



Fig 9.1 Typical hybrid energy system

Multiple energy sources are combined together to reduce battery capacity and increase reliability

A dictionary definition of hybrid is "Composed of diverse elements". A hybrid energy system therefore is a combination of two or more energy sources, arranged so as to complement each other to provide a reliable, cost effective power system. In figure 9.1 a wind generator, an array of solar panels and a diesel or petrol generator set are combined together through the D.C control panel, to charge a suitably sized battery.

The major advantages of such a system are greatly reduced battery size, reduced battery cycling due to more consistent energy production, and greater reliability because basically the system is failsafe. In figure 8.6 we saw that a typical energy efficient home energised only by solar power would require 10 days of battery storage. In a hybrid system this can easily be reduced to 5 or even 4 days, and if the wind factor is reasonable and the motor genset used only occasionally, many thousands of dollars can be saved in initial battery cost and battery replacement over the years. Even without the wind generator, a small, efficient motor genset matched to a powerful battery charger can still put you light years in front.

The individual sizing of various components is fairly critical and depends on the nature of the renewable energy resources available at your site, the type of appliances you wish to run,

and how much dependence you wish to place on fossil fuel energy. Lets discuss a few different scenarios to put you in the picture.

We'll start with a small system at Melony's place, down on the South coast at Esperance, outlined on page 52. This was a demonstration project that I installed that was partly funded by the Federal Government. The wind factor here is superb, with an average speed of 7.5 metres per second. No fossil fuel generator is required. There are currently six solar panels on the roof capable of charging the 7000 watt-hour battery at 300 watts per hour, the average input being 2200 watt-hours per day. This is supplemented by a small *Ampair* roof mounted wind generator capable of 100 watts per hour. The combined outputs of the solar and wind generators averages 3000 watt-hours per day, and the average daily load is 2000 watt-hours, this being a small fridge, small washer, t.v, stereo and halogen lighting.

Next we'll travel a bit further along the coast to Warwick's place at Dunsborough, a big beautiful, passive solar, rendered straw bale homestead designed for family living. We initially tried a solar / wind hybrid here as well, but the wind factor was a disappointment so the wind plant was removed and we settled on 12 *Canon* solar panels mounted on a tracker, with a genset for backup. The solar array charges the 21,000 watt-hour *Hoppecke*