Unit 301: Understand the fundamental principles and requirements of environmental technology systems

Worksheet 5: Solar photovoltaic (Tutor)

Using your notes and the internet (refer to Resource 1, 'Micro-renewable energies') answer the following questions:

1. In small groups and using the internet, discuss the planning requirements, including Building for solar photovoltaic systems.

Defined as 'permitted development' so planning permission not required providing certain requirements are met including panels not protruding more than 200mm from the building when installed.

The installation of solar PV panels on the roof on a house needs to comply with Building Regulations including Part A on Structural Safety. If the loading to the roof is increased by 15%, or more, this is a material alteration and a formal Building Regulation approval is required.

2. Again, in small groups and using the internet, discuss the optimum angle and orientation for installing solar photovoltaic systems.

Because most generation will occur when the light strikes the panel perpendicularly, the roof should ideally face due south at a pitched angle of around 30° from the horizontal to give the best overall annual performance.

Installations at any pitch and facing anywhere to the south of due east and due west are feasible, although output and income will be reduced. Installation is not recommended on roofs facing north.

3. What is the purpose of the 'invertor' in a solar PV system?

It detects when there is sufficient output from the solar PV panels and converts this d.c. output to a.c. that matches the supply a.c. including magnitude and frequency.

It also monitors the supply and immediately disconnects the solar PV panels if there is a power cut.

4. List **six** advantages of solar PV systems.

- **Benefit from the Government feed-in tariff.**
- **The feed-in tariff is guaranteed by the Government for 20 years.**
- **Panels designed for European countries generate power even on cloudy days.**
- **Clean energy means carbon emissions can be reduced.**
- **Producing your own power protects against rising energy prices.**
- **Once installed requires very little maintenance.**

5. List **three** disadvantages of solar PV systems.

- **A large area of unshaded south, south-west or south-east facing roof is required to maximise payback.**
- **Panels degrade over time by approximately 20% over 25 years.**
- **It may be beneficial to replace the inverter after 10 years to optimise power generation.**