

introduction

Welcome to *Wind and Solar Electricity*, a book that is intended for anyone thinking of installing either a wind turbine or solar panels and the associated infrastructure, or wanting to gain some understanding of renewable electricity generated at home.

This home generation is important for several reasons, but to put it in a nutshell: you can reduce your carbon footprint to minimise your own contribution to the decline of the environment, reduce your reliance on mains electricity, resist the general wasteful ethos that insists we buy and consume in ever-increasing volumes and take some control over the cost of your power.

Systems for home generation of electricity consist of wind turbines, solar panels, or a combination of the two depending on your site, and, with either a battery system to store the electricity produced or a grid-connect system that feeds the surplus into the National Grid. To build your own system you need to understand the basics of all the different elements of the system and to be able to decide what suits your circumstances best. *Wind and Solar Electricity* takes you through each aspect of the technology to provide the information you need for the decision-making process.

I start with a *system components* chapter that gives brief overviews of the major parts of a system and then gives some useful details of minor components that can be used for specific home-built sub-systems. Then there are chapters on wind turbines and solar (photovoltaic) panels in which I try to share the magic and wonder of these systems, but also give the details and limitations of each technology and where they are best applied.

The *batteries* chapter is based on years of experience of using battery banks and trying to keep costs down to a minimum. This includes the different types available, taking care of your battery bank, and revitalising second-hand units. All of this groundwork is important to make sure you understand the basic principles and avoid disappointment and wasting your cash reserves.

The *electricity* chapter tries to take the uninitiated through a bit of theory so that you can at least be confident about the terminology and what is actually happening. This needs to be understood if you want to get the best out of a battery-based system, especially if your property is without a mains-grid electricity connection. In this case you are forced to be self-reliant, but everyone can take steps along that road, and believe me when I say that when you get it right home-generated electricity is more reliable than mains power. You may want to read this chapter first as terms explained within it are used in all the other chapters.

Having said that, it is important to recognise that very few of us can attain complete self-sufficiency and in many places the next-best option is to use a grid-connect system where no batteries are required. The *grid-connected systems* chapter deals with synchronous inverters that provide a permanent grid interface and almost make the system a ‘fit-and-forget’ item.

The *building a system* chapter is full of tips and information that draw on my years of experience, and goes through the whole process to try to demystify it and show the practical application of everything covered in earlier chapters. The actual installation of a system is simple as long as you know how to connect things together with cables – and if you don’t it’s not something you can learn from a book, although Brian Scadden’s book *electrical installation work*, see *resources* (page 177), will give you plenty of guidance.

The *research* chapter tries to show the difference between extrapolated, commercially-available output figures and real-time, actual outputs during a shortest-day to longest-day cycle. The conclusions drawn from the research cannot be considered as definitive but will add to the overall level of system understanding and provide food for thought before the decision to invest in any specific system or generating component is taken.

Beyond that all I can say is that I hope you get the same level of interest and satisfaction from generating your own electricity as I do, and that, with the background understanding you gain from this book, you manage to build a reliable system that takes you through the next few decades. At the time of writing the cost of energy is increasing dramatically and we are facing times of unprecedented uncertainty, but your reliable home-generation system will buffer you from these external influences and you will be truly thankful that you fitted your piece of independence.