



## Sample projects and strategies to deliver lasting outcomes

Many Pacific Island schools are struggling with no electricity or relying on dirty generators they can barely afford to run a couple of hours per day. Leaving the students with little chance of a modern education.

For video introduction, project history etc. visit

<https://iitime.org/>

Its Time Foundation installs quality solar providing schools with power for lighting and computers. This transforms the education and work prospects for generations of students.

### Project objectives

- The project will deliver power for the electronic needs of a modern education. This significantly improves or creates the opportunity for computer literacy of students and gives them the opportunity of modern jobs and equips them for a tertiary education.
- Create on-going cash flow for the purchase of computers and other electronic equipment. Money is saved from generator fuel and contributions from teachers for their power supply.
- Reduced need for generator maintenance. Also, unlike generators, the “clean power” of the solar system does not shorten the life of computers and other electronic equipment.
- Improve teachers’ capacity to perform their job. A. by allowing them to deliver computer based education and B. allowing their computer work, photocopying etc. when it best suits their routine rather than arranging schedules around generator run times.
- Provide power to the teachers’ quarters to enhance the quality of life for teachers and their families. This along with the school’s new capacity for a robust computer education program will make the school more attractive to quality teachers.
- Eliminate use of kerosene lanterns in teachers' quarters - to reduce fire and health risks.
- We encourage the school to engage students in learning about renewable energy and climate change. We hope that the presence of the solar system will result in more environmentally aware and proactive school leavers.
- Energy efficiency strategy and education for students, teachers and the village community provides an attitude/cultural change consistent with the global trend toward energy conservation. The students will take these behaviours into adulthood.
- Reduced carbon emissions is a real and symbolic contribution to mitigating climate change.
- A difficult to define benefit is the morale and pride of parents and the community in knowing their children are now not forgotten and being left behind. Recent and up coming projects we are biased toward cyclone Winston impacted villages: <https://vimeo.com/595602750>
- Reduce plastic in remote environments. Schools commit to each month spending one hour picking up local and ocean drift plastics <https://iitime.org/plastics/>

*While children only make up 20% of the population they are 100% of the future. At this point in history there is no other investment that could better improve education outcomes for generations of students in these schools.*



## Examples

These schools are recent installations and for the purpose of this document serve as typical examples of the schools we help. The following page provides a summary of the installations and equipment used in the projects.

### Ratu Meli Memorial High and Primary Schools

Google maps: “Nacula village, Fiji”. Bottom left, out of the village.

183 students (55 High, 128 Primary) 50 are from small islands and board at the school.

The school had a poor quality, under powered solar system installed 12 years ago that never performed properly and has now failed and not repairable. They rely on 2 to 4 hours per day generator power (currently broken down). Teachers use various methods to provided limited lighting at night, for the 9 teachers’ quarters in the school precinct. Note this projects was completed March 2019: <https://iitime.org/projects/>

### Vuna Primary

Google maps: “Taveuni Island Fiji” Go to most westerly point of the island zoom in to see Vuna Lagoon Lodge, the school and teachers’ quarters are the south easterly buildings around large playing field.

171 students, 10 teachers, 8 teachers’ quarters.

Much of the school was destroyed in the 2016 cyclone Winston and rebuild is now complete. The teachers’ quarters are wired and the school has a good, but expensive to run, generator that supplies 2 to 4 hours day time power and 4 hours evening power for the teachers’ and night study.

### Navakawau School

Google maps: “Taveuni Island Fiji” See the end of the road at the most southern part of the island – the school and teachers’ quarters are the cluster of buildings north of the village.

165 students, 9 teachers, 8 teachers’ quarters.

Sustained significant cyclone damage and much of the school has been rebuilt repaired – completed early 2019. The school has a small generator that supplies up to 4 hours per day to the school office and some class rooms that have wiring. The teachers’ quarters have recently had small 300W solar systems added to each home for lighting, charging and some small appliances [that was not an Its Time Foundation project] so we will not extend the school solar to the quarters [that is a large wiring project] rather establish the school system so if needed in the future it can be extended to the quarters.

More project examples, images and videos: <https://iitime.org/projects/>

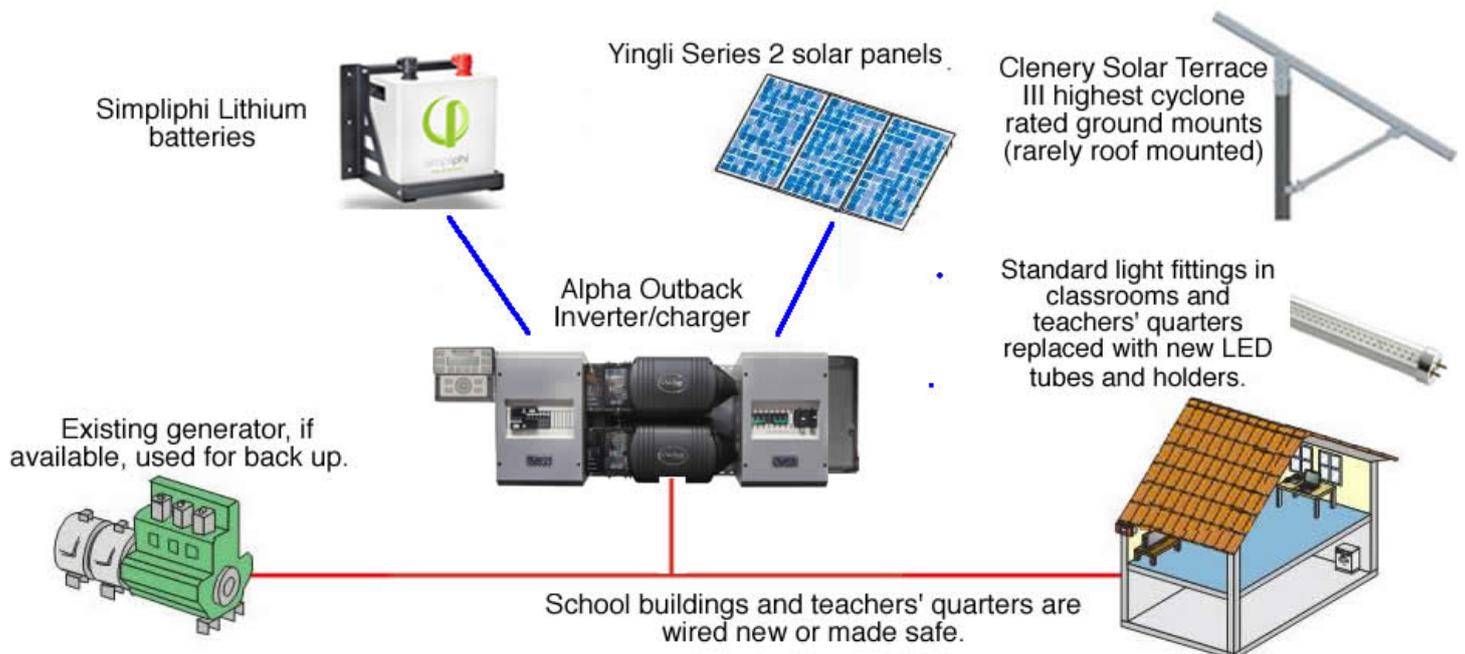


## System specifications

School	Array size	Panels <sup>1</sup>	Inverter/charger <sup>2</sup>	Battery PHI2.7 <sup>3</sup>	LED units	Electrical works
Ratu Meli	6000W	22	Outback Flex 2	12	80	Complete wiring of the school (18 rooms), 2 dormitories and 8 teachers' quarters including 400m reticulation.
Vuna	6000W	22	Outback Flex 2	12	48	Wire 3 remaining rooms in the school [others recently wired in the rebuild]. Make safe and add LEDs to teachers' quarters.
Navakawau	4240W	16	Outback Flex 1	6	40	Wire 9 classrooms, office and staff room.

These systems include premium components to withstand island conditions and deliver the benefits of the project for decades. Many of our suppliers <https://iitime.org/supporters/> gift or provide equipment at significantly reduced cost.

At minimum all projects include provision for refurbishment and make safe electrical work in the school buildings and/or teachers' quarter (occasionally the works include full electrification of the school and quarters). LED units include new holders as well as tubes. Standard wiring of a teachers' quarters is 4 lights and 1 double power point. Our systems are usually ground mounted<sup>4</sup> but Vuna was roof mounted on the strong new building.



<sup>1</sup> <http://www.yinglisolar.com/au/products/multicrystalline/yge-60-cell-series/>

<sup>2</sup> <https://www.outbackpower.com/products/integrated-systems/flexpower-two-fxr/>

<sup>3</sup> <https://simpliphipower.com/>

<sup>4</sup> <https://www.clenergy.com.au/display-product/fixed-tilt/solarterrace-ii-a/>



## General project notes

### Micro grid design

The solar systems are microgrids supplying power to the school buildings and teachers' quarters. This design, as distinct from small standalone systems for teachers' quarters (often the case for households in the islands), results in a small number of large premium quality components rather than many smaller, shorter lasting components.

The grid system allows new buildings in the future to be simply wired into the grid. Therefore, no need for future funding to install new solar infrastructure each time a new buildings are completed.

### Quality is a cornerstone

Across the Pacific it is commonplace that on the occasions when school solar is considered it is on a least cost basis. The result is low quality, underpowered and short lasting systems. Consistent with Its Time Foundation's objective of supplying 'decades' of opportunity at the school, this system includes premium quality components from world leading suppliers. Please note the system is delivered at considerably less than its retail cost due to the price support of our commercial sponsors that share our commitment to education in these remote communities.

### Maintenance considerations.

Too often good intentioned remote infrastructure is installed without appropriate provision for its long-term care. Whilst the systems are low maintenance, it is important that this infrastructure is not installed and forgotten. We have on-going relationship between the school, with CBS Power Solutions (in Fiji) and Its Time Foundation, so we are aware and can act on issues as they arise.

The Its Time reporting portal provides data indicating the performance of the system. <http://iitime.org/reportsvideo/> Compliance to the portal reporting varies but is generally good – note, the portal is being introduced retrospectively for older projects and COVID has slowed that process.

### Power Efficiency Strategies

Implementation of the following power efficiency strategies are a major component of the project to significantly improve the capacity of the system. The strategies include:

- Replacement of all existing tube lighting with **LEDs** and installation of LED lights in the newly wired buildings. For example, at Wainimakutu HS switching to LEDs reduced lighting load by more than 60%. Hence more power is available for the growing needs at the school.
- **Education.** Power efficiency requires a cultural change away from entrenched behaviours associated with diesel-powered electricity. At the time of installation all students, teachers and the school committee are engaged in education sessions about power saving practices.

These sessions are supported by posters (see Appendix) erected in all classrooms, administration and teachers' quarters. A video is created for future students and teachers. In addition, small "turn me off!" stickers are put on all light and power switches to constantly remind everyone in the school community about the importance of saving power.



The school committee agrees to check monthly that staff and students are following the energy saving practices.

- **Load limiting** in teachers' quarters. To ensure the micro grid performs well for all, 4 amp breakers are installed in all teachers' quarters. This will reduce the prospect of disproportionate growth in consumption in some quarters.

In addition we apply a power rationing system. Should teachers' evening consumption be high and draw batteries down to 25% power remaining (Depth of Discharge 75%) the system shuts down and the generator is then required. 25% is being preserved for start of school use the next day. That power automatically becomes available at 8.00 AM, so the school is preferentially supported. Please note – the need to use back-up generators is rare.

### Agreement and reporting obligations

The school committee agrees (see example agreement) to a range of commitments to maximise the life of the system and its day-today value to the school. Of course, it is not a legal document and is provided in good faith. Included in the agreement is that the school will comply with their reporting obligations.

Included in the agreement are two types of reporting:

- The school agrees to report regularly the battery charge data collected each day. This information is easy to collect, taking only a minute or so. Schools are gradually getting reasonable internet access, otherwise they collect the data on paper and when a teacher visits a town with access they upload the information. The data provides valuable information about system performance so Its Time Foundation can remotely monitor the health of the system (note, sophisticated remote system monitoring is not possible in most locations).
- The school also agrees to provide a report every school term. This information is valuable for monitoring system's performance, benefits profile and maintenance needs. The information also contributes to planning of solar systems for other schools.

Compliance to the reporting portal has been varied. Following 2017 meetings with the Fiji Ministry of Education, that now has access to the reporting, will be insisting schools comply via directive from the Ministry.

### Engagement and requests of teachers

When power is provided to the teachers' quarters, they are requested to pay FJD90 per term for their power supply. That is between 65 and 85 cents per day depending on whether or not the teacher lives at the school during the holidays. This is less than many teachers pay in other remote schools for only 3 to 5 hours of generator night power. It is also less than the average cost of electricity for an urban household. This money, along with the money saved on fuel, creates constant revenue for the purchase of new education resources.

Teachers are some of the few in these communities that have reasonable income so this request is fair.



## **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 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. Where possible charge laptops and other devices during the daytime

If possible purchase laptops rather than desktop computers.

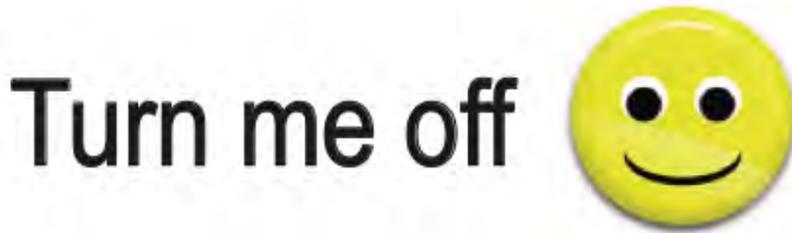
Do not use, electric cook tops, air conditioners, ceiling fans, kettles and other heavy load devices. Most of these won't work in teachers' quarters and they reduce capacity of the system to deliver power for the school and other teachers. Do ironing in the school building and preferably daytime on the weekends.

No one is allowed to change any settings or tamper with the solar equipment, timers, breakers or general electrical system

No power siphoning! That means no power cords to private homes. It steals opportunities from the school! **ONLY** the school and teachers have access to the school solar power.

## Stickers

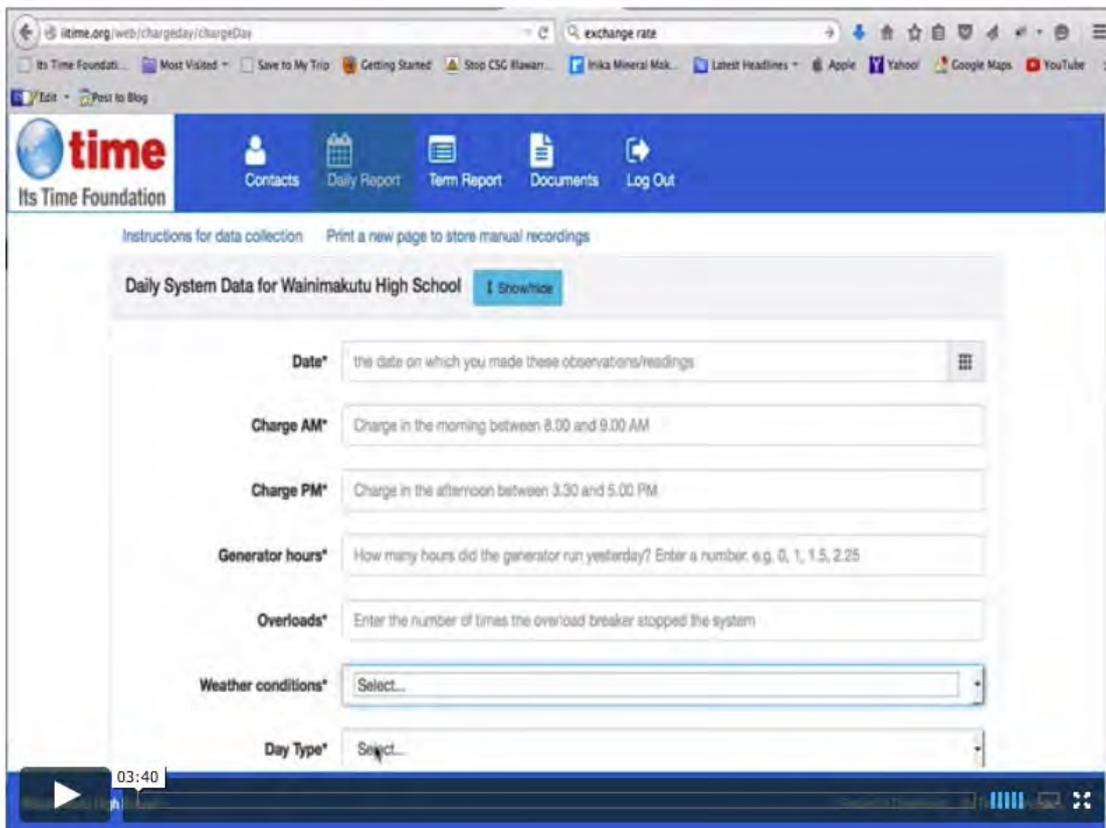
To keep power saving front of mind all light and power switches have this sticker on them.



## Reporting portal

We don't install and forget. Click the image below to view mechanisms of keeping in touch with the schools and their solar projects. This system was distributed to all schools to start using in 2016.

[Click the image to open the portal](#)



## **Agreement for acceptance of a school solar system by Vuna Primary School**

The solar system will:

- significantly improve education prospects for students by equipping the school to reliably step into the age of modern electronic education.
- save significant amounts of money for reinvestment in student education.
- improve teacher's capacity to do their work.
- improve teachers' quality of life and that of their families.
- make the schools more environmentally sound by reducing its carbon dioxide emissions and reducing plastic in the area.
- make a small but real contribution to reducing Fiji's dependence on imported energy.

This is one of the largest infrastructure projects at the school. Therefore this agreement between the school and Its Time Foundation is important to insure that the solar system provides the greatest possible benefits and that it lasts as long as possible.

In accepting the solar system the school management committees agrees to the following and that all is shared responsibility of both schools.

### ***Financial Considerations***

1. We ask each teachers' quarters to contribute \$90 per term for their 24hr power supply. Should generator power be required at times, power will revert to evenings only. We note this value is usually less cost to teachers of current arrangements for power supply.
2. The teachers' contributions plus the fuel savings will be spent on education resources for student benefit. We encourage expenditure on computers and other resources to advance electronic education. These savings are not for expenditure on administrative items or equipment for teachers' personal use. Each committee meeting will discuss/confirm plans for this expenditure.

### ***Energy Efficiency and Plastics***

3. The school and teachers' quarters will adopt a strong energy efficiency policy to minimise the demand for electricity. This will avoid or reduce the need to use the generator to supplement the solar system. The committee will assign a responsible person to report every month to the school committee about how well the energy efficiency policy is being applied in the school and the teachers' quarters. The energy efficiency policy will include all points listed on the posters erected in all classrooms and in teachers' quarters (as per copy provided). New copies available from: [www.iitime.org/new/power\\_poster.pdf](http://www.iitime.org/new/power_poster.pdf)
4. Teachers accept that high load electrical appliances such as cloths irons, electric cook tops, air conditioners, power tools and kettles will not be used in the quarters. This situation must be respected to ensure the system functions effectively for everyone. We suggest an area in the school is made available for teachers to do cloths ironing.
5. No member of the school community will change any settings or tamper with any of the installed equipment or general electrical system. That includes the circuit breakers in teachers' quarters. Altering the system is dangerous and may also be selfishly taking power from others in the school community. Should a teacher alter their power circuit or remove circuit breakers, the committee agrees to engage an electrician to disconnect power to that teacher's quarters for at least one term. That teacher is liable for the costs of disconnection and reconnection.

That may sound tough, but if everyone respects that the power supply has limitations, then everyone will enjoy good access to 24 hour power.

6. At each school assembly the principal/head teacher will remind everyone that saving electricity saves money and extends the life of the batteries, they are the most expensive part of the system.
7. The principal/head teacher will explain the energy efficiency policy to all new teachers and students entering the school. New teachers are also provided a copy of the letter to teachers. Download new copy at: [www.iitime.org/new/teachersletter.pdf](http://www.iitime.org/new/teachersletter.pdf).
8. Teachers' quarters and school buildings built in the future will be fitted with LED lights.
9. The school commits to, once per week, to spend 20 minutes picking up plastic in the surrounding area – and dispose of it as agreed. Please invite the community to join in this activity. You will indicate how many children participated and report this a picture to: [admin@plasticfreeoceans.org](mailto:admin@plasticfreeoceans.org) cc [rob@robedwards.co](mailto:rob@robedwards.co)

### ***Reporting and Compliance***

10. A person will collect battery charge levels every day and report the information as indicated in instructions provided at the time of installation. Report here: [www.iitime.org/reports](http://www.iitime.org/reports). Login is provided at the time of installation.

If you don't have online access, use the booklet provided to record the information and upload it at least once every two weeks when you do have access. This information allows Its Time Foundation to monitor the health of your solar system.

Perhaps have a senior student allocated to do that task each week.

11. Upload a "Term Report" during the last two weeks of each school term (or within two weeks after the term when you have internet access). This is done by answering the questions here: [www.iitime.org/new/reports](http://www.iitime.org/new/reports)
12. The school will ask parents, before Its Time visits, if they allow their children to be photographed. And if any say no – the school will exclude those children from photos.
13. A copy of this agreement is clearly posted in the school office. Email [rob.e@iitime.org](mailto:rob.e@iitime.org) if you need a fresh copy.
14. The compliance to all points of this agreement will be mentioned at each school management committee meeting and noted.

Signature by school representative 1:

Signature by school representative 2:

Name:

Position:

Telephone:

Date:

Name:

Position:

Telephone:

Date:

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Rob Edwards    Founder Its Time Foundation    +61 2 8003 4143    Date: 7/8/18



Dear Teacher

As part of the school solar project we aim to give you more access to electricity and therefore improve your quality of life.

The goal is to offer you twenty four hour access to electricity. If the solar batteries run out of power (this may happen occasionally during cloudy weather) the generator may be used, in which case the power supply will be limited.

This opportunity of greater power supply does come with some restrictions and commitments.

### ***Energy Efficiency***

Energy efficiency is vital for the project to provide maximum benefits to the school and to you. To assist, we have installed LED lighting, but we also rely on your support. Please read carefully the energy saving posters around the school and in teachers' quarters – please comply strongly with these guidelines, it makes a big difference.

Some electrical items will not work in the teachers' quarters, for example, cook tops, air conditioners, power tools, kettles and cloths iron. If you are using multiple appliances you may need to manage the timing of that usage.

A solar system to support unlimited devices in the teachers' quarters would simply be too expensive and you would not get twenty four hour power. Solar systems in other schools often don't include the teachers' quarters at all.

We have suggested the school committee set aside an area in the school for cloths ironing and it is preferred you do the ironing during the daytime on the weekends.

The signed agreement with the school committee states that if any teacher alters any part of the electrical system in their quarters, power will be disconnect by a qualified electrician for at least one term. That teacher is liable for the costs of disconnection and reconnection.

### ***Your Contribution***

We ask you to make a contribution of FJD90 per term for the electricity (that is approximately 85 cents per day if you live at the school just during the term or 66 cents per day if you live at the school all year round). This is less than many teachers pay in other remote schools for only 4 or 5 hours of generator night power. It is also less than the average cost of electricity for an urban household. This money is committed to buying new education resources at the school and contributes to maintenance costs of the solar system. Please note the contribution is per teacher rather than per teachers' quarters.

At the end of each term you will be asked if you have purchased any new electrical devices. Please don't consider this invading your privacy. We use this information to match with the power cycles of the system and that helps us better manage your system and also influences our planning for other schools. Your support in that regard is greatly appreciated.

Thank you very much for your support and I wish you well in the wonderful career you have chosen to positively influence the youth of Fiji.

A handwritten signature in black ink, appearing to read 'Rob Edwards', with a long horizontal flourish extending to the right.

Rob Edwards, Founder  
Its Time Foundation  
[www.itime.org](http://www.itime.org)