SECONDARY LEVEL

POWER FOR EVERYONE EVERYWHERE

PRINTOUTS

Power for Everyone Everywhere is a hands-on enquiry-based workshop that enables pupils to explore the global issues associated with electricity access and the role that engineering plays in electricity distribution.

UK ENGINEERS WITHOUT BORDERS

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This document and the accompanying materials are available to download from: http://www.ewb-uk.org/power-for-everyone-everywhere.

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OVERVIEW

Power for Everyone Everywhere is a workshop designed to encourage pupils to explore the challenges associated with access to clean and reliable electricity around the world. Pupils learn about the importance of electricity to people's everyday lives and the role that engineering infrastructure plays in the distribution of electricity. Pupils design, build and test their own model wind turbine as part of this workshop. This workshop builds on the Sustainable Development Goals and the concept of global citizenship.

This document contains the printouts for Engineers Without Borders Ambassadors delivering the workshop. Teachers and youth group leaders can also use it. It should be used and read in conjunction with the accompanying slides, slide notes and Facilitator's pack. Please note that this resource is periodically updated. The date of the last update is on the inside front cover.

If you are not a teacher/youth group leader, please sign up to become an Engineers Without Borders Ambassador to be able to deliver this resource. Find out more and register here on our website. For any queries, please contact Engineers Without Borders UK directly using the email address: outreach@ewb-uk.org.

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HOW DOES EVERYONE EVERYWHERE ACCESS WATER? CASE STUDIES

LOCATION	ISSUE	SOLUTION
Wimbe, Malawi, Africa	The country's central electricity grid has not reached the village. Therefore, the residents are unable to power electrical devices such as lighting. When it gets dark, they cannot see to read, socialise or make a living.	A 14 year old, William Kamkwamba, build a wind turbine and later installed solar panels. He learned about harnessing wind for energy from a library book. He successfully built a wind turbine to power electrical devices in his home and gave light to six other local homes through solar power.
East Riding, Yorkshire, UK, Europe	The increasing price of electricity from the National Grid and the reliance on fossil fuel power resources. There are regular reports of the fossil fuels upon which the national grid relies suffering from shortages.	Neil and Katie installed wind turbines on their farm, saving £2000 a year. Other people are very interested in doing the same. Customers are also keen to buy produce from the 250-acre farm, due to it using renewable energy.
Bangalore, India, Asia	Those without access to the central electricity grid have to burn kerosene for light. This is harmful and expensive. The Indian government subsidises kerosene, which generates a flame to bring light into homes, however it is still an expensive resource. Kerosene creates a smoke that is very harmful when inhaled.	Residents on the outskirts of the city installed solar panels, as most days of the year are sunny. With around 300 clear sunny days a year in Ashraya Nagar, solar power is a cheaper, healthier way to bring light into peoples' homes so that they can read and socialise after dark.

BUILDING A WIND TURBINE

Create an annotated sketch of your turbine blades, around the cotton reel that will turn around. Make sure you follow the design checklist.

Design Checklist:	✓
Think about what you think would make an effective design	
Decide on a design in your team	
Drawn blade design and labelled materials	
Described key features of design (e.g. shape, size, angle of blade)	

Evaluate

1. Describe what went well about your turbine performance test.

2. Explain how you could improve your turbine.

REFLECTION ACTIVITY: ELECTRICITY ACCESS ISSUES

Scenario 1

You are a population living high up a mountain, that lacks access to electricity as the terrain and distance makes it hard to install cables. It is also too expensive to buy the materials to install cables. There aren't currently enough people who know how to put the cables in place available to come and build it for them – installing electrical cables can be dangerous and requires technical knowledge.

1. What are the impacts of lacking access to electricity for your population?
2. What factors would an engineer need to consider and find out more about to address this scenario?

Scenario 2

You are population that had access to electricity but due to a technical break-down of the electrical distribution system, you are no longer connected. Technical faults happen regularly as it is costly to maintain the cables and distribution system. Other populations downstream of the system are also affected.

1. What are the impacts of lacking access to electricity for your population?
2. What factors would an engineer need to consider and find out more about to address this scenario?

Scenario 3

Your population is rapidly increasing, due to large numbers of people moving and building families, in areas that access electricity. The existing system was only able to support the previous population size. Now that there are more people demanding electricity in the same place, there is less electricity available for each person. There is limited money, materials and skills to provide a bigger system. Even if the system is expanded it will take time and the population may have grown even more since then.

1. What are the impacts of lacking access to electricity for your population?
2. What factors would an engineer need to consider and find out more about to address this scenario?

Scenario 4

You are a population that relied on a wind farm to generate your electricity. There has been a significant reduction/no wind this year and therefore no wind power was available to generate electricity. There is limited money, materials and skills to build new generation centres.

1. What are the impacts of lacking access to electricity for your population?
2. What factors would an engineer need to consider and find out more about to address this scenario?

Scenario 5

Climate change is not something we can ignore, so we need to do something about our reliance on fossil fuels. The Government has decided that they need to take drastic action and significantly reduce the amount of fossil fuels used to supply your population's electricity. The coal-fired power station that supplied 90% of your population's electricity is closed down. There is limited money, materials and skills to build new generation centres.

1. What are the impacts of lacking access to electricity for your population?
2. What factors would an engineer need to consider and find out more about to address this scenario?