Czech Republic: mining heart of Europe

Strategically located in central Europe, the Czech Republic has a long mining tradition which has been reformed to modern standards

THE Czech Republic has successfully made the transition from a post-communist state to prosperous European nation in the 16 years of its existence. In November 2009 the Czech Republic will celebrate the 20th anniversary of the Velvet Revolution when, as Czechoslovakia, it ceased to be under the control of the former Soviet Union – and benefitted from the fall of communism across Europe. The country was created in 1993 when Czechoslovakia was split into the Czech Republic and Slovakia, and began its accession to the European Union, achieved in 2004. In the first half of 2009, the Czech Republic held the presidency of the European Union (EU) Council.

In the Czech Republic, opportunity often comes disguised as an economic transition. This is especially true with the country's mining industries. Who would have guessed that the tailings from a mine in Jachymov – once the source of the silver tolar coin – would one day be refined into radium, bringing the world into the atomic age? The country has reserves and resources of coal, uranium, feldspar and many industrial minerals including clay and sand. As of December 2008, the country had 1,506 reserved and 801 non-reserved mineral deposits, with the number of exploited deposits markedly lower – 505 reserved and 211 non-reserved.

Before starting its presidency of the EU Council, the Czech Republic identified its main priorities as the three Es – Economy, Energy and European Union in the world. The Energy issues prioritised by the Czech presidency were relevant to the mining industry.

The Czech presidency focused on steps to strengthen medium- and long-term energy security across the whole EU and also completed the discussion on the strategic priorities of the Second Energy Review. The review considered key challenges of the EU energy policy, with a particular focus on security, external relations and the development of infrastructure. The outcome of this discussion will form the basis of the second Energy Action Plan.

The Czech presidency was also an opportunity to discuss European supply and demand of raw materials.

EURACOAL PRESIDENT ADVOCATES CLEAN COAL

In January 2009, Petr Pudil, chairman of Czech Coal AS, was elected president of the European Association for Coal and Lignite – Euracoal. "The current and repeated bottlenecks of supplies of imported energy in the EU underline the necessity, mentioned in the European Commission's current energy strategy, to maintain and further develop coal as a substantial component of Europe's energy mix," Mr Pudil said in his inaugural speech. According to Mr Pudil, coal utilisation can comply with the EU's ambitious climate protection objectives in the long term. Mr Pudil also argues that without new climate-friendly coal technology (clean coal technology), effective climate protection is not possible in Europe or globally.

The Mineral Resources for Europe conference held in Prague in April 2009 addressed the question of demand and supply of minerals for the EU and provided additional input for analysing the 'critical' short-, medium- and long-term needs of mineral resources for Europe's industry and economy.

With high-level participation from downstream industries, as well as European and worldwide mineral suppliers, the conference was a follow-up to the new EU Communication entitled "The raw materials initiative – meeting our critical needs for growth and jobs in Europe".

Continued on page 14

Sedlecký Kaolin is one of the Czech Republic's largest kaolin producers

CZECH REPUBLIC: FAST FACTS

Population: 10.2 million
Capital: Prague
GDP: 3.9%
Main commodities: Coal, uranium, feldspar

CZECH REPUBLIC MINERAL PRODUCTION

	2006	2007	2008
Bentonite (t)[b]	267,000	335,000	235,000
Bituminous coal (Mt)	13	12.5	12.2
Brown Coal (Mt)	48.9	49	47.5
Feldspar (t)	487,000	514,000	488,000
Kaolin (Mt)	3.7	3.6	3.8
- beneficiated	673,000	682,000	672,000
Limestone (Mt)	10	11.3	11
Uranium (t)	383	322	290
- concentrate[a]	358	291	275

a= sales production (without ore milling losses); b=Including montmorillonite clays from kaolin deposits overburden
Source: CGS-Geofond, 2008

Continued from page 13

The Czech economy slowed in late 2008 and the first half of 2009 as the effects of the US financial crisis were felt in Europe. In the first quarter of 2009, the gross domestic product (GDP) decreased by 3.4% and the inflation rate was 4.1%.

The slowdown came after one of the largest economic expansions the country has ever seen. Between 2005 and 2007, the GDP real annual growth reached 6.4%. The real growth of gross value added in the industry was enormously high between 2003 and 2007, with an annual average of almost 12%. Foreign direct investment (FDI) has been an important factor in the growth of the Czech economy: the country has attracted more than US$50 billion in FDI since 1993.

Prior to 1990, the Czech Republic's economy relied on heavy industry, supplying metallurgy and mechanical engineering to COMECON (Council for Mutual Economic Assistance) countries. COMECON was a grouping of communist states that facilitated trade between these nations from 1949 to 1991. The transition of the Czech Republic's economy began when eastern markets shut down, resulting in a huge drop in industrial production as domestic demand changed. The republic also faced strong competition from the liberalisation of foreign trade.

Despite the economy's strong growth in recent years, there has been a relative decrease in mining and quarrying, coke production, and basic and fabricated metals production.

The Czech trade balance for minerals and mineral products is permanently negative due to imports of fuel (crude oil and natural gas), iron ores and materials for mineral fertiliser production. "In terms of value, only one-tenth of raw material imports are from the (EU member states), while 95% of the raw materials extracted in the Czech Republic are exported to the (EU member states)," says Pavel Kavina, a minerals analyst with the Czech Ministry of Industry and Trade.

The country is self-sufficient in commodities such as brown coal and construction minerals. Other commodities, such as bituminous coal, feldspar and silica sand, cover the domestic consumption and are also exported. On the other hand, the country is totally import-dependent on many other minerals such as metallic ores, phosphates and magnesite (CGS-Geofond, 2009).

ENERGY MINERALS

Czech geological reserves of energy minerals are limited to brown coal (sub-bituminous coal and lignite), bituminous coal and uranium. Brown coal deposits are concentrated in the Piedmont Basin of the Krušné hory Mountains. About 60% of the domestic electric energy and heat (heating plant) production is covered by coal from this area. All bituminous coal mining occurs in the Czech part of the Upper Silesian Basin. The rising global price of uranium makes Czech mine production an attractive proposition. However, the extraction of energy minerals is complicated and limited by land accessibility and environmental issues (*see box: Communism's legacy tarnishes mining industry*).

LARGE INVESTMENT IN BITUMINOUS COAL

The 1,550km^2 of deposits of bituminous steam and coking coal in the Upper Silesian Basin straddle the border between the Czech Republic and Poland. About 30% of the reserves are in the Czech Republic and the remaining 70% in Poland. The Ostrava-Karviná Coalfield, containing substantial deposits of coking coal, is essentially the only source of bituminous coal in the Czech Republic.

Bituminous coal is one of the biggest Czech mineral exports in terms of volume and value. Annual exports traditionally are around 5.5Mt, but increased to 6.7Mt in 2006, more than half of all production. Exports – primarily to neighbouring countries Germany, Austria and Russia – dropped slightly in 2008.

Dutch company New World Resources NV is the country's sole producer of hard coal (bituminous coal) through subsidiary OKD AS, based in the northeastern city of Ostrava. OKD's annual coal production amounts to about 12.8Mt. OKD´s low-sulphur coal is a versatile fuel and is used for coking, in the chemical industry and other economic sectors.

Listed on the stock exchanges in Prague, Warsaw and London, New World Resources is investing over Ko8 billion (US$466 million) in its hard coal mines in the

ENVIRONMENTAL IMPACT

Communism's legacy tarnishes mining industry

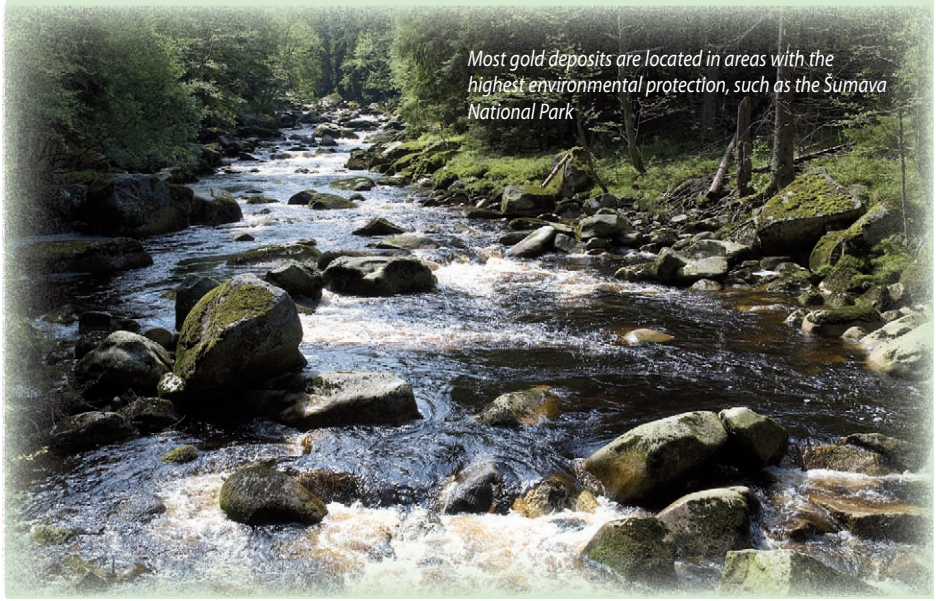
PRIOR to the fall of communism in 1989, which began in Poland and then spread through Eastern Bloc countries including Czechoslovakia, mining activities were undertaken with little respect for the environment and local communities. In many post-communist countries, mining is therefore unpopular in some regions.

With uranium, there is another factor – the use of political prisoners in the mines. After the Communist Party took control of Czechoslovakia in 1948, a large prison camp was established in the town of Jáchymov. Opponents of the communist regime were forced to mine uranium ore under very harsh conditions: the average life expectancy in Jáchymov was 42 years.

The government of the Czech Republic has worked hard to implement strict environmental codes to offset opposition to mining which has developed in some communities. For example, Act No. 114/1992 Sb on nature and landscape protection prohibits mining in specially protected areas of the Czech Republic, including national parks. Although the mining of mineral resources is not prohibited by law in other areas, such as nature reserves, it is very difficult to obtain authorisation. This is because the act prohibits "permanent damage of the soil surface" which practically excludes mineral mining.

The Czech mining law also outlines strict procedures for restructuring coal and ore mines, and eliminating negative environmental consequences of mining in the landscape. Erasing the effects of mining in affected areas is executed in several ways and with various financial resources. These include:

- Use of funds from a financial reserve generated by mining companies for remediation, reclamation and mining damages;
- Use of funds from annual royalties paid by mining companies on mining leases and on extracted reserved minerals pursuant to the Mining Act;
- Phase-out of mining activities and erasing consequences of coal, ore and uranium mining funded by the state;
- Use of proceeds from privatisation of state assets in eliminating old ecological burdens caused by mining, existing prior to privatisation of mining companies;
- A programme that deals with ecological damage caused prior to privatisation of brown coal mining companies in the Ústí nad Labem Region and Karlovy Vary Region. It involves ecological revitalisation upon termination of mining operations in the Moravia and Silesia Region, and reduction of the impacts of the termination of coal mining in the Kladno Region based on government resolutions in 2002. Funds are provided by proceeds from privatisation of state assets.



Most gold deposits are located in areas with the highest environmental protection, such as the Šumava National Park

WORLD'S FIRST MINING LAW IN 1283

The fast development of mining in Bohemia in the 13th century showed the weaknesses of locally established rules and the need for uniform laws. Wenceslaus II, the Czech king from 1283 to 1305, issued the Royal Mining Code of Laws (*Ius regale montanorum*), the first written mining law in the world. At the time of its introduction, it was a modern, carefully formulated code of sound legal principles with specific, regional transcriptions, mining standards and technical instructions. Although developed in the 13th century, *Ius regale montanorum* remained in force until 1834.

King Wenceslaus II giving the Royal Mining Code of Laws to the miners

northeast of the Czech Republic. From a European perspective, this has been one of the largest investments in the mining industry in recent years.

The mines in the Moravia-Silesia Region became the property of New World Resources in 2006 and the launch of its Productivity Optimisation Programme 2010 was one of the first strategic steps. At a time when global demand and price of hard coal were on the rise, there was no doubt as to the validity of this decision. Company management would do the same today despite the economic crisis, OKD chairman Klaus-Dieter Beck says. "The situation on the market is only temporary," Mr Beck told *Mining Journal*. "We are convinced that the demand for raw materials will grow in the long term. When the crisis ends, we will be ready to capitalise on market opportunities."

> "Foreign direct investment has been an important factor in the growth of the Czech economy: the country has attracted more than US$50 billion since 1993"

BROWN COAL LIMITS MAY BE EXTENDED

Brown coal in the Czech Republic is used almost entirely for domestic electricity and heat generation. Less than 2% of production is exported, primarily to countries such as neighbouring Slovakia.

In parallel with the global fluctuation in energy prices, there is an increased possibility for limits on open-cast mining to be extended. Limits were frozen during the early stages of the country's economic transition.

The major Bohemian brown coal basins are located along the Krušné hory Mountains. There are an estimated 1,900km^2 of coal-bearing sediments. The coal is extracted almost entirely through open-pit mining operations.

Continued on page 16

State-owned Diamo is the only company licensed to extract uranium in the Republic

The open pit of Kaznějov: In the last five years, Czech kaolin has been exported to more than 40 countries

LONG HISTORY OF ORE MINING

Ore mining has a very long tradition in Eastern Europe, with the oldest archaeological evidence of gold panning dating back to the ninth century BC.

During the Middle Ages, Bohemia became the centre of gold, silver and tin mining in Europe.

The period 1450-1600 was the peak of Czech ore mining. The first important mines were silver and gold mines. The name of the US currency, the dollar, is derived from the Czech coin known as the tolar.

This was followed by economic developments ushering in the mining of iron and non-ferrous ores. By the turn of the 17th century, many of these deposits had been mined out or abandoned due to technological, economic or political difficulties. Most mining activities were halted for an extended period.

Continued from page 15

Severočeské doly AS is the largest brown coal producer in the Czech Republic. Its largest customer and sole shareholder is the biggest Czech electricity company, ČEZ. Severočeské doly had a 47.6 % share of the domestic market in 2008.

The Czech Coal Group produced nearly one-third of the 47.5Mt of brown coal produced in the Czech Republic in 2008. The group's mines have substantial reserves. Vršanská uhelná AS (VUAS) has the largest coal reserves in the country within current mining limits. Litvínovská uhelná (LUAS) has the largest total reserves outside the existing mining limits. The group also includes Czech Coal AS, a trader in energy commodities such as coal, electricity and greenhouse gas emission allowances, and Czech Coal Services AS, a service company. Czech Coal products go to three market segments: power stations, heat and power plants; company power stations; and households and small boiler installations.

Sokolovská uhelná, another brown coal mining company, is the largest independent electricity producer in the country. Its annual brown coal production is 9.7Mt.

URANIUM – THE SOLE EU PRODUCER

The Czech Republic was formerly a leading world producer of uranium, with production peaking in the 1980s. From 1946 to 2008, over 110,000t of uranium metal in the form of sorted ores and chemical concentrate were produced. In 2008, the Czech Republic ranked 13th with an annual production of 275t U, which is less than 1% of world production. Despite this relatively low ranking, the Czech Republic is the only uranium producer within the EU.

Uranium production in the Czech Republic is balanced between ecologically cleaning up its past, while

maintaining a stake in the future. In the early 1990s, the government began a programme to shut down and reclaim mines, with the exception of the Rožná deposit. In 2005, the government decided to completely end production and close the last uranium mine at Rožná by 2008. But two years later, in 2007, the government reversed its decision – leaving open the possibility of mining at Rožná, provided that it is economically viable. This will be assessed by the government every year.

The only company licensed to extract uranium is Diamo, a state-owned company headquartered in Stráž pod Ralskem. Diamo is charged with producing uranium concentrate for the nuclear energy sector; the ecological shutdown of other chemical mining operations; and conducting limited coal mining operations.

Sedlecký Kaolin product is used to make porcelain

INDUSTRIAL MINERALS

Fine porcelain and cut crystal are the global face of the Czech industrial mineral sector. The most significant product is kaolin from the Plzeň (Pilsen) and Karlovy Vary Regions, as well as from Kadaň and Podbořany. Other important raw materials are glass sand, mainly from Střeleč and Provodín, feldspar from Halámky and Krásno, and clay from the Cheb Basin and Central Bohemia. There are substantial reserves and production of bentonite, limestone and minerals for cement production. The major mineral export commodities are kaolin, quartz sand, limestone, clays, feldspar and dimension stone.

Czech kaolin has a significant place in the global marketplace, and the country's open-cast mines are the source of 3% of the world's annual production. In the past five years, Czech kaolin has been exported to more than 40 European and non-European countries. Destinations include nearby countries (Germany, Slovakia, Austria, Poland and Italy), as well as more distant locations such as the United Arab Emirates, Iran, Bangladesh and Malaysia.

The Czech Republic is one of the top five feldspar producers in Europe and has a 3% share of world production. Feldspar is a growing export item of the Czech Republic. The total volume of feldspar exports doubled between 1999 and 2000, and export levels currently stand at 150,000t/y. Czech feldspar has traditionally been marketed almost exclusively in Central Europe. By far the biggest importer is Poland, followed by Hungary, Germany and Slovakia.

The Doupovské and České středohoří Mountains are home to the country's highest-quality and largest bentonite deposits. Formed by the alteration of volcanic rocks, a large portion of total production has the highest quality rating and is used as a bonding agent in foundry sand, drilling muds and – in a modern twist – cat litter.

The biggest traditional markets for Czech bentonite are Germany and Austria, and since 2007, France. Sedlecký Kaolin AS is one of the Czech Republic's largest kaolin and bentonite producers.

The Czech Republic has solid reserves of limestone. Limestone is used for the production of cement, lime, crushed and milled limestone, including a high quality micro-milled limestone with a broad variety of uses, mainly for desulfurisation. The major obstacle to utilising limestone resources in the Czech Republic is

Continued on page 18

New World Resources is the Czech Republic's only hard coal producer

Continued from page 17

the fact that most of the limestone-rich reserves are located in protected – biodiversity-rich – areas. Mining of limestone is therefore often accompanied by nature protection issues and conflicts.

CONSTRUCTION MINERALS RIDE ON BOOM

The building boom, highway prioritisation and floods of recent years have had a favourable influence on Czech mine production of construction minerals.

Unseasonal flooding in the summer of 2002 kicked off an increase in the production of construction minerals as the nation rebuilt. The floods were caused by very intense and large-scale rainfall that hit mainly the southern, central and northwestern parts of the country, causing enormous damage and losses in all regions. About 100 towns and villages were completely flooded and 653 were partly flooded. Total losses are assessed to be between €2 billion (US$2.8 billion) and €3 billion.

Prague received significant damage from what were deemed to be the worst floods to hit the capital in 200 years, with significant damage to the Prague Metro subway system.

A period of economic growth, with substantial commercial and residential construction, followed the floods from 2004 to 2008. Consumption of crushed stone, sand and gravel increased substantially during the renovation of local infrastructure and road and train networks.

The Czech Republic has very large geological reserves of construction minerals – dimension stone, aggregates (crushed stone, sand and gravel) and brick clays. The transition to a market economy slashed production of construction minerals by nearly half at the beginning of the 1990s, and remained very low and stable (typically for dimension stone and sand and gravel) through the 2002 flooding.

Czech Coal Group's Vršanská uhelná has the greatest coal reserves in the country within current mining limits

CYANIDE BAN HAMPERS GOLD MINING

The Czech Republic does not have any significant resources of metallic ores - except gold, and to some extent, tungsten. However, the use of cyanide to extract minerals is banned in the Czech Republic, which has effectively curtailed gold exploration and mining.

The deposit of gold-tungsten ores in Kašperské Hory is exceptionally large and rich from a European perspective. It is the most important and prospective ore deposit in the Czech Republic. The currently high gold price make the large deposits at the Mokrsko and Vacíkov open-pit mines economically promising. However, there has been no gold mining in the Czech Republic since the end of mining operations at the Krásná Hora Au-Sb deposit in 1992, and at the Zlaté Hory-západ base metal deposit in 1994.

The most promising gold reserves are in or near protected nature areas at the Mokrsko and Kašperské Hory deposits, which is another prohibiting factor.

Veronika Šandová works for EUROMINES – European Association of Mining Industries, Metal Ores and Industrial Minerals – in Brussels as a communication manager. She is working on projects related to sustainable development, image and communication issues.

For detailed data from the Mineral Commodity Summaries of the Czech Republic, see CGS-Geofond at www.geofond.cz.