Energy assessment (element 3)

To provide verifiable data on actual performance of a building, it is important to establish the energy use within the building. If performing BPE as active research, it is desirable to collect data before and after interventions are made.

Electricity and other non-electricity fuel sources should be assessed separately and not considered as total delivered energy. Depending on the level of detail to be analysed within the study, there are three main aspects to differentiate when doing energy assessments. These are:

- Space conditioning: heating, cooling and ventilation
- Non-space conditioning: end uses such as appliances and lighting.
- Generation, e.g. photovoltaics

Level 2: Energy meter monitoring

Cost: ₹₹₹₹₹	Time: ⌛⌛⌛⌛⌛	Skills: 👐👐👐👐👐

The installation of remote monitoring equipment to monitor the long-term use of electricity (or other fuels where necessary) uses a local WiFi or ethernet connection to provide remote access (via the internet) to the real-time energy metering data. This, in theory, allows for frequent and accurate readings of energy use. It also ideally, if connected to a suitable web-based platform, can provide real-time visual display of the data to provide early detection and correction of any issues with the data collection. By creating a remote storage for the data, it allows data to be accessed by the researcher directly, saving time and enabling detailed analysis of energy use. Remote monitoring is similar to smart metering in the way it is uploaded and accessed.

Where low or zero carbon technologies (LZT)s are installed, it is useful to understand how they are performing and used in order to build a picture around building energy use and behaviours. Where possible, the energy generation as well as the energy consumed by the systems should be monitored. Like monitoring of energy use, it is possible to monitor LZTs such as:

- Solar PV systems
- Solar thermal systems

The equipment required includes:

- Electricity meters (to monitor power used by pump; PV generation and export)
- Heat flux meters and temperature sensors (to monitor heat output/performance of low carbon heat sources)
- Pyranometers (to monitor solar irradiation)

How: Generally monitoring equipment should be installed by trained professionals with a guarantee to fix data transmission issues if they arise. The data collection, storage and processing systems should be considered carefully.

Timing: Ideally the monitoring would cover at least two seasons where energy consumption is greatest (two years). Programming of the study, from recruitment to installation and troubleshooting of the equipment should allow for this.

Potential barriers: Experienced practical issues may include:

- Limited space available in utility areas for additional metering equipment;
- Several independent specialists required (monitoring, electrical and gas engineers as well as building management) creating co-ordination issues;
- Processing of the data, depending on frequency, can require significant time and specific software skills.

In residential cases, intrusiveness of the installation process can cause tension for some occupants. The ‘troubleshooting’ period can often extend much further than anticipated. Such difficulties highlight the need for a sophisticated protocol and programme in place prior to any works taking place.

Remoteness of building locations and subsequent poor phone/internet signals can mean that data could be received intermittently. Other issues with the reliability of the data are due to poor installation of the monitoring equipment, and complex existing wiring.

Installation of a pyronometer has a number of practical issues in that it needs to be mounted at the same angle and face as the PV system and may require working at height as well as drilling into the external fabric of the dwelling.