

Dear Teacher,

Thank you for booking your class for a visit to the Newton Room for the *Renewable Energy* module.

Prior to your visit to the Newton Room we would like to provide you with some useful information to integrate the learning that takes place in the Newton Room with your normal lessons that take place in the school setting. The planned learning activities included with the Renewable Energy module are:

1. **Pre-work – General overview of energy** (to be completed before your visit to the Newton Room to give a platform for learning).

Pupils will attempt to define what energy is. Identify and classify different types of energy while starting to discuss conservation of energy and identifying which are renewable and non-renewable.

2. **Activity 1 – Building a Ball Track.** After being introduced to the concept of potential and kinetic energy and the law of conservation pupils will be split into teams where each pupil has a specific responsibility. Each team will build a ball track within given criteria and a vehicle which will be moved by the ball that runs on the track. The Important learning concepts in this activity are identifying and understanding potential and kinetic energy, energy transfer, and energy loss. This will be discussed and explained with the whole class.

3. **Activity 2 – Magnetic Induction.**

The pupils work with coils and magnets to induce current which is measured. The aim is to attain practical experience and understanding of what happens when a magnet and a coil move in relation to each other and be able to apply this to how different renewables provide electricity.

4. **Activity 3 – Electrical Energy from Renewables- Hydro**

Pupils will produce electrical energy by running water through a small hydro turbine. They measure electricity produced by the turbine while investigating different factors that can affect production. The electrical energy produced is measured with a wireless sensor enabling real time analysis of electricity produced when factors are changed.

5. **Activity 4 – Electrical Energy from Renewables- Wind**

Pupils use a mini wind turbine to produce electrical energy. They investigate the best structure, changing the number of blades and angles of blade while using the sensor to record and compare the energy output when changes are made to identify the best model.

6. **Post-work – Global and local energy mix**

(to be completed after your visit to the Newton Room)

Pupils look at the energy mix which is the combination of sources used to provide enough energy to meet demand, at any given time and place, globally and locally.

Here is an overview of the learning outcomes we plan to cover through the pre-work, Newton Room visit and post-work activities. This ideally can be built into a ‘chunk’ of learning over 1-2 weeks in school and may even feed into an Interdisciplinary Key Assessment Task or Snapshot.

Experiences and Outcomes:	● Processes of the planet ○ By considering examples where energy is conserved, I can identify the energy source, how it is transferred and ways of reducing wasted energy. SCN 2-04a
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	● Energy Sources and Sustainability ○ By investigating renewable energy sources and taking part in practical activities to harness them, I can discuss their benefits and potential problems. SCN 3-04b ○ By contributing to an investigation on different ways of meeting society's energy needs, I can express an informed view on the risks and benefits of different energy sources, including those produced from plants. SCN 4-04a ○ Through investigation, I can explain the formation and use of fossil fuels and contribute to discussions on the responsible use and conservation of finite resources. SCN 4-04b ● Topical Science ○ I have collaborated with others to find and present information on how scientists from Scotland and beyond have contributed to innovative research and development. SCN 3-20a ● Electricity ○ By contributing to investigations into the properties of a range of electrical components, I can select and use them as input and output devices in practical electronic circuits. SCN 4-09a
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Skills Developed:

Inquiry and investigative skills:

Plans and designs scientific investigations and enquiries

- ② Demonstrates initiative and increasing independence in identifying a number of key questions and in formulating aims, predictions and hypotheses based on information, observations and knowledge.
- ② Designs procedures to test a hypothesis and identifies the independent, dependent and controlled variables, with limited assistance.
- ② Demonstrates increased levels of collaboration and initiative in decision-making about samples, measurements, equipment and procedures to use.

Carries out practical activities within a variety of learning environments:

- ② Collects increasingly complex data and information using a range of methods and equipment, for example, data and software analysis tools (where available).
- ② Includes a control experiment when appropriate in experimental design.

Analyses, interprets and evaluates scientific findings:

- ② Selects appropriate methods to record data/information and demonstrates increased precision in use of terminology, units and scales.
- ② Establishes links between the findings, aim and hypothesis.
- ② Relates findings to scientific knowledge and understanding.
- ② Draws a conclusion based on results gathered and in relation to the aim.
- ② Begins to consider alternative explanations and applies or extends conclusions to new situations or to identify further studies.
- ② Evaluates a range of aspects of the inquiry/investigation, including the relevance and reliability of evidence, and suggests at least two ways of improving the methodology, if repeated.

Presents scientific findings

- ② Communicates effectively in a range of ways, for example, orally and through scientific report writing.

Scientific analytical thinking skills

- ② Applies scientific analytical thinking skills, with increasing independence, working with less familiar and more complex contexts.
- ② Applies understanding of an increasing range of science concepts to solve problems and provide solutions.
- ② Demonstrates further development of creative thinking including through the engineering processes of design, construction, testing and modification.

Skills and attributes of scientifically literate citizens

At Third Level, it is anticipated that learners will be able to achieve the Benchmarks below with limited assistance.

- ② Demonstrates understanding of the impact of science on society and debates and discusses the moral and ethical implications of some scientific developments, demonstrating respect for the views of others.
- ② Expresses informed views about topical scientific issues, including those featured in the media, based on evidence and demonstrating understanding of underlying scientific concepts.
- ② Demonstrates increased awareness of creativity and inventiveness in science and the use of technologies in the development of sciences.
- ② Demonstrates understanding of the relevance of science to their future lives and the role of science in an increasing range of careers and occupations, including science, technology, engineering and mathematics (STEM) careers.