Key factors that drive the Czech Republic coal industry

The coal industry of the Czech Republic has a long and distinguished history. ***Tomáš Vlček*** and ***Martin Jirušek***, both of the Energy Security Program, Department of International Relations and European Studies, Faculty of Social Studies, Masaryk University, Brno, Czech Republic, examine the key factors of an industry that has spanned three centuries and yet still continues to supply the country with the majority of its power requirements.

Since the beginning of 19th century there has been extensively coal mining in the country, and it is still an important part of the nation's economy. Coal was the key driver for the country's industrial revolution and helped develop not only of the country, but also the rest of the Austrian-Hungarian Empire. In fact, when the Empire dissolved, 90% of its bituminous coal production, as well as 84% sub-bituminous coal production were located within the Czech boundary: this had a massive impact upon the Empire's economy. During the socialist era, coal was the key source of domestic energy production. Production peaked in the late-1980s when around 130Mt/y of coal was produced. This tremendous level of production has dropped significantly over recent decades, compounded in no small part by environmental issues. In addition, the country´s deposits are becoming depleted, and as a result the industry has had to develop in a way that aims to maximise its profitability.

COAL IN THE CZECH REPUBLIC

Coal fired power plants, a crucial part of the energy sector for the Czech Republic, have an installed power capacity of 10,819MW. Thermal power plants (powered by brown coal, bituminous coal, biomass and light fuel oil) in the Czech Republic provided 44,737GWh of electricity in 2013, which is 51.4 % of the total gross electricity produced. (see Energeticky regulacni urad, 2014, p. 4, 11)

It is important to appreciate that the coal sector in the Czech Republic is basically divided into two parts: brown coal and bituminous coal. Both of these sectors have their own energy security issues and energy mix diversification influences. From the Czech energy security point of view, it is the brown coal sub-sector that is the most significant.

The chart (below) shows all the 150+ MW power plants in the Czech Republic including life expectancy, which is one of the most crucial aspect of the Czech coal industry. As seen in the chart, the life expectancy of the power plants is short, with electricity production from coal having two peaks: the first is likely to be around 2025, and the second around 2040.

It is generally accepted that coal accounts for between 50 and 66% of the overall operational costs of the country's coal fired power plants, which as a result is very sensitive to price fluctuations. Figure 1 shows 13 years of historical prices of coal in the world market.

The fluctuation caused by the world economic crisis of 2008 is obvious (see above). Unfortunately a potential 'return' to normal, was adversely impacted by an overall economic stagnation leading to flat industrial production. Since the market has not yet fully recovered, the demand, and therefore the price of coal is still low. In addition, fixed costs have continued to rise due to tighter environmental laws and associated regulations. However, following a temporary slowdown in growth in 2009 in the wake of the global financial and economic crisis (see OECD & IEA, 2012, p. II.21), investment in coal mining resumed its upward path in 2010. It is anticipated that the coal market will fully recover in the near future.

In the Czech Republic, only those entities with a permit from the relevant District Mining Authority can mine coal. These companies are obliged to pay mining royalties. All mined materials within the Czech territory are state owned at the point of their extraction, with the state permitting extraction and trade of such mineral upon payment of the relevant fees. Extracted coal then becomes the property of that particular company. The monies raised in fees are directed into a special account for mine remediation and restoration purposes.

BITUMINOUS COAL SUB-SECTOR

Shortly after the fall of communism, the Czech Republic started restructuring its bituminous coal production, taking into account changes in energy consumption. Within the industrial sector, shifting from a planned economy to a market economy, led to a significant drop in energy demand. The restructuring process is clearly seen by comparing what happened in 1993 (when 73 black coal deposits existed, of which 26 were mined) to 2014 (when 62 deposits existed, of which only 4 were mined). (See Ministerstvo hospodarstvi Ceske republiky & Ceska geologicka sluzba – Geofond, 1993, pp. 65-66; Ministerstvo zivotniho prostredi & Ceska geologicka sluzba – Geofond, 2013, pp. 147-148)

Currently, the bituminous coal sector has been negatively impacted by world markets. The low prices of coal (especially that of bituminous quality) means low mining profits. Mining bituminous coal is much more costly than that associated with extracting brown coal. Czech bituminous coal is mined in deep underground shafts in the Silesian region, unlike the brown coal that is

Tab. 1: Coal Power Plants in the Czech Republic with more than 150 MW of Installed Capacity

Power Plant	Owner	Installed Capacity	Connected to the Grid	Fired on	Life Expectancy*
Detmarovice	CEZ, a. s.	800 MW	1975 - 1976	Bituminous coal	2020-2030
Chvaletice	Severni energeticka a.s.	800 MW	1977 - 1978	Brown coal	2020-2029
Kladno	Alpiq Generation (CZ), s. r. o.	299.1 MW	1976, 1999	Bituminous coal, brown coal	2045-2050
Komorany	United Energy pravni nastupce, a. s.	239 MW	1959, 1978, 1986, 1994, 1997, 1998	Brown coal**	2025
Ledvice II	CEZ, a. s.	220 MW	1966-1968	Brown coal	2015
Ledvice III	CEZ, a. s.	110 MW	1998	Brown coal	2040-2055
Ledvice IV	CEZ, a. s.	660 MW	2014 - 2015	Brown coal	2055
Melnik (II)	CEZ, a. s.	220 MW	1971	Brown coal	2015-2020
Melnik (III)	CEZ, a. s.	500 MW	1981	Brown coal	2015-2020
Melnik (I)	Energotrans, a. s.	352 MW	1961, 1994 - 1995	Brown coal	?
Opatovice	Elektrarny Opatovice, a. s.	378 MW	1979, 1987, 1995 - 1997	Brown coal	2020-2030
Pocerady	CEZ, a. s.	1,000 MW	1970 - 1977	Brown coal	2029+
Porici	CEZ, a. s.	165 MW	1957	Brown coal	?
Prunerov II	CEZ, a. s.	1,050 MW	1981 - 1982	Brown coal	2015-2023 (2040***)
Prunerov I	CEZ, a. s.	440 MW	1967 - 1968	Brown coal	2015-2023 (2040***)
Tisova I	CEZ, a. s.	183.8 MW	1959 - 1961	Brown coal	2020+
Tisova II	CEZ, a. s.	112 MW	1959 - 1961	Brown coal **	2020+
Trebovice	Dalkia Ceska Republika, a. s.	174 MW	1961, 1998	Bituminous coal, light fuel oil	2015-2020
Tusimice II	CEZ, a. s.	800 MW	1974 - 1975	Brown coal	2035

* According to public open sources.
** The Komorany power plant is also partially fired on natural gas. One 55 MW block of the Porici power plant and one 57 MW block of the Tisova power plant employ a biomass combustion.
*** After completion of the modernization process that is due in 2015.
Source: Energeticky regulacni urad, 2010, p. 88, 92; Energeticky regulacni urad, 2012, p. 24. Livelong expectancy and overall adjustments by T. Vlcek.

Source: Edison Investment Research Fig. 1: Historical Coal Prices

mined in large open pits in northern Bohemia. Price fluctuations impact bituminous coal production more than that of brown coal production.

The production costs in 2013 were approximately $77 per mined tonne of bituminous coal. Averaged yearly prices for 2013 amounted to $111/t for coking coal and $62.4/t for energy coal. (See Moniova & Stalmach, 2014; New World Resources). At current long-term coal price assumptions, production of bituminous coal beyond 2023 is not expected to exceed 2Mtpy. (See New World Resources, 2014, p. 29)

OKD (which prior to January 1991, was known as Ostravsko-Karvinske Doly,) is the country's only miner of bituminous coal. OKD is fully owned by the Dutch company, New World Resources N.V (NWR).

OKD leads the mining works in the Darkov, CSM, Karvina (former Karvina-Lazy and Karvina-CSA mines) and Paskov underground mines. There is also the Frenstat mine, built in the 1980s, but never put into production despite reserves estimated at 1.6 billion tonnes. Since the estimates were 30 years old, in September 2011 NWR announced that it would undertake some 4 years of surveys for data clarification, (See Raska, 2012) after which the future of the mine would be decided. As the mine is in vicinity of the Beskydy Protected Landscape Area, strong local opposition against the mining already exists, and will no doubt play a part in any future endeavors.

OKD also plans to continue mining in the Karvina region for another 20 years. In addition, the company has decided to try to extract coal from the Polish side of the border through an underground route from the CSM Mine. The mine in question, Morcinek, is owned by the Polish company Jastrzebska Spolka Weglowa S.A., and was shut down approximately 11 years ago, although it was not mined to its full capacity. In 2007, agreements with the Polish government, as well as a Letter-of-Intent with Jastrzebska Spolka Weglowa were signed, leading to a feasibility study.

The Morcinek project involves two sub-sites: Morcinek 1 and Zebrzydowice 1. In 2003, NWR received a 12-year exploration license for Morcinek 1 sub-site, and in 2008 a 6-year exploration license for the Zebrzydowice 1 site to map and document the reserves. After the geological work was completed on Morcinek 1, in November 2012,

Tab. 2: Cash mining costs ($ per tonne)			
2010	2011	2012	2013
80.6*	93*	80.6	88.5
* All costs incurred in coal mining including administrative and non-cash costs.			
Note: Cash mining costs per tonne reflect the operating costs incurred in production of both coking and thermal coal. Source: New World Resources, 2014, pp. 2, 41			

Tab. 3: Key Indicators of the OKD Company			
Indicator	Units	2013	2012
Mines	-	4	4
Production tonnage	tonnes	8,610,000	10,796,000
Sales tonnage	tonnes	9,709,600	10,245,000
Profit before tax	$m	-976	63
Profit after tax	$m	-804	49
Operating profit/ loss	$m	-895	89
Net operating cashflow*	$m	-48	266
Total asset value	$m	904	1767
* before tax, changes to working capital and extraordinary items Source: OKD, 2014, p. 2			

the Polish Ministry of Environment approved the request for the inclusion of the reserves found into the official list of the country's coal reserves. This classification is necessary for the preparation of development plans, and in particular represents a major step forward in obtaining a mining license.

Meanwhile, the company continues its preparations at the CSM mine for possible future mining activities. Completion of this process should take a few years, but it is still cheaper that sinking a new $454m shaft at Morcinek. (See Vlcek & Cernoch, 2012, p. 122; Cinert, 2014; New World Resources; "NWR: Sloucime tezbu", 2014)

On the subject of international trade: more than 74% of OKD's production is destined for domestic markets and goes to the most significant consumers: ArcelorMittal Ostrava, Trinecke Zelezarny, Group–Moravia Steel, OKK Koksovny, Dalkia Ceska Republika, and CEZ. The remainder is exported, specifically to Austria, Slovakia, Germany, Poland and Hungary (See OKD). The trade balance in 2012 amounted to 3,390 million tonnes of clear exports (See table 5). Black coal is among the most important items of the country's foreign trade. Table 6 shows historical imports and exports of bituminous coal and metallurgical coke.

When speaking about the territorial directions of the coal export and import, in 2013 the top three recipient countries of Czech bituminous coal exports were Austria ($160m), Poland ($140m) and Slovakia ($11m) followed to a lesser extent by Germany, Hungary and Sweden. The top three importers of bituminous coal to the Czech Republic in 2013 were Poland ($18.0m), USA ($10.0m) and the Russian Federation ($3.0m) followed by negligible amounts from Australia, Germany and Slovakia. (see Cesky statisticky urad) The territorial directions of the coal export and import to and from neighboring countries are shown in table 7.

In the Czech Republic, the price of coking coal of OKD dropped from $208.9 per tonne in 2011 to $103.3 per tonne in 2014, and that of thermal coal dropped from $84.0 per tonne in 2012 to $61.3 per tonne in 2014. (See New World Resources, 2014, p. 47). As a result the low profit from bituminous coal mining eventually led to the plan to close down one of the four bituminous coal mines, (the least competitive, Paskov mine). This led to social problems in the affected area. Fortunately, OKD, the sole producer of bituminous coal in the Czech Republic, employs only 3,003 employers in the affected Paskov mine. (See OKD, 2014, p. 9) Furthermore, the Czech government promised to contribute $24.5m on social programs for the miners from the affected Paskov mine, if the company extended the operation until 2017.

The negative effects on the country's energy profile were limited by the fact that only about half of the coal is used for energy production. This coal is used in the country's only fully bituminous coal power plant (800 MW Detmarovice), as well as a few bituminous coal co-generation units (28 MW Kladno I-B3 and 174 MW Trebovice). The current domestic bituminous coal production takes into account the demand of these

Tab. 4: Exploitable Reserves of Bituminous Coal				
Mine	Exploitable Reserves	Production*	Life Expectancy**	Number of Employers***
Karvina****	23,975	2,621	6.7	4,422
Darkov	12,216	2,651	4.1	3,264
CSM	29,200	2,475	10.7	3,494
Paskov	850	863	-	3,003
Total	66,241	8,610	-	14,183
* As of 2013				

**Calculated as Exploitable Reserves divided by 3-year average production, both coke and energy coal included
*** As of 2013; including supply companies
**** Created by joining former mines CSA and Lazy in 2008
Note: figures in thousands of tons; Exploitable Reserves as of Ministry of Environment of the Czech Republic geological statistics; Life Expectancy in years. Mines Karvina and Darkov will be connected in one mine from 2015. The expected year of definitive end of bituminous coal production is 2040 according to Ministry of Industry and Trade.
Source: OKD, 2014, p. 7-11; OKD, a.s.; calculations of life expectancy by T. Vlcek.

facilities, as well as their life expectancy. The rest of the mined coal is high-quality, and is intended for use in metallurgical coke production. The mine with the highest life expectancy is CSM, which produces coal for energy production. Currently, it is relatively easy to find clients for thermal coal, compared to that for metallurgical coke following the recent economic slowdown and lower demand for metallurgical coke by the steel industry.

The current state of world market and the drop in demand for coal, has obviously led to financial problems. For example, OKD has undergone general restructuring since 2013 that started shortly after New World Resources (the owners of OKD) presented the economic results for Q1 2013. This process will take a few more years to complete and has several aims. Firstly, $114m savings in 2013 followed by more savings in the years to come; secondly, dropping the production costs to $68 per tonne; thirdly, 250 administrative employees to be laid-off followed by further lay-offs in supply. companies and elsewhere; fourthly, closure of the high-cost Paskov mine. (See CBU & ZSDNP-ST, 2014, p. 13) It was also intended that between 500 and 600 employees will be laid-off on an annual basis from 2014 onwards. (See "NWR: Sloucime Doly", 2014) This is not a full list of its aims.

Still, the problems are by-and-large local in nature, mostly due to the fact that the Czech Republic enjoys a well diversified energy mix. The negative effects of a highly volatile resource sector (particularly in terms of coal) are obvious.

Tab. 5: Czech Foreign Trade of Bituminous Coal, Briquettes and Similar Solid Fuels Manufactured from Bituminous Coal			
Indicator	Units	2011	2012
Import	thousand tonnes	2,398	1,979
Export	thousand tonnes	6,257	5,369
Average import price	$ per tone	163.1	142.1
Average export price	$ per tone	154.7	135.9
Note: as prices of black coal are considered confidential in the Czech coal industry, these are qualified estimates.			
Source: Ministerstvo zivotniho prostredi & Ceska geologicka sluzba – Geofond, 2013, pp. 148-149. Calculations to EUR by T. Vlcek using Czech National Bank yearly average exchange rates.			

Tab. 6: Import/Export of Bituminous Coal and Metallurgical Coke in History										
Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
BC Import	1,203	1,217	1,281	1,568	1,220	1,997	2,508	2,241	1,903	1,982
BC Export	5,713	5,689	5,669	5,576	5,254	6,517	6,805	6,082	6,516	6,271
MC Import	0,868	0,946	0,944	0,756	0,510	0,705	0,735	0,519	0,536	0,885
MC Export	0,527	0,523	0,700	0,958	0,913	0,956	0,807	0,830	0,562	0,875
Note: figures in thousand tones Source: Cesky statisticky urad										

BROWN COAL SUB-SECTOR

In Table 8, the exploitable reserves of brown coal are shown. One can clearly see the life expectancy of the two above-mentioned power plants expectancy peaks, i.e. the current electricity production from coal until the end of production. It is thus understandable that the only new coal fired power plant, Ledvice is to be constructed in the vicinity of the coal mine that has the same portfolio as the CEZ Group power plant. This logic will be expanded upon later.

There are three companies active in the extraction of brown coal in the Czech Republic: Severoceske, Czech Coal Group, Sokolovska Uhelna and Pravni Nastupce. Severoceske Doly holds almost 50% of the Czech brown coal market and is fully owned by the CEZ Group. Czech Coal Group is owned by Indoverse Czech Coal Investments Ltd. (50 %) and Czech Coal N.V. (50 %), and holds almost one third of the Czech brown coal market. Sokolovska Uhelna holds the balance of the country's brown coal market. Total brown coal amounted to 846Mt in 2012. (See Ministerstvo zivotniho prostredi & Ceska geologicka sluzba – Geofond, 2013, p. 152).

Following the charts 1 and 7, it is unsurprising that the key topic in the Czech coal sector in the last decade is the issue of territorial ecological limits on brown coal mining guided by the Government's Resolution No. 444/1991 in the North Bohemian Basin of October 1991. This resolution specified the final lines of mining and landfill in the following mines: Merkur, Brezno, Libous, Sverma, Vrsany, CSA, Lezaky, Bilina and Chabarovice, as well as in the Ruzodolska and Radovesicka landfills. In addition, it set out the limitation values of air pollution in the regions Chomutov, Most, Teplice, Usti nad Labem and Louny basins. (See Vlada Ceske republiky, 1991) The idea behind these limits was to provide the regions with some sort of governmental guarantee that the city environment would not deteriorate further, and provide the inhabitants with a stable datum upon which to base local investments, reconstructions, etc. The topic of territorial ecological limits on brown coal mining, has been on the political agenda for several years now. However, a degree of urgency arises as to how these limits will impact upon privately-run coal companies as they approach their end-of-life. The companies are going to mine out the deposits, resulting in the local coal fired power plants losing a rather cheap sources of coal. That is the reason why since 2003 they have started emphasising (sometimes fervently) the increasing risk of an energy crisis, huge blackouts and the collapse of both electrical and heat supply grids. (See Vlcek & Cernoch, 2013b, p. 81)

However, the problem with the Czech coal sector does not lies primarily with the territorial ecological limits of brown coal mining, but with the market's unpreparedness, including that of its heating plants. Their dilemma is based on uncertain coal prices and, as a result, how mining companies will react, which up to now have been relatively predictable. As coal supply dwindles, so a rise in its price due the large volumes of coal needed to operate a power plant which necessitated inland transportation over larger distances. Indeed, although the approval of the limits were passed 24 years ago, this was insufficient for the majority of heating plants/and or power plants to replace their fuel bases. That means that these same plants must (and will) buy coal, which leaves them at the mercy of the mining companies. (See Vlcek & Cernoch, 2013b, p. 82-83). The majority of the coal supply contacts expire between 2013 and 2015, and the mining companies can either track their prices to the stock market on a short-term basis (in small volumes) or at higher prices on long-

Tab. 7: Territorial Export/Import of Bituminous Coal, Brown Coal and Lignite to/from Neighboring Countries

	Q1 2012	Q2 2012	Q3 2012	Q4 2012	2012
Poland	45.6/60.7	54.5/53.0	44.5/45.0	35.0/40.2	178.5/200.0
Slovakia	66.9/0.3	611/0.4	61.4/0.3	55.1/0.4	244.6/1.4
Austria	51.7/ 0	67.2/0	68.0/0	30.6/0	217.4/0
Germany	1.0/1.0	2.2/3.0	3.5/2.3	4.0/2.5	10.7/8.8
	Q1 2013	Q2 2013	Q3 2013	Q4 2013	2013
Poland	42.7/46.4	44.0/46.4	35.1/41.8	42.4/50.1	164.2/1820.3
Slovakia	32.9/04	34.9/0.3	33.4/0.4	39.0/0.2	140.1/1.3
Austria	38.4/0	47.5/0	43.1/0	32.1/0	161.0/0
Germany	9.3/0.3	8.5/2.0	10.1/1.6	15.6/0.6	43.5/4.5

Note: figures in million $
Source: Cesky statisticky urad

term contracts.

The policy not to prolong contracts with heating/power plants originated from the Czech Coal Group. The company extracts coal from the CSA mine, where the greatest volume of coal behind the limits is to be found. Should the limits be maintained, the Czech Coal Group will be left with no coal in its CSA mine by 2021, and in its Vrsany mine by 2058. Alternatively, should the limits be breached, the mining in the CSA mine will be prolonged (in the first stage) until 2068, until 2115 in the second and until 2145 in the third phase. (See Skupina Czech Coal). The other companies, Severoceske Doly, Sokolovska Uhelna and Pravni Nastupce, extract coal and simultaneously operate (through their daughters or shareholders) their own coal fired electricity and heat power plants. On one hand, they have assured sales of coal, but on the other are not capable of supplying surplus coal to the market. (See Vlcek & Cernoch, 2013b, p. 83)

Czech Coal Group struggled to acquire its own coal fired electricity or heat power plant in order to increase the value of its coal. The biggest dispute took place between Czech Coal Group and CEZ Group for the Pocerady power plant (5x 200 MW). Czech Coal Group, originally Mostecka Uhelna, terminated a “so-called” contract with CEZ Group to provide it with coal for the next decade. This started a “war for coal” as CEZ Group unsuccessfully sued the Czech Coal Group for $410m in damages arising from the impossibility of realisation of the investment project for the renovation of its coal portfolio in Pocerady due to termination of the contract. (See Horacek & Klimova, 2010). At the same time, the termination of this contract led CEZ Group to change its investment plan in Pocerady from the coal-fired power plant to a combined gas-and-steam-cycle power plant of 840 MW, installed capacity in March 2011. One of the first solutions to this market dispute was the potential swap of coal fired power plant Pocerady for the brown coal mine CSA of the Czech Coal Group’s portfolio. This transaction was interrupted in 2009 by EC inspection investigating this transaction suspected market manipulation. (See Vlcek & Cernoch, 2013a, p. 466).

The estimated life expectancy of the four units of the power plant between 2012 and 2015 was associated with the original (and logical) replacement of these outdated coal units by a new coal investment project. The power plant could then be supplied with coal from the company Severoceske Doly (which is fully owned by the CEZ Group). The negotiations on the new contract for the supply of brown coal were simultaneously complemented by negotiations on the price of coal and also on the sale of a coal-fired power plant from the CEZ portfolio. An agreement was finally reached in 2012, when the original contract was nearing its end and the Czech Coal Group still had not secured sufficient sales of mined coal. (See Vlcek & Cernoch, 2013a, p. 466.) The Czech Coal Group and CEZ Group agreed in December 2012 on a 40-year contract (ie until the mining out of the Vrsany mine). Shortly after the deal was signed, the Chvaletice power plant from CEZ’s portfolio was sold to the Czech Coal Group. Also, the EC investigation was curtained after an agreement was secured that CEZ would sell one 800+ MW power plants.

The Chvaletice power plant was sold for $170m (plus 90% of the market price of CO2 allowances allocated free of charge of $18.5m) to the company Litvinovska uhelna, daughter of the Czech Coal Group. (See Tesar, 2013). Officially, this sale was presented as independent of the coal contract. Within the agreement with the EC, a tender for the sale of the bituminous coal Detmarovice power plant was opened, however, the tender was unsuccessful because the low market price of electricity discouraged potential investors.

The outcome of the “war for coal” is a good example of the current trend in the coal sector of the Czech Republic. Both sides are now in control of the whole coal fuel chain. The mining company Czech Coal Group now operates its own power plant, where the fuel demand is securely covered from its own mine, CSA, for the rest of the life expectancy of the power plant. Meanwhile, the CEZ Group has secured a long-term coal supplies until 2060 for its Pocerady power plant that will not only cover the rest of the life expectancy of the power plant, but also creates an option for investments into prolonging the life of the power plant. Similar situations occur involving other players in the Czech coal market, e.g. in the dispute over Melnik power plant between Energotrans and the Czech Coal Group, or in the dispute over Opatovice power plant between Energeticky and Prumyslovy holding and the Czech Coal Group.

SUMMARY

The Czech bituminous coal sub-sector is widely affected by the fluctuations in world price levels. The fluctuations caused by economic crisis are clearly a key factor driving the current changes and restructuring of the bituminous coal sub-sector. This sector is becoming extremely sensitive to market development and the closure of the Paskov mine may be the first step in the collapse of the sector. This would definitely lead to more significant social problems than that caused by the laying-off of 3,003 employers.

Fortunately, the negative effects are limited due to the existence of domestic consumers as the price of coal rises with increased distance from the mine. Also, as the bituminous coal producers´ reserves cover the energy bituminous coal consumers, the market actors are minded to make as much profit as possible before the total loss of their business. This notion is especially true in the brown coal sub-sector.

Another key reason limiting the negative effects within the coal industry is the fact that the Czech Republic enjoys a diversified energy mix (as seen in table 9).

The brown coal market within the Czech Republic behaves in a similar fashion. Against the background of the end of the coal industry they are making efforts to maximize their profits by coupling the coal production with the coal consumer (i.e. the power plants). Mining companies buy coal fired electricity or heat power plants, while the operators of such power plants are trying to buy their own mines or to secure long-term contracts. The latter two unresolved disputes, discussed previously, are amongst the last disputes in an otherwise (now) stabilised Czech brown coal sub-sector.

The primary factor driving the Czech Republic’s brown coal industry is the ‘territorial ecological limits’ on brown coal mining. This overarches all the activities of players within the coal market, and leads them to secure the whole coal chain to maximise their profits in the last years or decades of their coal sector. The ownership of the whole fuel chain (even though through daughters) seems to be the primary target that the key coal market subjects are aiming for.

The negative aspects (especially that associated with bituminous coal) are connected to expensive coal mining, low market prices of electricity and the high variable costs of the electricity production from coal fired power plants.

The coal industry also attracts strong competition with other sources, especially nuclear energy with very low variable costs but enormous fixed costs, which is essentially the reason the tender for two new nuclear units at the Temelin site was cancelled. Finally, one have to stress that the greatest negative impact of the total dissolution of the bituminous coal sub-sector would not be in the field of energy security, but in the sphere of export. This is due to the well diversified energy mix as well as the specific use of this coal (metallurgical coke and export in the first place, domestic combustion in the second).

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Tab. 8: Exploitable Reserves of Brown Coal

Basin	Company	Mine	Exploitable Reserves		
			As of Jan 2013	Life Expectancy	
North Bohemian Basin	Czech Coal Group	CSA	41.3	2017 (4.5)	2021 (3)
		Vrsany, Sverma	259.7	2044 (8)	2055 (7)
		Centrum	1.3	-	-
		In total	302.3	-	-
	Severoceskedoly, a. s.	Tusimice	227.2	2030 (13)	2035 (10)
		Bilina	154.4	2031 (9.5)	2036 (7)
		In total	381.6	-	-
Sokolovska	Sokolovska uhelna, pravni nastupce, a. s.	Jiri	142.9	2023 (5to6)	2034 (4)
		Druzhba		2030 (4)	2034 (4)
		In total	142.9	-	-
The Czech Republic in total			826.8	-	-

Note: Exploitable Reserves in millions of tons. Life Expectancy in years, possible annual production in millions of tons in brackets.
Source: Energostat

Tab. 9: Installed Capacity in the Czech Electricity Grid on 31 December 2012		
Type of Power Station	Installed Capacity (MW)	Percentage (%)
Thermal Power Station	10644	51.9
Gas Combined Cycle Power Station	521	2.5
Gas Fired Power Station	750	3.7
Hydroelectricity	1069	5.2
Pumped-storage Hydroelectricity	1147	5.6
Nuclear Power Station	4040	19.7
Wind Power	263	1.3
Solar Power	2086	10.2
Geothermal Power	0	0
Total	20520	100
Source: Energeticky regulacni urad, 2013, s. 11.		

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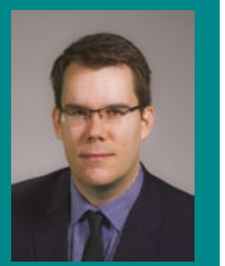

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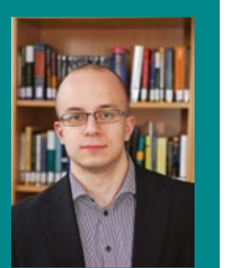

Siemens offers new series of planetary gear

Siemens has widened its portfolio of planetary gear units. The Planurex 3 is available in ten sizes, with a torque range from 1,700 to 5,450kNm. This raises the highest torque in the standard modular system from the previous 2,600kNm up to 5,450kNm. The size grading is harmonised to reduce the jump in power ratings between different sizes. This makes a suitable torque and a suitable transmission ratio available for almost every application.

The gear units also have the highest efficiency in their class. This has been achieved by increasing the torque density (Nm/kg) by an average of 17.2% in comparison to the previous series. A compact design enables space-saving, high transmission ratios to be achieved. This not only reduces the weight, but also the stress on the gear unit and application.

Planurex 3 is part of an integrated drive system (IDS), which is available as a complete solution, comprising motor, gear unit and coupling, combined with an oil supply system. The integrated drive system facilitates economic, efficient plant operation, as the components are perfectly matched to one another.

The technologically further developed Planurex series 3 replaces the Planurex 2 planetary gear unit series, initially in the XL range up to 5,450kNm. The harmonized size grading across the entire torque range allows better dimensioning of the gear units. Thanks to their ruggedness, all sizes of the new planetary gear unit can absorb peak loads up to twice their rated torque. Siemens has also extended the warranty on the Planurex 3, and shortened its delivery times.

Planetary gear units are primarily installed where high output ranges are required in limited space. They are typically used as roller press and central drives for mills in mines.

For further information see www.siemens.com/Planurex3

SATcase maintains vital communication for the industry

In the ever-evolving world of mining, ensuring up-to-date communication is vital to aspects of exploration and production. Dangerous conditions often contribute to volatile situations and the SATcase, a revolutionary new device, can help to improve the safety of all involved on a project by enabling reliable communication.

Because most potential and operational mine sites are in areas where mobile phone service is poor or even unavailable, the simplest, most cost-effective solution has previously been to employ the use of a satellite phone. However, satellite phones can be bulky and users are often frustrated by the need to carry multiple devices to take care of different tasks.

However, the state-of-the-art SATcase combines the functionality of the common smartphone with the capabilities of a satellite phone into one compact and durable unit, creating the perfect communications tool for both managers and workers. Working in conjunction with an app, the ruggedised case makes calls simple and seamless. It has also been designed to stand up to the tough working conditions found at exploration sites.

Information can be securely relayed the second conditions erupt that may have long-term consequences, and this enables companies to respond in ways that can save invaluable time and money. Additionally, in the event of a disaster, the device is equipped with multiple emergency functions that can facilitate rescue by land, air or sea. This includes an SOS button, two way rescue communications, online track and trace for live monitoring, silent alarms and infrared strobes.

HSE personnel will find that this tool is vital to maintaining communication and to facilitating the tracking of lone and remote workers who are often endangered. These capabilities remove any uncertainty, helping search-and-rescue teams to save lives more efficiently and reducing the financial costs often incurred during an operation.

Since those using the SATcase have access to their own smartphone, they can use the device with certified company apps enabled through the satellite system. Users can eliminate the need to carry multiple devices, because the device has multiple functions. As a bonus, it's also compact enough to fit into a jacket pocket.

Jim Thomson, founder and CEO of SATcase, commented: "We feel confident that those in…industry will find our device essential to their daily routines. We've used cutting-edge technology to develop a piece of equipment that will stand up to the impact of extreme outdoor conditions, yet also be capable of exhibiting outstanding performance."

The SATcase includes a smart mix of rescue and personal security features, enabling workers and individuals to remain in constant communications via voice, text and email, whilst being monitored and tracked outside of mobile phone coverage. A global communicator, powerful work tool and life-saving device in one, the SATcase provides a unique set of services for adventurers, mariners, aviators, remote/lone and tele-medicine workers and more. For more information, please visit www.satcase.com