Smart strategies for the transition in coal intensive regions

Project No: 836819

Roadmap for Lusatia

WP 6 – Task 6.3 / D6.4

May 2022

Authors: Anne Rademacher, FIB, Germany
Rainer Schlepphorst, FIB, Germany
Dirk Knoche, FIB, Germany

Editors: Charalampos Malamatenios, Centre for Renewable Energy Sources and Saving, Greece
Rita Mergner, WIP Renewable Energy, Germany
Rainer Janssen, WIP Renewable Energy, Germany

Contact: Forschungsinstitut für Bergbaufolgelandschaften e.V.
Dr. Dirk Knoche
Email: d.knoche@fib-ev.de, Tel.: +49 (0) 3531 – 7907 16
Brauhausweg 2
03238 Finsterwalde, Germany
www.fib-ev.de

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 836819. The sole responsibility for the content of this report lies with the authors. It does not necessarily reflect the opinion of the European Union. Neither the INEA nor the European Commission are responsible for any use that may be made of the information contained therein.

TRACER website: www.tracer-h2020.eu

Contents

1 Introduction

In Lusatia, the *Development Strategy Lusatia 2050* (Entwicklungsstrategie Lausitz 2050, Wirtschaftsregion Lausitz GmbH, 2020) is an already existing strategy for medium- to long-term development in the region, which places emphasis on research and innovation, especially in the energy sector. It was finalised in autumn 2020, in the frame of the "*Lusatia Future Workshop (ZWL) - Development of new perspectives within the framework of cross-border regional development in Lusatia*", a project of Wirtschaftsregion Lausitz GmbH (WRL) that began in December 2017. The strategy was developed as a "bottom-up" process (dialogue forum). Around 5,000 randomly selected people from Lusatia were invited to contribute their ideas and perceptions in various public participation formats (workshops) – a representative cross-section of the population.

Moreover, a comprehensive collection of materials and already existing regional concepts were condensed to a joint development strategy for the whole mining region. More precisely:

- A milestone for the structural change: The mission statement formulated describes Lusatia as a CO_2-neutral economic area in which existing economic structures have been evolved in the sense of a green industry approach. By anchoring new technologies, sustainable value chains could be established in the region in the long term.
- The fixed strategy is intended to form the coordinated framework for shaping a sustainable Lusatia. Adequate job opportunities and an intact living environment are an important basis for the success of structural change.
- When looking at the transformation process in all 9 TRACER model regions, it can be stated that Lusatia is going ahead, having already some experience in structural change, adaptation and reinvention – starting with the hard structural break in the 1990s, followed by disillusion to the organised change and new awakening nowadays.

Consequently, there is no need and it makes no sense to develop a separate − somehow new − strategy or roadmap together with stakeholders in the region within the framework of the TRACER project. Instead, the relevant contents of the *Development Strategy Lusatia 2050* are presented here, with some additional comments as, for example, what is promising and has already been achieved since 2020, or whether it is on the right track (or no). Thus, any roadmap for transition is only a current "snapshot", and has to be updated regularly and step-by-step, regarding the achieved results, recent developments, new initiatives and changing framework conditions. This is the aim of the work done herein.

The delivered results are convincing – even to sceptics − and give courage to people. Contrary to previous predictions, the emigration of young workers, especially in the rural sub-regions, seems to be stopped. After three decades of labour oversupply and unemployment, the Region is now facing skills shortage. Despite still existing barriers, politics and media are already talking about a new booming region, Lusatia. After years of uncertainties regarding the coal phase-out, the tipping point is now overcome. Also, the Lusatian "success stories" change the public opinion: Structural change in coal regions offers opportunities − for both humans and the environment! A self-fulfilling prophecy?

2 Strategic approach for the development of the Roadmap

Overall approach for developing a future roadmap

The political decision-makers in Germany have already initiated structural change in the coal-mining regions and initiated extensive measures for financial support and economic promotion in the affected regions. In August 2020, the Structure Strengthening Act for Coal Regions came

into force at federal level in Germany. It provides financial aid to compensate for different economic strengths and to promote economic growth in the coal mining regions of Germany.

The law is largely based on the work of the “Growth, Structural Change and Employment” Commission, which was set up by the federal government in the summer of 2018 and developed proposals for structural change in coal mining regions. The commission's findings were presented in a final report in January 2019, which proposed Germany's phase-out of coal-fired power generation by 2038.

In order to implement the Structural Strengthening Act, a federal-state agreement was passed in accordance with Article 10 of the Act, in which the details of the procedure for granting financial aid are specifically regulated. The Lusatian mining area receives 43% or around EUR 8.4 billion of a total of up to EUR 14 billion provided in the so-called 1st pillar of the Structural Strengthening Act by the federal government until 2038.

Further federal measures are set out in the so-called 2nd pillar of the law. This includes concrete measures to support structural change amounting to up to EUR 26 billion. As a result, the federal state of Brandenburg has federal funds totalling up to EUR 10.3 billion available until 2038, while the Saxon part of the Lusatian mining district is entitled to a total of around EUR 6.9 billion.

A newly created federal state coordination body accompanies and supports the federal government and the governments of the states in the implementation and coordination of the measures. This is to ensure that the money is only used to finance projects that are highly effective.

A closer look at the “Brandenburg way”

The funding guidelines for structural development in Lusatia from the State Chancellery of the State of Brandenburg are used to implement the financial aid of the Coal Regions Investment Act. For the operational implementation of the financial aid, project ideas can be submitted to the WRL. The WRL performs the tasks of a regional structural development company. It coordinates initiatives, networks the actors, initiates and qualifies project ideas. The aim is to achieve effective, "worthy of funding" projects that produce strong structural effects and ultimately secure and create employment and added value. The political responsibility for the entire process lies with the State Chancellery, represented regionally by the Prime Minister's Lusatia representative.

In addition, significant with regard to the development of the region is the Lusatia Programme 2038 - Process Paper on the Establishment of Decision-making and Accompanying Structures in the Transformation Process (Staatskanzlei Brandenburg, Dr. Klaus Freytag − Lausitz-Beauftragter des Ministerpräsidenten 2020).

WRL announced the *Development Strategy Lusatia 2050* in Autumn 2020 (Wirtschaftsregion Lausitz GmbH 2020). That is a broadly coordinated future concept that affects all relevant areas of public life. The strategy intends to provide a coordinated framework for shaping a sustainable and liveable Lusatia and to be an important basis for structural change. It was developed as a project from the WRL and summarises the work of about 50 authors. There are manifold references to R&I, especially in the fields of energy and environment.

Reskilling and retraining play only a subordinate role in Lusatia. A deficit of around 75,000 workers is expected by 2030 due to demographic developments alone. The focus is on recruiting new workers through immigration and reducing the emigration of potential skilled workers. The attractiveness is to be achieved through improved services of general interest in rural areas and a stronger identification and marketing of Lusatia's Sorbian roots.

The mission statement for the structural development of Lusatia is anchored in the Commission Report (K-WSB) and the Structural Strengthening Act (StStG). It takes up the key points agreed as a result of a joint cabinet meeting of the Land of Brandenburg and the Free State of Saxony in June 2017. The mission statement is the basis for the transnational development of Lusatia.

According to the strategic goals set, as the result of the transformation process, Lusatia will be:

- a European model region for structural change,
- a central, European interlinked region,
- an innovative and efficient economic region,
- a modern and sustainable energy region,
- a modern location for research, innovation and science, a model region for health that links research, teaching and care in a new way using digitalisation, and
- a region with a high quality of life, cultural, linguistic, ethnic and sporting diversity and intact natural areas.

Within the framework of the funding guideline "Structural development of the Lusatian lignite mining area in Brandenburg", the federal state of Brandenburg grants subsidies for projects that serve in particular to manage structural change and secure employment in the course of the phase-out of lignite mining and the generation of electricity from lignite. The programme's funding recipients are regional authorities and other public and private bodies that fulfil tasks in different of the funding areas.

Funding is granted for investments to shape structural change, particularly in the following areas: Economic infrastructure, transport excluding federal, state and municipal roads, public welfare, urban development, urban and regional development, digitalisation, broadband and mobile communications infrastructure, tourism infrastructure, infrastructures for research, innovation and technology transfer, climate and environmental protection, nature conservation and landscape management.

Structural funding makes it possible to try innovative concepts for green energies and other future fields. And the ongoing process is gathering speed. It must be mentioned that, the federal state of Brandenburg currently (Spring 2022) has 54 innovative undertakings on the way, with a public funding of EUR >1 billion, and further 29 investments in the pipeline. This funding deals only in the Lusatian part of Brandenburg by the federal state. The situation in the Saxonian part is similar. There is a bunch of different funding options by a number of programmes and institutions (for more detailed information see: TRACER D4.1 “Guideline on available European funds and programmes for low carbon energy projects in coal intensive regions”).

In addition, there are flowing EUR 0.8 billion subsidies from the European Just Transition Fund (JTF) into the region up to 2027 – starting in the second half-year 2022, making a direct funding of enterprises possible. The new instrument complements the national and federal structural funding by supporting the territories most affected by the transition towards climate neutrality; it is in line with EU cohesion policy’s aim to reduce regional disparities.

2.1 Prioritisation of R&I activities for the selected energy technologies

Like it is stated in report D 6.2 of TRACER (*Research & Innovation strategy in the field of energy for Lusatia*), the *Development Strategy Lusatia 2050* points out several goals and approaches to action in various future fields and action categories (Table 1).

Table 1: Content of the *Development Strategy Lusatia 2050* (Wirtschaftsregion Lausitz GmbH, 2020) with regard to the field of action: innovation, research and science

Action category: Research, experimental fields and energy
Overarching goal: The share of the following future technologies in the region has increased through innovations: Big Data, Artificial Intelligence, digitalisation, climate-friendly drives, autonomous driving, alternative mobility concepts, reclamation, circular economy, decarbonised energy production and energy storage systems. • Focus on technologies like Big Data, Artificial Intelligence, digitalisation, climate-friendly drives, autonomous driving, alternative mobility concepts, reclamation, circular economy, decarbonised energy production and energy storage systems in future measures
Subgoal 1: There is more research and development in Lusatia. Fields of action: • Expand existing universities and study academies • Expand research capacities (e.g. Fraunhofer, Leibniz, Helmholtz or DLR institutes; major DFG, EU or BMBF research projects; centres of excellence and innovation campuses, especially in the areas of energy-intensive industries, electronics and microsensor technology, and AI software and hardware)
Subgoal 2: The energy supply remains competitive. Fields of action: • Coordinate Saxony's and Brandenburg's energy strategies in order to reform the sector. • Strategically align the hydrogen economy through cooperation between the federal states Saxony, Brandenburg and Saxony-Anhalt • Arrange new business opportunities and markets • Increase acceptance of CO_2-neutral energy production • Participation of communities and the local population in economic returns • Citizen-oriented business models (local ownership, cooperatives, etc.) • Strengthening and expanding cooperation between business and research institutions • Establish a centre of excellence for the sustainable generation and use of electricity surpluses (Power-to-X)
Subgoal 3: There is security of supply in the energy sector. Fields of action: • Accelerate the national and cross-border expansion of the supply networks for gas and electric energy • Establish a nationwide hydrogen filling station network • Consistent linking of the heating, cooling and propulsion sectors as a substitute for fossil energy sources • Promotion of decentralised generation and storage projects (battery storage plant Schwarze Pumpe)
Subgoal 4: Lusatia has been developed into a model region for the hydrogen economy. Fields of action: • Use funding measures, e.g. from the BMVI's HyStarter programme • Prepare for expansion to HyExpert status • Support regional networking (e. g. promotion and institutionalisation of the DurcH2atmen network) • Promote supraregional and interdisciplinary cooperation

2.2 Prioritisation of local workforce reskilling / retraining needs

Employment in the lignite sector is falling sharply. However, the decline in employment from around 7,100 can be partially offset by the expansion of renewable energies (+ 4,500 employees). The structural changes in the next two decades will require an active shaping of the framework conditions, so a strategic quadrilateral of energy efficiency, hydrogen, energy export and climate protection could be an option (Prognos, 2021).

Reskilling/retraining play only a subordinate role in Lusatia. Further qualification or retraining of workers leaving the coal industry will be necessary if new activities are – or, to a large extent, will be − not so identical to those previously performed. Qualification measures should also address the motivation of the people concerned to better identify with the new activities. Thereby, Knuth (2019) lists examples of promising occupational fields for Lusatia that could be related to activities in lignite mining and in the associated power plants. These include: automation technology, construction electrics, electrical machine technology, line installation and maintenance, information and telecommunications installation, civil engineering, supply and disposal, train driver in railway transport, monitoring and maintenance of railway infrastructure and IT application consulting.

Many employees in the Lusatian lignite sector are already trained for the above-mentioned fields by their basic qualification and daily work. These are therefore occupational fields that correspond to their skill sets and interests, e.g. mechatronics, mechanical and electrical engineering, etc. However, it is rather questionable to what extent employees with the aforementioned expertise will be in future demand from companies that are not active in the coal sector. Recruiting new workforce through immigration and reducing the emigration of potential skilled workers is an important aspect of the strategy to reduce the expected deficit of the missing workforce.

Finally, Markwardt et al. (2016) point out that the Lusatian region is expected to lose 17% of their inhabitants by 2040. In addition, the average age of the population will continue to rise (to 54 years in 2040). The authors therefore forecast a shortage of about 120,000 labour force members in the medium and long term. Moreover, the *Development Strategy Lusatia 2050* sees Lusatia as (green) energy region promoting new technologies, not only as other-directed extended workbench of international enterprises, with their strategic head outside. Overall, this positioning offers good job perspectives, especially for young people, even without special training programmes for employees leaving the coal industry. The stepwise transformation process is already underway. Also, in this crucial point for regional development the current situation cannot be compared with the structural and socio-economic break after the German reunification in the 1990s (Wirtschaftsregion Lausitz GmbH, 2020).

2.3 Barriers analysis

In Lusatia, a SWOT-Analysis was conducted on aspects of research and development in energy technologies. The main barrier for further development is the potential shortage of high educated labours due to emigration of young people and the age distribution of the population with a predominant share of older people who have already retired or will soon retire from working life (Wirtschaftsregion Lausitz GmbH, 2020). There is already and will be in the near future a considerable lack of qualified workers, especially in future-oriented fields of industrial development and research.

What´s more, the lack of skills shortage now covers all other fields of industry and trade, but also research and innovation. There is a tough competition about the best minds, often at the costs of small and medium-sized companies. In contrast, large industrial players, but also state or federal institutions, have competitive advantages. Even more, it is essential to strengthen and stabilise the recruiting of well-trained specialists from other regions – like it happened 150 years before, when industrial coal mining changed the pre-industrial cultural landscape and

society in a few decades: immigration & knowledge transfer as an indispensable “success factor”.

Another barrier is that, overall, there are many initiatives, e.g. engaged start-up projects, but the degree of cross-linking, international cooperation and job relevance still is low. Therefore, all job-generating network activities must be enforced across border lines and branches within the value chain. One promising example is the network agency “Renewable Raw Materials Brandenburg” at the FIB Finsterwalde, established in December 2021. The basic idea behind it is to create and ‘power up’ regional value chains for an efficient and sustainable biomass processing in line with recycling economy.

Finally, when considering all activities in transformation of the energy system, double structures must be avoided, for example, when looking at the hydrogen and energy storage research activities in both Brandenburg and Saxony. Actually, too often in the past, both federal states have gone different ways in the implementation of funding measures, especially with respect to small and medium-sized enterprises. For a closer cooperation, Saxony and Brandenburg have recently signed a new cooperation agreement in November 2021 − now words must be followed by deeds.

3 Recommendations for Measures

3.1 Major axes needed to accomplish the objectives of the R&I Strategy

Basically, the research landscape in - the predominantly rural region of - Lusatia is relatively well positioned and offers a lot of potential, both in terms of innovations and new developments in the field of energy, as well as an employer for highly qualified people. The greatest challenge facing the state governments in the coming years will be to maintain, strengthen and further expand the existing structures, based on competence fields and “hidden potentials” (Nagel & Zundel 2021). Two decisive factors will probably be how the region can present itself on the one hand as an attractive location for innovative companies, and on the other hand as an attractive employer region for highly qualified potential employees.

The driving factors are:

1. Stabilisation of existing industry groupings, i.e. clusters/branches having high location coefficients (Farhauer et al. 2014), with agglomeration, specification and infrastructure advantages, realisation of business settlements in upstream and downstream value creation stages, thus creating workplace relevant opportunities of growth which individual enterprises miss.
2. If necessary, development of business-related infrastructure for emerging competence fields, e. g. digitalisation in all business fields and daily life, broadband expansion, 5G – 5th generation mobile network.
3. Innovation, research, science to establish sustainable value chains in land use, including new land combined use forms, like highly efficient photovoltaics or agroforestry systems, based on the established knowledge carriers.
4. Attraction of entrepreneurs by special funding programmes and easier framework conditions for innovative start-ups, promising business models, looking at the whole value chain, and staying true to the motto “from the idea to the product”.
5. SME-programmes for a further diversification and modernisation with respect to green economy and regional recycling economy.

6. Long-term security for the enterprise location and economic position, further improvement of the regional attractiveness for investors, including land reclamation and other measures for the improvement of the living environment.
7. Networking for a better linking of different economic sectors, including H_2-spread measures in the field of energy, traffic and automotive industry in the region.
8. Establishment of new transformation centres and path-breaking lighthouse projects, with scientific support and evaluation.
9. Starting new training initiatives, linking different enterprises within a regional cluster or branch, using synergies (network of companies).

3.2 Major axes needed to fulfill the needs for workforce retraining

The current workforce is well trained and can switch with some minor reskilling/retraining to other areas relatively easily. For example, there is already a cooperation between the mining company LEAG and Deutsche Bahn AG (DB) for the continued employment of workers. The problem is that Lusatia is expecting a huge deficit of qualified workers within the next years. This is due to demographic trends – basically, an aging population. So the focus is directed to attract new workers to move to or stay in Lusatia. This will be reached by the following major axes:

1. Comprehensive expansion and further development of existing returnee initiatives in the region (for stimulating potential newcomers);
2. Create diversity in the educational landscape, strengthening the specialised workforce pool;
3. Promote and support interregional and cross-sectional cooperation.

The *Development Strategy Lusatia 2050* focuses on setting goals and approaches. Thus, it is the major axis (compass) for structural development, including the very crucial point of workforce retraining and creation of future-oriented jobs, especially in the sector of green energies. Core elements are:

1. The basis of the strategy is an analysis of the previous development, the existing resources and the potential, as part of a comprehensive SWOT analysis.
2. The goals and fields of action are SMART:
   S − specific, i.e. sufficiently specific to structural change and the region
   M – measurable, i.e. operationalizable (indicators) and operationalised
   A − accepted by those who should help shape it (participation)
   R − realistic
   T – terminated (a temporally differentiated development path must be recognisable).
3. Besides the economic considerations, also demographic development and "spatial images" were taken into account.
4. Conflicts between the goals were resolved in terms of the priorities "*Strengthening and developing competition and the ability of companies to advertise*", "*Develop the Lausitz/ Łužica/Łužyca brand*" and "*Strengthening and development of quality of life*". Synergies were worked out.
5. The strategy specifies the model for the Lusatian mining area. The strategy has all relevant national, regional and municipal strategies adequately taken into account. This also applies without restriction to the European Union strategies and programmes.
6. For all these reasons the *Development Strategy Lusatia 2050* has sufficient acceptance among municipal actors, the economic and social partners, and civil society.

7. In the sense of continuous (rolling) planning, the strategy must be updated regularly on the basis of systematic analyses (accompanying research) and with critical questioning of the goals and approaches to revise.

One integral field of action is to create adequate future jobs for employees in the mining and generation sector. A remarkable example is the new railway maintenance depot in Cottbus, a one billion EUR investment and central initiative for structural change – “coal leaves and railway comes”. It trades as Europe`s most modern railway engineering project at the moment. It provides already in 2026 about 1,200 high quality industry jobs. At the same time, the Lusatian railway infrastructure is upgraded, with a special focus on the neighbouring industry regions in Poland and the Czech Republic. To ensure the long-term requirement of skilled employees, the German Federal Railway Company (DB) and the energy company (LEAG) have signed in 2020 a cooperation agreement about advanced education and training, as well as for transfer of employees.

This “partnership of responsibility” is a role model for other industrial segments too, especially for the transfer of workforce into the branch of green energies (e.g., plant technicians and mechanics, electrical and mechatronics engineers). It fits well with the new, quite promising qualification project/initiative for renewable energies (Qualifizierungsverbund Lausitz für die Erneuerbaren Energien / QLEE), initiated by LEAG, the Institute for Operational Educational Research (Institut für Betriebliche Bildungsforschung / IBBF) and the German Association for Renewable Energies (Bundesverband Erneuerbare Energien e. V. / BEE), that has just started in May 2022.

Since 2020, new companies are also established in the region and nearby, like TESLA / Grünheide or the Canadian resource company Rock Tech Lithium / Guben. In fact, they push the transfer of employees towards a climate-friendly industry. But they are not only looking for specialists, while the whole service sector and regional trading is benefitting. Demand creates economic growth.

Particularly challenging, but equally labour market effective, is the modification for already existing production lines, e.g. when BASF / Schwarzheide is on the road away from crude oil oriented towards biodegradable plastics.

4 Action Plan of the Roadmap

4.1 Assessment and prioritisation of the proposed measures

The administrative structure in Germany is organised federally. Therefore, different levels of legislation exist. The federal government basically gives general directions and defines a legal framework. In the case of Lusatia, the Federal states of Brandenburg and Saxony implement the legal framework and have sufficient margins for state-specific features and implementation of detailed regulations. The last years, a civil society organisation called Wirtschaftsregion Lausitz GmbH worked out the *Development Strategy Lusatia 2050* following a very intense participation process. The strategy considers aspects of the Federal states of Brandenburg and Saxony and reflects the approaches of national and EU policies. As it is the outcome of an interactive process and broad public discussion considering the lessons learnt from the structural break in 1990, it is well known by politicians and local stakeholders.

According to the *Development Strategy Lusatia 2050*, the Lusatian mining area will become - as a result of the structural strengthening process - a CO_2-neutral economic area, which looks like rather ambitious and hardly imaginable today, but possible when taking seriously the European Green Deal (2019). Therefore, existing economic structures have been further

developed, now in line with a green industry approach. In the region there are new technologies established and sustainable value chains created on a long-term basis.

The *Development Strategy Lusatia 2050* defines the priorities of action for the adequate implementation of the mission statement:

- Priority 1: Strengthening and development of the competitiveness of business
- Priority 2: Development and establishment of the regional brand Lausitz/Łužica/Łužyca
- Priority 3: Strengthening and development of life quality

4.2 Specification of the set of actions required to implement the Roadmap

For a brief overview, the main focus points on which the strategy is aimed are mentioned here. A detailed description of the individual measures to achieve this priority goals can be found in the development strategy itself.

- Priority 1: Strengthening and developing the competitiveness of business
  - Innovation, research, science to build sustainable value chains
  - Stabilisation of existing companies
  - Realise business settlements
  - Development of business-related infrastructure
  - Securing skilled workers
- Priority 2: Development and establishment of the regional brand Lausitz/Łužica/Łužyca
- Priority 3: Strengthening and development of life quality
  - Culture and arts
  - Social infrastructure
  - Tourism
  - Protection of the environment and nature
  - Sports

Within TRACER it was found that the research landscape in the predominantly rural region of Lusatia is relatively well positioned and offers a lot of potential, both in terms of innovations and new developments in the field of energy, and as an employer for highly qualified people. The greatest challenge facing the state governments in the coming years will be to maintain, strengthen and further expand the existing structures (see TRACER D6.2). The projections for the energy-mix are going back on Germany's first climate protection plan, which aims to reduce greenhouse gas emissions by at least 55% from 1990 levels by 2030 at the latest. There is a focus on strengthen the renewable energies, especially (agro) photovoltaics (see TRACER D6.1).

However, a big challenge in Lusatia is an expected deficit of around 75,000 workers by 2030 due to demographic developments. Reskilling and retraining play only a subordinate role there (see TRACER D6.3). The focus is on recruiting new workers through immigration and reducing the emigration of potential skilled workers. The attractiveness needs to be achieved through improved services of general interest in rural areas and a stronger identification and marketing of Lusatia's Sorbian roots. Two decisive factors will probably be how the region can present itself as an attractive location for innovative companies on the one hand, and as an attractive employer region for highly qualified potential employees on the other.

The stepwise transformation process is in several levels already underway, with different active stakeholders from politics, economy, science and civil society.

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