# T206 Energy for a sustainable future

## T206 Project

### 1. Energy Requirements analysis

The spreadsheet *Energy Required* enables you to estimate power requirements and electrical energy usage in a domestic type building. This can be used in topic 1 or topic 2

To use the spreadsheet simply enter the number of appliances and an estimate of daily usage in the appropriate columns and the spreadsheet will calculate

- Average load: the demand you can expect under normal conditions
- Peak load, the demand when everything is on.
- The energy used per day in kWh

In addition, the spreadsheet calculates the total energy used in a year in kWh simply by multiplying the daily usage by 365.

This can be used in both topics 1 & 2 to estimate the required capacity of any [sustainable] energy supplies you are proposing for your field centre or village.

You need to specify your equipment to be able to supply somewhere between average load and peak load. To cope with peak load, you will need backup mechanism and at times where the power generation exceeds the demand a mechanism for "dumping" the excess.

In the case of the field centre, your backup in the first instance will be by means of batteries which can be charged during times when demand is otherwise low. For times when batteries are insufficient, you may have to consider having a standby diesel generator. Dumping is usually done by heating water in a large tank. (see para. 2 below on exploiting waste heat)

In the case of sustainable energy for a village, both your backup and "dump" is via the grid.

For hot water, you can make estimates from the various activities that need a hot water supply, washing, showers, washing machines etc. Cold water from the mains is usually at a fairly constant 12°C and you need to heat the water to at least 60°C. A lower temperature is normally sufficient, but in a building with many users the higher water temperature is necessary kill legionnella bacteria.

For space heating you should follow the method in the course book, *Energy Saving in Building*" i.e. estimate heat losses based on U-values then use degree days to calculate annual heating requirements.

### 2. Exploiting waste heat

If you use renewables for generating electricity for your field centre, there will be times that the generator will be putting out more power than you are using. Normally this excess power will be used to charge up the backup batteries. Once these batteries are fully charged, then the excess power needs to be "dumped" somewhere. This is usually done by passing the electricity through a heating coil in a large tank of water. Consider using the heat in this tank to supplement your hot water and/or space heating. Hot water is probably better as demand is less dependant on external temperature.