

# Windmills and Environment

Renewable energy and you



Windmills at the Swedish West Coast. 7 August 2011, Public domain file, open to free distribution.

<https://commons.wikimedia.org/wiki/File:Windmills-Sweden.JPG>

# CONTENTS

General overview	3
Understanding Renewable Energy - Activity 01	4
Activity overview	4
Descriptive Activity Sheet	4
A Successful Flow - Activity 02	7
Activity overview	7
Descriptive Activity Sheet	8
Informative Text Based Designing - Activity 03	14
Activity overview	14
Descriptive Activity Sheet	14
Resources	18

## General overview

This exercise will focus on renewable energy. This is an important factor for a lot of countries and can be utilized by students wanting to create a more cost-effective, safe environment for businesses related to their vocation, or local care. The module will provide activities related to the following categories:

- Handcrafts (Activity 02, and 03)
- Science (Activity 02 and 03)
- History (Activity 01 and 02)
- Technology (Activity 01, 02, and 03)
- Economy (Activity 01 and 03)

Energy is a factor of everybody's everyday life, all across the world. It is utilized from the most basic of activities to the most extreme. The current energy trend is one that takes more than it gives back. In order to reconcile this, renewable energy needs to be the new goal for people working in any industry. Understanding how it works can be a main factor in being able to manipulate how businesses run and how smoothly workers can manage situations.

Vocational students are the future of the working world and need a concrete understanding of renewable energy to;

- Have a more cost effective and low emission business
- Increase their corporate and social responsibility
- Have a positive impact on the natural world.

# Understanding Renewable Energy - Activity 01

## Activity overview

### The advantages and disadvantages of renewable energy

This activity focuses on a TED TALK by David MacKay, where he briefly but thoroughly explains about renewable energy, the positives and negatives. He talks about history, for example; the peaks of fossil fuels throughout several years, and how that decline will maintain its pattern. He focuses the discussion on:

- Area (land) needed to provide renewable energy
- Costs and tips on how to lower consumption/bills
- Potential advancements that could be made
- Statistics for many countries about energy and devices

The website has a video player that can caption in 22 different languages, a transcript for people to provide references and a plethora of information to be understood and discussed by the students. This topic will be very useful for the following VET jobs/classes including but not limited to:

- Electronics technician
- Entrepreneurship and Small Business
- Environmental Engineering Technology
- Electrical engineering technology

## Descriptive Activity Sheet

### Stage 1

#### **Description / Instruction**

This exercise is for the entire class.

The teacher will play the video “Renewable energy”. This video contains lots of information about renewable energy, differences in countries and how someone can control their own output. The video contains 22 languages.

## Entry level Basic

### Objectives

Increasing the student's awareness about renewable energy, the advantages and disadvantages of renewable energy.

Increasing the students' ability to understand and interpret concepts, facts and opinions.

### Key competences

- Communication in the mother tongue;
- Communication in foreign languages;
- Mathematical competence and basic competences in science and technology;

### Resources

Teachers who have a basic understanding of how to show a video.

Equipment: Internet connection, laptop, video projector.

### Duration

The video itself is 20 minutes to allow time for set-up. The time for this activity is 30 minutes

## Stage 2

### Description / Instruction

This Exercise is for the entire class.

Have the students discuss their thoughts about the video they just viewed.

This will allow students to discuss their perspectives about what they have just seen.

Discussing what this means to the students will help with their ability to critically think.

Questions for discussion:

- “Does your country use renewable energy?”
- “How could this help with businesses?”
- “Can you think of alternative ways to assist with power consumption?”

**Entry level** Basic

### Objectives

Increasing the students ability to communicate ideas with peers.

Increasing the students ability to critically think about situations.

### Key competences

- Communication in the mother tongue;
- Communication in foreign languages;
- Mathematical competence and basic competences in science and technology;

### Resources

Teachers who understood spoken languages

### Duration

This should allow time for students to discuss with each other their thoughts and perspectives (30-40 minutes)

# A Successful Flow - Activity 02

## Activity overview

### Building and understanding water/power

Humans have been using water for power for a long time. More than 2,000 years ago, farmers used water wheels to grind wheat into flour. A water wheel spins as a stream of water, which is being pulled down by gravity, hits its blades. The gears of the wheel drive heavy, flat, rotating stones that grind the wheat into flour. Hydropower plants use the same action of falling water to generate electricity. A turbine and a generator convert the energy from the falling water to mechanical and then electrical energy.

More than half of the energy used in Sweden comes from renewable energy sources. Sweden manages to combine a high energy consumption with low carbon emissions. Hydroelectric power plants have been used in Sweden to generate electricity for more than 100 years. There are two mills of Baggeboda Såg- & Skvaltkvarn, the older of the two mills is the smaller mill with the horizontal water wheel. The exact age of this flour mill is not known, but old documents show that it has already existed in 1764. This shows that Sweden has used and relied on water power for many years.

The EU is the world leader in sustainable energy capacity per capita. The rapid development of renewable energy technologies has helped the transition of Europe's energy sector. This has led to emission reductions in the EU electricity sector, in the consumption of energy for heating and cooling, and, to a lesser extent, in transport. The additional consumption of renewable energy sources throughout Europe since 2005 has enabled the EU to reduce its demand for fossil fuels with more than 12% and the associated greenhouse gas emissions with 10 %.

*Source: Eionet Report on Renewable energy in Europe 2019*

The proposed activity has the potential to teach motor skills, understanding of basic electronic concepts, and the ability to think of solutions on a broader scale. It maintains professional learning, while adding crafts to improve enjoyment and helps to focus students that learn through more direct physical means rather than academically.

This is very useful for students in the trade and science sectors of VET learning.

## Descriptive Activity Sheet

### Stage 1

#### **Description / Instruction**

Have the students research 'Hydropower' and 'Waterwheels' on their laptops and provide assistance when needed.

So they can have a basic understanding about the subject before the quiz (Stage 3).

#### **Entry level** Basic

#### **Objectives**

This will improve the students' ability to research it will also increase their digital competence by using such devices

#### **Key competences**

- Communication in the mother tongue;
- Communication in foreign languages;
- Mathematical competence and basic competences in science and technology;
- Digital competence;

#### **Resources**

Teachers who understand basic digital functions and know how to research (incase the students need help)

Equipment: Laptop, Internet connection.

#### **Duration**

Allow students sufficient time to have a reasonable understanding of the subject (30-40 minutes)

## Stage 2

### Description / Instruction

Read the instructions listed there ["https://deceptivelyeducational.blogspot.com/2014/09/how-to-make-waterwheel.html"](https://deceptivelyeducational.blogspot.com/2014/09/how-to-make-waterwheel.html) and have the students perform the same experiment.

This allows students to understand the concept of motion and forces, that allow the creation of energy from a basic resource such as water.

**Entry level** Intermediate

### Objectives

This will increase the students' abilities to follow precise instructions.

It will also increase the students capacity to understand how forces work.

It tests students ability to manipulate objects with their hands in order to create a functioning piece of machinery at a more basic level; this will particularly support students in course where fine motor skills are required. For example; mechanics, florestory, hairdressers, makeup artists and design.

### Key competences

- Sense of initiative and entrepreneurship;
- Cultural awareness and expression;
- Communication in the mother tongue;
- Communication in foreign languages;
- Mathematical competence and basic competences in science and technology.

### Resources

Teachers who can perform arts and crafts.

Equipment needed:

- A solid cylinder
- Empty plastic thread holder
- A plastic cup
- Heavy duty tape
- Empty Soda bottle

- Scissors
- Straw
- Thread/Fishing line
- Metal washer (or something heavy to be tied on the straw)
- Digital device & internet for the teacher

### **Duration**

Allow the students to have time to understand what they are creating and have time to construct this which may vary depending on the ability of the students (45+ minutes).

## Stage 3

### Description / Instruction

Quiz the students with the questions provided.

This will allow students to recall information increasing their capacity.

### Entry level Basic

### Objectives

This will improve students academic abilities, memory, language, relevance.

### Key competences

- Communication in the mother tongue;
- Communication in foreign languages;
- Social and civic competences;
- Cultural awareness and expression.

### Resources

A teacher that understands basic language and has the ability to quiz students.

Equipment: questions, paper, writing tools.

**Duration** Allow students time to recall information and time allotment for differences in speed (30+ minutes)

### Notes

#### Questions:

- Discuss what students already know about hydropower. To warm up the class, ask the following series of true/false questions and have students vote by holding thumbs up for true and thumbs down for false.

Count the number of true and false and write the number on the board. Give the right answer.

- True or False: Hydropower dams reduce pollution (Answer: True)
- True or False: Hydropower dams are cheap to build (Answer: False: they can be very expensive to build.)

- True or False: Hydropower dams rarely interfere with natural wildlife (Answer: False: dams can disrupt migratory fish patterns and spawning habits, especially for species like salmon. This can have devastating effects on both the fish population and people whose livelihoods depend on these fish.)
- After the true or false quiz, ask them this series of multiple choice questions and have each student write down their answer. After the quiz has been completed, in sequence call out the answer for each question and see who has gotten the answers correct.

How does hydroelectric energy work?

- A. It uses the power of the sun to turn work
- B. Water turns a piece similar to a propeller to power (correct answer: B)
- C. The water heats up and it turns into water vapor to power
- D. Water freezes and then is thrown to power it

Why is it so easy for hydroelectric energy to make energy?

- A. It was made that way
- B. Water is everywhere so you can use it everywhere (correct answer: B)
- C. It doesn't cost that much to make one
- D. It rains all the time

What is a main power plant for hydroelectric energy?

- A. Rivers
- B. Oceans
- C. Dams (correct answer: C)
- D. Sunflowers

Which of the following is a disadvantage of most of the renewable energy sources?

- A. Highly polluting
- B. High waste disposal cost

- C. Unreliable supply
- D. High running cost

(correct answer: C)

# Informative Text Based Designing - Activity 03

## Activity overview

### Informative information sharing and networking

Businesses across Europe may not have an understanding of what can be done to improve their situation in regards to power consumption and how this can be solved. This activity will involve seeking out local businesses and sharing information about the current situation in your country and effective methods of cost reduction and power usage management.

Business can often be overcome with bills that are too high which can cause a business to suffer, this information and action can help local businesses and give them a chance to reduce the amount of money that goes towards bills. This brochure can also be utilized to provide extra information regarding renewable energy in your country raising awareness of an important topic which can be adapted to advertising.

This will be very useful for students wishing to create their own businesses and increase their ability to construct packets of factual well-researched information available for passing. It also helps understand basic formats of brochure and sign making.

The proposed activity has the potential to teach; Researching, Templating, Writing, Typing, Language, and placing specific information according to a topic, or subject. This activity has both practical and theoretical learning elements helping different people learn in correspondence with different learning methodologies.

This activity will be very useful for students in the business sector of VET studies.

## Descriptive Activity Sheet

### Stage 1

#### **Description / Instruction**

Take the students for a field trip to local businesses and have them communicate with the owners/staff in order to establish a link. The students will be creating a brochure with information about how to reduce the expenditure of the business. This allows the students to

have a base working point in order to conduct research and provide methods to help the business

### **Entry level Basic**

### **Objectives**

To allow the students the capacity to establish networks with local businesses around their town/city.

### **Key competences**

- Communication in the mother tongue;
- Communication in foreign languages;
- Social and civic competences;

### **Resources**

A teacher with connections to local businesses and an understanding of language and business.

Equipment: Vehicle for transportation (if walking is not possible).

### **Duration**

A whole day (5 hours) is likely necessary to complete this step (varies on situation).

## Stage 2

### **Description / Instruction**

The students must begin researching for information that will suit the business they are trying to help. This information will be specific to each student and business. This will be the main part of this activity as the information gathered will be the information that will be provided within the brochure.

### **Entry level** Basic

### **Objectives**

This provides students with a large chance to increase their researching ability which can be used for many different topics and subjects. This will also increase the students capacity to use digital devices and gather relevant information.

### **Key competences**

- Communication in the mother tongue;
- Communication in foreign languages;
- Digital competence;
- Social and civic competences;

### **Resources**

A teacher that is able to help with research on a specific level.

Equipment: Laptop, internet connection and a way to store information (Notepad, Word document / pen and paper).

**Duration:** A whole day (5 hours) is likely necessary to complete this step (varies on situation).

## Stage 3

### Description / Instruction

This will be the final product of the activity and should consist of a booklet containing useful information about Energy uses, Renewable sources and how the business can improve their usage / consumption.

Have the students use the collected information to create a booklet or brochure that details what can be used by their selected business.

Method 1: The students can hand make the products with Pen/Pencil and paper.

Method 2: the students can create the product electronically and print the result.

### Entry level Basic

#### Objectives

The students may choose to translate information gathered increasing their competence for other languages.

The students must also consider the business they are working for and the person they are doing this for increasing their networking capabilities and understanding.

#### Key competences

- Communication in the mother tongue;
- Communication in foreign languages;
- Digital competence;
- Sense of initiative and entrepreneurship;

#### Resources

A teacher with basic linguistic skills and can provide insight on information designing

Equipment: Method 1: Pen/Pencil and collected information  
Method 2: Laptop, Information and printer

#### Duration

This will be the final product of the activity and should consist of a booklet containing useful information about Energy uses, Renewable sources and how the business can improve their usage/ consumption

## Resources

### Activity 01

1. Video link  
“[https://www.ted.com/talks/david\\_mackay\\_a\\_reality\\_check\\_on\\_renewables](https://www.ted.com/talks/david_mackay_a_reality_check_on_renewables)”
2. Information on David MacKay ‘The speaker’  
“[https://en.wikipedia.org/wiki/David\\_J.\\_C.\\_MacKay](https://en.wikipedia.org/wiki/David_J._C._MacKay)”

### Activity 02

Eionet Report on Renewable energy in Europe 2019: [Renewable energy in Europe 2019 - Recent growth and knock-on effects](#)

Includes some potential websites for the students to research with;

3. <https://www.nationalgeographic.com/environment/global-warming/hydropower/>
4. <https://www.energy.gov/eere/water/hydropower-basics>
5. <https://deceptivelyeducational.blogspot.com/2014/09/how-to-make-waterwheel.html>
6. [https://www.teachengineering.org/activities/view/cub\\_enviro\\_lesson09\\_activity3](https://www.teachengineering.org/activities/view/cub_enviro_lesson09_activity3)
7. <https://www.reliableplant.com/Read/18560/sweden's-biggest-hydroelectric-plant-going-strong-after-56-years>
8. <https://www.guidebook-sweden.com/en/guidebook/destination/baggeboda-sag-skvaltkvarn-historic-watermill-olofstroem>