RENEWABLE ENERGY AT YOUR SCHOOL

Energy consumption is Victorian schools' greatest impact on the environment and a significant contributor to climate change. A really important aspect of addressing climate change is sourcing our power from renewable sources. If installing renewable energy at your school, it is important to monitor your power usage, address energy efficiency, reduce energy demand and focus on behaviour change. Participating in ResourceSmart Schools is a great first step!

CERES, along with the support from Planet Savers, have created this tips and tricks guide to understanding renewable energy – solar and wind - at your school.

INVESTIGATING RENEWABLES - 2 EASY STEPS:

1 Efficiency first: CERES strongly recommends completing energy efficiency measures within your school before investing in renewable energy. A great way to do this would be to conduct an Energy Audit, which will identify energy usage and appropriate actions to reduce consumption.

2 Viability Analysis: It is good to understand the size and type of system that will be most beneficial for your school before making these investments.

WIND VS SOLAR

	BENEFITS	CONSIDER
WIND	24 hour system	Need a space where wind speed averages a minimum 3m/sec across entire year to be viable. *We strongly advise that schools undertake monitoring of at least 12 months prior to any installation.
SOLAR	Able to install on school roofs	The orientation of the panels and the size of the system to be installed.

FINDING YOUR INVERTER (S):

Whether your school has solar power or wind power, the system will have an inverter. An inverter transforms direct current (DC) to alternating current (AC), which is the standardised form of the electricity network and is used by all commercial appliances. The inverter also monitors data.

Inverters come in a variety of models but are often red, yellow or grey looking boxes with electrical cables going in and out with a visible display. The power of the inverter is indicated in Watts, W, and is generally shown on a sticker, label or sometimes as part of the name (eg. Soliva 5.0 is 5 kilowatts) on the outside of the inverter. The image below shows a label from a 2000W inverter: Pac 2000W or Power alternating current.

power-one—

N10606
CS9114N
Made in Italy
PROTECTIVE CLASS I

AURORA
PHOTOVOLTAIC INVERTER

MODEL:
PVI-2000-OUTD-AU

$V_{DC\ max}$	600 V	$V_{AC\ nom}$	230 V 10
$V_{DC\ MPP}$	90 - 580 V	f_{nom}	50 Hz
$V_{DC\ MPP,\ Full\ Power}$	220 - 530 V	$P_{AC\ nom\ (cos\varphi=1)}$	2000 W @ 40 °C amb.
$I_{DC\ max}$	10 A	$cos\varphi\ nom$	>0.995
$I_{SC\ max}$	12.5 A	$I_{AC\ max}$	10 A

IP65

-25 to + 60 °C
-13 to +140 °F

5 minutes

Solar

The inverter is usually located on a wall of the building that the solar panels are mounted on. Generally it will be on an internal wall but it may have been placed in a cupboard or storage room.
*If you have many solar panels you may have multiple inverters. Additionally, if solar panels are located on the roofs of different buildings, each building may have individual inverters.

Wind

The inverter is usually located at the tower or nearby at the building the power is connected to.

UNDERSTANDING YOUR INVERTER:

Inverters for solar and wind will appear to look the same. It is suggested that the instruction manual be located, or downloaded, and kept close to the inverter for future reference.
The data we mostly look for on our inverters is read in kilowatt hours, kWh. Depending on the model of the inverter, different information can be displayed including the hourly total (h-total), daily total (E-today) and/or overall total (E-total/ T->Energy). The inverter may display this information automatically or a button may need to be pressed to view the different readings.
*Do not hesitate about pressing the buttons, none of these will affect or reset anything (unless it states reset something in which case don't press OK without referring to the instruction manual).

MAINTENANCE:

Maintenance on your renewable energy system is extremely important, and will also ensure that it performs at its optimum.

Solar panels collect dust, leaves, bird droppings, etc. So it is important that the surfaces be cleaned to allow for a better working system. It is recommended that solar panels be added to the maintenance schedule and routinely cleaned every 6 to 12 months. The more regularly your solar panels are cleaned, the more efficient they will be.

Wind Turbines require scheduled maintenance that will be referred to in the user guide and is probably best carried out by the installer or similar qualified tradesperson. Generally, maintenance should involve providing a clear, obstacle-free wind passage.

SEEING DIFFERENCES BETWEEN YOUR EXPECTED SOLAR GENERATION AND YOUR ENERGY BILL?

If you do not see generation on your power bills, it is likely that your school is consuming more power than you are generating.

A quick formula you can use to calculate the expected solar system energy generation in a year is:
System size kW x 3.8 x 365
eg. 5 kW x 3.8 kWh per day x 365 days = 6935 kWh per year
This formula is for the Melbourne latitude and is based on the average energy production per day of 3.8kWh for each 1kW of solar panels in the installation.
It could also be used as a quick check if your system is working at capacity.
*It's worth noting that systems will usually operate at ~10% under rated capacity for various reasons, some as already suggested above in maintenance.

For any additional questions, contact your electricity provider.
http://www.energyandresources.vic.gov.au/energy/environment-and-community/victorian-feed-in-tariff-schemes

TROUBLESHOOTING - WHO TO CONTACT?

If you have any issues with your system, it would be best to contact the installers. However, if you are unable to get in contact with them, there are a few other options:

1 Victoria State Government - Earth and Energy Resources
http://www.energyandresources.vic.gov.au/energy/sustainable-energy

2 Efficient Initiatives - http://efficientinitiatives.com.au/

3 Clean Energy Council - http://www.solaraccreditation.com.au/

FEED-IN TARIFF:

Any electricity generated by your grid-connected renewable energy system that is not directly consumed by your school will automatically 'feed' into the national electricity grid. The school's electricity meter should recognise this and the electricity retailer records this as 'Feed-in' on your bills. Retailers should/will credit you according to the total kWh that your school system feeds into the network during the billing period. If you cannot see feed-in on your bill, contact your energy provider as it should be recognised that you are generating renewable energy.

Feed-in tariffs vary depending on the age of installation and the contractual agreement between the school and the retailer. It will be between $0.05 - $0.66 per kWh. Again, the bill will indicate the rate paid per kWh in the feed-in section of the bill.

CAPTURING YOUR GENERATION DATA ON RESOURCESMART ONLINE

If your school has renewable energy, it is important to capture this data and enter onto ResourceSmart Online. This guide will help your school understand how you are directly combating climate change. It will also demonstrate that Victorian schools are leading the way when it comes to renewable energy. If your school's generation data is already being monitored on other systems, (e.g. Solar SETS - http://www.solarsets.com.au/ or Solar Schools - http://www.solarschools.net/), skip Steps 2 and 3.
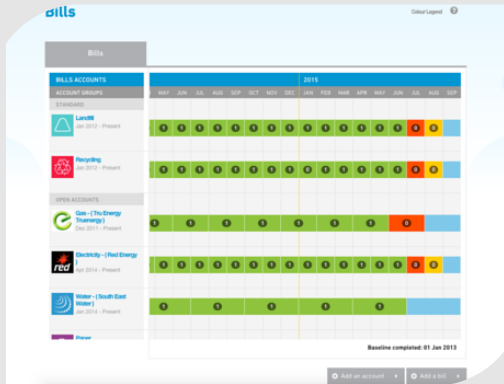
1 CREATING A GENERATION BILLING ACCOUNT

- Log onto ResourceSmart Online
- Add an account
- Pick 'Generation' as the resource
- Under the 'Billing Period' tab, allocate the billing period for as often as you will read the inverter. Eg. monthly, quarterly etc. We recommend aligning it with your electricity bill.

2 MARK YOUR CALENDAR

Mark your calendar to remind yourself to check your inverter for the period set in Step 1.
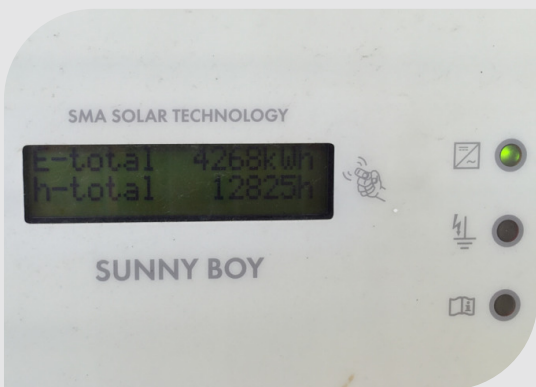
3 FIND YOUR INVERTER AND TAKE THE FIRST READING

The easiest way to calculate and enter data into ResourceSmart Online is to use the overall total generation. This may be called a number of different things such as E-total or T->Energy. Make a note of this number and wait until the next date in your calendar to read the inverter.

4 CALCULATE THE GENERATION AND ENTER INTO RESOURCESMART ONLINE

To calculate the generation for the billing period, subtract the original reading from the current reading. This will give you the total amount that has been generated over the set billing period. Next time the data is due, subtract the total of the past reading from the current reading. Enter the usage into ResourceSmart Online as you would with a normal bill. For the bill total, enter $0.

*Repeat this step for every inverter your school has (add these totals).

http://sustainability.ceres.org.au

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