

Teacher's manual

The aims of this teaching material are to make pupils aware of the effect consumers have on global warming, and to make them reflect on their role as consumers. Further learning goal is the use of tree as a carbon sink and the importance of forests to combat global warming.

Introduction

One of mankind's greatest challenges is to ensure sustainable development. Such a complex matter is of no doubt a challenge to teach. In order to increase environmental awareness, knowledge is crucial. However, perhaps more important is the understanding of the role each and every one of us play.

Images and objects is a teaching method which emphasizes active learning and critical thinking. Different images and objects are used to create reflection and discussions. This method is used in this teaching material to enable critical assessment of the options we are faced with as consumers.

Thus, based on education and knowledge, the modern citizen will make well-founded decisions to maintain and improve on a sustainable living.

Age group

The teaching material is easily adjusted to different age groups. However the recommended use is for pupils from the age ten till sixteen years.

The teaching material

The teaching material consists of:

1. Three separate PowerPoint presentations giving a **short introduction** to the themes
 - CO₂, global warming and carbon footprint
 - Trees as a part of the solution to climate changes
 - Wood as a material and the effects of substituting other materials
2. **A range of activities** connected to the themes, which pupils may do at home, at school or in their surroundings. Many of the activities involve taking photographs, either to document or to comment on an idea.
3. A final part where the pupils may present their photographs and share their ideas and thoughts. The purpose is to give the pupils an **opportunity to discuss and reflect on what they've learned**. It could also be a good idea to finish off with the activity "images and objects". This class activity is meant to create a consciousness on the effect different products may have on the climate.

The PowerPoint presentations

CO₂ - a global issue

This presentation about global warming and carbon footprint gives a very simplified version of the causes and consequences of global warming and climate change. For the older children, it would be expected they learn more about the greenhouse gases, the greenhouse effect, and the possible consequences of global warming.

Before introducing the term carbon footprint, there is a slide with the question: “Does your way of living cause emissions of CO₂”? Please challenge the pupils to answer this question before you go on. Do they see the connection between their lifestyles and the use of fossil fuels? Slides with the title “Your way of living?” and “Does your way of living = CO₂” are meant for a discussion in the classroom.

At this point, it is also perhaps necessary to talk about what actions they may take to reduce their own carbon footprint. What choices can they make? What may be done at school? Can changes be introduced at home? The pupils will need some knowledge of possible measures before they can do the activities.

Why are trees a part of the solution?

This presentation is also a simplified version of the truth. The photosynthesis is only mentioned. For most classes, it will be natural to explain the whole photosynthesis.

However, the main message is that trees store carbon (C), and thereby reduce the amount of CO₂ in the atmosphere.

Wood as a material

This presentation explains the advantages of choosing wood as a material, as compared to concrete, steel or cement. However, many pupils may not like the idea of cutting down the forest. To them, it wouldn't seem like an environmentally friendly thing to do. It is therefore necessary to explain the importance of sustainable forestry.

The activities

The sheet “Summary of activities” gives a brief description of the different activities, and explains their purpose. Please note the following:

Many of the activities involve actions at home, and it may therefore be a good idea to involve the parents in advance.

Most of the activities involve using a digital camera. For some this may not be possible, others may feel uncomfortable about taking personal pictures. It is therefore an option to gather pictures from the internet or to make drawings. Some of the activities can also be done without any use of picture/illustration.

However, there are several arguments for taking their own photographs. One is the idea about making it personal. *Your room, your clothes, your choices.* The other point is to be able to share what they've found with the rest of the class. Last, but not least, we also believe that with a camera in their hands, the pupils will become more active and more focused on the task. Sitting

in front of the computer will not be the same as looking for the “environmental choices” in the surroundings or in their own home.

There is no further information on the last activities, “Group discussion”. They are only suggestions for topics that may be discussed.

Images and objects

A description of this activity is on a separate sheet. Please note that there aren’t necessarily any “right or wrong” answers. The point is rather to create a discussion and a learning process.

Many of the images are easily replaced by objects.

No.	Title	Photographer	Comment
1	Downhill skiing area	Trygve Øvergård	Downhill skiing requires the use of a lift, and is therefore more energy consuming than cross country skiing
	Cross country skiing	Terje Johannesen	
2	Bus		The bus takes more passengers, and is therefore a better choice than a car. However, a full car is better than an empty bus!
	Car		
3	Brick house	Nina Ree-Lindstad	Releases CO ₂ in the production process
	Wooden house	Nina Ree-Lindstad	Stores carbon, and is therefore a better choice
4	Plastic bag	Nina Ree-Lindstad	Plastic is made of petroleum, which is not a renewable resource. In addition, plastic bags are not durable and often tossed away
	Shopping net	Nina Ree-Lindstad	May be used many times. Made of cotton, renewable resource (but in many cases the production of cotton is problematic, due to use of pesticides).
5	Cement pier	Nina Ree-Lindstad	Releases CO ₂ in the production process
	Wooden pier	Nina Ree-Lindstad	Stores carbon, and is therefore a better choice
6	Bottled water	Nina Ree-Lindstad	Where tap water is drinkable, use of bottled water is not necessary and hence it is an environmental problem because of production and transportation
	Tap water	Anna Lena Albertsen	
7	Bananas	Anna Lena Albertsen	The idea is that bananas have a longer transportation. This will of course vary, depending on the country. Apples and bananas may therefore be substituted by other fruits/vegetables.
	Apples	Anna Lena Albertsen	
8	Wooden floor birch	Anna Lena Albertsen	In Norway, birch is a local species. The use of merbau implies transportation. In addition merbau is considered a threatened species.
	Wooden floor merbau	Nina Ree-Lindstad	
9	Metal stool	Anna Lena Albertsen	Releases CO ₂ in the production process
	Wooden stool	Nina Ree-Lindstad	Stores carbon, and is therefore a better choice

No.	Title	Photographer	Comment
10	Soles made of old car tires	Anna Lena Albertsen	Is a better choice because the material is reused
	Soles made of rubber	Anna Lena Albertsen	Rubber is also a natural and renewable resource, so the choice is not obvious!
11	Paper cup	Anna Lena Albertsen	Made of wood, a renewable resource
	Plastic cup	Anna Lena Albertsen	Made of petroleum, not a renewable resource
12	Sweater made of fleece	Anna Lena Albertsen	Made of petroleum, not a renewable resource. However, the fleece may also have been made by used plastic bottles, and would then be a good example of reuse of material.
	Sweater made of wool	Anna Lena Albertsen	Wool is a renewable resource
13	Petroleum base heater	Nina Ree-Lindstad	Both heaters will emit the same amount of CO ₂ . However, wood will not release more CO ₂ than it gathered as a live tree, and wood is also a renewable resource.
	Wood based heater	Anna Lena Albertsen	
14	Concrete bridge	Nina Ree-Lindstad	Releases CO ₂ in the production process
	Wooden bridge	Nina Ree-Lindstad	Stores carbon, and is therefore a better choice
15	Glass fiber boat	Nina Ree-Lindstad	Releases CO ₂ in the production process
	Wooden boat	Nina Ree-Lindstad	Stores carbon, and is therefore a better choice

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Summary of activities

Title	Task	Purpose
Carbon footprint		
My carbon footprint	Investigate your personal consumption (how many shoes and clothes you have at home), and what actions the family takes for the environment	To make pupils aware of their own and their families' consumptions. To map parts of what constitute a carbon footprint. (There are two sheets, one for the pupils, and another one for the teacher showing how many points for each recording.)
Inspire your family	Investigate together with your family what you do for the environment. Can you do more?	Create awareness of what one already does and what one can do. Involve the family. Discover possibilities of environmental friendly actions at home. We must all be ambassadors and everyone must contribute.
Good and bad choice	Take two photos; one of something that is a good, and one of something that is a bad environmental choice.	Give the pupils an opportunity to reflect on good and poor environmental decisions. And to make them aware that we have a choice.
How far did your T-shirt travel?	Check the tag of your jacket or jumper, and see if you can find out the country of production. Check label on food and find the country of production	Make pupils aware that transportation is an important contribution to the carbon footprint. Not only transporting ourselves, but also the products we buy.
Wooden products		
What is it made of?	Check certain items in the kitchen to find out what they are made of.	Create awareness of the different types of materials, and discover that the same product can be made of different materials.
Wooden products in everyday life	Take photos throughout a whole day of all possible wooden products you encounter. How many photos did you take?	Create awareness that many of the products we are surround by are made of wood.

Title	Task	Purpose
Classroom activities:		
Images and objects	30 photos depicting 15 themes. The pupil chooses an image and must find his/her "partner". Together they will decide which of the two images / objects that is the most environmentally friendly option. (Many of the pictures can easily be substituted by objects.)	Create reflection and discussion on the two alternatives of the same issue.
Group discussion	What would the world be like if we didn't have trees?	Make the pupils understand that trees are vital for our well-being.
Group discussion	What products would disappear if we did not have trees?	Why should we choose wooden products when we can easily select other types of material?

My carbon footprint

In this exercise you shall record what you have at home and what actions you perform at home. Be honest and do the registration as precisely as possible. Please fill in "My recording" first, then calculate how many points. (The teacher will tell you how many points each recording corresponds to.) The purpose is to give you an indication of your carbon footprint. However, this is not a precise method, and some elements, such as food, are excluded. Anyway, the idea is that the higher your score, the bigger is your carbon footprint.

Questions 1 – 3 is your personal consumption	My recording	Points
1) What do you have of the following clothing and shoes? Register the number per item.		
Number of pairs of shoes (including boots, sandals, sports shoes, etc.)		
Pants (including jeans, sweat pants, etc.)		
Outer wear (including coats, rain coats, jackets, etc.)		
2) How many items of clothing and shoes have you purchased the last 2 months? Mark an x at one of the alternatives below.		
0		
1-3		
4-7		
More than 8		
3) Do you reuse?		
Do you sometimes buy second hand clothes?	Yes /No	
Do you sometimes use a shopping net rather than a plastic bag?	Yes /No	
Sum question 1-3		=
Questions 4 – 7 involves the rest of the family The numbers below should be added up and then divided by the number of persons living in the home.		
4) What's in your home? Write the correct number of each item		
Number of televisions		
Number of DVD players (or Blue Ray, VHS etc)		
Number of game consoles		
Number of computers (included laptops)		

Number of mobile phones		
Number of iPads or similar e-readers		
5) Check the following items at home. Are they labelled as energy efficient? Yes or no		
Stove	Yes /No	
Washing machine	Yes /No	
Freezer	Yes /No	
Refrigerator	Yes /No	
Dish washing machine	Yes /No	
6) Others		
Number of power saving light bulbs		
Number of other light bulbs and fluorescent tubes		
Do you have water saving shower head?	Yes /No	
How do you travel to school?	Walk/bicycle/bus/tram/car	
7) What kind of waste do you separate		
Plastic	Yes /No	
Paper	Yes /No	
Batteries	Yes /No	
Drinking cartons	Yes /No	
Light bulbs	Yes /No	
Bio-waste	Yes /No	
Glass and metal	Yes /No	
Do you recycle bottles	Yes /No	
Sum question 4-7		=
Divided on the number of persons living in the home		/
New sum		
+ sum from question 1-3		+
Sum for me (my carbon footprint)		=

My carbon footprint – how many points

After the pupil has filled in “My recording”, this sheet will help them calculate how many points they’ve got. The purpose of this exercise is to give the pupil an indication of his/her carbon footprint. This is not a precise method, but the idea is that the higher the score, the bigger is the carbon footprint.

Questions 1 – 3 is your personal consumption	My recording	Points
1) What do you have of the following clothing and shoes? Register the number per item.		
Number of pairs of shoes (including boots, sandals, sports shoes, etc.)		1 point per item
Pants (including jeans, sweat pants, etc.)		1 point per item
Outer wear (including coats, rain coats, jackets, etc.)		1 point per item
2) How many items of clothing and shoes have you purchased the last 2 months? Mark an x at one of the alternatives below.		
0		-1 point
1-3		1 point per item
4-7		2 points per item
More than 8		3 points per item
3) Do you reuse?		
Do you sometimes buy second hand clothes?	Yes /No	No = 1 p, Yes = -1 p
Do you sometimes use a shopping net rather than a plastic bag?	Yes /No	No = 1 p, Yes = -1 p
Sum question 1-3		=
Questions 4 – 7 involves the rest of the family The numbers below should be added up and then divided by the number of persons living in the home.		
4) What's in your home? Write the correct number of each item		
Number of televisions		2 points per item
Number of DVD players (or Blue Ray, VHS etc)		2 points per item
Number of game consoles		2 points per item
Number of computers (included laptops)		2 points per item
Number of mobile phones		2 points per item
Number of iPads or similar e-readers		2 points per item

5) Check the following items at home. Are they labelled as energy efficient? Yes or no		
Stove	Yes /No	-1 point per item
Washing machine	Yes /No	-1 point per item
Freezer	Yes /No	-1 point per item
Refrigerator	Yes /No	-1 point per item
Dish washing machine	Yes /No	-1 point per item
6) Others		
Number of power saving light bulbs		-1 point per item
Number of other light bulbs and fluorescent tubes		1 point per item
Do you have water saving shower head?	Yes /No	No = 1 p, Yes = -1 p
How do you travel to school?	Walk/bicycle/bus/tram/car	Walk = -1 p Bicycle = 0 p Bus/tram = 2 p Car/taxi = 4 p
7) What kind of waste do you separate		
Plastic	Yes /No	No = 1 p, Yes = -1 p
Paper	Yes /No	No = 1 p, Yes = -1 p
Batteries	Yes /No	No = 1 p, Yes = -1 p
Drinking cartons	Yes /No	No = 1 p, Yes = -1 p
Light bulbs	Yes /No	No = 1 p, Yes = -1 p
Bio-waste	Yes /No	No = 1 p, Yes = -1 p
Glass and metal	Yes /No	No = 1 p, Yes = -1 p
Do you recycle bottles	Yes /No	No = 1 p, Yes = -1 p
Sum question 4-7		=
Divided on the number of persons living in the home		/
New sum		
+ sum from question 1-3		+
Sum for me (my carbon footprint)		=

Inspire your family

Introduction: Our lifestyles contribute to CO₂ emissions. If we want to reduce emissions of CO₂, we need to make changes in the way we live. They don't necessarily need to be big changes, and they don't need to reduce our quality of life. However, it is important that we do it together. We must all contribute. In that way, even small changes can make big differences.

Duration: minimum 1 week

Equipment: Digital camera

Location: Home

Task: Request a family meeting where you all should discuss what you as a family do for the environment/discuss your lifestyles. It is your task to chair the meeting and to explain to the rest of the family what the meeting is about. You must also make sure that someone writes down the suggestions coming, and what you agree on. You can use the form below for notes.

Carry out a brainstorming session to answer the two questions:

- What do you already do at home which is good for the environment?
- Find suggestions for what more can be done.

Then you must choose one of the suggestions that the whole family can agree on. The agreed task must then be completed in one week. Use your camera to document the process. Next week you choose one of the other proposals, and implement it in one week. It is important that the whole family can agree. Remember to take photographs to document what the family does for the environment.

Environmentally friendly things we already do	These are suggestions on what more we can do

These are the proposals we have decided to implement:

Week	Description of what the family will do for the environment this week
1	
2	
3	
4	

Select the task you (and your family) were most pleased with, and present it to the class. Justify why you think it was a good initiative. Will the family continue to do this? Why / why not?

Questions:

1. Did the whole family understand why it is important to do something?
2. Was it easy for the whole family to agree?
3. Did everyone in the family manage to carry out what you had agreed on?
4. If not, what could be done to make everyone contribute?
5. In order to create a global reduction of CO₂ emissions, all the countries in the world must agree to contribute. Do you think this is possible? Explain your answer.

Good and bad choice

Introduction: At home, at school or at work, we always make choices. Some of these choices will lead to unnecessary emissions of carbon dioxide (CO₂), while other choices may help to reduce emissions. Often we make these choices without thinking much of it. This means that in many cases, we can easily make a smarter environmental choice, once we are aware of it.

Duration: 1 - 2 h

Equipment: Digital camera

Location: At home, at school or nearby

Task: Go out and take two photos. One shall depict an object or activity you think is a bad environmental choice. The other shall depict a smarter environmental choice. This can be photos of for example, transport, energy, products or trash, but remember that it should be linked to CO₂ emissions.

For each photo, you must explain why you chose to take this particular picture. Why is this a good example of a smart /poor environmental choice? How does this lead to reduced / increased emissions of CO₂? In addition, for the photo depicting a bad environmental choice, you should suggest what one ought to do as a better solution.

Share your photos and explanations with the rest of the class.

How far did your T-shirt travel?

Introduction: To assess the amount of CO₂ we emit, we need to consider our purchases. One of the things to study is where the goods have been produced. As a general rule, one can say that the further away the goods have been produced, the more CO₂ will escape on its way to you.

Duration: 1 h

Equipment: Clothes, food in its original packaging, digital camera

Location: At home

Task: Choose five different pieces of clothing; you may use what you are wearing. Find the tab inside the garment describing fabrics, etc. Usually it says where the garment has been produced. Register the country of origin. Find out which of these countries is furthest away and which one is the closest. Take a photo of the garment which is produced furthest away. Do the same for five randomly selected foods from your refrigerator or food cabinet.

	Product	Country of production	Rank from closest to furthest from you
1			
2			
3			
4			
5			
1			
2			
3			
4			
5			

Share with your class the product you found that was produced furthest away. What are the alternatives to buying this item?

Questions:

1. What is the reason so much of what we buy is produced in other countries?
2. What does it mean for CO₂ emissions, which country clothes or food is produced?
3. Which other questions should we ask ourselves when we buy something?

What is it made of?

Introduction: When we consider how much CO₂ we emit, we need to think through what we buy. One of the questions we need to ask ourselves, is “What is it made of”. Different types of materials have different production methods, usage and durability. In addition, it varies what happens to the product when discarded. We should therefore be aware of what material the item is made of. Do you know what the items in your home are made of?

Duration: 1 h

Equipment: Digital camera

Location: Home

Task: Go to the kitchen. Investigate the items from the list below and answer the questions. Take a photo of an item you would not have made from wood. Give reason for all your answers.

	Product	Which material is it made of?	If not wood, could it have been made of wood instead?	If yes, do you want to select wood next time?
1	Kitchen bench			
2	Floor			
3	Walls			
4	Table			
5	Cabinets			
6	Curtains/blinds			
7	Plates			

Compare your list with your classmates'. Were there any differences?

Questions:

1. What other questions should we ask ourselves when we make purchases?
2. Give some good reasons for choosing wood as a material.
3. What would be the reason(s) for not choosing wood as material?

Wooden products in everyday life

Introduction: When we consider how much CO₂ emissions our lifestyle causes, we must also consider how our purchases have been produced. One of the things we have to think about is what kind of material the product is made of. Do you know what the things around you are made of?

Time: 24 h

Equipment: Digital camera

Location: Home

Task: You must use the camera to document how many products of wood you are surrounded by during a normal day. That means you must have a camera nearby when you wake up, and take pictures of all products of wood that you see and / or use, until it is evening and you go to sleep.

Make a photo story and show it to the rest of the class

Questions:

1. How many pictures did you take?
2. Did you take more or less photos than you expected?
3. Do we need wood? Or can wood easily be replaced by other materials?
4. What are the benefits of wood compared to other materials?
5. What are the disadvantages with wood to other materials?

Images and objects

There are 30 photos available for this task, depicting 15 themes. Each theme has two photos, where one is considered more environmentally friendly than the other.

Each student chooses a picture, and the first task is to find the student who has a corresponding image. They have to look at each other's photo and figure out which images belong together.

Once all students have gathered in pairs, the next task is to figure out which photo's image is more environmentally friendly. They have to discuss the images and come up with a reason for their decision.

Next, the students are divided into two groups, one group having the environmentally friendly image and the other group the not so environmentally friendly image.

One by one, each student from the environmentally friendly group stands up and shows his/her photo and describes why it belongs to this group. From the other group the student with the corresponding image stands up and tells the reason for being in that group. The whole class decides whether they have come to the right conclusion.