

Smart strategies for the transition in coal intensive regions

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***Report on outcomes, lessons learnt
and guideline for the transition in coal
intensive regions***

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Abbreviations

EDP	Entrepreneurial Discovery Process
ESIF	European Structural and Investment Funds
ESMAP	Energy Sector Management Assistance Program
ICT	Information and Communication Technologies
RES	Renewable Energy Sources
S3	Smart Specialisation Strategy
SET	Strategic Energy Technology

1 Introduction

This report provides a summary of the findings, lessons learnt and outcomes of the best practice examples from TRACER tasks 2.1 to 2.5 to create a guideline and to give general recommendations for transition processes in coal-intensive regions. Some examples might not fit to each target region, so there is a need to select and adapt.

All best practice examples are shown [here](#).

2 Best practice on technologies, industrial road maps and transition strategies

The goal of the energy transition is to shift the central, coal-based heat and power production towards decentralised, renewable energy production. Therefore, new technologies and transition strategies need to be implemented. Decentralised means that the implementation is not only focused on the former coal intensive region, it is especially focused on the whole country. It is important to setup strategies on national and regional level to support that renewable energy production pathway.

The following examples will give valuable recommendations for the regions for the transition from coal towards renewable energy sources. This transition process does not generally mean the same pathways, so the best technologies and solutions need to be selected individually for each region.

Within the TRACER project 12 best practice examples on technologies, industrial road maps and transition strategies were developed to show how to implement decentralised renewable energy. These 12 fact sheets show how...

- ...a [wind farm complex](#) was located on a reclaimed site of the former lignite opencast mine Klettwitz in the Lusatian Lignite District (Germany) and how the blade factory Vestas settled down nearby.
- ...a lignite-based refinery converted into a showcase for industrial transition at [Chemistry park "Schwarzheide"](#) and established a project-based cooperation with several universities in Germany.
- ...Europe's [biggest short-term storage battery system](#) with a capacity of 53 MWh and high-voltage grid connection is installed at the site of the lignite-fired power station "Schwarze Pumpe", as part of the industrial park "Schwarze Pumpe" in Germany.
- ...[decentralised electricity production](#) should be implemented in the whole country, due to the shift from a central coal-based power production to a renewable decentralised energy production.
- ...the "[greening the gas](#)" strategy brings renewable gas (e.g. biomethane) to the existing natural gas grid.
- ...[heat storages technologies](#) can help to detach the production from the demand and to balance (buffer) fluctuations of energy production to increase the flexibility of renewable energy systems.
- ...the conversion of a lignite processing industrial site could be done at the example [industrial park "Schwarze Pumpe"](#) in Germany.
- ...[Power-to-X technology](#) can be used to transform surplus electricity into forms of energy that can be saved or stored relatively easily.

- ...[photovoltaics and wind power](#) can be important parts of the energy mix in the future. These solutions are not limited to coal intensive regions, these solutions should be implemented countrywide.
- ...a [smart city](#) uses information and communication technologies (ICT) to increase operational efficiency, share information with the public and improve both the quality of government services and citizen welfare.
- ...the [solar park complex "Senftenberg"](#) covers 500 hectares on agricultural reclaimed sites of the former lignite opencast mine Meuro in the Lusatian Lignite District, Germany.
- ...[usage of surplus heat](#) helps to increase the share of renewable energy. Several best practice examples are shown all over Europe.

There is a need to **setup strategies on national and regional level** to support the shift from a central, coal-based heat and power production **towards decentralised** renewable energy generation.

3 Best practice on smart specialisation strategies and SET plan implementation actions

The **Smart Specialisation Strategy** (S3) is a strategic innovation approach that supports stakeholders in a specific sector to come together and agree on its regional or national strengths. It outlines public and private interventions and resources to centre on a limited number of priorities based on national or regional competitive advantage, ultimately leading to economic development.

Smart Specialisation is a **bottom-up approach**, which is seen as:

Smart: it identifies the region's specific strengths and assets;

Specialised: it targets research and innovation investment on these strengths; and

Strategic: it supports stakeholders to define a shared vision for regional innovation.

The S3 approach draws on EU experimentation with regional innovation strategies since the 1990s. Currently, every EU region or Member State has a Smart Specialisation Strategy (S3) – or a regional/national innovation strategy – as a condition for receiving EU Cohesion policy funding. Non-EU countries and regions are also using this approach to developing strategies for national and regional innovation. S3 delivery depends on cooperation, which allows underused knowledge and innovation capacities to be identified and used more effectively. The S3 approach is therefore based on an inclusive process of stakeholder involvement centred on an “entrepreneurial discovery” process (EDP).

[The S3 Best Practice Report \(D2.2\)](#) provides examples of wide-ranging and **inclusive stakeholder engagement processes**. For instance, in Slovenia and in South Moravia (Czech Republic), the process started early, took place over an extended period, and included open discussion space where stakeholders could make their needs known. Ensuring an inclusive

process can be challenging; for example, Portugal illustrates the importance of building on existing networks of actors and pre-existing regional innovation dynamics. The report further outlines how to cope with lost momentum and re-animating S3, how to widen the consultation and engagement process, and include previously excluded actors, or new actors such as universities.

Building on the EDP, the S3 approach involves a **prioritisation exercise** which helps stakeholders to identify the areas and economic activities where regions or countries have the potential to generate knowledge-driven growth and target investment and resources on these themes. Between regions, different approaches are taken to find the right priorities, such as commissioning a study to narrow down the themes or a hybrid approach comprising entrepreneurial discovery and public tendering with expert input (in Pomorskie, Poland). Priority setting can also take place below the regional level and may require the alignment of priorities at different governance levels (local-regional, in Bilbao) or different types of area (rural-urban, in Extremadura, Spain).

In practical terms, S3 implementation is being carried out in different ways, for example, using calls for projects in North-Rhine Westphalia (Germany), a new dedicated funding instrument in Flanders (Belgium) and action plans/roadmaps in Slovenia. It is important to **build trust** among the participants in the process, e.g. through focus groups and project development labs, or investment in collaborative projects which promote spill-overs.

S3s (or antecedents) have played a key role in the innovation focus of **regions in transition out of coal**. They partly used the competitive advantages they may have in the production and transportation of energy sources. For example, mining history, wider transition policies, challenges and change-enabling conditions show how (former) coal regions have been handling economic diversification and structural adaptation. The longitudinal historical processes and current innovation strategies that shape these territories may be an important resource for S3 and wider transition policies in coal-intensive regions elsewhere. **Examples from South Limburg (the Netherlands), Asturias (Spain) and North-Rhine Westphalia (Germany) show that long-term national support for the region, different levels of stakeholder engagement, and new strategies in the areas of renewable energy, knowledge economy and cross-border cooperation are key components to ‘catch up’ in economic terms.**

The **Strategic Energy Technology (SET) Plan** has been the research and innovation pillar of the EU's energy and climate policy since 2007, coordinating low-carbon research and innovation activities. The SET Plan helps to structure European and national research programmes and triggers substantial investments on common priorities in low-carbon technologies. SET Plan Implementation Plans bring together SET Plan countries, industrial and research stakeholders to identify R&I activities to accelerate energy transition. The coming years will produce opportunities and potential synergies for Implementation Plans with existing R&I strategies in TRACER target regions facilitating their transition towards a sustainable energy system.

[The report D2.2](#) selects a range of good practices from around Europe in different parts of the S3 process.

- Strategy to **combine funding sources** to pursue Smart Specialisation goals, e.g. through the Stairway to Excellence in Wales. The approach is commended for R&I capacity improvements (funded through e.g. ERDF) to act as stepping stone to leverage further funding.
- To ensure and retain **continued stakeholder involvement**, regions set up targeted structures and invest in trust-building with a role in strategy implementation. Examples are the regional and national **innovation platforms** (in Portugal and Greece), including regional meetings, workshops and round tables with relevant actors in an ongoing consultation; EDP trust-building exercises in Greece; and **action plans**, developed on the basis of workshops with the Commission's Joint Research Centre, entrepreneurs, the science sector and business environment institutions (as in Poland).

- Strategies may **cross administrative borders** and priorities have to be aligned at different levels of governance. Examples of a cross-border Smart Specialisation strategy and vertical collaboration are found between Galicia (Spain) and Norte (Portugal) and Bilbao (Spain), where the city's development agency organised a cluster prioritisation exercise at city level which then informed the Basque specialisation themes at the regional level.

Lastly, an effective S3 must include a sound **monitoring and evaluation** system to disseminate good practice and address difficulties. The report provides a list of detailed examples in which the regional governments:

- measure socio-economic '**change indicators**', alongside more commonly-used output and results indicators. They track changes in the regional economy with reference to the areas of specialisation and include "specialisation" and "transition" indicators. Specialisation indicators cover patents, research grants, value of business-research contracts, share of new start-ups, and number of SMEs per specialisation;
- carry out a **mid-term evaluation** or an **external evaluation** of the S3s. These assessments analyse the evolution of individual indicators and comparative performance of context indicators, incl. benchmarking against other (EU) regions.
- conduct in-depth interviews (individual or group) with entrepreneurs, S3 coordinators and representatives of local government units, and organise discussion panels with independent experts to analyse the data obtained, assess the consistency of the results and explain results, their causes and recommendations.

The **report for best practice examples for Smart Specialisation Strategies and SET plan implementation actions** could be downloaded [here](#).

4 Best practice on financing

Experts from the Coal Regions in Transition Platform Working Group report mixed opinions about the best practice in financing coal transition. Above all else, local populations whose income is at risk due to the coal phase-out need to be involved early to support the definition of a phase-out strategy; their ideas for the form that the transition should take must be taken seriously; and maintaining of jobs, which should happen primarily through retraining the workforce, is of the highest importance.

Having in place a specialisation strategy has proven to be effective (e.g. transition in the Flemish region of Limburg, Polish Wielkopolska region, or the Netherlands' 'Brainport'). It is important to target financial resources on some well-chosen industries and the EU has been encouraging this approach as well. To illustrate, the JASPERS technical assistance facility, used by the European Commission's Coal Regions in Transition Platform, screens projects for their contribution to a region's Smart Specialisation strategy.

Lessons learned from the previous transition processes show that Coal regions need coordination money as several regional administrations report a need for more staff to help them create financing plans from available public resources. Regional authorities are also eager to learn from the experiences of their peers, and to use bodies like the Coal Regions in Transition Platform to organise study tours between regions. Other such networking groups include WWF's Mayors on Just Transition, [Wandel als Chance](#) and a new [collaboration between the Energy Community, World Bank and European Commission](#) to create a "Coal Platform" for Ukraine and the Western Balkans.

Setting aside money for facilitation has turned out to be very important. One of the first things that a coal region will need to pay for is its strategy, which should be produced as a collaborative exercise with the local population. There are already streams of funding for technical assistance (e.g. JASPERS of the European Investment Bank, the Work Bank's Energy Sector Management Assistance Program (ESMAP) and the EC's Structural Reform

Support Service). Regions are using this money but still find that they lack manpower as shown by feedback from Czech Republic, Poland and Germany for example. International financial institutions are sensitive to the need for a socially just 'Energy Transition' as shown by the European Investment Bank, which is increasing the resources it offers coal regions, and by the [European Bank for Reconstruction and Development](#), which launched its [Green Economy Transition](#) assistance package. Alongside this support from big and sometimes remote institutions, some pressure groups are petitioning for the setting up of 'Civil Society Funds' to build organisational capacities, facilitate funding access and empower civil society.

Once there is a strategy backed by the local populations, finance for the strategy must be found. There are different funding streams – public and private. In regions just beginning their transition, the funding is often public. But private financing can take over within a decade or two if the public money has been well spent: **on general purpose infrastructure, effective land reclamation or education facilities for example.**

Amounts of public funding vary greatly from country to country. Germany earmarked €40 bn for transition measures in coal regions compared to around €30 M in Greece – albeit over different timescales. In 2021-2027 period, in Greece, the regional OP could become the main financing tool for Just Transition because the rules for Cohesion Policy Funds require 65% of spending to be directed at entrepreneurship, innovation and climate change, which are relevant areas.

A strategy for public financial support to a region doesn't necessarily have to take the form of a cash hand-out by the public to the private sector. It can also take the form of foregone tax receipts in order to attract private capital. Poland, Germany and others has set up such '**special economic zones**' (or similar schemes) to attract investment. However, the favourable terms offered by one place can undercut another region that may need the money more.

Among non-grant financing, one finds local equity funds specifically focused on a region that has undergone or is undergoing transition. An example is LRM, offered by the province of Limburg in Flanders (Belgium). The fund's capital, which has grown since it was created, is eyed enviously by regional and federal governments, with the province resisting pressure to give it up. Companies that do not receive LRM investments sometimes complain that it provides an unfair advantage to those that do.

Removing obstacles to using funding is another priority. It is not clear to what extent EU State Aid rules are an obstacle to financing transition away from coal. Some countries such as Spain and others report that they are a problem, preventing the subsidising of new or growing businesses. Smoothing access to ESIF is also important as its allocation to energy efficiency projects has been increasing. Regions have been advised to use ESIF's "non-competitive mode" if they want to get money to promising projects quickly. Furthermore, very large Operational Programmes (like the EU's largest, Poland's national Infrastructure and Environment Operational Programme) could run calls open only to coal regions. Regions have been allowed to reshuffle their allocations of ESIF funds to regions wanting to use it for their abandonment of coal. **Another point to consider is that authorities should draft broad calls to allow networks of towns to apply for funding in order not to exclude towns that are in the same position.**

In response to an interview given by TRACER, Romania has said it is generally content with the management of Cohesion Policy Funds. It wants clarity and simplification of the European regulations' texts, and flexibility of application procedures / rules. TRACER also learned that its Vest (West) region hopes for greater decentralisation of resources and responsibilities at its level.

Cohesion Policy Funding will move from an "n+3" rule to an "n+2" rule in the period 2021-2027. This means that all use of Cohesion Policy Funds by Member States must be fully accounted for within two years of 2027, not three. This will encourage Member States to start distributing Cohesion Policy Funds earlier in the period, but it also shortens by one year the maximum length of projects, creating some issues for large-scale energy transformation projects which would span programming periods.

The report for best practice on financing the transition from coal in European coal regions could be downloaded [here](#).

5 Best practice on labour markets, social issues and tourism

The process of energy transition involves major structural change.

[Good practices regarding labour markets, social problems and tourism](#) represent models/examples - representative by conception, way of implementation, engagement of stakeholders and the results obtained by solving some problems of the energy transition. They are not the only ones and can be taken over, adapted to the specific conditions of each mining region. The sustainability of these good practices, which are in fact "changes for the better" (authors note) is ensured by multiple means ("formalization of new mechanisms, setting of operating rules, construction of new structures, implementation of viable monitoring and evaluation mechanisms, allocation of resources necessary for the further development of the work processes involved, the motivation of the staff and other stakeholders"¹, continuous improvement, etc.).

The field of the labour market, social issues and tourism represent the most tangible effects of change, more precisely the transition, because change that involves people is a transition according to Bridges², and **people are the essence of any process of change**.

For people, the transition is a psychological process, a difficult psychological reorientation, of painful and long-lasting renunciation through which people go through to accept the new situation.^{3 4}

In general, combining a learning dimension with an innovation dimension (partial or radical) and even in the case of beneficial changes, such as these good practices, there are **transitions that start with giving up something**.

Statistically there are perhaps the most concrete and numerous examples in this field analysed. In tourism and culture it is difficult to select truly best practices due to the diversity, inventiveness and final results/effects. There are sometimes quite spectacular examples by creating spaces/environments for relaxation, rest, treatment, fun, even learning.

In the field of labour market the situation is different, almost in all the former mining areas. Most of the training programs do not have a real calculation of impact. Feedback includes setting measurable goals: **thousands of people in intensive coal mining areas have been trained, and retrained, but how many have been hired and are using the new skills?** How many secure themselves and their families from other jobs for which they have been reinstated? Thus, the cost of change increases and the impact is diminished.

The answer can be found by each one of us, in our immediate vicinity in the mining areas with thousands of layoffs, which have become "a real social problem", sometimes unnoticed in the labour market statistics and more in the difficulty of finding good practices, i.e. training targeted

¹ Nicolescu, O., Nicolescu, C. (2006). Organizational Transition and Change Resistance, Theoretical and Applied Economics, no. 7, pp.9-16, <http://store.ectap.ro/articole/119.pdf>

² Bridges, W. (2004). The Transition Management, Curtea Veche Publishing, Bucharest, p. 197

³ Bridges, W., Mitchell, S. (2000). Leading Transition: A New Model for Change, Leader to Leader Journal, Spring, vol.16, no. 3, pp. 30-36

⁴ Irimie, S. (2005). Aspects of change management and transition management, 10th Scientific Conference, "Constantin Brâncuși" University, Tg. Jiu, pp. 134-139

at existing jobs or created by new RES technologies, new businesses, etc. to harness this huge human potential.

It should be analysed not only the number of trainings dedicated to this occupational category, but especially the effect, the individual, organizational and societal impact (it has the skills required by the labour market, it uses them in a job, it adds value in the organization where it is employed, it raises the level of individual and community living standard, manages to stabilize locally and prevent the migration wave and depopulation of these former mining areas).

Professional conversion has been the goal for solving social issues in all coal mining areas.

Unfortunately, this step was blocked in the middle of the road, meaning there were many courses, helping layoffs to get two or three qualifications or certifications, but without the certainty of future jobs, to secure their existence and their families. Therefore, the results are not at all as expected: large number of trainings, skills provided, but no guaranteed jobs. To this aim, the social problem remains a very serious one.

This is on the one hand due to the lack of financial, entrepreneurial education and career counselling and on the other hand due to the discrepancy between the legislative framework, several uncorrelated strategies, policies, development programs of the mining areas, investors or locals willingness to set up companies and provide jobs for these laid off. Many such strategies / action plans were endorsed but not adequately implemented nor monitored and therefore without result-oriented solutions for the social issues generated by the transition process from coal.

The report presents causes of the inefficiency of unemployed re-training programs in the coal-intensive regions in transition.

The report also highlights the key factors that effectively support and facilitate coal transitions, taking into account the following warning "if mining cannot be seen as a vehicle for regional development and job creation, community relations may become tense and lead to costly conflicts as well as to other types of business risks for the companies (Söderholm and Svahn 2015)."^{5 6}

What is very important is to present the evolution history, the becoming of these regions from the former mining areas in today's spaces through exhibitions/museums with panels, models, photographs, machines, installations, augmented virtual touristic tours, Open Mines Day (for example, Petritu, Romania), even the mines' school (for example, Freiberg, Claustal, Germany; Carbonia - Iglesias, Sardinia, Italy, etc.). All this effort helps today's generations to become informed, to understand the hard work, the industry the technology (machines and installations) from the former mining regions.

If in other areas the preservation of the occupational tradition could be achieved over generations, in the mining profession and the related ones in the field, once the mines are closed, the quarries will be lost. Future generations will be well aware of the true value of working in coal-bearing areas "hard and risky work to give the country as much coal"!

One of the lessons learned from the successful transition processes presented in the report (Lusatia, Germany; Limburg, Netherlands, etc.) shows an unanimous agreement, involvement, collaboration and coherence in actions of all stakeholders, confirming the statements of

⁵ Moritz, T. et al. (2017). The local employment impacts of mining: an econometric analysis of job multipliers in northern Sweden, Mineral Economics, vol. 30/1, pp. 53-65, <http://dx.doi.org/10.1007/s13563-017-0103-1>.

⁶ Söderholm, P. and N. Svahn (2015). Mining, regional development and benefit-sharing in developed countries, Resources Policy, Vol. 45, pp. 78-91, <http://dx.doi.org/10.1016/J.RESOURPOL.2015.03.003>.

Waters, Marzano & McNulty⁷, who stress that not only the model matters, but how the stakeholders see the change and it will be successfully implemented only when the stakeholders will be part of this process, participating and presenting their opinions.

Another lesson learned to facilitate a successful and socially acceptable transition is the strategic step-by-step approach to the labour market and the social transformation process, consisting of three stages and 11 subordinate steps, which can be customized by each coal intensive region, taking into account its socio-cultural heritage.

Promoting current good practices will facilitate and reinvent the implementation of viable solutions appropriate to each carboniferous mining area in transition.

These good practices regarding labour markets, social issues and tourism, together with the others, are part of the holistic approach of finding solutions to the problems of the coal mining areas in transition.

The **report for best practice on labour markets, social issues and tourism** could be downloaded [here](#).

6 Best practice on environmental protection and post-mining land reclamation

There are some key principles to consider when planning mine closure and implementing post-mining reclamation. First of all, any concrete guidelines for ecological restoration should be an integrated part of the mine resource management through the life of a mine, always regional specific, situational and considering the available scientific information on both substrate quality and the best possible usability. However, and besides key milestones that have to be achieved (like soil target values, growth and vitality criteria), there remains still a degree of uncertainty when looking at the long-term ecosystem development on new ground - even more as nowadays the climatic conditions are changing rapidly thus overlapping endogenous soil and ecosystem forming processes. In addition, the economic framework conditions and production targets in agriculture and forestry continue to develop, one example being innovative biomass processing chains.

Therefore, it makes sense to apply the risk-spreading precautionary principle when conclusive information on long-term ecosystem development is missing in detail. For reclamation performance and quality control there must be detailed conceptual descriptions and assessments of all reclamation activities including target criteria that have to be achieved in definite time, like soil target values in agriculture or biomass growth and biodiversity indicators for afforestation. It must be ensured that the reclamation objectives have been met once operations cease. Otherwise, additional maintenance measures are necessary.

However, the land management itself should be adaptive to react reasonably if the cropping situation changes, e.g. by integrating natural succession processes in restoration or site adapted native species and special cultivation methods developed for reclaimed land. Below the line, a mosaic of different land use categories is provided that promises the highest economic and ecological value but also stakeholder acceptance.

⁷ Waters, T.J., Marzano, R.J. & McNulty, B. (2004). Leadership that sparks learning, Educational Leadership, vol. 61, no. 7, p.48

Agricultural reclamation

As compensation for the minus of production area an agronomic upgrade should be intended - in particular, through the provision of high-yielding substrates and a proper topsoil preparation.

The application of organic materials (composts, solid and liquid manure, digestates, etc.) with a balanced ratio between carbon and plant available macronutrients is stimulating soil development. But equally important is a soil fertilising and structuring crop rotation with nitrogen-fixing legumes in a key position.

Guideline (target) values for soil properties and a monitoring of the yield development provide an evaluation or control of the reclamation progress and success. The key criteria for the topsoil evaluation are: pH-value, humus and carbon content, plant available macronutrients, water storage capacity and bulk density.

On humus- and nutrient-poor raw soils the first yields do not reflect the real cropping potential. Improving soil fertility is a long-term, biologically driven process taking 60 to 80 years until the site-adapted and sustainable yield production potential is achieved.

Forest reclamation

In principle, the biological self-organisation of forests can follow technical reclamation and natural succession, depending on the landscape planning objectives, i.e. the requirements of the society and subsequent users of the reclaimed land. Leaving behind or creating a suitable rooting medium is an essential precondition for ecosystem development - in particular, if forest management orientates primarily at economic targets.

The overall challenge is to establish diverse, low-risk, forward-looking and sustainable forest ecosystems for multifunctional use options. Scheduled afforestation by planting or seeding and natural succession should complement each other, with different nuances and emphases in detail.

As for all long-living and complex ecosystems it makes sense to assess the reclamation quality by a combined growth evaluation and biodiversity check. In contrast to agriculture, soil target values which have to be achieved in a short management period are questionable, since after initial revegetation there is no more regular soil cultivation.

Forest ecosystem and soil development are long-term processes, although mature forests on reclaimed land show quite similar functional features as forest stands of the surrounding area regarding biomass growth, mineral nutrition, water turnover, nutrient cycling.

Nature conversation

Technical agriculture and forest reclamation imply a landscape design and soil preparation adequate to the management demands of the land users. A dilemma from the ecological point of view: intensification of mining operation and standardised good reclamation practice are in general leading to a more productive but also uniform, artificially smoothed post-mining landscape.

As a counterpoint to production targets the different plans in the active mining and mine closure should always take into account the management requirements to ensure biodiversity values and ecological variety in the developing post-mining landscapes. In particular, habitats with extreme substrate and specific microclimatic conditions are a good refuge for endangered species.

Therefore, the establishment and conservation of sparsely vegetated, nutrient poor and dry bare substrates, dunes and wetlands play a key role. Another option relates to agro-environmental measures for conserving the open landscape and early successional stages, e.g. by extensive grazing and cutting regimes.

Summing up, nature conservation measures should contribute to improve biodiversity upon the pre-mining conditions, even if there is no concrete legal obligation. However, even in designed nature reserves landscaping cannot stand against overruling and legally-binding reclamation targets, notably considering long-term erosion control and safeguarding of ground stability.

The report for best practice on environmental protection and post-mining land reclamation could be downloaded [here](#).