Welcome

Coal-mine Closure Companies

Platform for Coal Regions in Transition

#CoalRegionsEU

Energy

Lessons Learned on Coal Mine Closure

Insights from Germany

Dr. Michael Haschke
Am TÜV 1
45307 Essen, Germany

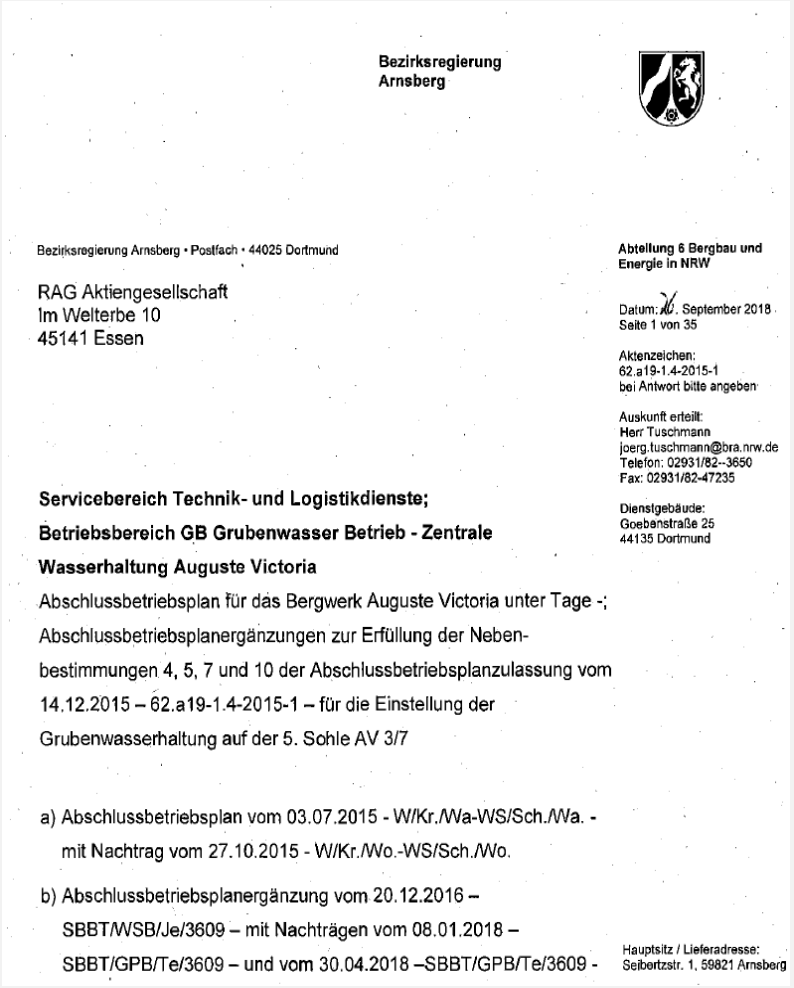
email: michael.haschke@dmt-group.com

Content

- **Summary** of Best Applied Practice in Coal Mine Closure Procedures
  - Underground (Hard Coal)
  - Surface Installations (Coking Plant)
  - Open Pit (Lignite)
- **Type Example** - Post-Closure Mine Water Management
- **Innovation** – Closurematic: Automated Mine Closure

Long-term Experience in Coal Mine Closure

- **>30 years experience** in best practice of hard coal & lignite mine closure in Europe (30 mine closure projects since 1990s (25 hard coal, 5 lignite, incl. 60 shaft fillings).
- Mine closure services in Germany since 2003:
  - Mine *Prosper Haniel* (end 2018, **in progress**)
  - Mine *Ibbenbüren* (end 2018, **in progress**)
  - Mine *West* (end 2012)
  - Mine *East* (end 2010)
  - Mine *Lippe* (end 2008)
  - Mine *Walsum* (end 2008)
  - Mine *Lohberg* (end 2005)



Bezirksregierung
Arnsberg

Bezirksregierung Arnsberg • Postfach • 44025 Dortmund

RAG Aktiengesellschaft
Im Welterbe 10
45141 Essen

Abteilung 6 Bergbau und Energie in NRW

Datum: 26. September 2018
Seite 1 von 35

Aktenzeichen:
62.a19-1.4-2015-1
bei Antwort bitte angeben

Auskunft erteilt:
Herr Tuschmann
joerg.tuschmann@bra.nrw.de
Telefon: 02931/82--3650
Fax: 02931/82-47235

Dienstgebäude:
Goebenstraße 25
44135 Dortmund

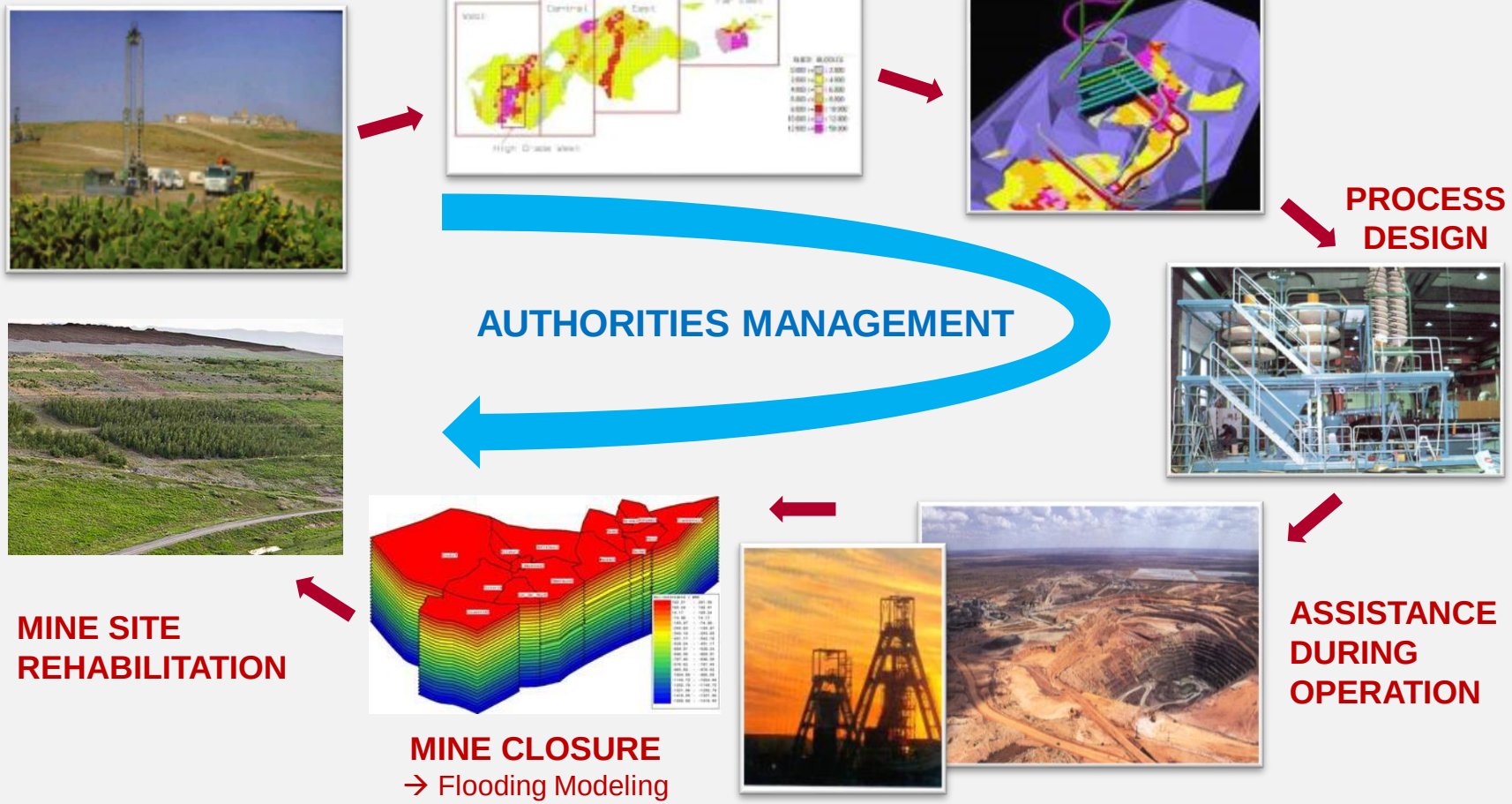
Servicebereich Technik- und Logistikdienste;
Betriebsbereich GB Grubenwasser Betrieb - Zentrale
Wasserhaltung Auguste Victoria
Abschlussbetriebsplan für das Bergwerk Auguste Victoria unter Tage -;
Abschlussbetriebsplanergänzungen zur Erfüllung der Neben-
bestimmungen 4, 5, 7 und 10 der Abschlussbetriebsplanzulassung vom
14.12.2015 – 62.a19-1.4-2015-1 – für die Einstellung der
Grubenwasserhaltung auf der 5. Sohle AV 3/7

a) Abschlussbetriebsplan vom 03.07.2015 - W/Kr./Wa-WS/Sch./Wa. -
mit Nachtrag vom 27.10.2015 - W/Kr./Wo.-WS/Sch./Wo.

b) Abschlussbetriebsplanergänzung vom 20.12.2016 –
SBBT/WSB/Je/3609 – mit Nachträgen vom 08.01.2018 –
SBBT/GPB/Te/3609 – und vom 30.04.2018 –SBBT/GPB/Te/3609 -

Hauptsitz / Lieferadresse:
Seibertzstr. 1, 59821 Arnsberg

Coal Mine Closure – Relevance in the Mining Project Cycle



International best Practice Regulations

- Mine Closure is highly regulated.
- Mine closure planning & mine site rehabilitation (incl. EIA) are integral parts of mine operation plans worldwide.
- Mining companies are required to set aside contingencies for mine closure & mine site rehabilitation.

Coal Mine Closure & Rehabilitation

Main Requirements

Mine Site Rehabilitation

Coal Mine Closure – Financial Provisions Guideline

- **Updated and reported regularly** (every semester according to construction status)
- **3rd party audit every 3 years**
- **Use of historic data vs. market data**
- **Threshold depending on the Life-of-Mine**
- **Social development hand-in-hand with mine closure objectives**

COST ESTIMATE ACCURACIES	Initial	-50% to +50%
	Class 0	-25% to +35%
	Improved Class 0	-25% to +25%
	Class 1	-15 % to +25%
	Class 2	-5% to +15%
	Class 3	-5% to +10%

Coal Mine Closure Criteria

- **Residual Risk Reduction**
- **Closure Criteria Identification, based on Risk & Outcome**
  - Reshaping of waste rock dumps
  - Mine Water Treatment & Management
  - Surface (subsidence) and Topsoil Management
- **Cost Reduction and Asset Optimization**
  - Financial Perspective
  - Closure perspective – liability
  - Integrated approach – tailings
- **Management and Perceptions**
  - Open Pit and Housing
  - Operational Monitoring
- **Reputational Risk and Licence to Operate**

Closure Operating Plan – UG Hard Coal Mines

Surface restoration and remediation of operational areas of hard coal mining areas

Detailed Description of Planned Closure Activities (*Abschlussbetriebsplan* appr. by Bezirksregierung Arnsberg, NRW)

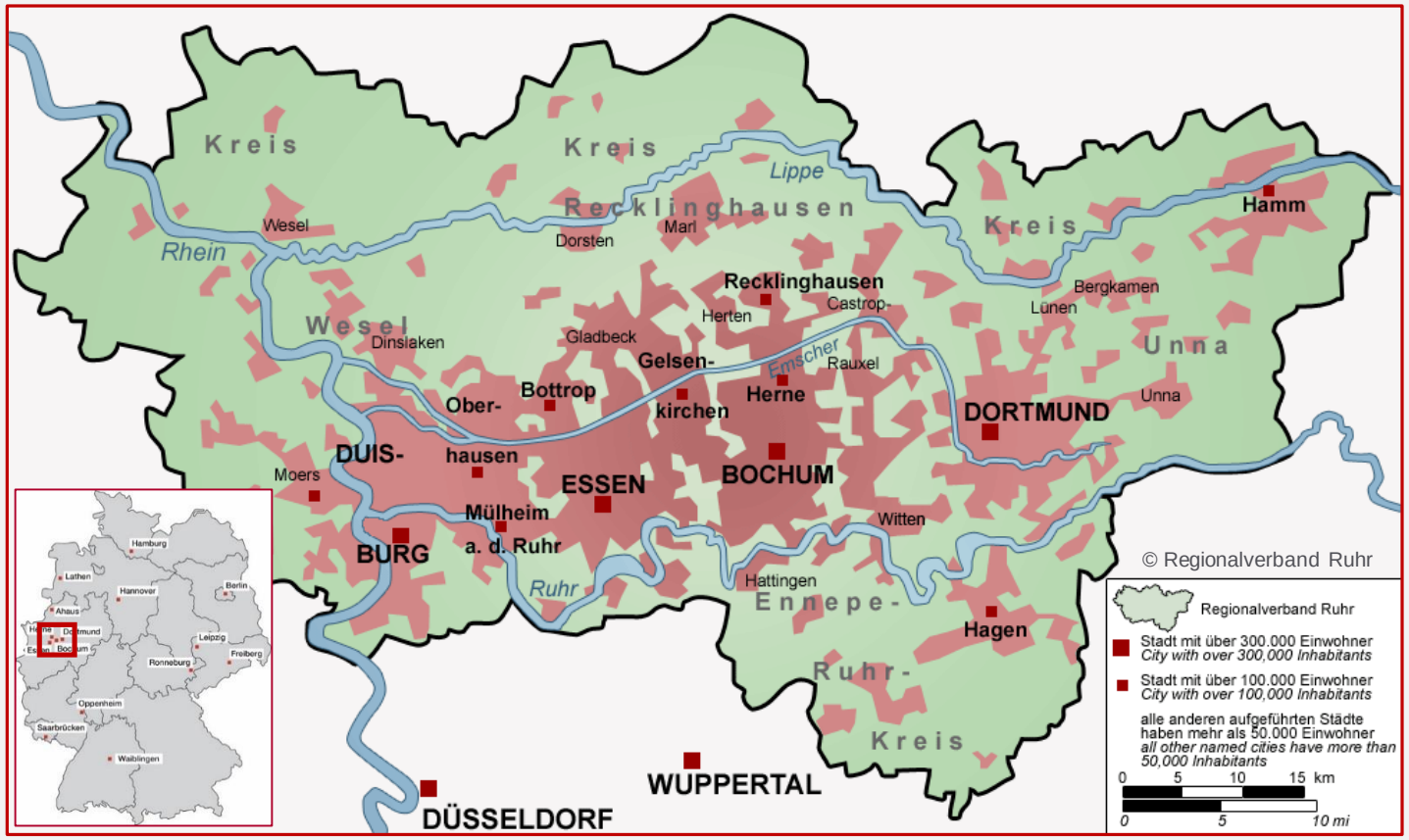
- **Description of UG mine operational facilities and components to be decommissioned**
  - UG mine to be shut down
  - Company chronicle (according to §53 Abs.2 BBergG)
- **Details on intended final operations**
  - Removal of mechanical equipment, lubricants, and other operating materials
  - Sealing and backfilling work (drifts, shafts)
  - Time schedule for closure operations
  - Occupational health & safety protection during final work
  - Ventilation during final works & the closure operations, incl. ventilation sites
  - Pit structure mapping and planned sealing of drift segments
  - Waste disposal plan
- **Effects on mine water**
  - Time of setting the dewatering systems
  - Simulation of mine water rise scenarios
- **Surface protection above mine areas**
  - Securing the structural integrity of surface area above mines
  - Protection against uncontrolled gas leaks at the surface (e.g. by mine gas extraction for energy generation)
  - Simulation of mine water level rise on the surface

Source: www.ruhr-tourismus.de, accessed 24/9/2019

Mine Water Management Concept Ruhr Area

Some important items to be considered:

- 5 Mio population (1.138/km^2)
- 1950s: 143 mines, ~1 Mio employees in coal & steel industry
- SAT monitoring of surface level changes (subsidence during mining vs. mine water rise).
- Saline mine water rise towards ground(fresh)water reservoir. Prospective mine flooding models: -600m vs -380m mine water rise.
- Pilot actions of geothermal use of 20-25°C mine water, underground pumped storage facilities in mine infrastructure.



Closure Operating Plan – Coking Plants (and other surface facilities)

Remediation of operational areas of surface installations

Detailed Description of Planned Closure Activities (*Abschlussbetriebsplan* appr. by Bezirksregierung Arnsberg, NRW)

- **Description of Surface Facilities to be Closed**
  - Operational facilities and installations to be decommissioned
  - Operating history (according to §53 Abs.2 BBergG) incl. references to potentially contaminated sites
  - Planned use of plant site after decommissioning
  - Time schedule for closure operations
- **Buildings and Installations intended for Alternative Use or Disposal**
  - Buildings and facilities intended for further use incl. remaining supply and disposal lines
  - Buildings and facilities intended for disposal, incl. descriptions of foundations remaining in the ground (e.g. cable canals, bunkers …)
- **Hazard assessment**
  - Documentation of historic use (e.g. construction plans, air photographs)
  - Documentation of geological and hydrological settings
  - Investigation of groundwater, soil, soil air, and building substance for potential contamination
- **Decontamination or safety measures based on hazard assessment for future use**
- **Design of business site premises with regard to planned future use**
- **Disposal of waste resulting from closure works**
- **Occupational health & safety protection during closure measures, incl. securing site against unauthorized access**

Source: Rasi57, CC BY-SA 3.0, https://commons.wikimedia.org/w/index.php?curid=9687293

Closure Operating Plan – Lignite

Surface restoration and remediation of operational areas of lignite mining areas

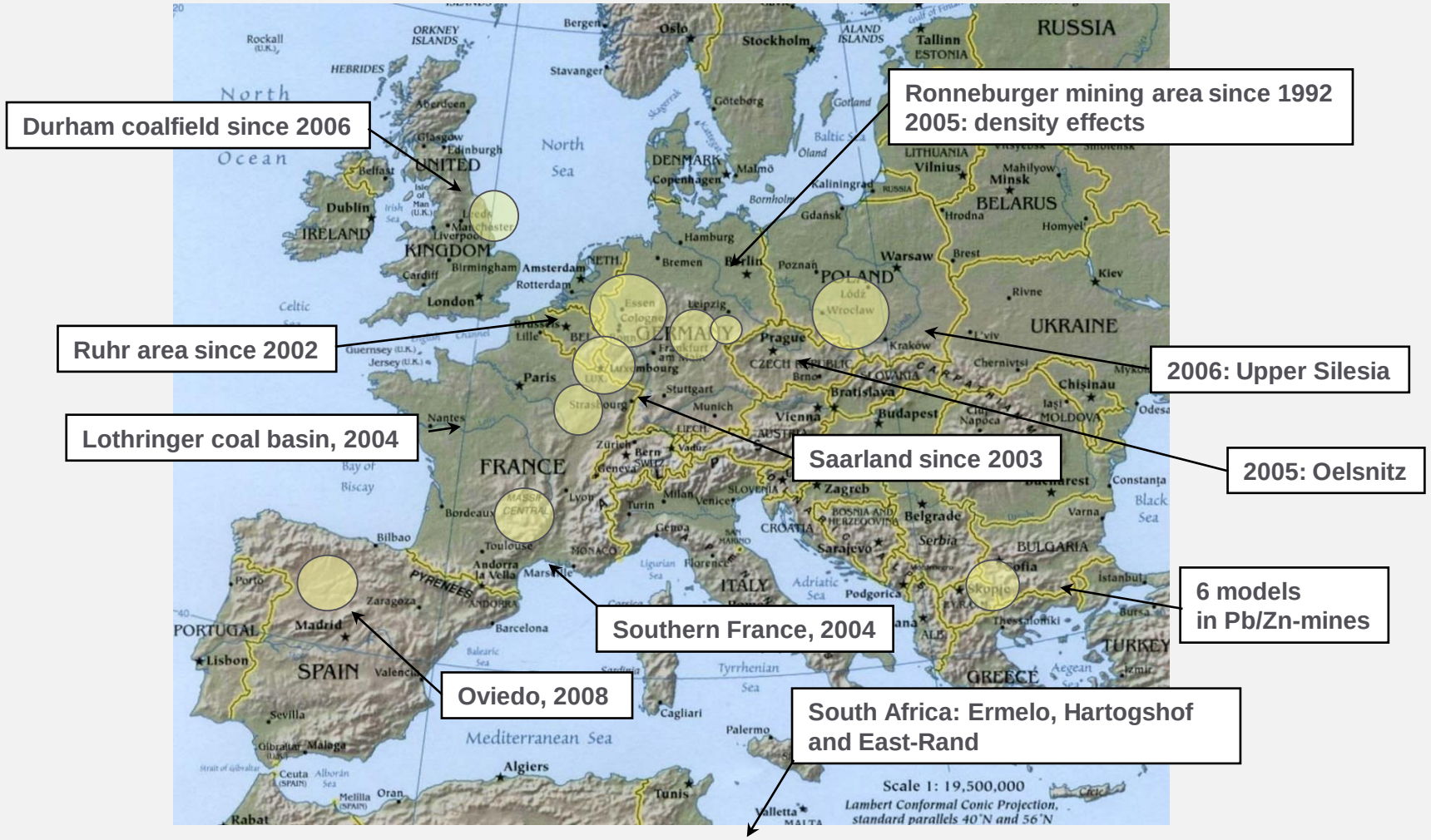
Detailed Description of Planned Closure Activities (*Abschlussbetriebsplan* appr. by Bezirksregierung Arnsberg, NRW)

- **General information**
  - Planning documents, spatial and state (lignite) planning, legal requirements
  - Operational planning & Opencast mining development
  - Timetable for closure actions
  - Balancing of soil material required for reuse
- **Structuring of landscape, surface design and types of reuse**
  - Landscape design, surface waters, and catchment areas prior to mining use
  - Agricultural & forest rehabilitation, landscape-structuring elements & wetlands
  - Redevelopment of road infrastructure
  - Area balance according to types of reuse & requirements from the lignite plan
  - Future groundwater level in the former mining area
- **Implementation planning & specifications for implementation**
  - Condition & treatment of raw dumps for reuse
  - Agricultural rehabilitation & development of agricultural land
  - Measures to avoid harmful soil changes
  - Measures to improve reuse profitability & soil improvement (melioration)
  - Reforestation, development of new forest, forest management
- **Occupational health & safety documentation** (appointment of responsible personnel)
- **Documentation of reuse statistics, loess balances, aerial photographs, etc.**

Source: The Vattenfall lignite mine and cooling towers of the lignite-fired power plant in Jaenschwalde, Griessen, Germany. Photograph: Patrick Pleul/DPA/Corbis

Source: www.rpv-westsachsen.de (10.10.2019). Tagebau Goitsche-Holzweißig-Rösa

International Applications of Mine Water Model



Closurematic

Management Tool for Continuous Mine Closure

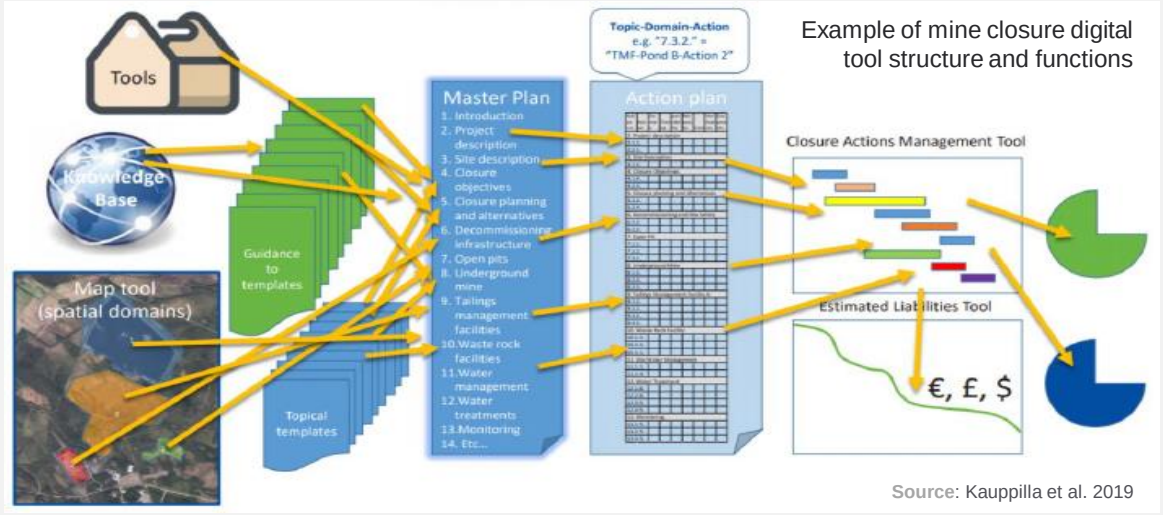
CLOSUREMATIC

Product

- Automated planning and management of mine closure.
- Systematic standardized administration and sustainable environmental management of mine closure.
- Templates for EU-compliant documentation for mine closure incl. costs and risks (add-on).

Result

- Effective mine closure process according to EU technical and environmental standards.
- Social, economical and ecological sustainability of mining.



Example of mine closure digital tool structure and functions

Source: Kauppilla et al. 2019

Key Mine Closure and Reclamation Themes

- Key mine closure and reclamation themes within the ISO TC 82/SC/7 strategic plan

Mine Closure 2019 - AB Fourie & M Tibbett (eds)

https://papers.acg.uwa.edu.au/p/1915_61_Murphy/

An update on the development of mine closure and reclamation standards by the International Organization for Standardization

Abstract

The work program through the International Organization for Standardization (ISO), which aims to develop a series of international standards that will provide requirements and recommendations for mine closure and reclamation management, is now advanced, with two standards at committee draft level. In accordance with ISO timelines, these international standards are targeted for publication in 2020. Twelve countries are actively participating in development of these standards, with a further 11 countries observing. The two standards currently under development include one related to mine closure and reclamation terminology and one related to mine closure and reclamation planning of future or ongoing mines. A strategic plan has also been developed that outlines key themes under which further standards may be developed in the coming years. A new initiative within the work program concerning management and securing of orphan mines is currently under development.

Keywords: *International Organization for Standardization, terminology, mine closure planning, standards*

Source: Murphy et al. 2019, Australian Center for Geomechanics, Perth

CONCLUSIONS

- There is abundant experience in **mine closure with best practice being applied**
- **Mine closure is highly regulated** → Typical of experienced mining nations is that mining license is only approved once EIA and mine closure plans are approved by authorities
- The **cost of mine closure** can be significantly reduced with mine closure in mind during the mine planning & development stage

- At least in underground mine areas, **surface subsidence & mine water management** are significant risks and costs cost drivers for mine closure
- **Mine water simulation models** are challenging but help saving mine closure cost. They may be adapted to mining regions worldwide
- **Mine closure management may be standardized, possibly even automated**, which could be helpful to save cost in *Coal Regions in Transition*

Thank you for your attention

Questions & Comments ?

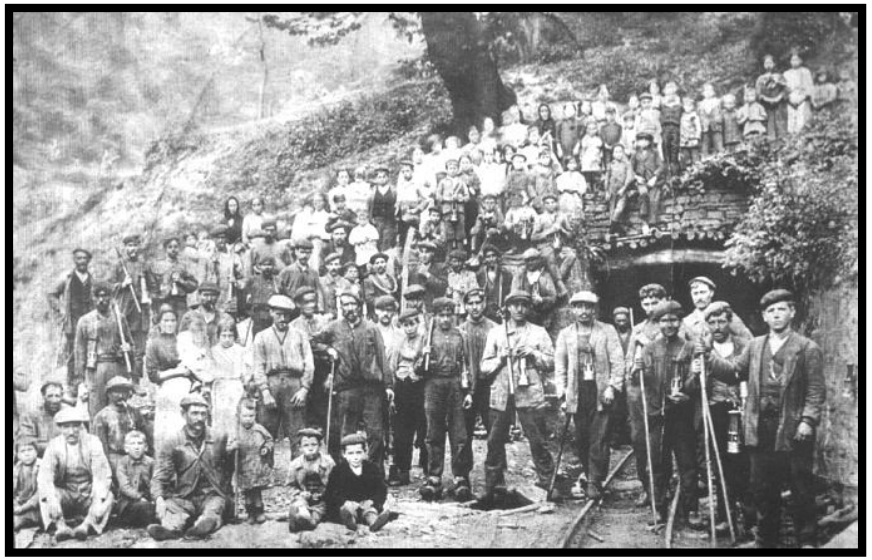
Coal Mine Closure Solutions in Asturias

María Belarmina Díaz Aguado

General Director of Energy, Mining & Repurposing

Government of Asturias

Brussels, October 16th 2019



Past

- Mining with centuries of history. Arnao Mine (1591 - 1915), First coal mine in Spain
- More than 2,000 mountain mines
- More than 73 mining vertical shafts
- Affected surfaces (hundreds of hectares) and problems of environmental affection
- Infinite (eternal) costs: water pumping, subsidence.

Still important for us

Significant and strategic activity in Asturias:

- Coal and Metal mining: gold, silver, copper.
- Rocks and industrial minerals: limestone, kaolin, fluorspa
- Other mineral resources:

1. Mineral and thermal water
2. Mine water geothermal energy

Index

- Spanish legal framework
- Reclamation: good practices
- Hunosa study case
- Conclusions

Index

- **Spanish legal framework**
- Reclamation: good practices
- Hunosa study case
- Conclusions

Spanish legal framework

- Law 66/1997 of Administrative fiscal and social measures
- Ministerial Decree IET/2095/2013 Aid for loss of production due to loss of competitiveness in coal mining
- RD 675/2014 Economic support for development of coal mining councils
- RD 676/2014 Economic support for labor costs to closure of coal mines
- RDL 25/2018 Urgent measures for just transition and sustainable development in coal mining councils

Spanish legal framework

Law 66/1997 of Administrative fiscal and social measures

- Article 78 => It allows the creation of ***Institute for transformation of coal mining and alternative development of coal councils***
- Article 79 => ***Object of the institute***: execution of the restructuring policy of coal mining, development and execution of measures aimed at promoting the economic development of those areas that, in agreement with the applicable regulations, could be considered coal mining municipalities
- Article 80 => ***Obligations of the Institute***: economic support and assistance arising from processes of restructuring or closing of coal mining companies.

Spanish legal framework

Ministerial Decree IET/2095/2013 Aid for loss of production due to loss of competitiveness in coal mining

- Article 1 => The purpose of this order is the establishment of the regulatory bases for the **subsidies** to companies with production of thermal coal used for electricity generation which have closed production units, as provided in Article 3 of **Decision 2010/787/EU** of the Council.
- Article 2 =>The provisions of this order shall apply to the aid that is convened **between January 1st, 2013 and December 31th, 2018.**

Spanish legal framework

RD 675/2014 Economic support for development of coal mining councils

- Article 2 =>These funding are intended to **finance actions that favor the alternative development of coal mining councils**, through the execution of infrastructure projects and reclamation of degraded and/or abandoned areas due to the closure of mines.
- Article 4 => The **geographical scope** of this royal decree includes all those municipalities affected by closing processes of coal mining production units in the Regions of Aragon, Castilla-La Mancha, Castilla y León and Principado de Asturias.

Spanish legal framework

RD 676/2014 Economic support for labor costs to closure of coal mines

- Article 1 => The purpose of the support is to **regulate the scheme by labor costs** to cover exceptional costs due to plans of closing production units of coal mining companies, after the provisions of Council Decision 2010/787/EU, concerning state aid to facilitate the closure of non-competitive mines.
- This adjustment **will allow workers** affected by the new closures to qualify **for early retirement** or incentivized off- work, depending on their professional career.

Spanish legal framework

RDL 25/2018 Urgent measures for just transition and sustainable development in coal mining councils

- Preamble => Despite the important efforts made by the latest Coal Plans and the 2013-2018 Action Framework to encourage alternative activities in coal-producing mining regions, these regions currently maintain a high level of dependence on coal mining industry. Therefore**, there is still a significant volume of workers on staff, with extensive professional experience in coal mining** and significant physical wear, in areas where there is a high rate of unemployment and limited opportunities for reintegration.
- Article 3 => The temporal scope covers the **years 2013 to 2025**.

TOGETHER with the Agreement for a just transition of coal mining and sustainable development of mining councils 2019-2027

Index

- Spanish legal framework
- **Reclamation: good practices**
- Hunosa study case
- Conclusions

Reclamation: good practices

- Already reclaimed areas
- Inventories of abandoned mines
- Support of Ministry for ecological transition: new reclamation plans
- After coal mining …

- All mining operations in Asturias, even small ones, have the corresponding reclamation projects approved
- All areas affected by mining are guaranteed, according to amounts favorably reported by the Environmental Ministry.

More than € 32 million in restoration guaranties!

SOCIAL ASPECTS

- SOCIAL PERCEPTION: rejection, not only against new extractive industries, also against existing ones and even against research permits.
- IMPORTANCE OF MINING, MINERALS AND AGGREGATES NOT perceived by citizens.

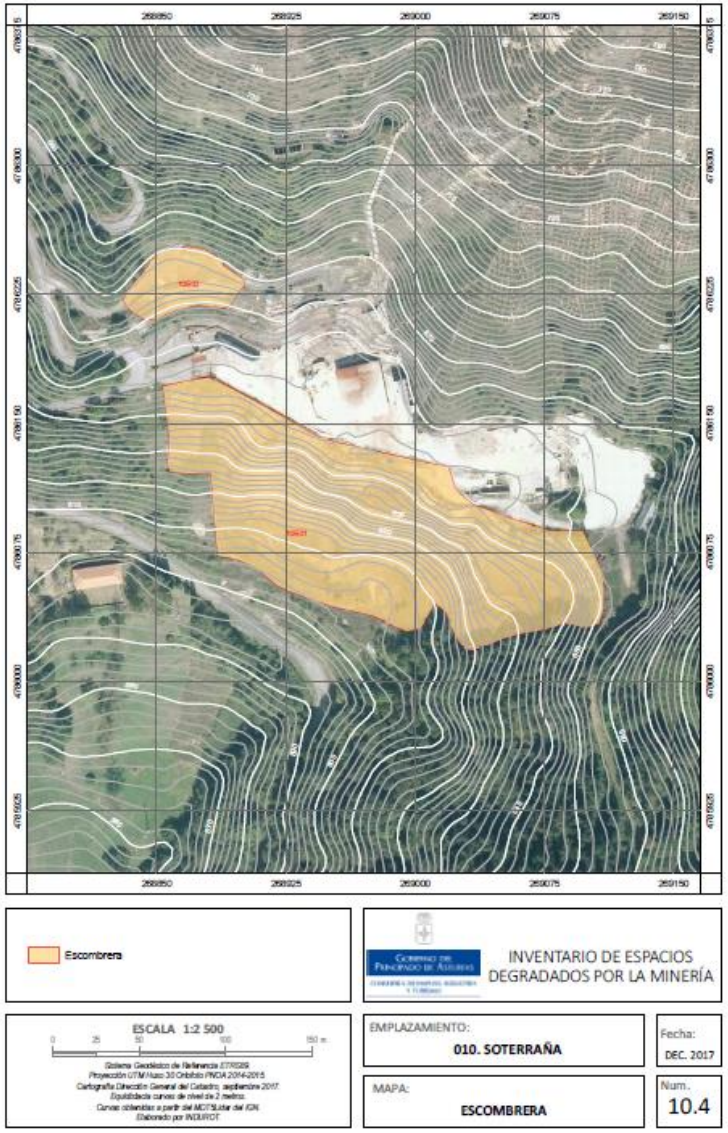
Coal Regions in Transition Platform

Coal Mine Closure - Solutions in Asturias

ALREADY RECLAIMED AREAS

European Commission
Coal Regions in Transition Platform

INVENTORIES OF ABANDONED MINES



Gobierno del Principado de Asturias
Consejería de Empleo, Industria y Turismo

INVENTARIO DE ESPACIOS DEGRADADOS POR MINERÍA

CÓDIGO	10	NOMBRE	La Soterraña

DATOS GENERALES

MUNICIPIO	33033	Lena

COORDENADAS	Huso	XUTM	YUTM	LONGITUD	LATITUD
	30	269 131.8	4 786 214.1	-5.84	43.19

Sistemas de Referencia UTM ETRS89 Huso 30 N (EPSG: 25830) – Coordenadas Geográficas WGS84 (EPSG: 4326)

REF. CATASTRAL	33033A04900173 / 33033A04911173
PROPIETARIO	Siderfluor SA

RECURSO	Sección	Mineral	Sustancia
	C	Cinabrio	Mercurio

DESCRIPCIÓN

Las labores correspondientes a la mina de mercurio de La Soterraña, se sitúan en la ladera sudoeste del monte Campusas, a unos 600 m. al noreste del pueblo de Muñón Cimero y cerca del límite septentrional del término municipal de Lena.
Las labores mineras se centraron principalmente por debajo de la cota 650 y las escombreras se encuentran en las inmediaciones, en una zona de ladera.

FOTOGRAFÍAS

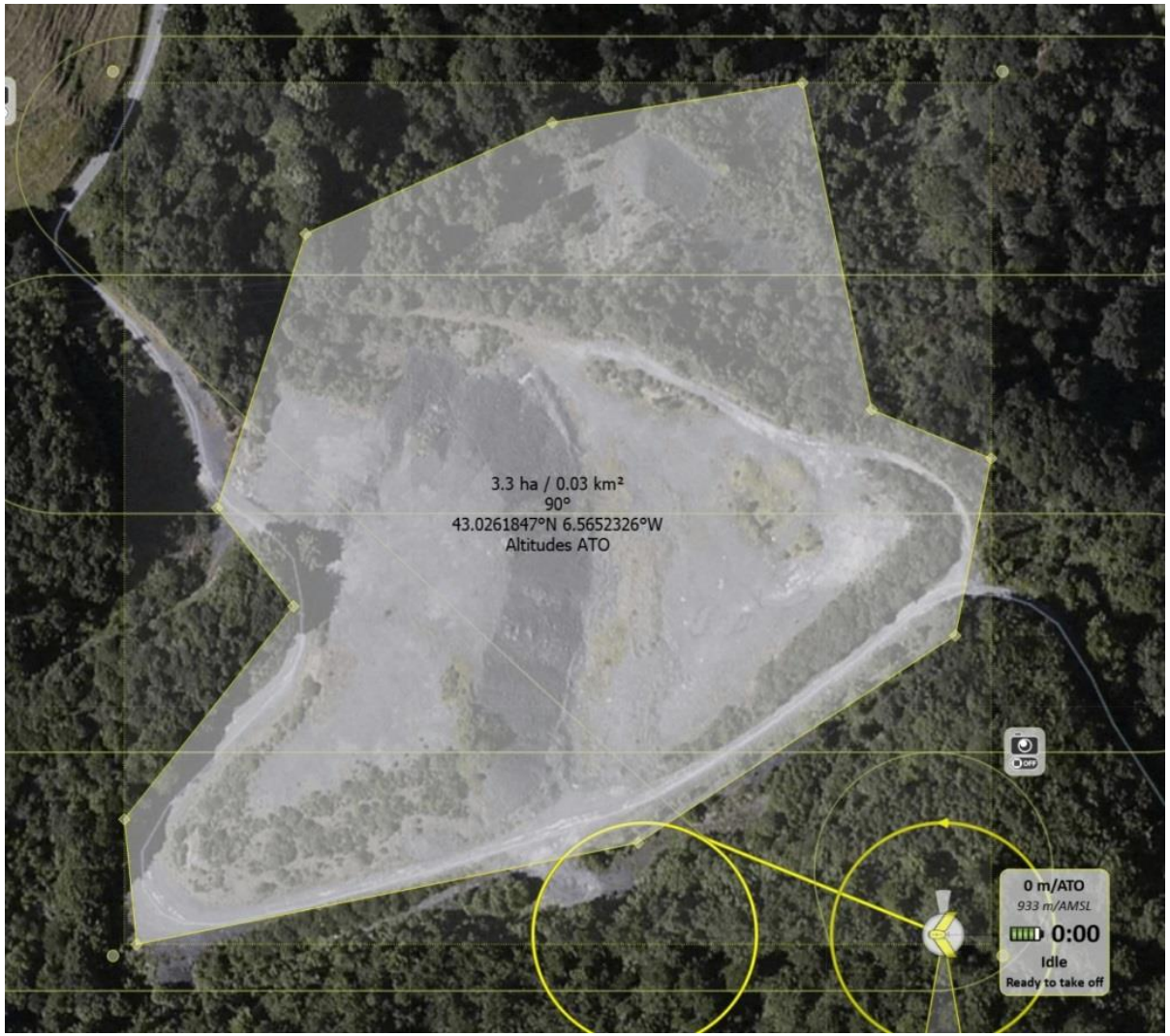
Panorámica

Chimeneas

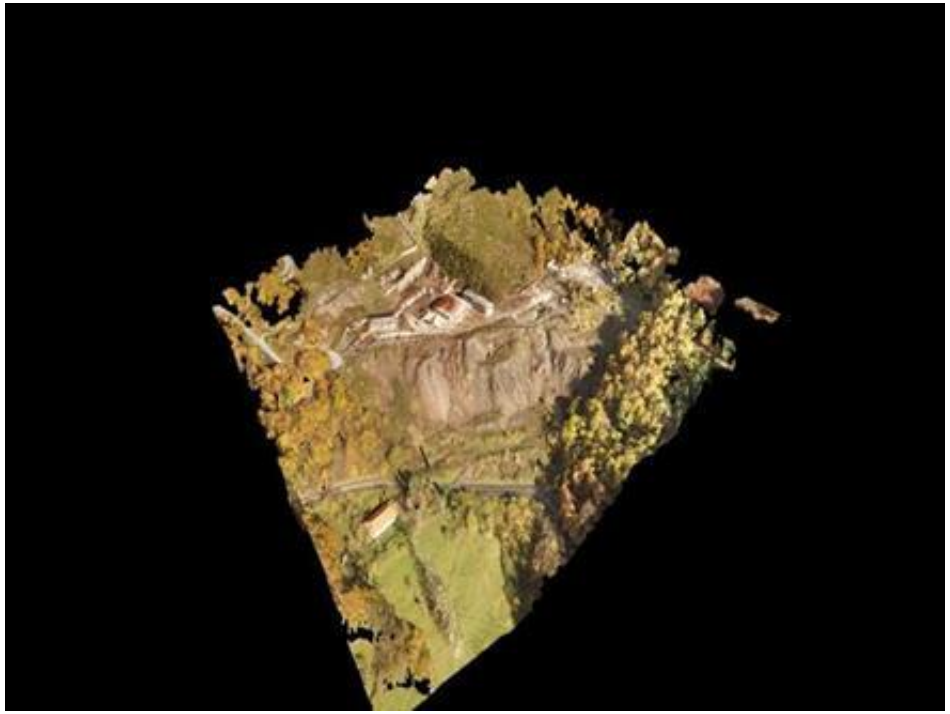
Restos

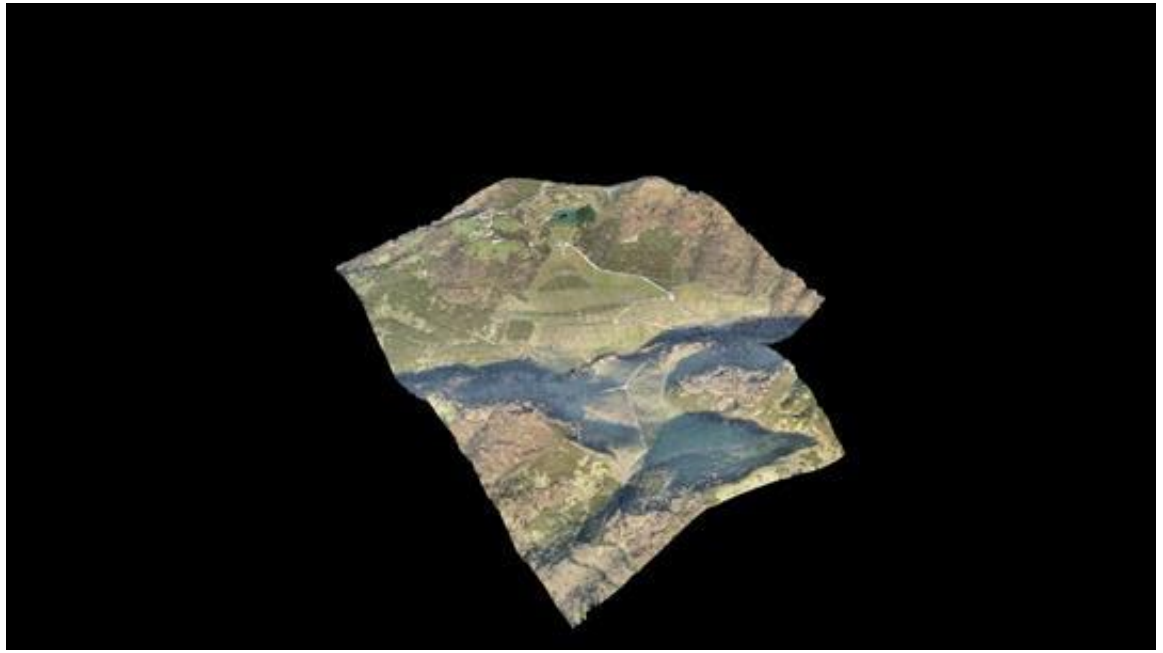
INVENTORIES OF ABANDONED MINES. RECLAMATION PLANS.

INVENTORIES OF ABANDONED MINES. RECLAMATION PLANS.



INVENTORIES OF ABANDONED MINES. DRONE FLIGHTS.





Support of Ministry for Ecological Transition

- Analysis of affected areas. RECLAMATION PLANS
- **Committee to evaluate the impact of energy transition in Asturias.** 1st working group
- Design of ***urgent agreements for just transition***
- Phases for elaboration of the agreement: Starting information and expected results for each of them.

o Characterization of the area.

o Diagnosis of the area.

o Strategy for the area. Identification of projects.

o Signature of the Agreement.

Support of Ministry for Ecological Transition

- Signature of Agreements. Tools and funding.

TRADE UNIONS

ASTURIAS GOVERNMENT

MINISTRY

COAL MINING COUNCILS

ASSOCIATION OF EMPLOYERS

Support of Ministry for Ecological Transition

- Minimum contents of Agreements: wide enough to include specific characteristics and casuistic of each area.
  - Concrete actions to be performed.
  - Budget and schedule of each action.
  - Commitments of each of the parties involved.
  - Priority access to water and energy
- Possible sources of financing (European, state, regional and local). Brief analysis of different financing alternatives.

Support of Ministry for Ecological Transition

SOURCE: TRAGSA

Prov.	DENOMINACIÓN EMPRESA EN EL PLAN DE CIERRE	PROPIETARIO ACTUAL DE ACTIVOS MINEROS	UNIDAD DE PRODUCCIÓN PLIEGO	TIPO DE EXPLOTAC.	CÓDIGO TRABAJO UP	NOMBRE
Asturias	Carbonar, S.A.	Carbonar, S.A.	Única-Coto Sur	Subterránea	AS01-CAB-CAN	AS 01 - COTO SUR - CARBONAR S.A.- T.M. CANGAS DE NARCEA (ASTURIAS)
Asturias	Coto Minero Cantábrico, S.A.	Cía Minera Astur Leonesa, S.A.	Coto	Subterránea	AS02-MAL-DEG	AS 02 - GRUPO CERREDO - CÍA. MINERA ASTUR LEONESA S.A. - T.M. DEGAÑA (ASTURIAS)
Asturias	Coto Minero Cantábrico, S.A.	Cía Minera Astur Leonesa, S.A.	Cantábrico	Subterránea		
Asturias	Coto Minero Cantábrico, S.A.	Cía Minera Astur Leonesa, S.A.	Única-Cerredo (La Granda)	Cielo abierto	AS03-MAL-DEG	AS 03 - CIELO ABIERTO DE CERREDO O LA GRANDA - CÍA. MINERA ASTUR LEONESA S.A.- T.M. DEGAÑA (ASTURIAS)
Asturias	Unión Minera del Norte, S.A.	Minerales del Bierzo S.L. (PROSIMET explotadora)	Pilotuerto	Subterránea	AS04-MDB-TIN	AS04 - PILOTUERTO - MINERALES DEL BIERZO S.L. - T.M. TINEO (ASTURIAS)
Asturias		Coto Minero Cantábrico, S.A.	Área Noreste de Tormaleo	Cielo abierto	AS05-CMC-IBI	AS 05 - TORMALEO - COTO MINERO CANTÁBRICO S.A. - T.M. IBIAS (ASTURIAS)
Asturias		Unión Minera del Norte, S.A.	Buseiro	Cielo abierto	AS06-UMN-TIN	AS 06 - BUSEIRO - UMINSA - T.M. TINEO
Asturias		Antracitas de Gillón, S.L.	Grupo Coto Matiella	Subterránea	AS07-AGI-CAN	AS 07 - GRUPO COTO MATIELLA - ANTRACITAS DE GILLÓN S.L. - T.M. CANGAS DE NARCEA (ASTURIAS)

After coal mining …

POTENTIAL AND CAPABILITIES

- Important power generation industry
- Raw materials
- Heavy industry and energy related industry, with projects worldwide. Goods and engineering services.
- Deep-rooted mining and industrial culture and experience: human capital with great experience, high qualification and adaptability.
- Research institutions and organizations, such as the University of Oviedo, a network of technology centers specialized in matters related to RIS3 and R+D+I; institutions, such as CSIC-INCAR
- Assets linked to mining activity: HUNOSA

After coal mining …
"NEW MINING RESOURCES":

Fundación Barredo

- Former mines as land and location for projects
- Mine water for hydraulical energy
- Mining knowledge
- Technology and equipment

MINING SALVAMENT RESCUE TEAM

National and international reference in mining rescues and other underground infrastructures:

- Recovery of deceased in mining accidents or evacuation of injured miners.
- Fires and confined spaces
- Training
- Firemen

BRIGADA CENTRAL DE SALVAMENTO MINERO

After coal mining …

Fundación Barredo

Length: 600 m
VARIABLE cross-section
S (without suspended ceiling): 66 m^2
S (with suspended ceiling): 44 m^2

Index

- Spanish legal framework
- Reclamation: good practices
- **Hunosa study case**
- Conclusions

Pozo San Nicolás

Planta de La Pereda

Lavadero de Batán

- HUNOSA: Created in 1967
- Public owned coal mining company towards diversification

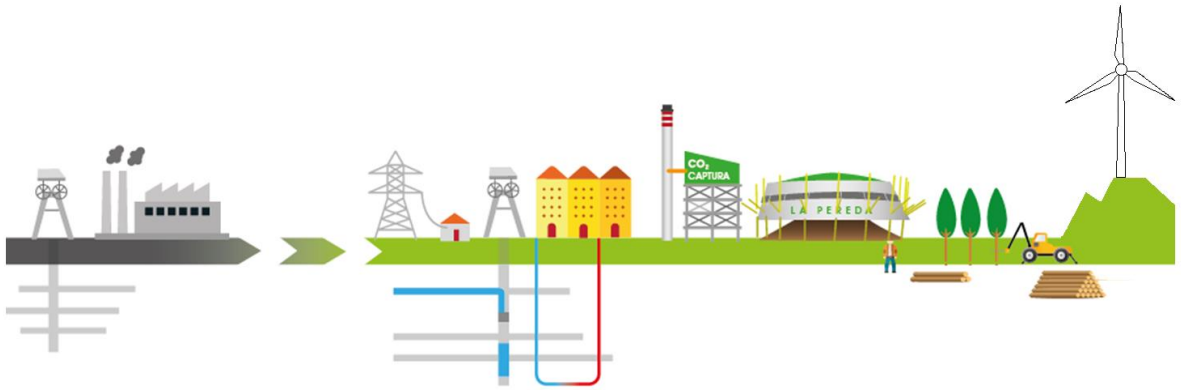
FROM COAL MINING => ENERGY DIVERSIFICATION

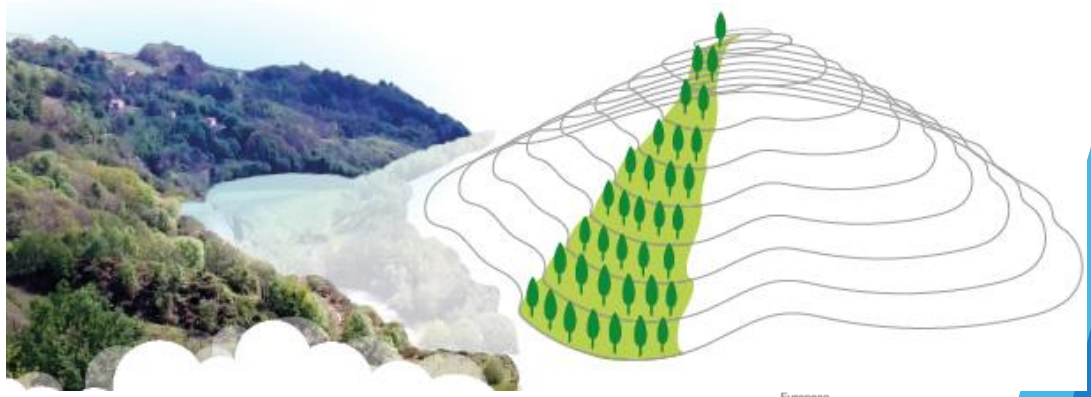
- Mine water and its pumping costs are an eternal (infinite) environmental
- Annual pumping costs: 10 M €
- Mining vertical shafts are within cities or in their urban environment: potential interesting energy sources

New resources

Many reclaimed coal waste deposits: forest and wood waste biomass
Forest biomass that involves the enhancement of more than 3,864 Ha of forest with a forest resource of more than 9,000 tons / year (22,950,000 kWh useful in thermal energy), for supply energy service contracts.





CONFIDENCIAL

Proyecto

Hybridization of the La Pereda Thermal Power Plant (50 MWe) with biomass

	Total	Año 1	Año 2	Año 3	Año 4
Coste	20.500.000 €				
Plazo					
Apoyo mínimo					
Socios	No investment partners to				

Descripción

The project consists of adapting the La Pereda Thermal Power Plant, owned by HUNOSA and located in Mieres, for the use of biomass together with the fuel currently used: a mixture of approximately 60% coal and 40% of sterile mine.
To this transformation is added a change in the cooling system of the Central, to implement the technology of the hygroscopic cycle, which will also bring great environmental advantages and in relation to the performance of the boiler.

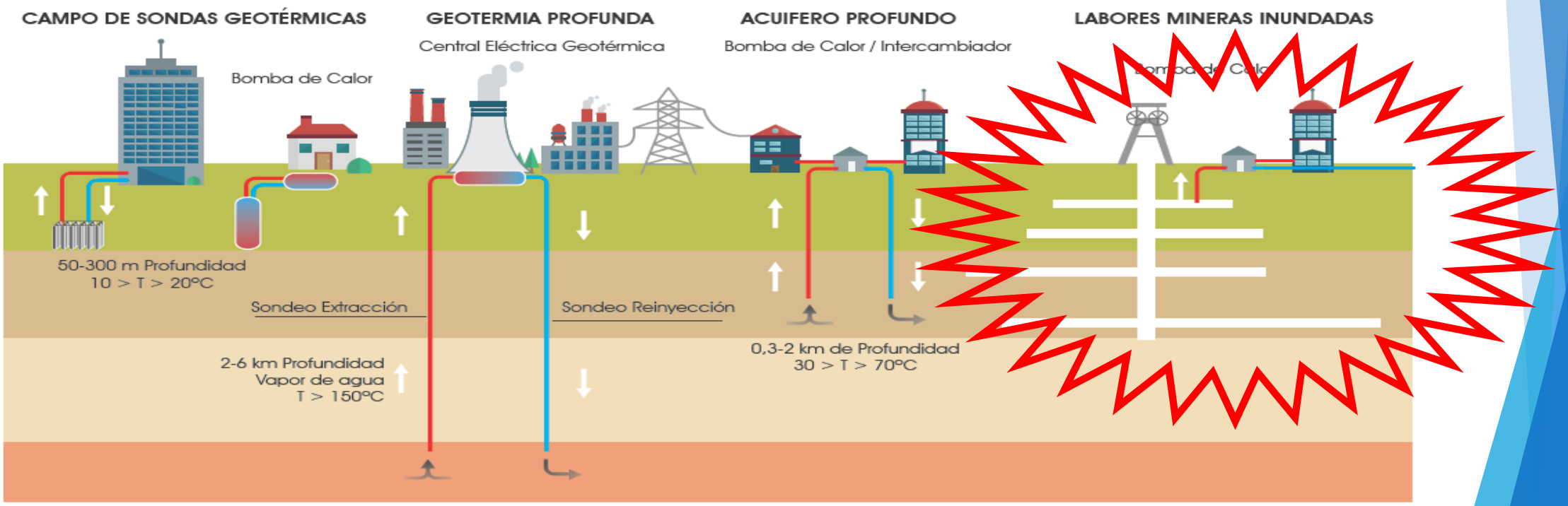
Impacto esperado

Social aspects: Generation of jobs in plant and forestry work. Population fixed in mining regions and rural areas.
Environmental aspects: Renewable energies, improvement of the environment (cleaning and logging). Independence of fluctuations in the prices of fuels from abroad (due to their native origin). Reduction of CO2 emissions and other pollutants released into the atmosphere.
Economic aspects: empowerment of autochthonous resources, saving by substitution of fossil fuels, revitalization of mining areas and rural areas.

HUNOSA study case

MINE WATER AS A SOURCE OF ENERGY

Mini Hydraulic / Geothermal Energy



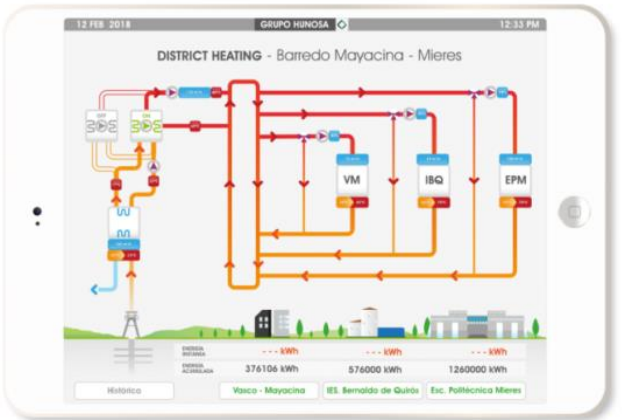
Fuente: libro "La innovación Geotérmica: nuevos usos del agua de mina" Aula HUNOSA de la Geotermia y la Biomasa

After coal mining …

- Assets linked to mining activity: District heating through Mine water geothermal energy

1. District Heating Barredo – Mayacina:

- Main University Building in Barredo and FAEN
- Bernaldo de Quirós High School
- 2 buildings with 117 and 131 flats in Vasco Mayacina

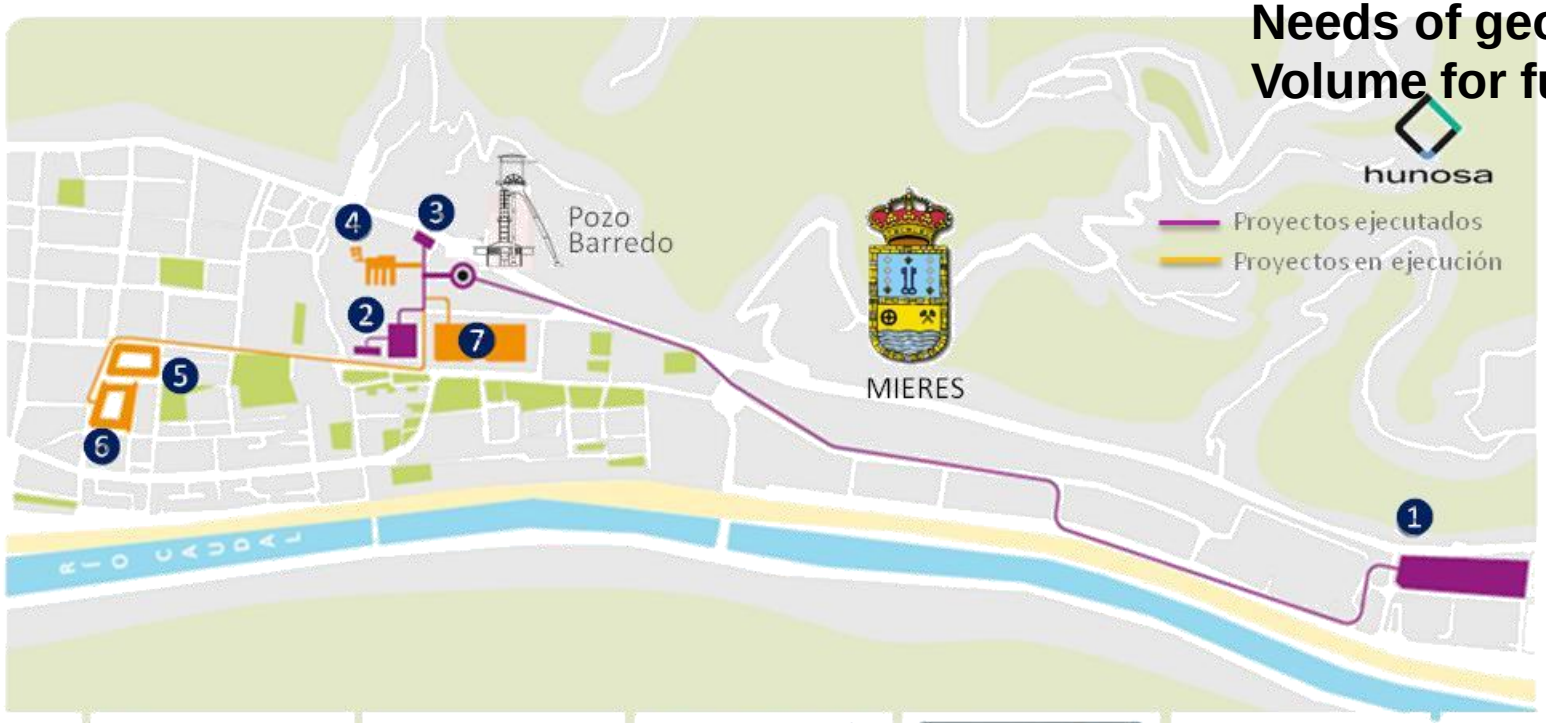


"The future geothermal heat network project in Barredo will install an additional 2MWt, which will mean a total power of close to 6MWt, making up the first geothermal district heating in Spain"

MIERES DISTRICT HEATING

Currently 4MWt installed between the 3 facilities make the geothermal development of Barredo the largest in Spain.

Pumping capacity: 860 m³/h
Needs of geothermal systmems: 530 m³/h
Volume for future development: 330 m³/h



Current (heating)

Hospital VAB:	3.000 kW
Campus University:	724 kW
FAEN:	100 kW

Increase in **2MWt installed** for 4 new installations.


1- Hospital Álvarez-Buylla


2- Edificios Campus Universitario


3- Fundación Asturiana Energía


4- Instituto Bernaldo Quirós


5- Edificio M9 - Mayacina


6- Edificio M10 - Mayacina


7- Escuela Politécnica Mieres

FONDÓN DISTRICT HEATING: FUTURE

Pumping capacity: 200 m^3/h
Power to be installed: 1,2 MWt


1 – C. Deportivo Juan Carlos Beiro


2 – Edificio C/ Dolores Ibárruri 9


3 – Residencia N.S. del Fresno


4 – Langrehotel


5 – Centro de Salud La Felguera

Requirements:

Sport center “Juan Carlos Beiro”:	700 kW
Buildings (45 flats):	200 kW
Hotel + Geriatric care home:	700kW
Health centre area 8:	500 kW

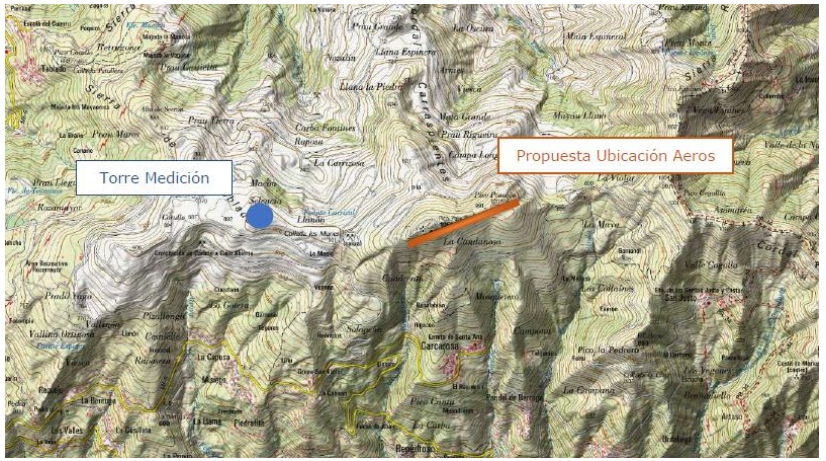
Year 2018: DG Mining and Energy, Low Carbon european fund for regional development (EFRD) funding: 1.100.000 € for total investment of 1.700.000 €.

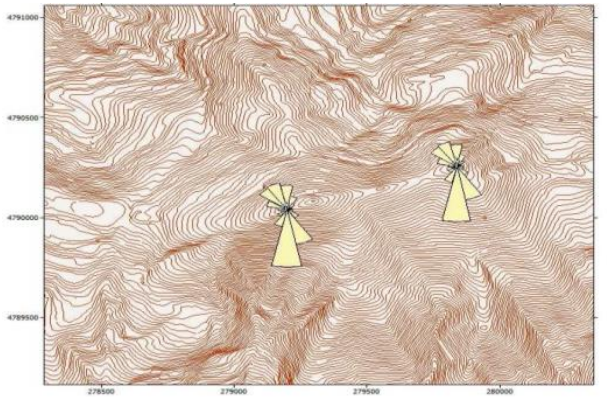
hunosa

SEPI

OTHER ENERGY DEVELOPMENTS

Wind measurement tower Polio Mountain area: to assess wind resource.
The study shows that there is feasibility to install two 2MW wind turbines operating 2,000 equivalent hours per year that would generate 8 GWh per year to cover the 7 GWh demanded by pumping water from abandoned wells .





Index

- Spanish legal framework
- Reclamation: good practices
- Hunosa study case
- **Conclusions**

Conclusions

- **Lessons learned:**
  - Cooperation between local, regional, national and European Authorities
  - To be together to achieve results
  - Enhance our experience as miners and energy producers and the added value
  - Public-private partnerships

Conclusions

- **What do we aim?**
- Flag projects of reclamation with added value
- Repurposing of coal areas: no magic solution
- To give the territory their own tools to diversify
  - Energy diversification
  - Energy efficiency
  - Renewable energies

PORTFOLIO OF PROJECTS

Coal Mine Closure Solutions in Asturias

María Belarmina Díaz Aguado

General Director of Energy, Mining & Repurposing

Government of Asturias

Mariabelarmina.diazaguado@asturias.org






Coal Platform in Transition

6th Working Grup 16-17.10.2010

Zespół Elektrowni „Pątnów-Adamów-Konin” S.A.

Company Presentation

Zbigniew Stępniewski

Management Board Advisor

PAK

Energia dla Ciebie

ZE PAK SA Group overview

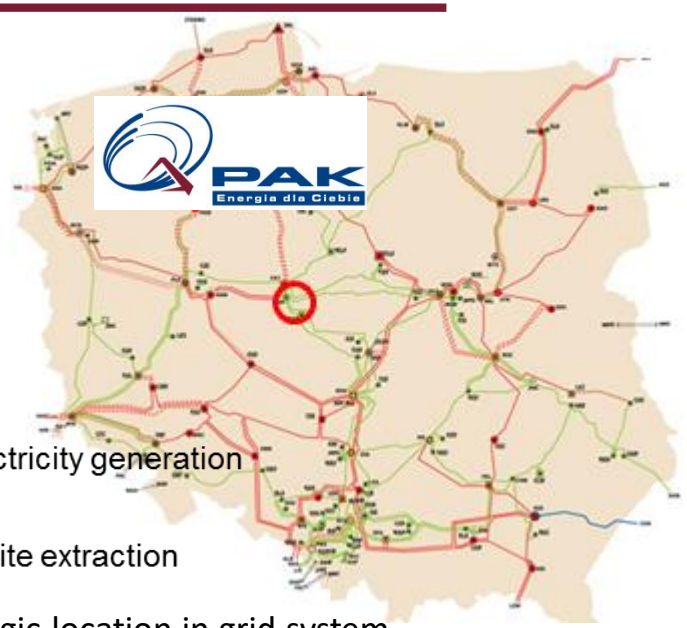
Zespół Elektrowni Pątnów-Adamów-Konin SA is a parent company in ZE PAK SA Capital Group, one of the biggest companies in eastern Wielkopolska region. The Group consists of power plants in Pątnów I, Pątnów II, Konin and lignite mines in Adamów and Konin.
Basic activity of the Group is lignite extraction, generation and sale of electricity and heat.

The Group generates electricity from lignite and biomass. Apart from the core business, the Group comprises also other companies which perform e.g. construction and erection works, maintenance works, provide services, deal with production and trade to meet demand from and offer complex services for industry. All the companies of the Group employ nearly 5 thousand workers.

ZE PAK SA Group – 100% integrated electricity supplier

- Poland's #4 power producer by installed capacity and electricity generation, and the biggest producer, not owned by the State.
- Vertically integrated business model with:
  - Lignite mining for own generation
  - Electricity and heat generation
  - Electricity wholesale
- All assets located in close proximity in Wielkopolska region
  - 1.9 GW of gross electricity generation capacity in three power plants
  - about 7mt annual lignite production from two mines covering most of ZE PAK's lignite needs
- Zygmunt Solorz (indirectly) owns 58.23% share.

The company has been listed on the WSE since 2012.

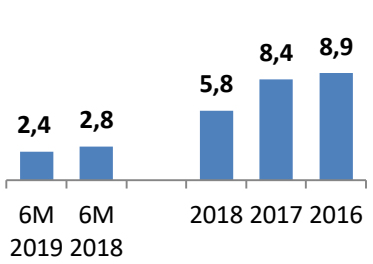


#4 In electricity generation

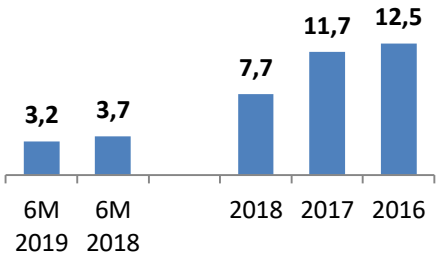
#2 In lignite extraction

Strategic location in grid system

Production (from lignite)



Net Electricity [TWh]



Lignite [m tons]

Own lignite mines

Estimated reserves of open pits currently being exploited 41.7[1] million tons.
PAK KWB Konin SA conducts activities aimed at obtaining formal consents for the exploitation of the Ościsłowo deposit with the estimated resources of 34.2-39.9 million tons

1 PAK KWB Konin SA ('KWBK')

Total estimated industrial reserves of open pits being exploited: 36.5[1]million tons

Activities aimed at obtaining new deposits.

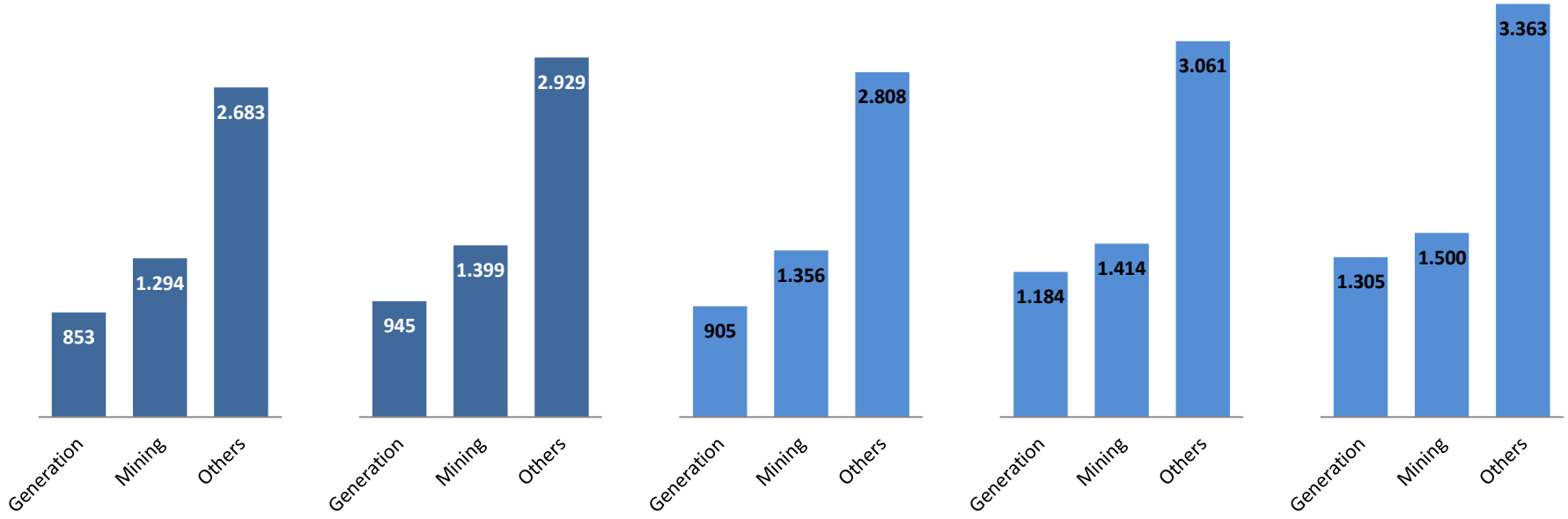
2 PAK KWB Adamów SA ('KWBA')

Total estimated industrial reserves: 5.2[1] million tons

(1) as of September 2019

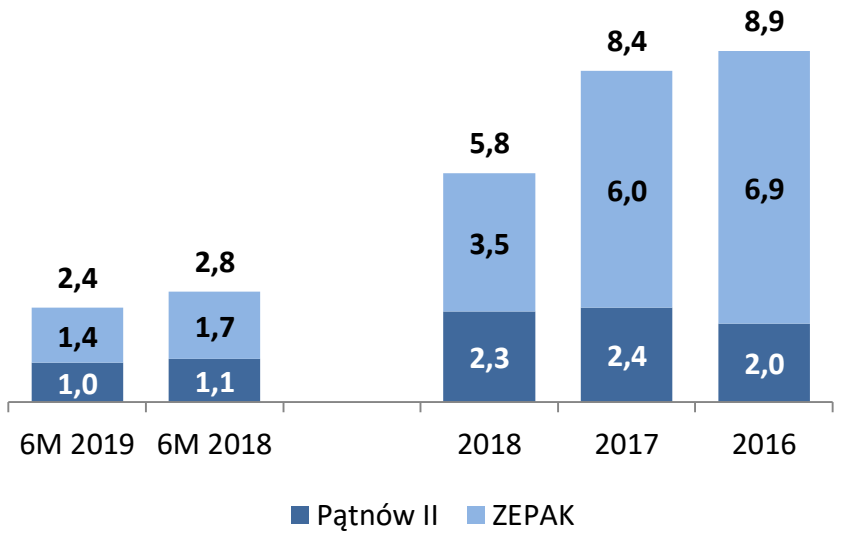
Employment
[full time]

30/06/2019	30/06/2018	31/12/2018	31/12/2017	31/12/2016
4 830	5 273	5 069	5 659	6 168



ELECTRICITY

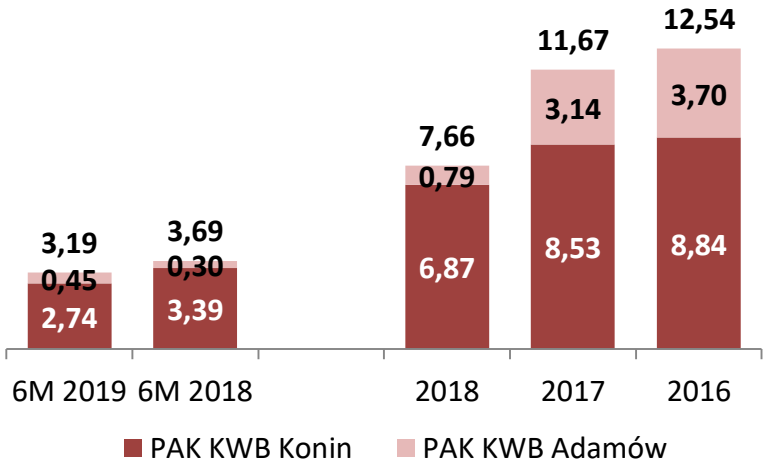
Electricity production [TWh]



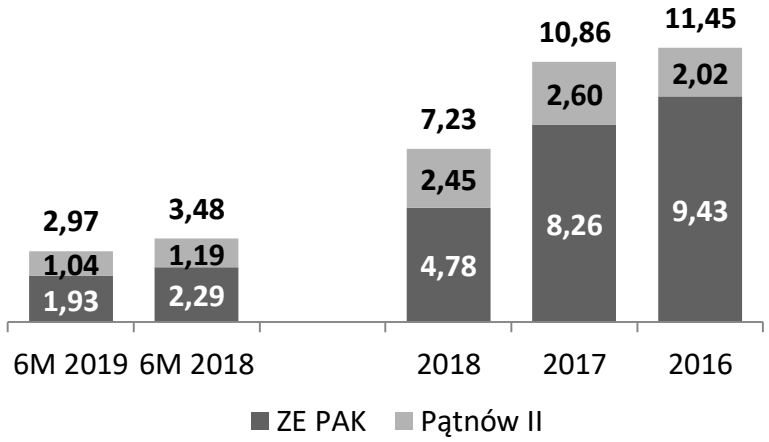
Decrease in generation in 2018 was mainly due to the lack of generation at Adamów power plant (coal units of Adamów 600MW ended production with the beginning of January 2018).

Lignite consumption and emission of CO_2

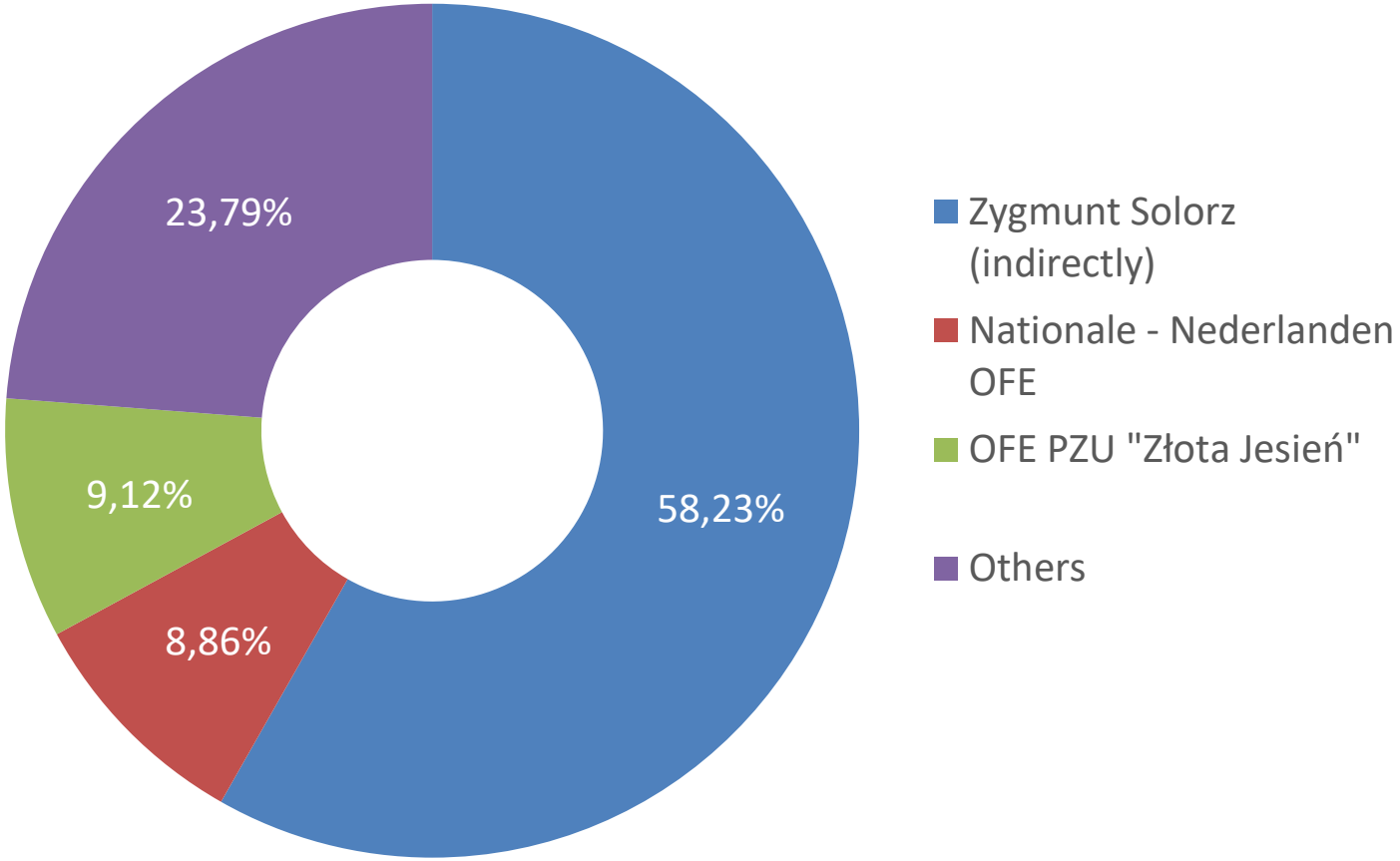
Lignite consumption [m ton]



Emission of CO_2 [m ton]



Shareholder structure(1)



(1) According to the information available to ZE PAK SA based on the submission of notifications on the acquisition / disposal of shares.

Problems in the mine closing process

- Basic problems in the process of closing lignite mines
  - Reclamation costs
  - Costs in the process of dismissing employees - no legal support for lignite
  - Employee training in the process of closing mines, acquiring new competences
  - A decrease in local governments' income from taxes, as a result of mines closures

Problems in the mine closing process

- Reclamation
  - European and Polish legal regulations regarding mine closures
    - Directive 2004/35/EC on environmental liability with regard to the prevention and remedying of environmental damage
    - Pursuant to the Act on the protection of agricultural and forest land, a person who causes the loss or limitation of the value in use of land is obliged to remediate it at his own expense.
    - Geological and mining law

Lack of support in the process of closing lignite mines, including employees leaving mining.

Pursuant to the Council Decision of 10 December 2010 on aid to facilitate the closure of uncompetitive coal mines 2010/787/EU, only closure aid is allowed, i.e. covering the current production losses of the unit to be liquidated, included in the closure plan, the date of which falls on December 31, 2018 at the latest. The regulation also allows the granting of assistance to cover extraordinary costs that arose or arise as a result of mine closures. This assistance may be granted for the entire duration of the regulation, i.e. until the end of 2027. Assistance based on Decision 2010/787/EU must be of a decreasing nature.

Problems in the mine closing process

- The need to launch support for mine employees in the process of acquiring new qualifications - the problem of transformation of competences
- New qualifications adapted to the needs of the market, including the renewable energy market
- Support for new investments in the coal region in creating new jobs

Problems in the mine closing process

- A large decrease in local government revenues from taxes on mining activities
  - Property tax
  - Extraction tax
  - ❑ Total in 2018 – EUR 17.3 million

- Changes in legal regulations in the area of creating local development plans and changes in regulations limiting the creation of wind farms (10h rule)

Clean Poland Program – clean environment is the biggest challenge

- Zygmunt Solorz has decided to involve himself, and his companies, in a program supporting efforts to preserve air quality and tackle adverse climate changes
- The country's achievements in the economic and social areas are at a very high level now, putting Poland in the position of a country which is advanced economically, technologically and socially
- However, ecology and care for natural environment still remain development challenges
- Clean Poland Program – proposed by Zygmunt Solorz – can be an answer to these challenges and aspirations of a significant part of Polish society

Clean Poland Program – clean environment is the biggest challenge

- Zygmunt Solorz's vision is to make Poland clean through joint care for Poland - by caring for the natural environment, the air, the water and the nature around us
- Zygmunt Solorz would like to invite all Poles to take part in the Clean Poland Program
- Zygmunt Solorz's Group has started the work from its own backyard:
  - Zygmunt Solorz has established an association whose goal will be to keep Poland ecologically clean.
  - ZE PAK SA power generation company has embarked on a transformation process, including reduction of the share of coal in energy production and development of projects involving renewable energy sources (RES)
  - A natural role for Polsat TV is to promote and provide information on the efforts associated with the pro-ecological topics
  - Cyfrowy Polsat Group has introduced zero-emission vehicles to its car fleet, chargers for electric cars have been installed in the Group's HQ and also car sharing solutions have been implemented

Thank you for your attention

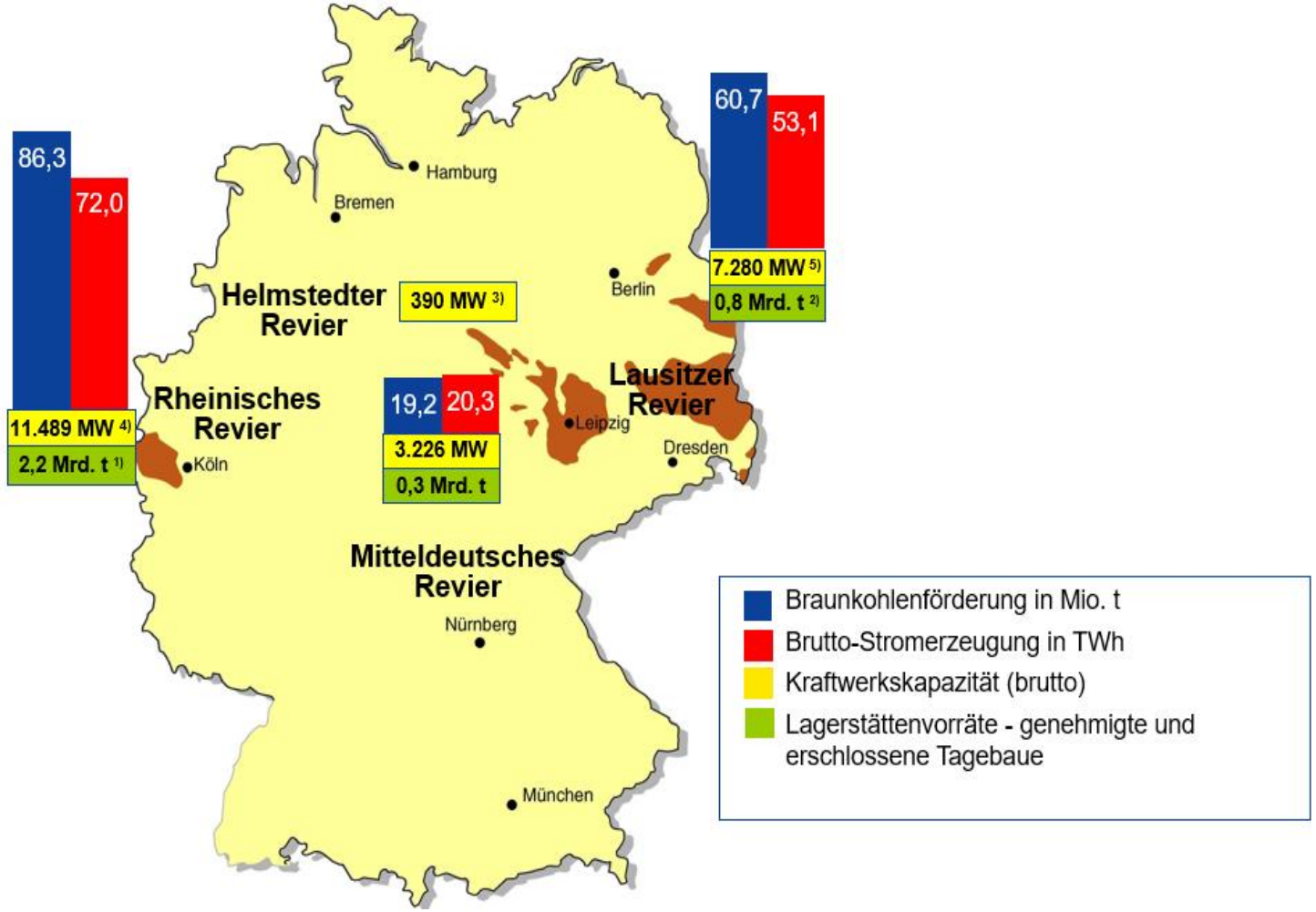
Zbigniew Stępniewski Management Board Advisor

Coal mine closure – systemic legal and organisational practices to accelerate transformation of mining regions

Dr. Thorsten Diercks
German Lignite Industry Association (DEBRIV)

DEBRIV
Bundesverband Braunkohle

German lignite 2018 – Some key facts as a reminder



1) Auf Basis der Leitentscheidung des Landes NRW vom 05.07.2016 hat sich der genehmigte Lagerstättenvorrat verringert (ca. 0,4 Mrd. t)
2) Nutzbare Vorratsmenge laut 1994er Braunkohlenplänen per 31.12.2017 = 0,8 Mrd. t, weitere Vorratsmenge nach in 2015 genehmigten Braunkohlenplan Tagebau Welzow-Süd TA II = 0,2 Mrd. t und weitere Vorratsmenge lfd. Braunkohlenplanverfahren Tagebau Nochten, Teilfeld Mühlrose = 0,15 Mrd. t)
3) Sicherheitsbereitschaft; 4) Rund 1.200 MW Sicherheitsbereitschaft; 5) 500 MW Sicherheitsbereitschaft
Stand: 03/2019 – Daten vorläufig, z. T. geschätzt

- **In October 2019 around 18 GW of power plant capacity** (plus „Sicherheitsbereitschaft“)
- **21 % of German power production**.
- M**ajor contribution to security of supply** and to **affordable electricity prices** in Germany.
- Competitive.
- Probably # **1 industry sector in CO2 emission reductions since 1990**. Environmental law fully respected.
- **Power plants became very flexible** (can reduce its minimum load to about 25 % of the maximum)

DEBRIV
Bundesverband Braunkohle

The case of active lignite mines and active lignite regions

Foto: Helmut Rauhut

- According to the German Commission on Growth, Structural Change and Employment coal and lignite should be used in Power Plants till **end of 2038**.
- The federal Government fully confirmed this **societal consensus** on October 9, 2019.

DEBRIV
Bundesverband Braunkohle

What needs to be done now in view of 2038 ?

- Formal agreements between the federal government, the Länder and the companies are nesessary on any decommissioning of power plants, compensation etc.
- No counteraction against the recommendations by any partner e.g. when transposing the LCP BREF into national law.
- In favour of all industry: Honest and realistic revision clauses are part of the compromise - They must be respected in a transparent way.

- And – most importantly – reliability and planning security: The societal consensus has to be put into place from now till 2038.

  In case an open pit mine needs to close earlier than currently planned due to political decisions: How can we help transformation and guarantee a reliable and safe operation of the mine at the same time ?

Existential systemic link of lignite-fired power plants and open-pit mines

- An open-pit lignite mine usually only delivers to just one or two power plants. **Therefore, the closure of the power plant ahead of schedule directly affects the operation of the mine.**
- However, open-pit mines are planned and approved from the outset to a **defined final level - this is the basis of the investment**.
- Illegal and possibly **dangerous conditions due to an abrupt premature termination of an opencast mine must be avoided.**

DEBRIV
Bundesverband Braunkohle

Post-mining landscape must be adapted in case of earlier phase out

Long term spatial planning – an important task of the region and the municipalities

To be redetermined in due time, e.g:

- **The location of the future lake.**
- **The course of roads, paths, lines and infrastructures.**
- **The location of industrial areas, agricultural land, of settlement areas, of free spaces etc.**

Particularly, a region "in transition" wants to actively shape its land use in a forward-looking way. Thorough and timely planning is necessary!

DEBRIV
Bundesverband Braunkohle

Once there is a decision on spacial issues – more administrative procedures to come up

Lignite mines are based on numerous planning and approval decisions:

- State and regional planning decisions (with SEA)
- Mining permits (with EIA)
- Water law permits
- Waste Management permits
- Soil protection permits
- Nature conservation permits

In case an open pit mine needs to be reduced in size, these existing permits have to be newly prepared and issued.
Citizens and NGOs have the right to take legal action – and in many cases they will.

A lot of time required for planning and approval decisions

- New legally secure planning decisions and permits for new open-pit mining management and new post-mining landscape take many years.

- Corresponding transition periods are required – for the regions, for the people and for the companies.

- Previous experience shows:

  - Lignite planning process: **6 – 10 years**
  - Following framework mining plan procedure: **4 – 8 years**
  - Permit procedures under water law and planning approval procedures for modified open-cast mine lakes (can partly be done in parallel): **3 – 7 years**
  - **In addition, citizens and NGOs are allowed to bring legal action at every stage of the procedure!**

Acceleration options?

Are there options to accelerate any new planning and approval procedures for new open-pit mines management/ post-mining landscape?

National level, e.g.

- improve staffing of approval authorities
- limit the number of instances at court
- streamline landscape planning procedures, e.g. have fewer requirements when dealing with adjacent municipalities and land owners.

National law contributes to long-lasting planning and permit procedures – the acceleration potential seems to be limited.

Acceleration options?

Are there options to accelerate any new planning and approval procedures for new open-pit mines management/ post-mining landscape?

EU level: EU sourced environmental laws is binding and causes a lot of formal procedures, e.g.

- Directive 2001/42/EC – Strategic Environmental Assessment Directive (SEA)
- Directive 2011/92/EU – Environmental Impact Assessment Directive (EIA)
- Regulation (EC) No 1367/2006 - Application of the provisions of the Aarhus Convention
- Directive 2000/60/EC – Water Framework Directive
- Directive 92/43/EEC – Conservation of natural habitats and of wild fauna and flora
- Directive 2006/21/EC – Management of waste from extractive industries

EU law adds many time-consuming steps to long-term planning and permitting procedures. It is assumed that the EU is not ready to adapt Directives for the purpose of accelerating transformation in the European coal regions.

Therefore: Acceleration option not excluded, but questionable. We will need time !!!

Conclusion – ACCELERATION IS DIFFICULT – WE NEED TIME

1. **A safe operation of the mines is most important.**

2. Lignite phase-out often means **deep cuts in the approved operation** of open-pit mines **and the planned post-mining landscape**.

3. In these cases, all existing **planning decisions and approvals** in mining and environmental law have to be newly worked out while the operation of the mine goes on.

4. Each of these planning and approval procedures **takes years**. In addition, there is the risk of legal action.

5. Therefore, **long transition periods are necessary** to avoid structural breaks. **There is little room for any acceleration.**

DEBRIV
Bundesverband Braunkohle