egea

Scientific Report

Western Regional Congress 2024

March 11th – 15th, Drouwen

Contents

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Introduction

By Jakob Buchallik

„Let's make it about geology!"

That simple sentence must have fallen somewhere at the AC2023 in the Austrian alps, when Stijn and Esther agreed on assembling a team for the WRC2024. I joined a few weeks after the fact, just in time to debate on how to make the best earthquake related pun as motto. With "Don´t take ground for granite" we struck gold. In our multi-national and multi-entity team, we also did not take our roles for granite, so even if Tabea and I are mentioned as Scientific Coordinators, we acted more as a team in organizing the scientific input for the congress. On the next pages of this report, you can follow how we and our congress' participants explored the formation of the Geology and Landscape of the northern Netherlands, it´s gas fields and their exploitation, beside the consequences for locals and hear about our debate on European energy futures. Huge thanks go out to all of the team, our partners and workshop leaders as well as all participants.

1 Opening Lecture

By Stijn Wansink

The opening ceremony took place in the aula of the 'Academiegebouw' of the Groningen University. A general introduction elaborated on the location and geography of the North Netherlands. The provinces of Groningen and Friesland are part of the deltaic plain that forms The Netherlands. They are dominated by grasslands, cows and lakes. It is a relatively featureless landscape. Groningen city is located on the far end of a small moraine, De Hondsrug, that rises up to 30 m from the surrounding fields. This glacial till was pushed by glaciers during the last ice age and. Mostly the province Drenthe is dominantly characterized by a higher elevation, sandy ground and forested regions as a result. The congress accommodation is in Drouwen in the center of Drenthe. Additionally, Drenthe is mostly known for stone age megalithic graves (Dolmen) called Hunebedden. These are constructed from the glacial boulders transported from as far away as central Sweden and Finland.

Highly relevant to Groningen is the natural gas field that was discovered in 1959. The gas is stored in a Permian sandstone 2 - 3 km underground. This was at the time the largest known gas field worldwide and is currently still one of the largest known onshore gas fields. The gas was extracted and exported to neighboring countries, leading to billions of euros of annual income for the Dutch government. This formed a significant contribution to the welfare and economy in the following decades.

After around 2000, a number of earthquakes larger than 2.5 on the Richter scale took place in Groningen. This kept at around 10 - 20 earthquakes with a strength of 1.5 - 3.6 each year, peaking around 2012. This led to a significant amount of damage to houses in Groningen but damage compensation was handled poorly by the government and involved companies. In Groningen this resulted in a broad opposition and resentment to gas extraction and a feeling of confirmation that the Groningen people were less relevant than national economic prosperity. After years of discussion and essentially a national crisis, it was decided that the final stop of gas extraction would take place on April 19th, 2024. The actual permanent closure of the main gas field or cessation of extraction of secondary fields is not yet determined however.

Currently, a large amount of research is done in Utrecht University as well as other institutions, to the causes of the earthquakes and the properties of the Groningen sandstone reservoir. Dr. Suzanne Hangx was invited to record a video lecture on the research taking place in Utrecht. Her and colleagues found out that the removed stress by extracting the gas leads to unequal compaction of the sandstone as quartz grains and other minerals deform and move. This sandstone compaction reactivates existing normal faults from earlier tectonics and deformation and movement along the faults forms the earthquakes.

This combination of (deep) geology, social crises, physical geography and national relevance makes the seemingly monotonous North Netherlands a varied and relevant region for geographers and geologists which offers a number of workshop and excursion possibilities for the WRC 2024.

2 Workshops

2.1 Workshop - “Embodied experiences of disasters in slow motion”

By Thea Kottolinsky and Finja Hinrichs

Introduction

The decades-spanning consequences of gas extraction in Groningen are being described as a ‘disaster in slow motion’, that are not “one disastrous occurrence of limited duration”, but rather “problems spanning various decades with the consequences of each earthquake piling up on top of the previous consequences” (The House of Representatives of The Netherlands 2023, pp. 38–39). Even though protest led to the gas extraction being fully stopped (Rijksoverheid 2023), the worries of Groningen people remain, with the added fear that compensation for continuing future consequences might not be honored (The House of Representatives of The Netherlands 2023, p. 32). While the earthquakes did not lead to large scale collapse of buildings, the earthquakes nevertheless resonate through experiences of the affected people. Here, the feminist concept of embodiment is central to our explorations, highlighting that bodies are not neutral entities but are shaped by societal power dynamics and hegemonies (Vorbrugg et al. 2021). Emotions and affects are integral components of embodied experiences (Hutta et al. 2021), which is why, in our workshop we focused on the profound effects of extractivism on individuals and communities. We discussed the concept of embodiment in the context of the past, present and future consequences of the local disaster and explored the intricate relationships between human experiences, societal structures, and the impact of disaster within the context of our capitalist system. Specifically, we asked: What are the embodied experiences of the Groningen gas extraction as a disaster in slow motion? By the end of the workshop, we aspired that participants a) have gained insights into the Groningen gas extraction and its disastrous effects on the Groningen people, b) have come to understand counter mapping as a powerful, participatory and critical method, and c) developed a critical lens through which they can analyze and understand the intricate connections between human experiences, societal structures, and the impact of disaster within the context of our capitalist system.

Methodology

The workshop was conducted in three integrated sessions. The central methodology was a participatory counter mapping approach and a subsequent discussion. In the first session, we introduced the topic by framing the local situation through a timeline of the local developments. Afterwards, the participants had the opportunity to delve deeper into their main interest areas by prepared multimedia materials. These included citations of interviews (e.g. from reports of Gronings Perspectief), scientific papers (e.g. Zijlstra et al.), contents for activist groups (e.g. Groninger Bodem Beweging, Code Rood) and contributions in the Parliamentary Inquiry Report. In the second session, we proposed counter mapping as a powerful and critical participatory scientific method. The objective of the session was the creation of counter maps which map the embodied experiences of the local people in contrast to the unilateral “typical” maps. We provided a body map as a base map on which the participants were asked to visualize the information on embodied experiences elaborated in the first session. In the final session we aimed to place the embodied experiences of the Groningen people in the larger global context. With the discussion question “How does labelling Groningen as 'De gaskolonie' reflect the complexity of (post)colonial extractivism?” We referred to a recent book by Brandsma et al. Results & Interpretation As workshop results three counter maps of key topics were produced (see annex). The first group focused on direct social impacts of the earthquakes, the second on the bureaucratic burden and trust in institutions, and the third on protest and self organization. The workshop revealed a broadly positive reception and adoption of the counter mapping among participants. While familiar to some, the methodological approach was novel for others, facilitating enriching content exchanges. Collaboration proved both productive and purpose-driven, characterized by diverse group dynamics and creative expressions. This was most notably through the integration of visual elements and text. Particularly commendable were the unique strategies devised by each group for mapping, underscoring the primary aim of empowering participants and visualization of often overlooked content. These individual or collective outputs respectively necessitate tailored interpretation for which the consideration of the specific participant group involved is of high relevance. Importantly, when participants personally presented and elucidated their maps, the interpretations acquired greater depth, revealing the pivotal connections between symbolism and intended meanings. Therefore, all groups shared their results with the whole group at the end of session 2. The maps

revealed a complex web of emotions and societal shifts that occurred during the disaster: Feelings such as helplessness, isolation, and being ignored intertwine with a sense of inability to act alongside a deep sense of loss, confusion, and an erosion of trust in institutions. These psychological impacts are not merely abstract as they manifest in tangible losses: the erosion of hope, the destruction of homes, diminishing trust in institutional structures, financial depletion, and a draining of energy, resulting in a deviation from what was once considered a 'normal' life. Moreover, this emotional and societal disruption significantly affects interpersonal relationships. For example, the burden of bureaucracy has led to parents having less capacities for their children with serious impacts for their daily life. In contrast, the shared struggle formed the basis of social movements, fostering a sense of solidarity amongst the affected. This 'us versus them' dynamic, with 'them' being both the state and NAM, can unite communities. However, the convoluted bureaucracy, opaque decision-making processes, and inconsistent compensation for similarly affected individuals contributed to community fragmentation. Here, it becomes visible that the response to these experiences of disaster is not uniform: while some are driven into action, others are left in inaction, overwhelmed by the burden. But what all have in common is an overarching, compelling desire for change. This intricate web of emotions and responses highlights the complexity of human resilience and adaptability in the face of systemic and personal disruptions. In the discussion, the focus was on the understanding of the term "colony" and the underlying power structures. Central to the discussion was the indisputable acknowledgment that the Groningen region had been in a long-term exploitation relationship between energy corporations and the state on one side, and the local population and nature on the other. Voices and rights were structurally ignored for years, and resources were depleted. However, what distinguishes the Groningen situation from (post-)colonial situations is the extent of disregard for the rights of the local population, and especially the absence of racial connotation. The exploitation of (predominantly) white people by (predominantly) white people in this case can thus be seen more as a primary consequence of capitalist interests. This is particularly evident in the now significant reinforcements and recognition of the problem by e.g. governmental institutions. An alternative historical use of the term for settlements of miners is also not applicable to Groningen. Thus, labelling it as a "Gas colony" is factually incorrect and must be critically examined against the backdrop of (post-)colonial global relations - although this does not intend to downplay the individual embodied experiences of the Groningen people. The discussion highlighted the issue of relativity and the handling of this in examining global inequality and

extractivism. Overall, the workshop and the results have exceeded our expectations. We would like to take this opportunity to thank all participants for their active contributions. The only issue we identified was that a more detailed explanation of the theoretical-conceptual background (in our case, the concept of embodiment and understanding of words in the context of colonialism) would have been supportive. Therefore, we advise future workshop leaders to take the time to explain the conceptual framework so that everyone regardless of their previous knowledge feels safe to work with it.

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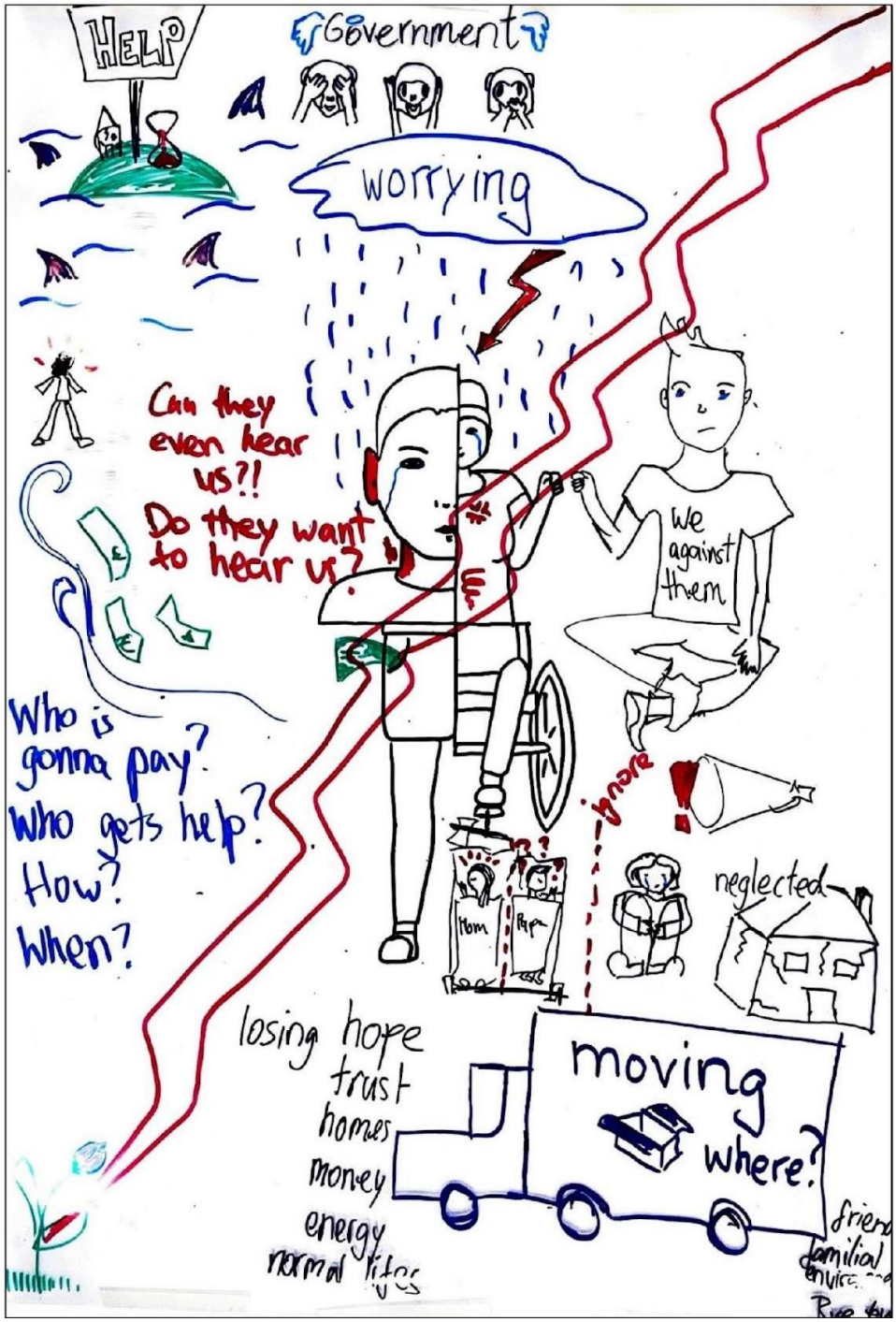
Annex

Annex 1: Counter map of group 1 on social impacts of the earthquakes in Groningen.



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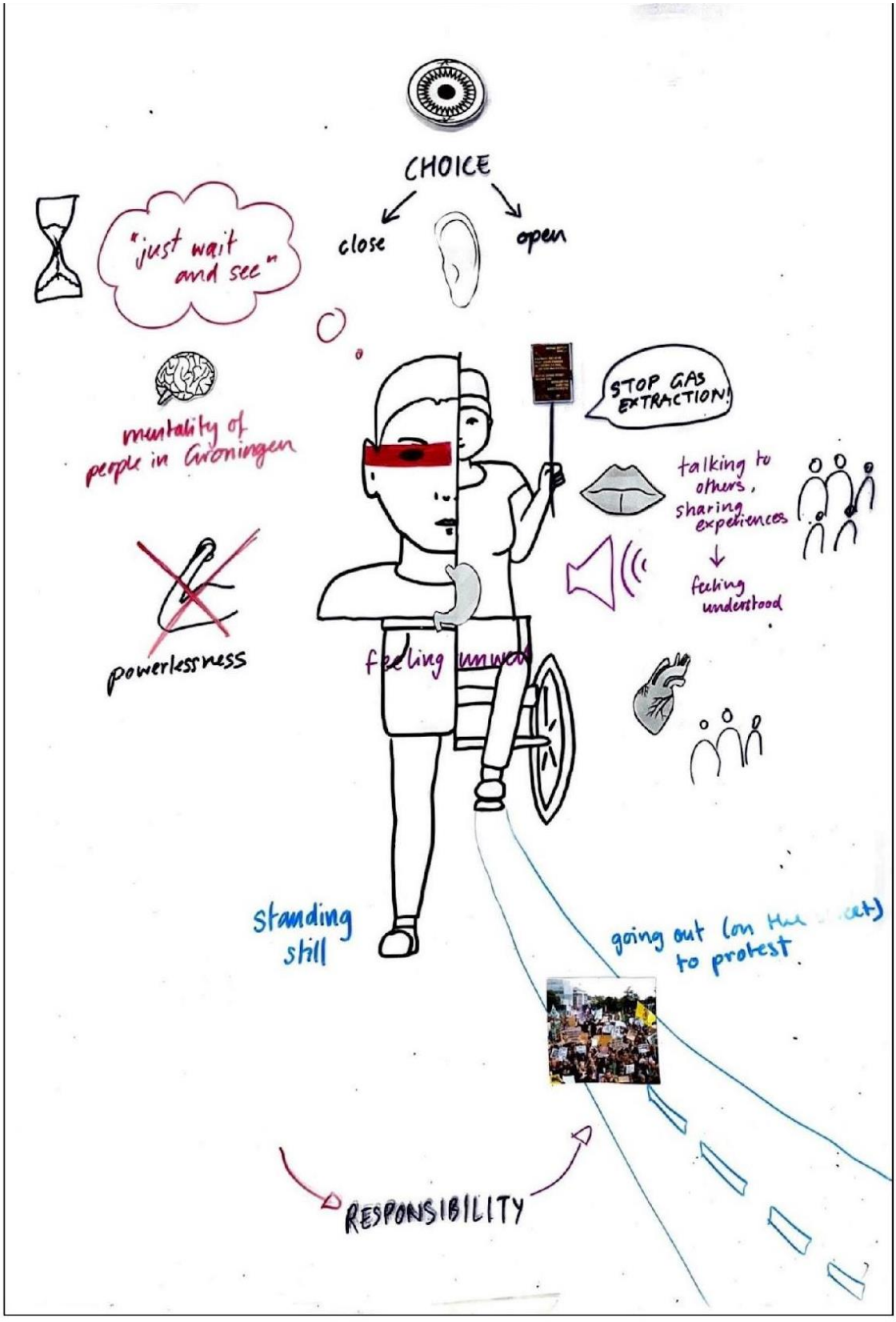
Annex 2: Counter map of group 2 on the bureaucratic burden and trust in institutions.


CHOICE
close
open
"just wait and see"
mentality of people in Groningen
STOP GAS EXTRACTION!
talking to others, sharing experiences
feeling understood
powerlessness
standing still
going out (on the street) to protest
RESPONSIBILITY

2.2 Workshop - "Moving Soils – Understanding soil subsidence in the Netherlands"

By David Hacke and Thees Owe Both

Introduction

In the workshop we worked with the topic of soil subsidence. One goal of the workshop was that we wanted to show the physical geographical reasons for soil subsidence in peatland areas of the Netherlands. The second goal was to connect the physical causes and consequences with the economic implications of soil subsidence. We gave our participants the opportunity to examine the problem from different viewpoints and work on different aspects to gain new knowledge on self-chosen aspects.

This way participants will gain a comprehensive understanding of the complex interplay between natural processes and human activities that led to the gradual sinking of the Dutch landscape and how to deal with them.

David studies in a master's program for physical geography, called landscape science, with focus on soil science, landscape and city ecology. Beneath that he is enthusiastic about peatlands and the interactions between human land use systems and their abiotic impact on nature.

Thees has nearly finished his bachelor program in geography with a focus on economic geography and studied before on policy connected topics like worker migration and energy security.

Methodology

During the first session of the workshop, we at first had the opportunity to dig a soil profile in preparation for a later training session to connect our participants with the importance of soil and highlight the interconnection of the topics conveyed at the congress. Additionally, participants drilled several soil cores to compare differences between them. The soil was described by the participants and first findings were discussed in the group. Afterwards we introduced theoretical aspects in our respective areas of experience. During these theoretical inputs we focused on giving a broad spectrum on the topic and distinguishing different viewpoints of soils subsidence.

In the following sessions and after the theoretical input we introduced different topics and ways to present knowledge regarding soil subsidence to our participants where they could choose from to elaborate and work on. We had different papers and materials prepared for topics like pluviculture, biodiversity, infrastructure costs, rewetting programs, or economic costs of soil subsidence.

For most groups we had at least one scientific paper regarding their topic prepared, but we also had some more open topics that were completely based on the knowledge and research skills of the participants. Through this we wanted to accommodate a large bandwidth of interests and hoped everyone would be able to bring in their own expertise and knowledge.

Results & Interpretation

The workshop resulted in an unexpected large number of posters that were created from the different groups and some groups even found the time to also put their time into a more creative ways to communicate knowledge regarding of soil subsidence by putting together a meme regarding the ongoing problem of soil subsidence having a low visibility or rewriting a song text to show the different steps when classifying soils. Another group prepared an online quiz which also could be used for beginners or students during lessons.

David and I are impressed by the amount of output and creativity this workshop was able to facilitate. On the other hand, we would like for future workshops to be able to focus the work of participants stronger towards explicit goals. We do this in hope of being able to sharpen the output on the topic of the workshop.

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2.3 Workshop - "Shaking grounds: Gas mining and earthquakes in Groningen"

By Laura Wallböhmer and Marius Maleschka

Introduction

The workshop was centered around the gas mining in the region of Groningen and its consequences for the people and the landscape in the area. We wanted to explore the history of the extraction of gas and the outcomes of the exploitation of the natural resources. The workshop was the first time for us both to hear about the ongoing earthquakes in the area, which inspired us to go deeper in the topic and to share our findings with our participants. In our research we decided to let the participants work on three different main topics, which were the geological formation of the gas field, the economic value of the gas extraction and the social outcome of the gas extraction, mainly working on the earthquakes and the damage that they brought to the region.

Methodology

After a short introduction from our side into the topic and the region, we went into group work. Since our group was very big, we decided to separate them into five smaller groups which each worked on a subtopic. The groups worked on the geological processes of the gas field, a timeline of the gas extraction in the area, the economic values and problems of the gas extraction, the earthquakes as a consequence of the extraction and an outlook in the future, now that the gas mining is basically over. Each group did a small Info-Post which can be posted on social media and can be used to give a compact summary on the situation to people not familiar with the topic. A few examples can be seen in the pictures below.

We gave the participants literature which we examined before the congress in order for them to have something they can base their posts on and also that they don't have to do all the research on their own.

To name a few examples, we based our literature mainly around the paper of Mulder and Perey, "Gas production and earthquakes in Groningen. Reflection on economic and social consequences" and the recommendation paper of the parliamentary committee of

inquiry into natural gas extraction in Groningen “Groningers before gas”. Of course, the participants could also do their own research based on our literature.

Results & Interpretation

The results were some informative info posts. It was clear that the groups really went into their respective topics and could filter out the most important points out of the literature we gave them.

It was a bit hard to work with such a big group, as there were only two of us workshop leaders and the time was limited. Under these circumstances it was hard to approach the situation in a more extensive manner. Still, we found a good solution to separate the group so each person could get at least a bit of expertise about the topic they chose in the group work. Our advice to future workshop leaders would be to really watch out after the time. 6 - 8 hours is not much to explore a topic especially if there are many people

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and the topic is very broad. Keep that in mind when creating a timetable for your workshop and expect delays in the workshop sessions!

3 Debate - “Navigating the Path to Sustainable Energy”

By Jakob Buchallik

As an European youth organization, EGEA was a perfect partner of the Engage4thePlantet campaign that aimed at getting less heard demographics, such as young people, involved in European politics and the then upcoming European elections. One essential partner of that campaign was EGEA Alumni, and through Esther from our Orga team and Anna from EGEA Alumni we got in touch and got it running. Some members of EGEA Alumni also participated in the debate and visited us at the congress location. While the previous parts of the scientific program dealt with natural resources, especially oil and gas, the debate would move beyond and tap into the whole energy system and its future.

Methodology – Articulate a vision

Despite the title of energy debate, we choose a more collaborative approach, as proposed by the partners. Our aim was to find a future vision and come to clear resolutions as an appeal to the new European commission and parliament that are to be formed in summer 2024. Therefore, the participants would go to four stages to “Articulate a vision”. First, they would identify pressing energy issues in their countries. In the next steps, they were asked to formulate visions of these issues for 2030 and 2040, to show developments that could happen in the near and medium future. To finish, they should make demands on how to realize these visions. In this process, we counted on people to bring their own knowledge, experiences from our workshop and additionally gave each group a small input on different energy issues to spark discussions.

Results

Key Policy Recommendations:

- Harmonization of Energy Networks through Europe
- Advocacy for a unified European railway system
- Acceleration of the switch to renewable Energies
- Access to renewable energy as a human right

- Stronger processual and financial involvement of citizens in energy endeavors

Digitized Summary of the Tables / Working Groups

Green Energy debate			
Table 1			
Current Issues	Vision 2030	Vision 2045	Policy Recommendation
Slow progression of Renewables (Wind, Solar, Hydro, Geothermal)	Commitment of governance funding to renewables with fixed figures	Energy production should be as local as possible as well as cheap and efficient	Scientific targets for renewables on individual, corporate and government levels
Nuclear is seen as controversial	Companies should take responsibility for greener energy; investment should be supported by tax reductions	There should be net zero emissions	Integrated European green transportation / mobility network through electric trains
Issue of Energy dependency in face of Russia's war on Ukraine	Quick building of infrastructure for renewables	Coal is seen as the worst pollutant and shouldn't be used by then	Network efficiency of sustainable energies for transport, housing, food production and water availability
Efficiency of imported Energy is questionable	Exchange of knowledge on how to produce renewables most effectively	Intense and detailed strategic between the European countries	

Lack of public knowledge	Research investment	Science based decision making in energy production • Strategic locations for the sources • Measurable climate impact	
Lack of government subsidies, clear regulations for public energy initiatives	Better connectivity for energy imports		

Table 2

Current issues	Vision 2030	Vision 2045	Policy Recommendations
Too much energy consumption	Enforce existing laws and policies through monitoring and sanctioning	Enforce industrial energy consumption to adapt to fluctuations of renewables	Sustainable energy should be a human right. It needs to be enforced by the EU and the global community.
Inefficient energy usage	Research storages for sustainable energies	100% renewables	
High prices and price fluctuation lead to insecurity and social inequality	Investments in decentral sustainable energy infrastructure	Decentralized energy production	

Dependency on international imports for Nuclear fuel, Oil and Gas	More easily accessible funding for energy adaption of households	People owned energy infrastructure	
Environmental impacts	Funding for climate actions on the municipal level	Energy distribution based on solidarity	
Transportation and Storage	Reduction of bureaucratic hurdles	European managed energy distribution	
Distribution of energy production / transportation costs → social and monetary			
Transformation from Nuclear and fossil infrastructure into renewables and green energy			

Table 3

Current Issues	Vision 2030	Vision 2045	Policy recommendations
Energy dependency - past dependencies to Russia	Simplification of bureaucracy		Simplification and unification of energy related bureaucracy
Coal phaseout			Taking advantage of the power of EU-Institutions

Remaining high influence of fossil lobbying	European solar panel production	New innovations and energy resources	EU funding of energy infrastructures
High bureaucratic hurdles for renewable energies depending on the region	Simplification of bureaucracy	Unified bureaucracy	
Questions of energy transportation	Improved European energy infrastructure	decentralization	
Local protests e.g. against wind energy	More renewable energies	100% renewable energies	
Inflation of energy prizes	Increased use of hydrogen	EU as main coordinator in a united grid	
		Independence from energy imports	

Table 4

Current Issues	Vision 2030	Vision 2045	Policy recommendation
France: Labelling of nuclear energy as renewable despite waste and water contamination; local resistance against renewables	Reducing bureaucracy	Lossless powerlines	Tax increase to rich people and companies

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Germany: Replacement of nuclear energy by coal and gas; ~ 50% renewables; Local resistance	Store excess energy	Green policies without lobby intervention	Public funding for necessary changes the people have to make e.g. house renovation, insulation, heating
Austria: High percentage of hydroelectricity	Cut funding and subsidies for non-green projects	Circular economy	Fund an unified railway system in Europe
	Reduce conflicts between member states	Rural regions are connected to the public transportation network, public transport as prime mode of transportations	Allocate funding exclusively to projects and purposes with the least carbon footprint / climate damage
	Investment in public transport and improvement of international train tickets, esp. Through ticket compatibility	Avoidance of neo-extractivism, profits and control of resource extraction should stay local	Nationalization or Europeanization of public services such as transportation or electricity

Table 5

Current issues	Vision 2030	Vision 2045	Policy recommendation

Nuclear Power	Inspiration from nature	Fixing priorities	Subsidies green elements in cities
NIMBYs on Wind	Working with scientists, experts	Bring everything to the UN	Make citizens shareholders of green energy
Gas	Speed limits	Concrete stop	Organ for public transportation in Europe for effective international green transport
Not enough research on large scale renewables	EU-Involvement in public transportation		Increased taxation on microflights
Bureaucratic hurdles	Less taxes on green energies, more taxes for coal		
Bad spatial planning			
Deutsche Bahn is to unreliable			
Modes of transportation (Microflights)			
New Buildings			

Table 6

Current issues	Vision 2030	Vision 2045	Policy recommendations

Fossil fuel dependency	Increased public participation through education	Nuclear fusion	Make EU funds available for energy education
Current emissions	Incentives for investments in renewable	Fossil fuel free mobility, Hydrogen based air traffic	Use AI to improve energy management
Infrastructure development with increasing costs and low public participation	Improvement of regulations	More renewable energies	
Social acceptance	Transformation of industries e.g. hydrogen-based steel production		

Table 7

Current issues	Vision 2030	Vision 2045	Policy recommendations
Germany; 50% of primary energy production comes from renewable energies but those rely on the weather, season and time of day → production and usage is not always matching, leading for the need to import and use other (fossil) sources	Immediate Actions: funding for more research, education on / about energy, working on a global support system, planning for production, storage and transport of energy	Renewable energies should account for almost all production	

Ukraine: Dependence on imported natural gas, outdated energy infrastructure, large energy losses in the transmission system + insufficient development of alternative energy sources	Renewable energies: the classics, solar, wind, geo-thermal and sustainable hydro plants Hydrogen?	More storage capacity for renewable energies	
		Better infrastructure to equalize regional differences → reduce energy consumption; innovation in new and existing sustainable energy sources	

4 Excursions

4.1 Excursion - “Hard bike excursion”

By Maren Schaal

During the hard bike excursion, we were able to enjoy two things that the Netherlands are well known for - biking and flat grounds. Starting at the accommodation with some classic Dutch “fiets”, we first passed by lake 't Gasselterveld, a former sandpit that is now open to the public. Not far away, we visited one of the “Hunebedden”, which can be seen several times in the area. After a short break in Gieten we continued through a long stretch of typical Dutch landscape in the Drenthe National Park, wetlands and fields and got to ride along natural stretches of the river Hunze for a while and took a break by the river. We continued our trip to the town of Stadskanaal and got to experience the typical infrastructure of the Netherlands with straight and endlessly long roads. After some free time in the town of Stadskanaal we made our way back to the accommodation. Everyone really enjoyed the excursion, although there could have been more input on the location and surroundings.


Von Borger-Odoorn nach Borger-Odoorn
Tripscompagnie
Muntendam
Kiel-Windeweer
Borgercompagnie
Zuidlaarderveen
Veendam
Zuidwending
Wildervank
Ommelanderwijk
Annerveenschekanaal
Spijkerboor
Annen
Eexterveen
Boven Pekela
Gieterveen
Eext
Gasselternijveen
Gasselte
Buinen
Buinerveen
Borger
1e Exloërmond
2e Exloërmond
Ees
BOSWACHTERIJ EXLOO

4.2 Excursion - “Easy bike excursion”

By Liselotte Goderie

The topic of the excursion was all about the landscape and how it was influenced by ice-ages and humans. It gave us a better understanding of the formation of the landscape around us in Drenthe.

First we had a lecture by a professor in landscape studies. He provided us with the needed background information of the structures and landscape forms that we would encounter later that day. We learned about the influence of ice-ages in the region and when the role of humans came into play from the early times to the present.

We hopped on our bikes and made our first stop at a dolman in Drouwen. We learned how these massive structures were built and what the importance of them was back in the day. Then we moved on to our next stop in the forest. This forest used to be heathen land because of deforestation and the loss of nutrients. A project was set up to turn the heathen land back into forest which made it look like the forest it is today. Quite impressive! Nowadays it is more the other way around: forest takes over heathen land and active conservation of heathen land is needed. Also at this location, we had the opportunity to look into the ground beneath us. There was a sand pit that showed us the deposits of the different ice-ages that played a role in this region. Three distinct layers were visible. Next stop was at a pingo lake. Pingos were ice mounts that collapsed after the ice retreated and are left in the landscape as deep lakes. We also learned more about the relationship between humans and nature over time. For long nature was seen as something wild and scary that needed to be claimed and reformed. We had another stop at a viewpoint that looked out onto an old ice dam burst. Nowadays a road goes right over it but the inclination where the burst had happened is still visible. After the bike ride to all these different stops, we went to the Hunebed (dolmen) museum in Borger. This museum told us even more about the dolmans and their function in ancient society. Besides that, we got to know more about the culture of that time and how people lived. There were a lot of interactive games that made our visit so much fun. Lastly, we made it to another viewpoint, to look over old agricultural land. The agricultural land was given back to nature and was in its pioneer stage of development.

All in all, I really enjoyed this excursion. It was a perfect combination of gaining knowledge about this very interesting subject and leisure. The content was interdisciplinary and brought to us by the specialists themselves that would answer all of our questions. I cannot really think of anything to improve, but I would have loved to see a meandering river as shown in the presentation.

Contact info of our partners for the excursion:
Prof. Theo Spek (Uni Groningen): theo.spek@rug.nl
Jasper Thomesen & Leo Bouwmeesrer (Geopark De Hondsrug): info@dehondsrug.nl
Harry Wolters (Hunebedcentrum): communicatie@Hunebedcentrum.nl

4.3 Excursion - “Hiking excursion Drentsche Aa”

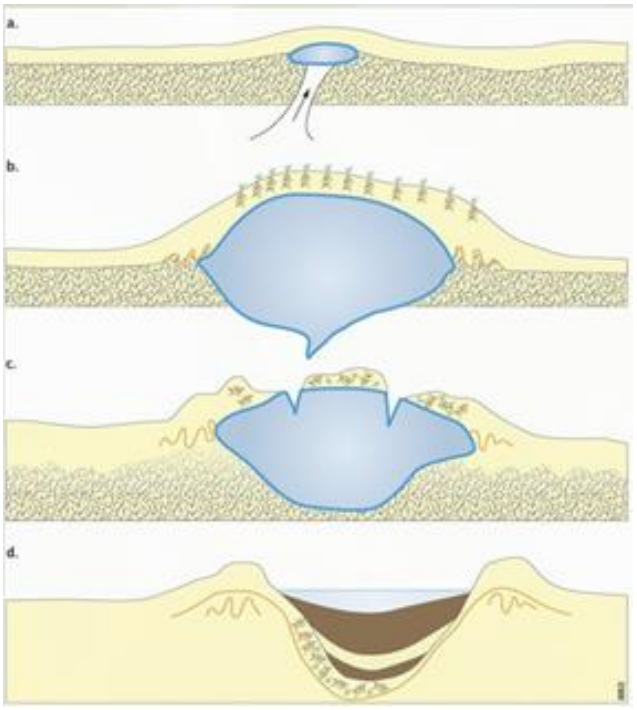
By Frederike Schneider

The hiking excursion was a relaxed hike of 15 kilometers through the national park ‘Drentsche Aa’. We were accompanied by two guides, Bernadette Boumans and Frank Pardoel, who are both volunteer guides for the national park and experts in the landscape development of the area. Bernadette works at Groningen university as a professor for landscape architecture and urbanism. Frank works independently as a geology consultant for the Drentsche Aa. It was clear from the start that they had a lot to tell us and were enthusiastic about teaching us all about the area.

The excursion topic was related to the congress topic because we experienced the unique natural landscape of the ‘Hondsrug’. This translates to the ‘dog’s back’ and describes the moraine that was formed here by a glacier from northern Europe, which moved across the Netherlands and ‘pushed’ up the ridge that is now the Hondsrug. The geology and landscape of the Hondsrug and the Drentsche Aa are what makes it a unique part of the Netherlands.

During the excursion we got to see different landscapes and both natural and man-made landscape formations. We passed by two of the ‘Hunebedden’, for which Drenthe is famous. These are our ‘stonehenges’, ancient burial grounds that were built around 3000-3500 BC. There are 52 Hunebedden in Drenthe, and they are all numbered. We visited Hunebed no. 19 and 20.

We also walked around a large lake, which was created by sand extraction. The lake had a beautiful blue color due to the acidity of the sands particles. Parts of the lake, where the water is shallow, are used for recreational purposes. It is strictly forbidden to swim in the deep parts (up to 60m), as underwater currents of cold water can cause shocks while swimming.



Another unique phenomenon in the area are the 'pingoruins'. These used to be relatively small frozen lakes under the ground, during the last ice age. The ice kept growing because the ground water moved to the surface and froze. This is how a hill formed. When the water melted, cracks started to form and the hill collapsed to form a lake. To explain the phenomenon, Bernadette used the sketch shown above.

Last but not least, we visited the 'Boomkroonpad', which translates to 'treetop-path'. This describes it perfectly: it was a path that went up through the tops of the trees, to show

visitors the perspective of the wildlife that lives in and around trees, from down in the soil to 20 meters above the ground. The local guide told us about the importance of educating children about the natural habitats and environment of the local plants and animals. Which is why projects like the treetop-path are an important part of nature conservation.

All in all, this excursion was immensely interesting. We enjoyed the landscape with it's many unique characteristics and we were of course very grateful for our excellent guides!

4.4 Excursion - “City and Energy: Groningen city tour and harbor visit”

By Tabea Kottek

City Tour of Groningen

This report provides an overview of a city tour in Groningen, organized by EGEA Groningen. The tour included visits to the main train station, canals, market square, and the rooftop of Forum Groningen. Additionally, we sampled local cuisine, specifically Eierballen. After the Tour we headed to Eemshaven to visit an energy power plant by RWE.

Groningen, a vibrant city in the Netherlands, is known for its rich history, cultural landmarks, and picturesque landscapes. EGEA Groningen organized a city tour to showcase Groningen's geographical and tourism highlights. This report documents the sites visited and the significance of each location.

Groningen's main train station, an architectural marvel known for its historical significance and modern amenities. The station, originally opened in 1866, serves as a crucial transportation hub connecting Groningen to major cities across the Netherlands and Europe. Its blend of neo-Gothic and Renaissance Revival styles symbolizes the city's blend of history and progress. The station itself is a tourist attraction due to its architectural beauty and historical importance.

Groningen's canals shape the city's landscape. Initially built for defense and transportation, now serve recreational purposes and add to the city's aesthetic appeal. They also contribute to the city's drainage system and urban planning. Boat tours and canal-side cafes attract tourists, offering a unique perspective of the city's architecture and daily life.

The market square, Grote Markt, is the bustling heart of Groningen. Surrounded by historic buildings, it hosts a vibrant market offering local produce, crafts, and food. The market square is a focal point of urban activity and social interaction, illustrating the central role of public spaces in city life.

During the tour, we sampled Eierballen, a local delicacy. Eierballen are deep-fried snacks consisting of a boiled egg encased in a breadcrumb mixture. Tasting local cuisine is a key part of the tourist experience, offering insights into the city's culture and lifestyle.

The tour concluded at the rooftop of Forum Groningen, a modern cultural center. The rooftop offers panoramic views of the city, providing a visual understanding of its layout and landmarks. The Forum is a major cultural attraction, and its rooftop is a popular spot for tourists seeking a comprehensive view of Groningen.

Visit to Eemshaven Energy Power Plant RWE

Eemshaven, located in the province of Groningen, Netherlands, is home to one of the most modern and efficient coal-fired power plants in Europe, operated by RWE. This facility plays a crucial role in the regional and national energy supply, combining traditional energy production with innovative sustainability practices.

The visit began with a theoretical introduction provided by a RWE representative. The introduction covered:

- History of the Plant: Opened in 2015, Eemshaven is one of the most modern coal-fired power plants in Europe.
- Energy Production: The plant has a capacity of 1,560 MW, using both coal and biomass to generate electricity.
- Environmental Impact: RWE's efforts to minimize environmental impact through advanced technology and sustainable practices.

Following the theoretical introduction, the group was taken on a guided tour of the Eemshaven power plant. The tour included several key areas:

Control Room: The control room is the operational heart of the power plant. Here, operators monitor and manage the entire energy production process in real-time.

Turbine Hall: The turbine hall houses the turbines and generators that convert thermal energy into electrical energy.

Biomass Handling Facilities: RWE's commitment to sustainability is evident in the biomass handling facilities, where biomass is processed and prepared for co-firing with coal.

Emission Control Systems: The emission control systems are a critical component of the plant's environmental strategy.

Cooling System: The plant uses seawater for cooling, taking advantage of its coastal location.

The visit to the Eemshaven Energy Power Plant operated by RWE offered valuable insights into the complexities of modern energy production and the importance of sustainable practices. The combination of advanced technology, environmental initiatives, and operational excellence positions Eemshaven as a key player in the regional energy landscape. Understanding these elements is crucial for appreciating the plant's role in meeting energy demands while addressing environmental challenges.

4.5 Excursion - “Round Trip to earthquake sites”

By Stijn Wansink and Jasper Oosterloo

The excursion left at Drouwen by bus and headed for Groningen city. After dropping off the people for the city tour excursion, we arrived at the campus of Groningen University. In a lecture room, a presentation was given by Eddy Kuperus from the Gasunie. The Gasunie is the operator and maintainer of the gas pipeline network in The Netherlands and North Germany. It plays a central role in the distribution and sale of gas in the Netherlands. The presentation elaborated on the functioning of the Gasunie, the relationship with the government and extractors (NAM) and the future goals after gas extraction in Groningen. Much research and prospects are focused on the potential for the Groningen gas field as capacity for CO2 storage where other gasses can be injected. Additionally, the potential for hydrogen gas (H2) in commercial application could reuse the current gas network that facilitates every neighborhood in the Netherlands. The Gasunie will retain a relevant position in national policy as well as in energy transition but is therefore itself also in a transitional phase.

After the Gasunie presentation, we had a lunch break and visited the location of EGEA Groningen and met the board of the geography study and we had a small tour of the Groningen University campus. Subsequently, we drove to the town of Appingedam for an on site visit of the earthquake problems in Groningen. It was an authentic and hands-on view of the problems the community of Appingedam is facing every day. First, we got a presentation in the old town hall, to give crucial context of the subject at hand. After the presentation we got a bike tour of Appingedam where we visited crucial sites in the development and rebuilding of the town. We saw old, damaged houses, newly built earthquake proof houses and houses that were partly rebuilt. We also spoke to town inhabitants who experienced the process that the town went through, and this made the somewhat abstract subject matter come to life in a way that we could empathize with the people of this region. We enjoyed the bike ride, as this was a perfect way to see the different sites and we also got to climb the town hall tower so we could see all the building projects from a birds eye view. This made the scope of the project really stand out. The guides were friendly and had insightful stories and comments. All and all, it was an insightful and enjoyable afternoon.

The round trip to earthquake sites formed a combination of insights from the more business orientated gas operators as well as the results of gas extraction that locally affect

communities in Groningen. It included a diverse program of visiting the university, driving to the countryside, making a bike ride and talking to locals. A truly all in Groningen experience that shows the relevance of the gas extraction in the province.

5 Skill sessions & Closing Words

Last but not least I'd like to thank the leaders of our skill sessions that gave our participants a little insight into topics of joy or use in their daily lives: Job with "Giving dirt a fancy name: The Basics of the WRB Soil Classification in the Field"; Julia with "How to Slay Every Event? A practical guidebook", Marwin with "Self Defense and How to Fall"; David with "Taking it way too serious: How to organize a Running Dinner using QGIS and Python Pandas" and Michal with "The Joy of Painting". Your contribution added a spark of interest to our program to go beyond the overall topic. It's great that we could show the diversity of knowledge and skill across EGEA through your sessions.

All in all, we managed to find a great topic for our workshop and fitting workshop leaders and partners to secure rich input that made our congress a success in the EGEA spirit of combined learning and celebrating European connections, while stepping further into the direction of deeper scientific involvement and professional development of EGEAns. I hope you found some fond memories or inspirations for your own events reading this report!