C2: MY ENERGY AUDIT

Overview

While issues like renewable and non-renewable energy, climate change, and resource efficiency are often investigated in the school context, it does not always follow that the understanding and knowledge gained through these investigations are then applied by the students to areas and situations outside the classroom.

In **My Energy Audit** the students take stock of their personal use of energy. In **C2 ACTIVITY 1: FOOD MILES** students, using online resources, may realise that calculating food miles is a way of personalising the environmental impact of food from crop to table to waste disposal. **C2 ACTIVITY 2: TESTING PERSONAL ENERGY EFFICIENCY** introduces students to the concept of energy efficiency both at home and in school.

This theme of energy efficiency is continued in **C2 ACTIVITY 3: ENERGY LABELS AND APPLIANCES**, where students are given an opportunity to examine a number of aspects of energy labelling, such as the meaning and rationale of energy labels, tracking energy transfers, and calculating the running costs of appliances both at home and in school. This is also an opportunity for students to consider energy efficiency in light of energy conservation.

C2 ACTIVITY 4: ENERGY SANKEYS introduces the students to another way of visualising energy efficiencies. The International Energy Agency (IEA) makes extensive use of Sankey diagrams to depict the energy efficiency levels of member countries.

SEAI's One Good Idea is a challenge to students who, having assessed their own energy usage both at home and in school, are now in a better position to involve their peers in the project and come up with good energy saving ideas.

C2 ACTIVITY 1: FOOD MILES

Background

Students are probably familiar with the phrase 'food miles' but may not be sure what it means, especially in terms of energy and global warming. The term refers to the distance food is transported from the time of its production until it reaches the consumer. This is a factor used when assessing the environmental impact of food, including the impact on global warming. In this activity, the students select a number of food items, source their origins and then calculate the food miles using an online food miles calculator.

What to do:

1. Start with a short brainstorming session to get the students thinking about the weekly shopping basket. Put the following questions to the class:
   - ***Who takes part in grocery shopping for their home?***
   - ***When choosing food to purchase, are they conscious of the country of origin or does price decide?***
   - ***What is meant by the term food miles?***
2. Using **C2.1 WORKSHEET B: WHAT'S THE COST OF YOUR SHOPPING BASKET?** the students can compile their list at home, and verify the origin of the food from the food label. They can then calculate the food miles using the online food miles calculator.
3. Set students the task of investigating how many of the products are available nearer home. Then ask them to draw up a list of prices to compare locally available products with long-distance imported ones. It may be appropriate to introduce the ethical aspect of cash crops here. The following link may be useful for research on this issue: http://www.sustainablefood.com/guide/Fairissue.html.

C2.1 WORKSHEET B: WHAT'S THE COST OF YOUR SHOPPING BASKET?

Make a list of food items in an average weekly shopping basket bought by your household. Calculate their food miles using the food miles calculator found at www.foodmiles.com.

FOOD ITEM	**COUNTRY OF ORIGIN** according to its label	**AIR MILES TRAVELLED** (km)	**ESTIMATED CO_2/CARBON EMISSIONS**
e.g. Fairtrade coffee	Brazil	8,650 km	By airplane – 1,935 kg CO_2 or 528 kg carbon emissions
Total air miles travelled/ Total CO_2 emissions of your shopping basket:			

Note: The food miles calculator does not take into account all factors involved in the production of the goods. It only calculates the distance travelled by the item from the country of origin to the country of destination. For instance, it does not consider the energy taken to produce the food, the pollution created, refrigeration level necessary, distance it had to travel from point of harvest to point of packaging, or the distance it travelled to get to your local shop after reaching Ireland.

C2 ACTIVITY 2: TESTING PERSONAL ENERGY SAVING

Background

This activity introduces students to the concept of energy saving in the home and at school. The activity encourages students to develop an awareness of their personal energy use profile. By calculating their own carbon footprint, for example, they may come to appreciate how their habits can impact on the environment. There are several online carbon calculator available. Why not try this one from carbonfootprint.com. The self-awareness exercises **C2.2 WORKSHEET C: HOW GOOD IS YOUR ENERGY SAVING AT HOME?** and **C2.2 WORKSHEET D: HOW GOOD IS YOUR PERSONAL ENERGY SAVING AT SCHOOL?** provide opportunities for students to critically examine their energy use and identify behaviour changes that would improve their energy efficiency.

What to do:

Introduce the concepts of energy usage and energy saving as follows:

1. Start with a brainstorm about personal energy consumption and collect responses to the following questions:
   - ***What does the phrase energy efficient mean?***
   - ***What does it mean to be energy efficient?***
   - ***Does efficiency refer to appliances or to the way they are used?***
   - ***What is the connection between energy use and sustainability?***
   - ***What is meant by a carbon footprint?***
2. Introduce students to the concept of carbon footprints, making use of the carbonfootprint.com website and use their carbon calculator.
3. Distribute the self-auditing sheets **C2.2 WORKSHEET C: HOW GOOD IS YOUR ENERGY SAVING AT HOME?** and **C2.2 WORKSHEET D: HOW GOOD IS YOUR PERSONAL ENERGY SAVING AT SCHOOL?** All the instructions are included on the sheets.
4. Following the completion of these activity sheets, scores should be shared to inspire a discussion about the highest and lowest scores. An interesting exercise might be to draw up a graph of all the scores and comment on the resultant shape.
5. Challenge the students to think of other ways they can save or waste energy in their daily routines. Having gathered some suggestions, let the students now measure their carbon footprints before and after they decide on energy saving strategies. The comparison may cause them to revisit their 'energy saving' ideas.
6. In 1990, the Netherlands introduced a tax called the carbon tax. Since then many other countries have introduced this type of tax. In 2010 the Irish Government introduced this tax. In 2012, Australia introduced this tax, but it was repealed in 2014. Rather than explain what this carbon tax is, let the students research the topic. They should then present their arguments for and against carbon tax in the form of posters or a class debate.

Resources:

- For introductory research into carbon tax:
  - *Click here for a simple explanation on how carbon tax is applied here in Ireland.*
  - *Click here for more information on the carbon tax in Ireland.*
  - *Click here for an interesting article on how carbon tax is applied across the world. There are also links to other articles on the implications of carbon tax.*
- You can rent a Home Energy Saving Kit from your local library to carry out an audit of your home.
- The SEAI website has a list of energy saving tips that could help your class with their audit.
- The Energy in Education website has a variety of support material for saving energy at school including fact-sheets and informative videos.

C2.2 WORKSHEET C: HOW GOOD IS YOUR ENERGY SAVING AT HOME?

Tick the box below which you think best describes your behaviour. Then add up your score and find out whether you are an energy saver or an energy waster.

SCORING METHOD:
Each 'always' = 3 points
Each 'sometimes' = 2 points
Each 'never' = I point

AND WHEN THEY ARE ADDED UP...
If your score is 15 – 21 you are an excellent energy saver!
If your score is 8 – 14 you are not too bad but could do better.
If your score is 0 – 7 you need to change your ways.

	ALWAYS	SOMETIMES	NEVER
When leaving a room which is not in use I switch off the lights.			
I boil the kettle with only the amount of water I need.			
I use a ring on the hob which best fits my pot/pan.			
I switch off the television, video, or computer instead of leaving it on standby when not in use.			
I only turn on the dishwasher when there's a full load.			
I cycle, walk or take the bus to the shops.			
I switch my radiator off when my bedroom's not in use.			
I unplug my mobile when it is fully charged.			
I leave my mobile unplugged overnight.			
I use only CFL bulbs in my bedroom.			

Your score ☐ The class average ☐

C2.2 WORKSHEET D: HOW GOOD IS YOUR PERSONAL ENERGY SAVING AT SCHOOL?

Tick the box below which you think best describes your behaviour. Then add up your score and find out whether you are an energy saver or an energy waster.

SCORING METHOD:
Each 'always' = 3 points
Each 'sometimes' = 2 points
Each 'never' = I point

AND WHEN THEY ARE ADDED UP...
If your score is 15 – 21 you are an excellent energy saver!
If your score is 8 – 14 you are not too bad but could do better.
If your score is 0 – 7 you need to change your ways.

	ALWAYS	SOMETIMES	NEVER
When leaving a room which is not in use I switch off the lights.			
When entering rooms I open blinds fully.			
I switch off PC screens when I'm not using them.			
I close doors when I'm leaving a room.			
I only turn on the dishwasher (in the laboratory/Home Economics room) when there's a full load.			
I cycle, walk or take the bus to school.			
Turn off taps fully after use.			

Your score ☐ The class average ☐

C2 ACTIVITY 3: ENERGY LABELS AND APPLIANCES

Background

In this activity students examine some aspects of selected appliances. They learn what energy labels are, how to read them, and why not all appliances carry energy labels. Students are taught to interrogate the labels and to look at all aspects of the appliance's energy use. They examine the energy conversions involved in the appliances, calculate their running costs, and consider the connection between energy efficiency and energy conservation. To help to engage students and deepen their understanding, the teacher can set them the task of drawing up simple flow charts.

Suggested approaches:

- With the class, examine the electrical appliances used in the classroom.
  - ***Do any of them have an energy label?***
  - ***Which appliances carry an energy label and which ones do not?***
  - ***Can the students suggest any reasons why some appliances carry labels and others do not?***
  - ***Where should they look for the energy label?***
  - ***Do they understand any or all of the information on the label?***
  - ***Can they find the power rating of the appliance?***
  - ***Do they know where to look for the power rating?***
  - ***What is the use of knowing the rating?***
  - ***Why do we have energy labels?***
  - ***How might energy labelling contribute to energy conservation?***
- Energy labels rank the energy efficiency of an appliance from A (most efficient) to G (least efficient). Using the sheet labelled **C2.3 WORKSHEET E: DOMESTIC APPLIANCES** ask the students to guess which appliances are legally obliged to carry energy labels and the energy efficiency rating of each appliance. Remind the students to consider whether all the energy is being used solely for the purpose of the appliance, or if there is any loss via heat, sound, or light (for example a washing machine is for washing clothes but also generates noise).
- By way of involving home usage the students can select a number of appliances for inspection at home. Ask them to fill in the first two columns of **C2.3 WORKSHEET G: HOW MUCH DO YOUR HOME APPLIANCES COST?** and bring it into class. They can calculate the cost as a class exercise.
- Challenge the students to list all appliances they can think of that are legally obliged to carry an energy label. At the moment there are 14 categories of domestic appliances but the list is increasing. SEAI's website has information on energy labelling. *S.1 No. 351 of 2014 Energy Labelling* gives the list of households appliance categories that must be labelled.
- Arrange the students in groups of three. Assign one of the listed items from this energy labelling list to each group and set them the following task:
  - ***Find two versions of the same product on the market, each with a different energy label.***
  - ***Indicate what information is shown on the energy labels.***
  - ***Suggest reasons why two similar products can carry different energy labels.***
- Arrange the students in small groups. Present each group with **C2.3 WORKSHEET E: DOMESTIC APPLIANCES** and assign them one appliance per group along with the following tasks:
  - ***Calculate this appliance's running cost for a given period (e.g. three days, a week, for a family of four over the course of a week…).***
  - ***Draw a flow diagram showing the various energy transfers which take place from the time an appliance is switched on to the time it is switched off. Highlight which energy transfers could be considered 'wasted energy'.***
  - ***Present your findings to the class for discussion and debate on the issues that have been highlighted.***

What to do:

- Decide on a starting approach:
  - ***Introducing energy labels***
  - ***Introducing appliances for calculating energy consumption, then moving onto the subject of energy conversions***
  - ***Introducing appliances for students to track energy transfers***

Resources:

- Various online appliance calculators are available. Try this one from Sust-it. This could be used as a resource for helping students to appreciate the energy usage of appliances. Students could each select five appliances and find out how much it would cost to run each one over a ten-year period. They could then use this figure to work out the cost for shorter periods.
- The Energy in Education site has a number of fact-sheets and videos which aim at supporting the strategic monitoring of energy consumption and emphasising the resulting savings.

C2.3 WORKSHEET E: DOMESTIC APPLIANCES

OVEN
Power rating: 927 W

TV
Power rating: 350 W

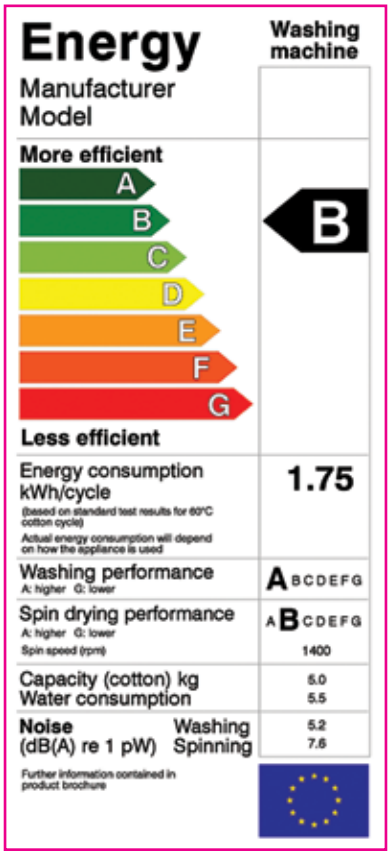
BLENDER
Power rating: 450 W

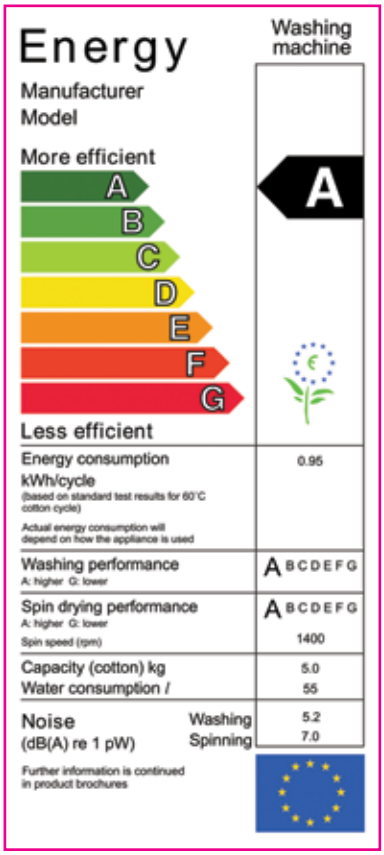
TOASTER
Power rating: 1150 W

VACUUM CLEANER
Power rating: 1700 W

C2.3 WORKSHEET F: ENERGY LABELS

- *On what are these labels found?*
- *Where are they located?*
- *What useful information do they contain?*





C2.3 WORKSHEET G: HOW MUCH DO YOUR HOME APPLIANCES COST?

Name:_____ Date:_____

	APPLIANCE	POWER RATING	COST TO RUN (PER HOUR)
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

1. Which appliance requires the most power?

_____

_____

2. Which appliance requires the least power?

_____

3. Can you think of ways to save electricity by using appliances more efficiently?

_____

_____