

Sustainable materials

What you need to know

A number of different elements contribute to the sustainability of the materials used to make buildings are. These include: transportation of materials to the building site; making or refining materials; durability; ability to be recycled and re-usability. Defining sustainability is not always simple, for example wood that is sourced locally and untreated, uses little energy for transportation and therefore creates less carbon emissions, but might be less durable, and therefore need early replacement.

Section D
Chapter 2
Introduction



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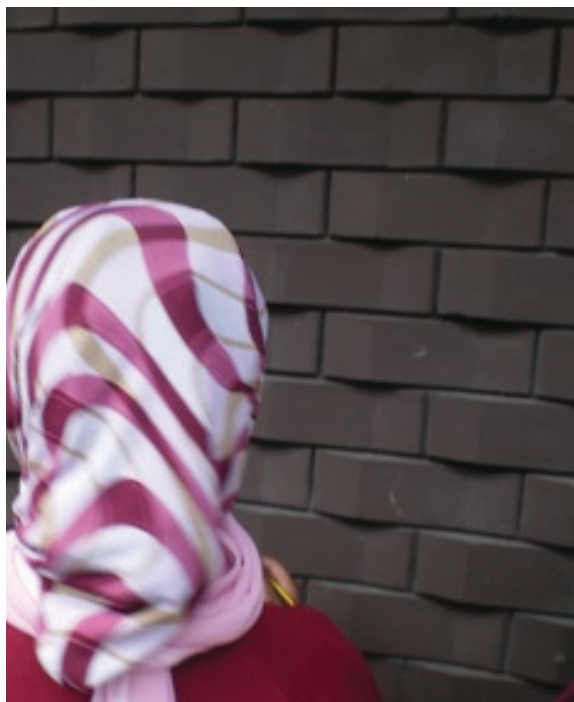


Making materials

Subject and scheme of work: Art and Design: exploring and developing ideas; knowledge and understanding; English; speaking and listening

Learning outcomes: knowledge and understanding of how different materials are made; ability to creatively record colour and form; ability to communicate the intended message; confidence in describing own experiences

Materials: simple step-by-step description of how different materials are made/refined; coloured pencils; pens



1. Explain to the class that very few materials are used in their raw form but have to be refined or adapted in some way for use in making buildings, in the same way ingredients are cooked for a meal.
2. Ask students to describe to a partner how the ingredients for their favorite meal are prepared: eg stir-fry: carrots are peeled and chopped; beansprouts are washed; peppers are deseeded and sliced, etc.
3. As a class, discuss how different common building materials are made (see following page for ideas).

4. Ask students to illustrate recipes for preparing different materials for making buildings in order to work out which materials take more steps to make and require more energy through heating and cooling: timber, concrete, brick, glass.



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Chapter 2
Activity 1

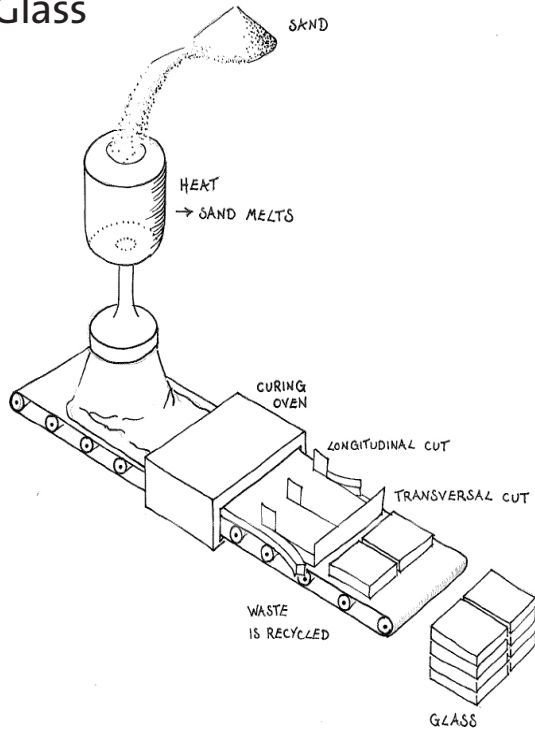
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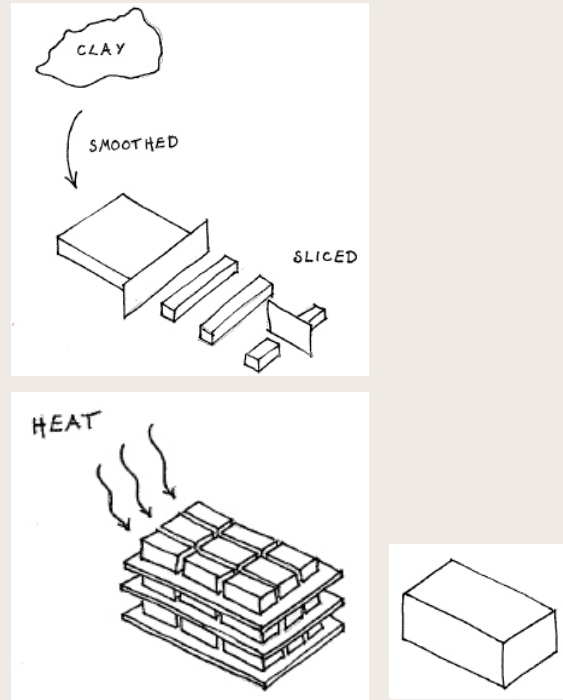
My Green School

An Eco-design resource

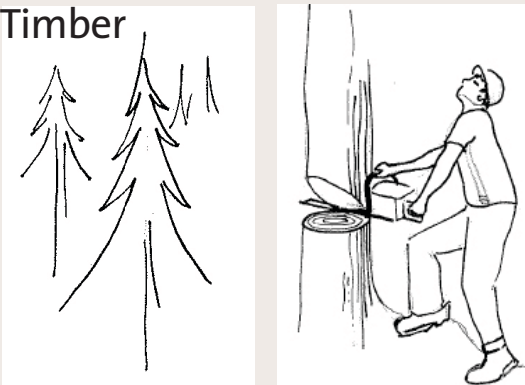
Glass



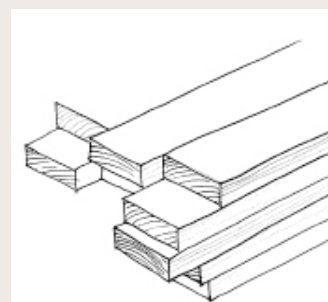
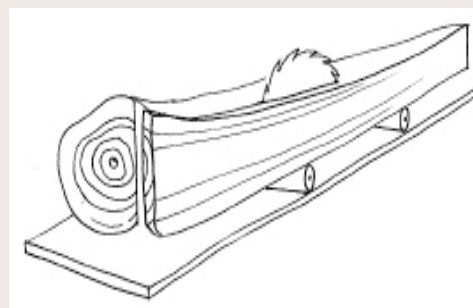
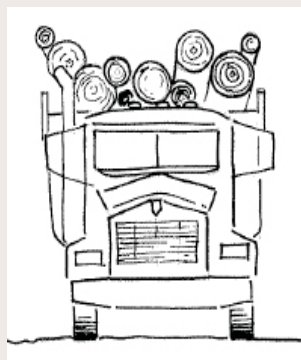
Brick



Timber



1. Wood is grown in a sustainable forest
2. Trees are cut down
3. Trees are transported to a saw-mill
4. Logs are sawn into planks at the saw-mill
5. Planks of wood are created to be used as timber for building



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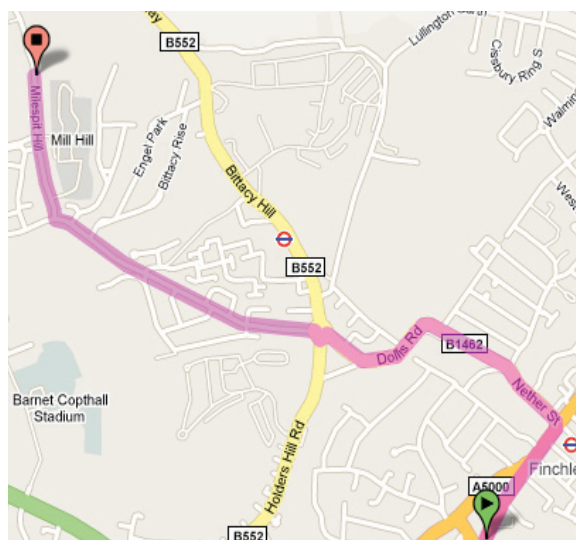
Mapping materials

Subject and scheme of work:

ICT; Geography: knowledge and understanding of environmental change and sustainable development

Learning outcomes: understand how the transportation of building materials can impact negatively on the environment; understand why the choice of materials is important to the sustainability of the overall design; develop research skills – making choices between different information sources; ability to explore different research methods; ability to work with others

Materials: map of London and surrounding area/UK; internet access; paper; pens



1. Ask students to imagine their journey from the main school entrance to the classroom they're sitting in, and discuss with a partner the materials they see along the way, making a list together.

2. Brainstorm, as a class, where each of these materials might have come from/where they were made

- Wood – a forest
- Brick – a factory
- Metal – a factory or forge
- Stone – a quarry
- Glass – a factory

3. Ask students if they have seen any of these places in London or elsewhere and in pairs or teams, students pick one of the materials and research on

the internet where the nearest producer of that material is – eg search for 'brick factory near London'.

4. All pairs/teams mark on the map the place they've found and label with their material.

6. Using Google maps or AA Route-Panner via the internet, students work out the shortest route to get their material to the school building and label number of miles on the map.

7. As a class, add up all the distances, and calculate the total reflecting on the amount of energy used and pollution created when transporting each material.

Sustainable materials: top trumps

Subject and scheme of work: Science: Sc3 Materials and their properties; Geography: Knowledge and understanding of environmental change and sustainable development

Learning outcomes: understand the properties of different materials; begin to understand why different materials might have been chosen for different parts of buildings; be able to identify a number of different building materials and list their properties; be able to group materials according to their properties; team-working skills; understanding of the environmental impact of using different materials for building; ability to compare the sustainability of different materials

Materials: samples of wood, slate, brick, ceramic, tile, metal, glass; a bag; pieces of paper with the name of each material written on them; pens; Q&A and top trumps blank cards



1. Each pair is given a top trumps card template to fill out for one material: timber, concrete, glass, metal, plastic, brick or ceramic.

2. Discuss with the class what they each had for lunch and where they think it may have come from.

3. Plot answers on a world map – either printed out or on the interactive whiteboard – and ask the class how they think it may have got to London.

4. Explain that materials to make buildings also have to be transported, so less energy is used when the source of materials is close by.

5. Ask students in teams to explore the building/a couple of spaces in the school building, and note down all the different materials they can find.



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Activity 3

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6. Ask the class to feed back the materials found and vote on which could be recycled or re-used and then rate on their top-trumps card 1 – 5.

7. Taking answers from the Making Materials activity, ask pupils to rate how complicated each material is to make and mark their rating on their top trumps card, explaining to the class that making the materials uses energy as well.

8. Students guess the number of years each material lasts and rate its durability on their top trumps card.

9. Complete top trumps cards including an image.

10. Photocopy the finished cards so you have a number of 'packs' of cards and students can play top trumps in pairs.

