

Summaries

STANISLAW BIERNAT, MONIKA HARDYGÓRA,
JUSTYNA GÓRNIAK-ZIMROZ, ROBERT KRÓL, RADOŚLAW ZIMROZ

A proposal of Computerized Maintenance Management System for Integrated Technical Data Related to Operation of Belt Conveyors System • *Kwartalnik Górnictwo i Geoinżynieria* • z. 3, 2011

The paper deals with the latest developments in the field of computerized maintenance management system for a belt conveyors system. Some of existing in mining industry computer based systems are presented and discussed. It is showed that there is a need to build a comprehensive computerized tool for example based on a Business Intelligence software that will be able to store, process and quickly analyse data and use extracted information for decision making. A concept of such system is presented in the paper, moreover several advantages of the proposed approach is discussed. The crucial part of the system are data stored in data base — proposals of data structure organized in layers and some examples of decision using these data are also shown.

Keywords: *belt conveyor, CMMS, maintenance rules, decision support system, spatial data modelling*

KAZIMIERZ CZOPEK, BEATA TRZASKUŚ-ŻAK

Energetic Perspective of Brown Coal in Context of the European Emissions Trading Scheme (ETS) • *Kwartalnik Górnictwo i Geoinżynieria* • z. 3, 2011

At the moment the production of electricity from lignite is economically very effective. At the same time ecological requirements, especially the European Emissions Trading Scheme (ETS), impose a need to reduce emissions of carbon dioxide, which in the case of using brown coal is an important problem. In the Polish conditions cannot be considered perspective variant of reduction of CO₂ emissions by eliminating basic fuel, such as hard coal and lignite. There are therefore taken into account two realistic possibilities; using CCS system, which is costly and has not be proven in practice or purchasing emission limits for CO₂ (the EU ETS system). From the forward-looking point of view in the article, it has been considered the second need. It is also taking in to account at the same time, that the Polish energy security requires planning the exploitation of new lignite deposits. In view of the long investment cycle of mine and power plants construction, electricity production from the new deposits will be possible after the year 2020, after which the EU ETS assumes total liquidation of the freeware limits emissions of CO₂ and functioning of a free market of those CO₂ limits. This article analyses the situation of two selected lignite deposits, for which the profitability criterion is the cost of production 1 MWh from these deposits. In the analysis was taken into account the main factors affecting the cost of production energy, such as: the exploitation and sale cost for the power plants, expressed in PLN/Mg and PLN/GJ; the cost structure of production of electricity, including the participation volume in these costs of burned coal; efficiency of energetic blocks, because it depends on how large the level of coal consumption will be to produce energy, i.e. GJ/MWh; quality of the fuel, mainly include calorificity og lignite and its chemical composition; the cost CO₂ emissions, which not only will depend on price limits on the market, but also on the mentioned quality of lignite and blocks efficiency. The analysis showed that for the analyzed lignite deposits, the production of electricity will be economically attractive due to much more efficiency of energetic blocks and with a smaller lignite consumption and also less CO₂ emission.

Keywords: *brown coal, energetic, energy efficiency of power plant, the exhaust emissions, carbon dioxide, cost of energy*

ZUZANA ČERMÁKOVÁ, EMILIE PECHAROVÁ, MIROSLAV MARTIŠ

Butterflies Fauna Biodiversity in the Post-Mining Landscape • Kwartalnik Górnictwo i Geoinżynieria • z. 3, 2011

In this research we study butterflies diversity and abundance in North Czech Coal Basin (NCCB) and Landscape protected area České středohoří (LPA). Butterflies are very sensitive species for changes in agricultural management (Denis 2004). They can be used as bioindicators and umbrella species. We study 4 localities — each of them includes 3 study plots. Two localities are situated in LPA and two are situated at dumps of (NCCB). We compare three different succession stages (low xerotherm grassland, mezophilous grassland, areas with trees and bushes) on two different types of landscape (seminatural biotops × reclamations). In 2009 there were done four observations on each locality and two visits were done in 2010. Higher number of species was found in LPA and also more of rare and endangered species were observed there compare to dumps. Although dumps seem to be good potential habitats for butterflies. Important for all localities is, if there is an active anthropogenic management or not.

Keywords: *Butterflies, conservation, landscape management, diversity and abundance*

DIRK FREESE, CHRISTIAN BÖHM, ANSGAR QUINKENSTEIN

The Contribution of Agroforestry Systems to Land Reclamation • Kwartalnik Górnictwo i Geoinżynieria • z. 3, 2011

Agroforestry systems are traditional land management systems that are recently under development in the temperate zone. These systems are defined as sustainable ways of land use which integrate both agricultural and forestry practices on the same land and at the same time. They are of particular significance to marginal regions and degraded lands where the land use system represents an alternative to land abandonment and afforestation, leads to diversification of land use and offers new socio-economic benefits. Agroforestry systems improve the efficiency of utilisation of natural resources, improve microclimatic conditions within the system, can help mitigate severe soil erosion problems and nutrient losses, enhance landscape biodiversity, lead to an overall high biomass production for material or energetical conversion (fuelwood), and thus matching the increasing demand for a self-supply with bioenergy in rural decentralized areas. For this reason, in the temperate zone, agroforestry systems attract more and more public attention as they offer a promising and comprising way to produce biomass and food, the evaluation of the carbon and nutrient budgets, the assessment of the potential impact of agroforestry on biodiversity at landscape scale and finally the exploration of the sustainability functions and socio-economic cross-cutting issues.

Keywords: *land reclamation, agroforestry, bioenergy*

GRZEGORZ GALINIAK, ANDRZEJ BIK, JERZY JAROSZ

Sozotechnical Practice in Mining Activities of the Sieniawa Lignite Mine • Kwartalnik Górnictwo i Geoinżynieria • z. 3, 2011

Lignite Mine „Sieniawa” is the only mine in Poland, which extracted lignite using both underground and open pit method. The latter extraction is carried out until present day. The effects of the lignite mining process are most evident in transformation of the landscape, and therefore systematic approach to the rehabilitation of brownfield sites is a very important element of the mine’s environmental policy. Lignite Mine „Sieniawa” may serve as an example of such correct approach to the sozological and sozotechnical problems encountered in open pit mining.

Keywords: *lignite, land reclamation, sozotechnique, open pit mining*

STANISŁAW HAJDO, JERZY KLICH, KRZYSZTOF POLAK

Properties of Low-Quality Coal in Underground Coal Gasification • Kwartalnik Górnictwo i Geoinżynieria • z. 3, 2011

Underground coal gasification is an exploitation method, which has been developed for the last 100 years. A number of experimental trials conducted so far all over the world allowed to improve this method. First successful trials on lignite deposits were performed even before the World War II. In the 60’s of the 20th century lignite deposits were gasified on industrial scale in the former USSR. Successful lignite gasification trials were also conducted in the 70’s of the twentieth century in the USA. Recently, coal gasification trials were carried out in Australia. This paper describes the UCG method and discusses conditions for conducting trials and results of the operation of experimental

and industrial installations. In addition, it presents coal properties affecting the course of the underground gasification trials. Comparatively the matching of properties of deposits excavated in Poland by open-pit method has been made.

Keywords: *Underground Coal Gasification, lignite, coal properties*

LESZEK JURDZIAK, WITOLD KAWALEC

A Power Station as a Lignite Processing Plant — New Possibilities of Optimization of a Lignite Pit and a Power Station Joint Activity • Kwartalnik Górnictwo i Geoinżynieria • z. 3, 2011

An idea of an integration of joint activity of a lignite surface mine and a lignite fuelled power plant, that treats the power plant as a processing plant of the mine has been presented. Consideration of various parameters of “processing” (power plant efficiency, internal losses of produced energy) as well as selling costs of the final product — electric energy (e.g. carbon allowances costs) allows to analyze optional scenarios of the vertically integrated power engineering company. Advantages of such approach are: identification of mineable reserves as a raw energy source for a power plant, an exact assessment of CO₂ emission for a given mine schedule, analysis of the impact of carbon allowances trading, identification of the necessary level of a power plant efficiency which maintains the lignite reserves within the presumed assumptions of the whole power engineering enterprise, quick re-optimisation of the activity the integrated complex following the changes of key parameters. The case study, developed upon the quality block model of the Legnica East lignite deposit, shows the multivariate results obtained for various levels of power plant efficiency, carbon allowances costs and energy pricing

Keywords: *integrated power engineering company, joint optimization of a lignite pit and a power station, lignite reserves, power plant efficiency*

ZBIGNIEW KASZTELEWICZ

The Analysis of Operating Parameters of Domestic Lignite Mines • Kwartalnik Górnictwo i Geoinżynieria • z. 3, 2011

The article presents a comparison of numerous parameters describing the operation of Polish lignite mines. Coal production and overburden stripping, overburden to coal ratio, the amounts of water pumped out, water to coal ration and employment were analyzed. An analysis and comparison of capacity, time of malfunctions, energy consumption and age structure was also conducted. To summarize the article, a comparison of chosen parameters of Polish and German BCS systems was performed.

Keywords: *lignite, bucket wheel excavators, open pit mining, BCS systems*

ZBIGNIEW KASZTELEWICZ, SZYMON SYPNIEWSKI

The Directions of Reclamation in Polish Lignite Mines — Chosen Examples • Kwartalnik Górnictwo i Geoinżynieria • z. 3, 2011

The article presents the condition of post mining terrains’ reclamation in Polish lignite mines. Hitherto achievements of Polish mines in the fields of reclamation and revitalization are also described. The main focus of the article has been put on presenting different directions of reclamation used in the lignite mining industry. A picture of post mining terrains on which reclamation is conducted on an European level emerges from the article. These terrains now serve the inhabitants for recreation and significantly improve the attractiveness of surrounding regions.

Keywords: *reclamation, open pit mining, post mining terrains, lignite*

ZBIGNIEW KASZTELEWICZ, SZYMON SYPNIEWSKI, MACIEJ ZAJĄCZKOWSKI

The Possibility of Managing Lignite Deposits in Lubuskie Area • Kwartalnik Górnictwo i Geoinżynieria • z. 3, 2011

The article presents an analysis of ratings of lignite deposits in Poland. In anyrating the individual deposits have different positions, however, similar collection of deposits repeats at the top of the list. It can therefore be assumed that three deposits from Lubuskie region (Gubin, Mosty and Torzym) are among the best in the classification.

Based on this, the concept of building two new coalfields has been presented. Recoverable reserves, the power of power station and machines for the multi-pit mine have been described.

Keywords: lignite deposits in Lubuskie region, deposit rating, lignite deposits management

HANS-JOACHIM KLUTZ, CLAUS MOSER, NIKOLAUS VON BARGEN

The RWE Power WTA Process (Fluidized Bed Drying) as a Key for Higher Efficiency • Kwartalnik Górnictwo i Geoinżynieria • z. 3, 2011

RWE is a large utility company focused on Germany and Europe. About 10,000 MW of the generating capacity is based on lignite which is mined in three large open cast mines in the Rheinland. This lignite with a heat content of around 9000 to 10000 KJ/kg has a moisture content of about 55%. This high moisture content needs to be removed prior to any further utilisation. It is also responsible for a relatively high specific CO₂ emission. RWE Power has developed the WTA Process (Fluidized bed drying with internal waste heat utilisation) which offers important advantages in comparison against the conventional drying technologies: much better thermal efficiency, less CO₂ emissions, much better flexibility, chance for water recovery and lower costs. The principle method of this process is the drying of lignite in a drying chamber in a fluidized bed heated with low pressure steam of about 4 bar and recovering of the energy content in the vapour. This technology will be used to dry the raw lignite for the new proposed 1000 MW thermal units and thus increase efficiency of the entire power station by about 4 to 6% points. This will result in a CO₂ reduction of about 500 000 tonnes per 1000 MW unit per year. At the site of the BOA unit at Niederaussem a large scale prototype plant with a throughput capacity of 210 tonnes per hour (100 tph of evaporation capacity) was built and is now in its trial period. First operational results will be shown.

Keywords: lignite, fluidized bed drying, steam drying, waste heat utilization, WTA

TOMASZ KOTLIICKI, ANDRZEJ WAWSZCZAK

Waste Co-Combustion in Boilers • Kwartalnik Górnictwo i Geoinżynieria • z. 3, 2011

The paper introduces chosen aspects of combustion and co-combustion of biomass and waste in existing boilers. An initiation of co firing in power-installations demands, in general, modernization of technological systems, what causes an investment costs. This leads to change a maintenance conditions of installation, both in context of boiler operation (worsening of combustion, pollutants etc.), as well as legal requirements. Restrictions depend first of all from kind of fuels which have to be burnt and their classification as waste or biomasses. Installation management must make allowance for possibility of more restrictive emission standards for boilers, with necessity of installation of additional monitoring, or with the duty to keep a definite levels of process parameters.

Keywords: waste, incineration, standards of emission

WIESŁAW KOZIOL, ŁUKASZ MACHNIAK, EDWARD SOŚNIAK, ROBERT CHALUPKA

Exploitation Technology of Hard-To Mine Rocks for Example Belchatów Brown Coal Mines • Kwartalnik Górnictwo i Geoinżynieria • z. 3, 2011

Hard-to mine rocks occur both Belchatów and Szczerców field. The prognose shown the necessity of exploitation about 1.4 million m³ of hard-to mine rocks annually. Majority part of them is not mined mechanically with bucket wheel excavator operating in the mine. Therefore in the mine Belchatów uses of preliminary loosened by means of blasting technique. The loosened of rocks due to the possibilities of mechanical mining exploited with bucket wheel excavators or auxiliary machine on cyclical characteristic of the work. The all stages of technological process exploitation of hard-to mine rocks have been presented.

Keywords: open cast mining, technological of exploitation, hard-to mine rocks and soils

WIESŁAW KOZIOL, EDWARD SOŚNIAK

Mine Technology for Release and Extraction of Brown Coal in Field Szczerców • Kwartalnik Górnictwo i Geoinżynieria • z. 3, 2011

In this article was describing location of the brown coal „Belchatów-Field Szczerców”. Since 1977 were presenting documentations and elaborations had influence to choose technology for extraction of brown coal in field Szczerców.

The history of preliminary work was presenting against a background of decisions at the top level with regard to build or discontinue new investment. In simple way was illustrating technology of mine works making accessible coal ledge. In 2010 has been accepting mine technology coal extraction on direction north-south and after change direction to west-east.

Keywords: *Field Szczerców, Brown coal ledge "Belchatów", Technology for extraction of brown coal*

WOJCIECH KRZAKLEWSKI, JERZY WÓJCIK, BENEDYKT KUBIAK, JACEK DYMITROWICZ

The Problems of Reclamation of the Szczerców Field Outer Waste Heap • Kwartalnik Górnictwo i Geoinżynieria • z. 3, 2011

The current reclamation measures taken by Belchatów Brown Coal Mine are shifting their focus to the outer waste heap of Szczerców Extraction Field. The original plans aimed at temporary biological reclamation (sodding) of the waste heap and its re-exploitation to the Belchatów and Szczerców workings. Meanwhile the decision was taken that the heap should remain where it is being built now and that most of its area would be reclaimed for forest management. For this reason, an afforestation method has been developed which is based on the results of flora and soil analyses which allowed for distinguishing 4 area categories, each with appropriate cycles of reclamation measures.

Keywords: *forest reclamation, afforestation method, outer waste heap*

STEFAN LECHNER, HANS-BERND ROMBRECHT, HANS JOACHIM KRAUTZ

Pressurized Steam Fluidized Bed Drying (PSFBD) and Carbon Dioxide Separation by Flue Gas Scrubbing — New Challenges for the Lignite Power Industry • Kwartalnik Górnictwo i Geoinżynieria • z. 3, 2011

The protection of the climate requires the separation and discharge of carbon dioxide proceeding from lignite fired power plants. One measure to achieve this objective is the scrubbing of the flue gas. This process demands a high energy input in form of heating steam of a pressure of ca. 4 bar. A further measure to decrease the carbon dioxide emissions and increase the profitability of the power plant is the predrying of the lignite. A recent process is the Pressurized Steam Fluidized Bed Drying (PSFBD). Due to the high pressure the equipment is smaller than in atmospheric dryers and the steam coming from lignite water has a temperature range between 140 and 160°C. The integration of this heat in the power plant process is a task still to solve. The combination of drying and gas scrubbing allows the use of the entire heat coming from the dryer in the gas scrubber where nearly 40% of the heat demand in the desorber can be substituted. By this means the necessary heat which has to be got after the intermediate steam turbine is significantly reduced. The overall power plant efficiency rises. The paper gives an overview about the state of the PSFBD-research and discusses possibilities of the use of the this heat in the desorber of a flue gas scrubber.

Keywords: *lignite, drying, fluidized bed, carbon dioxide scrubbing, power plant*

VRATISLAV ONDRÁČEK, MICHAL REHOR, JIRI BRABENEC, MARETA HENDRYCHOVÁ

History, Present and Future of Revitalization of the Radovesice Dump • Kwartalnik Górnictwo i Geoinżynieria • z. 3, 2011

The Radovesice dump is the most extensive dump of the Severoceske doly a.s. and one of the largest dumps in the Czech Republic. Overburden filling was completed in the year 2003. Technical and biological, mostly forestry, reclamation takes place in the area presently. The difficulty in reclamation of the Radovesice dump consists in the large area size of the dump and mostly severe properties of rocks of the dumps. The report summarizes the history, present, and perspective of the reclamation of the Radovesice dump. The main attention is devoted to the application of modern reclamation methodology, first of all to application of marls and to foundation of areas retained to a natural succession. Two experimental succession areas are the greatest succession areas in the Czech Republic presently and their research is very important. Some results of the research are presented in this article.

Keywords: *restoration, natural succession, marl, Radovesice*

DARIUSZ ORLIKOWSKI, LILLA SZWED

Land Reclamation in the Adamów Brown Coal Mine — Landscape Before and After Manning Activity • Kwartalnik Górnictwo i Geoinżynieria • z. 3, 2011

The article presents experiences acquired in the Adamów brown coal mine in the field of land reclamation. The reclamation of the already closed pits and those planned to liquidation in the nearest period have been described. The greatest challenge of land reclamation is not only reestablishment of post — mining area when lignite comes to end but created completely new landscape.

Keywords: *lignite, reclamation, opencast mining*

MARCIN PAPIERKOWSKI, MARIAN ROTKO, WIESŁAW ZIELIŃSKI

Lignite Quality Monitoring in the Home Economy • Kwartalnik Górnictwo i Geoinżynieria • z. 3, 2011

History and the current state of the lignite quality parameters monitoring in the home economy, with the regard to the situation in mining and energetic industry have been presented. The existing measuring conditions and adapted to them methods and measuring equipments have been discussed. The general conclusions taking over perspectives on next years have been presented.

Keywords: *on-line measurement of ash content, radiometric methods, lignite*

ANDRZEJ PATRYCY

Influence of Electrical Energy Production in Brown Coal Fired Sources on Stabilization of Energy Prices for Ultimate Consumers • Kwartalnik Górnictwo i Geoinżynieria • z. 3, 2011

The paper provides estimation analysis of prognosis of electrical energy price increase for ultimate consumers versus energy demand as planned in „National energy policy up to 2030” and scheduled generation investments. Economical preconditions to maintain high rank of brown coal fired sources of electrical energy on energy market.

Keywords: *lignite, development, energetics*

VLADIMIR PAVLOVIC, DRAGAN IGNJATOVIĆ, PREDRAG JOVANČIĆ, SLOBODAN MITROVIĆ

Coal Production in Serbia — Status and Perspective • Kwartalnik Górnictwo i Geoinżynieria • z. 3, 2011

This paper review importance of coal in Serbian energy sector, achieved results, as well as perspectives for exploitation in future.

Keywords: *coal production, development strategy, investments*

MIRANDA PTAK

The Method for Assessment of the Possibility of Conducting Open Pit Mining Exploitation Affecting Natura 2000 Areas • Kwartalnik Górnictwo i Geoinżynieria • z. 3, 2011

The development of opencast mining today and in the upcoming years will depend on the ability to solve conflicts connected with the impact of the exploitation on Natura 2000 areas. This new form of environmental protection, which was introduced into the national system on May 1 2004, makes it necessary to include protective actions in mining projects to maintain the proper condition of natural habitats and of protected animal and plant habitats. The article presents the essence of the protection of Natura 2000 areas together with assumptions for the developed method of deposit classification — KZN200/mAHP. Simultaneously the article presents chosen deposits, exploitation of which affects Natura 2000 areas.

Keywords: *open pit mining, Natura 2000 areas, application of neural networks, analytic hierarchic process, environmental impact assessment*

MILAN RADUNOVIĆ, OBRAD KECMAN, TANJA MIHAJLOVIĆ,
JÖRG SCHLENSTEDT, PETER DENKE, DUSAN DJURIC

The Possibilities and Chances of the Project Energy Complex Kovin — New Coal Mine and Power Plant • Kwartalnik Górnictwo i Geoinżynieria • z. 3, 2011

Project Energy Complex Kovin refers to future coal mining and power plant construction. Coal from a Kovin deposit is in all parameters of quality suitable for burning in power plants and commercial use. Over the past 15 years in the „unprotected” part of the deposit there is a test pit with an experimental underwater coal mining method to collect data and examine the possibilities of this method in large-scale and reserves adequate for the construction of power plants. This paper presents the activities, activities that are in progress and highlights of the project.

Keywords: *coal, underwater mining, geological explorations, power plant, experimental*

KRZYSZTOF RZEPECKI

Method of Disposal of Combustion Wastes Coming from Turów Power Station and Related Problems • Kwartalnik Górnictwo i Geoinżynieria • z. 3, 2011

In the process of electricity production in brown coal-fired, thermal power plant significant quantities of combustion wastes are created. The wastes are ashes (by-products of combustion) which contain products of flue gas desulfurization. Properties of ashes containing products of flue gas desulfurization depend on both coal combustion process in boilers and flue gas desulfurization process. There are some properties of combustion by-products which are suitable for commercial utilization. The present paper presents information on the properties of various combustion wastes coming from the Turów Power Station. Both the history of waste management over years of operation of Turów Power Plant and current utilization practices are included as well. The paper is concluded with description of presents problems which appear in the process of waste management in PGE GiEK SA Division Turów Power Plant.

Keywords: *ash, combustion wastes*

EDYTA SILARSKA, RYSZARD FRANKOWSKI, JACEK KAPUSTA

Models of „Belchatów” Deposit — Sustainable Deposit Management • Kwartalnik Górnictwo i Geoinżynieria • z. 3, 2011

The usage of continuously updated digital models of the Pole Belchatów and Pole Szczerców fields as well as the know-how acquired allow for applying the information provided by them within a broad scope of activities. The model makes it possible to create maps, geological sections of the entire field, its part or the planned shortfall. It provides information concerning lithology, stratigraphy or coal quality — depending on the needs. The software user may calculate the necessary data for short- or long-term mining operations quickly and much more precisely. The generated data are of good quality and reflect the actual characteristics confirmed by the ongoing exploitation.

Keywords: *digital model of deposit, updated model, deposit, geological resources, deposit management*

LESZEK SONDAJ, DONAT MILKOWSKI, MICHAŁ WOJCIECHOWSKI

Problems of Protection and Access to Natural Resources of Brown Coal in Deposit Turów, in Aspect of the Flood Hazard, that Occur in August 2010 • Kwartalnik Górnictwo i Geoinżynieria • z. 3, 2011

On the 7th August 2010 there occur torrential rain in Izera Mountains on the territory of Czech Republic and Poland. In these Mountains begins every rivers surrounding mine „Turów”, among other things Nysa Łużycka, Miedzianka and Witka. Great amount of water flowing from the North sides of mountains to cause flash flood. In time of 24 hours to flow down 150 billion litre of water. Such amount of water, cause natural disaster in Bogatynia, Porajów and Sieniawka, destroyed urban infrastructure and tens historic buildings. On the pillar of East side of mine, water broke through the embankments and rush in open pit mine Turów. Additionally significant increase and brimming over caused the violent rainfall of settlings basin on pumping stations, overflow of waters from ditches and their violent flow into the bottom of the excavation causing breaking main draughts belt conveyors and communications. The mine had to stop coal mining. Water to flood open-pit bottom and two working levels and ducked one level dump. On the West side of mine, water from flooding Nysa tried to destroy west embankments. Water broke through the dam(5 millions m³) on the Witka River and caused destroy an only access road between

Bogatynia (Żytawa Basin) and the rest of Poland. This report describes the rescue action, liquidation of ravages, recovering flooding coal seams and other protection actions against the flood.

Keywords: *flood hazard, landslide, rescue action, recovering flooding coal seams, desludging, dumping, stability calculating, monitoring*

ANTONI TAJDUŚ, PIOTR CZAJA, ZBIGNIEW KASZTELEWICZ

The Role of Coal in the Energy Sector and the Strategy of Polish Lignite Mining Sector in the First Half of XXI Century • Kwartalnik Górnictwo i Geoinżynieria • z. 3, 2011

In the last few dozens of years we have seen rapid growth of the global economy, coupled with the increase of electricity consumption, both in mature economies and developing countries. Basing on available sources and forecasts the author describes current trends in the use of different sources and fuels for electricity production in Poland and abroad. The global economic crisis slightly inhibited growth in the demand for energy, but it appears likely that this will only effect of short-lived. The world, especially developing countries like India and China, is rapidly increasing its demand for energy. In the absence of consensus on limiting CO₂ emissions, the most realistic forecasts show that further increase of the importance of fossil fuels, especially coal, will follow. This puts our country, with large reserves of this fuel, in a privileged position in relation to other European countries, that depend heavily on imported minerals. Meanwhile, energy policy assumes a reduction in coal mining. This scenario, described in the article, now has a good chance of realization due to the assumption made by the Government to abandon the greater use of domestic energy resources for energy production and replace them with imported technologies and sources. This approach results in exports of both capital and jobs outside Polish borders. It is neither building energy security, nor reducing our exposure to increased geopolitical risk.

Keywords: *mining, energy sector, energy security*

ANTONII TAJDUŚ, JÓZEF DUBIŃSKI

Global Problems of the Lignite Mining Industry • Kwartalnik Górnictwo i Geoinżynieria • z. 3, 2011

The basis issues of global and national trends in lignite mining industry has been presented. Authors have formulated the key barriers and challenges for the Polish lignite mining industry and have proposed the priority lines of action for the development of this industry. On the basis of mining production and resources data as well as the structure of primary energy and electricity production in Poland the potential of lignite fuel and its importance for continued use in the domestic economy as the guarantor of a stable Polish energy policy have been emphasized.

Keywords: *Mining, lignite, energy policy, energy's security, mining production, coal resource base*

GRZEGORZ WACHOWIAK, GRZEGORZ GALINIAK, WALDEMAR JOŃCZYK, RENATA MARTYNIAK

Evaluation of Changes in Runoff in the Catchment of Widawka River in the Hydrologic Year 2010 under Influence of Mining and Energy Sectors Investments in Belchatow Region • Kwartalnik Górnictwo i Geoinżynieria • z. 3, 2011

Changes in water conditions (surface and groundwater) are one of the important elements of the impact of open pit lignite mining and associated energy production on the environment. In this article, the authors characterize (for the hydrological year 2010) the impact of the mine and power station "Belchatow" on the river runoff in the catchment of Widawka river. This influence is manifested primarily by providing the hydrographic network with drainage water coming from the mine; by flow-reducing influence of the depression cone, as well as by abstractions for the power station. The analysis of changes in the outflow was based on the determination of river flows (actual and reconstructed as in natural conditions) and on the size of anthropogenic factors.

Keywords: *open pit mining, energy sector, depression cone, runoff, Widawka river*

JUSTYNA WOŹNIAK, LESZEK JURDZIAK

Methodology of Risk Analysis of Profitability of Mining and Energy Investments in Conditions of Uncertainty Based on the Legnica-East Deposit Example • Kwartalnik Górnictwo i Geoinżynieria • z. 3, 2011

Development of domestic energy industry based on brown coal requires new investments. Growing prices of CO₂ emission allowances and closing moment of the necessity of their purchase on auctions cause, that electric energy

production out of brown coal become more and more risky business. For 20 equally probable models of the Legnica-East lignite deposit obtained from conditional simulation (module ConSim in Datamine Studio 3) process of Lerchs-Grossmann pit optimisation was carried out (NPVScheduler) leading to 240 ultimate pits in 12 groups obtained for different lignite price levels. Data about amount of overburden and lignite inside these pits and lignite quality (quality indicator QI) were used in Monte Carlo simulation process (*@Risk* and *Crystal Ball*) to assess the influence of parameters describing the planned mine and power station (treated as random variables with selected distributions) on non-discounted financial results of a mine, a power station and a vertically integrated energy producer for 12 scenarios describing future market conditions of their operations (2 electric energy prices, 6 levels of CO₂ emission allowances: 0–300 PLN/Mg CO₂). Obtained histograms allowed for calculation of probability of their profits maximisation for selected pits, probability of losses and determine influence of examined parameters and scenarios on profit levels and risk connected with its achievement. Analysis was carried out in the Institute of Mining Engineering at Wrocław University of Technology in frame of realized PhD thesis.

Keywords: lignite, electric energy, risk, conditional simulation, open pit optimisation, vertical integration

MACIEJ ZAJĄCZKOWSKI

Influence of the Shape of External Dump on the Transportation Costs • Kwartalnik Górnictwo i Geoinżynieria • z. 3, 2011

Influence of the shape of external dump on the transportation costs was analyzed in the article. In order to do this, three shapes of external dump were defined with the same volume and height, general slope gradient and the location of the transportation ramp. In all three cases the position of center of gravity was determined depending on the received shape of the basis of the dump. Knowing the distance from the center of gravity to the beginning of the transportation ramp, the average road of transportation on the dump was estimated and the elementary energy demand to transporting fixed volume of the overburden. These values make estimation of the transportation costs of the dumping masses possible and show the most profitable shape of external dump considering these costs.

Keywords: external dump, center of gravity, distance of conveyor belt transport, dumping

STANISŁAW ŻUK

Production Results Analysis in the Poland Brown Coal Branch within the Year of 2008–2010 and the Current Situation Review in the Brown Coal Mining of the European Union Countries • Kwartalnik Górnictwo i Geoinżynieria • z. 3, 2011

The topic of the paper is a presentation of the achievements of the brown coal mining branch in Poland based on the productive data of four brown coal mines active in the perspective of the quarters too III years 2008–2010. Description refers to the basic data in respect to operational resources in the active regions of the exploitation operation of the brown coal mines. In the further part a trial was undertaken to present the power engineering based on the brown coal in the background of the whole Polish electrical power engineering as well as a comparison of its stand with the current situation in the brown coal mining in EU and the role of the brown coal mining in the power engineering system of Europe was made.

Keywords: brown coal, analysis, production, mining, utilization brown coal