Summary Report

Joint seminar on Just Transition between Poland and Norway

Cracow, 25 October 2018

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Document details

Title	Summary Report - Joint seminar on Just Transition between Poland and Norway
Report number	2018/43
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Commissioned by	EEA and Norway Grants
Date finalised	30 November 2018
Availability	Public
Keywords	Just transition, Norway, Poland, EEA and Norway Grants, climate change

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1 Introduction

This report summarises the key messages from presentations at the joint seminar on Just Transition between Poland and Norway held in Cracow, Poland, on 25 October 2018. The seminar was organised by the Polish Ministry of the Environment and the Norwegian Ministry of Climate and Environment with assistance from the Institute of Environmental Protection – National Research Institute in Poland.

In the preamble of the Paris Agreement there is a provision that the Parties to the agreement should take into account the imperatives of a just transition of the workforce and the creation of decent work and quality jobs in accordance with nationally defined development priorities.

The main objective of the seminar was to promote the concept of just transition as an accompanying initiative to the negotiation process at the forum of United Nations Framework Convention on Climate Change COP 24, which will be held on December 3-14, 2018 in Katowice, Poland. Just transition refers to a balanced and fair economic transformation towards a low-carbon economy considering social costs and the need for new job opportunities. The seminar was aimed at promoting bilateral cooperation between Poland and Norway and to highlight opportunities for a just transition based on Polish and Norwegian experiences.

2 Key messages

The presenters at the seminar included high-level political representatives from Poland and Norway, as well as representatives from trade unions, research institutions and energy businesses in both countries.

Some of the topics covered during the seminar were experiences from the bilateral cooperation between Norway and Poland under the EEA and Norway Grants, just transition from a trade union perspective, business opportunities in the transformation to a low-carbon economy, developments in the field of Carbon Capture and Storage (CCS), opportunities for electromobility, and investments in renewable energy by energy producers.

The challenges posed by the need for a transformation of the Polish energy sector was one of the key issues discussed at the seminar. In his opening speech, Michal Kurtyka, Secretary of State of the Polish Ministry of Environment, stressed the importance of "leaving nobody behind" in the future development of the global climate policy.

Astrid Knutsen Hårstad, Junior Minister of the Norwegian Ministry of Climate and Environment emphasized that ownership to the transformation process, is a key issue. In Norway several industries have created their own road maps to a low emissions society, in many of these the trade unions were involved. She also pointed to the opportunities the cooperation between Poland and Norway under the EEA and Norway Grants present in taking steps towards a green transition.

The presentation by Sławomir Mazurek, Undersecretary of State in the Polish Ministry of Environment, showed that funding from the EEA and Norway Grants have resulted in successful projects and that results are exceeding expectations. Several presentations showed positive experiences from cooperation under the EEA and Norway Grants, including projects on electromobility in Poland, energy management in Polish SMEs, and air quality in Poland.

The Director of the Just Transition Centre Oslo, echoed the message of leaving nobody behind and pointed to the role governments can play in both smoothing out the impacts of transition for vulnerable workers and creating new jobs through initiatives such as retraining programs and investments in affected communities.

Presenters from trade unions and the Confederation of Norwegian Enterprise highlighted the need for an active role by the government in facilitating the transition to a low-emission society through social security and welfare systems. It was also pointed out that social dialogue and cooperation between government, science, trade unions and the business community are crucial elements in achieving a successful transition with effective and sustainable solutions.

Several projects under the EEA and Norway Grants were presented by Polish and Norwegian project owners. These have contributed to energy efficiency and green innovation. The projects have also provided new jobs opportunities, as well as contributing to reduced air pollution, reduced greenhouse gas emissions and other environmental benefits.

Another topic of the seminar was Carbon Capture and Storage (CCS) and the opportunities it presents. Norwegian trade unions, the Confederation of Norwegian Enterprise, the Norwegian Research Council and energy consultants highlighted CCS as a necessary tool for achieving climate goals and a just transition. CCS has the potential to both secure existing jobs and create new ones. The Norwegian Research Council emphasised the importance of knowledge sharing and cooperation at an international level in

building the competence needed within the area of climate change and CCS. An invitation was extended to Poland to become partner in the R&D programs Joint Program Initiative climate (JPI Climate) and Accelerating CCS Technologies (ACT). Aker Solutions presented new developments within CCUS, which can be attractive solutions for the industry future in Poland.

Statkraft, Europe's largest generator of renewable energy, argued that transition from a coal-based economy to renewables is beneficial for several reasons: renewable energy is clean, creates domestic jobs and is based on domestic resources. Onshore wind, offshore wind and solar will go dramatically down in cost, while existing coal, new coal and gas is getting more expensive. The energy businesses PGE and Equinor are expanding their activities in renewable energy, specifically in offshore wind, to reduce their carbon footprint but also because renewable energy is looking increasingly attractive compared to traditional energy sources.

A transition to a low-emission society will bring challenges but also new opportunities. Presenters pointed to opportunities for new decent jobs from – among other areas - innovation and new low-emission technologies, electromobility, renewable energy, energy efficiency, and green infrastructure. National authorities can contribute to scaling up efforts. The expansion of these sectors can also generate additional benefits for local communities such as improving air quality. The EEA and Norway Grants can facilitate a low emission development for Poland, and Norway is ready to assist.

3 Summary of presentations

3.1 Long-term perspectives for the Polish energy sector and climate commitments

Michal Kurtyka, Secretary of State, Ministry of Environment, Poland, Incoming COP24 President

In his opening speech, Mr Kurtyka stressed the importance of "leaving nobody behind" in the future development of the global climate policy.

He pointed to Katowice, Silesia, as an example of a Polish region that has achieved success in terms of economic progress, environmental standards and social cohesion. This success was built on dialogue. In Mr Kurtyka's view, Poland must move forward in this manner by modernising the energy mix, using and developing new technologies, and making old technologies more efficient, while at the same time making sure that they are able to accompany this movement by new competencies and new jobs.

3.2 Climate Challenges and follow-up of the Paris Agreement

Astrid Knutsen Hårstad, Junior Minister, Ministry of Climate and Environment, Norway

Ms Knutsen Hårstad emphasised that just transition is about putting people at the centre of climate policy, and that support and social security provided by the government, as well as social dialogue, are key elements in the transformation towards a low-emission society. She also pointed out that Poland and Norway can help each other by sharing information and experiences.

She outlined four important elements in the transition:

- Support for green innovation and technology
- Finance must flow to low emission investments
- Green technology must reach the markets
- Ownership to transformation

Examples of Norwegian initiatives to strengthen these elements include the state enterprise Enova, the investment company, Nysnø, established by the government for climate investments, and Innovation Norway which helps green technology reach the market. Several industries in Norway are taking ownership to the transformation and have created their own roadmap to the low-emission society, providing a good basis for dialogue and cooperation between the government and the business community.

Ms Knutsen Hårstad argued that cooperation between Poland and Norway under the EEA and Norway Grants can achieve important steps in the direction towards a green transition. The climate, energy and environment program – with 140 million euros available - will provide opportunities for capacity building and projects to cut emissions such as switching from coal to renewables, energy efficiency and other climate friendly technologies.

3.3 Polish Experiences from co-operation under the EEA and Norway Grants

Sławomir Mazurek, Undersecretary of State, Ministry of Environment, Poland

Undersecretary of State Sławomir Mazurek welcomed all the participants and underlined Polish efforts aimed at improving air quality (Governmental "Clean Air" Programme supporting inhabitants to change heat sources in their houses) and developing circular economy as well as Polish presidency of the 24th Conference of the Parties to the United Nations Framework Convention on Climate Change. He also announced that the negotiations on the final text of the declaration on Just Transition due to be presented during COP 24, in December 2018, entered its decisive phase.

Piotr Bogusz, Deputy Director, Department of Ecological Funds, Ministry of Environment, Poland

Mr Bogusz showed that the EEA and Norway Grants 2009-2014 have been successful and that results have exceeded expectations. During the program period, there has been significant interest in applying for funding and EEA and Norway Grants are often seen as beneficiary-friendly.

Programmes under the EEA and Norway Grants 2009-2014 were:

- PL02 Protection of biological diversity and ecosystems. 21.6 million EUR. 61 projects.
- PL03 Improving environmental monitoring and inspection. 15.2 million EUR. 9 projects.
- PL04 Saving energy and promoting renewable energy source. 144.9 million EUR. 124 projects.

The third round of funding, EEA and Norway Grants 2014-2021, is in preparation. The Environment, Energy and Climate Programme will have a budget of with a budget of 140 million euros. The budget will spend:

- 72 % on renewable energy, energy efficiency and energy security.
- 19 % on climate change mitigation and adaptation.
- 9 % on environment and ecosystems.

3.4 Experiences from Norway on tripartite/social dialogue in relation to restructuring of industries, roles of organizations

Are Tomasgard, Confederal Secretary, Norwegian Confederation of Trade Unions, LO-Norway

Over 930 000 workers are affiliated to the 26 national unions which in turn are affiliated to the Norwegian Federation of Trade Unions.

The trade union movement in Norway has called upon politicians to be responsible and ensure climate policies that include necessary measures. According to Mr Tomasgard climate change is also a trade union business and there is no option, but to deliver on the climate goals.

He highlighted five elements necessary to achieve a just transition:

- Ensuring climate measures are carried out, that the climate targets are reached.
- Guaranteeing workers' rights.
- Building the low emission society; investments and development of environmentally friendly technologies.

- Providing education and training, building skills and competence for new tasks and new jobs.
- Social rights through social security and welfare systems.

LO has worked to get the national government to establish a national just transition council or taskforce, but not yet succeeded. However, LO has worked with the City of Oslo, which will soon establish a just transition taskforce. The hope is that this will set an example for other authorities and governments on how to ensure just transition.

Mr Tomasgard underlined that CCS is necessary for achieving climate goals but also a tool for just transition. The research institute SINTEF has published a study; *Industrial opportunities and employment prospects in large-scale CO_2 management in Norway*. The report finds that giving priority to the CCS value chain in Norway will secure 80-90,000 existing jobs and create 30-40,000 new jobs by 2050.

3.5 Just Transition from the perspective of the Polish Presidency of COP24

Artur Lorkowski, Special Envoy on Climate, Ministry of Foreign Affairs, Polish Presidency Team of COP24 in Katowice

Mr Lorkowski underlined that political leaders of the world would participate in the Climate Change Summit in December 2018 in Katowice. He stressed that the main objective for the Polish Presidency of COP 24 is the adoption of the Katowice rulebook, a set of rules and principles for how the Paris Agreement will be implemented. This task is a priority in order to allow for the Parties to organise the climate ambition in a structural way, but also in order to allow the other actors of the climate process such as the business community, regions and cities to be a part of the Paris Agreement.

Three main focus areas of the Polish Presidency of COP24 in Katowice are:

- *Just transition.* Leaders will be asked to sign a declaration of Just Transition in December in Katowice as it is one of the main priorities for the COP 24 Presidency and as Just Transition is included in the Paris Agreement.
- *Electromobility*. Provides a significant opportunity for reduction of GHG emissions and improved air quality. Norway is welcome to contribute to and support the development of electromobility in Poland. It could provide new jobs and better wages for people employed in that sector. This initiative is open also for cities and regions.
- *Forests.* Forests can make a large contribution through the absorption of CO_2 by 2050. Forests are the central priority for the Polish Presidency. The latest IPCC Special Report on Global Warming of 1.5° C (SR15) also stressed the importance of forests in the fight against climate change.

3.6 Decent Work agenda and Just Transition internationally

Samantha Smith, Director Just Transition Centre, Oslo

Ms Smith works for the International Trade Union Confederation and runs a small centre on just transition in Oslo. In her view, just transition is about making our economies more sustainable and creating decent jobs for everyone. She pointed to the role governments can play in smoothing out the impacts of transition for vulnerable workers and in creating new jobs. New jobs can be created area such as in

electromobility, public transport, in green buildings, in infrastructure, retrofits, clean energy generation, distribution and storage.

She pointed to a growing number of workers, unions, and employers internationally working to create just transition plans. These are plans to create decent jobs with low emissions, but also to support workers and regions in transition or in sunset industries.

Ms Smith presented an example from Alberta, a region dependent on sunset industries, where directed initiatives and planning is helping smooth the transition. Alberta offers a bridge to pension for older workers, vouchers for skills training, a commitment by employers to keep jobs in the province and to re-deploy jobs to the new sectors, and from the federal and provincial government to invest in the affected communities with better infrastructure, schools, hospitals etc.

3.7 Labour market aspects of coal transition – Polish case study

Piotr Lewandowski, President of the Board, The Institute for Structural Research (IBS)

Mr Lewandowski presented findings from a recently released report on the labour market aspects of coal transition in Poland.

The report shows that meeting Poland's commitments to stay within the 2°C target is feasible but requires a substantial reduction in coal consumption. According to the analysis, CO_2 emissions consistent with the 2°C target would be half of the emissions in the baseline scenario. To achieve this reduction coal production would have to be cut by two thirds compared to the baseline scenario. The implications on coal mining employment is that there would be around 50,000 fewer people employed in coal mining under the scenario of meeting the 2°C target.

The reduction in coal mining employment can largely be managed by a natural attrition of workers (outflows to retirement) and stable, limited inflows of new workers. The transition is likely to be easier for the coal sector workers than the transitions many industrial workers have endured in the past, for two reasons:

- Labour demand will be strong: There will be demand for workers in other manufacturing industries such as the automotive sector, retrofit programs are offering jobs, and the transport and services sectors are growing.
- Labour supply is declining: Demographic changes create labour shortages, older miners can work until retirement, and young cohorts are better educated and can more easily be channelled to different jobs.

According to Mr Lewandowski, the next 10-15 years present a window of opportunity because:

- Automation will reduce the future demand for low- and middle skilled labour
- Tackling air pollution, energy poverty and degraded areas is an urgent need
- Structural funds will be available for training, job placement, etc.
- Social support programmes already exist (leaves and redundancy payments)
- Opportunities should be expanded in the less-developed subregions

3.8 Just Transition from a Polish Trade Union perspective

Ewa Buzoń-Krupińska, Representative of the Inter-union Team for the Social Pre_COP24

Ms Buzoń-Krupińska presented the results of a study carried out by experts from the Economic University of Katowice for the Polish coal mining company PGG. The results of two scenarios were presented: 'transformation or creating new jobs' and 'liquidation scenario'.

In the first scenario, 'transformation or creating new jobs', the average cost of replacing one workplace in the coal sector is PLN 1.2 million (approx. EUR 280,000) and the cost of such a transformation for 200,000 employees of PGG and the mining sector is PLN 190 billion (approx. EUR 44 billion). In this scenario there is closure of mines with simultaneous need for investment for new jobs in other sectors. To achieve this there must be investors, specific projects and funding, otherwise only a liquidation scenario is possible.

In the second scenario, 'liquidation scenario', the average cost of replacing one workplace in the coal sector is PLN 270,000 (approx. EUR 63,000) and the cost for employees of PGG and the mining sector (200,000 employees) is PLN 54 billion (approx. EUR 13 billion). This scenario has negative socio-economic effects (i.e. unemployment, outflow of capital, inhibition of development).

Ms Buzoń-Krupińska stressed that it is crucial to have willing investors before starting a process of closing mines.

3.9 Just Transition from a Norwegian Trade Union perspective

Jan Olav Andersen, The Electrician IT Workers Union

Mr Andersen is the general secretary of the Electrician and IT Workers Union in Norway. The union has 38 000 members, working in sectors like electrical engineering, production of renewable energy and distribution of electricity, telecommunications and IT. Mr Andersen presented five pillars fundamental in the concept of just transition from a trade union perspective:

- *Creating new and better jobs in a sustainable economy*. Political action and investments in new sectors are important to achieve this.
- *Ensure worker´s rights and ability to obtain necessary and updated skills.* One of the most important aspects of just transition is continuous work to gain and maintain the competence needed. Workplaces and the education system can facilitate this.
- *Social security based on a welfare state.* A transition might result in periods where workers are unemployed. The alternative to employment cannot be poverty.
- *An international and collective responsibility.* There should be dispersion of the burden of transforming the economy. Rich and developed countries must take most of the burden.
- *The inclusion of workers organisations in shaping a sustainable future.* Cooperation between workers organisations, employer organisations and government.

Barbro Tverfjell Auestad, The Industry and Energy Union

The Norwegian Industry and Energy Union represents over 55,000 workers in oil, gas and onshore industry.

Ms Tverfjell Auestad emphasised that the world needs CCS. CCS will make it possible to use hydrocarbons as energy without any GHG emissions. When or if the demand for hydrogen increases, CCS can enable provision of emission free energy easy to use for shipping or other off-grid energy use. It will also make it possible to make cement and other produce for infrastructure and buildings without CO_2 emissions. She was concerned that the process is moving forward too slowly.

For a just transition to occur, she pointed to a need for enough permanent and high-quality jobs and for workers to be able to stay in the same geographical areas as before.

3.10 Opportunities in a low emission society- Norwegian Business Perspective

Per Anker-Nilssen, Head of Energy and Environment, Confederation of Norwegian Enterprises (NHO)

The Confederation of Norwegian Enterprises is Norway's largest organisation for employers, with 26,000 affiliated companies. The main objective of the confederation is to create and sustain conditions that safeguard competitiveness and profitability of business and industry in Norway.

Mr Anker-Nilssen reiterated the message from previous presentations that the government plays an important role in ensuring a transition towards a sustainable economy. It can provide incentives to push markets in the right direction (e.g. the NOx fund) and lay the foundation for innovations and new technologies through research, development and demonstration (R&D&D) programs and provision of infrastructure facilities for testing pilots. An example of such a program is the CLIMIT program in Norway which helps fund CCS pilots on cement and waste incineration. Public procurement is also a tool to increase the application of new and environmentally friendly technologies. In his view, there are not enough relevant public instruments being used to date.

He highlighted that there are major barriers in early commercialisation stages, with high costs and risks, and that public incentive schemes will have the greatest impact on the pace of innovation in these stages. Investments in R&D&D require predictability in demand and stability in regulation. According to Mr Anker-Nilssen, business action depends on two things:

- the market formed by customer preferences, demands and willingness and ability to pay the environmental cost
- the regulatory framework set by authorities globally, regionally and nationally.

NHO believes that cooperative multi-stakeholder partnerships within and among business and employees, investors, states, regions, cities, and communities can help catalyse growth jobs and emission reductions. Trust and mutual understanding is important.

3.11 Co-operation on air pollution and improving the efficiency of the Polish environmental inspection

Barbara Toczko, Chief Inspectorate of Environmental Protection (GIOŚ)

The Chief Inspectorate of Environmental Protection (GIOŚ) is responsible for air quality monitoring and assessments in Poland under the framework of the State Environmental Monitoring Programme. It acquires data on voivodeship (county) and national level and reports to foreign and international institutions, including the European Environment Agency and European Commission.

Ms Toczko presented two projects financed under the EEA Financial Mechanism 2009-2014 to support air quality in Poland. The Norwegian Institute of Air Research (NILU) was Project partner on both projects.

- Project 1 (budget: 1,3 million euros). Strengthening of air quality assessment system in Poland based on Norwegian experience. The project included the development of a portal for visualisation of air quality data.
- Project 2 (budget: 6,6 million euros). Strengthening technical capacities of Inspection of Environmental Protection through the procurement of measurement, laboratory and IT equipment.

Possible projects under det EEA Financial Mechanism 2016-2021 with NILU as project partner are:

- Research project on the influence of emission sources on PM concentrations in chosen cities and agglomerations in Poland
- Strengthening monitoring of wet deposition in Poland – revision of methodology and implementation of the new system

3.12 Transportation: Electromobility

Krystian Szczepański, Director of the Institute of Environmental Protection- National Research Institute, Poland (IOŚ-PIB)

Mr Szczepański presented the results of a project under the Norwegian Financial Mechanism 2009-2014 on electromobility in Poland. The project had three components; Research and Development, Evaluation Studies-Implementation, and Promotion. Some of the key findings of the project:

- Electromobility expansion will not overflow the National Power System but will significantly affect the distribution network. Local energy storage, distributed energy and high-quality charging equipment can reduce the burden on networks. Modernisation of the medium and low voltage system should be carried out concurrently with electromobility development.
- Electromobility development showed no effect on air quality with the existing energy mix in Poland but will result in apparent improved air quality if the energy comes from renewable energy sources. Electromobility should be treated as one of the aspects of improving air quality in metropolitan areas.
- The most effective initiatives to support electromobility development were found to be:
  - Strong direct financial incentives in the initial phase of electromobility development and their gradual withdrawal as it progresses
  - Creation of a good "climate" for Electric Vehicle (EV) users - free parking lots, dedicated parking spaces, access to bus lanes and low-emission zones

  - Instantly recognizable marking of EV cars
  - Strengthening low-emission public transport, including EV sharing and electric taxis
  - Promoting pro-environmental lifestyle, including the use of low-emission individual and public transport
  - Establishing a platform/institution coordinating and supporting electromobility development in Poland
  - Charging infrastructure should be developed in a thoughtful and comprehensive manner
- Promotion tasks of the project included a nationwide promotional campaign, an information campaign for public administration, and establishment of publicly available, fast charging stations integrated with renewable energy systems.

3.13 Electromobility - experiences from Oslo, Norway

Sture Portvik, Oslo Municipality

In 2008, the City Parliament in Oslo adopted "a ten-point plan" to reduce CO_2 emissions, to which the large-scale introduction of EVs plays a big part. Mr Portvik presented some of the key success factors and challenges for the use of EVs based on experiences from Oslo.

To increase the use of EVs, the cars must be cheap to buy (no purchasing tax, no VAT), cheap to use (free parking, free electricity, free passing in toll gates), and convenient to use (easy access to charging, access to parking, bus lines). It is also critical that the right product is available on the market. While incentives have been in place in Norway since the 1990s, the uptake of EVs didn't take off until electric car models like Nissan Leaf and Tesla Model S were available on the market.

Some of the challenges experienced in Oslo include:

- It is hard to deploy enough chargers to keep up with demand
- Over half of Oslo's population is living in flats, posing challenges for charging
- Electrification of EVs for professional use (trucks, vans etc) needs a boost

3.14 Energy Management in the Polish Industry

Andrzej Rajkiewicz, National Energy Conservation Agency (NAPE), Hans Borchsenius, Norwegian Energy

Mr Borchsenius and Mr Rajkiewicz presented the experience from a project aiming to improve energy management in Polish SMEs. The project was financed by Norway Grants within the programme PL04 "Energy saving and promoting renewable energy sources" and implemented by National Energy Conservation Agency (NAPE) in cooperation with Norwegian Energy . The project was initiated in early 2016 and finished by the end of 2017.

During the project, energy management in accordance with the energy standard ISO 50001 was implemented in nine selected Polish companies. In each company the energy policy, energy audits have been prepared and the energy management structures have been created. As the by-effect of the project, in result of performed energy audits in participating companies, a set of measures improving energy efficiency has been identified. The sum of the effects of implementation of the measures has been estimated to energy savings of 57 000 MWh / year.

Measures implemented included modernisation (exchange) of heating networks and nodes, modernisation of ventilation systems and electric drives, and modernisation of lighting, compressed air systems, reduction of heat and cooling losses, economisers on boilers.

3.15 Climate change adaptation - green infrastructure, jobs and public health

Anne Erlandsen, Vista Analyse

One of the expected consequences of climate change is increased intensity and frequency of rainstorms. Ms Erlandsen's presentation showed how green infrastructure presents an opportunity to make cities more resilient to heavy rainfall while at the same time generating additional benefits such as improving water and air quality, reducing the heat island effect, reducing noise pollution, capturing CO_2 and protecting biodiversity. Many of these benefits also have positive effects on public health and wellbeing. Examples of green infrastructure include green roofs, rain gardens, green walls, permeable pavement, urban parks and wetlands.

The Green City, Clean Waters initiative launched by the water department in Philadelphia is an example of how green infrastructure can be a sensible approach to stormwater management while at the same time creating local job opportunities and generating environmental and social benefits. The initiative was launched in 2011 and will spend $1.2 billion on public investments in green infrastructure over 25 years. The water department estimated that investments in green infrastructure were less costly than upgrading the existing combined sewer system. To date the initiative has helped create an industry cluster of at least 60 green infrastructure firms and is supporting 430 local jobs.

3.16 International cooperation in the CCS field through ERANET Cofund under Horizon 2020 and EEA-Norway Grants

Ragnhild Rønneberg, Special Adviser, Norwegian Research Council

In her presentation, Ms Rønneberg emphasised the importance of knowledge sharing and cooperation at an international level in building the competence needed within the area of climate change and CCS. Ms Rønneberg also underlined the importance of political interest and will to support R&D projects. She extended an invitation to Poland to become partner in the R&D programs Joint Program Initiative climate (JPI Climate) and Accelerating CCS Technologies (ACT). The EEA and Norway Grants can be used to finance expenses and investments needed to join these initiatives.

The purpose of JPI Climate is to increase open international climate change research and innovation cooperation. There are currently 12 member countries (and 5 associated) in JPI Climate. JPI Climate is in the phase of developing a series of activities, including calls, for the next 2-5 years.

ACT is an international initiative to establish CO_2 capture, utilisation and storage (CCUS), as a tool, to combat global warming. The ambition of the initiative is to fund research and innovation projects that can lead to safe and cost-effective technology. ACT has 13 partners from 12 different countries. The knowledge sharing is taking part across borders between R&D institutions, industry and policy makers, benefitting all partners. Membership also provides value for money. For example, Norway invested 7 million euros and Spain invested 0.3 million euros in the first round of ACT calls and both got access to projects results at a value of 50 million euros.

3.17 Polish experiences – domestic and international projects

Adam Wójcicki, The Polish Geological Institute – National Research Institute (PIG-PIB)

The presentation showed a historical overview and status of selected R&D Carbon Capture Use and Storage (CCUS) activities in Poland. Saline aquifers make the most of CO_2 storage potential in Poland (mostly onshore) but this option seems to be a waste of a precious resource.

The potential of CO2 storage in hydrocarbons including enhanced hydrocarbon recovery is relatively small but this option is relatively safe and viable (the technology is proven worldwide, especially in case of CO2-EOR).

The main problem is (in)availability of a sufficiently big and not very expensive CO_2 stream. Though small-scale installations capturing CO_2 from flue gases in power plants exist, it seems the solution is too expensive. However, there are several chemical (fertiliser, ammonia) plants in Poland releasing relatively pure CO_2 which could be easily captured.

EEA and Norway Grants has financed a study on CO_2 injection into gas bearing shales (from 2014 to 2017) as a method to enhance gas production. However, industrial production of gas from shales has not been achieved yet.

3.18 Just Catch – modular capture plants – offer several advantages

Oscar Graff, Vice President, Head of CCUS, Aker Solutions

Aker Solutions is a Norwegian company offering products and services to the oil and gas industry but is also active in CCUS and floating wind. The company has 14,000 employees in 50 different locations around the world and the only company globally that covers the whole CCUS value chain. Mr Graff presented a new development by the company: modular capture plants named “Just Catch”.

One substantial benefit of the modular capture plants is that the technology is standardised and can be scaled according to the size of the plant. The modular capture plants can be easily transported, are quick to install, and come at a low cost.

CCUS is not only for fossil fuel, but for the industry in general (waste-to-energy, steel and cement production, etc.). If the world is going carbon neutral, we must apply CCUS. The CCUS technology is verified and ready for the market and while the cost of emitting CO2 is increasing the cost of carbon capture is decreasing.

There is considerable potential for the use of CO_2 as feedstock for other products or in greenhouses. For example, Europe is a net importer of methanol but can make methanol from CO_2. There is also a lack of proteins needed for fish feed in Europe, but proteins can be made via algae production and CO_2.

3.19 Green innovation - Presentations on new business opportunities

Knut Ringstad, Innovation Norway, Jan Wrzesień, President of the Board, Zakłady Sanitarne w Krakowie, Paweł Jarzyński, Vice-chairmen of the Board, Jawar Sp. z.o.o.

Mr Ringstad from Innovation Norway provided an overview of the Green Industry Innovation program and the results achieved in Poland to date, followed by examples of projects supported by the program presented by Mr Wrzesień (Zakłady Sanitarne w Krakowie) and Mr Jarzyński (Jawar Sp. z.o.o).

Innovation Norway stimulates profitable business development throughout Norway, but also contributes to investments in green technology and products in European countries through the Green Industry Innovation program. The program is funded by the EEA and Norway Grants and has for the program period of 2009 to 2014 resulted in 28 implemented projects in Poland with annual reduction of 50,000 tonnes CO_2, more than 85 new green jobs, 55 new production technologies, and improved profitability. For the program period 2014 to 2021 (implementation 2018 to 2024) Poland will receive 85 million euros from EEA and Norway Grants. Mr Ringstad expressed that it was a unique positive experience to work with Polish companies and authorities.

Zakłady Sanitarne w Krakowie received funding from the Green Industry Innovation program for the construction of a plant dedicated to burning only wet biomass. Mr Wrzesień expressed his gratitude to Innovation Norway for their friendly and professional approach during the process.

Jawar Sp. z.o.o received funding from the Green Industry Innovation program for the development of a green chimney system, which can reduce PM2.5 and PM10 by 80 percent. Jawar has benefited from the development of the green chimney and is expanding internationally. It is now working on a new generation chimney that will be even more energy efficient, with support from an EU grant. Mr Jarzyński echoed Mr Wrzesień's gratitude to Innovation Norway for their approach during the process referring to mutual trust in their relationship, high flexibility and little bureaucracy.

3.20 Equinor: Offshore wind – new business opportunities

Paal Coldevin, Manager New Energy Solutions

Equinor is the second largest gas exporter to Europe but has in the last few years also started focusing on renewables. The company has renewable energy operations in the UK providing energy for 60,000 homes. A driver for the company's strategic move towards renewable energy is the increased competitiveness of renewable technology. Compared to traditional oil and gas, renewable energy is looking increasingly attractive.

Mr Coldevin mentioned three major projects in offshore wind in their portfolio going forward:

- Dogger Bank in the UK
- Empire Wind outside New York, US
- Joint Venture with Polenergia on the Baltic 2 and 3 leases in Poland.

The Joint Venture with Polenergia will result in two projects that each will have investments in the range of 1.4 to 1.8 billion euros and result in direct employment during the construction phase of 1,200 to 1,500 man-years spread over two to three years. These projects would be in operation for at least 25 years.

In Mr Coldevin's view there is potential for high class developments in Poland going forward and for offshore wind to become an important industrial activity. There is strong interest from leading developers and positive interest from Polish stakeholders. Politicians should ensure the regulatory and policy frameworks support this kind of development.

3.21 Statkraft: Renewable energy technologies – role in the future

Steinar Bjørnbet, Commercial and Business Development Manager – Wind Europe, Statkraft

Statkraft is Europe's largest generator of renewable energy. The production is mostly based on hydropower, but the company has an ambition to grow in onshore wind and solar in Europe, including Poland.

Mr Bjørnbet gave four reasons for why a transition from a coal-based economy to renewables is beneficial:

- Renewable energy is clean
- The resources are domestic
- Renewable energy generates domestic jobs. For example, in the US there are now as many jobs in wind power as in coal, and double as many jobs in solar as in coal.
- Onshore wind, offshore wind and solar will go dramatically down in cost, while existing coal, new coal and gas is getting more expensive.

Mr Bjørnbet emphasised the need to harness these benefits and to have a long-term national plan for the transition from coal to renewables.

3.22 PGE in transition – How we do it

Robert Grzegorowski, Managing Director Offshore Wind Energy Office, PGE Energia Odnawialna S.A.

PGE is the largest energy supplier in Poland with over 5 million households as well as major business and industry as customers. The PGE value chain consists of mining, power generation, transmission, distribution and wholesale. PGE's production mainly comes from hard coal and lignite, but the company is looking to expand its renewable energy production in the future.

Development of offshore wind is one of PGE's key initiatives for reducing its carbon footprint. Mr Grzegorowski presented details from PGE's Baltica Offshore Wind Farm project, which consists of three parts, Baltica 1, 2 and 3. PGE is working with several agencies and ministries in order to come up with a dedicated fit-for-purpose Act for offshore wind.

3.23 Panel: Just transition – how can we proceed?

Moderator: Mr. Robert Jeszke, *Head of Strategy, Analysis and Auction Unit, The Institute of Environmental Protection – National Research Institute (IOŚ-PIB)/The National Centre for Emissions Management (KOBiZE)*

Participants:

S. Mazurek, Undersecretary of State, Ministry of Environment, Poland

I. J. Wiese, Senior Adviser, Ministry of Climate and Environment, Norway

A. Tomasgard, Confederal Secretary, LO

S. Smith, Director Just Transition Centre, Oslo

M. Burny, Director, Department for International Affairs, PGE S.A.

P. Lewandowski, President of the Board, Institute for Structural Research

Question to S. Mazurek, Undersecretary of State, Ministry of Environment, Poland

How is the transformation/transition going?

- We are onboard and want to be part of this global project. Our ambition is to reach the goals in Katowice. We are implementing changes and need to create roadmap to meet our ambition. We must look for synergies with global trends, circular economy, artificial intelligence. Polish forests present an opportunity to capture CO_2. We have the tools to pursue renewable energy and electric transportation. Clean air is a priority. Just transition is possible and will be completed if the decisions of my government are accepted by the public. We need to create jobs and reduce social costs and achieve this without harming social groups.

Question to I. J. Wiese, Senior Adviser, Ministry of Climate and Environment

Could you share some of Norway's experience in just transition and workforce issues and highlight the key challenges in this area?

- There are several opportunities for Poland as we see it. We believe the government has a special role to play in facilitating a just transition. As Mr Mazurek pointed out, there is a need for a long-term plan for a transition to a more climate friendly energy mix. We understand your challenges and the uncertainties felt by the workforce and population, but we also see that there are so many new opportunities. The fact that costs of solar and wind have come down, while at the same time the cost of coal is increasing, presents a golden opportunity to take a step forward. The Government of Norway, business enterprises, labour unions and research institutions are ready to support Poland in the transition period, for example through EEA grants, the climate energy and the environment program, green innovation program and research programs. There is a possibility for a smooth transition that can benefit all of us if you use these opportunities.

Question to A. Tomasgard, Confederal Secretary, LO and S. Smith, Director Just Transition Centre, Oslo

What are the key issues that we should keep in mind in the transition from coal from the governmental point of view but also from the workers point of view?

A. Tomasgard:

- No one has the clear answer to this question. But I can share some experience. I was born in Odda, a small industrial town on the West Coast of Norway. The fjord outside the factories was the most poisoned in the world, it was completely red. The government, trade unions and the polluting company cooperated to find solutions to the problem. As leaders of trade unions, we have to tell workers what they need to hear, not only what they want to hear. The reality in the example

above was the if the poisoning did not stop, there would not be jobs in Odda in the future. Cooperation, good relations and trust is essential.

S. Smith:

- Just transition is about people. The transition is inevitable but what is not inevitable is that it will be just. When people are working in a sunset industry, knowing there is a discussion about change, those people are frightened and angry. Governments have a role to play in providing social security, such as facilitating re-training/re-skilling and secure pensions, as well as creating job opportunities, for example by investing in new infrastructure, improve quality of schools and hospitals and investing in regions so people want to stay. These things are key to build trust and make people feel secure.

Question to P. Lewandowski, President of the Board, Institute for Structural Research

Could you share your reflection on the costs of the transformation of the coal region in Poland?

- We should carefully consider how to spend funds on social security. In Poland we spent a fair amount of money towards supporting miners in the late 1990s and early 2000s. It is unlikely that the costs of a transition today would be higher than they were back then. Most of the transition can be achieved via letting workers retire. Money would be well-spent on modern vocational training and lifelong learning. It will be smarter to invest in education for new industries, not sunset industries.

Question to M. Burny, Director, Department for International Affairs, PGE S.A.

How do you perceive the issue of financial support for a just transition of the energy sector in Poland?

- The transition of the energy mix will not finance itself. We need broad retraining and reskilling programs. The current mechanisms under the revised EU ETS directive are not sufficient to cover the huge capital expenditure we have in front of us as utilities to stay on the path of decarbonisation, and so we would need more EU funding for the transformation of the Polish energy mix. According to our calculations we would 60 billion euros in capital expenditure alone to continue the transition towards low carbon energy world by 2030. We need to expand the just transition principle not only from social welfare perspective but also to concrete investments which would move us towards renewables, gas-fired plants and also possibly nuclear. We are on the pace of changes, but do not expect the undoable.

The moderator, Mr Jeszke, briefly summarised the panel discussion by identifying to structural problems: the social problem (workers losing and having to change jobs) and the business problem (the need for investments). Mr Jeszke stressed that just transition touch the problem of the whole energy sector in Poland and that the increasing prices of energy would have an impact on the whole economy. Going forward it will be important to calculate the costs of the transition and to analyse how it can be faced in the most beneficial way, economically and socially.