Sources of Electricity (50 minutes)

Industry Participant

Ideal Industry Participant:

An electrical engineer or equivalent. Industry participants who are relatable to young people and/or who challenge career stereotypes. It would be helpful if industry participants could inform the students about potential pathways into their occupation and how the subjects taught at school relate to their career.

Example Job Titles:
Environmental Adviser
Environmental Engineer
Environmental Management Consultant
Sustainability Consultant
Geochemist
Mechanical Engineer
Design Engineer
Electrical Engineer

Description

This session aims to get students thinking about how their classroom learning on the National Grid and electrical power relates to careers within construction and the built environment sector. The main focus of the session is a group project in which students have to work out how much electricity is needed to power more and more homes as they are built, as well as discuss how this demand can be met.

What Year Group or Key Stage is the session targeting?

This session should be delivered to GCSE KS4 science class (Year 10-11)

Maximum number of students?

This session would be ideal for 30 students.

What is the goal of the session?

For students to understand how different energy sources can be used to generate electricity.

Role of the Industry Participant

The industry participant will provide information on their current role, career path and potential routes for a young person interested in their particular occupation. The individuals will be answering questions from groups of students, mainly based on renewable and non-renewable energy sources.

The industry participant will deliver the session and manage activities.

Resource Checklist
USB Resource 4 - Hard copy of PowerPoint Resource 4 - Electronic copy of PowerPoint (please note PowerPoint is uploaded in two parts due to document size. Please combine the two parts for session delivery) Resource 1 - Student Work Booklet Resource 2 - Student Instruction Brief Resource 3 - How to work out the answer (Print in A3) Post it notes Scientific calculators
Facilities Required from School
A good sized classroom which can accommodate 30 students.
Learning Objectives:
Learners will be able to... • To explain how the national grid operates • To explain the feasibility of different energy sources such as wind power, solar power, hydroelectric power, nuclear power and geothermal power

Gatsby Benchmarks	National Curriculum Links
Gatsby Benchmark 2: Learning from career and labour market information Gatsby Benchmark 3: Addressing the needs of each pupil Gatsby Benchmark 4: Linking curriculum learning to careers Gatsby Benchmark 5: Encounters with employers and industry employees.	English Language: Use discussion in order to learn; they should be able to elaborate and explain their understanding and ideas clearly. Science Language: Renewable and non-renewable energy sources used on Earth, changes in how these are used.

Teaching Strategies
Real Life Links: Students will listen to professionals and will be encouraged to link their current school subjects and various careers/professions. Visual: Prompt questions will be provided and an introductory PowerPoint will be delivered. Auditory: Students will listen to built environment professionals. Students will also have the opportunity to hear questions from their peers, encouraging collaborative learning.
Risk Assessment
Check with school regarding their DBS policy.

Duration	Industry Participant Activity	Learner Activity	Resources

4 minutes	Slides 1-7: Industry participant to deliver Overview of Construction presentation. This is to provide students with an insight into the industry and information on the range of careers that are available. Edit Slide 3: All About Me After this slide, insert a new slide with images of projects that you and your company have worked on so students can find out more about your work.	Students to listen	
4 minutes	Slide 8: Can you imagine a world without electricity? Encourage students to think about their day to day activities. Watching TV, charging their phone, driving a car and using a computer. Try to capture students' ideas during the class discussion on the white board. E.g. If we have no lampposts outside it would limit our day to day activities especially in the winter.	Students to write on post-it notes of the problems that would occur if we lived in a society without electricity. Ask students to share their ideas during the class discussion.	Hand out post-it notes
5 minutes	Slide 9-10: How the sun gives us energy. Slide 9: Outlines the different energy transfers the sun creates. Slide 10: Explains how the sun creates these different types of energy transfers.	Students to listen	
2 minutes	Slide 11: What is electricity? Ask students to create a definition of the term 'electricity'. As a class formulate a definition on the board and capture on the white board.	Students to create a definition for the term ' electricity'	

3 minutes	Slide 12-13 : National Grid Explain how coal-fired power stations generate electricity. Refer to the diagram when explaining how coal can be used to generate electricity. Slide 12 –Outlines the disadvantages of using coal fired power stations to generate electricity.		
3 minutes	Slide 14-15 : Kilowatts and Kilowatt hours. Explain the difference between watts and kilowatts.		
2 minutes	Slide 16: Government Task Read as a class - choose a number of students to read different sections of the worksheet.	Students to read the worksheet	Hand out: Resource 2 – Student Instruction Brief
1 minute	Slide 17 : Capacity Factor The capacity factor takes into account how effective each energy source is all year round. One of the drawbacks of renewable energy is that it's not always available like non-renewable resources. For example, there will always be wind but it isn't always blowing at the same strength and the sun only shines during certain hours.		
2 minutes	Student Work Booklet. Read p1 as a class		Hand out: Resource 1 – Student Work Booklet
3 minutes	Slide 18:Wind Power Go over calculations- step by step	Ask a student to find the capacity factor for wind power – remind them to convert the percentage into a decimal.	Hand out: Resource 3 How to work out the answer (Print in A3) Scientific Calculators

15 minutes	Slide 19: Government Task Students to calculate which energy source they would advise the government to build to power 250,000 homes.	Students to be in groups of 4. Each student in the group should focus on one energy source and then discuss their findings once all team members have completed their calculations. Students to refer to page 7 to find out the capacity factor for each energy source.	Resource 1 – Student Work Booklet
6 minutes	Slide 25: Decisions Cost , Reliability , Environmental Impact and Time Taken to Build Each group to nominate one student to pitch during the class discussion. Industry Participant to round up the session, thank the industry participants (volunteers) and students for their involvement.	Students to choose one student from each group to pitch which energy source they believe will be the best to power 250,000 homes.	
	Slide 21-24:Answers		

To-Do List	
<u>Before Session:</u> • Request that the session take place in a good sized classroom • Go over the session plan • Print all resources before you arrive to the school • Make sure the relevant files are on a USB/sent to the school contact	<u>After Session:</u> • Collect in resources at the end of the session
Hints & Tips	

• Here is the type of question that you may get asked:
  ○ What do you do on a daily basis?
  ○ How did you get into your career?	

Delivery Management	

- The session could be delivered by one industry participant
- The teacher will handle behaviour management
- Refer to 'How To Contextualise Curriculum' for more guidance on how to deliver this session