6.9P Challenge - Design an electrical generator as backup power for a house.

Aim

To make a small generator that will save energy to run electrical appliances in a house.

Task

Design a model house to be run by a renewable energy generator which powers a fan during the day, and lights at night using as little battery power as possible.
A day and night can be represented by:
Day: put house outside in sun for 5 minutes and the fan must keep running.
Night: put house inside in dark area for 5 minutes and three internal lights must keep running.

Assessment

Based on the amount of battery energy used up in one day and night.
Amount of battery used can be measured by measuring the change in voltage of the battery before and after the exercise.
You can have unlimited renewable energy from your home made generator.

Possible Equipment

Equipment to make a model house (cardboard, ply, LEGO or other materials)
Voltmeter or multimeter
Small DC motor and fan.
3 small bulbs (2 volt) or LED's
2 switches
rechargeable battery
Renewable energy generator:
Some possibilities:
wind generator, solar cell , Hand held generator

Method

1. Decide the generator you will make for backup power to the house.
2. Decide the materials and design of your model house.
3. Explain to your teacher your ideas (you can draw, speak or show)
4. Once you have teacher's approval, construct your House.
5. Get your backup power ready (see below for the power setup)
6. Install your electrical system for the house (1 fan and 3 lights)
7. Connect up your power (you can connect battery in series with your generator)
8. Measure your initial battery power.
9. Power your house for 10 mins (5 mins for outside for daylight and 5 mins inside for night) ensuring those powered items inside function correctly.
10. Measure your final battery power.

11. Did the battery use up much power?
12. Redesign if your backup was not very effective.

Results

How much power did your battery use?

How effective was the renewable power generator?

What did you change to make it better?

What other things could be done to save power?

To make your own renewable energy setup :

Connect your renewable energy to your rechargeable battery via a small diode. The rechargeable battery will replace the renewable energy if unavailable.