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THE DECLINE OF OIL RESERVES IN THE NORTH SEA

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World Geography Academy – Session I

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University of Oklahoma, Norman

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THE DECLINE OF OIL RESERVES IN THE NORTH SEA

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Grade Level: 7th

Purpose/Overview:

Norway's once vast oil reserves in the North Sea are dwindling, and the government is facing tough choices when planning for the country's economic future. The prospect that oil might one day run out, together with the growing threat from global climate change, means the need for alternative energy sources has never been greater. A key lesson from decades of burning exhaustible fossil fuels is the importance of renewable - or at least less damaging - resources. How will Norway adjust to this threat?

National Geography Standards from *Geography for Life, Second Edition*

Geographic Elements & Standards:

Human Systems –

11: The patterns and networks of economic interdependence on earth's surface

Environment and Society –

16: The changes that occur in the meaning, use, distribution, and importance of resources

The Uses of Geography

18: How to apply geography to interpret the present and plan for the future

Oklahoma C³ Standards:

Grade 7 World Geography: Eastern Hemisphere

Literacy Skills Standard 1: The student will develop and demonstrate Common Core Social Studies reading literacy skills.

A.1. Cite specific textual evidence to support analysis of primary and secondary sources.

A.2. Determine the central ideas or information of a primary or secondary source; provide an accurate summary of the source distinct from prior knowledge or opinions.

Literacy Skills Standard 2: The student will develop and demonstrate Common Core Social Studies writing literacy skills.

A. Text Types and Purposes

2. Write informative/explanatory texts, including the narration of historic events, scientific procedures/ experiments, or technical processes.

B. Production and Distribution of Writing

4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

Content Standard 5: The student will analyze the interactions of humans and their environment in the Eastern Hemisphere.

1. Cite specific textual and visual evidence to describe the relationship between the distribution of major renewable and nonrenewable resources and evaluate how the three levels of economic activities (primary, secondary, and tertiary) contribute to the development of a country or region including the

D. Value of North Sea petroleum reserves to developed nations' economies.

Materials:

Handouts 1 and 2

KWL charts

Procedures:

1. Give students a copy of Handout 1. Ask students to identify where most of the world's oil reserves can be found. Discuss why it might matter where oil is located.

Discuss why developed nations might want to find oil in their own region rather than rely on oil from other places, in particular the Middle East.

2. Give students copies of Handout 2. Instruct students to make a "KWL" chart. (See below). Ask students to write down what they know about the world's oil supply in the "K" section of the chart. Discuss their answers. Ask them to answer the question, "What do you want to know about the world's oil supply?" by writing questions in the "W" section of the chart.

K What I know	W What I want to know	L What I learned

(There is a full explanation of KWL at the end of the lesson).

1. Tell students that the class will read the article (Handout 2) orally. As they are reading they should underline words that they do not understand.
2. Read the article.
3. After some time for class discussion tell students to write what they have learned in the "L" section of their chart.

Resources:

Maps, charts and graphs from BBC:

http://news.bbc.co.uk/2/shared/spl/hi/pop_ups/04/world_the_world0s_oil/html/1.stm

http://news.bbc.co.uk/2/shared/spl/hi/pop_ups/04/uk_alternatives_to_oil/html/1.stm

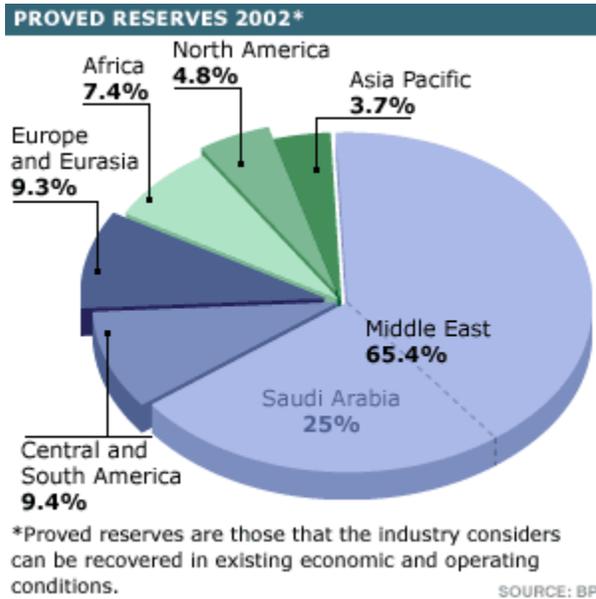
Article: "Norway prepares for dry North Sea"

<http://news.bbc.co.uk/2/hi/business/3622129.stm>

Assessment:

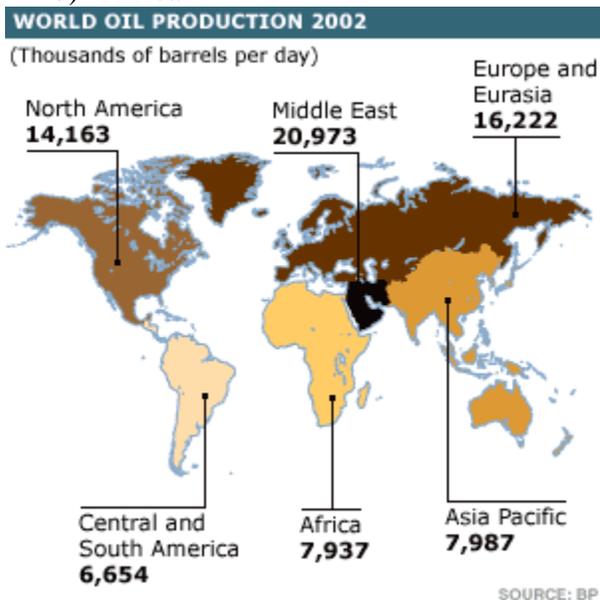
Summative Assessment: Instruct students to write a letter of recommendation to the Norwegian government as to what they should do about the decline in oil reserves in Norway. The recommendation should be based upon the knowledge gleaned from the article and their KWL charts.

Formative Assessment Questions – Interpreting maps and charts:



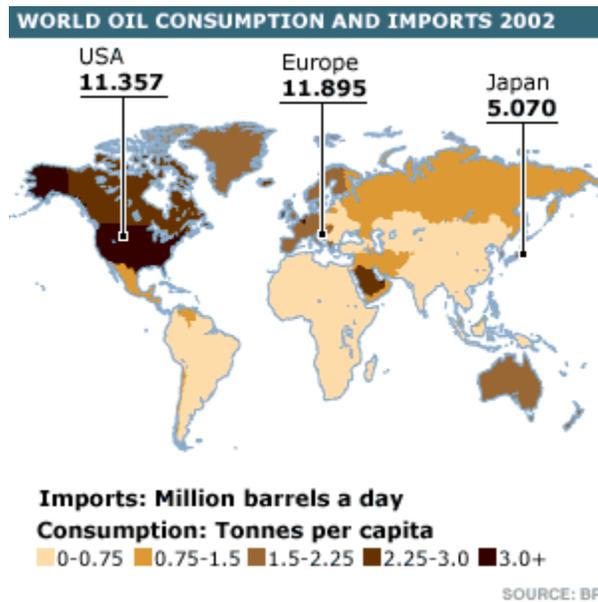
http://news.bbc.co.uk/2/shared/spl/hi/pop_ups/04/world_the_world0s_oil/html/1.stm

1. Which region has the largest percentage of known oil reserves?
 - a) Central and South America
 - b) Europe and Asia
 - c) Middle East*
 - d) Africa



http://news.bbc.co.uk/2/shared/spl/hi/pop_ups/04/world_the_world0s_oil/html/1.stm

2. Which of the following regions is **not** one of the world's major three oil producers?
- a) North America
 - b) Central and South America *
 - c) Middle East
 - d) Europe and Eurasia



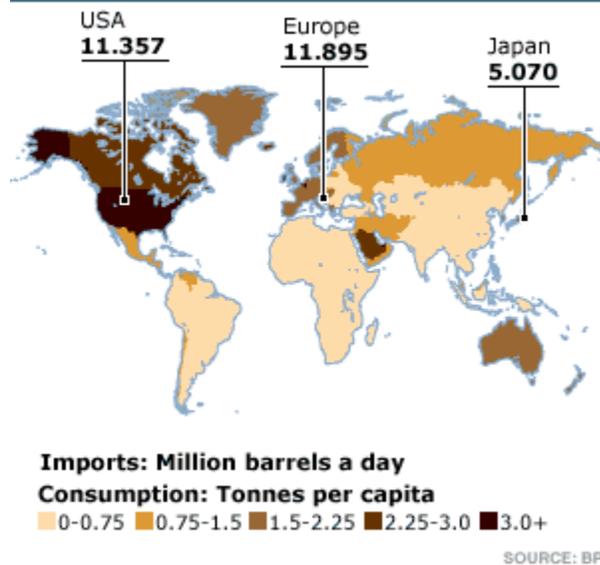
http://news.bbc.co.uk/2/shared/spl/hi/pop_ups/04/world_the_world0s_oil/html/1.stm

Which region consumes the most oil?

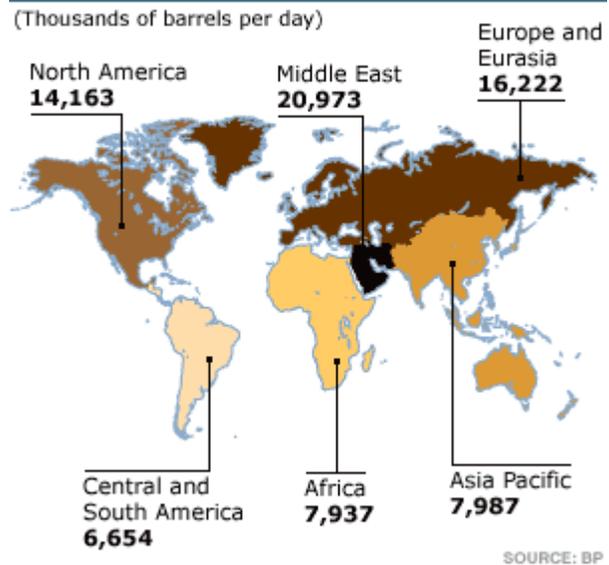
- a) USA *
- b) Europe
- c) Japan
- d) Africa

Use both charts above to answer the following questions

WORLD OIL CONSUMPTION AND IMPORTS 2002



WORLD OIL PRODUCTION 2002



http://news.bbc.co.uk/2/shared/spl/hi/pop_ups/04/world_the_world0s_oil/html/1.stm

Which region is the leading exporter of oil?

- a) North America
- b) Middle East *
- c) Africa
- d) Europe and Eurasia

Which region most likely is the world's leading importer of oil?

- a) North America *
- b) Middle East
- c) Central and South America
- d) Africa

Extension and Enrichment:

Explore alternatives to oil at

http://news.bbc.co.uk/2/shared/spl/hi/pop_ups/04/uk_alternatives_to_oil/html/1.stm

Handout 2

Norway prepares for dry North Sea

By Lars Bevanger In Oslo, Norway

<http://news.bbc.co.uk/2/hi/business/3622129.stm>

Norway's once vast oil reserves in the North Sea are dwindling, and the government is facing tough choices when planning for the country's economic future.

Since oil was discovered on the Norwegian continental shelf in 1971, this small nation has been propelled into the world's third largest oil and gas exporter, and petroleum activities contribute 20% of the gross domestic product (GDP). But now forecasts suggest the country's economic mainstay has started its inevitable decline.

The oil and energy minister, Einar Stensnaes, told BBC News Online it was time to start looking at the alternatives. "Not only is it essential to look for other energy sources. It is also important to look for other industrial activities to develop alongside the petroleum activity," he said.

Estimates say one third of the total petroleum resources on the Norwegian continental shelf are still unexploited. The government works on the assumption there are another 50 years left of oil there. It is not sure, however, that all the resources are exploitable.

New areas, bigger challenges

Norway's biggest potential finds are no longer in the North Sea, where oil companies are well established and have very good resources and knowledge of how to get the oil and gas to the surface.

"The undeveloped areas in the [far north Arctic] Barents Sea are very promising, but more challenging in many ways," said the director general of the Norwegian Petroleum Directorate, Gunnar Berge.

His directorate has advised the government that it must expand the search for oil and gas to the Barents Sea, and late last year the government announced it would allow drilling for oil and gas there.

This provoked fierce criticism from environmental organizations which argued the fragile nature of the Arctic would not withstand any potential oil leaks.

Many here say the oil and energy minister has been caught between a rock and a hard place on this question. "We must secure new acreage, and the most promising areas are in the far north," said Mr Stensnaes. "But this also coincides with the very important fishing areas in Norway, and the population in this area is heavily dependent on fishing."

Drilling in the Arctic is extremely expensive and difficult because of the often fierce weather conditions. And there is also a significant political dilemma still to be resolved. Both



Hydro executive Torvund is searching for alternatives to oil

Norway and Russia are laying claims to an area of the Barents Sea that is bigger than the North Sea and is thought to contain even more oil and gas.

Gas on the up

While Norway's oil production seems to have started its inevitable decline, gas production is on the increase.

Statoil is Norway's largest oil and gas producing company.

Acting chief executive, Erling Oeverland, told BBC News Online the company believes there is enough gas for another 100 years of profitable production. "In five years time, we will be producing as much gas as oil from the Norwegian continental shelf," he said. "After that, gas will be bigger than oil." Norway is already the third largest exporter of gas to the rest of Europe.



Norway's petroleum production is not critical to cover its energy needs

Alternatives

The production of oil and gas is not critical to cover the energy needs of Norway itself.

Most of this country's 4,5 million people are largely served by cheap hydro electric energy. But it is a great worry that the industry most crucial to this country's wealth is terminal. One company looking into future energy alternatives is Hydro, Norway's second largest oil and gas producer.



A third of Norway's petroleum resources remain unexploited

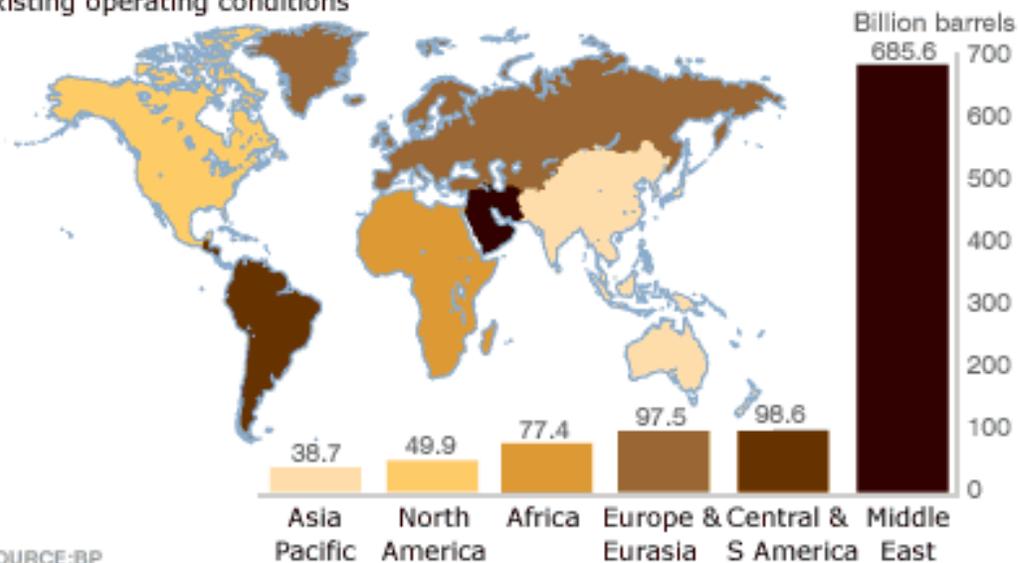
"We're presently making a small scale research project a small Norwegian island where we take the wind, transform it into electricity and then transform that electricity into hydrogen," said executive vice president Tore Torvund.

"When there is no wind, we can produce electricity based on hydrogen." Mr Torvund does not foresee making any profits from alternative energy sources for the next twenty to thirty years.

By then this country's economic mainstay - oil - may well be fast running out.

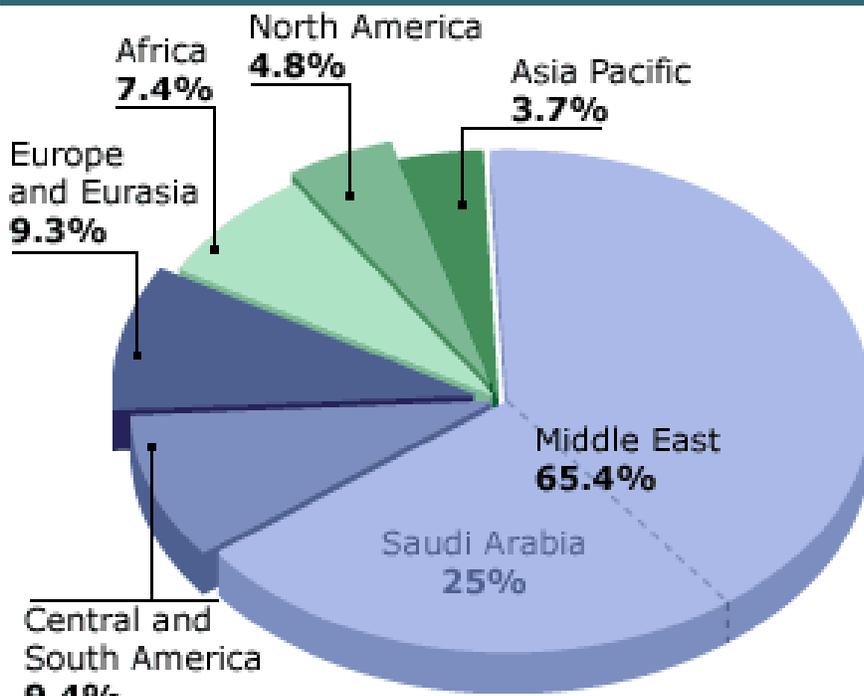
WORLD OIL RESERVES (2002)*

*Reserves that can be recovered economically in existing operating conditions



SOURCE:BP

PROVED RESERVES 2002*



*Proved reserves are those that the industry considers can be recovered in existing economic and operating conditions.

SOURCE: BP

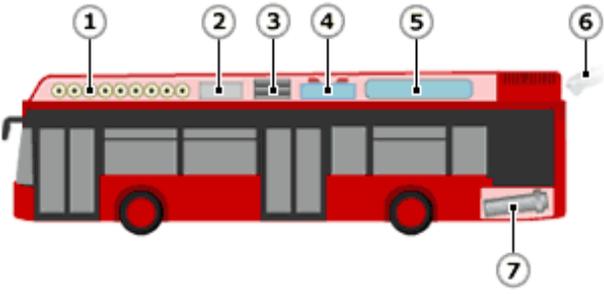
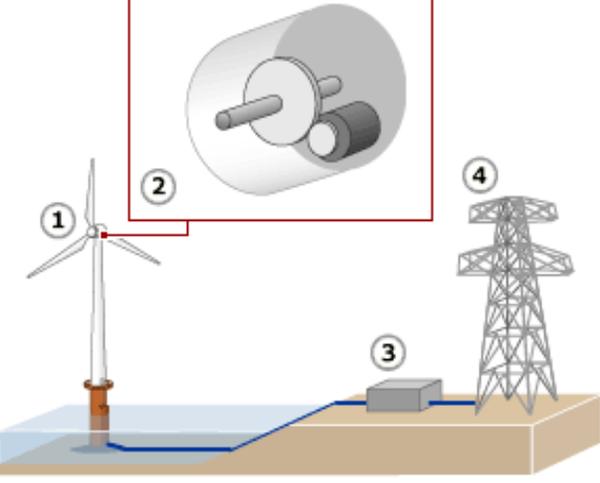
K*W*L

Strategy	Explanation	Accommodations for ELL									
KWL	<p style="text-align: center;">What is it?</p> <p style="text-align: center;">A graphic organizer used to help students predict and connect new information to prior knowledge.</p>	<p>First, model the strategy using guided practice and or partnering with a student with mixed ability who can provide support to the ELL student.</p> <p>Partner with students who have proficient English skills.</p>									
	<p style="text-align: center;">How to use it for instruction</p> <ol style="list-style-type: none"> 1. Create a 3-column chart labeled K (know) W (what I want to know) and L (what I learned) 2. Tell students to brainstorm what they know about the subject. 3. Tell students to list what they want to know about the subject. 4. As they read (or listen to the article being read) they should list what they have learned about the topic. 	<p>Second, model and scaffold the sequential use of the columns and their meanings by using short labels, picture icons, word walls,</p> <p>Accommodate questions for the “w” column to the needs of students. Avoid negative questions.</p>									
	<p style="text-align: center;">What does it look like?</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="width: 33%;">K</th> <th style="width: 33%;">W</th> <th style="width: 33%;">L</th> </tr> <tr> <td>What I know</td> <td>What I want to know</td> <td>What I learned</td> </tr> <tr> <td style="height: 100px;"></td> <td></td> <td></td> </tr> </thead></table>	K	W	L	What I know	What I want to know	What I learned				
K	W	L									
What I know	What I want to know	What I learned									

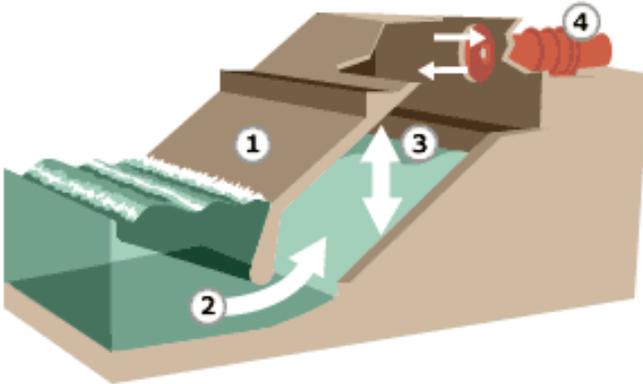
Extension: Alternatives to Oil

http://news.bbc.co.uk/2/shared/spl/hi/pop_ups/04/uk_alternatives_to_oil/html/1.stm

The prospect that oil might one day run out, together with the growing threat from global warming, means the need for alternative energy sources has never been greater. A key lesson from decades of burning exhaustible fossil fuels is the importance of renewable - or at least less damaging - sources.

<p>FUEL-CELL BUS</p>  <ol style="list-style-type: none"> 1. Cylinders hold hydrogen sourced from natural gas 2. Fuel cell supply unit - the cells have a gross power of 250kW 3. Fuel cell stacks 4. Fuel cell cooling units 5. Air conditioning unit 6. Water vapour from exhausts are the buses' only emissions 7. Electric motor, can give a top speed of 80km/h 	<p>Hydrogen</p> <p>It is abundant and clean – water vapor is the only waste product - but needs to be processed for use as fuel.</p> <p>It will need to switch to sustainable sources and be harnessed, stored and distributed economically before it can become the alternative fuel of choice.</p> <p>Some cars already use it and it is currently being tested on some London buses.</p>
 <ol style="list-style-type: none"> 1. Wind causes blades to rotate 2. Shaft turns generator to produce electrical energy 3. Electrical power is converted by a transformer to high-voltage supply 4. Electricity is transmitted via the National Grid 	<p>Wind</p> <p>The exposed UK is ideally placed to take advantage of the world's fastest-growing renewable-energy choice.</p> <p>Modern windmills are environmentally friendly and use an endless – if fluctuating – source.</p> <p>But their noise and obtrusiveness have generated some complaints, and the cost of setting up wind farms remains an obstacle.</p>

WAVE POWER STATION



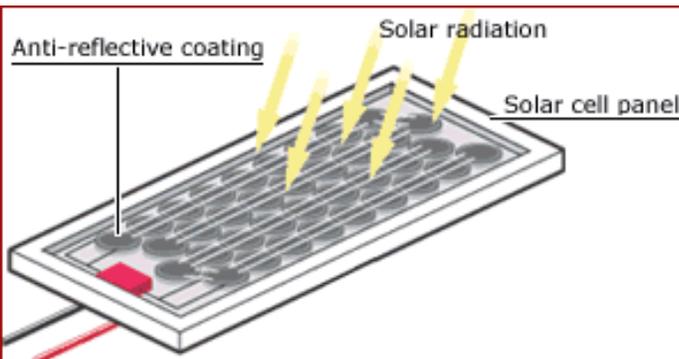
1. Wave capture chamber set into rock face
2. Tidal power forces water into chamber
3. Air alternately compressed and decompressed by "oscillating water column"
4. Rushes of air drive the Wells Turbine, creating power

Water

Hydro-power is safe and pollution-free, but is limited by location and the upheaval it can cause.

Hydro-electric power, where vast amounts of water are stored and then released at force, needs big sites; wave and tidal power need coastlines and can be costly to set up.

The UK's first wave-energy station, connected to the National Grid, is in Islay.



Solar power

It's been around a long time, but it's taken a while to develop an effective way of harnessing the Sun's energy.

Now, though, solar panels are a feature of many homes, generating electricity via photovoltaic cells.

They are now also being tested on sound barriers on the M27 in Hampshire to provide electricity as well as noise protection.