

Sustainable Architecture Project Pack

Made by the Learning team at RIBA

With special thanks to Mint Cake, Lionheart, Anja Grossmann and Feilden Clegg Bradley Studios

RIBA 
Architecture.com

About this pack

In this pack, you will find:

- a) some key information for teachers to help deliver learning activities focusing on sustainable architecture
- b) activities for young people to complete that will help them to learn about sustainable architecture.

Each project is broken down into 4 parts:

- Explore
- Design based on a design brief
- Make
- Evaluate

This fits with the Secondary National Curriculum format for Design Technology (DT), Science and Geography learning.

We have included Design Technology, Geography and Science curriculum aims in this project. We have listed the curriculum aims that this particular project covers at each stage.

Key information and aims

<p>Key words – make sure you know what these words mean. Use a dictionary, the internet or an adult to help you.</p>	<p>Architect – someone who designs buildings.</p> <p>Climate Change - a change in climate patterns caused by the increased levels of atmospheric carbon dioxide produced by the use of fossil fuels.</p> <p>Sustainability – providing goods or services that cause little or no damage to the environment and therefore being able to last for a longer time.</p>
<p>Materials – what you will need to collect to do this project.</p>	<p>Thick card or foamboard</p> <p>Tape, glue and scissors</p> <p>Paper, pencils and pens</p>
<p>Skills - what you should know how to do by the end of the project. Can you show someone else how to?</p>	<p>I can design with the environment in mind</p> <p>I can communicate my ideas by drawing them</p> <p>I can build a 3D model based on my drawing.</p> <p>I can compare my work to the work of professional architects.</p>
<p>Knowledge – what you should know by the end of the project. Can you tell someone else about it?</p>	<p>I know what architects and those working in the built environment are doing to tackle the climate crisis.</p> <p>I know about the process of working to an architectural brief.</p> <p>I know different ways of making buildings environmentally friendly and sustainable.</p>
<p>Extension activities – other things you can do to build on your learning</p>	<p>Find other examples of sustainable architecture – in books or on the internet</p> <p>Write a factfile or create a moodboard showcasing different materials, technologies and designs that create environmentally friendly buildings.</p>

What the National Curriculum says young people should learn:

Explore

Geography Key Stage 3 and 4:

- understand how human and physical processes interact to influence and change landscapes, environments and the climate
- research the causes, consequences of and responses to extreme weather conditions
- learn about the spatial and temporal characteristics, of climatic change and evidence for different causes, including human activity, from the beginning of the quaternary period (2.6 million years ago) to the present day
- discover how humans use, modify and change ecosystems and environments in order to obtain food, energy, water and other resources

Science Key Stage 3 and 4 :

- understand how carbon is used in obtaining metals from metal oxides, the carbon cycle, how carbon dioxide is produced by human activity and the impact on climate
- evaluate the evidence for additional anthropogenic causes of climate change, including the correlation between change in atmospheric carbon dioxide and the concentration and consumption of fossil fuels
- describe the potential effects of increased levels of carbon dioxide and methane on the Earth's climate and how these effects may be mitigated, including the consideration of scale, risk and environmental implications
- Learn how changes in the environment may leave individuals within a species, and some entire species, less well adapted to compete successfully and reproduce, which in turn may lead to extinction

Design

Design and Technology Key stage 3 and 4

- build and apply a repertoire of knowledge, understanding and skills in order to design and make high-quality prototypes and products for a wide range of users
- critique, evaluate and test their ideas and products and the work of others
- identify and solve their own design problems and understand how to reformulate problems given to them
- develop specifications to inform the design of innovative, functional, appealing products that respond to needs in a variety of situations
- develop and communicate design ideas using annotated sketches, detailed plans, 3-D and mathematical modelling, oral and digital presentations and computer-based tools

Make

Design and Technology Key stage 3 and 4

- select from and use specialist tools, techniques, processes, equipment and machinery precisely, including computer-aided manufacture
- select from and use a wider, more complex range of materials and components, taking into account their properties
- understand that all design practices takes place within contexts which inform outcomes
- identify and understand client and user needs through the collection of primary and secondary data
- demonstrate an ability to write a design brief and specifications from their own and others' considerations of human needs, wants and interests
- investigate factors, such as environmental, social and economic challenges, in order to identify opportunities and constraints that influence the processes of designing and making
- use different design strategies, such as collaboration, user-centred design and systems thinking, to generate initial ideas and avoid design fixation

Evaluate

Design and Technology Key stage 3 and 4

- analyse the work of past and present professionals and others to develop and broaden their understanding
- investigate new and emerging technologies
- test, evaluate and refine their ideas and products against a specification, taking into account the views of intended users and other interested groups
- understand developments in design and technology, its impact on individuals, society and the environment, and the responsibilities of designers, engineers and technologists
- understand how the critical evaluation of new and emerging technologies informs design decisions; considering contemporary and potential future scenarios from different perspectives, such as ethics and the environment

Technical Knowledge

Design and Technology Key stage 3 and 4

- understand and use the properties of materials and the performance of structural elements to achieve functioning solutions
- understand the impact of new and emerging technologies on industry, enterprise, sustainability, people, culture, society and the environment, production techniques and systems
- understand the way in which the selection of materials or components is influenced by a range of factors, such as functional, aesthetic, environmental, availability, cost, social, cultural and ethical



Explore

This is a project about sustainable architecture. Eventually you will be working as an architect to re-design your school. An architect is someone who designs buildings and places.



Bristol University commissioned Feilden Clegg Bradley Studios to design a new sustainable and environmentally-friendly campus. [Watch section two of the Building the Future film](#) to explore how they achieved this.

What factors did the architects have to consider when they created their design to ensure their building did not negatively contribute to climate change?

Explore

[Watch section two of RIBA's Building the Future film](#) about climate change and the built environment. Find the answers to the following questions.

Raising ground level

Why did the architects need to raise the ground level and what did they use to do this?



Using local materials

How does using local materials reduce the impact of the building on the environment?

Concrete

What is concrete used for in buildings? Why does it have a negative impact on the environment? How did the architects try to limit the harmful impact of using concrete?

Charging points

What are charging points used for in the campus and how can these help the environment?



Movable walls and ceilings

Why is it a good idea to have moveable walls and ceilings in a building?

Heating

How was the building heated and why would this be good for the environment?



Explore



Enterprise Centre, Norwich Research Park by Architype and BDP

This landmark project has changed the way the industry thinks about sustainable construction. The project is designed to achieve a 100 year lifespan and exemplifies the use of low embodied carbon materials. Use of local materials and construction was maximised to provide a low carbon building and help stimulate the local economy and traditional skills. Timber came from Thetford Forest, straw for the innovative prefabricated thatch panels from Norfolk and various low carbon building materials including wood wool internal cladding, sonaspray ceiling treatments and flint were all locally sourced and fabricated. [Read more here](#) and [here](#).



Bloomberg European Headquarters, London by Foster + Partners

Bloomberg's European Headquarters in London is one of the world's most sustainable office buildings. Its innovative ceiling panels feature 2.5 million polished aluminium "petals" that save energy by improving the efficiency of heating, cooling and lighting functions. Incorporating 0.5 million LED lights, the ceiling uses 40% less energy than a typical fluorescent office lighting system. Its unique petal design also helps manage acoustics and airflow. When the building is in natural ventilation mode, air is drawn up through the building's six-storey ramp and out through vents in the roof. Smart sensors allow airflow to be adjusted dynamically in response to how many people are in the building, which will save 600-750 MWh of power per year. [Read more here](#).

Explore

Explore some more examples of sustainable design on the internet;

[Feilden Fowles](#)

[Centre for Alternative Technology](#)

[Biodegradable Pavilion](#)

[Gbolade Design Studio](#)

Now take a walk round your school campus and make notes on:

Building materials and techniques that are good or bad for the environment

Spaces you would like to improve or change

Methods used to heat and power your school

How spaces are accessed and used



Design

In this project you are working as an architect to redesign your school to make it more environmentally friendly.

Look back on the notes you made during your walk round your school and use your observations to select areas and spaces to redesign.

What spaces have you chosen and why?

Think about:

- What building materials and techniques will you use in your design and why?
- Where will you source your materials from?
- How will you design and build your spaces to ensure they do not contribute negatively towards climate change?
- How will you heat and power your school?
- What special sustainable features will you include in your design?
- How will pupils, staff and visitors travel to and access your school?
- Are there any local environmental factors linked to climate change that you will need to consider when redesigning your school?

Design

Draw your design for your school in [elevation](#).



This drawing will need to be a front elevation like the drawing on the left and it will need to be labelled. Use the box to the right or a separate sheet if you need more space.

Extension: Draw your design for your school in [plan](#) and [section](#).

Extension: Draw a mini [masterplan](#) of the school area to showcase how it links to local infrastructure in a sustainable way.

Draw and label your school here:

Make

Look at your drawings of your school and consider how you can transform your drawings into three dimensional architectural models.

Think about the materials you can use – strong card or foamboard is really good for a base and paper and masking tape is great for experimenting with construction techniques.

How can you cut or join your materials to make the shapes you will need to make a 3D version of your school? This short [film](#) will give you some great ideas for creating three dimensional building shapes.



Photos copyright of Maria-Alejandra Huicho



3D building ideas by RIBA Learning

Evaluate

Look at your designs and your 3D model.

Explain what you did in the project (think about what you were asked to do and how you did it):

Can you see any similarities or differences to any of the architecture you looked at whilst you were at the Explore stage of the project?

Does your design fit the brief: is your school sustainable and why?

Would you change or improve anything?

Extension:

Ask other people to give you feedback! Is there anything they can suggest to improve your design? Make the changes to improve your design.