BUSH TECH #41

Lifecycle maintenance of standalone Renewable Energy systems

This Bush Tech compares some aspect of lifecycle maintenance for solar power systems, diesel generators and wind turbines.

SOLAR POWER SYSTEM LIFECYCLE MAINTENANCE

Correct maintenance makes a large difference to the longevity of a standalone RE system. Solar power systems include battery banks, which are expensive to replace and which will fail a long time before their intended lifetime if they are overused or not maintained.

LIFECYCLES OF RE SYSTEM COMPONENTS

With correct maintenance the parts of a standalone system can be expected to last as follows:

- batteries: 8-10 years
  (can be much less if overused/not maintained.)
- inverter: 10 – 15 years
- regulator: 8 – 10 years
- PE Modules: 25 – 30 years
  (giving 80% of their original output)
- diesel generator: 5 – 10 years
- wind turbine: 15 – 20 years

RECOMMENDED MAINTENANCE SCHEDULES OF RE SYSTEM COMPONENTS

BATTERIES

Battery banks pose a serious electrocution threat, as well as the risk of sulphuric acid burns and hydrogen gas explosion. Battery maintenance should be carried out by qualified technicians familiar with requirements for safety equipment and procedures. For a battery larger than 115V, a qualified electrician is required for all work.

There are 2 common types of batteries used in standalone renewable energy systems – sealed (gel) or flooded lead acid cells.

FLOODED LEAD ACID CELLS

Flooded lead acid cells will usually have a removable vent cap. These batteries require checking and/or refilling with de-mineralised water at least every month. This can be done by any trained person for small battery banks (<115V.) Terminals should be cleaned by a qualified person, and connections checked every 6 months. Voltages should be checked every 12 months.

SEALED LEAD ACID CELLS

Sealed lead acid cells require less maintenance than flooded cells. Sealed cells require voltages to be checked every 12 months.

Battery longevity is dramatically affected by overuse, not being returned regularly to full charge, overcharging and high temperatures. A professional should determine that these factors are correctly controlled.

PV PANELS

PV panels are largely maintenance-free, however they need to be kept clean and unshaded to support the battery bank.

Panels should be cleaned as often as once a month in dusty areas, with warm soapy water or a hose and a broom. Shading on a small part of the panels can have a large effect on the array's output. Regularly trim any regrowth to prevent shading.

The front and the back of the panels should be checked for damage, or places where the connections have burnt through. These panels should be replaced.

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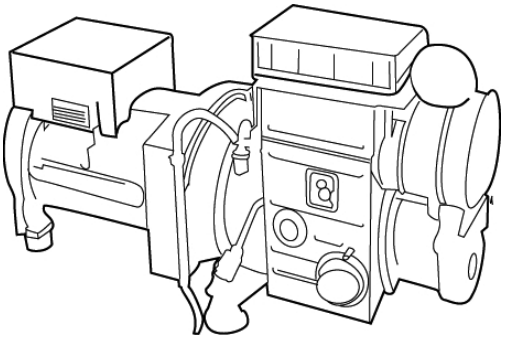
	MINOR MAINTENANCE	MAJOR MAINTENANCE
BATTERIES – FLOODED LEAD ACID	Every month Refill with demineralised water if required. Trained person (<115V) Electrician (>115V)	1 year Check and clean terminals. Voltages tested. Technician (<115V) Electrician (>115V)
BATTERIES – SEALED LEAD ACID		1 year Voltages tested Technician (<115V) Electrician (>115V)
ELECTRICAL CABINETS, CONTROL EQUIPMENT AND INVERTER	1 year Clean, check connections are secure, check settings Trained person	
PV PANELS	1 – 3 months Clean, remove any regrown shading Trained person	
DIESEL GENERATOR	250 hours minor service. 500 hours major service. Replace filters and air cleaner element. Trained person	5000 hours Complete engine overhaul Diesel Mechanic
WIND TURBINE	1 year Check blades, replace bearings, lubricants Trained team (to lower turbine)	4 – 5 years Engine overhaul Trained team, technician

DIESEL GENERATOR LIFECYCLE MAINTENANCE

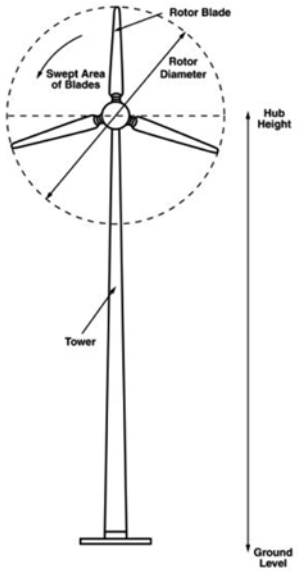
Diesel generators need regular minor and major maintenance. When they are part of a "hybrid" renewable energy system, automatically controlled by the inverter, they must be kept operational and provided with fuel and a starter battery so that they are available to support the battery.

Diesel generators require an oil change after every 250 hours, filter replacements on the fuel line, and replacement of the air cleaner element after every 500 hours of operation, or every 6 months. Cooling water needs to be replaced every year. The fuel injection pump, as well as rubber hose parts need replacement after 2000 hours or 2 years.

Gensets require a complete overhaul every 5000 hours or 5 years.



WIND TURBINE LIFECYCLE MAINTENANCE



Maintenance of wind turbines can be a significant part of their lifecycle costs. The turbine must be lowered once a year, to service the generator, the blades and lubricate bearings. The generator will require a major overhaul every 4–5 years.

OTHER SYSTEM PARTS

Other parts of a renewable energy system should be routinely checked. Electronic components and wiring, and lightning protection systems should be checked to see that wiring is still in place, and that enclosures are kept clean and free of insects.

FURTHER INFORMATION

Resource Agency Maintenance Tasks Manual for Bushlight Household and Community Systems, Available on request from Bushlight or online at: http://www.bushlight.org.au/media/ContrInfo/RA%20Maintenance%20Manual.pdf

Bushlight Maintenance Services maintenance@bushlight.org.au.

Clean Energy Council "Solar PV Systems - Users' Maintenance Guide" Available on request from the Clean Energy Council, or online at: http://www.bcse.org.au/docs/STA/Standards/Solar%20PV%20Maintenance.pdf

Australian Standard 4086.2 Secondary batteries for use with SPS - installation and maintenance.

Remote Area Power Supply Systems User Guide and Maintenance Advice, SEDO, Government of Western Australia http://www1.sedo.energy.wa.gov.au/uploads/rapsuser_11.pdf

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