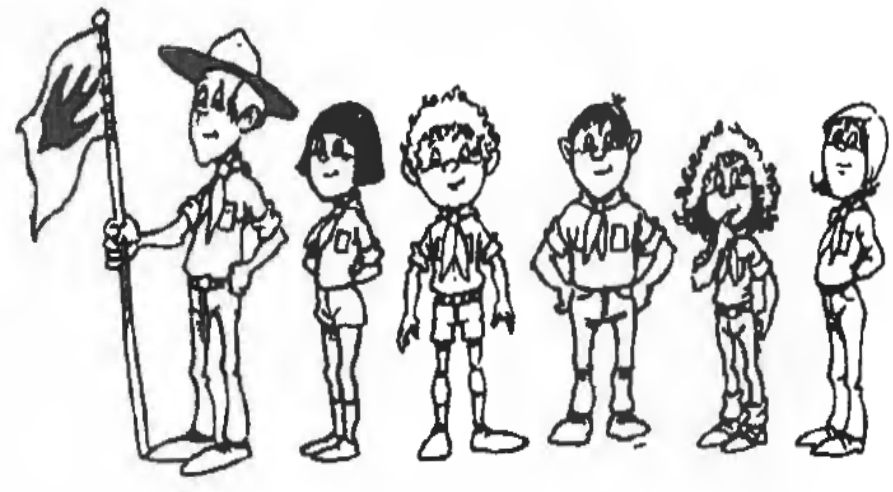
Sustainability



A handbook for the Øresund division sustainability course

Issue 1, 2025

Text and images are "borrowed" from:

The book on mineral raw materials and activities of importance (Råstofbogen), 2017.

https://www.overshootday.org/content/uploads/2022/06/2022_Past_EOD_en.pdf

Don Juul Madsen

Hey scout!

Welcome to.

Your leaders have chosen that you should learn something about resources, nature and sustainability.

As a scout, it is important to protect nature – that is, to take care of nature, and ensure that there also are nature in the future.

Table of contents:

This handbook will take you through the listed topics.

Purpose of this manual 4
Topics: 5
Sustainability: 6
What does a little overspending mean? 11
Energy supply and its problems: 15
Transportation. 34
Packaging: 43
The Internet. 47
Personal consumption: 54
What can we do ourselves to make society more sustainable? 65
How can we as scouts be more sustainable? 66
Own notes: 68
What can I do to minimize my CO2 emissions: 69

The purpose of this manual

The purpose of this scout handbook is to give you basic knowledge of what resources, nature and sustainability are, and what you, as a scout, can do to cherish nature (i.e. take care of nature).

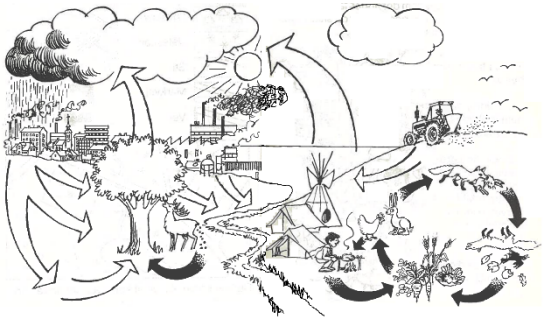
Topics:

In this booklet you will become familiar with:

- What is sustainability?
- Energy supply.
- Transportation.
- Packaging.
- The Internet.
- Personal consumption.
- What can I do as a scout?

Sustainability:

Sustainability is an expression of a technology's or society's wear and tear on natural resources.



As a simple example: If you grow grain in a field, and harvest/remove the grain from the field, then you need to add the same amount of nutrients, and carbon, to the soil that corresponds to the amount that you have removed from the field. If you do not add the same amount to the field as you remove, you are exhausting the soil, and the cultivation is not sustainable - the better you are at returning the substances to the field, the

more sustainable the cultivation of the grain is.

Now try to imagine a lake with a lot of fish. If you go down to the lake and only catch the same number of fish that are “growing” each year, then there is equilibrium in the number of fish in the lake. That is, there are just as many new fish as you catch each year. This is what is called “sustainable fishing”.

If you instead catch more fish than are “growing” each year, then there will be fewer and fewer fish in the lake, and eventually there will be no more fish in the lake. This is what is called “overfishing”.

Right now the world is consuming large amounts of carbon (coal, oil and natural gas) that has been stored in the ground. The carbon (CO_2) has been removed

from the earth's cycle for several million years . Previously, there was an equilibrium in the amount of carbon that was produced (released) each year, and the amount of carbon that was stored by plants and animals. This equilibrium was destroyed by the industrial revolution (starting in 1760 and until about 1820) when the world began to use large amounts of coal. Coal was primarily used to run industrial plants, and for transport (steam engines). Coal was also used for cooking and heating in private homes.

World consumption of oil began in 1859, when the first oil well was drilled (about 20 meters deep). World consumption of oil has exploded since then. Coal was replaced by oil, as oil is easier to work with, and machines that run on oil are easier to maintain and operate than machines that run on coal.

We humans, through our overconsumption , have used more resources every year than nature can create. In the old days, people were more sustainable than we are today. We lived closer to nature, and the substances we have taken from nature we also gave back.

Source: https://www.dragoerhistorie.dk/laes-om-lokalhistorien/leksikon/l/latrin/

Once upon a time, night workers drove around to each property and emptied

the locum bins. The contents were used as fertilizer on the fields, and the nutrients that were removed from the field as crops came back to the field as fertilizer.

Since 1857, when the first sewage system was established, the nutrient cycle where the fields received the “same” amount of nutrients back as was removed disappeared. In the Sewer System, the nutrients did not return to the fields, but out into the sea. Farmers now had to go out and buy the nutrients (artificial fertilizer) in order to grow the same amount of crops.

Today, we could easily return the sludge from wastewater treatment plants to the fields as fertilizer if it weren't for all the chemicals we pour down the sewer.

We also had less personal consumption in the old days. Back then, most people had two sets of clothes, one for work (everyday clothes) and one nice set of clothes (for church). Today, we have so much clothing that we throw away clothes we never wore because fashion has changed or we can no longer fit the clothes.

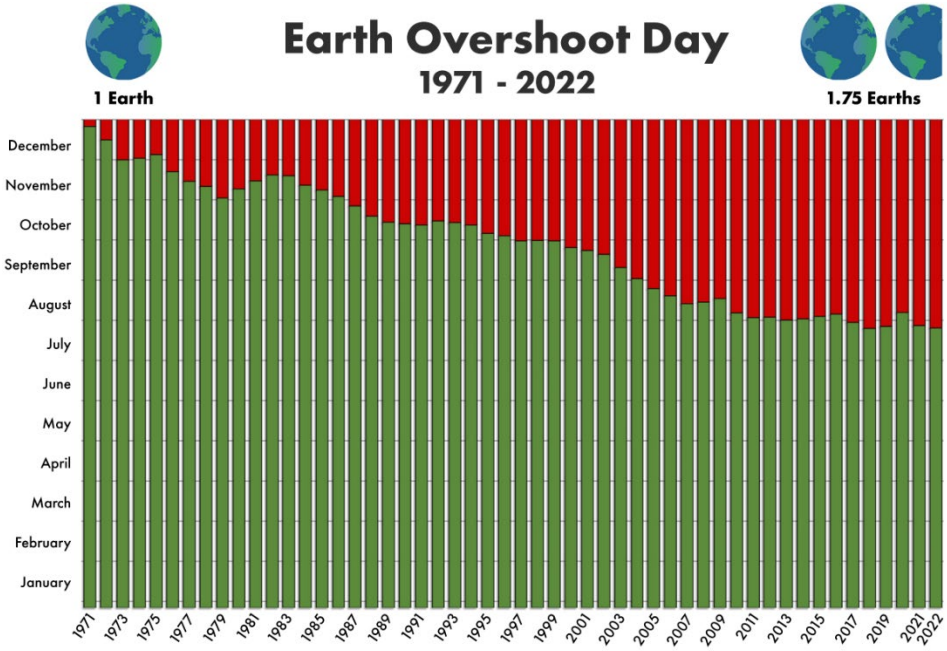
What does a little overspending mean?

If you have been following the internet about sustainability and overconsumption, you have probably come across the term “Earth Overshoot Day”. It is, in short, the day of the year when we have already used up the resources that the earth normally creates in an entire year. In 2022, we will

have used up the entire world's annual resources on August 2. All the resources that we use after this day are overconsumption of the earth's resources, meaning that we are consuming more than is being regenerated.

Think about the example of the lake and the fish from earlier:

There are fewer and fewer fish in the lake.☹



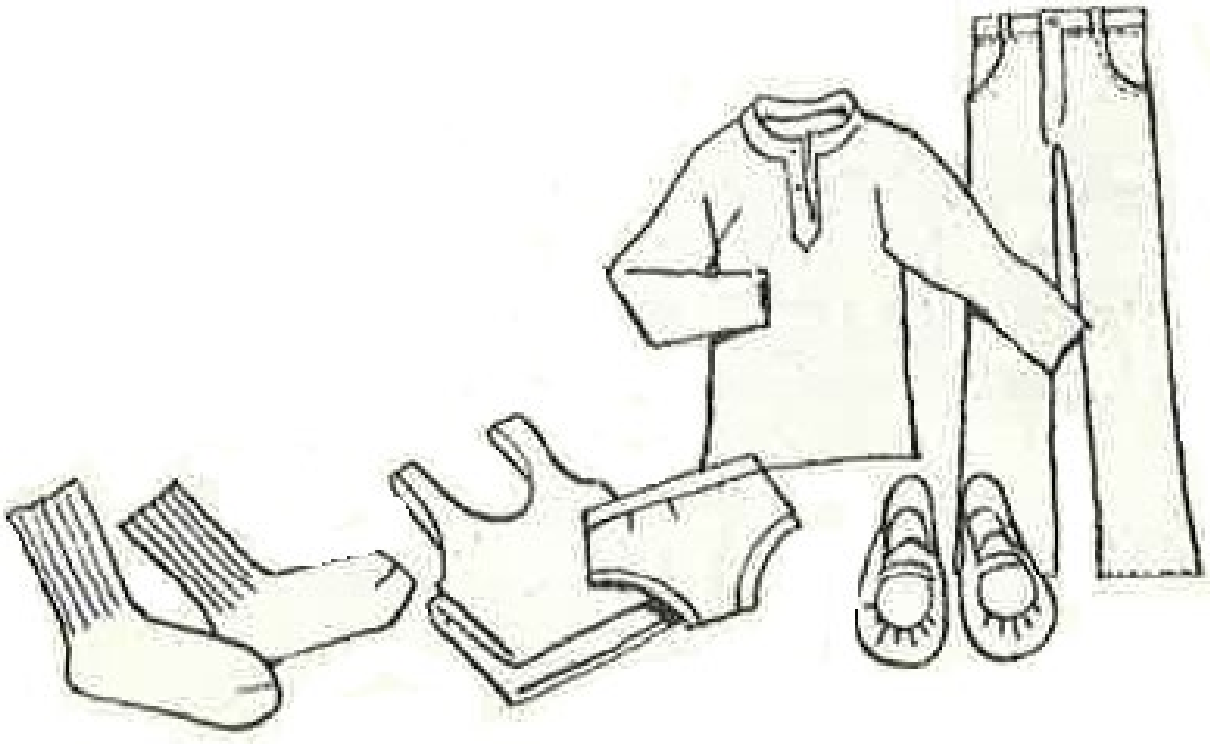
In 1971, we had almost sustainable consumption of the world's resources; today we are using 1.75 times the earth's resources each year.

Who is to blame for this overconsumption?

We all are, we all want more, and more. We can't settle for 1 pair of shoes. We need 10, or 20 pairs of shoes. 5 T-shirts are not enough, we need 20 or 30. And so on, and so on.

If you, and all of us, really want to turn things around, we need to take a step back and look at the way we have built our lives. Do we really need all the things we have chosen to fill our rooms/homes with? Do we need to buy new things all the time, or can we wait until we have worn out the things we already have?

How many clothes or toys do you have that you no longer use?



Energy supply and its problems:

There are many ways to get energy (power). In this section we will go over some of the different ways to make power, what advantages and disadvantages the different ways have.

Solar energy:

Today we can "harvest" the sun's energy in 3 ways:

1. You can either extract heat using a solar collector.
2. You can use solar cells to produce electricity using the photons in sunlight.
3. By heating a liquid using sunlight and using it to drive a steam turbine. (concentrate the sunlight using a parabola)

A team of visitors who are up to look at the possibilities for solar collectors north of the Arctic Circle (Sisimiut)

KTI's canteen building 2001 , Greenland

If we in Denmark installed solar cells on all roofs and house walls, which are really good for solar cells, we would be able to install 300 km2 of solar cells.

The biggest problem (disadvantage) of using solar energy to generate electricity is that the sun does not shine 24/7, and there is a difference in how much sunlight is present in summer and winter (at the latitude that Denmark is located). The other disadvantage is the price, if

each household is to have a 6kW solar cell system installed so that we in Denmark can have enough solar cell power. Then each household would have to spend a minimum of DKK 100,000. There are approx. 2,788,291 households in Denmark. This would mean an expense of approx. DKK 278,829,100,000 to have a solar cell system made. A household (average family of two adults and two children in a 150 m2 house) uses 4,500 kWh per year.

Some of the advantages of solar power are that there are very few CO2 emissions. The need for large high-voltage power lines crisscrossing the country is reduced, as each household

covers a large proportion of its own electricity consumption.

It will be difficult for foreign powers to black out Denmark, as most households will be able to generate their own electricity.

If, in addition to the solar cells, the homeowner also purchased a battery to store electricity, most households would be able to be almost completely self-sufficient in electricity.

Hydropower:

Hydropower has been known for centuries, first for crushing grain into flour, and as a driving force for forges. Later, hydropower became popular for powering factories (such as spinning

mills and weaving mills), later for powering a generator. Hydropower plants held the leading position as the cleanest and best (cheapest) form of renewable energy for many years.

The Copper Mill in Kupfermühle , 2017

The biggest problem (disadvantage) of using hydroelectric power to generate electricity is the changes that are made when a dam is built to provide enough water to power the power plant. Fish,

and other animals in the river, have a very hard time getting past the dams. Behind the dam, a lake is formed that changes the local landscape from a riverbed to a lake. This can have/has locally major consequences for the nature in the area.

Another disadvantage of hydroelectric power plants is that the dam lake emits methane, which is a greenhouse gas. The methane is caused by the organic material that the river carries with it, falling to the bottom of the lake and starting to rot (and creating methane). Energy from hydroelectric power would be almost completely CO2e free if it were not for the methane formed in the dam lake.

Some of the advantages of electricity from hydropower are that there is very little CO2 emission. Hydropower is easier to control than solar and wind. There are no daily fluctuations that can occur with solar and wind. However, hydropower is dependent on how much precipitation falls during a year.

Wind power:

Wind power has been used almost as long as water power, but primarily for crushing grain to make flour. Wind power had a great impact on flat lands without strong flowing watercourses (rivers). Almost every town and village in the old days had a windmill for

processing grain. Today there are almost no functioning grain windmills left in Denmark.

In 1980, the renaissance of wind turbines began, not for processing grain, but for the production of electricity. Wind turbines are today the preferred form of renewable energy. They provide "cheap" electricity in relation to the cost of establishment.

The biggest problem (disadvantage) of using wind to generate electricity is that the wind does not blow all the time. Sometimes it does not blow at all, and other times it blows too strongly for the wind turbines to use the wind. Another problem is that the blades of the wind turbine make noise when they turn. A

wind turbine should preferably be located 100 meters away from the nearest house so that the neighbor is not disturbed by the noise.

Many people do not think that wind turbines looks nice the landscape. This is one of the reasons why most new wind turbines are built out to sea, where they are not visible from the coast.

Wave and tidal energy:

Wave and tidal energy is in many ways the new kid on the block, sitting at the very back of the room. "Many" experimental plants, and model plants, have been built, but it has not yet been possible to find a design where the cost of building and operating the plant corresponds to the cost of the energy that the plant can produce. One of the problems with wave and tidal energy is that there are only a few places where the waves, or tides, are optimal for the behavior of these plants.

You should therefore not expect to see many wave and tidal energy plants (compared to wind turbines) in Denmark or the rest of the EU.

Electricity from Biogas:

By breaking down organic material, such as food scraps, sewage sludge, straw, and cow and pig manure, under controlled conditions, it is possible to produce metal, which is a combustible (clean) gas. This gas can be sent into a gas engine that can drive a turbine that then produces electricity. In this way, it is possible to produce green electricity from “waste”.

The biggest problem (disadvantage) of using biogas to generate electricity is that the first biogas plants were not built correctly, and therefore lost gas before it reached the engine (gas leaked out into

intermediate joints on the pipes in the plant).

Since methane is a greater greenhouse gas than CO2, this problem has a very large impact on how "green" electricity from biogas is.

Some of the advantages of electricity from biogas are that we as a society utilize some resources that would otherwise be lost, and form methane. Another big advantage is that we as a society have the opportunity to process the biogas that we do not use, and use it on a day when the sun is not shining or the wind is not blowing.

Biogas can thus be used as a “battery” for solar and wind. Denmark has storage

space for several months of gas consumption in the two underground gas storage facilities.

Electricity from biofuel:

All substances that contain carbon can be burned and used to generate electricity. Biofuels consist of wood chips, wood pellets and straw. By burning straw in a furnace, for example, it is possible to boil water, and the steam from the boiling water can be used to drive an electric turbine .

The biggest problem (disadvantage) of using biofuels to generate electricity is that there is a limited amount of biofuel available in Denmark, and one already

has to import biofuels from abroad to cover the Danish needs. This is not good for the CO2 balance sheet.

Some of the advantages of electricity from biofuels are that it is possible to store biofuels until the electricity is needed. If you are content to use the biofuels that are available locally in Denmark, you are utilizing a product for green electricity that would otherwise just be left out in nature to rot.

The black sources of power:

Coal, oil and natural gas emit the most CO2 per kWh produced, and electricity produced using coal, oil or natural gas is considered black electricity.

The biggest problem (disadvantage) of using coal, oil or natural gas to generate electricity is that they emit a lot of CO2, and there is a lot of CO2 being used to get the coal, oil or natural gas to the power plant.

The advantages of electricity from coal, oil and natural gas are that it is a cheap way to generate electricity. It is easy to increase or decrease the amount of electricity, and it is possible to cycle

through the coal, oil and natural gas until the electricity is needed.

Electricity from nuclear power:

Nuclear power uses the heat from nuclear fission to boil water, and in this way drive a turbine. There is no consensus on how much CO2 emissions from electricity produced by nuclear power. Some believe it is as low as 2 g per kWh, while others believe it is as high as 220 g per kWh. This and a number of serious environmental problems associated with the mining of uranium, make nuclear power a problem. Is nuclear power green, or black? You can find scientific reports on the Internet that claims both are true.

The biggest problem (disadvantage) of using nuclear power to generate electricity is that there are huge

environmental problems associated with the mining of uranium. Some have calculated that uranium mining alone have left behind 24 trillion tons of tailings (which is mine waste) and up to 20 times more waste rock.

Another problem is that there is not yet a permanent waste storage facility for the spent uranium (once it has been used to generate electricity).

The advantages of nuclear power are that it is a very stable source of energy. Weather and wind, like summer and winter, have no influence on how much electricity a nuclear power plant can produce.

Task:

Discuss in the patrol which source(s) of electricity you would choose to provide electricity to your country.

Write down why you have chosen that source or sources of energy.

Once all patrols have found their favorite source(s) of power, you must defend your choice to the other patrols.

Did all the patrols choose the same sources of power?

Transportation.

It costs energy to move a person, or materials, from one place to another.

We start by looking at how much CO2 the different modes of transport emit.

CO2 emissions from passenger transport

Means of transport	CO2 emissions per km.
To go	0 grams
Bicycle	0 grams
S-train	6g
IR4/electric train	7g
Bus	27g
Electric car	35g

IC3/diesel train	39g
IC4/ diesel train	82g
Car (petrol)	129g
Car (diesel)	142g
Ferry	170g
Airplane	223g

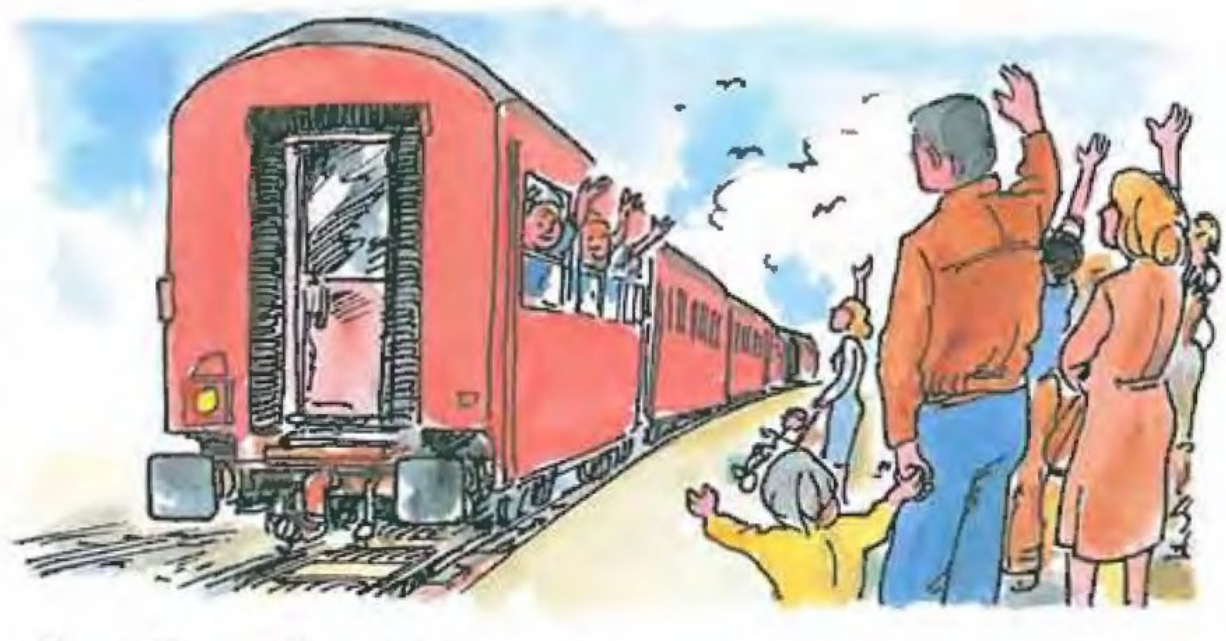
The way we choose to get around has a major impact on how much CO2 we emit over the course of a day, a week, a month, and a year.

If you are driven 5 km in a petrol car, you will emit:

$$5\ km * 129\ g\ CO2\ pr\ km = 645\ g\ CO2$$

If you instead traveled 5 km on a train (IC3), the calculation would look like this:

$$5\ km * 39\ g\ CO2\ pr\ km = 195\ g\ CO2$$



What do you think is best for the environment?

Try making an experiment:

A car emits approximately 0.13 kg CO2 per km. How many of the scouts in your branch are driven to the scout hut and picked up again?

How many kg of CO2 would you be able to remove if all the scouts walked, or cycled, to the scout hut when you are have meetings?

Try talking to your parents about not driving to the scout hut for a year, for example, if you live in the local area.

How many kg did you save after a year?

Do you get driven to school, sports activities, etc. by your parents? Do the other scouts in your patrol get driven to school or activities?

If you , in the patrol, walked or cycled (for everything), how much CO2 would you be able to save the environment?

CO2 emissions from transporting people account for approximately 15% of total Danish CO2 emissions.

If everyone walked, cycled, or took the train instead of driving, how much CO2 would we save?

CO2 emissions from transporting materials

Means of transport	CO2 per km per ton
Freight train	12g
Container ship	15g
Lorry	37g
Airplane	540g

Freight and goods transport accounts for 10% of Denmark's total CO2 emissions, so it is not without importance which form of transport is chosen.

Task:

How much CO2 will a 5 kg package sent from Beijing to Copenhagen cost in CO2 for the different means of transport?

There are 7231 km for a plane.

There are 10,080 km for a train/truck and 22,000 km for a ship.

Let's look at the task together:

We start by finding CO2 emissions per kg instead of per ton.

Means of transport	CO2 per km per kg
Train	0.012g
container ship	0.015g
Lorry	0.037g
Airplane	0.54g

Since we have a package of 5 kg, we just multiply the number by 5.

Means of transport	CO2 per km for 5 kg
Train	0.060g
container ship	0.075g
Lorry	0.185g
Airplane	2.7g

	CO2 per km for 5 kg	Kilometer
Train	0.060g	10,080
container ship	0.075g	22,000
Lorry	0.185g	10,080
Airplane	2.7g	7,231

We multiply the two numbers together.

Train:

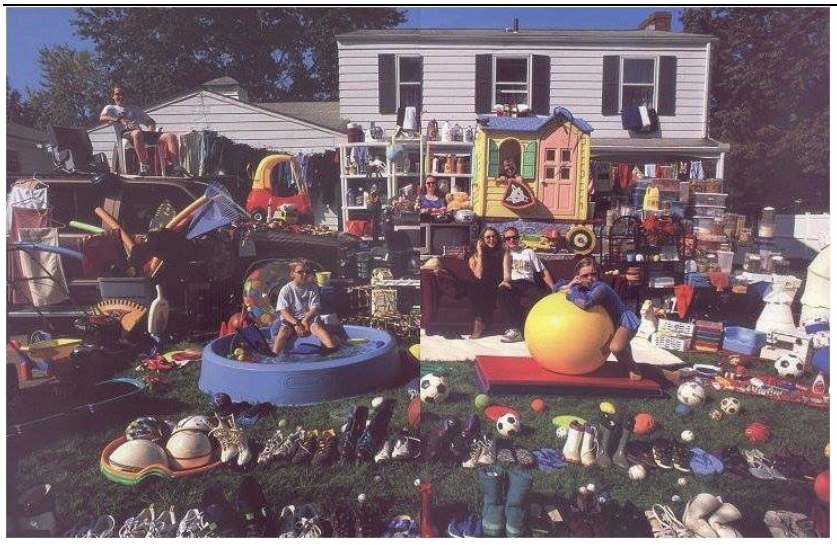
$$0{,}060\ g\ pr\ km * 10080\ km = 604{,}8\ g$$

Train	605g
container ship	1,650g
Lorry	1,864g
Airplane	19.524 grams

When you order new clothes, toys, etc., does the package have to be sent by air?

Can you calculate how much the last package you, or your parents received cost in CO2?

How much CO2 could you save if you bought local things instead?



Source: National Geographic

The image of things made of plastic in a home in the USA.

Packaging:

Everything is packaged today, and often in plastic.

Have you tried to investigate how much packaging you "use" during a day?

I bought a box of marzipan Easter eggs (see photo).

The image 1; Box of Easter eggs

There were 16 Easter eggs, and so much air/ packaging. The box of Easter eggs could easily have been half as big.

The manufacturer (Anthon Berg) could easily save the environment a lot of CO2 (pollution). If the box is smaller, then fewer materials (cardboard and plastic) need to be used. A smaller box also means less air is transported, which means there is room for more boxes in a truck. The less “air” a truck has to move from A to B, the less CO2 is wasted.

In 2020, REMA 1000 reduced the packaging consumption of bags of frozen vegetables and berries by 32% by reducing the thickness of their bags! This

meant that 70 tons less plastic was used per year.

Coop has replaced meat trays with plastic bags for minced meat. There is 70 percent less plastic in the so-called flowpack bag compared to the traditional meat tray. Coop is thus removing 169 tons of plastic from the refrigerated counter and reducing CO2 emissions by 539 tons annually.

So it is possible to change the packaging that surrounds the goods that we buy.

Task:

Can you, in the patrol, find examples of products that are "stupidly" packaged? That is, products that have a lot of air in relation to the product that is in the packaging.

Write some examples here:

The Internet.

What does the Internet have to do with sustainability?

The Internet uses approximately 84 to 143 gigawatts of electricity each year, and the number is increasing every year. This corresponds to approximately 3.6 to 6.2 percent of all electricity produced each year on Earth.

It has been calculated that the Internet emits approximately 4 percent of the world's CO2 emissions.

A bank in the Netherlands estimates that a bitcoin transaction costs 402 kg of CO2. The digiconomist.net calculated the CO2 emissions for a transaction to be 685.3 kg of CO2. It has been calculated that bitcoin transactions emit CO2

equivalent to 0.2% of the world's CO2 emissions each year .

So what do the different things we use the internet for “cost”?

- 1 text message costs on average: 0.01 g CO2
- Michael Jackson's "Billy Jean" lasts 4.53 minutes and takes up a total of 11.3 MB. 20 g CO2 per time you listen to it.
- Video streaming emits 6.67 grams of CO2 per minute.
- A single megabyte email emits approximately 20 grams of CO2 on its journey from sender to recipient. A regular email emits approximately 4 grams of CO2, while an email with an image emits 50 grams of CO2.
- A virtual meeting emits up to 16.67 grams of CO2 per minute.
- A Google search emits 0.2-7 grams of CO2 depending on the content of the page,

while looking at a web page with image or video content emits 12 grams of CO2 per minute.

- For every minute you use TikTok , it emits 2.63 g. CO2.
- For every minute you use Reddit , it emits 2.48 g. CO2
- For every minute you use Pinterest, it emits 1.3 g. CO2
- For every minute you use Instagram, it emits 1.05 g. CO2
- For every minute you use Snapchat, it emits 0.87 g. CO2
- For every minute you use Facebook, it emits 0.79 g. CO2
- For every minute you use LinkedIn, it emits 0.71 g. CO2
- For every minute you use X (Twitter), it emits 0.6 g. CO2
- For every minute you use Twitch, it emits 0.55 g. CO2

- For every minute you use YouTube, it emits 0.46 g. CO_2
- For every minute you use Spotify, it emits 0.91 g. CO_2

Young people aged 16-17 spend approximately 5 hours and 28 minutes on screens every day, and in a week this will amount to 38.2 hours.

Task:

How long do you spend on the screen (the internet) each day?

Are you an internet zombie who can't survive without the internet?

Task:

Write down what you spend your daily screen time on.

e.g.

- 46 minutes on youtube

-15 minutes on Facebook

List your consumption:

Task:

Now you have made a list of what you spend your screen time on, so how much CO_2 emissions does your screen time have?

Can you cut some of your screen time?

Should we as scouts really spend so much time on the internet, instead of being out in nature, meeting other scouts, going on scout runs or just having fun with the rest of the patrol?

Personal consumption:

Drinking water:

It is predicted that the price of clean drinking water will increase (drastically) in the coming decades, as more and more drinking water reservoirs are depleted or polluted. It is not impossible that drinking water will be traded in the same way as crude oil in the future (bought and sold).

Do you know how much water you and your family use every day?

A typical person uses approximately 105 liters per day.

Here you can see what you use your water for

Bathing and hygiene	37.8 liters of water.
Toilet flush	28.4 liters of water.
Laundry	13.7 liters of water.
Dishwashing and cleaning	10.5 liters of water.
Cooking + drinking	7.4 liters of water.
Everything else	7.4 liters of water.

Our drinking water is produced from groundwater (aquifers). It takes many years for rainwater to reach the groundwater so that we can collect it as drinking water. If our water consumption increases, natural wetlands and streams will be damaged as we take the water that they would otherwise have.

Source: https://lollandforsyning.dk/kunde/vand/viden-om-drikkevand/

Groundwater is threatened in many places by pollution from nitrates, pesticides and industrial pollution. Every year, drinking water wells are closed due to pollution.

What can we do to protect our drinking water?

- Avoid using chemicals in the home for cleaning.
- NEVER pour chemicals, oil or acid into nature or the sewer.
- Only use the drinking water you need, repair leaking taps.
- Take short showers.
- Use the small flush on the toilet whenever possible.

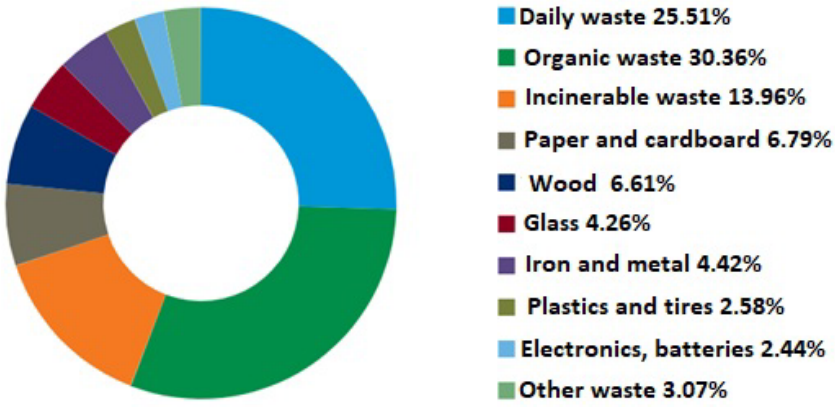
Modern society, and the price that nature pays.

When Denmark, and the rest of the world, went from being an agricultural society to being an industrial society (the modern society), people began to consume more than what nature could regenerate in a year.

Our modern society produces and disposes of enormous amounts of waste. Some of this waste ends up in the ocean.

In the Pacific Ocean, Circular Ocean Currents mean that waste - primarily plastic - collects into gigantic, floating islands. The plastic island can weigh up to 15 million tons and has a depth of between 30 and 60 meters.

In Denmark, every Dane produces 786 kg of waste per year.



Try weighing and counting your waste for a week. How many kg of waste do you produce during the week?

Waste	**Pieces of garbage**	**Kg of waste**
Daily cleaning		
Organic waste		
Paper and cardboard		
Wood		
Glass		
Iron and metal		
Plastic		
Hazardous waste		

Are you sustainable, or are you overconsuming?

Try to think about:

- How many pairs of shoes do you have at home? Do you have any shoes that you never wear, but just sit in your closet?

- How many blouses or pants do you have? Do you have anything that you no longer wear or have never worn?

- What about your toys? Is there anything they don't use anymore - should it be thrown out? Sold? Stored? Or given away?

Anything that can be reused by others saves the earth a lot of resources , and we get a more sustainable use of the earth.

Think about whether you really need the latest mobile phone, can't the old one

last a year or two? Do you want to throw it away, or recycle it so that others can enjoy it?

Do you buy new clothes, mobile phones, shoes, etc. because they are no longer fashionable, or is it because they no longer work?

I have taught at the only mining school in the Danish kingdom (the Mining School in Sisimiut-Greenland). On one of the school's vehicles there was a sticker that came from a mining equipment show in the USA. The sticker said:

EARTH FIRST!

WE MINE OTHER PLANETS LATER

Although the text on the sticker is intended as a bit of fun and mischief, unfortunately there are some people and companies who think that way . That we should just use the land we have, and when it is too toxic for us to survive on it, we should just find a new planet to live on.

We are scouts, we look after our land!

We only have the one.

Not just when we're on tour, but every day.

What can we do ourselves to make society more sustainable?

This will of course not mean that society will have to return to the Stone Age. No...on the contrary, society will only have to change a little bit. Instead of driving a petrol car, we will have to drive an electric or hybrid car. Instead of buying a " disposable " plastic carrier bag, we will use the same cloth carrier bag over and over again. Instead of disposable packaging, we will have to use reusable packaging , so we will exchange our empty bottle of detergent for a full one. etc. etc.

How can we as scouts be more sustainable?

- Use a wood-saving stove instead of a fire.
- Turn off the lights and save on heat.
- Buy organic products.
- Buy products that are produced locally.
- Use reusable shopping bags (cloth) instead of plastic bags.
- Make food from scratch instead of buying ready-made meals.
- Use a mug and plate instead of disposable cutlery.
- Buy fruits and vegetables that are in season.
- A scout should not be driven to meetings by car! We walk, or cycle, to the meetings.

- Buy things for the cabin that are made to last, and not always the cheapest.
- Repair instead of throwing it away and buying new.
- Don't buy more food or other things than you need.
- Buy used items instead of new ones.
- Sell or give away the things you no longer use instead of throwing them away as trash.
- Spend less time on the internet.

Own notes:

What I can do to minimize my CO2 emissions:

The Danish Scout Promise

I promise to keep the Scout Law.

The Danish Scouting Act

Anyone who is part of the Danish Scout community does their best to:

- to find one's own faith and have respect for others'
- to protect nature
- to be a good friend
- to be considerate and help others
- to be trustworthy
- to hear the opinions of others and form one's own
- to take responsibility for family and society

Motto

Be prepared