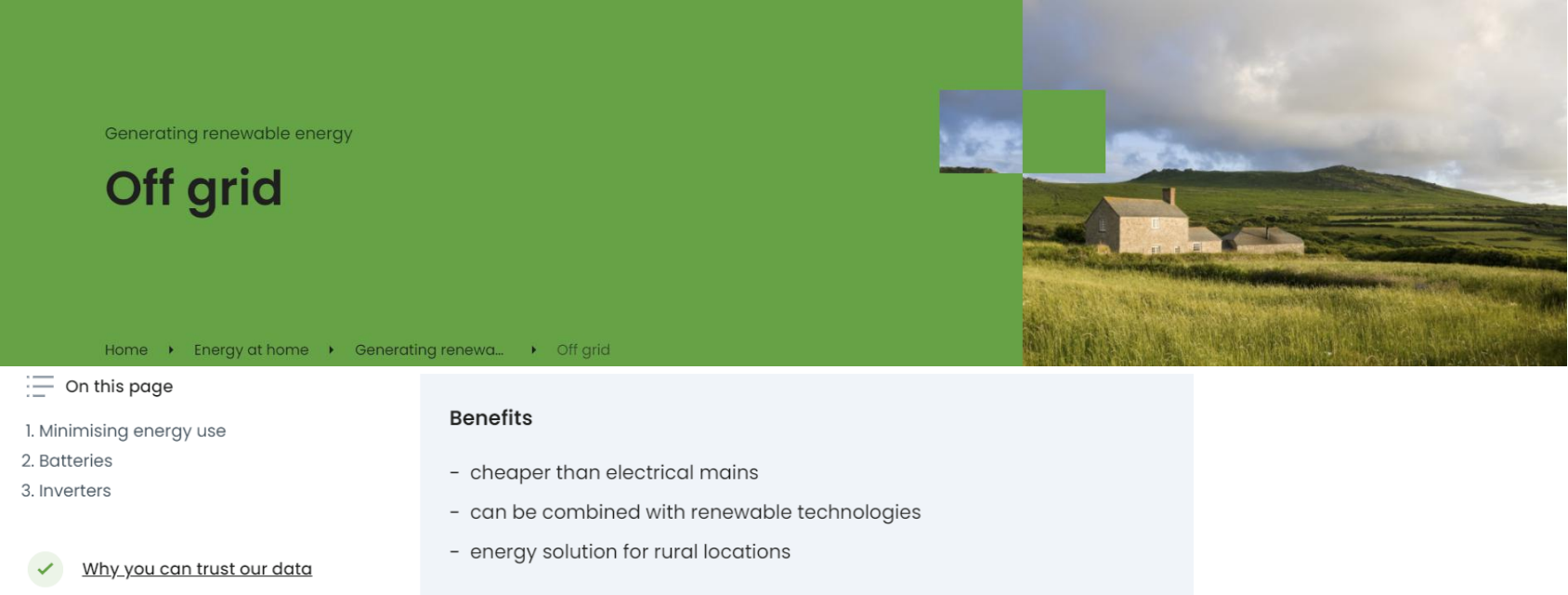


Appendix D – SOLAR POWER GENERATION OFF GRID & OTHER TECHNOLOGIES
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Isolated homes with no mains electricity supply either have to make do without electricity, or generate their own. For these houses, a renewable electricity generation system – using wind, water or solar power to generate power – could be the answer. A renewable heating system, such as a biomass boiler or a heat pump, can work in an off grid setting.

Living with an off grid energy system is never like living on the mains, but it can be cheaper than getting an electrical or gas mains connection, and is much cheaper and quieter than running a diesel generator.

Minimising energy use

The first step in setting up an off grid renewables system is to minimise your electricity use and heating demands. This is important for all home renewables systems, but if you're off the grid it's vital.

To reduce the electricity you need and therefore the size and capital cost of any renewable energy systems for electricity, tasks such as water and space heating can be done by using dedicated renewables such as biomass boilers, ground and air source heat pumps or solar water heating. Surplus wind and solar photovoltaic (PV) electricity could complement these systems once appliance demand is met and your batteries are full.

Reduce heating demands by insulating the property to a high standard.

Batteries

The heart of most off grid systems is the battery store. A bank of deep-cycle batteries will store electricity when it is generated and provide power for when it is needed. With proper controls and system design, a battery bank may last five years or more, but you should budget to replace the batteries several times during the life of a renewable electricity generation system.

Most deep-cycle batteries are lead-acid batteries, which are similar to car batteries but with thick solid plates to cope with the deep charging cycle. Batteries with liquid acid in them require care, as they give off hydrogen gas when charging, and they may lose water over time, which will need replacing. Absorbent glass mat (AGM) batteries do not contain liquid, and are much easier to look after, but are more expensive.

Batteries can be charged by multiple generation technologies: you might have an exposed site with a wind turbine, some photovoltaic panels to provide input during windless spells, and a diesel generator as backup and for running high-power appliances for short periods.

A hydro resource may be reliable enough for you to do without batteries or back-up generator, but this depends very much on the site (and on the needs of the household).

Inverters

Electricity from the batteries can be used directly to run low-voltage lighting and perhaps other direct-current (DC) appliances. However, most systems include an inverter to produce mains voltage alternating current (AC), to run standard appliances.

The inverter may act as a battery charger, as well as looking after the batteries and controlling the system, or you may have several separate boxes for these different functions.

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