

## A3: ENERGY AND SUSTAINABILITY

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### Overview

Everything we need for our survival and wellbeing has always depended directly or indirectly on sustaining a careful management of the natural environment. This need for sustainability has always been addressed, e.g. the rotation of crops is essential to managing the quality of the soil, moving grazing animals is needed to allow vegetation to recover. On the other hand, the damage caused in the American Midwest by the 'dust bowl' storms of the 1930s was partly due to deep soil ploughing resulting in the destruction of the grasses that trapped moisture and prevented the loss of top-soil. Failure to manage a sustainable balance between cash crops and food has contributed to poverty in many countries. There is an even greater focus now on sustainability for the following reasons: rapid population growth, economic growth and the consequential consumption of our natural resources.

In **1972 The United Nations General Assembly** convened at the **United Nations Conference on the Human Environment**, or the [Stockholm Conference](#). This conference introduced environmental concerns into the formal political development sphere, focusing on human interactions with the environment. Among the key resolutions were that Earth's capacity to produce renewable resources should be maintained and that non-renewable resources should be shared and not exhausted.

To rally countries to work and pursue sustainable development together, the **UN General Assembly** established the **Brundtland Commission** in **1983**. The Commission published *Our Common Future*, also known as the *Brundtland Report*, in **1987**. The report aimed at promoting a sustainable development path, and recapturing the spirit of the **Stockholm Conference**. The document coined, and defined the meaning of, the term 'sustainable development' i.e. to maintain 'developments that meet the needs of the present without compromising the ability of future generations to meet their own needs.'

The limit of our resources is illustrated by the first two activities – **A3 ACTIVITY 1: VISUALISING: WHY SUSTAINABILITY? IS THERE ENOUGH LAND FOR EVERYONE?** and **A3 ACTIVITY 2: VISUALISING: WHY SUSTAINABILITY? HOW MUCH FRESHWATER IS THERE?**

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### Suggested approaches:

- Before introducing any of the activities, pose the following questions to the class:
  - ① *Is there an energy crisis?*
  - ② *If so, what does this mean?*
  - ③ *What do the words sustain and sustainability mean?*
  - ④ *Apart from the Sun, what energy resources do we have on planet Earth?*
  - ⑤ *Which of these resources are essential for living?*
  - ⑥ *How can we replenish these resources?*
  - ⑦ *How long would it take to replenish these resources?*
- Alternatively, divide the class into groups and assign one of the above questions to each group. Record the responses for future reference. These questions should lead the students to understand that when resources like oil or coal have been depleted, there is no way they can be created again. The time spent need not be too long as the overall aim is to show that a number of our energy resources are indeed finite, i.e. should a crop fail or seeds be destroyed then there is no agency outside Earth to replace them.
- Let the students draw up a list of what they consider to be an **energy crisis** and how it might be addressed.

- Challenge them to list examples of **energy conversion applications** in everyday living and ask them which of these could be considered **energy efficient**.
- Former president of Ireland, Mary Robinson, founded the **MARY ROBINSON FOUNDATION: CLIMATE JUSTICE** which facilitates action on **climate change**. Challenge the students by posing the following questions for discussion:
  - ① *What exactly is **climate justice**?*
  - ① *Why was the **Mary Robinson Foundation** set up?*
  - ① *How are people affected by **climate change**?*
  - ① *How do we contribute to **climate change**?*
  - ① *How should we contribute to **climate change**?*
  - ① *What impact could a **rising population** have on **energy resources**?*
- Another approach would be for the students to carry out the two activities and then use them to generate discussions on: land ownership vs. usage, population demands, the conservation of water, the role of ethics in society, how lifestyle changes might make land sufficiency easier (eating less meat, eating seasonal foods, composting to replenish the soil, etc.).

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### Resources:

- [The Mary Robinson Foundation](#) website provides access to a number of fascinating studies and videos. Encourage your class to browse the website, or summarise some of the information for them.
- [Download the Principles of Climate Justice](#).
- The [SEAI One Good Idea](#) topics page has lots of information and factsheets for you to download.
- The [SEAI website](#) has a useful outline of how a **sustainable energy community** works.
- The [USA Environmental Protection Agency](#) website provides a simple introduction to the terminology and facts about climate change.
- Download a [graphic presentation of the population status in 2050](#) to show in class.
- [Download a short booklet on population and water resources](#).
- Trócaire has a great [website on climate change](#) and the effects it has on people in the poorer parts of the world. [Visit their education resource website](#).
- For examples of ways to live sustainably, show the [Eco Eye TV programme on Sustainable Communities](#) in class.

## A3 ACTIVITY 1: VISUALISING: WHY SUSTAINABILITY? IS THERE ENOUGH LAND FOR EVERYONE?

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### Background

It can be difficult for students to understand sustainability as it relates to their everyday lives. The following activity uses a map of the world and an apple to demonstrate visually why urgent management of our energy resources is so important.

The apple is divided into segments representing water and land (arable, habitable, etc.), and these areas are marked off on the map.

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### Equipment required:

- Melon (for a class demonstration) or one apple per pair of students – the fruit represents the Earth
  - Knife
  - Map of the world (marking the topographical features if possible)
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### What to do:

1. Print out copies of the map below and give one to each pair of students, or a large class size map will suffice.
2. Explain to the class that the fruit represents the planet Earth.
3. Divide the apple or melon into quarters.
4. Set three of these quarters aside, explain that they represent all the water on Earth and will be revisited later. Mark all the water areas on the map.
5. Explain that the remaining quarter of the fruit represents the land, then divide this segment into half giving you two one-eighth pieces of the world (half of a quarter).
6. Explain that one of the eighths represents land which is inhospitable (i.e. not suitable for people to live on). Set it aside. Mark on the map what land you would consider inhospitable, for example, mountains, deserts...
7. Referring to the already marked map, ask the class if there is much land which is not marked?
8. Divide the second eighth into four equal pieces. Explain that three of these pieces represent poor areas for producing food: areas covered by buildings, roads, cities, factories, 'out-of-town' shopping centres, etc.
9. Carefully peel the skin off the last eighth. Explain that the skin represents all the arable land on the surface of the Earth.
10. Ask the class if they have any comments on the amount of land in the context of the Earth's population? Is there enough to sustain a growing population?
11. Return to the three quarters that were set aside (in step 4 above) – explain that though these represent all the water on the planet, not all the water is potable. Ask the class to look at the map and, if possible, to estimate how much of the water is potable.

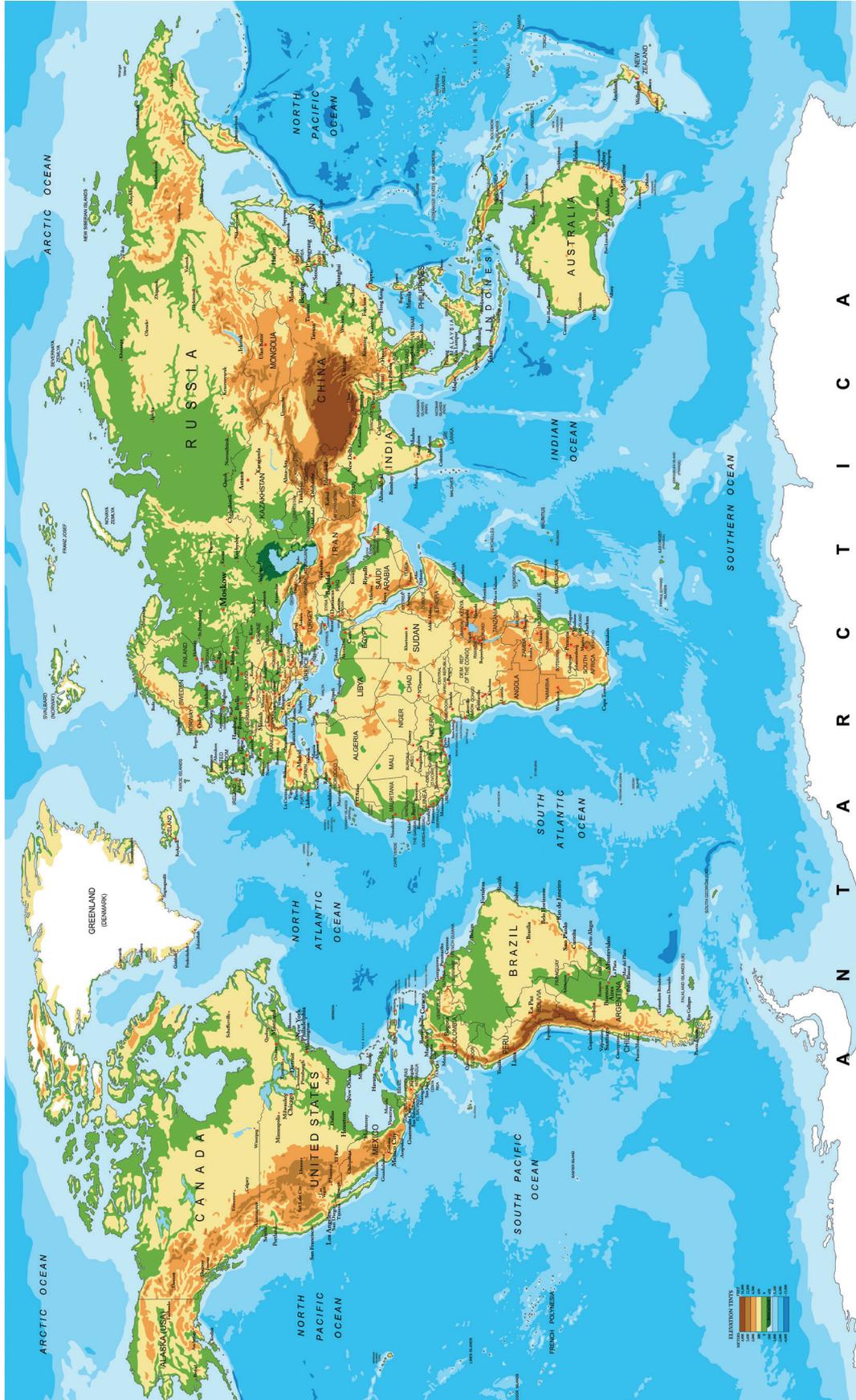
# STRAND A ENERGY AND SUSTAINABILITY

## A3: ENERGY AND SUSTAINABILITY



# ENERGY IN ACTION

ACTIVITIES FOR  
JUNIOR CYCLE



## A3 ACTIVITY 2: VISUALISING: WHY SUSTAINABILITY? HOW MUCH FRESHWATER IS THERE?

### Background

This activity complements **A3 ACTIVITY 1: VISUALISING: WHY SUSTAINABILITY? IS THERE ENOUGH LAND FOR EVERYONE?** The measures used are approximate ones but still within the same ratio frame and should illustrate how scarce freshwater is and why we need to be careful using it. The difficulty is in understanding, and appreciating, that the quantity of water on Earth is actually finite – there is no agency outside Earth waiting to replenish it – all our water is continually being recycled in various forms.

### Equipment required:

- Empty container with a four-litre capacity, or  
Four containers with a one-litre capacity each if a single container with a four-litre capacity is not available
- Two beakers, each with at least a 100 ml capacity
- Pipette and filler, or a large volume syringe
- Blue food dye
- A small amount of table salt
- Map of the world (marking the topographical features if possible)

### What to do:

1. Print out copies of the map above and give one to each student, or use a large map for the whole class.
2. Fill the container with approximately four litres of water. Explain that this represents the total amount of water on Earth.
3. Using a pipette or a syringe, remove 90 ml of water, transfer it to one of the 100 ml beakers and set it aside.
4. Add a few pinches of salt to the water left in the large container. Explain that this water now represents the oceans, i.e. water not suitable for immediate human usage. (You can explain that some countries are investigating desalination processes but it is very expensive both financially, and in terms of energy consumption.)
5. Return to the 90 ml set aside (in step 3). Add a few drops of the blue food colouring to this water. Explain that this water represents freshwater...
6. **BUT** that not all this water is accessible. Using the pipette remove about 80 ml of the water and put it out of reach. This represents water trapped in glaciers or too deep underground to be accessible.
7. Explain that what remains in the 100 ml beaker represents the amount of water available for daily use by the entire planet, e.g. agriculture, potable water, industry, freshwater ecosystems.
8. Explain that forecasts indicate that the world population will reach 9.6 billion by 2050 but the quantity of water available for daily use will still be represented by the quantity left in the 100 ml beaker. Ask the question, Why is this?

### Additional discussion:

1. Start a discussion on the issues of water pollution and how this will affect how much water is available for use.
2. Discuss water conservation. What can we all do to save water. Visit the [Irish Water](#) and [EPA](#) websites for more information.
3. Examine how much energy is used in the treatment of water.
4. Come up with a list of actions everyone can take to reduce pollution and save water.