

**Get drawing!** Create a cartoon character of your own, or maybe invent a machine that creates energy in an unusual way!



- P.10 Anagrams
  - A. Wind Turbine
  - B. Hydro
  - C. Wave Power
  - D. Solar
- P.11 Electrical Items
  - Welders' Helmet
  - Goggles
  - Gloves
  - Facemask
  - Boots
  - Safety Helmet
  - Ear Defenders
- P.13 Tools of the Trade PPE
  - Welders' Helmet
  - Goggles
  - Gloves
  - Facemask
  - Boots
  - Safety Helmet
  - Ear Defenders
- P.14 3 Creatures
  - A. Tern
  - B. Mackerel
  - C. Gannet
- P.15 Spot Steinar
  - A. Tern
  - B. Mackerel
  - C. Gannet
- P.17 Wordsearch
  - Longship
  - Jigsaw Piece
  - C
- P.18 Environment Quiz
  - Q1 - B
  - Q2 - C
  - Q3 - C
  - Q4 - A
  - Q5 - A



**Answers**

- P.1 Countries
  - A. Norway
  - B. Iceland
  - C. Netherlands
  - D. Denmark
  - E. Great Britain
  - London
- P.2 Circuits
  - 1. No
  - 2. Yes
  - 3. Yes
  - 4. No
  - 5. Yes
- P.3 Tangled Wires
  - Lottie - Green
  - Spark - Yellow
  - Steinar - Blue
- P.4 Matching Pair
  - F & N
- P.5 Crossword
  - Across: WATT, ELECTRICITY, LINK
  - Down: HIT, RISK, C

NorthSeaLink

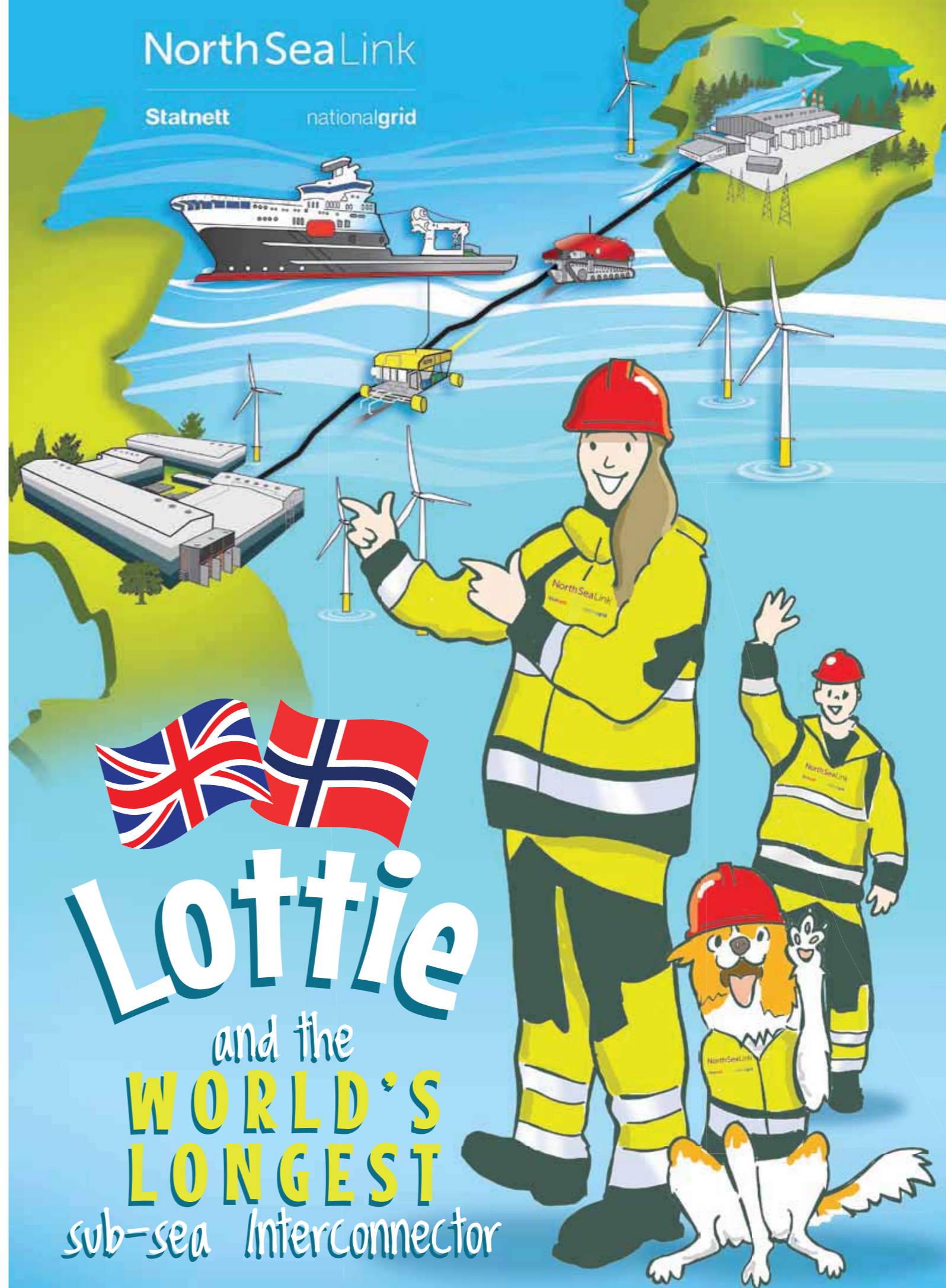
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NorthSeaLink

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**Lottie**  
and the  
**WORLD'S LONGEST**  
sub-sea Interconnector

# Hello!

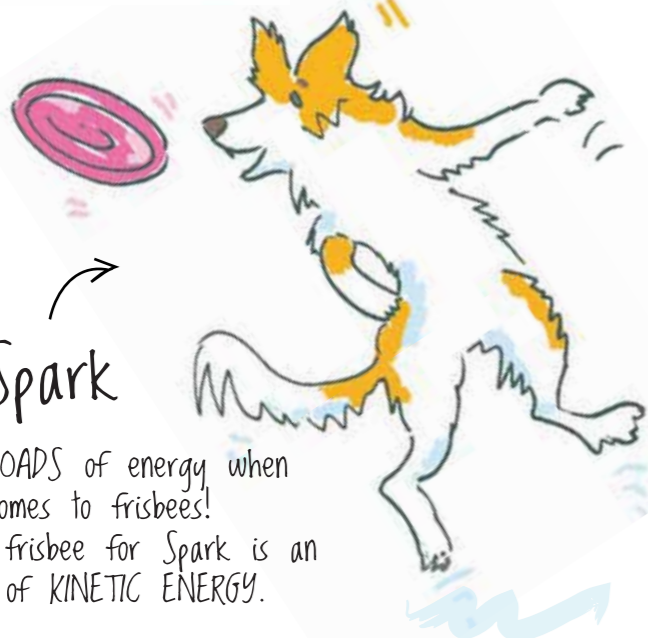


I'm Lottie!

**STEM** Do you know what **STEM** stands for? Lottie does! Let me explain. Lottie lives in The North East of England and when she was young, she was a pupil at Cambois Primary School in Northumberland.



Lottie loved school! She particularly enjoyed science, she was also good at maths and was interested in anything to do with technology. Her teacher, Mrs Allen, recognised all this and, as she did with all her pupils, she encouraged Lottie's enthusiasm for all things **STEM**. There's that word again ... **STEM**. So now can you guess what **STEM** stands for? The answer is:



Spark

He has LOADS of energy when it comes to frisbees!

Throwing a frisbee for Spark is an example of **KINETIC ENERGY**.

**S** for **Science**  
**T** for **Technology**  
**E** for **Engineering**  
**M** for **Mathematics**

## The Energy Education Centre

Mrs Allen encouraged her pupils to learn all about great engineers.

"Engineers," she said "aren't just people who fix cars. They help build ships, bridges, tall buildings, develop computers, generate electricity and lots of other things that are so important to us all." Listening to Mrs Allen, Lottie decided at a very early age that she wanted to become an engineer. A lesson that always stood out for her was when Mrs Allen provided lots of batteries, wires, switches, lamps, motors and buzzers. Lottie and her friends loved experimenting and investigating; discovering how circuits worked and how they could be controlled. We will look more at circuits on page 2.



Lottie learnt even more about electricity when Mrs Allen organised a visit to the The North Sea Link (NSL) Education Centre. The Education Centre told the story of electricity, renewable energy and a greener future. It had lots of activities and explained how the interconnector helped to transport renewable energy to and from a country called Norway.

Lottie told her Dad all about this on one of their many walks on their local beach.



Lottie's Dad explained that Norway was across the sea and that it is famous for its fjords with steep cliffs that are like giant lakes, created millions of years ago by glaciers.

They researched this back at home and discovered that in Norway, they generate electricity using hydro-electric power and that some of this power is used in the UK thanks to the sub-sea interconnector link she had learnt about at The Education Centre.

Below are five countries that have coastlines on the North Sea. Name the countries (the anagrams will give you some clues) and then write the capital city of each country underneath that.

A. WONYAR



B. DEANCIL



C. STERDNLHEN



D. KRADMEN



E. TERAG NARITB



\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

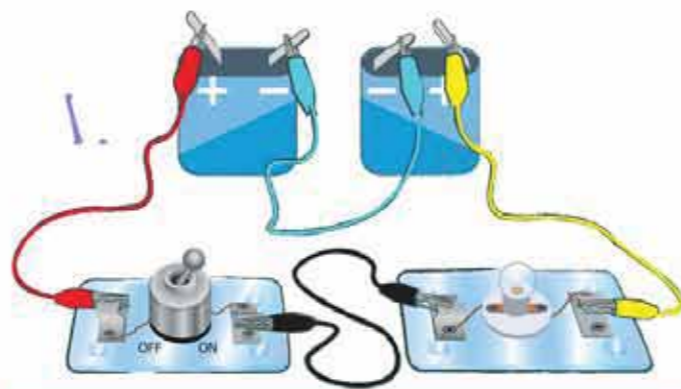
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# Circuits

There was so much to learn about at The Energy Education Centre.

The class made lots of circuits using batteries, wires, lamps, motors, buzzers and switches.

Look closely at these examples and tick Yes or No depending whether you think they'll work. Also write down reasons for your answers.



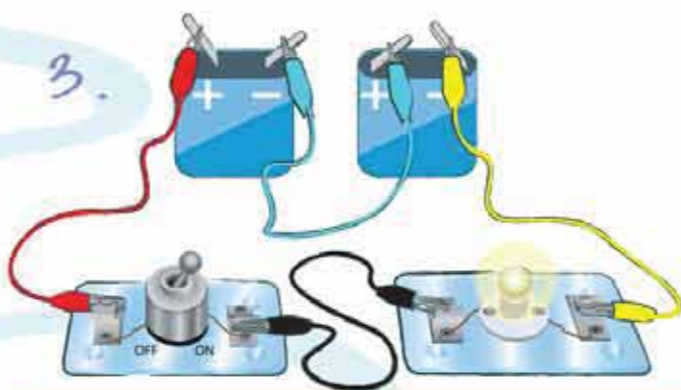
Will this circuit work? Yes  No   
If not, why?

.....  
.....



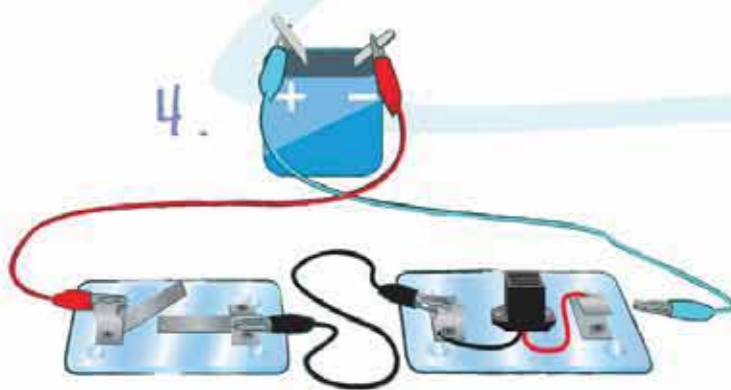
Will this circuit work when it is switched on? Yes  No

.....  
.....



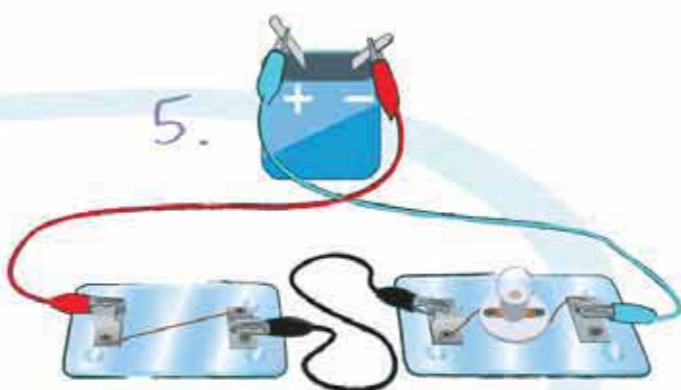
Will this circuit work? Yes  No   
If not, why?

.....  
.....



Will this circuit work when it is switched on? Yes  No

.....  
.....



Will this circuit work when it is switched on? Yes  No

.....  
.....

# PUZZLES!

Lottie found her old racing car track in the attic. This is a really good example of an electric circuit.

Which colour car is each of the friends below driving?

Lottie .....  
Spark .....  
Steinar .....

Only two of these batteries are identical. Name the matching pair. .... & .....



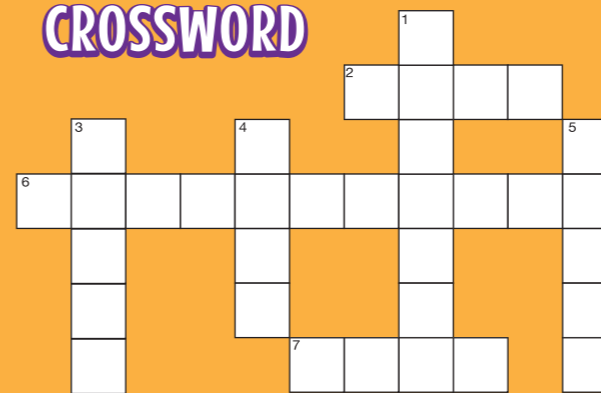
## FUN FACT!

Did you know that electric cars date back to 1832 when Robert Anderson developed the first electric vehicle?  
A man ahead of his time!

## REMEMBER!

**NEVER PLAY WITH MAINS ELECTRICITY**  
**NEVER PUT CELLS OR BATTERIES IN YOUR MOUTH**

## CROSSWORD



### ACROSS

- 2. North Sea L... (4)
- 6. This is generated by hydro and wind power (11)
- 7. Unit of power, one joule (4)

### DOWN

- 1. Complete electrical link (7)
- 3. English Town where the interconnector starts (5)
- 4. The initial letters (acronym) for \_cience \_echnology \_ngineering \_athematics (4)
- 5. The type of power generated in Norway (5)

# Lottie's apprenticeship

Lottie was determined to become an engineer.

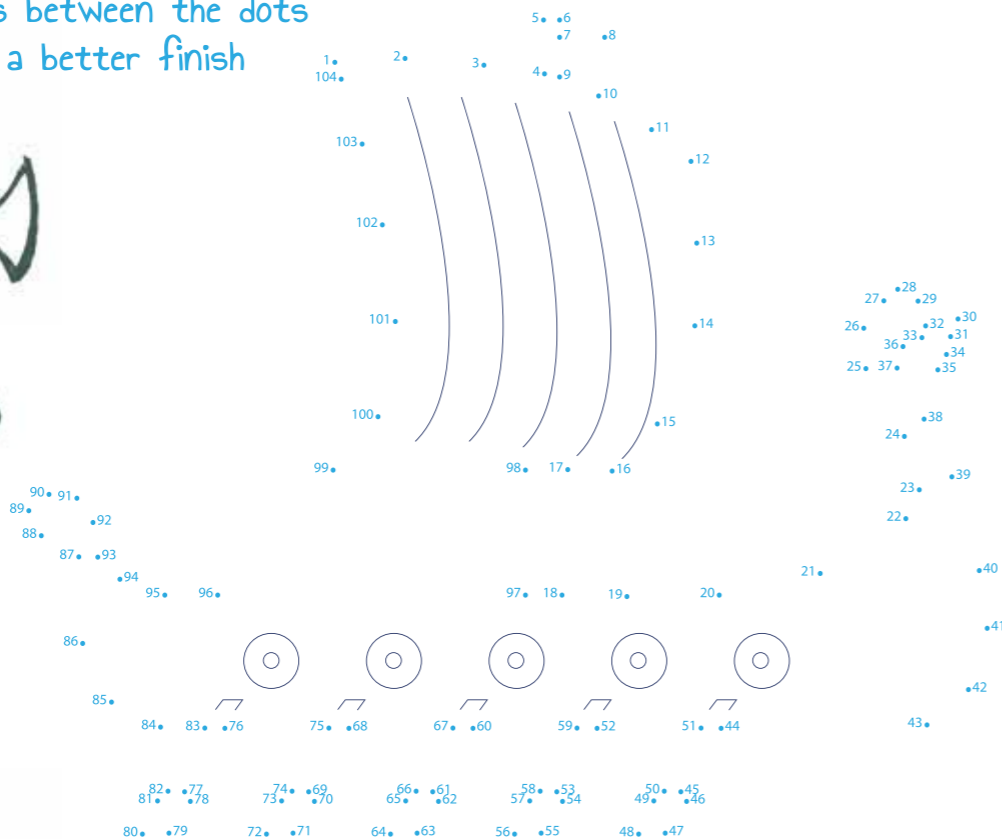
When she was a little older her dream came true when she became an apprentice working on the link between the UK and Norway known as - **The North Sea Link (NSL).**

Lottie was so excited about her apprenticeship and all the opportunities it presented. She was thrilled to be involved in The North Sea Link (NSL), which she soon learnt was to be the **world's longest sub-sea interconnector** connecting the UK and Norway. She was really keen to learn more about Norway.

Early seafarers from Norway included the Vikings. Colour this character in and find out what is behind him in the dot-to-dot.










TIP: Draw straight lines between the dots for a better finish



## Norwegian facts

Here are some

-  Norway is part of Scandinavia. Scandinavia is a region in Northern Europe that includes Norway, Denmark and Sweden.
-  The capital of Norway is Oslo.
-  The currency (money) in Norway is the Norwegian Krone.
-  Norway boasts the world's longest road tunnel which is an astonishing 24.5 km long.
-  Despite a population of little more than 5 million, Norway has won more Winter Olympic medals than any other country.
-  Over 90% of Norway's electricity used in homes comes from hydroelectric power plants.
-  Vikings travelled to and populated parts of Northern England. York was the "capital" of Viking territory, and the Vikings named it Jorvik. Maybe because they found it difficult to pronounce the old English / Saxon name Eoforwic?

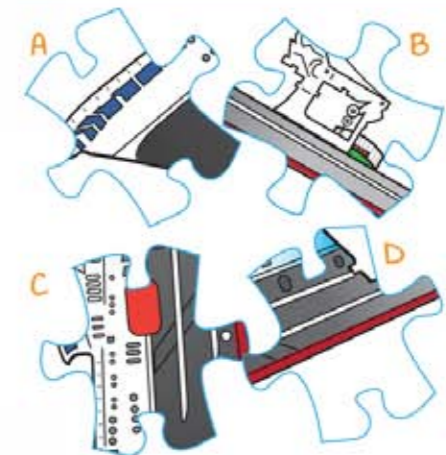
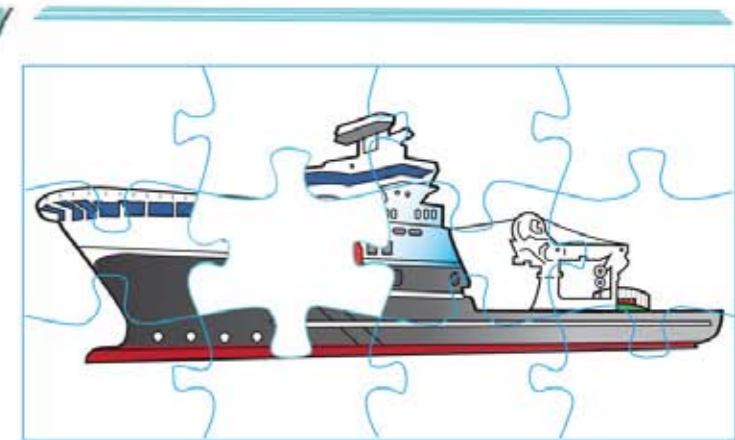
One of the things that Lottie most enjoyed about her work on The North Sea Link (NSL) was meeting other interesting people involved in the project. Early on she worked with Steinar. Steinar came from Trondheim in Norway and, after going to university, he qualified as an engineer. Like Lottie, he loves his work. He works on the boat that lays cables across the North Sea from Norway to the UK. The total length of the cable is an amazing **720 km**. This incredible feat of engineering makes the cable the **longest sub-sea cable of its type in the world**. The vessel that Steinar works on is truly amazing. It has the equipment to lay the cable, that imports and exports natural resources that are then converted to electricity at a converter station. The cable has to be very strong as it's going to last for more than 40 years.

Steinar, and all the engineers on board the vessel are kept very busy. However, they do find some time to keep an eye out for the amazing sights they see as they cross The North Sea. They have spotted everything from huge flocks of seabirds to seals. Steinar has learnt a lot about marine wildlife from his trips on the boat laying the cable. He has discovered that The North Sea supports over **230 different species of fish**. Some of these fish provide food for the seals, dolphins and seabirds that can be seen from Steinar's vessel.



- she likes a good dig too!

Steinar



Which is the missing piece of the jigsaw above?

# Steinar the engineer

Steinar is an Engineer like Lottie. He too was inspired when he was a pupil at his school in Kvilldal, Norway, and was particularly impressed by his country's generation of green energy. This type of energy has less of an impact on the environment, something Steinar is passionate about. He went on to study engineering at university, and now sees it as a great career. He too is involved in The North Sea Link (NSL).



The interconnector links Norway and the UK and is currently the longest sub-sea Interconnector in the world. Steinar and other engineers have helped lay the cables on the seabed between the two countries.

The result is that the U.K. and Norway can now import and export electricity generated by natural resources - wind and water.

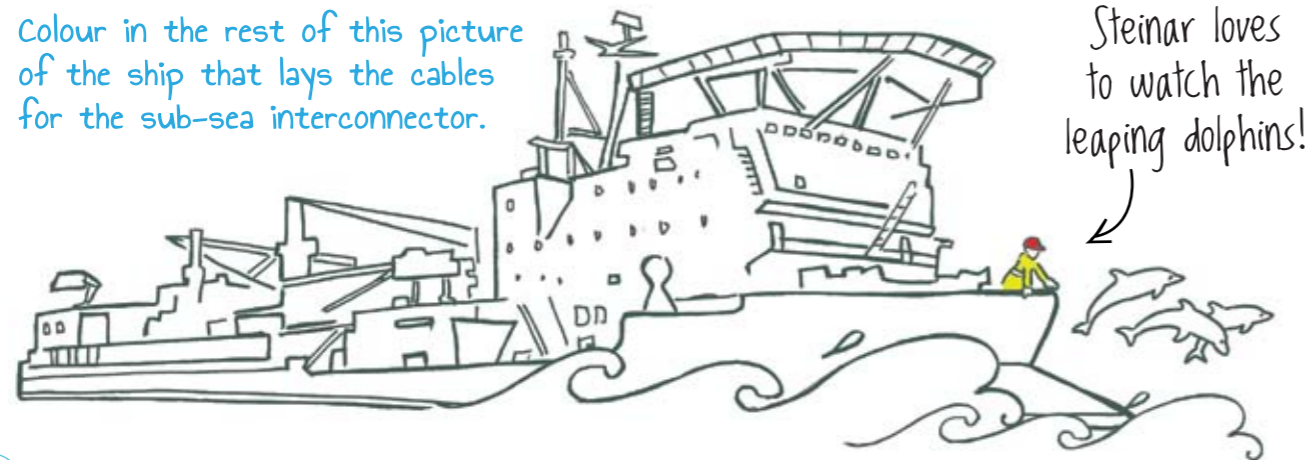
The cable runs from Kvilldal in Rogaland in the southwest of Norway and joins the UK at Cambois near Blyth.



Hydropower or hydroelectric power uses fast running water to produce electricity. Norway produces lots of electricity from these sources. Lakes and waterways flowing down from mountain tops, combined with waterfalls down to fjords and rivers, are what we use for energy production.

The UK has an increasing capacity for producing electricity from wind power. Like hydropower, wind power is a renewable energy.

Colour in the rest of this picture of the ship that lays the cables for the sub-sea interconnector.



Steinar loves to watch the leaping dolphins!

The North Sea Link (NSL) gives Norway and the UK the opportunity to work together to share their green energy.

The environment will be less affected by the production of electricity, something Steinar is very happy about.

When Steinar worked on the vessel laying the cables he kept notes of some of the amazing marine creatures he encountered in The North Sea.

These included, porpoise, dolphins and whales.

Do some research to find the different species of porpoise, dolphins and whales that can be found in The North Sea.

The North Sea and its shores is a fantastic place to spot all kinds of wildlife, from sea birds to lots of marine animals. See if you can find the following creatures in the wordsearch below.

## Wordsearch

COD HADDOCK WHITING PLAICE SOLE MACKEREL  
GANNET GUILLEMOT GULL ALBATROSS TERN SKUA

C	O	D	H	H	X	C	B	U	Z
N	V	H	G	A	N	N	E	T	C
M	F	R	Y	D	M	S	W	Q	U
A	I	T	F	D	A	R	J	G	S
C	L	E	V	O	K	E	R	X	W
K	G	R	Q	C	D	W	P	N	X
E	Z	N	S	K	U	A	L	S	R
R	N	V	B	H	L	M	A	J	O
E	R	O	W	H	I	T	I	N	G
L	F	G	R	O	Q	U	C	L	M
F	G	B	H	S	O	L	E	K	L
G	U	I	L	L	E	M	O	T	G
F	L	G	V	Y	I	Q	Z	F	M
A	L	B	A	T	R	O	S	S	V

Name three of the creatures below from the Wordsearch.



## Spot Steinar!

Can you spot Steinar amongst his colleagues at the Hydro Power Station?



# Marine Environment

Evan works for The Local Council.

He has a great knowledge of the area around Cambois and Blyth including the dunes, beach, estuary and sea. He spends much of his time walking on the beach and in the dunes. He does this for pleasure and as part of his job. His mission is to keep the environment clean and safe for all of the plants and animals that live there. He believes in working with partners for the best outcomes for the environment. Evan is passionately enthusiastic about education and knows that you never stop learning about supporting the environment. Lottie met Evan through work and she has learnt lots from him.

Evan particularly loves the dunes near Cambois, and knows that they provide a variety of habitats for different animals and plants. A habitat is the natural home of an animal or plant.

Many coastal areas of the UK are populated by dunes and support a variety of species. Evan has discussed the formation and conservation of dunes with Lottie. In particular they have looked at the importance of marram grass.

Marram grass helps anchor the dunes. Remember dunes are made of sand that can easily blow away. Marram grass needs very little water and nutrients so it can grow well in sand. It has long, strong roots that help hold or anchor the sand together. This helps build up the dunes and reduces erosion. This in turn creates an excellent habitat.



# Environment QUIZ

Test your knowledge of the environment by ticking the answers below

- Q1. Where would you find Cambois?  
 A.  On The South Sea coast  
 B.  On The North Sea coast  
 C.  On The West Sea coast
- Q2. Approximately what percent of the Earth's surface is water covered?  
 A.  25%  
 B.  50%  
 C.  70%
- Q3. What do you call the grass with long roots that helps anchor dunes?  
 A.  Bermuda  
 B.  Pampas  
 C.  Marram
- Q4. Why are dunes particularly important for the environment?  
 A.  They provide habitats for animals and plants.  
 B.  They attract tourists.  
 C.  They are a good place to shelter from the rain.
- Q5. Name the rare species of newt.  
 A.  The Great Crested Newt  
 B.  The Big Crested Newt  
 C.  The Double Crested Newt

## FUN FACT!

Did you know? The sea area near the route of the interconnector is called Dogger Bank. Around 8,000 years ago, it was dry land, and home to humans and animals including the woolly rhinoceros and mammoths!



Around Cambois the great variety of habitats provide natural homes for very many different species. These include:

- Badgers Common Toads
- Otters Hedgehogs
- Slow Worms Squirrels
- Great Crested Newts
- Common Lizards Bats

Here are some cartoon characters (including humans) that are often found on or around the beach near Blyth. As you can see we have given the characters names.



On a separate piece of paper, choose another creature you may see in the area and create a cartoon character from them. Write a story about them, or create a cartoon strip including some of the characters below.

# Renewables

The U.K. can generate a lot of electricity from **wind power** and Norway from **hydro** (water) power. Lottie and Steinar are equally passionate about this.

You will remember that Steinar felt very happy about the interconnector between Norway and the U.K. that allows the two countries to share **green energy**.



Lottie learnt that renewables are natural resources that are always going to be there - they are sustainable.

- Renewable energy won't run out.
- Renewable energy can save money.
- Renewable energy is better for the environment.

On a separate piece of paper, can you write down some of your opinions about why renewables are important?

However, renewables may not always be available. Wind turbines won't work when the wind isn't blowing! So, The North Sea Link (NSL) will help Norway and the UK work together to support an even better use of **renewables**.



Using the anagrams, work out the examples of renewable energy below.



A. DIWN RENIBUT



B. RYHOD



C. VEWA WEPOR



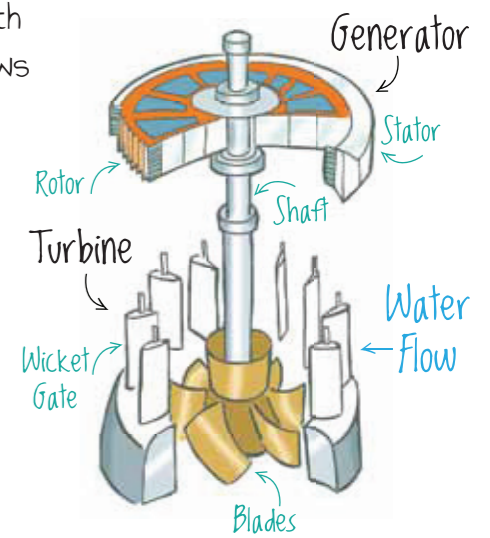
D. LAROS

Steinar loves the mountains, rivers, waterfalls and fjords that are all wonderful features of Norway.

Inland lakes are used where the height difference produces waterfall power. This power produces hydroelectricity which is clean energy for the country. The clean energy can then be shared by The North Sea Link (NSL) with the UK and, when conditions are right, allows the UK to share energy created by its many wind-turbines.



Steinar and Lilje love to canoe on the lakes. Steinar's paddling is a form of energy called **kinetic energy**.



Norway produces large amounts of **hydroelectricity** which The North Sea Link (NSL) can share with the UK. However, when the wind blows in UK we can also export some of the electricity produced by **wind turbines** in the UK to Norway. **Wind turbines** also drive generators that are making an increasing amount of electricity in the UK.

The North Sea Link (NSL) is allowing two countries to share electricity that is produced from two important renewables - **water** and **wind**. This electricity powers many of the things we take for granted.

How many items use forms of electricity?

On a piece of paper using the picture of Lottie (below) name as many items as you can.



Remember to always switch off electrical items when they are not in use.

Leaving unused items on standby wastes a massive amount of energy in your household each year.

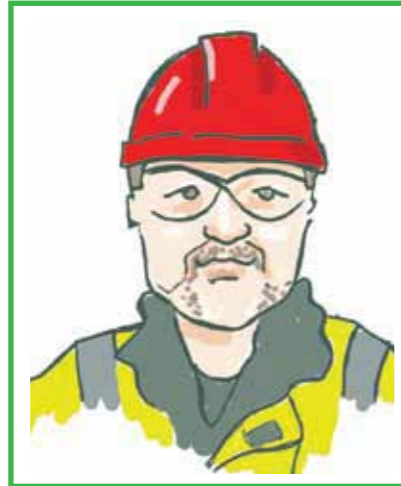
# Meet some of the Team!

Below are just a few of the many people who work on The North Sea Link (NSL).

What sort of job would you like to do if you were working for The North Sea Link (NSL)? Draw a picture of yourself in your role in the box on the right. Don't forget to consider what you would have to wear for the job you choose!



Hi, my name is Sally.  
I am the Stakeholder Engagement and Communications Manager for The North Sea Link (NSL). This gives me lots of opportunities to tell the public about our amazing project. One of the most exciting things I have done is helping develop an Education Centre near Cambois. We hope that The Education Centre will inspire our future engineers.



Hi, my name is Mike.  
I am the Site Manager for The North Sea Link (NSL) in the UK. I have a great team of engineers working with me. Together, we manage all the operations on the site to make sure the project is running smoothly. We also carry out inspections to make sure that the site is safe, and working at its best.



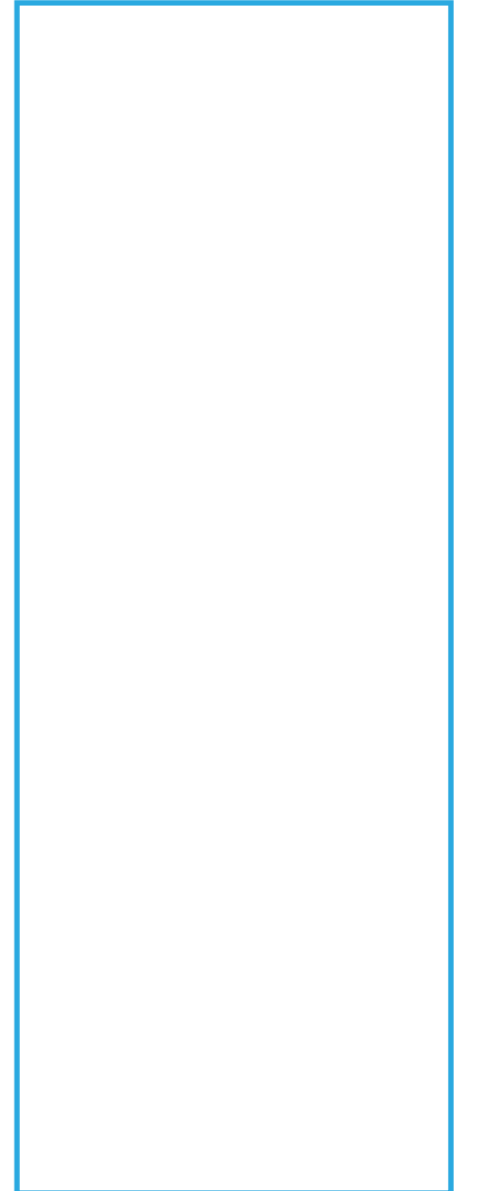
Hi, my name is Hilde.  
I am a Project Manager for The North Sea Link (NSL). I have a great team of people working with project controls, coordination, planning, reporting and communication which ensures the project is finished as planned and we have control on how much money we spend. I am so proud of the team working together to find good solutions for a greener energy production.



Hi, my name is Nigel.  
I am the Project Director of The North Sea Link (NSL). I have the best job in the world because we have lots of fun together building something really important for our country that will last for 40 years or more. I will take my kids to Blyth to show them what we have done and explain to them how it works. The best part for me was travelling to Norway, meeting lovely people and seeing how beautiful it was.



Hi, my name is Caroline.  
I am a Project Controls Manager. I monitor money and timescales so we can deliver things on budget and on time. It is so exciting working on The North Sea Link (NSL), installing cables at the bottom of the sea and it is all so we can share green energy between the UK and Norway.



## Tools of the trade!

Opposite are some items you may need for your job. Look at the list below and tick them off, colouring them in as you go.

Put a ring around the 8 items of PPE (Personal Protection Equipment) that are worn to keep people safe.

- |                                     |   |   |  |  |
|-------------------------------------|---|---|--|--|
| <input type="checkbox"/> SAW        | <input type="checkbox"/> FACE MASK      | <input type="checkbox"/> MOBILE PHONE     | <input type="checkbox"/> HAMMER          | <input type="checkbox"/> WALKIE-TALKIE |
| <input type="checkbox"/> NOTEBOOK   | <input type="checkbox"/> BINOCULARS     | <input type="checkbox"/> SPADE            | <input type="checkbox"/> COMPUTER        | <input type="checkbox"/> SAFETY HELMET |
| <input type="checkbox"/> GLOVES     | <input type="checkbox"/> PENCIL         | <input type="checkbox"/> DIVER'S FLIPPERS | <input type="checkbox"/> WELDER'S HELMET | <input type="checkbox"/> SET SQUARE    |
| <input type="checkbox"/> DRILL      | <input type="checkbox"/> LIFE PRESERVER | <input type="checkbox"/> LAPTOP           | <input type="checkbox"/> SPANNER         | <input type="checkbox"/> EAR DEFENDERS |
| <input type="checkbox"/> BOOTS      | <input type="checkbox"/> SCREWDRIVER    | <input type="checkbox"/> GOGGLES          | <input type="checkbox"/> THEODOLITE      | <input type="checkbox"/> TORCH         |
| <input type="checkbox"/> CALCULATOR | <input type="checkbox"/> HIGH VIS VEST  | <input type="checkbox"/> TAPE MEASURE     | <input type="checkbox"/> OXYGEN TANK     |  |