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SUPPORTING THE CLEAN ENERGY TRANSITION
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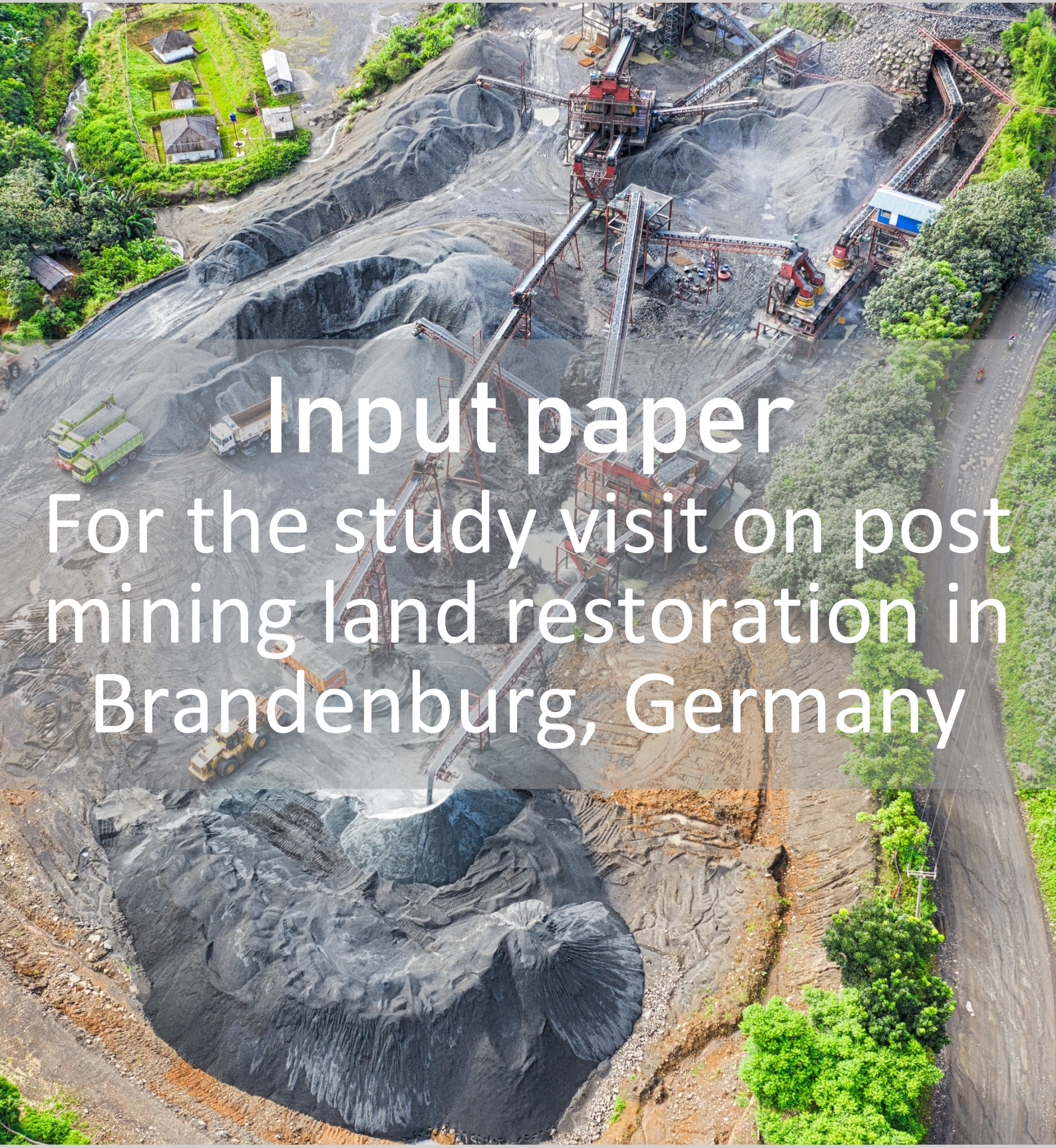

Input paper

For the study visit on post mining land restoration in Brandenburg, Germany

MINISTRY OF ECONOMIC AFFAIRS AND ENERGY OF THE STATE OF BRANDENBURG

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LAND
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1 EXECUTIVE SUMMARY

The DeCarb project includes the organisation of a study visit to promote interregional learning and capacity building among partnership organisations and their stakeholders, on key issues related to the decarbonisation and clean energy transition of coal intensive regions.

The study visit will be organised in Germany, in Brandenburg Region, by the Ministry for Economic Affairs and Energy of the State of Brandenburg on 6 and 7 November 2019. The focus will be on land restoration and environmental restitution processes following the shutdown of coal driven activities in a region (either the closure of coal mines or decommissioning of coal fired power plants). It will place emphasis on 4 aspects:

a) Legal framework governing coal mining and post mining land restoration in Germany and the State of Brandenburg,
b) Policy and regulatory measures to shape an enabling environment for mine reclamation,
c) Ecological and sustainability criteria for selecting appropriate land uses (e.g. renewables, agriculture, forestry, lakes and residential buildings), and
d) Cost-benefit analysis and socioeconomic appraisal of post mining land restoration investments.

Regional actors will present good practices on re-building the ecological functionality and integrity of degraded landscapes whilst stimulating the productive functions of land to mitigate the negative impacts of a coal phase out on local employment and income.

The report at hand (i.e. input paper), primarily addressed to study visit participants (partners' staff and regional stakeholders), will serve as the background documentation to thematically support the exchange of experience and capacity building processes of the study visit. The report is structured as follows.

- **Section 2** presents the scope and objectives of the study visit to be held in the State of Brandenburg.
- **Section 3** provides key facts for the host region, its energy sector and the world famous regeneration programme in Lusatia's former mine sites.
- **Section 4** describes the existing legal framework on lignite mining and land restoration in Germany and the State of Brandenburg.
- **Section 5** enumerates the criteria to be taken into consideration for selecting economically/technically feasible, environmentally sustainable and socially acceptable post mining land uses.
- **Section 6** suggests indicative regulatory and legal measures to establish an enabling policy environment for post mining land restoration in partnership territories
- **Section 6** provides a draft agenda with tentative activities and time slots.

2 SCOPE AND OBJECTIVES OF THE STUDY VISIT

Fossil fuels supply most of human energy demand in the EU-28, having the largest contribution to energy production; combustible fuels (coal, oil and natural gas) account for approximately 50% of total net electricity generated (Eurostat, 2016). In this share, coal (hard coal and lignite) provides ~25% of the production of primary energy in the EU.

In the EU, there are currently 128 active coal mines with combined annual production of over 500 million tonnes; and 207 coal-fired power plants with a total capacity of almost 150GW. The restrictions on coal use, the lack of competitiveness of coal mines, and EU countries' commitment to wean themselves off fossil fuel in electricity generation are a few factors that have gradually led to the shutdown of coal driven activities in a number of regions across Europe. In 2014-2015, 58 mines were closed in several EU countries (e.g. Germany, Poland, Slovenia, Spain, etc.). In parallel, the first wave of coal-fired power plant decommissioning is planned for the period 2020-2025, and it could lead to the loss of 15,000 jobs in coal fired power plants (EC predictions).

Regions with economies primarily fuelled by coal-mining and coal-fired power plants need to act in light of the aforementioned energy market transformation as phasing out the use of coal for energy purposes can push local communities towards stagnation and introspection, unless forward looking planning and remedial policy measures are set in place. In this context, particular emphasis within policy planning must be placed on the restoration and environmental restitution of the wounded landscape and the selection of appropriate post mining land uses. Mine reclamation, apart from mitigating environmental harm, can aid to secure employment and social cohesion in the affected areas whilst prioritising the adoption of alternative and/or diversified growth trajectories.

The purpose of the study visit is to provide in-depth information and insights from a region advanced in land restoration planning concerning all operational, administrative and technical aspects of land restoration processes in former coal mine sites. To this end, the host organisation will schedule field visit(s) in selected areas of the Lusatian Lake District (e.g. IBA Sea Terraces), one of the most cited and renowned mine reclamation projects worldwide. The site visit will be coupled with thematic presentations and panel discussions (round tables), where the topic of mine closure, land restoration and economic restructuring will be highlighted from different angles (namely needs assessment and criteria for land uses, policy making, socioeconomic appraisal of relevant investments), discussed with experts and supported by case studies.

The objectives of the study visit are to:

- Showcase examples of successful mine closure and land restoration programs from the host region, to obtain practical insights from actual implementation.
- Highlight mining and restoration policies and processes (incl. selection criteria) for the development of ecological and sustainable uses of land in carbon-intensive regions.
- Discuss the obstacles to the conversion of degraded (mined) landscapes to productive land use.
- Inform regional authorities about the anticipated losses from the termination of coal driven activities and illustrate the socioeconomic benefits that can stem from the restoration of former coal mines.

3 STUDY VISIT TO LUSATIA, BRANDENBURG

3.1 Geography

Brandenburg is one of the 16 federal states of Germany and one of the 5 new states created in 1990 after the reunification of the former West Germany and East Germany. It is situated in the east of the country, bordering with Poland, Saxony, Mecklenburg-West Pomerania, Saxony-Anhalt and Lower Saxony. Brandenburg covers 29,654 km^2 and is home to 2.500.000 inhabitants (Eurostat, 2018). Its capital is Potsdam.

3.2 Energy sector

Brandenburg is one of the main energy producers and exporters in Germany (+10% of national consumption). With a mix of renewable and conventional energy, Brandenburg is now considered the most reliable supplier of electricity in the country. This makes the energy sector the main driver of economic development and one of the largest sources of income and employment in the region, accounting for almost 27% of the regional GDP (Agora Energiewende, 2018).

Despite the fact that Brandenburg has taken decisive steps to foster the transition to a clean energy era, it remains one of the largest coal regions in the country, in terms of output (34 million tonnes) and power plant capacity (4500 MW). Notably, the Lusatian mining area in South East Brandenburg is one of the 4 most intensive coal mining areas in Germany. Brandenburg hosts two of the four opencast mines located in Lusatia; namely the “Jänschwalde” and “Welzow-Süd” mines, along with lignite fired power plants a rail transport network. Overall, the coal industry employs over 24,000 people; half of whom work in power plants and open-cast mines (direct employment) while the rest are employed in jobs indirectly related to coal driven activities such as equipment suppliers, services providers and R&D centres.

The reason why the shutdown of coal driven activities is delaying in the State of Brandenburg is that Lusatia (where most coal intensive activities take place) has a structurally weak economy with high unemployment that is largely reliant upon lignite production. According to government’s predictions, around half of the jobs related to coal driven activities are expected to be lost following a possible closure of mine sites and the decommissioning of power plants in the area. The anticipated consequences on local employment and income (even if these will be more evident in the short term) create second thoughts and hesitations for such a projection. Evidently, local communities are struggling in opposition to move to a new economic model unless they are convinced there is a robust plan (for the “next day”) with alternative business opportunities to maintain or even increase regional employment, support economic growth, and secure sufficient income and a decent living for the local population. The overarching goal should be to ensure that any economic decline that will occur from the lignite phase out in the affected areas will be counterbalanced with gains from other areas and economic activities; and as such the selection of appropriate post mining land uses must be a very serious concern for planning authorities.

3.3 Lusatia's regeneration programme

Lusatia is a rural region, located in the eastern German states of Brandenburg and Saxony, and in south-western Poland. Over 1.2 million people live in Lusatia's Brandenburg and Saxony districts. Lusatia's economy is largely, if not exclusively, based on coal mining and energy production. In 2015, the GDP of the Lusatian mining region was estimated at 31,425 million euros (RWI, 2018).

Lusatia has a long tradition in lignite mining. Since the 19th century, Lusatia emerged as an industrial region, with substantial production of lignite and electricity. The first mine was started in 1844, along with briquette factories that compacted the lignite into burnable bricks, and related manufacturing and metallurgy industries. Lusatia, very soon, became one of the most coal intensive regions in Germany. The total mined area was approximately 85,000 hectares. Lignite was being extracted mostly through open pit mining operations (open cast mines of 100 meters depth), which had direct and visible impacts on land surface and ground composition and affected severely regional climate and water quality (Krümmelbein, 2012).

Following unification, the German Government decided to gradually shut down all mining activities in the country, including Lusatia's mine sites (Mellgard, 2015). The former industrial and mine sites fell into decline, local populations (economically dependent on coal mining) were forced to re-settle to increase their chances of finding permanent employment; further to this the marred landscape was a source of pollution. The Government established a Mining Administrative Company to draw up restoration and rehabilitation plans in order to turn the degraded mine land into viable and functional ecosystems, fostering environmental restitution and assisting local communities to adopt a more sustainable growth pathway. For Lusatia, the plan was to convert the abandoned mine sites into a lake district surrounded by croplands, green spaces and forest. The objective was not to return the site into its previous form but to create a natural landscape that will restore area's natural functions and ecosystem services, and most importantly improve citizens' quality of life.

The Mining Administrative Company worked in this area for more than ten years, running 30 projects in total for new landscapes across the region, which has severely suffered from coal driven activities (Sullivan, 2016). Through flooding, several decommissioned lignite opencast mines were transformed into recreational lakes, making what was previously a coal intensive region the largest artificial district of lakes in Europe. The district now covers an area of 80 kilometres across the states of Saxony and Brandenburg, and includes 26 artificial lakes of different size and use.

The majority of lakes are accessible and earmarked for several recreation activities such as water sports and cycling; some have been deliberately left undeveloped to protect wildlife and act as (protected) nature reserves. Around the two most developed lakes (Senftenberger and Geierswalder), it has been constructed a complex of facilities, geared to families and visitors, offering accommodation and food and beverage services (e.g. restaurants, cafes, hotels, campsites, floating rental apartment) as well as leisure time and sports activities such as fishing and horse riding to quad-biking and diving. In addition, old power plants and briquette factories have been rehabilitated and are now open for the public.

Visitors may opt for an organised tour in monumental facilities, where they can travel back to time and experience industrial culture.

FIGURE 1: A FLOATING HOUSE ON "GEIERSWALDER" LAKE, LUSATIA (SOURCE: THE GUARDIAN.COM)

Restoration interventions also included replanting forests, creating fishing communities in lakes, making agricultural land, and constructing marinas and other recreational facilities such as exhibition centres and towers for gazing over the former mines. The regeneration project process did not go without problems. The decades of mining activities have created severe environmental damages that requires many years to heal in the absolute level. The major concern was related to water quality, and more especially acidification resulting from mining-induced pyrite oxidation. The Company needed to take targeted interventions (engineering and mechanical processes) to remove iron hydroxide dislodged and harmful chemicals from the soil and phosphorus and other pathogens from lake water. Lusatia's regeneration programme is recognised as a success story and acts as an inspiration for other coal mine restoration projects. The total estimated cost, so far, is over 2.2 billion euros and new interventions and projects are planned for the area.

The results achieved are particularly impressive. The region has successfully recovered its previous ecological functions; fishes have returned colonizing the artificial lakes by way of new canals that didn't previously exist or were too acidic to support life; new economic opportunities have arisen (e.g. sustainable tourism, agriculture, clean energy); more than 500,000 tourists stay overnight annually and visits have a constant growth rate of 10%; citizens enjoy a healthy natural environment and more employment opportunities (Mellgard, 2015). What is more, the Lakeland carries a huge symbolic value as concerns the country's commitment to decommission all nuclear and coal power stations in an ambitious push towards clean energy.

Yet, Brandenburg has a long way to go in the clean energy transition. Today, in Lusatia, there are 4 active opencast mines (operated by LEAG) with lignite deposits of over 800 million tonnes. The "Jänschwalde" and "Welzow-Süd" coal fields are located in South Brandenburg while "Nochten" and "Reichwalde" are on the territory of Saxony. In Lusatia, the energy company also operates 4 lignite-fired power plants with a combined capacity of over 8 gigawatts (GW) that are connected with the mine sites through a 400-km rail network.

4 LIGNITE PLANNING LEGISLATION IN GERMANY AND THE STATE OF BRANDENBURG

In Germany, lignite planning and post mining land uses are regulated (addressed) by spatial development and land planning policies, with responsibilities shared at 4 administrative levels (4 tiers spatial planning system); national (Bund), state (Lander), regional (Regionale) and local (Gemeinden). At the federal state, spatial development and land use planning is regulated by the Federal Regional Planning Act (ROG). The ROG outlines the framework principles and administrative procedures for spatial regional planning in the country. This Act seeks to guarantee the uniformity of spatial planning at all levels, setting the basis for sustainable regional development in the country. Notably, the ROG places particular emphasis on establishing high (and similar) standards of living and achieving a balanced and socially fair distribution of economic development in all regions.

The German Federal System follows a decentralised approach in spatial planning where legislative, administrative and executive competencies are largely delegated to the Federal States. Based on the ROG, the Federal States (Länder) have enacted their own planning laws for the areas that fall into their jurisdiction. Each of the 16 states (Lander) has already in place its own State Planning Act, called “Landesplanungsgesetz” (LPIG). In general, the State Planning Acts set the priorities for sustainable and inclusive regional development over a time period of 10-15 years and are meant to guide the development of corresponding land use plans. They also regulate spatial planning procedures and assign competencies at lower levels. The ROG provides States with the flexibility to decide whether spatial planning issues (incl. lignite plans) will be (exclusively) addressed by the State authorities or relevant functions/responsibilities can be also assumed by regional (counties) or local councils (decentralised level). Typically, States employ spatial plans at two levels; at state and county/regional (Landkreise) level. Regional plans are usually set aside to address the distinct characteristics and specificities of different regions/counties within the state, and must be compliant with the priorities defined in the State Planning Acts.

Lignite mining, as part of the spatial and land use planning system, is regulated by dedicated brown coal plans, which are may be developed either at state or regional/local level by special lignite committees. These committees are made up of those stakeholders that interact directly or indirectly with the management and/or use of the territory through their decisions and activity, and may be affected (positively or negatively) from lignite mining operations. This is to assure that all different (and probably conflicting) interests are well represented in the committee. The composition of lignite committees may differ from State to State but typically consist of representatives from State authorities, regional authorities and municipalities, trade unions, chambers of commerce, professional associations, knowledge institutes, environmental organisations and civic society groups.

Brown coal plans are intended to determine the requirements and framework conditions for lignite extraction operations in designated mine sites. They cover all 3 phases of mining: exploration, extraction and reclamation.

This means that post-mining land restoration is an integral part of the spatial planning procedure. The requirements for lignite extraction (e.g. demarcation of mining areas, type and depth of mining, displacement of communities, infrastructure and facilities deployment, relocation of traffic routes) and the restoration and environmental restitution of the wounded landscape (either once mining operations have been completed or while they are in progress) are specified in these plans, which are largely site-specific in order to reflect local environmental and development needs. As lignite plans have a long term scope – for instance extraction processes in an open cast mine may exceed 40 years – they are subject to updates and revisions so as to adjust to changing conditions and thus can effectively address the contemporary land restoration and environmental restitution needs.

The Federal Mining Act (Bundesberggesetz – BBergG), which is the is the primary legal basis for mineral extraction operations in the country, foresees that the granting of a mining concession permit shall meet the requirements foreseen by the State Planning Acts and be in accordance with regional/local lignite (brown coal) plans. In Germany, it is state authorities' jurisdiction to issue mining exploration and concession permits. State authorities may grant a permit only after the approval of the operator's mining (operation) plan and the environmental impact assessment report. This assessment is made on the basis of the BBergG, State Spatial Acts, lignite plans, and other applicable laws such as the Federal Water Act (WHG), the Environmental Impact Assessment Act (UVP-G) and the Federal Nature Conservation Act (BNatSchG).

The requirements for the rehabilitation/restoration of former mine sites are also addressed in the initial planning permit. Mine operators must designate and submit to competent authorities a mine closure plan. If the prescribed actions are deemed as not sufficient, the mining authority may not approve the extraction, potentially asking for additional remedial measures together with corresponding reservations/guarantees for effective land restoration. Post-mining land restoration requirements typically include the uptake (by mine operators) of precautionary measures on post mining land use, site rehabilitation and environmental restitution, site safety, decommissioning, waste dumps and tailings ponds, site water management, off-site infrastructure, and community socio-economic programmes.

LIGNITE PLANNING AND POST MINING LAND RESTORATION IN BRANDENBURG

The Lusatian mining district covers an area of 80 kilometres, which stretches over the states of Brandenburg and Saxony. Lignite planning, therefore, requires coordination between the competent authorities from the two states, and more especially from their lignite committees.

In Brandenburg, the authority responsible for spatial planning and development is the Joint Planning Department Berlin-Brandenburg (GL BB) as per the agreement signed by the federal states of Berlin and Brandenburg in 1996, forming the German capital region. Spatial structure plans (including brown coal and rehabilitation plans) for the entire region or certain locations within the federal states are prepared by the Joint Planning Department, in collaboration with relevant authorities and entities from both states. The main instruments for spatial planning in the German capital region are the state development programme and state development plan (LEP B-B).

In Brandenburg, lignite and rehabilitation (or else redevelopment) plans lie within the responsibility of the Joint Planning Department, with the state lignite committee and interested regional planning communities to advise and contribute in their development and approval, as foreseen by the Brandenburg Act on Regional Planning and Lignite and Redevelopment Planning (RegBkPlG).

The state's (lignite) rehabilitation plans prescribe all the necessary actions to be taken on the part of mining operators (e.g. site water management, restoration of off-site traffic routes, public and site safety measures) for returning the wounded land into an environmentally sustainable and productive state, thus paving the way for future sustainable land uses. Most importantly, the rehabilitation plans determine at an early stage (before the issuing of permit) the most appropriate and desirable post-mining land uses for coal mined in accordance with federal and state spatial planning priorities as well as the regional and communal land use plans in place. For Brandenburg, the most common post-mining land use purposes include agriculture, forestry, recreation, conservation and lakes.

According to the Federal Mining Act, mine operators are legally bound to fund with own capitals the restoration works in the worked out sites after the termination of mining activities. Notably, the German commercial law foresees that mining companies must create reserves from the gains of extraction activities on an annual basis in order to secure the necessary funding for the planned restoration works.

Brandenburg hosts 2 of the 4 opencast mines located in the Lusatian District ("Jänschwalde" and "Welzow-Süd" mines with approximately 450 million tonnes of lignite) and 2 lignite-fired power plants ("Jänschwalde" and "Schwarze Pumpe" plants with a combined capacity of over 4500 MW). All of them are operated by the energy company LEAG, which holds the responsibility to restore these fields once mining activities cease, following the state's rehabilitation plans in place. For instance, LEAG is currently working on the rehabilitation of the opencast mine in Cottbus-Nord, which was permanently closed in 2015. Over the next ten years, an artificial lake of 19,000 hectares size (to be the largest one in Lusatia) will be created in the position of the former mine site. The total cost of the project is estimated at 250 million euros, and will be fully covered by the operator. At this point, it must be also noted that an operator's disengagement from contractual land restoration liabilities is not an easy case, as the former is to remain accountable to state authorities until the natural environmental and the landscape fully return to the desirable state (not upon the completion of rehabilitation works), as foreseen by rehabilitation plans.

Beyond operators' contractual liabilities for the rehabilitation of operational mine sites, the State of Brandenburg implements a restoration program for areas affected by coal under the Administrative Agreement (VAI) on Lignite Remediation (2018-2022). According to the Agreement, over 1.2 billion euros will be allocated for lignite remediation the period 2018-2022 in 4 coal intensive states (565 million for Brandenburg). The Federal Government will contribute with 851 million euros while the rest will be covered by the states involved. The State of Brandenburg plans to allocate 212 million euros from the regional budget for the rehabilitation of decommissioned lignite mines in the region; 162 million euros will be allocated for environmental restitution and public safety measures in 262 abandoned mine sites/facilities (where no restoration activities have been carried out by mine operators) and 50 million

euros for infrastructure development, and the maintenance/reconstruction of residential buildings having already been affected or at risk of being affected by the rise of groundwater.

5 POST MINING LAND USES AND SELECTION CRITERIA FOR POST MINING LAND USES

5.1 Potential uses of mine sites and coal fired power plants following closure

According to Doley & Audet (2013), the primary restoration objective in a former mine site is to achieve the highest achievable standards of biological conservation and ecosystem administration. It is also crucial that processes should be developed in a manner that mining infrastructures are not abandoned but are adequately managed to pave the way for future (sustainable) uses. However, in extensively mined landscapes, ecosystem recovery may not be feasible. In that case, it would more efficient to pursue the establishment of a new safe, pollution-free landform along with new habitat development. Post-mining sites will always require interventions, however it is vital that any intervention should occur after evaluation and optimization of the value of post-mining land in order to ensure sustainability. Narrei and Osanloo (2011) have concluded to 8 main categories of possible alternative post-mining land-uses, based on an analysis of economic, social, technical and mine site factors pertaining in post mining land restoration. Table 2 presents these categories/types together with examples of exercised post-mining land uses for each category.

TABLE 1: POSSIBLE ALTERNATIVES FOR POST MINING LAND USES (SOURCE: NARREI AND OSANLOO, 2011)

No	Land-use Types	Exercised Post-mining Land Uses
1	Agriculture	Arable farmland, garden, pasture or hay-land, nursery.
2	Forestry	Lumber production, woodland, shrubs and native forestation.
3	Lake or Pool	Aquaculture, sailing, swimming, water supply.
4	Intensive Recreation	Sport field, sailing, swimming, fishing pond, and hunting.
5	Non-intensive Recreation	Park and open green space, museum or exhibition of mining innovations.
6	Construction	Residential, commercial (e.g. shopping center), industrial (e.g. factory), educational (e.g. university), sustainable community.
7	Conservation	Wildlife habitat, water supply (surface and ground water).
8	Pit Backfilling	Possibility of landfill (as last resort).

It is consequently noticeable that there are numerous alternatives available for post-mining land-uses. However, the decision leading to the choice of any particular alternative must be carefully evaluated based on sound engineering, economic, environmental and social analysis, and with leading to the betterment of the community and the environment. The fulfilment of these factors/criteria is crucial for the sustainable development of mining lands and the welfare of local communities as well.

5.2 Selection criteria for post mining land uses

The selection of the most appropriate land uses in a former mine sites has proved a complicated multi-criteria decision problem, due to the long term planning required, the variety of the criteria and parameters to be considered, and of course the difficulty in securing public consensus and social acceptance for post mining uses. What is firstly of high importance is to determine clear & feasible restoration objectives and identify the most suitable alternative land-uses, ensuring that the geography and morphology of the land is able to support the post-mining environment. According to Cooke and Johnson (2002), the most vital stages in such a process is to define: a) the restoration context, b) attainable restoration objectives, and c) measurable success criteria. Similarly, Doley et al. (2012) suggest that there are 4 steps in planning land uses that will essentially raise the economic potential of the area and minimise any disturbance to the environment caused by mining operations. These are:

1. Identification of landscape and soil characteristics.
2. Assessment of the resource inputs in order to achieve a sustainable "original", in terms of similarity with the previous one, or a new sustainable site.
3. Estimation of resource gap between original and alternative ecosystem.
4. Modification of the nature or degree of disturbance in order to achieve a sustainable final goal.

An important factor employed to define the ability of an ecosystem for restoration and further use is ***resilience*** (Hobbs, 1999; Walker, 1999). In order to avoid costly and unfavourable consequences, it is important to take into consideration the following geological/geographical factors:

- Geomorphology
- Climatic Conditions
- Hydrologic, stratigraphic and soil characteristics of a site (classified as natural land-use factors)
- Geographic, demographic and economic characteristics resulting from human activities (classified as cultural factors)

It is observed that in practice, natural factors are of vital importance for the suitability of the potential location or usage of the post-mining site, however, the practicability is usually determined by societal and cultural factors, and therefore they play the most significant role as they are fundamental in the decision-making stage. Other criteria that are vital for the post-mining land-use selection are related to land resources, ownership, type of mining activity (e.g. open-cast mining, open-cut mining, processing, rehabilitation or underground mining), and land restoration requirements stemming from applicable legislation.

According to Masoumi (2014), a range of financial and economic issues should be also considered when deciding on the most appropriate post mining land use(s). These considerations are imported in each stage of the planning/implementation procedure, as critical components of any investment decision. Finally, since the mining industry is usually associated with issues relating to aggregate social costs and benefits, the different socioeconomic interests prevailing in the area, and the subjectivity of decision makers and social partners, further considerations for land-use selection should be brought to the table such as the balanced and socially fair distribution of economic development. To conclude, the

socioeconomic criteria to be considered for deciding on post mining land use(s) include: wealth generation, income rates, employment growth, regional economic development, energy price variations, trade balance, quality of life, investments opportunities, and public health.

Palogos et al. (2017) put forward two approaches to land use selection in former mine sites; Multi-Criteria Decision Making (MCDM) and Spatial Decision Support System (SDSS). MCDM is suitable for single post mining land uses. It is based on the prioritisation and ranking of alternatives, leading to the selection of a single use for the whole mined territory. This selection is based on the assessment of diverse environmental, geospatial and socioeconomic criteria. Based on these criteria, the possible restoration choices can be compared effectively and the one that provides the highest environmental and socioeconomic benefits (i.e. the optimum one) for the local community can be qualified.

Should the reclamation of different parts of the mined area is to be provided, then a SDSS approach should be employed. This approach involves two main steps; first the identification of desirable post mining land uses based on territorial information on the existing legal framework regarding land reclamation and uses, as well as, the economic prospects for the area, and second the (spatial) zonation of the mined area to select the most appropriate land use for each zone based on spatial criteria and geological specificities. In this system, a number of technical and social criteria are considered for the characterization of land suitability for each of the possible alternatives.

The following table presents a model with geospatial decision parameters values for the selection of alternative land uses in worked out landscapes in former mine sites. The criteria used are terrain slope, soil fertility, proximity to lakes and proximity to archaeological sites.

TABLE 2. OPTIMUM DECISION PARAMETERS (CRITERIA) VALUES FOR THE SELECTION OF THE ALTERNATIVE LAND USE (SOURCE: PALOGOS ET AL., 2017).

Decision parameter (criteria) *k*	**Land Uses**			
	1 = Agriculture	2 = Forestry	3 = Recreational	4 = Industrial
1 = Terrain slope	0	1 or 2	0	0
2 = Fertility of the soil	2	0 or 1	1 or 2	0
3 = Proximity to lakes	0 or 1	0 or 1 or 2	2	0
4 = Proximity to archaeological sites	0 or 1	0 or 1 or 2	2	0
5 = Proximity to villages	0 or 1	0 or 1 or 2	2	0
Note: rating scale for the decision parameters is as follows: 0 = low, 1 = medium, and 2 = high.				

This model can be expanded to include also certain socioeconomic criteria. The socioeconomic criteria that could be more easily comprised in the new model, are those that are more easily measurable, attainable and applicable in most cases, such as wealth generation, income rate and employment rates. Similarly to the graph the socioeconomic criteria could be classified in the decision parameters (first

column), while land uses can be also applied in the model. To sum up, the criteria to be considered for selecting appropriate post mining land uses are the following.

Environmental (geological & geographical) criteria	• Climatic conditions (solar and wind availability) • Terrain slope • Soil fertility • Water quality • Biodiversity status • Proximity to lakes and watersheds • Proximity to settlements • Proximity to archeological sites
Economic criteria	• Wealth generation • Income rates • Trade balance • Growth opportunities • Energy price variations • Investment cost • Technological availability
Social criteria	• Employment • Quality of life • Public health • Education and technical specialisation • Social acceptance / Conflicts of interests • Compliance with land use and spatial plans

6 Enabling policy and regulatory measures for post mining land restoration

Effective land restoration and environmental restitution in former mine sites require strategies for formulating an enabling environment with both legal measures and incentives for mine operators to act against land degradation at mine sites during mine operations, and take over the responsibility to promptly restore former mines to an environmentally sound, healthy and productive state after the termination of mining operations. The key components of a stimulating environment for post mining land restoration include:

a) Conducive mining laws and regulations,
b) Taxation and financial regime,
c) Governmental coordination and synergies with local community, and
d) Land use & spatial planning.

The application of points a), c and d) in Brandenburg is described in section 4. These measures have been established for a long time and ensure the effective land restoration and environmental restitution of former opencast mines. They show how the state of Brandenburg has put these issues into practice. The introduction of taxes or other governmental financial instruments (point b) to restrict economic activity in lignite mining before 2038 is currently not considered by the state government. Structural changes in Lusatia have to be socially acceptable.

6.1 Conducive mining laws and regulations

Public authorities need to shape a mining legal framework conducive to post mining environmental restitution and land restoration. Relevant laws and regulations should outline mine operators' obligations and liabilities related to environmental management matters in all three phases of coal mining: exploration, extraction, and reclamation. Nowadays, there is a growing tendency in mining policies/laws to place particular emphasis on remediation and restoration works towards securing the sustainability of new post mining land uses. Mining acts and similar legislation should prescribe minimum environmental requirements for new mining activities and the subsequent rehabilitation of the worked out land by mine operators. The requirements for mine remediation and land restoration must form an integral part of any mining concession application, and relevant considerations must be addressed at the planning stage well before operations start.

To this end, mining laws and regulations should be enhanced with a series of clauses and provisions to diminish the environmental damage to be inevitably caused by mining activities, commit mine operators to sustainable environmental management and better accommodate for mine reclamation and environmental restitution needs. These may take the following forms:

- Requirement for the preparation of a waste management plan to the commencement of the extraction. The waste management plan is intended to ensure a short and long-term safe disposal of the waste generated during the exploration stage, actual operation and after closure of a waste facility.

- A financial guarantee required by mine operators to cover the cost of reclamation, rehabilitation of the worked out land after exploration or mining have been finished. The financial guarantee may cover the entire reclamation cost; this amount is typically subject to adjustments based on the progress of extraction processes and according to changing local planning needs. Some countries may require an advance payment as guarantee and the rest amount to be provided in annual instalments.
- Permitting schemes for harmful activities incurred across the entire lifecycle of mining operations (e.g. industrial installations, preparation for coal mining, coal extraction, handling wastes and residues) including but not limited to a) specifying the duration of mining exploration and extraction permit duration as well as the size limits for mining operations, b) setting maximum emission limit values, c) defining specific environmental quality requirements for preventing or restraining impact on soil, air, and water, and d) prohibiting the use of heavy machinery and chemical products such as pesticides, biocides, sewage sludge, nitrate.
- Requirement of an Environmental Impact Assessment (EIA) report, which will document the environmental status of the mined site and the surrounding area (e.g. soil stability and properties, water quality, biodiversity status, ecosystem service) before mine operations are started alongside side with an evaluation of expected positive and negative environmental impacts. Competent authorities shall regularly monitor whether the predicted impacts and proposed mitigation measures are fulfilled as defined in the EIA report.
- Special contract clauses to act as stimuli for environmental performance reinforcements. Financial incentives (in the form of tax reductions) can be an effective method of inducing a mine operator to perform the contracted services according to the mutually accepted (environmental) requirements. In the same vein, in case of non-compliance with environmental liabilities, the applicable law should foresee sanctions for mine operators that can take the form of monetary compensation or premature contract termination.
- Minimum timeframes for mine reclamation/rehabilitation projects; mine operators shall be subject to sanctions in case of delays and shortcomings. In this case, sanctions may take the form of monetary compensation or exclusion from future concession granting procedures.

6.2 Taxation and financial regime

Taxation is an effective pricing instrument for addressing the adverse impacts of economic activities (incl. coal mining) on the natural environments including waste disposal, water and air pollution, soil degradation and natural resources extraction. The purpose of “green” taxes is to address the market failure stemming from businesses and customers’ tendency to largely ignore the detrimental effects their offerings and consumption behaviours (e.g. coal fired electricity) respectively have on the environment with in most cases serious implications for human health and public safety. Environmental taxation is a means to internalise the negative externalities into market prices and compensate for the damage caused to the environment throughout the lifetime of a product or service from production and consumption to waste recovery and reuse. The following (indicative) types of environmental (“green”)

taxes can be imposed in coal driven activities to accommodate for negative environmental impacts caused by mining operations or electricity generation.

- Royalty or resource tax to be paid to the state as financial compensation for the depletion of non-renewable (mineral) resources. This amount can be either unit based (per ton of extracted raw material or hectares of land area with mining permit) or value based (calculated on the nominal value of the mine product).
- Concession fees understood as the fee for a mining company to participate in a concession permit procedure and conclude to the concession agreement for raw materials extraction. The fee may be fixed or variable depending on the type of mineral resources, the timeframe of mining operations, the size of mined land, and available ore deposits.
- Permitting fees for the exploration of mineral deposits. It is a fee required by mine operators to obtain the permit to start mineral exploration works. This fee must be accompanied by certain provisions/clauses to carry out investigative activities, restore the land to its previous state and relinquish the areas which is out of interest for other productive or recreational uses.
- A fixed fee for administrative expenses relating to the composition and issuing of the coal extraction permit.
- Land use tax; an ad valorem levy on the use and potentially on the value of the land. Besides being a source of revenue, the state may use this type of tax as a countering incentive for coal extraction operations; primarily by orienting economic activities towards other more sustainable and environmentally friendly land uses.
- Environmental taxes on businesses and industries producing and selling services and products indirectly related to coal driven activities; largely dependent on mining activities, further support the development/advancement of mining operations and most essential have an added detrimental effect on the natural environment.

In all cases, the introduction of green taxes shall ascertain a level playing field across the EU. It is imperative to prevent any market distortion or failure as a result of excise or ad valorem taxes that could potentially lead to unfair competition, as stringently dictated by the EU internal market legislation and basic principles of the TFEU. Regional authorities may figure out the optimal combination of taxes to mitigate the extent of environmental consequences caused by mining activities, without distorting competition and slowing down economic growth potential. They can also establish a dedicated fund for post mining environmental restitution and land restoration, based on the state revenues from the aforementioned environmental taxes imposed on coal driven (and associated) activities. Those funds are to be made readily available for rapid governmental response to hazardous environmental incidents caused by mining activities, and which cannot be promptly covered by operators to constrain the damage. A share of those funds could be also used for restoration works and public safety measures in former mine sites that have not gone through appropriate remediation.

6.3 Cross-departmental collaboration and synergies with local community

Post mining land restoration is a subject of policy making and planning, which encompasses a wide range of environmental, social, economic, governance and political factors/variables that need to be approached in a coordinated and directional manner. In fact, however, most public administrations are organised by field (e.g. agriculture, rural development, environment, energy, spatial planning) with distinct jurisdictions and responsibilities. This creates a significant barrier to sustainable post mining land restoration and management, as different administrations and stakeholders (in most cases with colliding environmental and socioeconomic interests) seek to achieve multiple, cross-sectoral goals that do not fall into (at least solely) their administrative boundaries. It is, therefore, imperative that policy making, planning and decision making on post mining environmental restitution and land restoration should be coordinated across different disciplines (horizontal integration) and between different levels of government (vertical integration).

This institutional and policy harmonization at the national, sub-national and levels can help to eliminate unintended negative interactions that may arise in the landscape of former mine sites when multiple laws and regulations apply and implemented independently of each other (Whitbread et al., 2017). Meanwhile, cross-sectoral collaboration can help policy makers recognize multiple benefits at landscape scale.

As noted above, restoration efforts planned in degraded landscapes require a coordinated and integrated approach to assess possible and alternative land uses; nonetheless this should not be restricted to the cross sectoral collaboration of competent public administrations but should involve all those actors (e.g. environmental institutions, economic operators, citizens) who retain an interest in the area and will be directly or indirectly affected by future land use(s). This scheme can be more or less seen as a bottom-up or participatory approach to post mining landscape planning. The underlying idea behind participatory land planning is to bring together actors with diverse socioeconomic interests in the area, to interact, collaborate and come up with commonly accepted alternatives for post mining land uses. The fruits of this consultation will be a number of weighed and promising land uses that preserve the ecological integrity of the area and promote a sustainable development pattern, whilst maintaining stable levels of income and employment for local communities. Besides, only through involvement can come ownership and only through ownership can come understanding and support.

6.4 Land use and spatial planning

Spatial planning refers to the process of regulating the current and future spatial distribution of activities in a given (well-defined) territory, in an attempt to effort promote more desirable social and environmental outcomes as well as a more efficient use of resources. It provides a rational organisation of land uses, showcasing linkages between them, and determining future land uses to contribute to the attainment of territorial environmental and socioeconomic aims. Spatial planning reflects the different policies that affect the spatial distribution of activities and is primarily meant to compromise the different interests on land use and achieve a balanced and socially fair distribution of economic development.

The overriding objective of spatial planning is to ensure that the utilisation of land resources is planned and implemented in an organized manner to meet the contemporary and future needs of local communities. It is widely recognised as an important lever for promoting sustainable development and improving the quality of life. Land use and spatial planning is also the key entry point for selecting possible land uses in former mine sites. Post mining land uses must be consistent with the region's spatial planning and eventually integrated into these plans. Spatial plans, in turn, must be in place before a permit for coal extraction is granted so that mine operators are aware of the previous land uses, the linkages with other uses and activities taking place in the territory and the desirable post mining land uses to achieve the desirable environmental and socioeconomic goals (European Commission, 2017). These plans will show the way forward on how to maintain ecological balance and proactively offset the negative impacts on employment, income and growth from the shutdown of coal driven activities. In all cases, land use and spatial planning requires an integrative and comprehensive planning approach in order to rationalise the appropriate land use activities.

7 AGENDA

ARRIVAL

5th of November 2019 (Tuesday)

From 15:00 onwards		Check-In

WELCOME & CONFERENCE

6th of November 2019 (Wednesday)

09:00 h	Lindner Hotel Cottbus Karl-Marx-Straße 68A, 03046 Cottbus Room Goethe, 1st floor	**Project Meeting** For Partners Project Progress overview
10:15 – 10:30		COFFEE BREAK
10:45 – 11:30		**Project Meeting** For Partners Project communication – Technical and Financial Reporting
11:30 – 12:00		**Welcome & Opening** For Partners and Stakeholders Mr. Uwe SELL Head of Department Lignite and Remediation Mining State Office for Mining, Geology and Raw Material of Brandenburg (LBGR)
12:00 – 12:20	Approx. 10 min	Transfer to Restaurant (Walk)
12:30 – 13:40		LUNCH
13:40 – 14:45		City Visit with Guide
15:00 – 15:30	Lindner Hotel Cottbus Room Goethe, 1st floor	**Presentation of MinGenTec Project** For Partners and Stakeholders Mrs. Silke SCHWABE Division Manager – International Affairs Chamber of Commerce and Industry (IHK) Cottbus

15:35 -17:00		**Interregional Workshop 1** For Partners and Stakeholders Input on “Needs analysis report on environmental restitution and land restoration in DeCarb regions” Followed by a round table discussion Mr. Dionysios SOLOMOS Research Consultant/External Expert DRAXIS Environmental SA
17:00 – 19:00		Time for bilateral Talks
19:00 – 21:00	Room Goethe, 1st floor	**Reception** with regional Businesses connected to land restoration and regional Stakeholders **Welcoming address** by Mr. Torsten MAERKSCH Head of Regional Centre South-Brandenburg Economic Development Agency Brandenburg (WFBB GmbH) **Presentation about the Lusatian and Central German Mining Management Company** (LMBV mbH) by Mr. Jörg SCHLENSTEDT Senior Expert **Networking & Exchange on potential of future cooperation**

PRESENTATION OF BEST PRACTICE PROJECTS IN THE LAUSITZ/LUSATIA REGION

7th of November 2019 (Thursday)

08:20 – 09:00	Approx. 40 min	Transfer Hotel to Gut Geisendorf
09:15 – 10:00	Gut Geisendorf Jahnstraße 7A, 03103 Neupetershain	**Welcome and Presentation** Topic: "Cottbuser Ostsee – From a Mine to Lake" Mr. Peter LAUX GIS coordinator LEAG – Joint brand of Lausitz Energie Bergbau AG and Lausitz Energie Kraftwerke AG
10:00 – 12:15	Welzow-Süd	**Recultivation tour** with special LEAG-busses Open Cast Mine Welzow-Süd LEAG in cooperation with Mr. Prof. Dr. Wolfgang SCHAAF Deputy Head Chair of Soil Protection and Recultivation from the Brandenburg University of Technology (BTU) Cottbus-Senftenberg Mr. Rainer SCHLEPPHORST Research Associate for Irrigation in Agriculture and Renewable Resources at the Research Institute for Post-Mining Landscapes (FIB)
12:30 – 13:30	Gut Geisendorf	Lunch
13:30 – 14:00		**Project Meeting** For Partners Evaluation of Visit
13:30 – 14:00		Visit of Gut Geisendorf For Stakeholders
14:10 – 14:40	Approx. 30 min.	Transfer to Großräschen
15:00 – 15:30	IBA-Sea Terraces Seestraße 100, 01983 Großräschen House 3	**Welcome at IBA-Terraces** Mr. Thomas ZENKER Mayor of Großräschen Mr. Prof. Dr. Rolf KUHN Managing Director IBA Fürst-Pückler-Land 2000-2010 and Mr. Dipl.-Ing. Karsten FEUCHT District Supervisor Landkreis Spree-Neiße

15:35 – 16:30		**Interregional Workshop 2** For Partners and Stakeholders Input on the "Development of the lake-landscape in the Lusatia Region as an example for best practice" Followed by a round table discussion Mr. Prof. Dr. Rolf KUHN and Mr. Karsten FEUCHT
16:40 – 17:40 18:00	approx. 1h	Transfer to Cottbus Departure from Cottbus

8 BIBLIOGRAPHY

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9 ANNEX A: COST-BENEFIT ANALYSIS (CBA) OF POST MINING LAND RESTORATION INVESTMENTS

Cost Benefit Analysis (CBA) is a widely used analytic tool for socio-economic appraisal and evaluation of both public and private interventions and investments. It allows to evaluate costs and benefits, and calculate the return-on-investment (ROI) and Net Present Value (NPV) of different proposed ideas for projects, to be juxtaposed so as to identify which of these alternatives yield the greater level of benefits in relation to the resources invested.

Why shall we employ a CBA for post mining land restoration?

In the context of post-mining land use, it is currently observed that both the public authorities and mine operators, working on achieving acceptable rehabilitation, have difficulty in defining and quantifying the diverse parameters against which rehabilitation success may be measured. A cost-benefit analysis can be therefore employed to provide a systematic process for selecting and supporting the most environmentally and economically effective strategies for the rehabilitation of a post-mining land. This analysis will aid to identify which uses can yield the higher possible returns for a given amount of costs and in relation to the losses from the termination of coal mining activities. In all cases, the ultimate criteria should be environmental sustainability and the maximization of social welfare. It is estimated that such a procedure constitutes an objective method for both decision makers and miners in order to assess and justify rehabilitation procedure efficiently and adequately.

How a CBA works?

There is not a universally accepted and standardised format for performing a cost benefit analysis, however, there are certain core elements that are identified in almost all analyses. European Commission (2015) outlines a scheme with seven core steps for performing a cost benefit analysis for large scale investments, and which can be applied for assessing land restoration projects.

1. **Description of the context**. The first step is to shape the social, economic, political and institutional context within land restoration will take place. The presentation of the context is instrumental to predict and calculate future trends, especially for demand analysis. In addition, this exercise attempts to substantiate that the project is suitable for the framework in which it is implemented.
2. **Definition of restoration objectives**. A thorough and clear definition of the project's objectives is crucial in order to identify the impacts of the projects so to be further assessed in the cost-benefit analysis and to verify its relevance.
3. **Project identification.** A proper identification requires information related to the physical elements and activities that will be implemented, the body responsible for their implementation and its financial and institutional capacities as well as the impact area, the beneficiaries and the local stakeholders.
4. **Technical feasibility and environmental sustainability.** This analysis consists of the following components:

a. Demand analysis, including current and future demand.
b. Options analysis; defined as the investigation of different land uses.
c. Environmental and climate change considerations; with a particular focus on how to return the land and water resources to the previous or a sustainable ecological state, and achieve increased resilience to climate change effects.
d. Technical design, cost estimates and implementation schedule. Emphasis to information concerning the location, technical design, production plan, cost estimates and implementation timing.

5. **Financial analysis.** This stage includes assessing project's financial viability. Only cash inflows and outflows are considered in this stage. In our case, the project cash-flow forecasts should cover (at least) a period until the project achieves a Return on Investment. The major components of such an analysis are:
    a. Investment cost, replacement costs (costs occurring during the reference period to replace short-life machinery) and residual value (the remaining service potential of fixed assets whose economic life has not been completely exhausted on the completion of the project).
    b. Operating costs (costs to maintain and operate the new facilities/uses and revenues (cash in-flows directly paid by users for the goods or services provided in the reclaimed land)
    c. Sources of financing (fully covered by the operator or co-funded by both the mine operator and the public)
6. **Economic analysis**. The most critical stage in a CBA is economic analysis. This includes to appraise the project's overall contribution to welfare after non market impacts have been monetised. The key concept is to identify whether the different alternatives for post mining land uses can essentially offset the negative impacts to be caused from the shutdown of coal driven activities, and improve the quality of life of local population.
7. **Risk assessment.** Finally, a risk assessment is required to handle the uncertainty that always permeates investment projects (such as land restoration). This is to be done by assessing the risks that may arise throughout project lifecycle and jeopardise its successful completion, and setting forward precautionary and mitigation measures to effectively deal with them.

What types of impacts (both benefits and costs) should be assessed for a post-mining land restoration investment?

The types of impacts that should be assessed for a post-mining land restoration investment can be arranged into three broad categories. The first category encompasses social development trends. This category is mostly related to the changes that will occur is citizens' everyday life (e.g. security, health, education, transport, communication, leisure time). The second broad category relates to the economic development trends that can be seen as function to specific economic metrics. The third category is made up of the environmental impacts from the recovery of the ecological status of former mine sites,

in comparison with the previous situation and the damage created to the natural environment (incl. ecosystem services, biodiversity, and pollution) during mining operations.

In this framework, the cost benefit analysis should examine a) how post-mining activities could influence the mining environment as well as the surrounding area and b) what would be the impact of the project in terms of socio-economic development and macro-economic development. Nevertheless, a comprehensive cost-benefit analysis needs to account for the adverse impacts on local communities from the interruption of coal driven activities; and assess to what extent the planned post mining land uses will counterbalance the losses of income and employment. Therefore given that, as mentioned earlier, it is important for benefits of a project to outweigh costs, the cost-benefit analysis has to consider and encompass all impacts in order to explain more efficiently how the above mentioned losses can be counterbalanced by post-mining land uses.

To examine the different socio-economic development impacts that influence post-mining land selection, it is important to classify them using certain metrics. DeCarb A1.1 suggests a classification with 8 metrics/features that captures comprehensively major aspects of the socio-economic sphere that are mostly relevant to land restoration. These metrics are: a) per capita income, b) level of agricultural development, c) level of industrial development, d) occupational structure, e) level of educational development, and f) health status.

As far as the macro-economic development category is concerned, the impacts that should be assessed according to IEA (2016) are found in 4 broad areas, namely: Economic development, (measured by GDP), Employment, Energy Prices and Trade Balance. In what follows, the categories of costs and benefits that should be included in a CBA for post mining land restoration investment are presented:

Costs that can be included in a cost benefit analysis:

- Direct costs (labour in manufacturing, inventory, raw materials, manufacturing expenses).
- Indirect costs (operational costs such as utilities and management).
- Intangible costs (such as customer impact of pursuing a new business strategy, project, or construction of a manufacturing plant, delivery delays of product, employee impact).
- Opportunity costs (investments).
- Cost of potential risks (regulatory risks, competition, and ecological impacts).

Benefits that can be included in a cost benefit analysis:

- Revenue and sales rise (increased production or new product/services).
- Intangible benefits (employee safety and morale, customer satisfaction thanks to enhanced product/services offerings).
- Competitive advantage or market share gained as a result of the selection of particular land use.
- Additional benefits deriving from the rehabilitation of mined land may comprise: improved downstream water quality; improved aesthetic value; a reduction in undesirable flora and fauna;

and a better-quality image for the mining industry reflected in the share price of the mining businesses. There is limited available research on any of these topics, and this thesis has commenced the process by having experts rank the environmental attributes impacted by mining in order of importance.

How can we value socioeconomic impacts which cannot be measured by market values?

Primarily, in CBA, the impacts are measured in monetary terms in absolute relation with market prices. Monetary measurement has been the leading method of analysis. Nonetheless, while the direct economic impacts from an investment can be readily understood and measured by market value, societal and environmental impacts, by default, cannot be easily monetised; given also their complexity and volatility.

The most practical way to appraise the environmental effects of a project or investment, is to run a survey directly asking individuals or households what economic value they attribute to specified environmental changes. This analysis seeks to identify the price local residents are willing to pay to secure a positive environmental change (willingness to pay) or what compensation they would require to give it up (willingness to accept). The main weakness of this approach is that the questions, addressed to survey participants, are usually of a hypothetical character, such that no actual payments are made. This means that the responses provided to such questions are naturally contingent upon the hypothetical circumstances under which respondents are told. Respondents may be also unfamiliar with environmental issues and the implications these may have on their everyday life, they probably have never considered such a trade-off or might not be adequately prepared to get involved in such analysis/research. An alternative method to perform an environmental valuation is to study the views and preferences of a group of knowledgeable individuals or field experts. Expert panels can help overcome the limitations described above and thus provide more accurate and non-biased judgments and valuations.

10 ANNEX B: FEEDBACK FORM

A feedback form will be given to participants to evaluate how effective the study visit was. This form is meant to capture participants' experience and identify whether the visit has met their expectations and how they have benefitted from their participation in this event. Participants will be asked to provide a short assessment on the organisation of the study visit and discuss the findings and lessons learnt, as well as the different perspectives brought on the table by the different participants during the exchange of experience and capacity building activities of the study visit. Participants will be also given space to further contribute to the (ongoing) policy dialogue with new perspectives and ideas on the themes discussed but not adequately addressed during the study visit; and which can essentially improve relevant policy making. The form will be distributed by the host organisation before the official end of the study visit; participants are encouraged to keep notes during field visit(s), presentations and panel discussions so they can better reflect to evaluation questions.

STUDY VISIT IN BRANDENBURG **FEEDBACK FORM**	
Name:	
Organisation:	
Country:	
Region:	
I. FINDINGS	
1. One of the aims of the study visit was to exchange examples of good practice on post mining land restoration. Could you please very briefly describe what aspects make these projects/programs successful, worth further exploring and integrating in own region's initiatives and policies?	

2. The study visit also aimed to support policy development towards clean energy transition and post mining land restoration. Please summarise what you learnt about such policies and their implementation during the visit (barriers and challenges faced, measures taken, results achieved).
3. What is the most interesting/useful information and findings that you are going to communicate within your own organisation and to competent authorities in your country?
4. Are there any issues related to the themes of the study visit that have not been adequately covered during the event and may bring added value to the discussion for relevant policy improvements?

II. ORGANISATION OF THE STUDY VISIT

5. Considering your experience, how much do you agree/disagree with the following statements?

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
5.1. The study visit was properly structured and organised.	☐	☐	☐	☐	☐
5.2. The agenda was comprehensive and conclusive.	☐	☐	☐	☐	☐
5.3 The background documentation (i.e. input paper) helped to prepare for the visit.	☐	☐	☐	☐	☐
5.4. Field visits and presentations were relevant to the thematic focus of the workshop.	☐	☐	☐	☐	☐
5.5. Field visits were useful and informative.	☐	☐	☐	☐	☐
5.6. The group comprised a good mixture of participants with diverse backgrounds who brought different perspectives in the discussion.	☐	☐	☐	☐	☐
5.7. There was enough time for discussions and exchange of ideas.	☐	☐	☐	☐	☐
5.8. Participation in interactive activities enhanced capacity building & mutual learning.	☐	☐	☐	☐	☐

III. SUMMARY

6. Considering your overall experience, how satisfied you are with your participation in the study visit?

☐ Very satisfied

☐ Satisfied

☐ Neither satisfied nor dissatisfied

☐ Dissatisfied

☐ Very dissatisfied

7. Do you agree that the study visit will lead to improvements in relevant policy making? ☐ Strongly disagree ☐ Disagree ☐ Neither agree nor disagree ☐ Agree ☐ Strongly agree
8. Will you support the integration of key findings and conclusions drawn from the study visit into regional policy measures? ☐ Extensively ☐ Considerably ☐ At some extent ☐ Marginally ☐ Not at all
9. Other comments