Geophysical Research Abstracts
Vol. 12, EGU2010-7133, 2010
EGU General Assembly 2010

Alternative Energy Lessons in Scotland

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In Scotland the new science curriculum for pupils aged 12 to 15 shall include the following outcomes: "Using my knowledge and understanding, I can express an informed view on a national or global environmental issue;" "I have participated in constructing a model to harness a renewable source of energy and can investigate how to optimise the output;" and "I can discuss why it is important to me and to the future of the world that alternatives to fossil fuels are developed."

There will be an emphasis on creating lessons that will nurture responsible citizens, improve pupil engagement and allow students to develop their team working skills. To help teachers plan lessons to address this, the Scottish Schools Equipment Research Centre and Edinburgh University made teaching materials on four renewable energy resources. This poster describes how their suggested activities on solar cells, wind turbines, hydroelectric power stations and wave power were used in science lessons with twelve year old students.

After an initial class discussion based on issues related to climate change and diminishing fossil fuel supplies, a workshop activity was carried out in three stages. The students were issued with a fact sheet about one of four imaginary islands (Skisdale, Cloudy Island, Surfsville and Sun City) and they were asked to work in teams to choose the most suitable method of generating electricity for their island. Issues such as costs, where it will be sited and environmental implications were considered. They were then asked to conduct practical activities by constructing and testing models for these forms of renewable energy. To conclude, they presented their proposal to the rest of the class with reasoned explanations.

The kits used in the lessons can be purchased from Anderson Scientific (sales@andersonscientific.co.uk). The solar cells were simply connected to a voltmeter. The wind and hydroelectric groups used the same basic equipment. This was made using a small water bottle, insulating tape, a screwdriver, a connecting block, a solar motor, a plastic fan and thin wires. The only difference was that the wind groups were issued hairdryers and the hydroelectric groups worked at a sink. The wave turbine was constructed in a similar way using the bases from two 5 litre water bottles. Various investigations were conducted into the factors affecting the voltage produced. For instance, the effect of the distance from the light source, the area of the solar cell, the type of blades, the depth of water and the wind speed were studied.

The lessons reinforced their understanding of ideas covered in Science and Geography, such as voltage, power, fair tests, compass directions and map contours. Students also had the opportunity to practise connecting electrical components in series and they consolidated their understanding of energy changes, observing that generators convert kinetic energy to electrical energy.

The activities allowed students to learn the basics of how renewable energy technologies work. The tasks provided a hands-on experience of renewable energy being used to power small-scale electrical devices such as an LED. The students also gained an appreciation of the complex issues involved in planning and implementing renewable energy generation in the real world.