The Hammerfest mobility

Life in a Northern Town
Our Erasmus Mobility to Hammerfest

A week in Hammerfest

Friday 22, September 2023

Visit of a windmill-park

We started the day early at 9am and took the bus on a 3-hour journey to the worlds most northerly located windmill park Havøygavlen in Havøysund. On our way to the windmill park, we passed through multiple different landscapes. It ranged from lower sea levels where there were big lakes, tall firs (Abies normanniana), pines, aspen and grasses to higher sea levels where there was more tundra, small flowers like the alpine azalea and even parts that were covered in snow. Throughout the journey, we also repeatedly encountered small streams and even waterfalls flowing through the rocks. Only very rarely did we come across any signs of civilisation apart from a few Norwegian wooden houses and huts that were distributed along rivers and lakes.
Once we arrived at the windmill park, which was located on a mountain just above the small village of Havøysund, we were kindly greeted by Mike and Fredrik – two members of staff at the Havøygavlen windmill park. They started off telling us about their lack of workers in the north of Norway which also led to their team being rather small and made up of multiple members from different countries like from the Netherlands and Germany. However, the choice of building the windmill park so far out was done on purpose as it provides rough, but very strong wind conditions which allows the windmills to work as effectively and efficiently as possible.

Thereafter we were split into two groups who were led by Mike and Fredrik. Mike, who originally comes from Germany, was responsible for giving us a tour of the turbine. He explained that the farm consists of a total of 10 windmills. The energy there is produced through the rotation of the blades of the windmill and then transferred to the ground. From there on the energy gets contributed to all of Norway as for the city Havøysund one windmill is enough to produce all the needed energy.
Mike also informed us of the difficulties when wanting to make changes or adjustments at the windmill park because of the many parties that are always involved in the decision making. There are for instance the Norwegian indigenous people, the Sami, who do not approve of the continued building of windmills as they are starting to also be built on Sami territory. Firstly, this strongly affects their traditional practices of travelling throughout the landscape in groups that are oftentimes comprised of multiple families. On their journeys they survive on nothing but hunted and fished goods that they're able to secure on their way. Secondly the windmills harm and disturb reindeer and other parts of Norwegian wildlife all throughout the country which has already led to many protests fighting for the preservation of wildlife. The Sami people are especially sensitive when it comes to the harming of reindeers as they traditionally have profound respect of the dead and animal spirits. Therefore, they believe in interacting with spirits through different states of consciousness, which is also known als shamanism. As a result, the well-being of the reindeer is especially important to the Sami people.
Meanwhile Fredrik, a Norwegian expert on mechanics, held a presentation on the physics of wind turbines and gave a more detailed overview of how wind energy is generated. At the Havøygavlen windmill park he works as the operation and maintenance operator. Thus, he explained wind turbine terminology on the basis of a graphic. Thereby Fredrik broadened our understanding of how exactly the windmill blades manage to capture wind and how the shape of the blades add up to a successful generation of wind energy. We learned about the gearbox, that is

located right behind the centre point of the rotor blades of a wind turbine and is responsible for an increase in speed. This is followed by a generator shaft and the generator that then converts the gained rotational energy into electrical energy. Fredrik also pointed out the brake that is located right in between the gearbox and the generator shaft in the form of a thin metal disc. This is the component of the turbine that keeps the rotor blades from continuing to turn after the wind turbine is shut down. The Havøygavlen windmill park is also affected by the need of occasionally having to shut down turbines for a while due to bad weather conditions like strong wind and snow. Another reason for a non-continuous use of all turbines is that hydropower performs better on the Norwegian financial market. In comparison to wind power, hydropower is simply more efficient and additionally does not harm landscapes and nature as much.

During our tour they told us a lot about the renovation process that took place over the past few years, as it was a very important part of the entire energy production journey and defines the park as it is today a lot.
In the past years there weren't always 10 windmills in the wind-park. It used to be 16 which were built in 2002, but because of safety reasons they got rid of 15 windmills and built 9 new ones. Before building them, they observed the area and took wind measurements to then choose the places where the windmills should be built so now, they use the conditions as good as possible. The process of renovating, which is usually very hard to do because of the conflicts that occur because very many different parties are involved when you want to build a new windmill, for instance the close town Snefjord, also planned on building windmills about 20 years ago but still nothing happened there.
The renovations of the windmill park Havøygavlen in Havøysund, started in April 2019 but then was delayed due to Covid. For the work shelters needed to be built because working in the winter, which last from October to May, is very hard because of the extreme weather conditions and the temperatures that can be very low and the darkness all day long. Furthermore, they usually have a lot of snow in that area, so it is not always possible to transport things there by car and for working the streets need to be prepared first.
Generally, the rebuilding was an international project, were not only local people, but also people from Germany, the Netherlands and Finland helped working on. Many things could not be done directly and the delivery of the materials that are needed to build a completely new windmill and its fundament took longer than expected. At first the old, not safe windmills were taken down for about 20 million Norwegian krones. Then they had to build a new road, that made the transport of for example the blades of the windmill easier. The blades are in total 75 meters long and you cannot transport them in fragments so the transport is very hard and needs to be tested before so nothing will get destroyed. Moreover, new foundations where the windmill is placed on had to be built, as the old ones were too small. Therefore, concrete and steel are needed, and it took already 16 hours of only pouring concrete as it's a thing that needs to be done very carefully and is very hard but also very important to optimize the efficiency of the windfarm.
The tower of the windmill was built in three sections as all of them are about 85 meters high, so it is neither possible to transport it all in one nor possible to build it all in one piece. The construction of the tower is very dependent on the weather conditions, and it is not possible to continue building it when it's for example too windy. This led to another delay in the overall project of renovation the wind-park. it's and they include an elevator, which is used to do construction work inside of the windmill.
The old material, that was not needed anymore, was not put into the ground because everything could be reused, recycled ore used by other companies from around the world. While for example the steel was send to other parts of Norway, where it could be recycled, entire parts like the turbine of the windmill could be sent to Scotland for 5 million Norwegian krones, where it then was improved and partly changed to extend the lifetime and keep using it.

During the process of renovating, they included an elevator in each windmill, which is used for construction work inside of the windmill and right next to it there is also a safety cable that is always in reach in case the elevator gets stuck. Moreover, now it's not only possible to stop and control the windmills from inside but also online so the possibility of working from home is a new thing that can also be done. This will probably be further developed in the future and create new chances and challenges for the work there and change it a lot from how it is now.

Overall, the entire construction work took half a year longer than expressed and was finished in the end of December in 2020/21?, but in the end they made a very efficient wind-park, where the preconditions are as good as possible, and they produce energy in a very efficient way. As an example, before the construction they only produced 2,4 megavolts, while they produce about 4.3 megavolts afterwards, so they almost doubled the capacity of the windmill-park.
Next our teachers divided us into mixed group with our Norwegian exchange students and gave us the task to take three meaningful pictures of the windmills, the environment but also from our group. We were supposed to hand in our final pictures so the teachers can choose the winner group with the best pictures. In our groups we also talked about the windmill-park and we learned, that for the norwegians wind energy may be a good energy resource but for the people in Norway cannot make as much profit as they can with the gas production, for example. One of the reasons for this issue are the low number of working possibilities windmills offer, because they can mostly be controlled by computers. The production of gas, on the other hand, is a working field that many people can work in. At the end of our guided tour we had tho opportunity to drive all the way up to the highest located windmill of the windmill-Park. There we had an amazing view over the sea and the mountains that are located around Havøysund. Around the windmill was still a little snow left from the week before.

Lunch in Havøysund and welcome meal

After our tour at the windmill-park our Norwegian exchange students invited us to lunch with them in a small restaurant, named Kroa, in Havøysund. There we ate all kinds of baguettes and salads. The following three hours we spent on the bus again and drove along the coast of multiple fjords.
We arrived back in Hammerfest at the schoolhouse where we were greeted with a welcome meal at the school. Students from a cooking class, that took place earlier that day, prepared tapas for us. The variety of the different meals reached from fiskeboller (fish dumplings) over different kinds of salads and mais avlet (corn bread). After the tapas buffet, we were surprised by german Windbeutel as dessert.
Next, we got back together in our groups that we had at the windmill-park and first talked about our impressions of the day. Later we had to do a quiz in our groups. We were asked questions about facts that we learned during our tour like how long a blade is and how deep the hole for a windmill has to be. Other questions dealt with people we got to know that day for example or tour guides and our bus driver. The final questions concerned all pants, rivers and villages we came across on our way. One special question showed a diagram, that compared the energy use between Norway and Germany. The diagram revealed that Norway has a higher energy consumption than Germany but is also the biggest energy producer in Europe.
The winner group won traditional norwegian hiking chocolate for the hiking trip the next day. The rest of the evening we spent in our host families.

Sunday 24th September

On Sunday we went on a hiking trip. We therefore could choose between two different mountains. Tyven was the higher and more difficult one, Storfjellet was the easier and lower situated one. Three of the Germans chose Storfjellet and went there with five Norwegians. It was a 2,5 hour trip and it is also a trail for inexperienced hikers.
While walking up the hill, it became obvious that the Norwegians are more trained and much faster than we are. This is not surprising because in Münster there are no mountains at all. All in all, Hammerfest is surrounded by a lot of nature and water. The inhabitants are nature lovers and enjoy going hiking, hunting, fishing and during the long months of snow doing many different winter sports in their free time. Münster, in contrast, is a big city with a beautiful old town. In our free time we go shopping or drinking a coffee somewhere nice. The Norwegian lifestyle is in general healthier. However, Münsteraner spend a lot of time outside as well as we take the bike basically everywhere.
The trail started from central Hammerfest and while going up we were able to get a view on the Hammerfest airport, which is very small and in the middle of the centre, as Hammerfest is a very small village. It was also possible to see Melkøya island from the middle of the trail.
The LNG plant provides a lot of revenues for Norway. The LNG has become even more important after the invasion of Russia in Ukraine. Moreover, Melkøya is considered the second most important military target.
The viewpoint is near the transmission tower, which one can also see from the centre of Hammerfest. On the top of the mountain we had a great view over Hammerfest and the ocean. On the islands across the coast of Hammerfest people live in even smaller villages. They attend the boarding school to be able to go to school. The mountain is located 421 meters above sea level and the view on the top of the mountain was mixed by the landscape, Hammerfest city centre but also the sea. On the sea you could also see the biggest rock in the world, that you can also see from every position in Hammerfest. At first the people thought it was an island on ist own. However, it was proven that it can not be defined as an island and therefore is the biggest rock existing in the whole world.
Furthermore the landscape was very rocky with many berries, but without bushes and trees as a result of it's subartic climate. Furthermore, the reindeers, who live in the mountains during summer, eat all young trees. In general, reindeers are herded by the Sami, an indigenous people in Northern Norway. Today they have their own parliament and rights in politics. However, the Sami are often passed over for example in the siting of windmills. The wind parks are placed in the herding grounds of the reindeers.
On the way up the mountain we came across narrow water falls. In whole Norway exist many waterfalls. They make it possible for Norway to produce an enormous amount of hydropower. Enough that it could provide Norway fully with renewable energy.

Later on that day we were even able to see reindeers by our own as we drove to the beach and on the way there, two of them were at the edge of the street eating bushes (see figure 7). So we got out of the car and took a closer look. We had to be silent and were not allowed to run towards them as they are very shy and would probably run away then. We were about 5 meters away from them which happens often in Hammerfest, especially in summer. Also you could see that connected to food, as many of us ate reindeer meat at home which is something typical in Hammerfest.

Afterwards we were driven around in the region by our host father.
We went to a small, beautiful beach (see figure 8). In summer the highest water temperature is 12 degree celsius. The people in Hammerfest sometimes do ice bathing, which improves the blood circulation.
Further down the coast we visited a wooden construction which was used to dry fish (see figure 9). In the past Hammerfest was a fisher village. Nowadays the fishing industry is still huge and in leisure time it is important as well. Additionally, the roof of the local church is inspired by the frame.
On top of an observation deck we had an excellent view on Hammerfest (see figure 10,11). It was even possible to identify the house of our host family.

I find it fascinating, that only a few hundred meters higher, where small settlements are located, the snow period is a few weeks longer.

The other mountain Tyven (Norwegian for the thief) is located just east of the northern Norwegian village of Rypefjord (municipality of Hammerfest, province of Troms og Finnmark) on the island of Kvaloya. From the mountain peak (418m) you can overlook Rypefjord, Hammerfest and the Soroysund with its islands. At 12:15 we met at the bottom of the mountain to start together.
The Norwegians were already experienced and knew their way around and were able to show us the way. It was a steep and long way up. We walked over stones and meadows. In between, small streams ran along the sides. Every now and then we had to take stone stairs because the path became too steep and dangerous. The higher we went, the more beautiful the view of the city became and the colder it became. The wind was also getting stronger and the clouds were getting closer. When we reached the top after about an hour, we could already see that there was some snow on the other mountains. The air was so clear that every breath was refreshing. At the summit you feel as if you could see all over Hammerfest and you feel a bit of power. The silence on the summit is great and is only broken by the whistling wind. The connection with nature, the silence of the mountains and the seemingly endless expanse of the Arctic sky leave deep impressions
We were then able to sit down in a kind of wooden igloo to warm up and look at the view from there. From above you could look over the sea and small islands and headlands. After some photos and views, we made our way back at 2 p.m. Since the path was steep, it was quicker on the way back and it only took us half an hour. You had to be careful because the stones occasionally came loose under your feet and rolled away. When we arrived downstairs we were picked up by our host families and driven home.
In the evening we had a game evening with another host family with a typical Norwegian cake with cloudberries. The games were also Norwegian and called "Hint"
", which is similar to activity and "ryket gàr" which is a
guessing game of drawing and writing.

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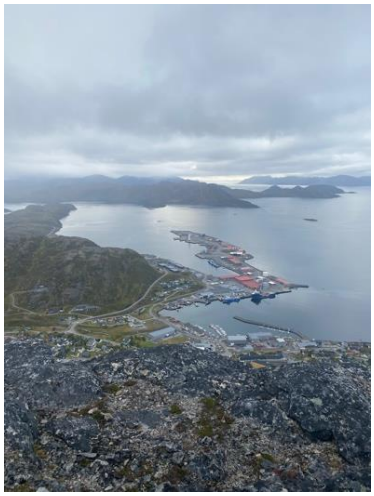

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1,2,3,5,6 vegetation and view on top of Storfjellet

4 cabin on top of Storfjellet

7 reindeers

8 beach near Hammerfest

9 traditional wooden construction for drying fish

10,11 view on Hammerfest city

12 hiking group on top of Tyven

Monday 25th September 2023

This day was our first one at school. We walked around the building, and the Norwegian students told us about the school systems and that they have practical education as an option in higher grades. In our classroom for the day we had a presentation about the island Melkøya from one of the employer's. Melkøya is a startup from fall 2007. They have 370 permanent employers and 500 workers each day. The three main products they deal with are LNG-Liquified Natural Gas, LPG-Liquified Petroleum Gas and Condensate with the main focus on the LNG production. Besides the primary component methane in natural gas, it also contains some ethan. We use it in combustion reaction to create energy, so it can be used for heating, cooking as well as I industrial processes and in gas power plants (electricity). The special thing about the gas is, that LNG is made liquid with pressure and very low temperature (below -161,4 degrees celcius). With this method it is 600 times lower in volume in liquid form than in gas form. The arctic ships from Hammerfest store and ship the LNG with using fuel oil and diesel oil for transport. You can see the ships on the water from the land because of their huge size. It is fascinating that one of these LNG ships can supply Hammerfest with ten years of electricity. The installations are all located under the sea at Melkøya, that it is still safe for example for the fishers to trawl around. There are 143 kilometres pipeline and about 20 wells underwater for the transportation of the gas.

Onshore, the light and heavy hydrocarbons are separated as well as CO_2 is removed and reinjected. Furthermore, they remove the water to prevent the freezing of the resources. Condensate is about 15 degrees, LPG is cooled down to -40 degrees and LNG to an extreme cold down to to -163 degrees. With these temperatures they storage the product before they load it to ships for sale. Continuing with the process on the ships, there is one ship every fifth day with LNG and about 70 in a whole year which deliver all over the world. One of the boats can hold 145000m3 and contain 1 TW energy. The LNG boats have an approximately value on about 1 trillion with a very high gas price of 4,7 billion per boat. After the trade, about 80 percent of the income goes to the Norwegian government.

The second workshop focused on the Republic of Nauru, a tiny island in the Pacific with a population of roughly 10,000 people and a complicated past due to its previous existence as a European colony. The island is just 21 square kilometers in size. Nauru, which gained independence in 1968, initially prospered from phosphate mining and by 1970 had the highest GDP per capita in the world. But by 1990, overexploitation of the country's phosphate riches had caused an economic collapse, leaving it with serious problems, such as a stunning 30% diabetes rate by 2003.
Following that, we discussed energy as a societal issue related to Nauru. In Nauru, the issue of energy is closely linked to its natural resources.

Laws and governments are essential in deciding how to use these resources in a sustainable manner. Nonetheless, there remains a clear socioeconomic divide at the individual, ethnic, national, and continental levels. While some benefit from environmental degradation, others—especially the impoverished—bear the brunt of it. Nauru's Battle with Climate Change and Economic Repercussions is Another Theme. Nauru is threatened by extreme weather events and rising sea levels due to climate change, which is a global concern. The economic fallout is severe, resulting in issues with food production, migration due to climate change, and a rise in resource-related conflicts.

Norway is a gas, oil, and wind energy supplier. The towns of Hammerfest and Melkøya in Western Norway are situated at the nexus between environmental responsibility and economic growth. Gas and oil are the region's main sources of employment, supporting about 200,000 people. But the move to renewable energy—especially wind power—presents a new set of difficulties, notably with regard to the rights of indigenous people who live nomadic lives that are closely linked to fishing and reindeer herding.

We did, at least, discuss wind power and indigenous rights, particularly in relation to the Fosen Wind Mill Park. One of Norway's biggest windmill parks, Fosen represents the conflict between economic development and indigenous rights. The 2010 Norwegian energy policy permitted windmill installation without the Sida (native reindeer herding clan)'s consent. Despite being built, two Sida challenged the approval, claiming that their rights as Indigenous people had been violated. The building permits were found to be illegal by the Supreme Court in 2021, casting doubt on the windmill park's future.

The aforementioned cases from Norway and Nauru highlight the complex interplay between social, economic, and environmental concerns in the pursuit of sustainability. Balancing progress with respect for

indigenous rights, preserving nature, and mitigating climate change impacts are critical for a sustainable and equitable future.

At 11:55 Ida, a science teacher from the school in Hammerfest holds a presentation about sustainability.

She starts with differentiate between different areas of sustainability and
explains that she is going to specify on the environmental area.
First, she points out that LNG is a natural gas out of Methane and ethane and non-renewable. She says it is used for the heating of houses and electricity etc. and it made with high pressure and low temperatures. One of the main issues is that you can get health problems from it but she concludes that even though it has some disadvantages it is still one of the better options.

Then, she goes on talking about the climate and the rising temperatures. Ida underlines the horrifying consequences like warmth, heat periods, increased precipitation, drought tropical cyclones and high sea levels, which will lead to rreduced crops, soil erosion, live stock death and fire and an increased salt content.

She quotes a geologist and geophysics professor: "Gas is a real option" and clarifies why that quote is actual. Furthermore, she explains the advantages of gas in comparison to other techniques, like the cheap costs, low use of critical materials, high stability, little solid waste and a rather little storage area. Lastly she puts focus on the new technique which is called Css and it´s able to reduce the CO_2 emissions by 80-90%. The problems are: it is very expensive and there are practical limits to the scoope.

However, she transfers the theory to the actual example of Melkøya, which was newly electrified. That gas power plant gets the electricity from the power grid. In the end is Melkøya able to reduce the emissions by 900 000t.

Ida's next topic are windmills. In total there are 610 windmills spread in Norway. There are a lot discussions about it. However, in comparison they are quite climate friendly if you look at the CO_2 emissions. The problem is: they have a high use of critical materials like neodymium and dysprosium. On the other hand are the costs for electricity quite cheap. In contrast to the belief are windmills no big problem for the

wildlife. 80-90% of the windmill can be recycled, even though it is expensive, only the rotor blades are non-recycable. The old rotor blades are delivered to landfills or sold to other countries, but the goal is to make them recyclable till 2040. Another problem of the windmills is the microplastic they release. However, if you calculate that down, it's only 100-150g per year per windmill, so it doesn't have a big influence in total. Ida ends with one last problem: some chemicals are released and those environmental toxins cling to the microplastic, which is eaten by animals.

Tuesday 26.09.2023

In the morning

At about 7:55, students started arriving at the school. The first half of the day, we would just participate in the regular schedule of our Norwegian exchange students, so at 8:00 o' clock, we had Gym class. We started with a warm up, which took about 20 minutes.

Then we played a game called "kin ball". With the Norwegian class and our group combined, we were quite a lot of students, so we were devided into 3 teams with 2-3 groups of 4 students within each team. At first, one group of each team plays against each other. One group starts holding the kin ball, which is a very light-weighted ball with a diameter of about 1.5m. Now one person of the same group hits the ball as strong as they can, while shouting the word "omnikin" and one of the other team's name. This team then has to catch the flying kin ball while it's still in the air. Now it's this team' s turn of throwing the ball. If one team makes a mistake, such as not catching the ball before it hits the ground, throwing it beyond the field or not throwing it far enough for another team to catch it, the other two teams will both receive a point. The winner is the team with the most points at the end.

At about 9:25 we were dismissed from class, so we would have time to shower in the changing room if we wanted, which no one did. This time is used as a break between classes. The next one began at 9:45.

Along with our Norwegian exchange students, we were devided into 2 different classes: English and Biology.

In English, we mainly discussed newly learned vocabulary. At first, the teacher introduced some technical terms, some of which the students already knew and some new ones. After that, a short break of 10 minutes was needed. Afterwards, we played a game involving this new vocabulary and did some tasks from a book, which we later compared. All in all, the tasks we did seemed quite easy in comparison to our English lessons in Germany.

In Biology, they got a worksheet, which introduced the students into the new topic of economy. This seemed to be either very difficult for the Norwegians, or they just chose not to participate. However, most of the participation in this class was by the Germans.

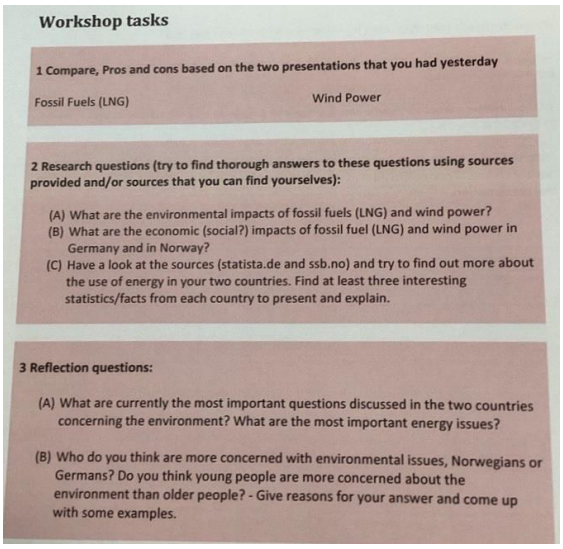
Both classes finished at 11:20, dismissing us into a 30 minute break to get lunch at the cafeteria.

Noon

At 11:20am we had lunch in the cafeteria. We had rice with tandoori chicken and salad.

On that day the students got sorted to their seats at the table, that was done by putting pieces of paper with each name on it at their place at the table. Therefore the students were able to get to know each other better.

At 11:50am the classes continued. We got together in groups of five and discussed what we did and learned the day before. In class we discussed the topics windpower and microplastic, conflicts between Sami people and Norwegians and other benefits and disadvantages of the environment in Norway.


Workshop tasks

1 Compare, Pros and cons based on the two presentations that you had yesterday

Fossil Fuels (LNG) Wind Power

2 Research questions (try to find thorough answers to these questions using sources provided and/or sources that you can find yourselves):

(A) What are the environmental impacts of fossil fuels (LNG) and wind power?
(B) What are the economic (social?) impacts of fossil fuel (LNG) and wind power in Germany and in Norway?
(C) Have a look at the sources (statista.de and ssb.no) and try to find out more about the use of energy in your two countries. Find at least three interesting statistics/facts from each country to present and explain.

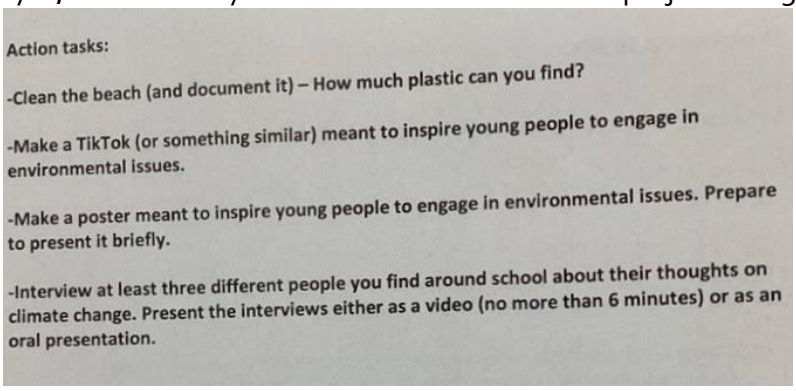
3 Reflection questions:

(A) What are currently the most important questions discussed in the two countries concerning the environment? What are the most important energy issues?

(B) Who do you think are more concerned with environmental issues, Norwegians or Germans? Do you think young people are more concerned about the environment than older people? - Give reasons for your answer and come up with some examples.

The teachers then showed us two short videos about teamwork which indicated, that we will only achieve a good result when we all work together. Every group got workshop tasks which we had to finish by the end of the school day. Plus an action task we could choose freely by given ideas. Through these tasks we got the opportunity to reflect what we already learned and especially see the differences between the environmental handling of Germany and Norway. For example Norway has way more electrical cars than we do, also they use a lot more water than Germany. Germans usually tend to always turn off the lights when no one is in the room or if it is still enough light outside for us too see inside. That is also because of the "dark months" in Norway when there is a lot less light than usual, so they are used to leave the light on.

Meanwhile the groups where working on their workshops two Norwegians and two Germans went outside because there was a reporter from Hammerfest to interview us on the Erasmus+ project. She asked us questions about the arrival from Germany. Then she went on to the project itself and if we learned anything yet, we claimed yes and talked about how the project was going so far. The German students talked about their impression of Hammerfest and the differences between the cities we grew up in, the Norwegian students then told us their impressions when they went to Münster, Germany and things that are different in our cultures and behaviors. We all agreed that the biggest difference was the usage of water and light, because most Norwegians use these resources freely and often, while most Germans are very thrifty about these topics. We figured a reason for that is, that in Norway people pay a lot less for that than Germans do. In the end she thanked us and took a picture of us.


Action tasks:

-Clean the beach (and document it) – How much plastic can you find?

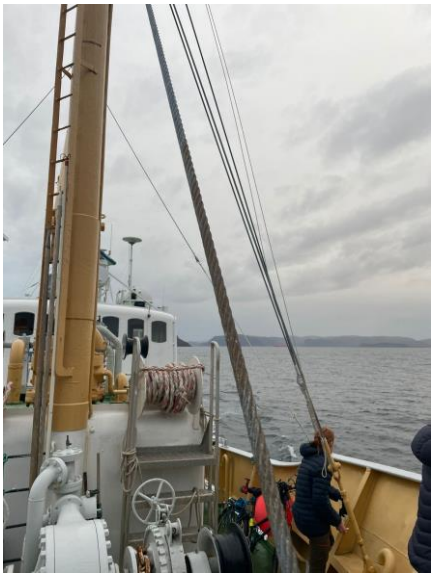
-Make a TikTok (or something similar) meant to inspire young people to engage in environmental issues.

-Make a poster meant to inspire young people to engage in environmental issues. Prepare to present it briefly.

-Interview at least three different people you find around school about their thoughts on climate change. Present the interviews either as a video (no more than 6 minutes) or as an oral presentation.

Back in the class we started to present our workshop and action tasks and had very different aspects and perspectives we could all learn from. Most students made a poster but a view also interviewed others and got interesting ideas from everyone.

Afternoon and evening

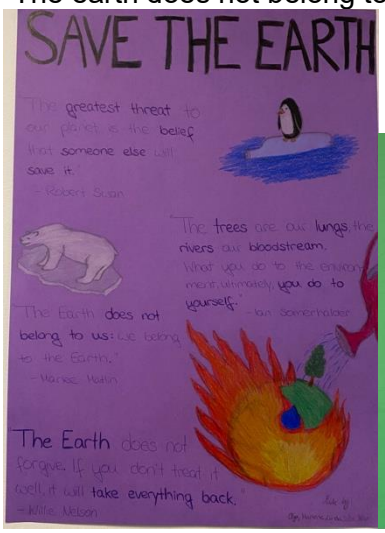


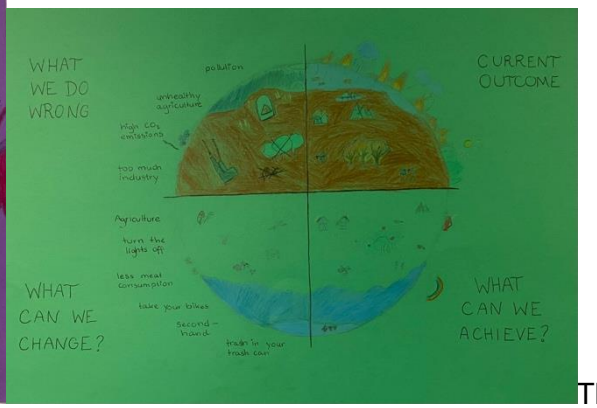
After the workshops we went to the haven and boarded a boat for the planned boat trip around 14:20. Students dorming in the school joined the exchange students and us on the trip and the boat crew prepared softdrinks and different types of pizza with salami, jalapeño or chicken for the students and teachers.
After an hour the German students proceeded to go outside and view over the sea and the coast. During the whole trip we saw a lot of different, for us never seen before animals like eagles or dolphins. Furthermore we saw eagles, jellyfish, a sheep and hundreds of seagulls following the boat the whole time because some of our students, some of the Norwegian students and the boat crew caught some fish and killed and prepared them on the boat deck.

On the deck it was really windy but the weather in general was rather good, a little bit cloudy but it did not rain as expected.
On the way back to Hammerfest we also saw a huge LNG-ship that we learned about in some workshops from the days before.
We were back at around 18:30 and went back to our respective exchange families homes and spent the evenings in privat.
During the whole boat trip the German students could experience a lot of new impressions of the everyday Norwegian culture and their habits such as the fishing and especially the preparing of the fish right on the boat and right after it got caught. Moreover we could experience the transportation of one of Norways most important energy sources in modern time: LNG. The German students had seen pictures of these big LNG-ships but seeing them from afar in the ozean brought a new perspective to this.

Wednesday 09/27/2023
Wednesday was our last official day in Hammerfest. We started off in school, but did not attend to any classes like the day before. The first hours until lunch we worked on the projects we started on Tuesday. The tasks were mainly focused on climate change and the similarities and/or differences in the way it is treated in Norway and Germany.
We for example created posters in group work to raise awareness on the climatic change and the problems it comes with. These were designed with illustrations to make them look more attractive in order to get more people to read it. After researching all of our facts to put on the posters we presented our work in front of the group. Thematically they dealt with small steps we can take to save our earth, which were for instance to waste less water as only 3% of the water is actually drinkable and Norway alone uses 140 litres per

person each day, paper because we should think more about our nature as 42 million trees are being cut down daily for paper and other productions, instead one could use recycled paper and energy in general. Furthermore we came to the result that it is necessary to reduce our plastic waste, in order to stop the raging numbers of 1.000.000 tonnes of wasted plastic per year in Germany. An easy opportunity is to recycle your old trash by bringing back your bottles to the store or do creative DIYs with it so you can give it a new function. It was also mentioned, how we always only talk about the effects of climate change and that we need to change something about it but never actually take action, which was supposed to at least start to be changed by the small steps that were presented on the posters, which everyone can easily do on their own. The next group presented to us the future of our earth if we do not change anything about our behaviour. Those images contained radioactivity, even more pollution and a complete lack of trees. Nevertheless we saw a healthy earth with a lot of nature, a variety of animals and enough ice in the antarctic on the other side, which displayed the earth if we do change how we treat our environment. Lastly we also heard some inspiring quotes, that underlined the importance of being protective of our planet.
“The trees are our lungs, the rivers our bloodstream. What you do to the environment, ultimately, you do to yourself.” - Ian Somerhalder
“The earth does not belong to us: we belong to the Earth” - Marlee Matlin





The group intentionally chose quotes from celebrities, to especially inspire young people to get more active, when they see that their idols or people they look up to share the opinion that we are constantly harming our planet and that it needs to stop instantly. The goal to reach younger people is justified by the fact that they often feel more responsible for our planet as they have their whole lives in front of them and of course want the best environment possible to live in instead of experiencing the hard consequences of environmental pollution.
While comparing our two countries Germany and Norway we noticed, that in general Germans are a bit more sensitive about climate change than the Norwegians although they are very conscious about it too. These thoughts are based on the already mentioned problems of Norwegians when turning off the lights or leaving the faucet on while the water is still running. Due to Germany’s geographical conditions, where many populated places are located near to each other, it has the benefit, that they’re able to work more with public transport, like buses or trains and reduce emissions when you want to get someplace, since more people can travel together. Instead Norway has a lot of large areas of bare nature where those traffic systems would not pay off. In our city, Münster as well as in many others we can easily take the bike to most places in a short time and in many parts of the city cars are not allowed to drive, which reduces emissions as well.

To make such a proper judgement, we were asked to reflect on our own behavior and way of looking at things involved in the dealing with resources as well as sustainability. It was interesting to see in which aspects we agreed on and, more importantly, what things they did very differently from us. Generally shown was that the distance between Hammerfest and Münster and therefor the geographical and cultural disparities have a huge impact on our actions and natural way of thinking. For example the for us German students normalized sort of reflex to turn off the light when you leave a room was something new to our hosts from Norway. This can be explained by different climatic circumstances. Due to Hammerfest being located up in the North close to the Tropic of Cancer, there are days when the sun barely rises or, once a year, does not rise at all. With no direct light coming from the Sun, there is no true daylight. This so called Polar Night occurs before and after the winter solstice on the 21st December and is led and followed by many days with only a few minutes of light. This phenomenon takes place because of the Earths natural tilt by 23.5 degrees. As a result of this axial tilt, there are periods of the year where the Arctic Circle and the Antarctic Circle are either completely exposed or obscured from the sun, while rotating troughout the year.

For Hammerfest this means rather “long days” during summer and “longer nights” during the winter months. Now this of corse has a huge impact on the people living in those regions. They had to find ways to addapt to their circumstances. Such as leaving the light on, even tho no one is in that room or at home at all. A rather obvious example for why comparing our behavior to theirs always comes with a certain consideration of how and why our decisions are so impacted by our environment. During our conversations with the other students we also realized many other differences, like cultural or religious practices. The north of Norway is mainly Protestant. Confirmation is therefore celebrated in a big way in Hammerfest. As in Germany, friends and family are invited to the celebration and food is served. However, the confirmands wear special clothing, the so-called bunad nordland. This is an outfit based on old folk costumes from the farming society. The girls get these dresses as one of their presents, which they keep for special occasions like weddings or Christmas. The confirmation is of corse a prayer of intercessions that confirms the promises God gave when you were baptised. But it also serves a cultural purpose. In Hammerfest it is held to mark the transition of Norwegian children into adulthood and to make them an official member of their society.
In the evening we all got together a last time to enjoy a farewell dinner at the school, hosted by the Norwegian teachers. During dinner we got to talk again about everything we experienced and learned in this week and this whole exchange. We noticed through all these new impressions and experiences how everyone grew as a person and how we did as a group, owing to the fact that we experienced so many new situations, we all had to adjust to, in our families and their ways of living, their food, traditions and expectations. A nice example is the time where we took the bike to school all by ourselves down the hill and had to find the way to the school. But instead of driving there we ended up on the other end of the city, since we were confident it was the right way. Luckily we were two people so we figured it out eventually and finally found the way to the school just a couple of minutes late. So overall we definitely learned important things, grew personally and had a memorable exchange that we will always look back on with a smile. After our meal the teachers said a few words before we all received a certificate for our participation in the project.

In the evening our hostmother spontaneously drove us out to the beach where we were able to witness aurora borealis, also known as polar lights or nothern lights. They normally occur between mid October and late March. It was pretty unexpected since it is normally too cloudy in Hammerfest to properly see them over 80% of the time. So even if they take place, they rarely become visible for people in that part of Norway. The activity causing this colorful picture starts on the sun. This planet is made out of super hot gases which contain millions of electrically charged ions. Their movement over the sun’s surface then forms a stream called the solar wind, which can travel millions of miles trough space. Then this solar wind, technically strong enough to destroy our entire planet, is blocked by the magnetosphere when it’s approaching the Earth. Due to this blockage by the Earth’s magnetic field most of the electrically charged particles are led around the planet and stream further into the solar system. When some of these ions manage to enter trough the magnetosphere they are temporarily trapped in the so-called ionosphere centered around the Earth’s geomagnetic poles. The ionospheres are ring-shaped holding areas that mark the tilted axis of the Earth’s magnetic field. After the ions have entered the ionosphere they collide with the oxygen and nitrogen atoms of the atmosphere. Those clashes cause the energy release which then becomes visible as colorful glowing halos in the nightsky. The stronger the solar wind is the brighter the auroras appear. While this stream itself is fairly constant, the solar weather on the other hand changes constantly. Solar weather means the heating and cooling of the different parts of the sun, which can be measured by the cooler dark spots on a sun’s surface called Sunspots. If the solar weather changes very drastically, it’s causing so-called magnetic storms, resulting in auroras to appear in unusual places far from the magnetic poles. The color of the polar lights is a result of the chemical reaction that caused them.

Therefor a variety of shades and tones can be seen depending on the atom that collided with the solar stream. The color that we saw, which is also the most common one, is green as a result of an interaction of oxygen atoms and the ions. Other options are a reddish and bluish light produced by the clash with nitrogen or purple auroras, which human eyes can rarely detect, caused by helium atoms. Those jcollisions produce tiny flashes that only last for less than a second. But as billions of flashes occur in sequence, the auroras appear to move or "dance" in the sky. Especially for us German students witnessing these lights was a great event and we were all so excited about it. Even tho capturing their beauty on camera isn’t that easy, we still took many photos to make sure that we won’t forget about this lucky night.