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LUSATIAN LIGNITE — SUSTAINABLE MINING TO MEET FUTURE CLIMATE CHANGE POLICY

1. Vattenfall — a short overview

Vattenfall is based in the North-European countries Sweden, Finland and Denmark as well as Poland and Germany and most recently in the Netherlands. In Germany, the Business Group Central Europe operates one of the most modern lignite-fuelled power plant parks worldwide and is the third largest supplier of power and heat. The company's ambition is to improve competitiveness, environment and quality of life of the customers by efficient energy solutions and first-class service.

Based on the successful economic and social acting there results our ambition to make an essential contribution to the development of the Lusatian mining area. The company is a reliable partner of the region and is committed in various spheres of public life.

2. The Lusatian lignite mining area

In the last year the 4 active opencast mines of Vattenfall Europe Mining AG had an output of approximately 58 million t of lignite. The lignite was supplied to the power plants of Vattenfall Europe Generation, the refining plant at Schwarze Pumpe and other customers. The Lusatian power plants supplied around 46 TWh to the grid equalling the level of the previous year. The production of refining products (briquettes, fluidized-bed coal and pulverized lignite) could be further increased (Fig. 1).

Since the beginning of 2000ies, the raw coal production in the Lusatian mining area remains stable at a high level. Whereas only 50 million t of raw lignite per year were extracted at the end of the 90ies, the production has remained at about 60 million t per year since then. More than 90 percent of the raw coal production is used for power generation.

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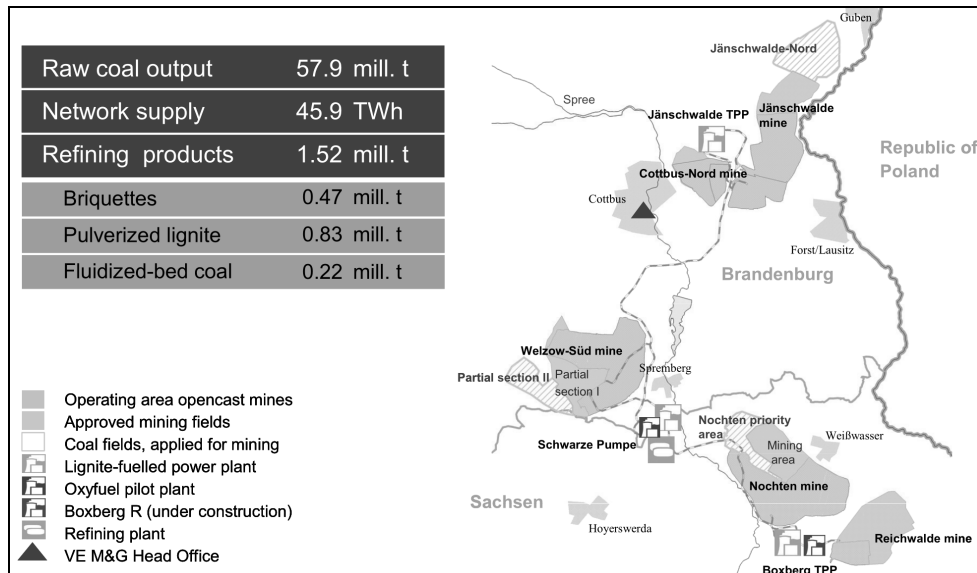


Fig. 1. The Lusatian lignite mining region in 2008

The Lusatian lignite mining area is characterized by an active investment activity. By the erection of the plants for direct coal supply of the Jänschwalde power plant by September 2009, the transport distance of run-of-mine coal from the Jänschwalde mine to this power plant will be significantly reduced.

By the stagewise development of a double-tracked coal connecting railway system between the Welzow-Süd mine and the Jänschwalde power plant it is intended to maintain the energy site in the long term. A grinding and loading plant for pulverized lignite is erected at the refining site Schwarze Pumpe to cover the future demand for this refining product.

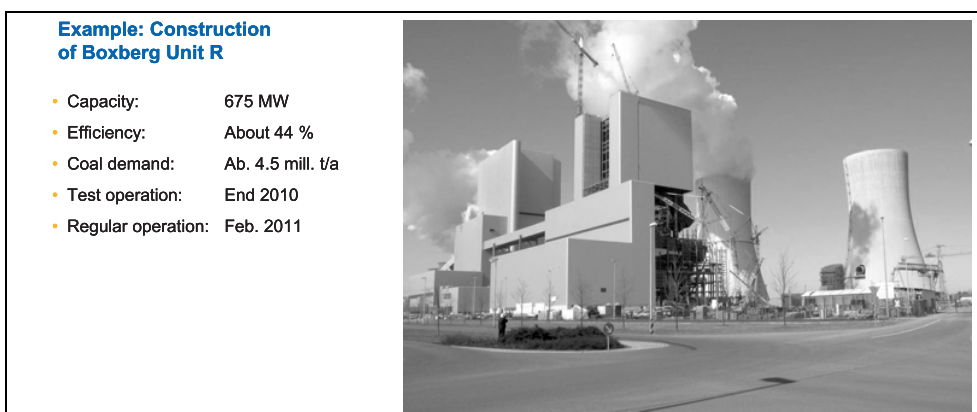


Fig. 2. Lignite-fired unit Boxberg R

The importance of the North-Saxon energy site will be further increased by continuing the coal production in the Reichwalde opencast mine and erecting the Unit R of the Boxberg power plant in the southern part of the Lusatian mining area. Coal production in the Reichwalde mine will be resumed in April 2010, while the regular operation of Unit R is scheduled for the beginning of 2011 (fig. 2).

4. Priority areas and future coal fields — reliable planning activities

During the last few years a number of important decisions regarding the future of the Lusatian lignite mining areas have been made or launched. At the end of 2006 the company already publicly notified the intention to use the partial section II of the Welzow-Süd mine and the priority area of Nochten.

More than 500 million t of raw coal are deposited in the two coal fields. This coal quantity is needed from approx. 2027/2028 to supply the existing power plant units in Schwarze Pumpe and/or Boxberg including Boxberg Unit R under construction.

The lignite mining planning procedure for each of these coal fields was opened at the end of 2007. The planning procedure will probably last for more than 5 years. The permits shall be available by 2015.

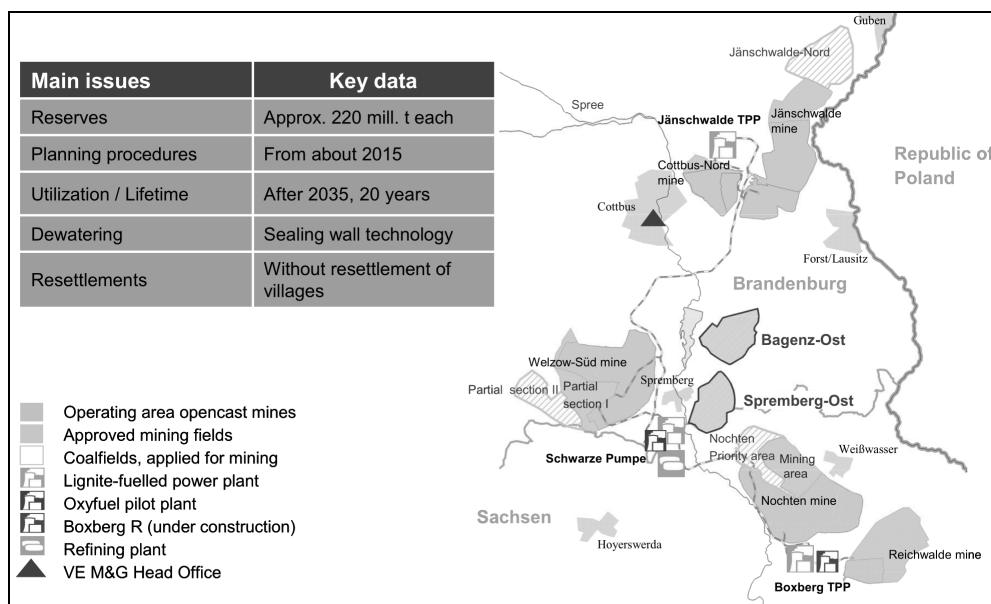


Fig. 3. Future lignite fields — Bagenz-Ost, Spremberg-Ost

The planning works for the utilization of the Jänschwalde-Nord field started at the beginning of 2008 to maintain the Jänschwalde power plant site in the long term. The field

has a coal reserve of about 250 million t and shall supply the power plant facilities at the Jänschwalde site after 2025. At the end of 2008 the necessary documents for opening the lignite planning procedure were handed over to the State Planning Committee of Berlin-Brandenburg.

As a result of a thorough evaluation process the company decided to use the coal fields of Jänschwalde-Nord, Bagenz-Ost and Spremberg-Ost.

While the planning works for the Jänschwalde-Nord coal field are already ongoing, the planning procedures for the Bagenz-Ost and Spremberg-Ost fields will be prepared from about 2015. The two future lignite fields can be operated without any resettlement of villages (Fig. 3).

5. Socially responsible resettlement and recultivation

The use of lignite means claiming of land and requires the resettlement of villages. Already in the mid of the 90ies the company has developed principles for socially responsible resettlements of people. These strategies have been permanently further developed in the last one and half decades. Today, resettlements and recultivation form benchmarks for trust and credibility.

The below principles of socially responsible resettlements have formed the basis for establishing very early clear and constructive procedures which mainly contributed to increase public acceptance:

- Joint resettlement to one location,
- Integration and active participation of the concerned people before, during and after resettlement,
- Maintaining and developing village life at the old location until resettlement,
- Functional compensation for property without new indebtedness based on the existing property,
- Maintaining and supporting activities of clubs and associations,
- Concept for tenants with socially acceptable rents,
- Maintaining and continuing of small enterprises and
- Establishing social networks.

These principles form the basis for concluding a resettlement agreement between the community to be resettled and Vattenfall Europe Mining & Generation in favour of the people concerned.

Resulting from experiences made in the past, basic agreements are concluded with the concerned communities. The agreements consist of the parts: “Compensations“ (1), “Community development“ (2) and “Municipal action concept“ (3) and are the framework for the preparation and implementation of the resettlements, at present for the partial

resettlements of the communities of Trebendorf und Schleife from the mining area of the Nochten mine. About 250 inhabitants and various small-scale firms are concerned. The resettlement shall be completed by 2013.

The basic agreement about the partial resettlement of the community of Trebendorf was concluded on 17.09.2008, while the basic agreement about the partial resettlement of the community of Schleife was signed on 15.12.2008.

In the past years, the principles of a sustainable recultivation have contributed to a greater variety and diversity of the Lusatian mining area (Fig. 4):

- Immediate recultivation of mine-site areas after finishing the mining operations,
- Development of a post-mining landscape with model character,
- Shaping of high-quality landscape types,
- Creation of a sustainable, multiply usable landscape typical of the region and
- Development of a cultural landscape and economic resource...

...form the basis for shaping of attractive areas.

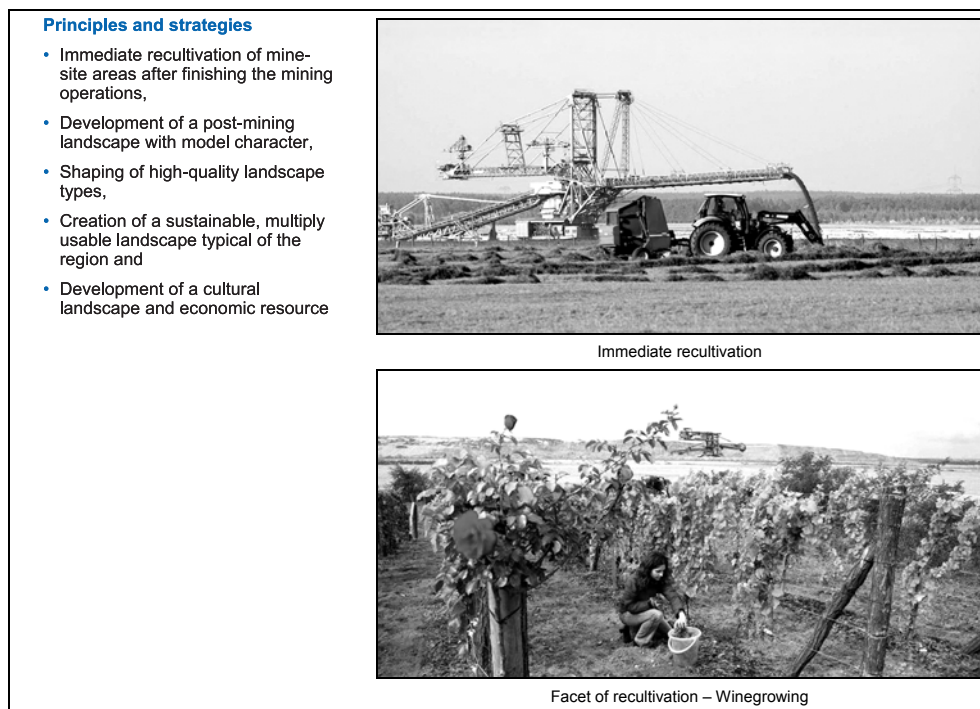


Fig. 4. Recultivation principles

For this, the company is co-operating with educational institutions and domestic

agricultural and forest enterprises. For example, an artificial catchment area, the so-called “Hühnerwasser”, with a size of 6 hectares has been created on the former inside dump of the Welzow-Süd opencast mine under scientific support of the Brandenburg Technical University of Cottbus, the Technical University of Munich and the Federal Technical University of Zurich.

6. Chance for the future — Lignite

Vattenfall defined for their own plants the goal to reduce CO₂ emissions until 2030 by 50% compared to the basic value in 1990. CCS (Carbon Capture and Storage) is the key.

On September 9, 2008 the Oxyfuel pilot plant in Schwarze Pumpe started its operation to capture CO₂. About 70 million Euros have been invested into the construction and already the first results have been promising. This plant facilitates to capture more than 90% of the CO₂ (fig. 5).

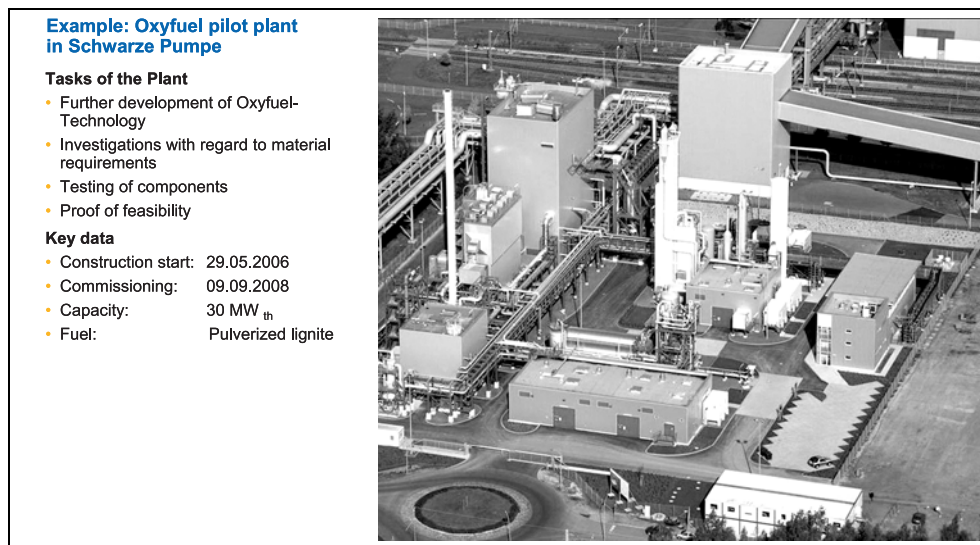


Fig. 5. Oxyfuel pilot plant in Schwarze Pumpe

This plant signals a milestone in the development of the CCS technology — the changeover to large-scale industrial development on the power plant sector.

Based on the knowledge and experience from the operation of the pilot plant, a demonstration plant will be planned and erected until 2015.

For the demonstration plant, one of the six 500 MW units of the Jämschwalde power plant will be retrofitted. Two partial concepts are planned. Partial concept 1 includes new

erection of one boiler with Oxyfuel technology (Fig. 6).



Fig. 6. Demonstration plant in Jämschwalde

In partial concept 2 it is planned to equip an existing boiler with CO₂ flue gas scrubbing. From 2015 the demonstration plant will produce large amounts of lignite-based power in a climate-neutral manner. According to preliminary estimations the costs for the demonstration plant will amount to approximately 1 billion Euros.

The first large-scale commercial power plant with CO₂ capture is assumed to start operation at around 2020.

Apart from capture the CCS technology also includes transport and underground storage of the separated CO₂. The CO₂ captured in the pilot plant is transported by a variable mobile system.

The CO₂ captured in the Oxyfuel pilot plant will be used as means for increasing the degree of exhaustion in an almost depleted natural gas field of the “Altmark“ deposit. All technical and safety-related aspects of the transport have been clarified. Experiences made with the operation of underground gas stores verified that the covering layers are leak-proof.

The CCS technology is not only of importance for global climate protection — it also opens future prospects for the Lusatian region. Lignite has to be understood mainly as

a chance for the future. Because the future of the energy industry in Lusatia will be based on parallel existence of energy sources — the so-called energy mix that is also supported by Vattenfall. Lignite takes a solid share within this mix.

7. Innovative energy region Lausitz / Spreewald

The development of an innovative energy region Lausitz-Spreewald is not only connected with the topic climate-neutral lignite-based power generation. For example, also the capture of CO₂ from the flue gas by microalgae offers the possibility to separate this gas from the power plant process and also the biomass production for heat and power generation. A pilot plant in the Senftenberg combined heat and power plant shall start operation already this year.

Another project is the development of a “low-energy housing village”. This concept aims at reducing the energy consumption of entire villages to a minimum. It is intended to use this model in particular for future resettlements.

The establishment of wind energy on recultivation areas provides further application areas for these energy plants. Initially, the company plans to erect five wind power plants until 2010 on dumping areas of the Jänschwalde mine. The capacity could be increased to approx. 50 MW by the middle of the next century.

In Grieben, a place at the eastern boundary of the Jänschwalde mine, it is planned to erect a biogas plant. This plant shall use energy crops and agricultural by-products for generation of power and heat.

Another project serves the “development of sustainable crop rotation and cropping systems in Lusatia“. Aim is to improve the resource basis for renewable energies in Lusatia.

Different educational institutions, institutes and research facilities and also companies from the region work together with Vattenfall in these projects supported by representatives of politics.

Vattenfall has made all necessary decisions for the development of Lusatia as an energy region.