inverter (see next page for details).

Report for school term: **1 or 2 or 3** **Date of report:**

Is the agreement between NamamanucaPS and Its Time Foundation confirmed each committee meeting? **Yes or No**

How is the solar system benefiting the school:

Is the money saved on generator fuel being spent on education resources for students? **Yes or No**

What items have been purchased or are being planned for purchase:

Describe how often the generator is now being used:

How much per month is the current cost of generator fuel? **FJD**

Is the school is depositing FJD80 per month to the "Maintenance Account"? **Yes or No**

The current balance is:

Are teacher's each contributing FJD5/week to the school budget for electronic learning resources for students? **Yes or No**

How much was that last term? **FJD**

Does a responsible person to report to each committee meeting about how well the energy efficiency policy is being applied in the school and the teacher's quarters? **Yes or No**

Energy efficiency posters are displayed in the office, classrooms and teacher's quarters. **Yes or No**

Are all equipment and lights turned off when not being used? **Yes or No**

Computers and screen preferences to be set to maximum energy saving. **Yes or No**

Photocopying, scanning, printing, power tools used in the daytime where possible. **Yes or No**

Where possible do washing machines and other power activities between 11 AM and 1 PM on weekends. **Yes or No**

Is only a minimum of corridor lighting being used? **Yes or No**

How many lights were replaced last term?

Were the replacements LEDs? **Yes or No**

What new electrical appliances have been added to the school and teachers' quarters:

How do the teachers feel about the current power supply to the teachers' quarters:

Have there been opportunities for the school to teach students about climate change and renewable energy?

Thanks, Rob Edwards, Founder, Its Time Foundation, +61 2 8003 4143, +61 2 413 734 916, info@iitime.org