Your CO$_2$-Calculator

Pedagogical material to complement the CO$_2$ Calculator: project ideas and work suggestions

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Foreword – Däin CO$_2$-Rechner

Today, climate change is no longer questioned by science, but how can global warming be stopped and, if necessary, reversed? It is a complex problem, although the goal is supposedly simple: reducing the CO$_2$ footprint.

All living things release carbon dioxide into the atmosphere. Plants need it to live. Everyday activities, from surfing the internet to a burger to a cup of coffee, similarly release greenhouse gases. However, these gases can store a lot more heat than the atmosphere normally does. The result is a greenhouse effect where the planet's temperature rises. This increase in the global temperature can lead to ecosystems failing, species dying out, and an increase in extreme weather events in the form of storms, floods and droughts.

However, the less CO$_2$ and other greenhouse gases that are released into the atmosphere, the easier it will be for the climate to stabilise itself. Thus it is possible to aspire to CO$_2$ neutrality and to avert climate change.

The stimuli and ideas for project work in lessons presented below are intended to enable learners to inform themselves about this subject, to research facts and to form an opinion about the extent to which they are affected and which actions are appropriate, in their opinion.

The booklet is intended as educational support material for the online tool.

The calculator was developed by the klimAktiv organisation and adapted to the Luxembourgish context in collaboration with the Nohaltegkeetsrot (High Council for Sustainable Development). Calculating a personal CO$_2$ footprint is based on questions which are answered in the following categories: lifestyle, travel, living and electricity. There are exercises in the booklet for each of the categories, which can be used to gain a deeper understanding of the subjects.

Däin CO$_2$-Rechner:

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I. Mobility

I.1. My mobility – My footprint

Discussion and survey

Phase 1: The teacher discusses the following, or similar, questions with the students. It is also possible to display photographs or pictures in advance, as stimuli to encourage students to speak. The results are recorded on the board, as keywords.

- How do you travel to school, or to the cinema?
- How do you travel when visiting your friends?
- How do you travel when you go on holiday?

Phase 2: Based on the keywords, a survey is prepared together (e.g. using Microsoft Forms, Doodle, SurveyMonkey or similar). Small groups can devise 3–4 questions each. However, clarify in advance what kind of questions should be asked (open questions, yes-no questions, questions involving estimates, etc.). REMINDER: The questions should be worded as objectively as possible, in order not to influence those giving answers.

Phase 3: The survey is tried out in the class and can be shared with other classes, to make the figures more reliable.

Phase 4: The statistics are evaluated: What trends can be observed? What are the challenges in relation to mobility? And to sustainability?

TIP: Young people and adults fill out the questionnaires separately. Whose footprint is more environmentally friendly?

I.2. Planning a class outing

Planning the project

The students plan an imaginary or a real class outing. They consider the following questions:

- What are the criteria in choosing where to go?
- What aspects need to be considered when travelling?
- Which means of transport is chosen (judged on travel time, duration, comfort, price, CO_2 emissions or the nature of the experience)?
- Which means of transport would the students choose, and for what reasons?

I.3. On foot or by bike to school – "safe school routes"

Carrying out a project

The class produces a "green" school routes map for one or more schools in the area: What is the safest route for cyclists and pedestrians? The map can be produced digitally, so that it can be shared more easily with other classes or other young people from the local area later on. Green (safe) routes are drawn in on the map and possible danger areas marked.

Once this work is completed, there is an opportunity to get in touch with the school management, local authority officers/councillors and the Ministry of Mobility to alert them to identified dangers, to put forward possible solutions and to find out whether people are already working on solutions.

TIP: This link shows one possible way of evaluating cycle routes: www.veloskaart.lu
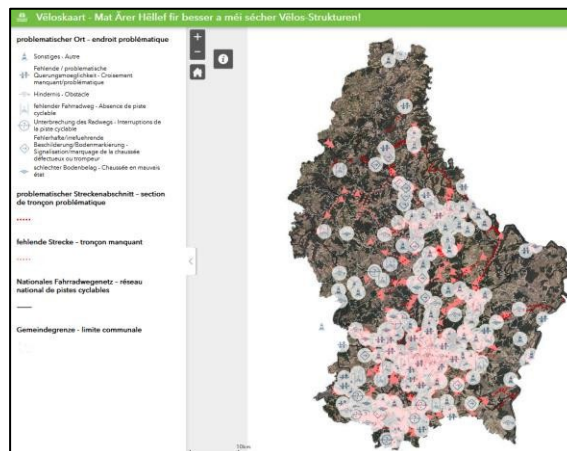
I.4. Car as status symbol?

Discussion

The class arranges the chairs in a circle. The teacher lays out photos of possible status symbols in the centre of the circle: cars, travel photos, selfies, photos of nice-looking meals, clothes, a yoga course, bikes, brand logos, etc. The students each choose one to two photos and explain why these photos in particular appeal to them.

A numbered rating scale (1–10) is drawn on the board. The students put their photo under it, based on the importance they attach to it *personally*. Once everyone has presented their status symbols, the class votes to create a joint ranking of the five most important status symbols.

Next, the students should use the scale to show the suspected compatibility of the status symbols with the environment and the climate (1 = not at all, 10 = very compatible).

- What does comparing the two rating scales tell us? How can we explain that?

The teacher guides the discussion onto the value of the car in society.
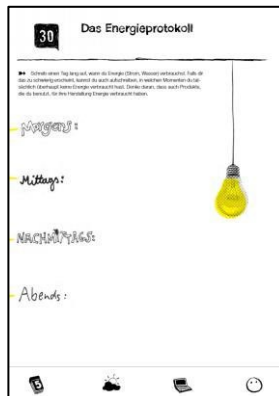
- What is seen as a status symbol today? Why?
- What do the students think about the car? Why?

II. Energy and climate change
II.1. Daily energy consumption

Keeping a record, research, debate

The students investigate their own energy and electricity consumption: for this, they can use Page 30 in the *Logbuch Politik* as a template, for example.

Possible additional research:
(the results should be recorded as keywords, e.g. as a mind map):

- How much energy is used when you do an internet search or send a text, or post a photo or a video online? How much water is needed to cool the servers?
- What is the energy consumption like for gaming and streaming?
- Where does Luxembourg get its electricity from? Where is it produced, and how is it sourced?
- Which are the forms of energy producing the most CO_2 emissions?
- What concerns (political, moral, environmental, etc.) exist in relation to the individual sources of electricity?

Closing debate:

The class is divided into two (or four) debating teams. The teams each look for arguments for or against the subject given below. They have around 20 minutes for this. After researching, they then swap arguments. Each team member must present at least one argument. Which team was the most convincing?

> *What are the advantages and disadvantages of digitalisation in all areas of life (school, work, leisure) with regard to a sustainable future?*

TIP: Worksheet "Klimakrise – Herausforderung für die Zukunft und die Demokratie" ["Climate crisis – a challenge for the future and democracy"] in: *duerchbléck 8: Zukunft elo!?*, p. 26/50. You can find a graphic here with project stimuli and information.
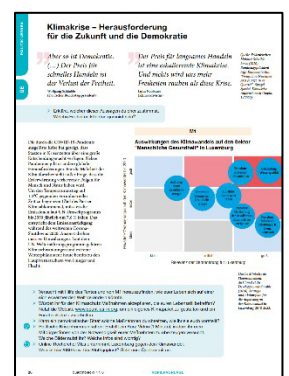
II.2. Controversial climate debate

Discussion

The students read the following statements about climate change, which also illustrate the policy discussions. They are asked to respond to them: which statements do they have sympathy with? Which not? What do they think about the respective statement? Why?

After this, the statements should be analysed in detail for their content, and discussed:

- Comparison between statements by Greta Thunberg and Donald Trump: What emotions are they looking to stir up in their audience? Are there facts or scientific findings that support one of the statements? Which?

- Comparison between statements by Wolfgang Schäuble and Luisa Neubauer. What criticism of politics is being discussed here? How are the two arguing?

I want you to panic. I want you to feel the fear I feel every day. [....] I want you to act as if our house is on fire. Because it is.

Greta Thunberg (Swedish climate activist)
At the World Economic Forum, Davos, 25 January 2019

Der Preis für langsames Handeln ist eine eskalierende Klimakrise. Und nichts wird uns mehr Freiheiten rauben als diese Krise. [The price of acting slowly is an escalating climate crisis. And nothing will rob us of more freedoms than this crisis.]
Luisa Neubauer (German climate activist)
Source: Feldenkirchen Markus/Schaible Jonas (2020). Bundestagspräsident trifft Klimaaktivistin. "Wenn Frau Neubauer jetzt Ja sagt, ist es Quatsch". Spiegel Spezial. Klimakrise. Aufbruch nach Utopia, 1 (2020).

Aber so ist Demokratie. (…) Der Preis für schnelles Handeln ist der Verlust der Freiheit. [But that's how democracy is. (…) The price of acting quickly is the loss of freedom.]

Wolfgang Schäuble (President of the German Bundestag) Source: Feldenkirchen Markus/ Schaible Jonas (2020). Bundestagspräsident trifft Klimaaktivistin: "Wenn Frau Neubauer jetzt Ja sagt, ist es Quatsch". Spiegel Spezial. Klimakrise. Aufbruch nach Utopia, 1 (2020).

The POLAR ICE CAPS are at an all time high, the POLAR BEAR population has never been stronger. Where the hell is global warming?

Donald Trump (former US President)
Source: Twitter, 29 October 2014

II.3. Let's talk about … climate *change*, climate *crisis*, climate *catastrophe*?

Research, analysis, discussion

The various viewpoints concerning a changing climate are similarly reflected in the choice of words used. To introduce the subject, the teacher writes the three terms on three A2 sheets of paper and asks the students what effect the words have on them. What thoughts do these terms trigger?

The students write the words they associate with these terms on the respective sheet. Does anything change in our perception depending on which word is used as the second element in this composite term?

In more extended research, students can find out which forms of words (climate change/catastrophe/crisis, global warming, etc.) are used by political parties or civil society organisations in Luxembourg. Using a table, they can record the various opinions of Luxembourg political parties on the subject of "climate". The following questions could be discussed:

- What effect do these terms have? Why are they used differently and used in debate?
- Are these positions appropriate or not, in your opinion?
- What subjects are priorities for you when you vote (or if you could vote)?
- What role does the subject area of climate and environment play?

II.4. Can nuclear technology save the climate?

Discussion and research

The teacher puts up the two quotations printed below via the projector, and discusses them with the students.

- What is the content of these statements?
- What reasons could people have for saying these things?
- Which people are more trustworthy? Why?

Through research, the students can engage with the subject and gather facts and figures. One part of the class gathers arguments in favour of nuclear energy, another the arguments against. After this, the arguments and facts are presented.

Quote 1

Die Kosten für Solar- und Windenergie sind in den letzten Jahren massiv gesunken, für Atomstrom hingegen deutlich gestiegen. Das Geld, das in neue Kernkrafttechnik fließen konnte, fehlt zudem an anderer Stelle für billigere, nachhaltigere Alternativen. (...) Die Investition in neue Atomkraftwerke verschlimmert die Klimakrise. Da gibt es überhaupt keine Zweifel.
[The costs of solar and wind energy have fallen massively in recent years, whereas those for nuclear energy have risen significantly. The money that went into new nuclear power engineering is also lost elsewhere for cheaper, more sustainable alternatives. (...) Investment in new nuclear power stations makes the climate crisis worse. There can be no doubt about that.]

Mycle Schneider, in *World Nuclear Industry Status Report*, Governmental advisor on nuclear energy, 2021, in ARD-Magazin *Fakt.*
Source: https://www.mdr.de/wissen/vierte-generation-atomkraft-reaktor-klimawandel-100.html (last accessed on: 11.05.2022)

Quote 2

(...) faire en 30 ans de la France, le premier grand pays du monde à sortir de la dépendance aux énergies fossiles, et renforcer notre indépendance énergétique industrielle dans l'exemplarité climatique. (...) Ce sont des choix éclairés par l'expertise et par la science. S'il est nécessaire d'être prudent sur la capacité à prolonger nos réacteurs, je souhaite qu'aucun réacteur nucléaire en état de produire ne soit fermé à l'avenir compte tenu de la hausse très importante de nos besoins électriques (...) **[To make France, in 30 years' time, the first country to free itself from dependence on fossil fuels, and to strengthen our energy and industrial independence whilst setting an example for the climate. (...) These are choices informed by expertise and science. Even if it is necessary to be cautious regarding the ability to extend the lifetime of our reactors, I hope that no nuclear reactor capable of production should be closed in future, given the significant increase in our need for electricity (...)]**

Emmanuel Macron, President of France (February 2022) Source: https://www.elysee.fr/emmanuel-macron/2022/02/10/reprendre-en-main-notre-destin-energetique (last accessed on 02.09.2024)

Possible additional tasks:

- Research: What are the views of Luxembourg's political parties on nuclear energy? Make a table to illustrate this.
- What are the alternatives to conventional nuclear energy (using nuclear fission)? Are there technical innovations that could supply sufficient clean energy in future?

III. Food

III.1. Organic produce and regionalism vs. globalisation

Survey and research

The teacher gives the class the statistics shown below. In pairs, the students evaluate the statistics. Possible questions are:

- What strikes you about the graphic?
- How can you perhaps explain the differences between the overall population and the organic shoppers?

After this, using an online tool with the class, statistics are gathered using similar questions reflecting the world the young people live in and their consumer behaviour (e.g. questions about what they eat in school). The class evaluates these statistics for themselves. After this, the survey is given out to other classes.

Evaluation: The results can be presented in the class and discussed, or published via a QR code displayed in the school.

Share of shoppers in organic shops in Germany by purchasing behaviour for food, compared with the population in 2021
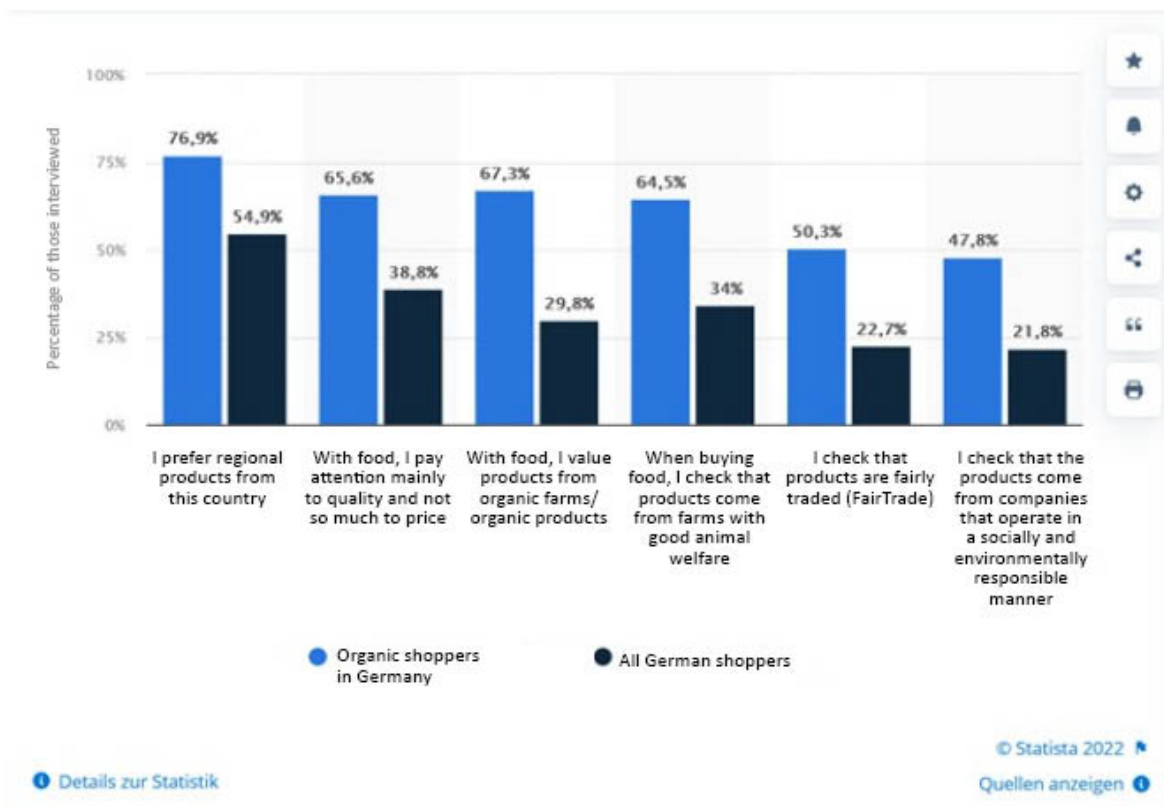
Suggestion for an extended discussion or a written exploration:
ConsommActeur/ConsomActor: What is the meaning of this term? Do you think that consumer behaviour influences food production?

III.2. Good chocolate?

Research

The class is challenged to research the course of production, from the cocoa plant to the chocolate bar, in small groups. In their work, the groups focus on:

- Conventional chocolate products;
- Organic chocolate products;
- FairTrade chocolate products.

Each group uses its own drawings or a photo-collage to illustrate the social and ecological effects of the manufacture of their product. Alternatively, a short explanatory video can also be created, using cut-out animation (max. 2–3 minutes). There are tutorials on this online.

III.3. At the supermarket

Role-play and creative task

Phase 1: The class works in small groups to come up with criteria and arguments that are important to them when shopping.

Phase 2: The class is divided into two groups: one half of the class wants to sell organic and fair-traded products. The other half are consumers. The sales side try to convince the consumers about their product.

What were the problems? What (new) arguments came up?

Phase 3: The class jointly develops an advert for fair-traded chocolate. What are they trying to convey to the consumer? And how? What approach would they take in an advertising poster? What approach for a TV advert or an advert on social media?

III.4. Eating meat: *Meatless Monday*?

Research

The class conducts online research into the term *Meatless Monday*:

- What is *Meatless Monday*? Where does the idea come from?
- What is the aim of it?
- How long has the initiative been running?
- Where do you find *Meatless Monday*? What are the experiences from it?
- Are there other models?

The research can take a deeper dive using the following questions:

- What are the arguments raised, and by whom? (Author, politician, homepage, newspaper?) The arguments can be collected in a list with arguments for and against.

- Are there any reader comments on the articles? What arguments are understandable, and which are not?

Closing discussion: What do the students think about this initiative?

> **Possible action:** record a week's canteen menus to analyse meat consumption at school.

III.5. "Anti-Gaspi": combating food waste

Placemat

Phase 1: The students take part in the following quiz and then discuss what was new for them or what surprised them.

https://www.geo.de/natur/nachhaltigkeit/23255-quiz-quiz-was-wissen-sie-ueber-lebensmittelverschwendung (last accessed on: 02.09.2024)

Phase 2: The students gather suggestions about sustainable food using a placemat. The template below can be used for this (DIN A1 or A2): What can we do differently? At home? At our school? Me personally? In politics?

The class is divided into groups of four: Each group is given a placemat (see template) and 15–20 minutes' time to fill it in. The students each write an idea down in the space they have in front of them. Then the placemat is turned around, so that they have a new question in front of them. The placemat can be rotated several times, so that the individual answers can be supplemented with further ideas.

At the end of the specified time, the individual groups present their results.

> **Possible action:** The ideas that have come up for *At our school?* are collected. Two or three of the suggestions are chosen by the class, discussed, supplemented and worded formally. Afterwards, they are circulated verbally or in writing to the student council and/or to the school management. What practical steps would need to be taken to implement these proposals?

What can we do differently?

At our school?

At home?

Me personally?

In politics?

IV. Fast Fashion
IV.1. What makes me tick!

Positioning activity

The teacher creates a slide show with the various statements about clothes consumption, and arranges the classroom in such a way that the students can move around freely and stand in three corners. The corners are labelled with paper signs, reading: "Yes!", "No!" and "Don't know."

The questions are read out or projected, and the students answer by moving to one of the three corners. That forms an initial picture of opinions. The teacher then uses a few questions to look more closely at the positions some students have taken up, allowing them to explain their position.

> ➢ Buying clothes makes me happy.
> ➢ I'm happy every time I put on a new item of clothing.
> ➢ After buying something, people are happy for a long time.
> ➢ *Solden/Sales*, *Black Friday*, *Clearance Sales*? I'm going shopping!
> ➢ Branded clothes are important to most people.
> ➢ Brands stand for quality.
> ➢ The people stitching the clothes should be paid fairly.
> ➢ It's important to people to know whether child labour has been used in the manufacturing.
> ➢ People research how their clothes are made.
> ➢ Fairly produced goods are important to consumers.
> ➢ People buy clothes when they need them. Any other considerations don't matter.
> ➢ People should mend more clothes.
> ➢ Clothes say a lot about social status.
> ➢ It's OK for fur for hoods to come from fur farms.
> ➢ I know shops that sell second-hand stuff.
> ➢ In Luxembourg, people buy a lot of things second-hand.
> ➢ I have clothes or accessories made from recycled material.
> ➢ People mainly pay attention to the price.
> ➢ Advertising and influencers influence us in our choice of clothes.
> ➢ Quantity is more important to me than quality.
> ➢ As a consumer, you have power.

IV.2. Why do we consume?

Placemat

The class is divided into small groups (max. 4 students). Each group is given a placement with four questions (cf. Activity *III.5*: *"Anti-Gaspi": combating food waste*). The students each write a sentence or a keyword in a section. The placemat is then rotated. The next person adds their keyword or adds another statement. This can be played for a couple of rounds. After that, each group presents its results.

The four questions:

- What are a person's basic needs?
- Why are there other needs/desires in addition to the basic needs?
- What is a need that is important to you personally?
- Who or what influences people in how they consume?

IV.3. The clothing journey

Research

Materials: Items of clothing, world map, coloured pens, pins, coloured threads

Phase 1: The teacher first explains the three pillars of sustainability to the class: environment, economy and society.

The students work in pairs, choosing 2–3 items of clothing they often wear day-to-day. Using the labels, they can find out where the items of clothing were manufactured. The students visualise on a world map where their clothing comes from. Once the map has been created, it is presented. In the class discussion, the following questions can be tackled:

- Are there similarities between the various maps?
- Why is more produced in certain countries?
- What does this mean for the three pillars of sustainability?

> **TIP:** The teacher can bring along current statistics on clothes or fabric production, to compare the students' results with these figures.

Phase 2: The students research the various production stages for their clothes. For jeans, for example: planting, weaving, dying, artificial ageing ("vintage look"), transporting, selling.

After this, they create a simplified diagram of this manufacturing process. This can be supplemented with a geographical map showing the product's journey. How many kilometres has the item of clothing travelled when it is sitting on a store counter or brought home?
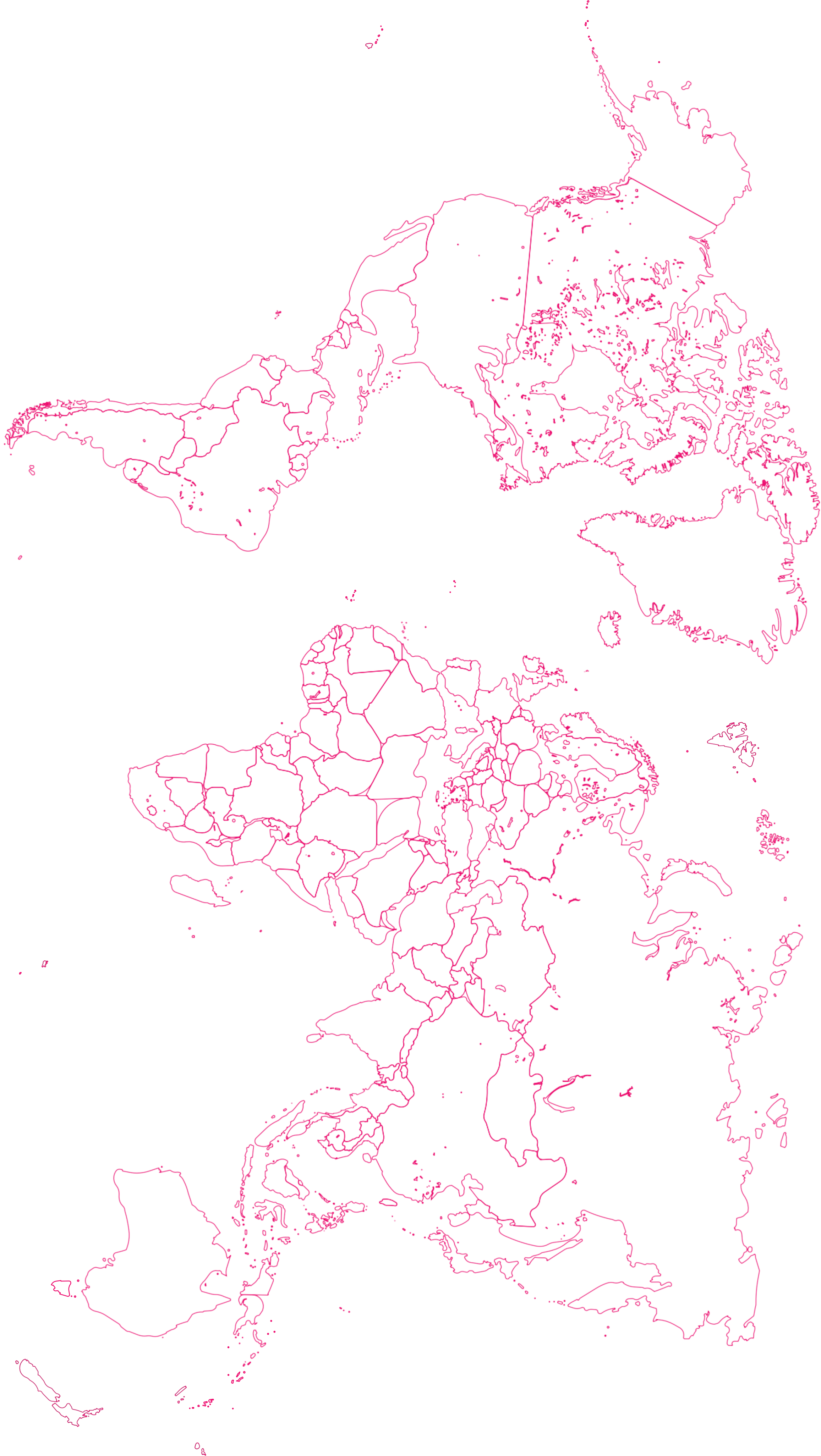
IV.4. Sustainable production: what is it? Who buys it?

The teacher hands out labels to the class that can be found on clothes. The students then research which stand for sustainability, where the labels come from, and what they mean. Analysis of the following statistics can serve as an additional input.

Closing discussion: Do labels influence people's purchasing behaviour? What are the reasons that someone chooses a certain product?

IV.5. My consumption and other people

Research

In groups or pairs, the students each research a particular subject:

- Environmental pollution through the conventional growing of cotton
- Environmental pollution through chemical dying processes
- Working conditions in clothes factories in Bangladesh, Turkey, etc.

The students produce a poster with the following viewpoints:

- What are the disadvantages and advantages for me?
- What are the disadvantages and advantages for people in the manufacturing process?
- Who profits the most?
- What is the impact on the environment?
- What can I do as a consumer to contribute to a positive solution?

Possible actions:

- Research where you can buy second-hand or upcycled products in Luxembourg.
- Organise a swap shop for clothes as a class, as part of a project day/project week.

V. Waste avoidance and recycling

V.1. How rubbish is created

Research and group work

Over a given period (a day, a week, a month), students record how much rubbish is created at home/in the classroom/in school. Example: Where, when and how much rubbish is produced during a day (at home and in school).

Next, they research the following questions:

- How much household waste is created per capita in Luxembourg? (Useful sources include the STATEC site or online STATEC publications such as *Luxemburg in Zahlen*.)
- How has the amount of waste created changed over recent years?
- What happens to the waste in Luxembourg?

Lastly, the students create a list of programmes and initiatives in Luxembourg aimed at waste avoidance or reusing or repairing products.

V.2. How does waste avoidance/recycling work?

Research and creative activity

Phase 1: The class is divided into two groups: one researches the subject of waste avoidance, and the other recycling.

The students look for videos or texts on these subjects (it is important to pay attention to the credibility of the information: why are the videos or texts credible?)

- How does e.g. plastic or aluminium recycling work?
- How can waste be avoided?
- How does separating waste work? Where do uncertainties exist?

Phase 2: In small groups, the students create their own meme or a short video lasting a few seconds, addressing the subject of waste avoidance. These might explain e.g. "typical" mistakes when recycling, in a humorous or interesting way.

After this, as a class they consider how they could effectively circulate the best memes or videos.

> **Note:** If student videos are created during a school project, the school management should be told about the project and included in it. The students who are filmed need to obtain a declaration of consent from a parent or guardian. If they are an adult, they can sign this consent themselves.

V.3. Fact-check – Does recycling make sense?

Brainstorming and fact-check

The class first brainstorms the following questions, and can then create a word-cloud using an online tool:

- What is the good of recycling?
- Which sectors of the economy benefit from it? Which might not benefit from it?

The following text is read out to the class, or the class watches the video.
Text: [Was bringt Recycling wirklich?](#) [What good is recycling really?] (last accessed on: 02.09.2024)

To finish, a comparison table is created to record which ideas from the word cloud are confirmed and which have proven to be a myth.

V.4. A question for the politicians?!

Positioning activity

The teacher puts up the following statements on opposite sides of the room. The students position themselves between the statements, on an imaginary line where how close they are to the statement reflects their opinion.

> *Statement 1*
> *We can do more than sorting waste or riding a bike. We need to work for cycle paths and to prevent waste from being made in the first place. We can influence that.*
>
> *Statement 2*
> *Why should I, specifically, do something? Politicians should take the decisions. It doesn't affect me, and on your own you can't achieve anything anyway.*

The students are asked to argue their position with regard to the two statements. The following questions could then be discussed:

- Was it hard to position yourself? Why?
- Statement 1 claims that we can influence things ourselves. Do you agree with that or not? What are your other thoughts and ideas on this?
- As a young person, how can I get involved politically in Luxembourg? What opportunities are there for influencing things for the under-18s? And for the over-18s? These results can be recorded in a table.

TIPS

Trips

- To tackle the subject on a practical level, it is possible to compare shopping in a weekly market with shopping in a supermarket. Where, and what, waste is created?
- Visits to Superdréckskëscht, SIDOR or Valorlux (recyclers) are also suitable for taking a more detailed look into the subject.

Worksheets (DE/FR) for a more in-depth look at the subject of participation/engagement at www.zpb.lu

- "Partizipation" in *duerchbléck Nr. 5, 100 Joer Demokratie zu Lëtzebuerg*, p. 26–27/46–47.
- "Demokratie online" in *duerchbléck Nr. 6, click & go*!?, p. 36/55.
- "Mitmachen erwünscht — aber wie?" in *duerchbléck Zusatzmaterial, Ee Bléck op d'Walen,*

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