

Digest

Renewable energy sources

How they work and what they deliver

Part 1: Photovoltaics

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This Digest provides a basic understanding for people who have little or no prior knowledge of solar photovoltaics, and for engineers and architects who wish to know more about the technical details of photovoltaic modules.

It includes an introduction to different types of solar photovoltaics, their properties, operating characteristics, annual energy performance, standards and certification. The Digest will also discuss the components of PV systems and their purpose. However, this Digest is not intended to be used as a technical guide for the installation of photovoltaic systems.

This is one in a series of four related Digests. Each focuses on a renewable energy technology commonly used in domestic buildings. The other Digests in the series cover wood fuel, heat pumps and solar thermal collectors.



Solar PV installation at the BRE Group site at Garston

Introduction

Climate change and depleting resources of fossil fuels have increased the significance of renewable energy in the sources of energy that we use. Renewable energy can be generated from a number of sources including wind, sunlight, moving water, biomass and heat contained in the ground or in water. These sources are universally available, albeit with variations, and generating renewable energy from them can significantly reduce carbon emissions.

Solar photovoltaic (PV) modules generate electricity from sunlight and have emerged as one of the most widely accepted and used renewable technologies^[1]. Currently there is a significant amount of research^[2] aimed at improving the efficiency of the technology and reducing the cost of solar PV systems.

Overview of types of PV modules

PV modules have become one of the most popular sources of renewable energy in domestic buildings partly because of the availability of financial incentives (eg Feed-in Tariffs (FiTs)) and also reductions in cost arising from the increasing number of PV modules and other systems components (such as inverters) being produced. PV modules are relatively straightforward to install^[3] and have low maintenance requirements.

Different types of PV modules and mounting mechanisms are discussed in this Digest.

Crystalline silicon PV modules

Silicon is used to make PV cells – the electricity generating components of PV modules.