WESTMILL

WeSET

SUSTAINABLE ENERGY TRUST

Solar Energy

Sunset

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  - Plants that rely on the sun to grow
  - Warmth as the temperature would drop
  - The Moon which reflects light from the sun

The Sun

- The Sun, also called ‘Sol’ is **a star** made up of hot whirling **hydrogen** and **helium** gasses
  - The sun is almost perfectly **spherical**
- The process of **fusion** inside the Sun’s core makes it an incredibly powerful **source of energy**
  - What **types** of energy does the sun provide?

The Sun's rays

- Some of the Sun's energy **radiates** as far as the earth and we receive this in the form of **heat** and **light** energy
  - The Sun's rays take about **8 minutes** to travel around **150 million km** reach the earth's surface
  - How can the Sun be used to **tell the time**?
  - The Sun has been **worshipped** throughout history by many different cultures

Light for life

- The Sun is vital to **all life on earth,** from human beings and animals to plant life
  - As the **earth revolves** giving us **day and night** it also **orbits** the sun giving us the **seasons**
  - It regulates our **climate** and ensures that the earth is habitable
  - In what other ways do we **benefit** from the Sun's energy?

Energy from the Sun

Task 1: Bring me sunshine

- Using the words in the list below, **fill in the gaps** in the following sentences

heat	shadows	radiates	sundials	24	revolution	star

length	Greek	hours	Sun	light

- The ___ is our closest ___, it is at the centre of our ‘solar’ system. The word solar comes from the _____ word for Sun, Sol.
- Some of the Sun’s energy _____ as far as the earth we receive this in the form of ____ and ____ energy.
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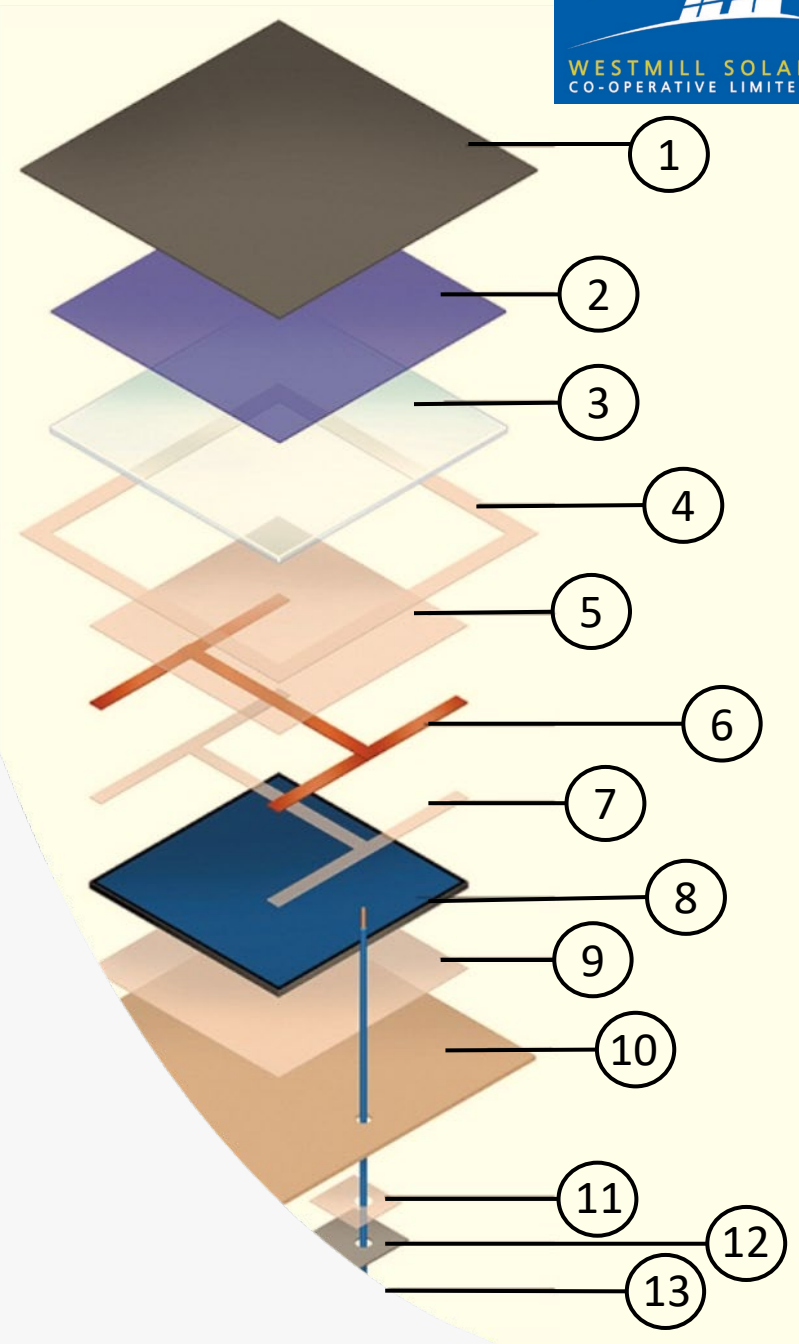
Measuring light levels

- The **intensity** of sunlight and of **radiation** can be measured using different tools
  - Scientists and **meteorologists** use a range of complex instruments
  - We can use handheld **light meters** to measure the **intensity** of light on a surface
  - Why might we need to measure **light** or **heat** energy levels?

Solar panels

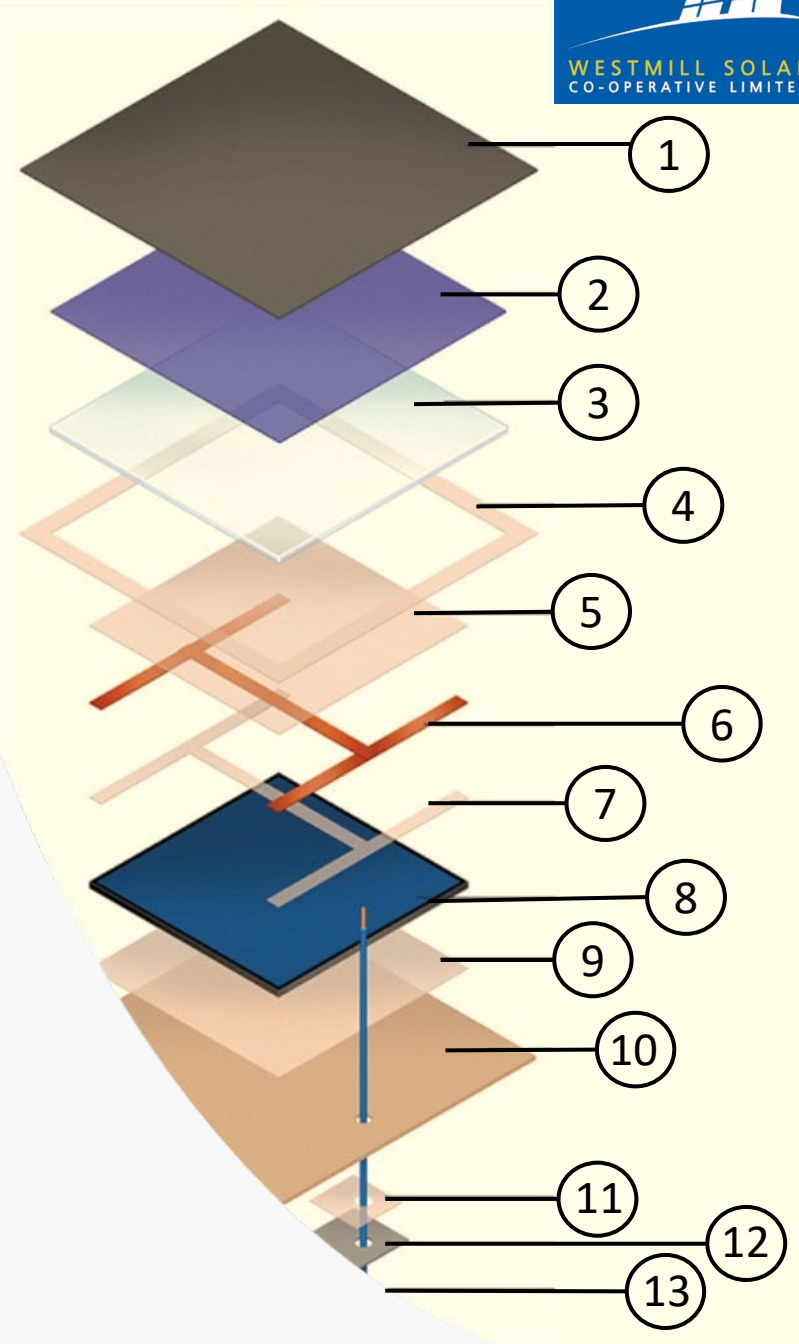
- Solar panels are designed to **collect energy** from the Sun and **transform** it into **electricity**
  - Solar panels can be mounted on the roofs of our **homes** and **offices**
  - Do solar panels need direct sunlight to work efficiently?
  - An **inverter** is installed to convert the **DC** or **direct current** from the panels to **AC** or **alternating current** used in homes
  - Any **electricity** that isn't used by the homeowner is fed back into the **National Grid**

The parts of a solar panel



The parts of a solar panel

1. blackout material



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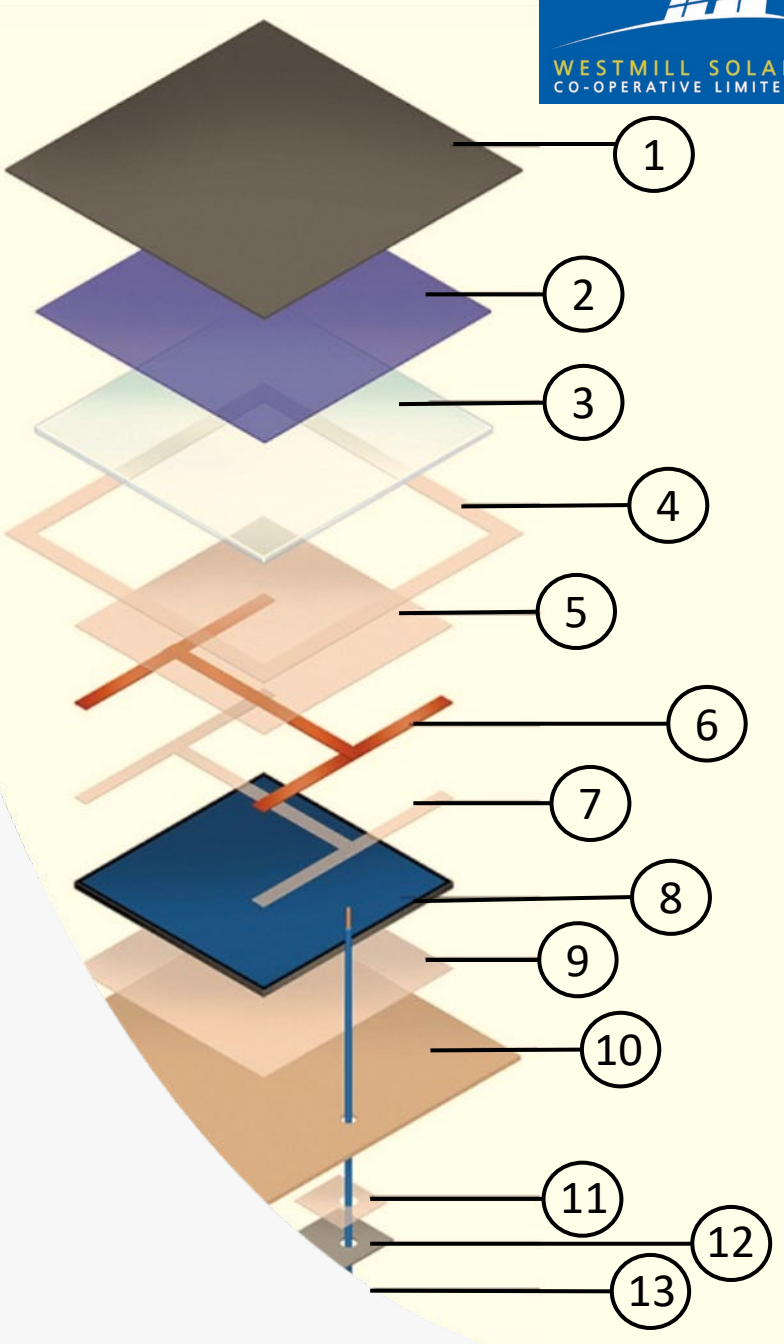
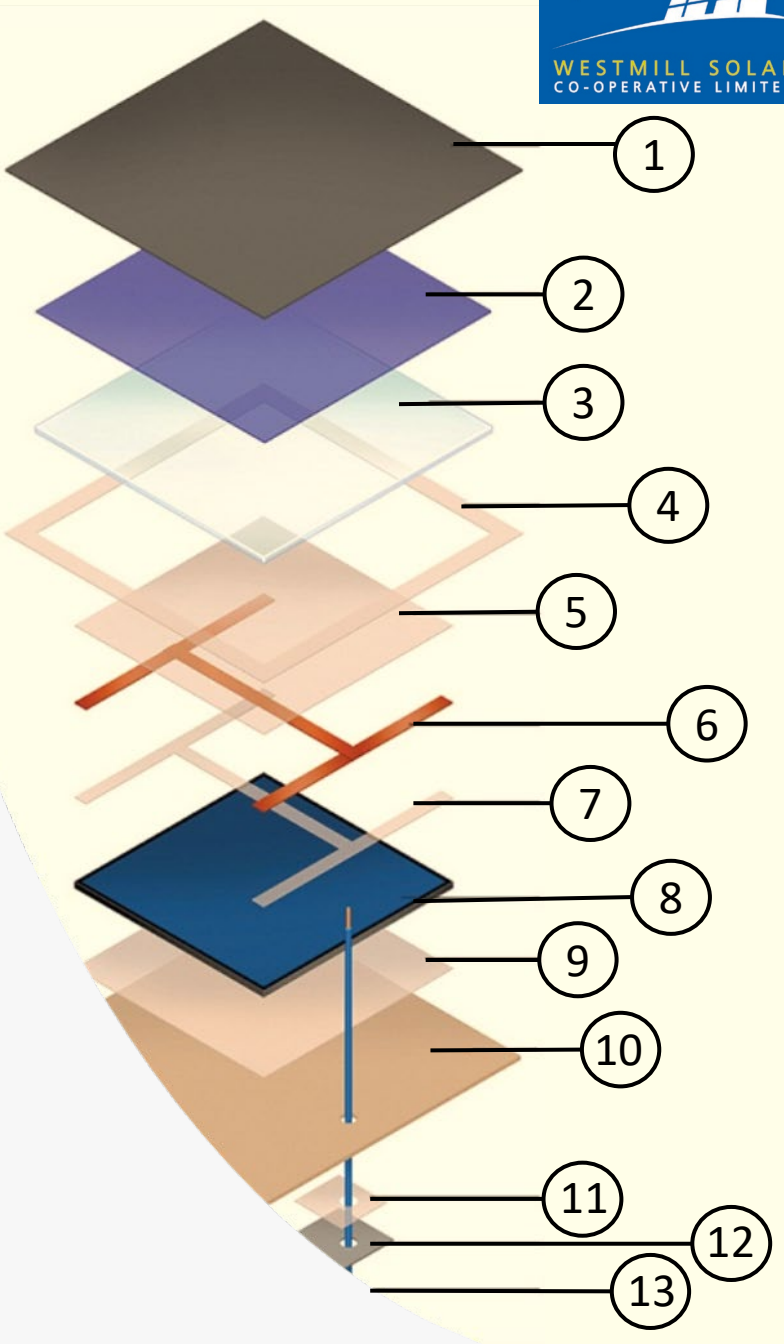
2. UV enhancement film



The parts of a solar panel

1. blackout material
2. UV enhancement film
3. glass



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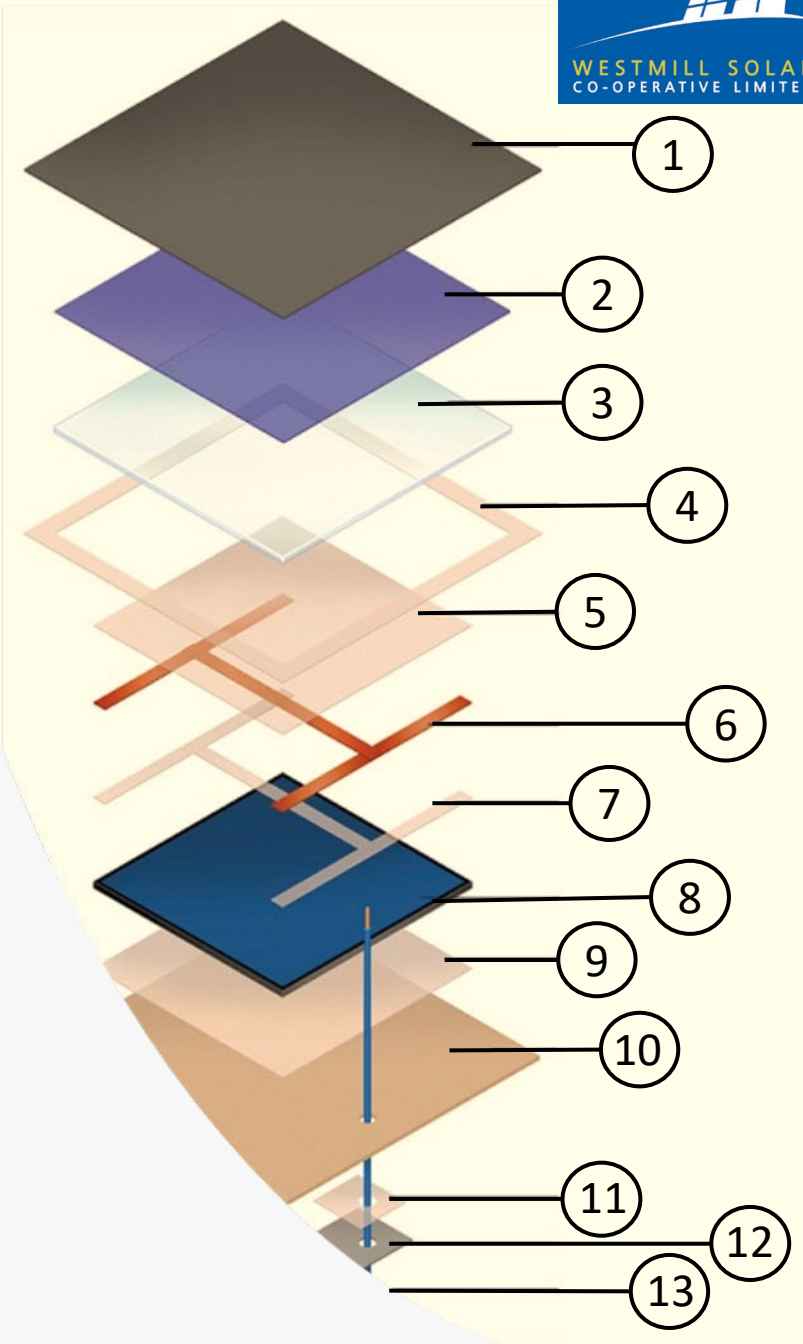
3. glass
4. adhesive seal



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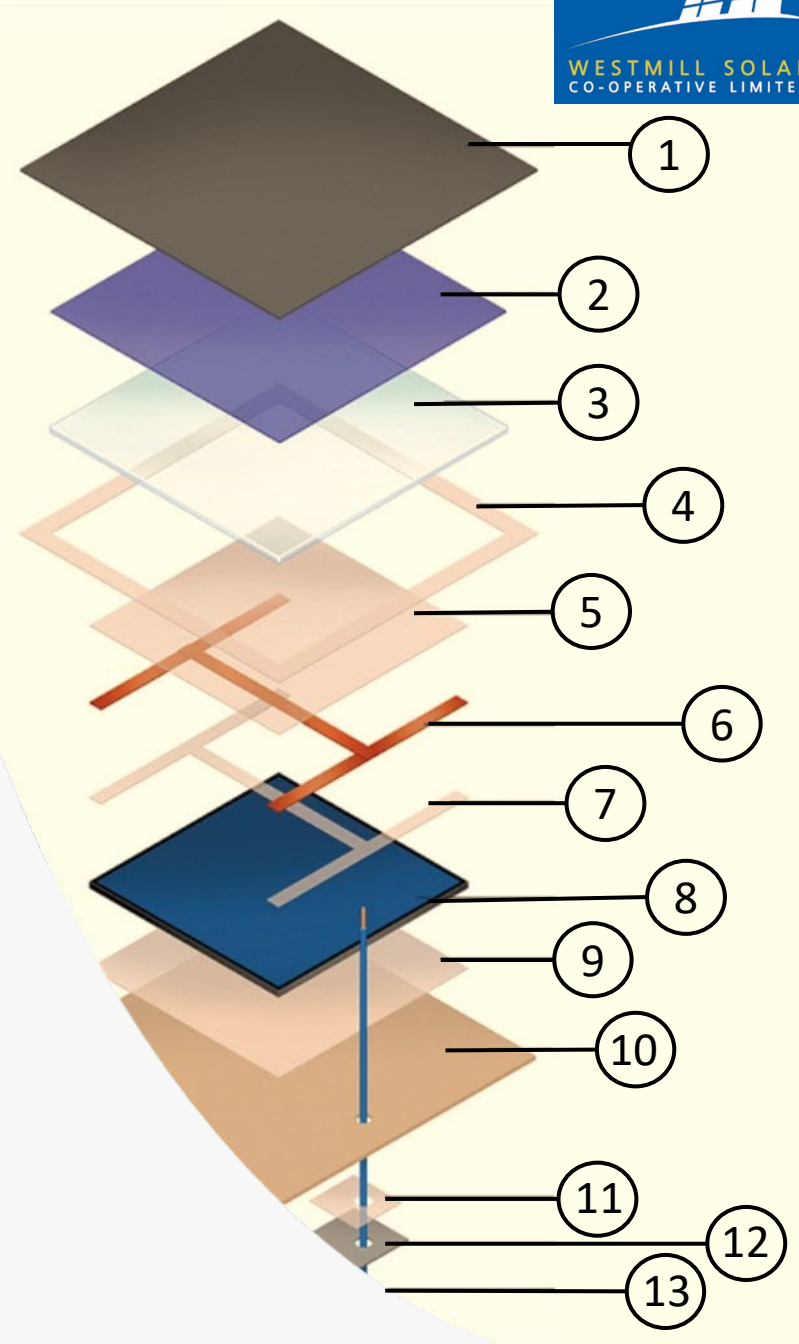
4. adhesive seal
5. adhesive sheet



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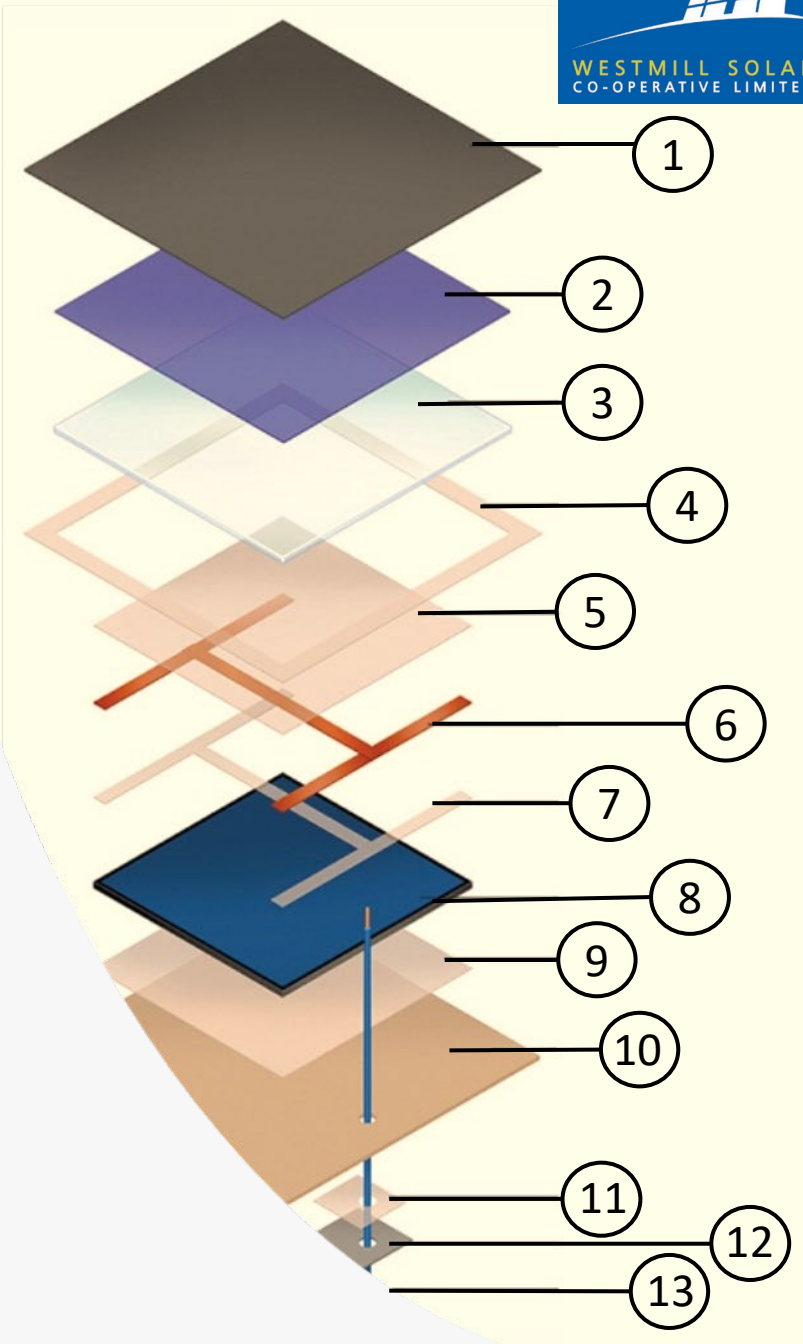

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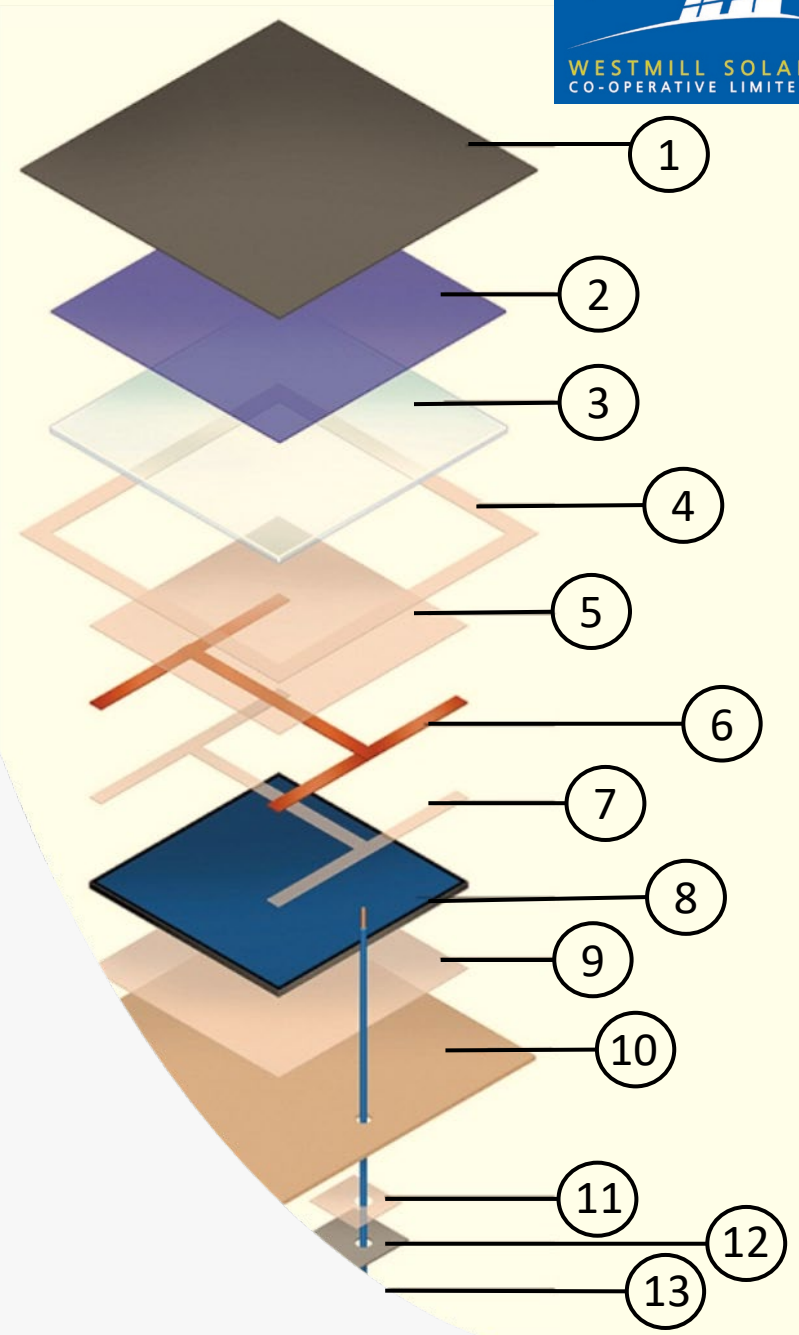

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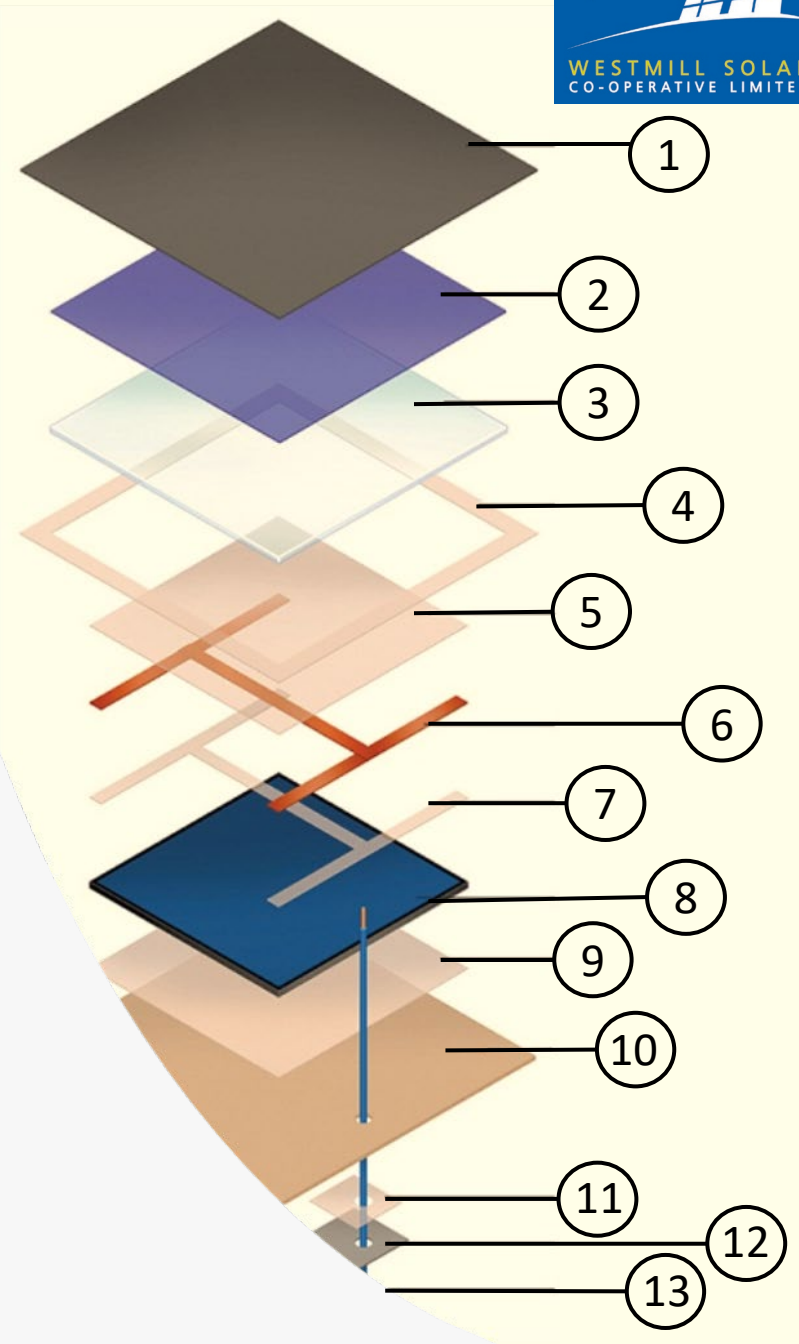
7. adhesive
8. silicon PV cell



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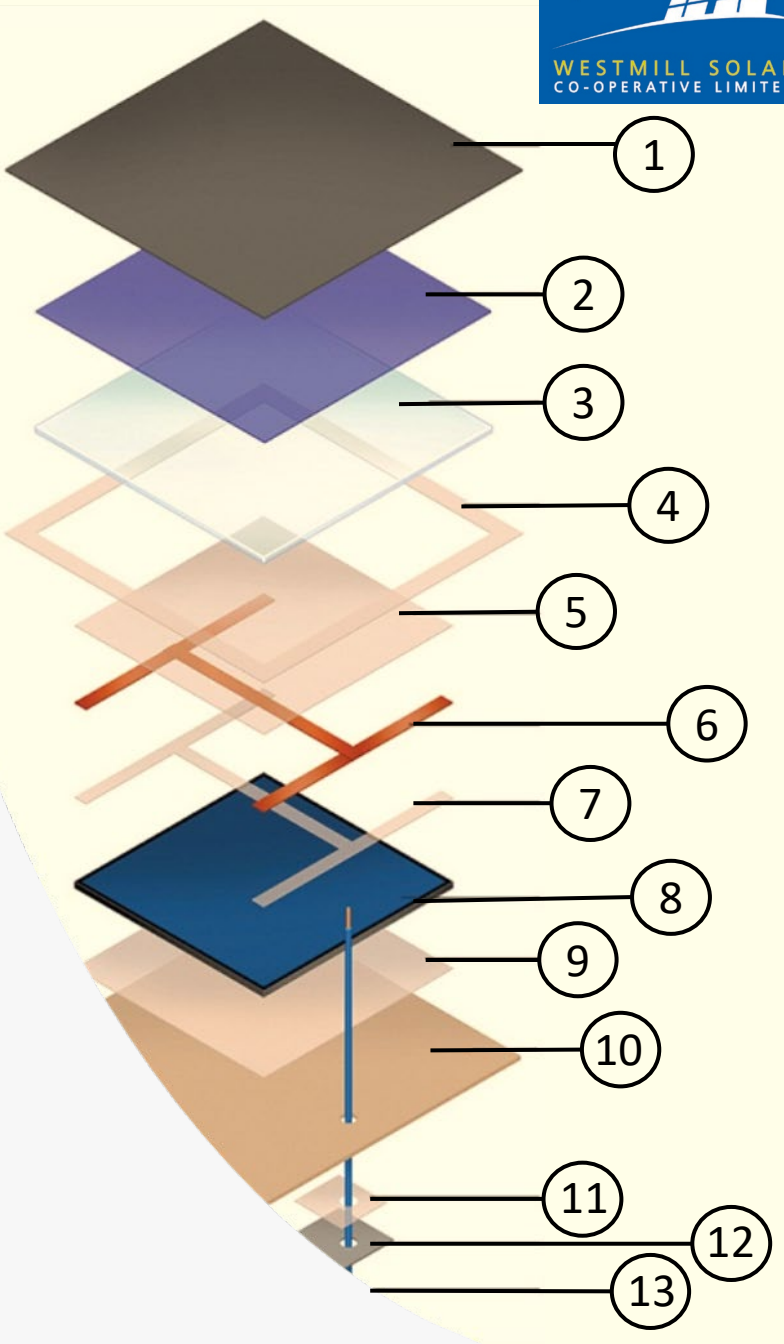

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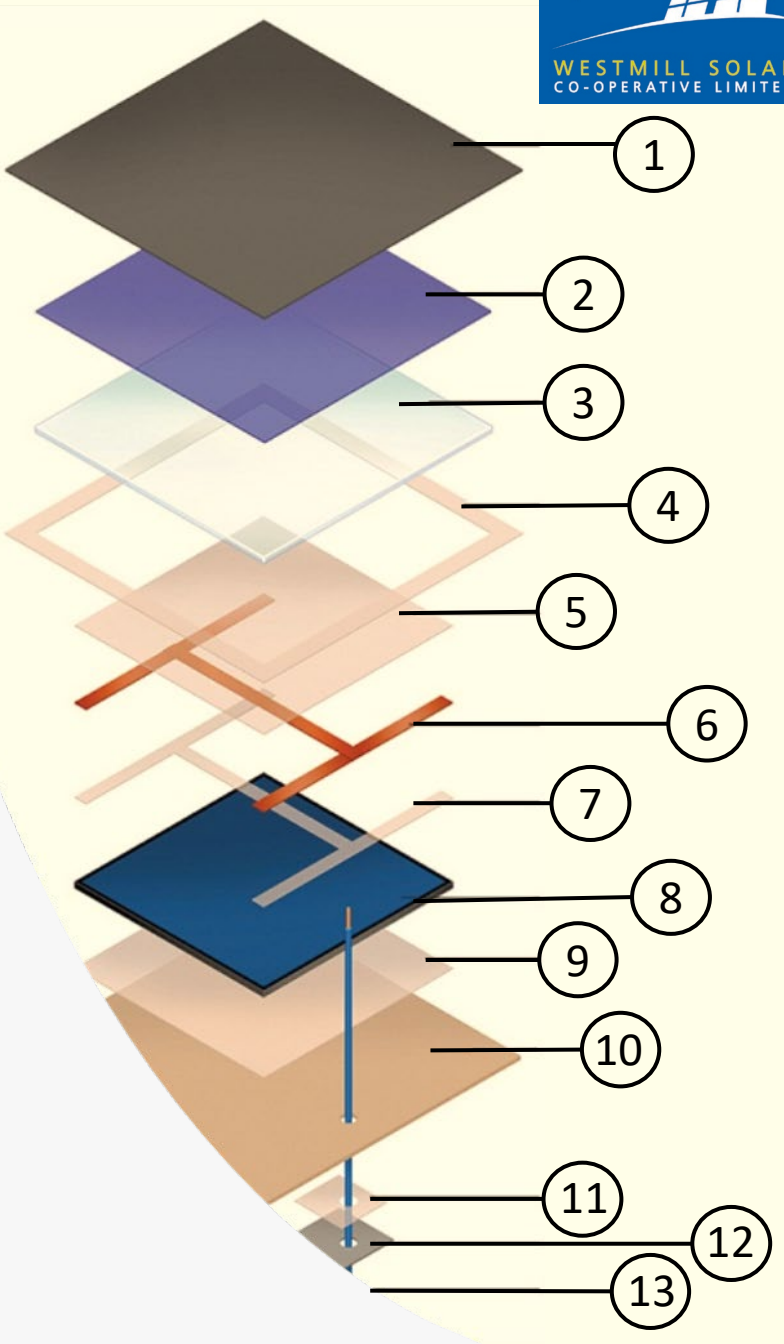
10. backing material



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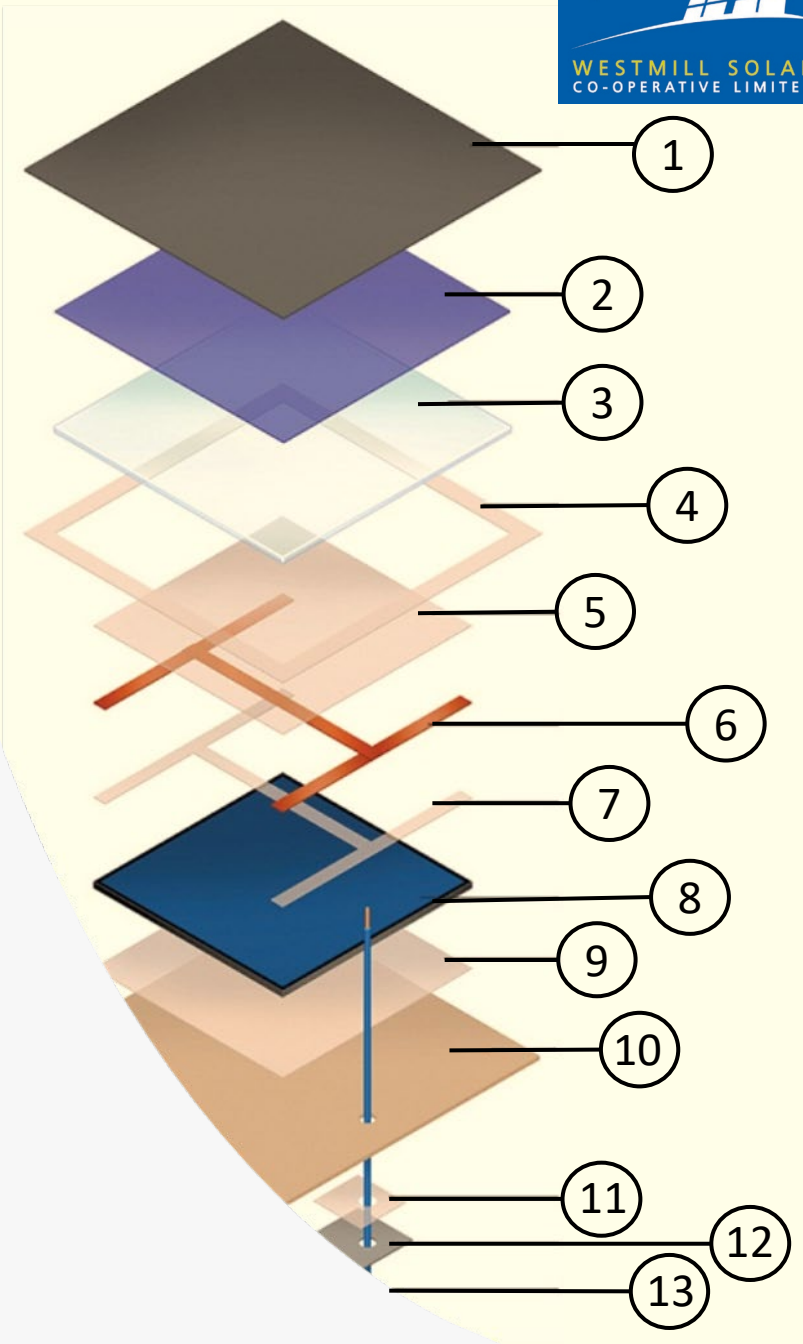
10. backing material
11. high bond adhesive



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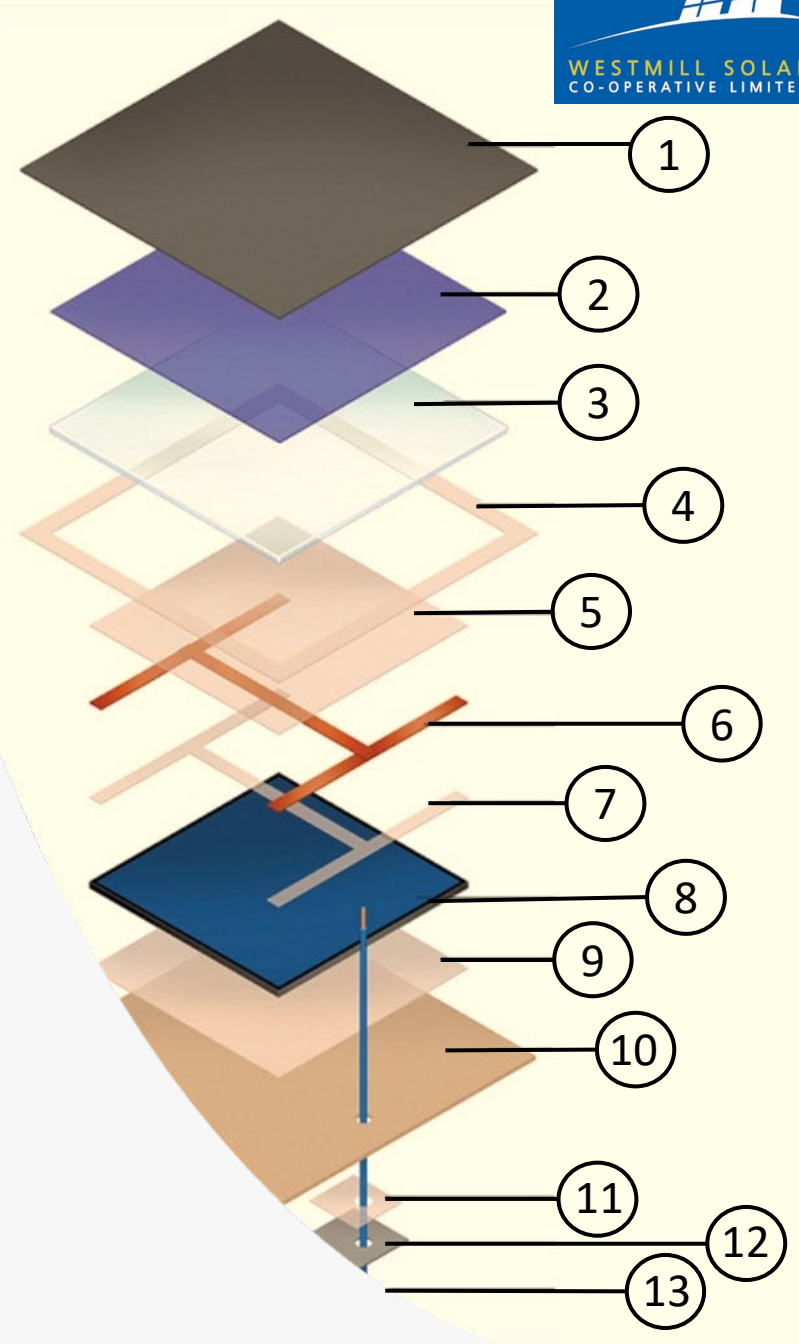
11. high bond adhesive
12. core plate



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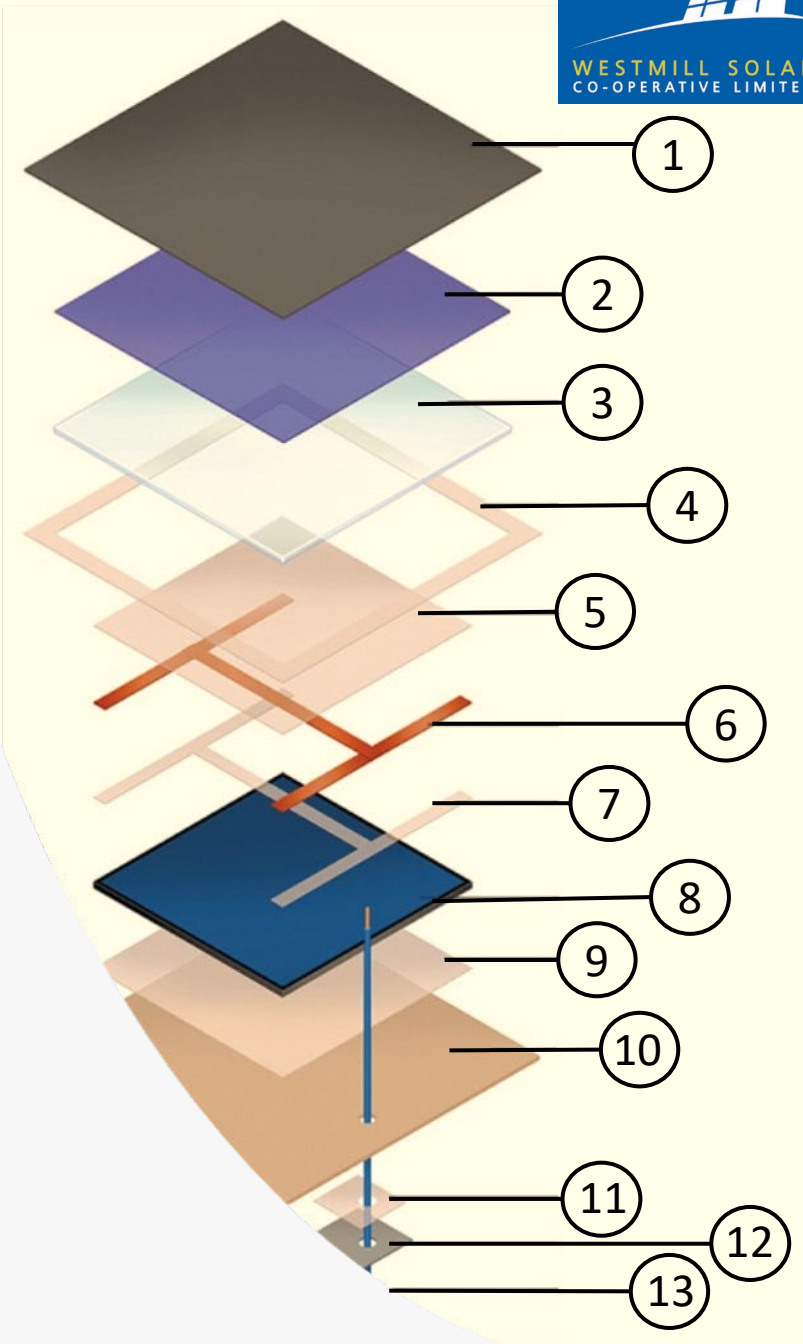
12. core plate
13. wire



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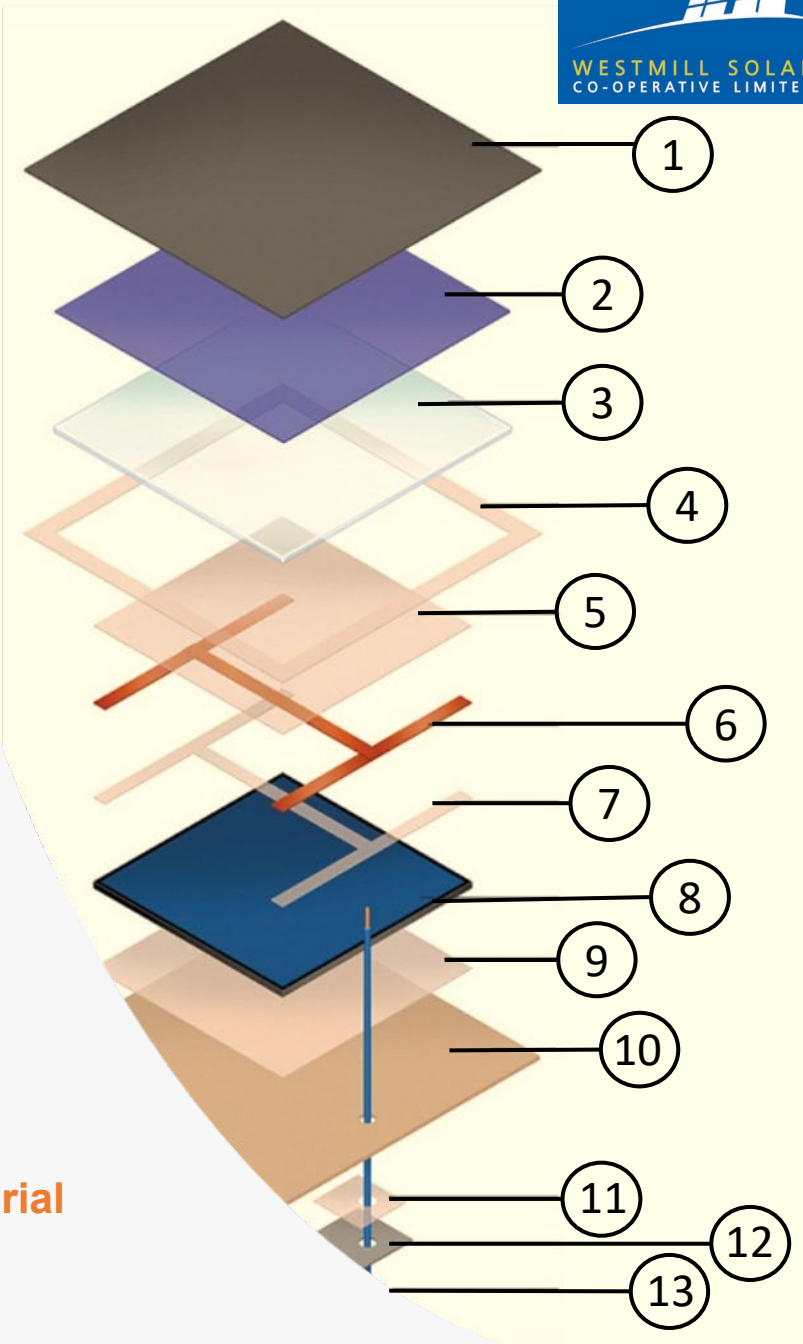
- What is the function of the **blackout material** layer?



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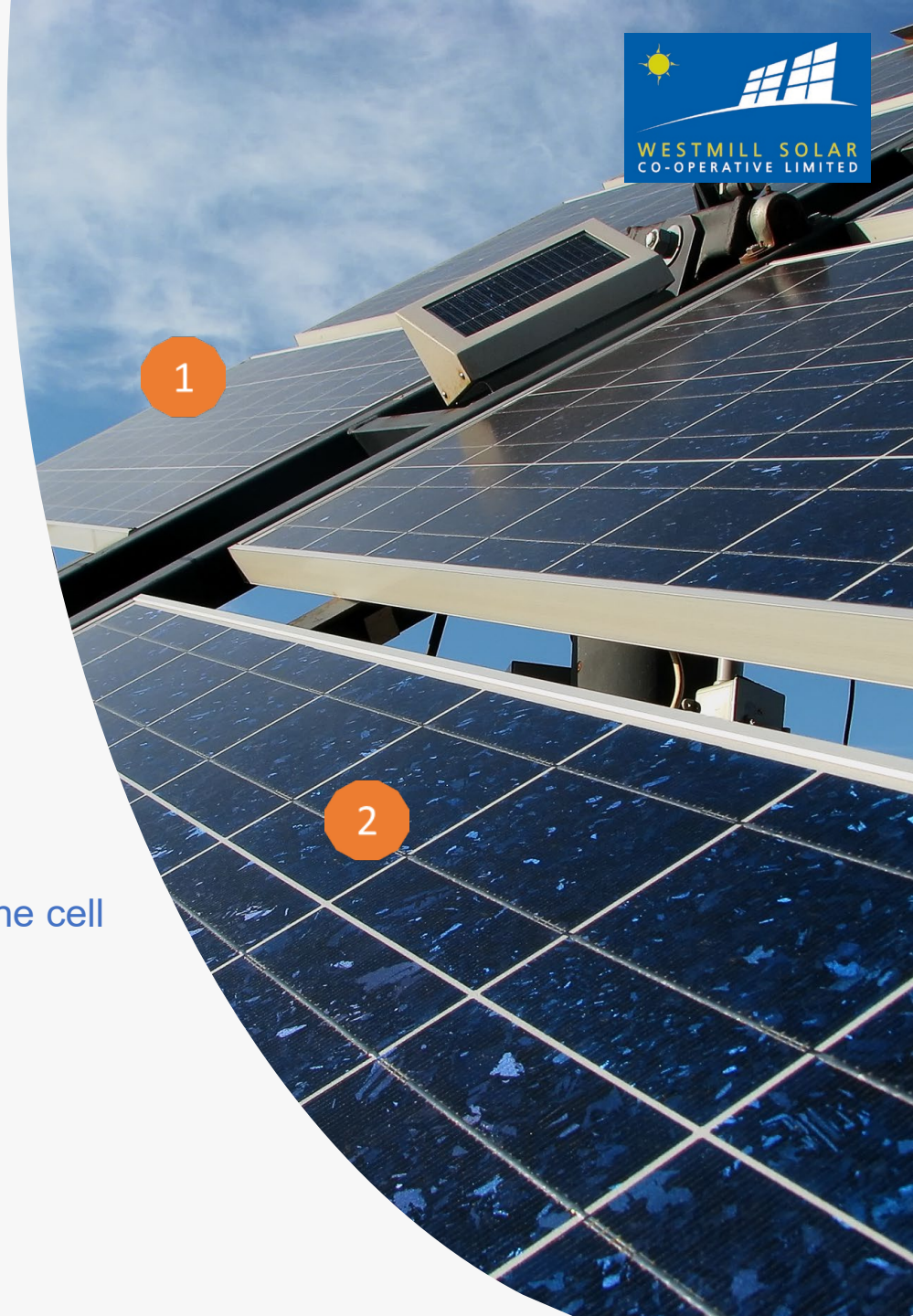

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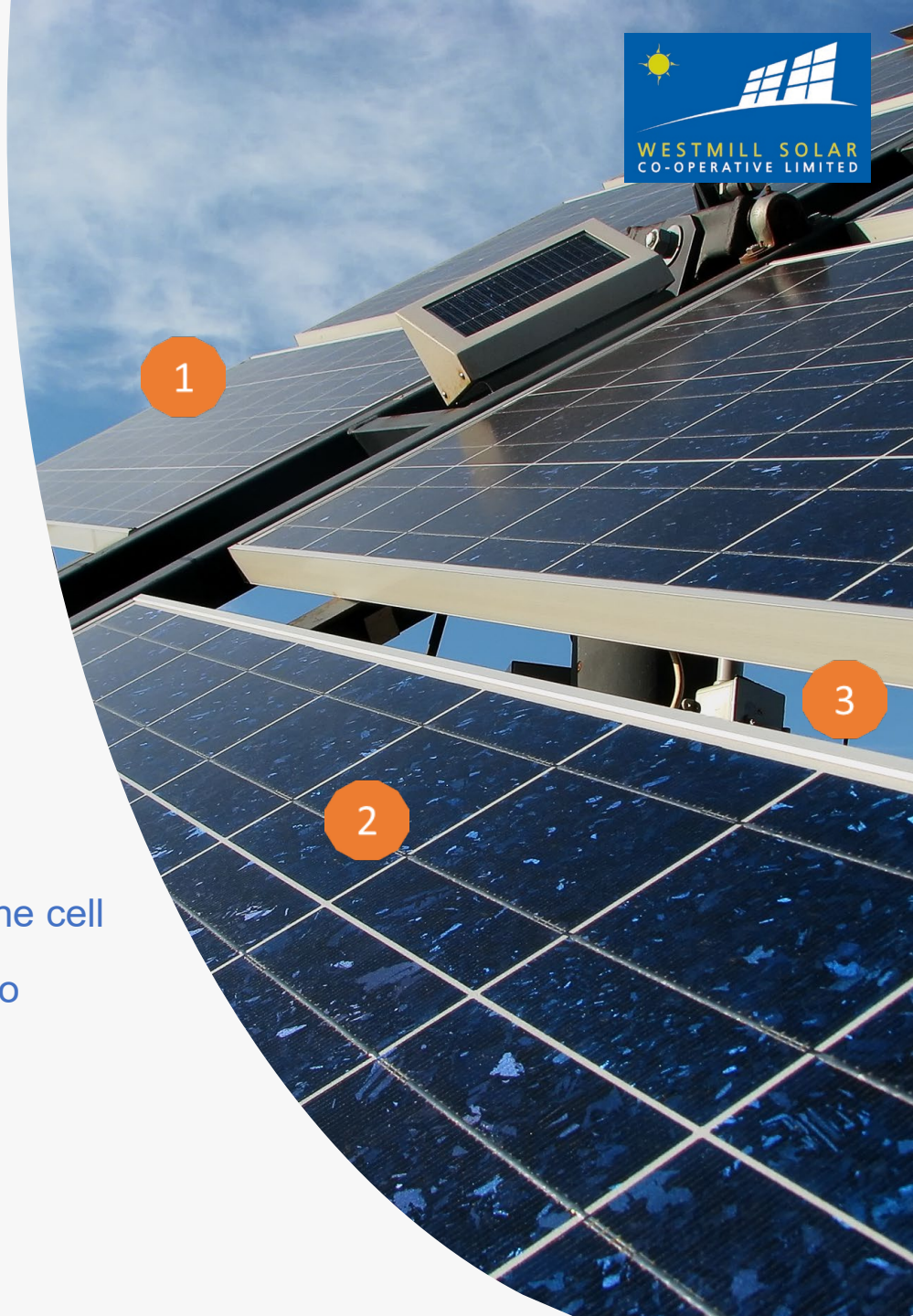

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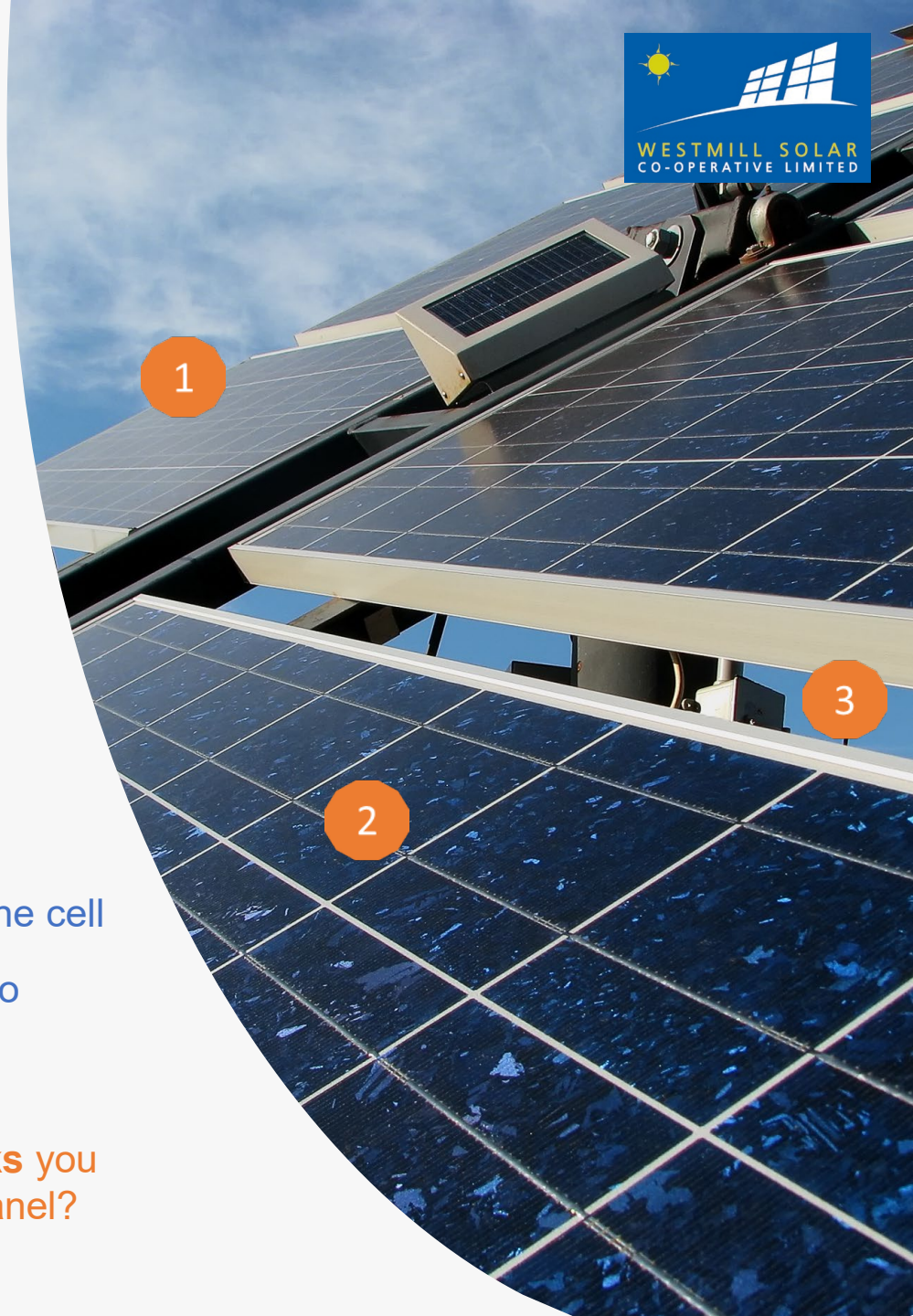
  - What do you think causes the **flecks** you can see under the surface of the panel?



How solar panels work

Task 2: Solar installation

- Examine the image of the **solar installation** on the house below and see if you can answer the following questions

  - Do solar panels require **direct sunlight** to produce energy?
  - What **direction** should the solar panels be facing **in the UK**?
  - How is **direct current** from the panels converted into **alternating current** that can be used in the house?
  - **Circle** the point on the image where this is happening
  - What happens to any **excess energy** produced?
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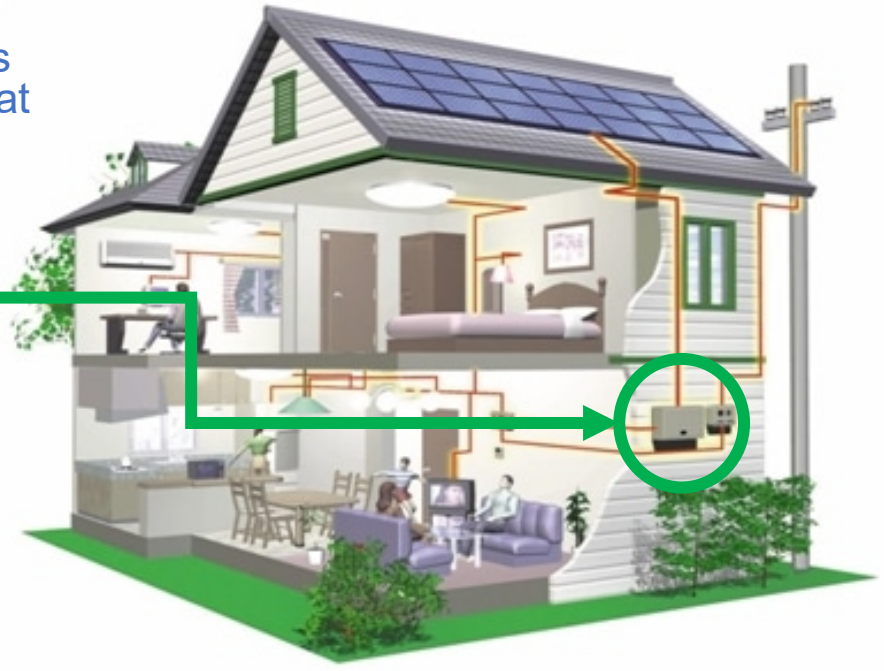

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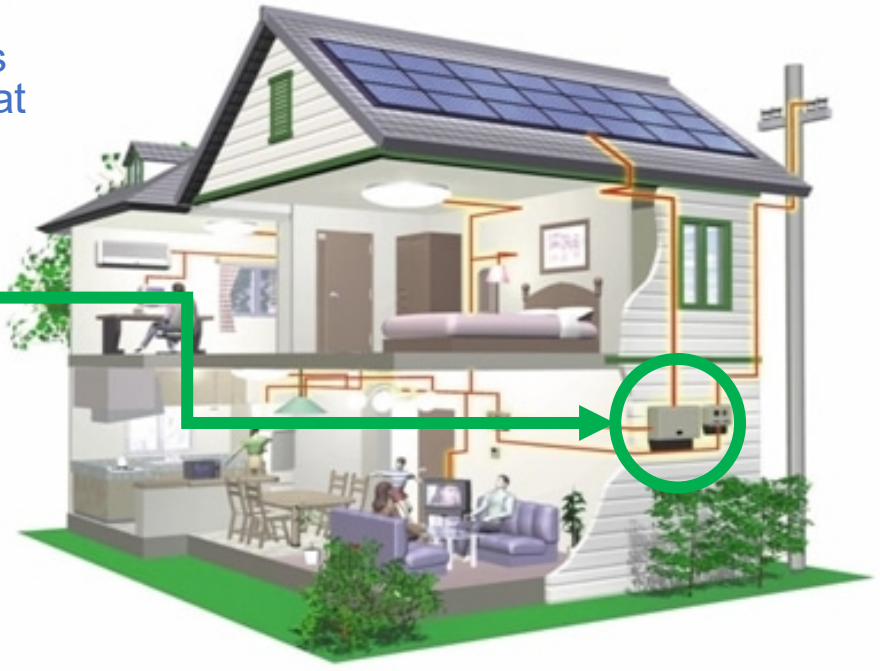

- What happens to any **excess energy** produced?
  It is fed back into the National Grid
- **Circle** the point on the image where this is happening

Task 2: Solar installation

- Examine the image of the **solar installation** on the house below and see if you can answer the following questions

- Do solar panels require **direct sunlight** to produce energy?
  No, they can generate energy from daylight
- What **direction** should the solar panels be facing **in the UK**?
  South
- How is **direct current** from the panels converted into **alternating current** that can be used in the house?
  Using an inverter
- **Circle** the point on the image where this is happening

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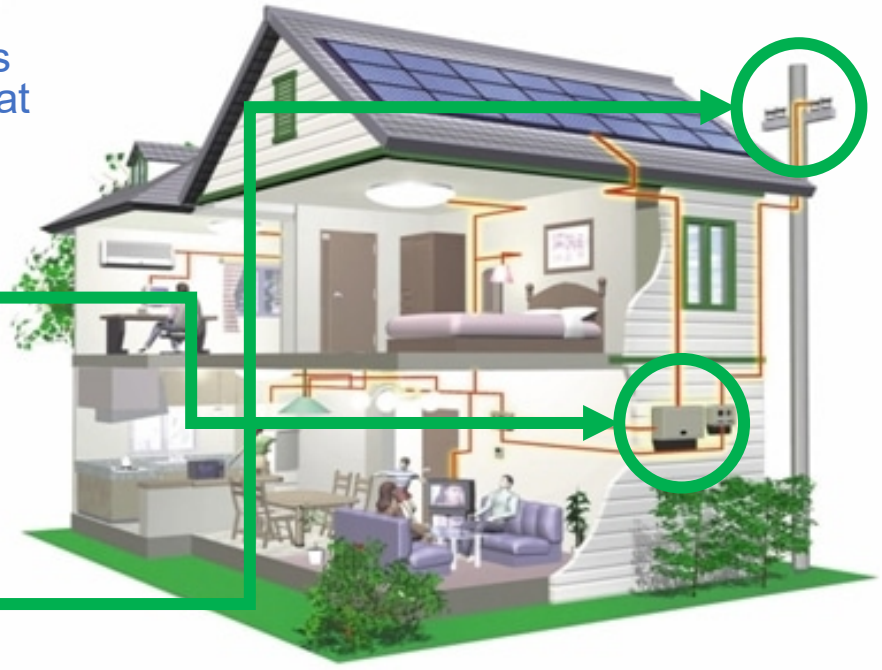

Small beginnings

- Many of us have a calculator powered by small **solar cells**
  - Solar powered calculators were first available in the **1970s**
  - Since then, solar and **photovoltaic** technology has come a long way
  - We can create vast **solar arrays** covering many acres
  - What do you think the term '**solar array**' means?

Solar power myths

- Like wind farms, despite being a **cleaner energy source**, solar still attracts some negative publicity
- Some people say
  - They cause dangerous glare
  - Solar panel can't be recycled
  - They require a lot of maintenance
  - They don't work when it is cold or cloudy
  - Do you have any **worries** about solar panels and solar farms?

Solar power facts

- Solar panels **absorb light** so will cause **less glare** than most household **window glass**
  - Solar panels can last 25 years, after which they can be **recycled**
  - Solar panels **do not require a lot of maintenance**, just regular cleaning
  - Solar panels **work efficiently** at different temperatures and in cloudy weather
  - How can fields with solar panels in them be used to increase biodiversity?

Building a solar array

The potential

- Solar technology is **improving** and **costs are falling**
  - **Battery technology** has improved, allowing solar energy to be stored
  - Solar panels reduce reliance on **wired electrical grid networks**
  - Solar panels enable some product to be powered wirelessly
  - Can you name some countries you think could benefit particularly well from solar power?

Solar light story

- Artist **Olafur Eliasson** and engineer **Frederik Ottese** launched '**Little Sun**' in 2012
  - They wanted to bring light to people living **without access to electricity**
  - How could small **portable** solar lights improve the lives of **school children**?
  - Their **vision** is to improve health, education, gender equality, and environmental sustainability

Little Sun

Task 3: Solar challenge!

- The challenge
  - In pairs, **design a solar streetlight that could be used on pathways between villages to light the way making it safer for children to walk to school**

Present your ideas in the form of a drawing with notes

Work together to present your ideas to the class

The design must use energy efficiently and fit nicely into it's planed location

The difference

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- A light meter is used to measure what?
- Solar panels are made up of many PV cells. What does PV stand for?
- What is used to convert direct current from solar panels into alternating current to be used in homes?
- What term is used for a group of solar panels grouped together?

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