



UK

ENGINEERS

WITHOUT BORDERS

WHO ARE WE?



UK

ENGINEERS

WITHOUT BORDERS

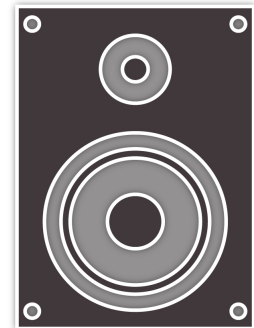
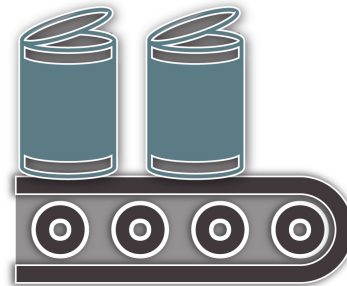
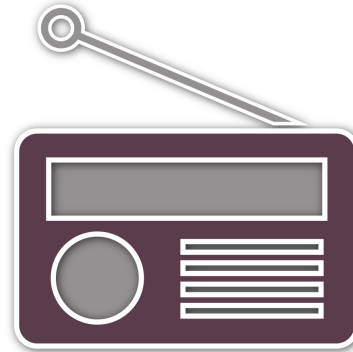
WHO ARE ENGINEERS WITHOUT BORDERS UK?

Engineers Without Borders UK is part of a global movement engineering a better future.

- They inspire, enable and influence the engineering community to serve all people and the planet.
- They are putting global responsibility at the heart of engineering and inspiring a new generation of creative, innovative and socially responsible engineers.
- Globally, there are over 60 Engineers Without Borders organisations, and tens of thousands of committed engineers.

HOW DO YOU USE ELECTRICITY?

TASK: Think of as many ways as you can





UK

ENGINEERS

WITHOUT BORDERS

TODAY'S WORKSHOP

Learning objectives:

- Understand the importance of electricity and that access to it is not equal
- Describe the role of an engineer in bringing about access to electricity
- Consider the challenges engineers face to give people around the world access to electricity
- Design your own model turbine



ELECTRICITY IS IMPORTANT

- We are completely dependent on reliable access to electricity.
- Access to electricity can increase quality of life and economic growth.
- People without access to electricity do not have the services that it can provide:
 - transport
 - refrigeration
 - entertainment
 - washing systems



HOWEVER



1 billion people still lack access to electricity

**WHAT HAPPENS IF I DON'T HAVE
ACCESS TO ELECTRICITY?**

I could not use the internet

**WHAT HAPPENS IF I DON'T HAVE
ACCESS TO ELECTRICITY?**

**ELECTRICITY SUPPLY CUT OFF OR
UNRELIABLE**

ELECTRICITY SUPPLY CUT OFF OR UNRELIABLE

```
graph TD; A[ELECTRICITY SUPPLY CUT OFF OR UNRELIABLE] --- B[Infrequent or no light]
```

Infrequent or no light

ELECTRICITY SUPPLY CUT OFF OR UNRELIABLE

```
graph TD; A[ELECTRICITY SUPPLY CUT OFF OR UNRELIABLE] --> B[Infrequent or no light]; B --> C[Reduced education];
```

Infrequent or no light

Reduced
education

ELECTRICITY SUPPLY CUT OFF OR UNRELIABLE

```
graph TD; A[ELECTRICITY SUPPLY CUT OFF OR UNRELIABLE] --> B[Infrequent or no light]; B --> C[Reduced education]; B --> D[Cannot work to earn an income];
```

Infrequent or no light

Reduced education

Cannot work to earn an income

ELECTRICITY SUPPLY CUT OFF OR UNRELIABLE

Infrequent or no light

Reduced education

Cannot work to earn an income

Miss out on social time

ELECTRICITY SUPPLY CUT OFF OR UNRELIABLE

```
graph TD; A[ELECTRICITY SUPPLY CUT OFF OR UNRELIABLE] --- B[Can't power equipment]
```

Can't power equipment

ELECTRICITY SUPPLY CUT OFF OR UNRELIABLE

```
graph TD; A[ELECTRICITY SUPPLY CUT OFF OR UNRELIABLE] --> B[Can't power equipment]; B --> C[Reduced education];
```

Can't power equipment

Reduced education

ELECTRICITY SUPPLY CUT OFF OR UNRELIABLE

Can't power equipment

Reduced education

Cannot work to earn an income

ELECTRICITY SUPPLY CUT OFF OR UNRELIABLE

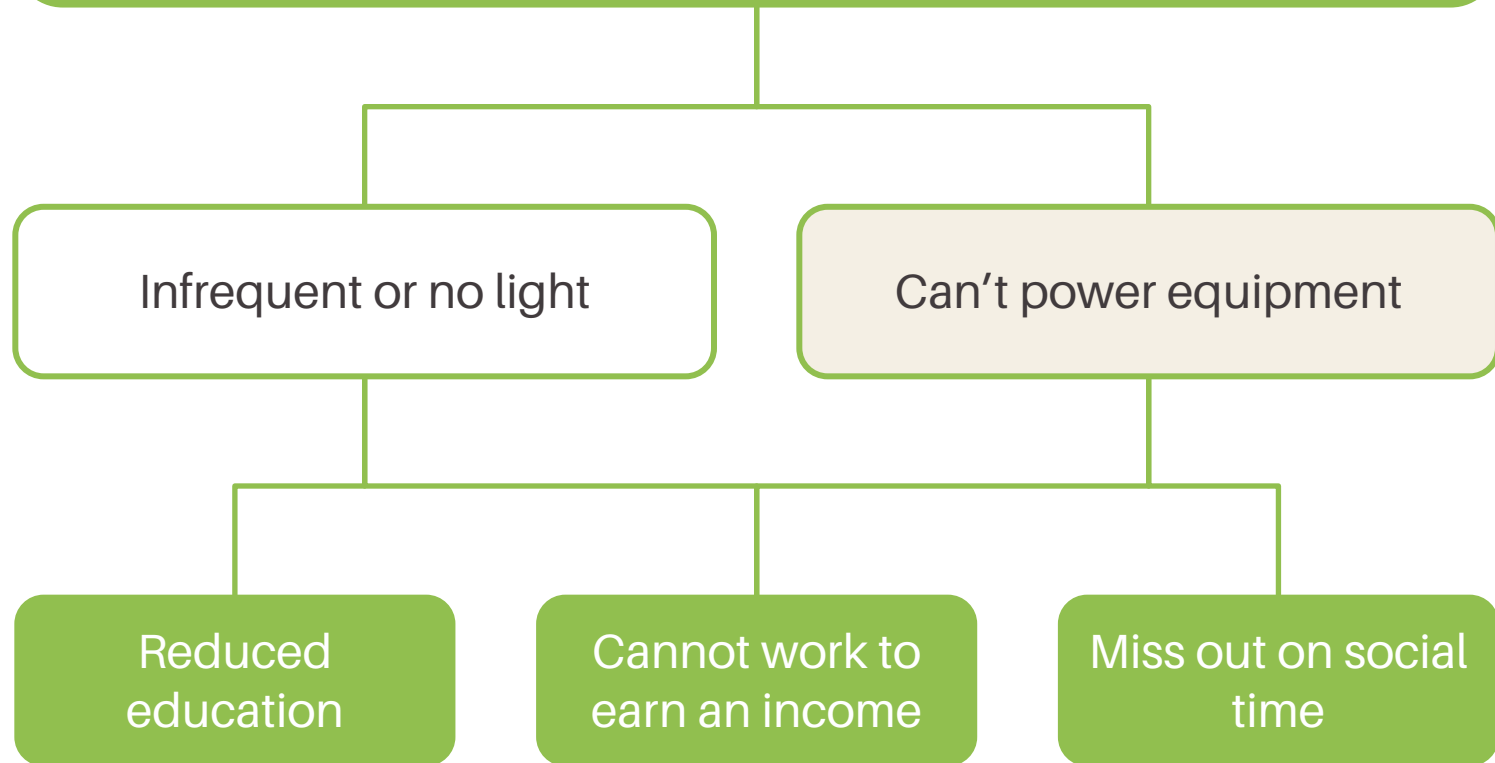
Can't power equipment

Reduced education

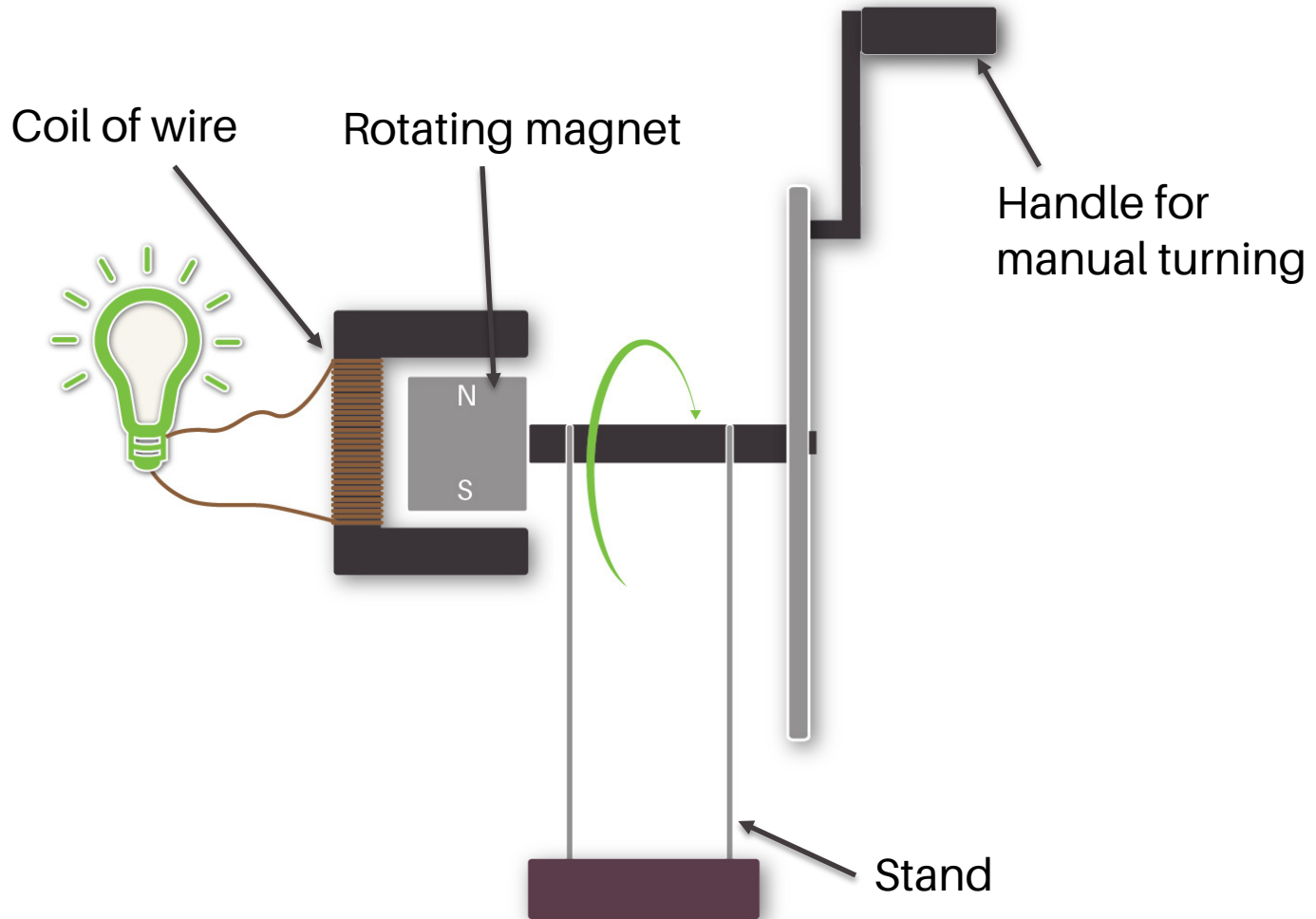
Cannot work to earn an income

Miss out on social time

ELECTRICITY SUPPLY CUT OFF OR UNRELIABLE



GENERATING ELECTRICITY



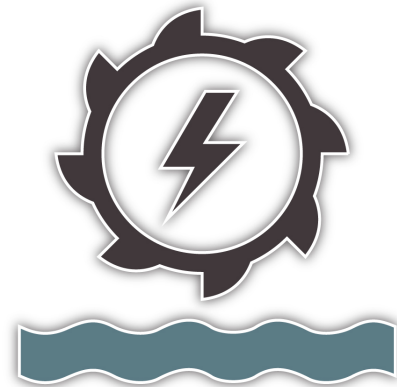
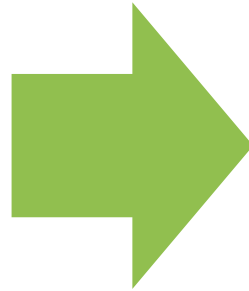
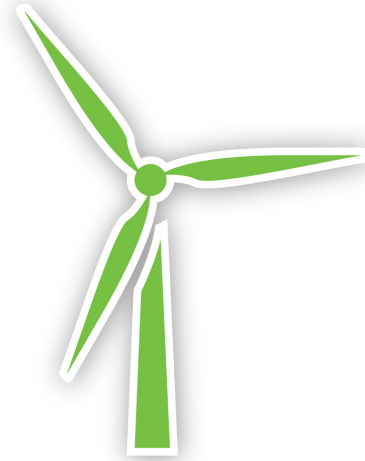
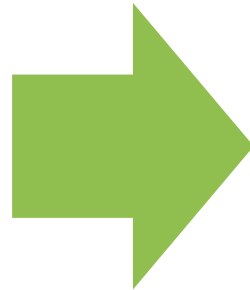
WHAT RESOURCES CAN GENERATE ELECTRICITY?



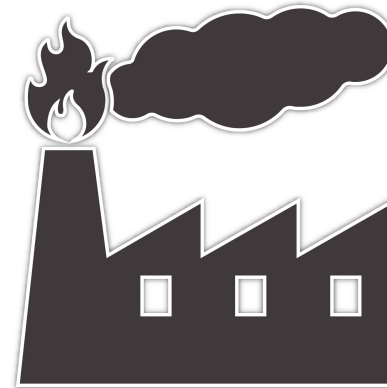
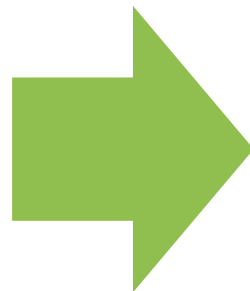
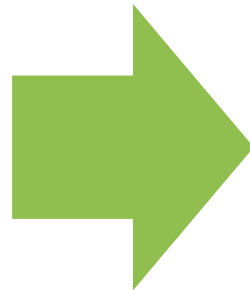
POWER RESOURCES



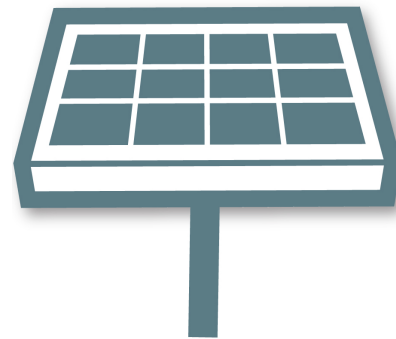
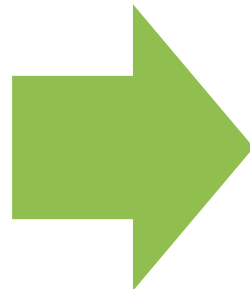
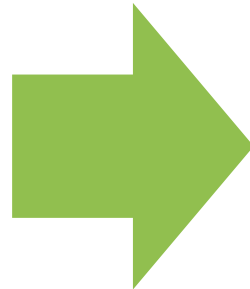
POWER RESOURCES



POWER RESOURCES



POWER RESOURCES



RENEWABLE AND NON-RENEWABLE POWER RESOURCES

RENEWABLE RESOURCES: types of resources that can be replaced after they have been used, so that they will never run out. Wind and solar power are examples of renewable resources.

NON-RENEWABLE RESOURCES: types of resources that can not be replaced after they have been used. Fossil fuels are non-renewable resources.

POWER RESOURCES

TASK: Sort the resources into renewable and non-renewable



Wind



Nuclear



Waste



Wave



Fossil fuels
(oil, coal, gas)

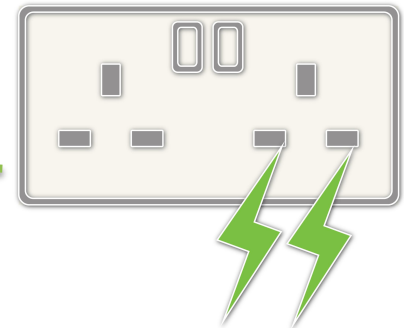
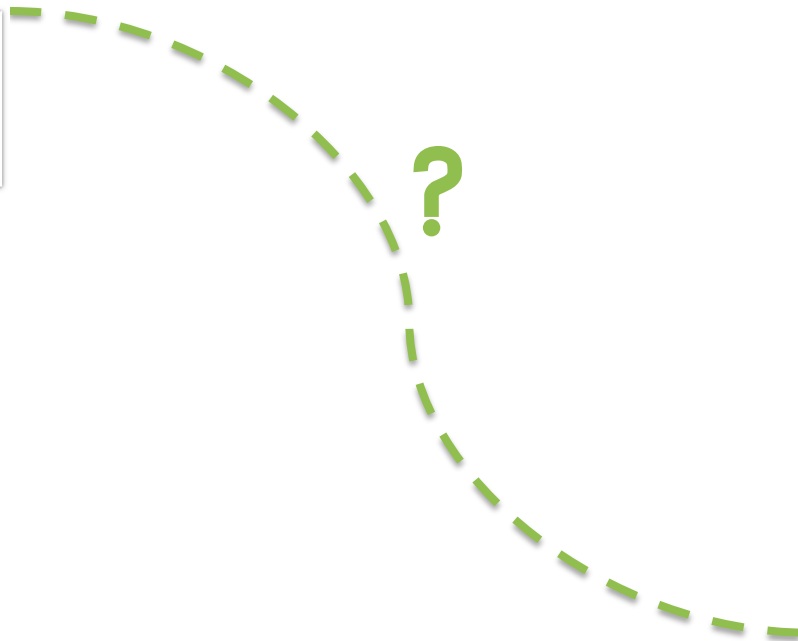


Solar



Wood

HOW DO WE GET ELECTRICITY TO WHERE WE NEED IT?



WHAT AFFECTS ACCESS TO RELIABLE ELECTRICITY?

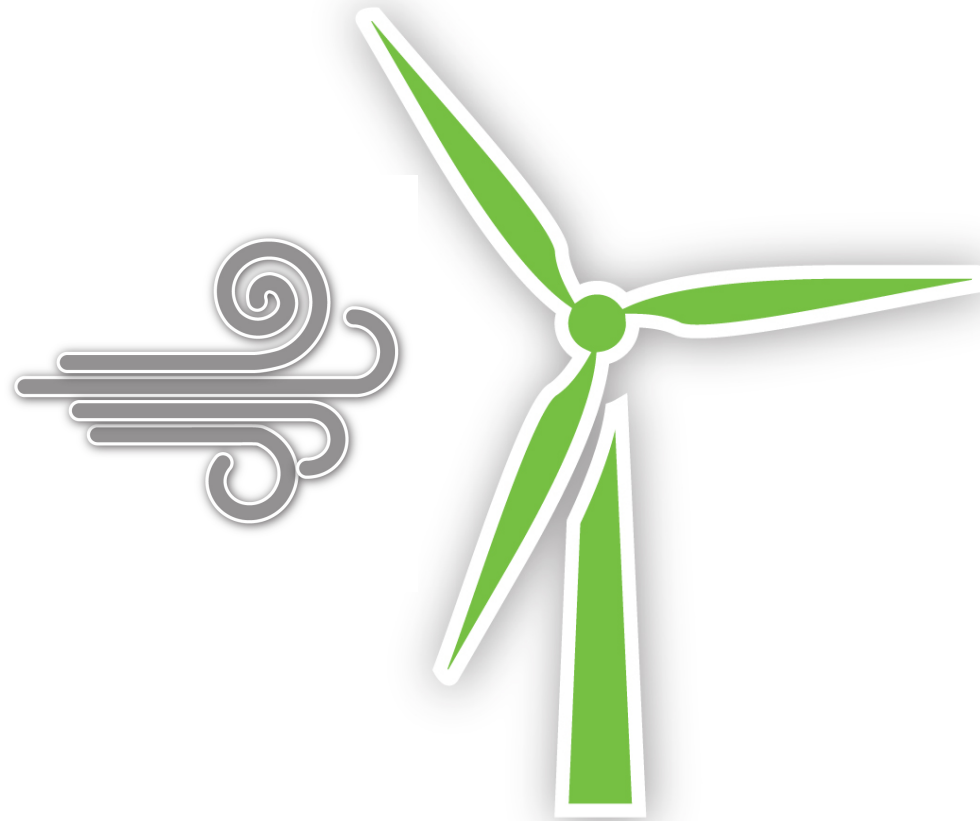
WHAT AFFECTS ACCESS TO RELIABLE ELECTRICITY?

- **Location** - distance and difficulty to connect
- **Money** - available money, materials and skills
- **Reliability** - electricity distribution system and amount of electricity available

WIMBE, MALAWI



HOW A WIND TURBINE WORKS



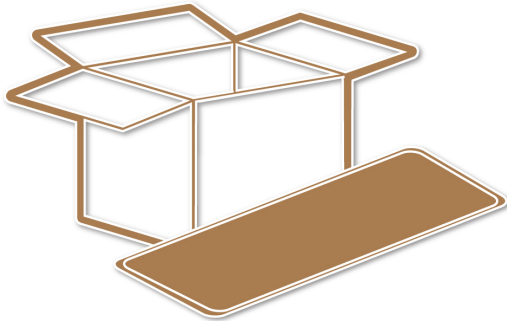
BUILDING A WIND TURBINE

TASK:

1. Produce a labeled design sketch for your turbine blades.
2. Build your turbine.
3. Test and evaluate your turbine's performance.



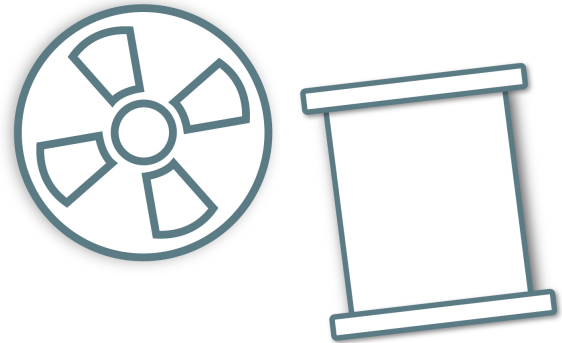
BUILDING A WIND TURBINE



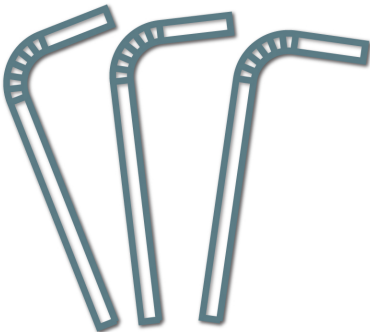
Cardboard



Card



Cotton Reel



Straws

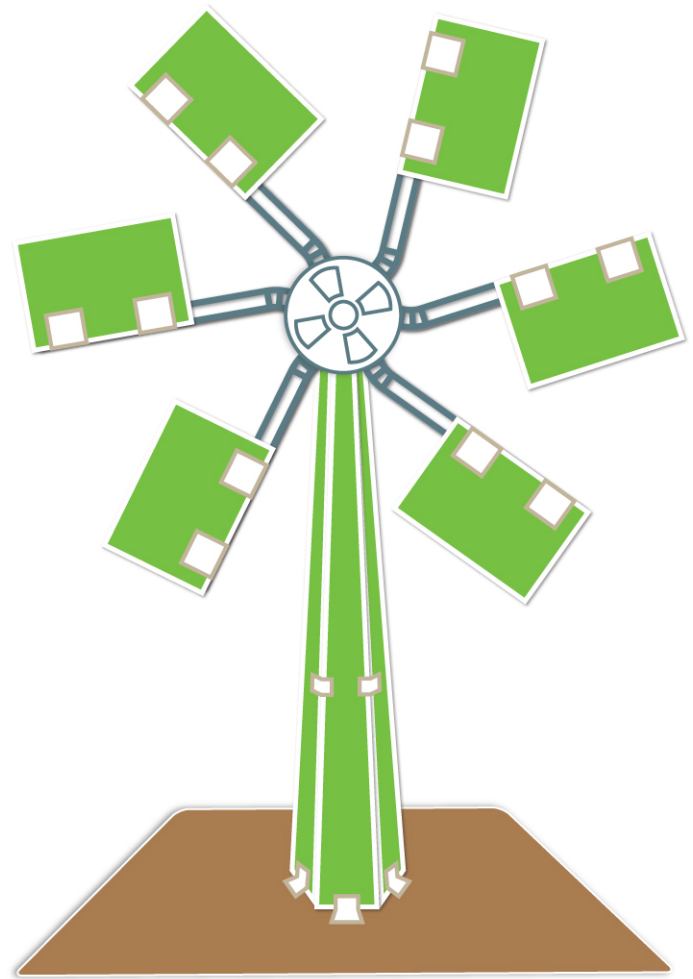


Scissors



Sticky tape

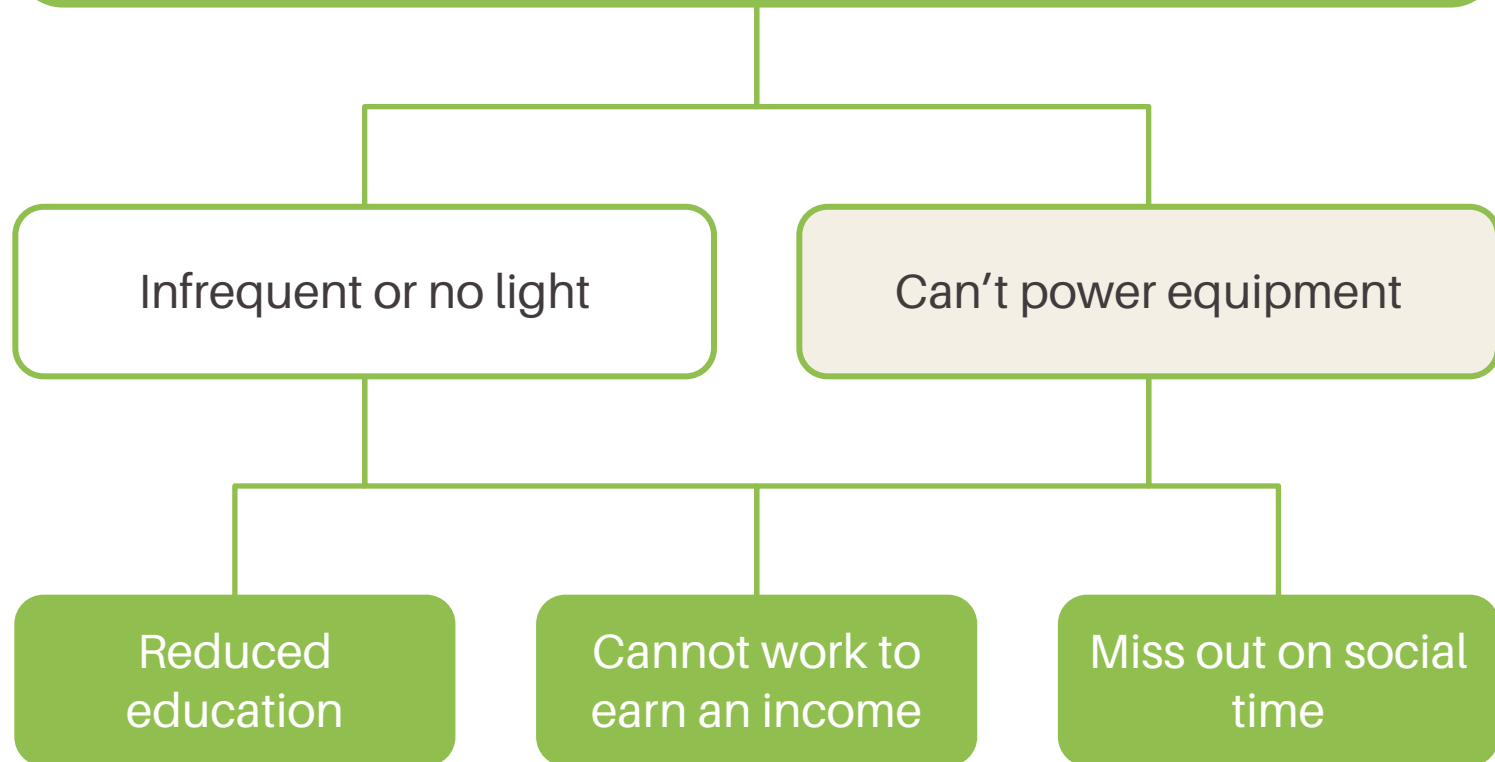
LET'S TEST THEM!



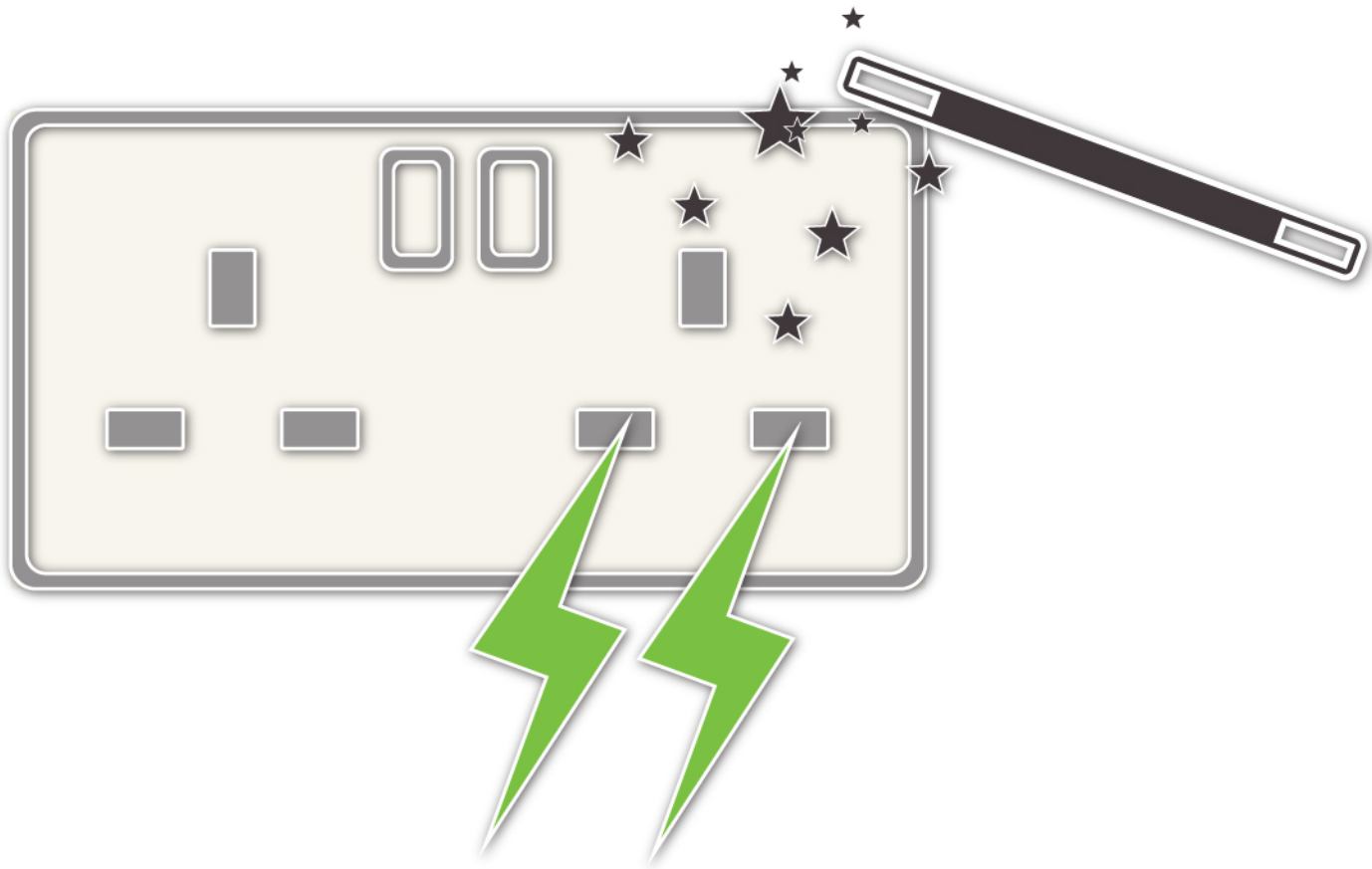
WHAT AFFECTS THE TURBINE'S PERFORMANCE?

- Materials used and turbine strength
- Shape, size and angle of the blades
- Whether the hole in the cotton reel is blocked

ELECTRICITY SUPPLY CUT OFF OR UNRELIABLE



**HOW DOES EVERYONE
EVERYWHERE GET ACCESS TO
ELECTRICITY?**



WHAT YOU CAN DO



BECOME AN ENGINEER!

WHAT HAVE WE LEARNED?

Learning objectives:

- Understand the importance of electricity and that access to it is not equal
- Describe the role of an engineer in bringing about access to electricity
- Consider the challenges engineers face to give people around the world access to electricity
- Design your own model turbine



THANK YOU!

www.ewb-uk.org



Mathematics

What we did today

Science

Technology

QUESTIONS?

University

Engineering

Engineers Without Borders UK

NOTES ABOUT THESE SLIDES [NOT FOR PRESENTATION]

The session is designed for a standard school class of approximately 30 pupils with the class divided into groups of two to six pupils for the build activity. However, the content can be easily modified to suit smaller or larger groups. Please contact us for guidance on this.

This particular resource is suitable for upper KS2 (9-11 years of age, Years 5-6). There are separate resources suitable for KS3-4 (11-16 years of age, Years 7-11) on the Engineers Without Borders UK website.

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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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