Ministry of the Environment
of the Czech Republic

MINERAL COMMODITY SUMMARIES OF THE CZECH REPUBLIC 2014

STATISTICAL DATA TO 2013

(Data deadline: August 31, 2014)

Czech Geological Survey

October 2014

Compiled by:
Jaromír Starý
Ivo Sitenský
Dalibor Mašek
Tereza Hodková
Mirko Vaněček
Jaroslav Novák
Anna Horáková
Pavel Kavina

Typesetting:
Oleg Man

Graphic design:
Oleg Man
Ludmila Richterová
Budoš Volák
Renata Kachlíková

geofond@geology.cz
www.geology.cz

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EXPLANATORY NOTES

List of abbreviations, symbols and technical units

AOPK ČR	Nature Conservation Agency of the Czech Republic (Agentura ochrany přírody a krajiny České republiky)
a. s.	initials after a Czech company name indicate that it is a joint stock company (akciová společnost)
bbl	barrel of crude petroleum, 158.99 dm^3; 1 tonne of crude petroleum is approximately 7 bbl (6.76-7.75 bbl for crude petroleum extracted in the Czech Republic)
BP	British Petroleum, British multinational oil and petrochemical company
BRICS	acronym for economic group of Brazil, Russsia, India, China, South Africa
CFR	Cost and Freight (named port of destination)
CHKO	protected landscape area (Chráněná krajinná oblast)
CHOPAV	Natural water accumulation protected area (chráněná oblast přirozené akumulace vod)
CIF	Cost, Insurance and Freight (named port of destination)
CIS	Commonwealth of Independent States, in Russian: Содружество Независимых Государств
CMMI	Council of Mining and Metallurgical Institutions
Coll.	Collection of laws (Sbírka zákonů České republiky) of the Czech Republic
CPPP	constant prices of previous period
CZK	Czech crown (česká koruna)
CZ NACE	Czech adoption of the General Industrial Classification of Economic Activities within the European Communities (Nomenclature générale des Activités économiques dans les Communautés Européennes)
ČBÚ	Czech Mining Authority (Český báňský úřad)
ČGÚ	Czech Geological Office (Český geologický úřad)
ČNB	Czech National Bank (Česká národní banka)
ČNR	Czech National Council (Česká národní rada) – former parliament of the Czech (Socialist) Republic
ČR	Czech Republic (Česká republika)
ČSÚ	Czech Statistical Office (Český statistický úřad)
DP	mining lease (dobývací prostor)
EIA	1) Environmental Impact Assessment 2) Energy Information Administration, section of the Department of Energy of the USA providing energy statistics, data, analysis
EU	European Union
EURATOM	(ESA) – Euratom Supply Agency, European agency for common supply

	policy on the principle of regular and equitable supply of nuclear fuels for European Community users
EUROSTAT	Statistical Office of the European Communities, organisational branch of the European Commission
FDI	foreign direct investment
FMPE	Federal Ministry of Fuels and Power (Federální ministersvo paliv a energetiky)
FNM	National property Fund (Fond národního majetku)
FOB	Free on Board (port) – seller pays for transportation of the goods to the port of shipment, plus loading costs
GDP	Gross domestic product
GVA	Gross value added (GVA) is a widely used indicator of the total economic performance of each branch. It is an indicator corresponding to the GDP in the whole national economy. It is calculated by subtraction of the intermediate consumption (consumption of the raw materials, energy, materials) from the total value of the production (in terms of accounting, this is the difference between the sales and other services of companies and their consumption of materials, energy and services, this is therefore the sum of their book values added)
IEA	International Energy Agency
IM	Industrial Minerals (journal)
IMF	International Monetary Fund
JORC	Joint Ore Reserves Committee
KKZ	Commission for Classification of Mineral Reserves (Komise pro klasifikaci zásob)
k. s.	initials after a Czech company name indicate that it is a limited partnership company (komanditní společnost)
kt	kilotonne, 1,000 t
Ma	Million of years
MB	Metal Bulletin (journal)
MCS	Mineral Commodity Summaries, mineral yearbook of the US Geological Survey
MHPR	Ministry of Economic Policy and Development (Ministerstvo pro hospodářskou politiku a rozvoj)
mill	million, 10^6
MUS	Mostecká uhelná společnost, a.s.
MŽP ČR	Ministry of the Environment of the Czech Republic (Ministerstvo životního prostředí České republiky)
N	not available or not reliable data
NP	natural park (Národní park)
OBÚ	Regional Mining Authority (Obvodní báňský úřad)
OPEC	Organization of Petroleum Exporting Countries
pcs	pieces
PKÚ	Palivový kombinát Ústí, s.p.
POPD	plan of mine development work of reserved mineral deposits (plán otvírky, přípravy a dobývání výhradních ložisek)
PÚ	exploration area (průzkumné území)
ROPO	Recognised Overseas Professional Organizations

Sb.	Collection of Laws (abbreviated as Coll.) of the Czech Republic
SD	Severočeské doly, a.s.
SITC	Standard International Trade Classification
s. p.	initials after a Czech company name indicate that it is a state public enterprise (státní podnik)
spol. s r. o.	initials after a Czech company name indicate that it is a limited liability company (společnost s ručením omezeným), ditto initials s. r. o.
s. r. o.	initials after a Czech company name indicate that it is a limited liability company (společnost s ručením omezeným), ditto initials spol. s r.o.
SU	Sokolovská uhelná, právní nástupce, a.s.
t	metric tonne, 1,000 kg, 1,000,000 g
ths	thousand, 10^3
UNCTAD	United Nations Conference on Trade and Development
UNECE	United Nations Economic Commission for Europe
UNFC	United Nations Framework Classification
UNSTAT	United Nations Statistics Division (http://unstats.un.org/unsd/default.htm)
USGS	United States Geological Survey – Geological survey of the USA
v. o. s.	initials after a Czech company name indicate that it is an unlimited company (general partnership) (veřejná obchodní společnost)
VAT	Value Added Tax
WBD	Welt Bergbau Daten (World Mining Data), mineral yearbook of Austrian Federal Ministry for Economy, Family and Youth
WNA	World Nuclear Association
ZCHÚ	specially protected area (zvláště chráněné území)

Exchange and inflation rates of currencies in which minerals are priced

Annual inflation rates (%) in the USA (US), the United Kingdom (UK), the Euro Area (EUR) and the Czech Republic (CZ)

	US	UK	EUR	CZ
1991	4.2	7.4	–	56.6
1992	3.0	4.3	–	11.1
1993	3.0	2.5	–	20.8
1994	2.6	2.1	–	10.0
1995	2.8	2.6	–	9.2
1996	2.9	2.4	–	8.8
1997	2.3	1.8	–	8.4
1998	1.5	1.6	–	10.6
1999	2.2	1.3	1.1	2.3
2000	3.4	0.9	2.1	3.8
2001	2.8	1.2	2.4	4.7
2002	1.6	1.3	2.3	1.8
2003	2.3	1.4	2.1	0.1
2004	2.7	1.3	2.1	2.8
2005	3.4	2.0	2.2	1.8
2006	3.2	2.3	2.2	2.5
2007	2.9	2.3	2.1	2.8
2008	3.8	3.6	3.3	6.3
2009	–0.3	2.1	0.3	1.0
2010	1.6	3.3	1.6	1.5
2011	3.1	4.5	2.7	1.9
2012	2.1	2.8	2.5	3.3
2013	1.5	2.6	1.3	1.4

Notes:

- *source – IMF. World Economic Outlook Database. October 2013*
- *inflation rates based on average annual changes of consumer price indices (index, 2000 = 100)*

Average yearly exchange rates of CZK against EUR, USD and GBP

	EUR	USD	GBP
1991	–	29.5	52.0
1992	–	28.3	49.9
1993	–	29.2	43.8
1994	–	28.8	44.0
1995	–	26.5	41.9
1996	–	27.1	42.3
1997	–	31.7	51.9
1998	–	32.3	53.4
1999	36.9	34.6	56.0
2000	35.6	38.6	58.4
2001	34.1	38.0	54.8
2002	30.8	32.7	49.0
2003	31.8	28.2	46.0
2004	31.9	25.7	47.1
2005	29.8	23.9	43.6
2006	28.3	22.6	41.6
2007	27.8	20.3	40.6
2008	24.9	17.0	31.4
2009	26.4	19.1	29.7
2010	25.3	19.1	29.5
2011	24.6	17.7	28.3
2012	25.1	19.6	31.0
2013	26.0	19.6	30.6

Source: Czech National Bank

Mineral reserve and resource classification in the Czech Republic and its evolutional comparison with international classifications

Czech classification

After 1948 the reserve classification of the USSR was progressively adopted in Czechoslovakia, of which the Czech Republic formed part. A Commission for Classification of Mineral Reserves *(Komise pro klasifikaci zásob – KKZ)* was established in 1952, as a state agency to review the categorisation and estimation of reserves of all types of minerals, except radioactive ores.

Initially geological reserves (all reserves in their original state in the deposit without subtracting losses from mining, beneficiation and processing) were classified into subdivisions of groups and categories (slightly simplified).

Groups of geological reserves according to industrial utilisation:

nebilanční potentially economic – currently unminable due to a low grade, small deposit thickness, particularly complicated mining conditions, or due to the unfamiliarity with economic processing methods for the given mineral type, yet which may be considered as exploitable in the future

bilanční economic – minable, suitable for industrial utilisation and for the technical mining conditions for extraction

Categories of geological reserves according to the degree of deposit exploration:

A – explored in detail and delimited by mining works or boreholes, or by a combination of these. Geological setting, distribution of quality mineral types in the deposit and the technological properties of the mineral are known to such a degree that allow for the development of a method for beneficiation and processing of the mineral. Natural and industrial types of minerals are given. Reserves A include those parts of the deposit, where the geological setting, hydrogeological conditions and mining conditions are known to such a degree that a deposit development method can be developed**.**

B – explored and delimited by mining works or boreholes, or by a combination of these in a sparser network than in category A. It further includes reserves of deposits adjoining blocks of category A, verified by exploration works. The manner of geological setting, natural and industrial types of minerals are determined without knowing their detailed distribution in the deposit. The quality and technological characteristics of the minerals are given within a range allowing for a basic choice of a processing method. Hydrogeological conditions and general principles of deposit development are sufficiently clarified.

C_1 – determined by a sparse network of boreholes or mining works, or by a combination of these, as well as reserves which adjoin the reserves of categories A and B, if they are justified from a geological perspective. They also include the reserves of relatively complex deposits with a very irregular distribution of the mineral, even though these deposits were explored in detail. Included here are the deposit reserves partially mined-out with low recovery methods. The setting conditions, quality, industrial types and processing technology of the mineral are defined based on analyses or laboratory tests of samples, or based on analogy with explored deposits

of a similar type. The hydrogeological conditions and the principles of deposit development are defined quite in general.

C_2 – are assumed based on geological and geophysical data, confirmed by sampling of the mineral deposit from outcrops, isolated boreholes or mining works. Also, reserves adjoining the reserves of A, B, C_1 categories, where geological conditions for this exist.

It is further defined that project development and investment amounts for the construction of mining facilities are permitted on the basis of the economic mineral reserves in categories A + B + C_1, which are therefore reserves eligible for industrial utilisation. That is why, in practice, the economic reserves of categories A, B, C_1, or their total A+B+C_1 were designated by the term industrial reserves.

Further improvement of the classification introduced Order of the CSSR Government no.80 in 1988 [7].

In 1963, KKZ established the prognostic reserves *(prognózní zásoby)* category in an amendment of its Principles for the Classification of Solid Minerals (hereinafter Principles) *(Zásady pro klasifikaci zásob pevných nerostných surovin)*. They were defined as unexplored mineral reserves, assumed on the basis of the formation patterns and the distribution of mineral deposits, and investigations, dealing with the geological structure and the history of geological evolution of the evaluated locality. The parameters for the evaluation of prognostic reserves (strike, length, thickness, average grade and the like) are determined according to geological assumptions or they are derived. According to the Principles, prognostic reserves are not listed in the national Register of Reserves *(bilance zásob)*. They serve only as a basis for future planning of geological exploration.

In 1968, KKZ innovated the definition of prognostic reserves. In the amended Principles for reserve classification, it established the division of reserves into proved (by exploration or mining) and assumed, or prognostic. Prognostic geological reserves are unverified reserves, however they are assumed based on geological, geophysical and other scientific knowledge and material. They are predominantly the reserves of larger localities and formations, and, in isolated cases, the reserves of unexplored parts of large structures or deposits.

Due to the establishment of the prognostic reserve category, geological reserves *(geologické zásoby)* can, with regard to contents, be translated into English as total resources. However up to 1989, the term resources did not appear in Czech or Czechoslovak classifications. But up to now, reserves also represent mineral accumulations, which meet the reserves criteria due to being explored, but which do not meet them due to technical and economic reasons (potentially economic reserves *nebilanční zásoby*). They are therefore mineral resources.

In 1981, the Czech Geological Office issued Directive No. 3 [3], where the present prognostic reserves *(prognózní zásoby)* were divided into categories D_1, D_2, D_3. They are defined as follows:

D_1 – relate to verified mineral deposit reserves, with which they form one whole deposit. Determined in delimited areas and quantifiable based on positive detection of an existing mineral and its basic quality characteristics.

D_2 – territorially independent. They are determined in a delimited area based on positive detection of an existing mineral and its basic quality characteristic. Analogies are also used for their determination.

D_3 – determined on the basis of regional investigation. So far, mineral existence has not been proven in such a way, in order to be able to delimit the area of their occurrence and to quantify the prognosis.

In October 1989, the Czech Geological Office issued Decree No. 121/1989 Coll., which redefined the prognostic reserve categories, changed their designation, and for the first time in the Czech Republic established the term resources. The term prognostic resources has been used instead of the term prognostic reserves ever since. The categories P_1, P_2, P_3 were as follows:

P_1 – assumed due to the continuation of an already investigated deposit beyond the reserve outline of category C_2 or due to the discovery of new deposit parts (bodies). The basis for this category are the results of geological mapping, geophysical, geochemical and other work in the area of possibly occurring prognostic resources: geological extrapolation of data results from the investigation, or the verification of part of the deposit. In justified cases this category also includes areas with isolated technical works which do not fulfill the requirements in order to be included in the reserves category C_2. The quantity and quality of the prognostic resources of this category is estimated according to the given deposit type and its part with detected reserves.

P_2 – assumed in basins districts and geological regions, where deposits of the same formation and generation type were detected. It is based on a positive evaluation of deposit indications and anomalies observed during geological mapping and geophysical, geochemical and other work, whose prospect is, if necessary, confirmed by a borehole or surface excavation work. The prognostic resource estimate of assumed deposits and the concept of the shape and dimensions of the bodies, their composition and quality, are derived by analogy with known deposits of the same type.

P_3 – assumed solely on the basis of conclusions concerning the formation possibilities of the deposit types under consideration with regard to favourable stratigraphic, lithological, tectonic and paleogeographic conditions detected while evaluating the locality during geological mapping, and during analysis of geophysical and geochemical data. The quantity and quality of prognostic resources is estimated according to assumed parameters of the deposit development by analogy with more closely explored localities, where deposits of the same genetical type were detected or verified. The prognostic resources of minerals in category P_3 can only be displayed by a surface projection.

The amendment of Mining Act no. 541/1991 Coll. divided the classification of reserves (reserved deposits) according to exploration into the categories of prospected reserves (*vyhledané zásoby)* and explored reserves *(prozkoumané zásoby)*, and, according to exploitability conditions, into economic reserves *(zásoby bilanční)* and potentially economic reserves *(zásoby nebilanční)*

Economic reserves – suitable for existing technical and economic conditions in exploiting a reserved deposit.

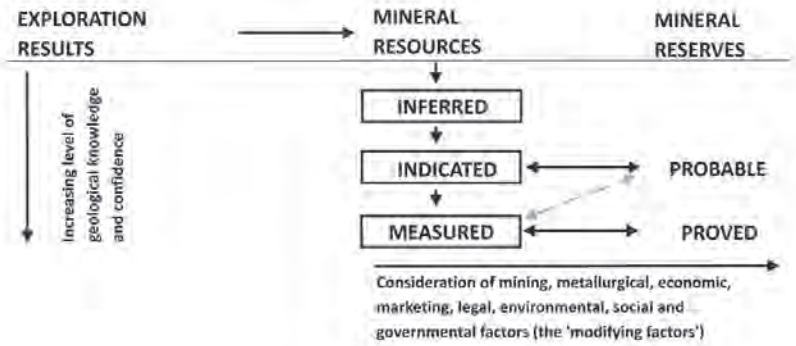
Potentially economic reserves – currently unexploitable due to being unsuitable for existing technical and economic conditions of exploitation, yet assumed to be exploitable in the future in consideration of expected technical and economic development.

Neither this amendment nor any other regulation defined the content of the terms **prospected** and **explored** reserves. In practice, these categories are identified with the categories of reserve exploration, as they were in effect before the amendement of Mining Act no. 541/1991 Coll., in the following manner: explored reserves = sum of reserve categories A + B + C_1 (also called industrial), prospected reserves = reserves of category C_2.

International classifications

International systems of classifying reserves and resources developed most rapidly in the last quarter of the twentieth century. In 2001, the Pan European Reserves and Resources Reporting Committee (PERC) published the Code for Reporting of Mineral Exploration Results, Mineral Resources and Mineral Reserves [1]. This corresponds to the reporting standards of the Australian, Canadian, South African and other organisations grouped in the Combined Reserves International Reporting Standards Committee (now called Committee for Mineral Reserves International Reporting Standards) – CRIRSCO which is a subcommittee of CMMI (Council of Mining and Metallurgical Industries). It is summarized as follows:

Relations between mineral reserves and resources, their definitions
Chart of the relations [1]



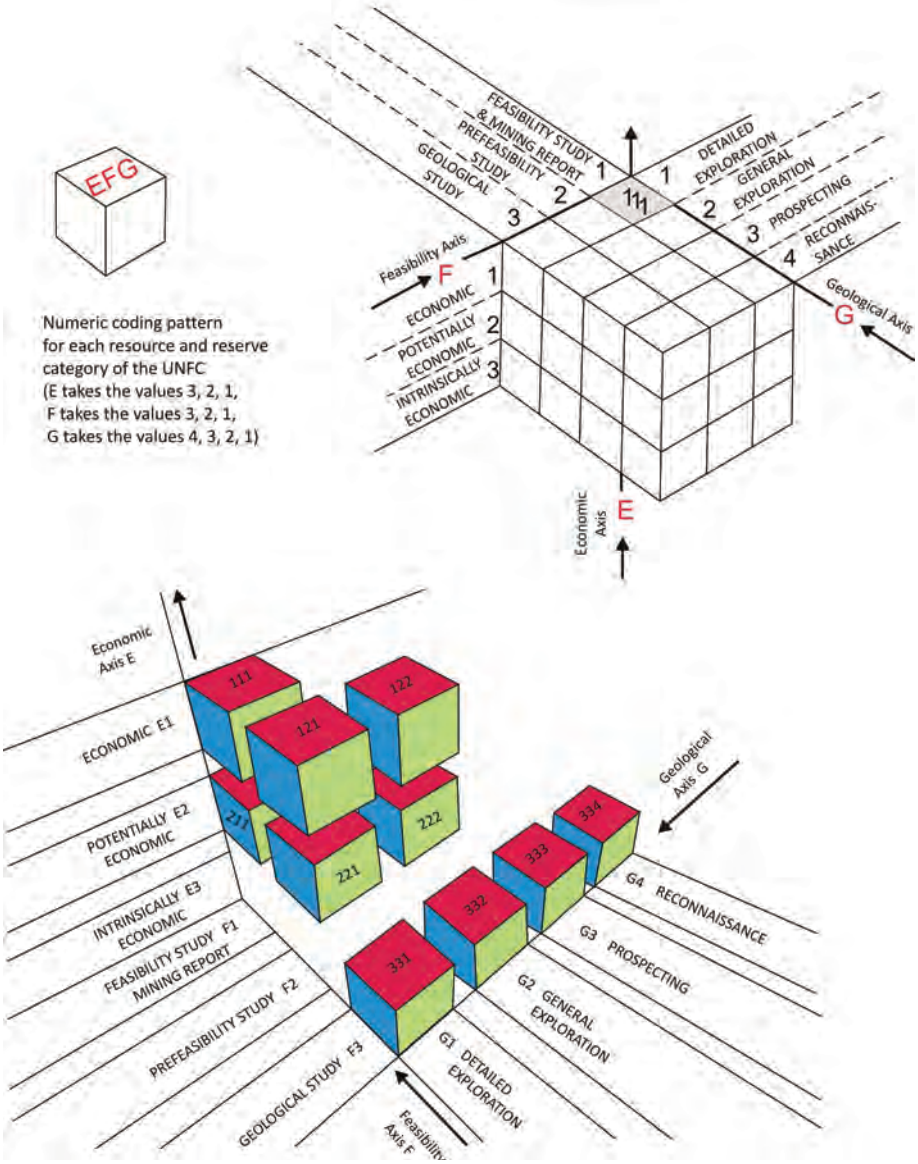
The given definitions are in accordance with the definitions of the UNFC (United Nations Framework Classification) classification of the UN, published by UN-ECE in 1997 [4]. This classification divides (just as, for example, the classification of the USA [5]) its categories according to economic feasibility (quantity and quality of the mineral in situ) in one direction into 3 groups. For the division according to the level of geological knowledge it does not use one direction, one criterion (verification according to the technical work carried out), as is common, but two directions, two criteria: 1) According to which of the 4 phases of exploration (from geological to mining) and 2) according to which study (from geological to mining) the given mineral accumulation was prospected or verified. Thus in the area between the axes E (economic), F (feasibility) and G (geological), a total of 36 categories can be established mechanically, out of which about 10 actually exist. The categories are marked with a three-digit code and a priori do not have designations (although recommended designations exist).

(Notice: In the course of discovery and verification of mineral deposits and their estimations of mineral resources and reserves two fundamental stages connect with each other: prospecting and exploration.

Prospecting is a set of geological activities aiming at discovery of a mineral accumulation (mineral accumulations) which could be a mineral deposit (mineral deposits) and to express in numbers its (their) mineral resources.

Exploration is to decide if a mineral accumulation (prospective mineral deposit) is a mineral deposit or not and if it is, to estimate its mineral reserves.)

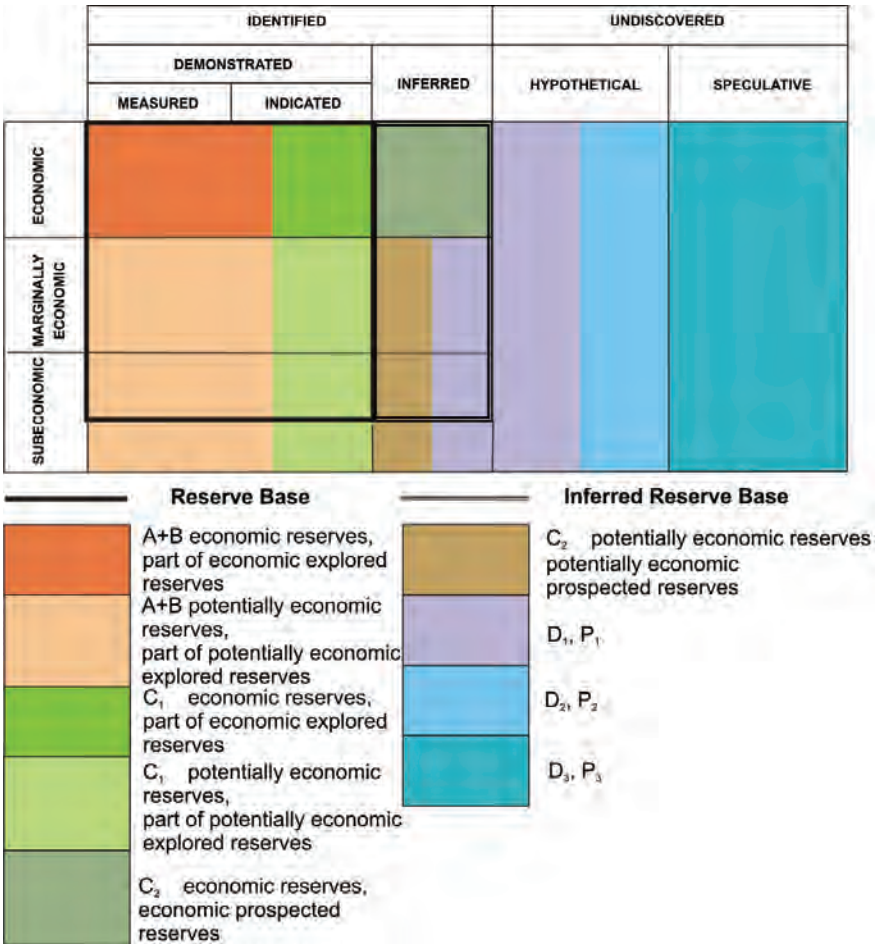
Two ways of presenting UNO spatial mineral resource - reserve classification system (United Nations Framework Classification)[4]



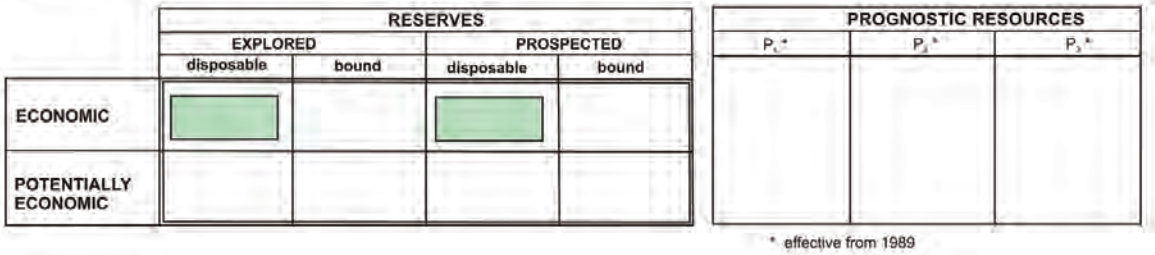
An important aspect of the European and similar reporting codes is the concept of the "competent person". He/she is responsible for the calculation of reserves and its categories, is a member of an acknowledged professional society (which sees to the expertise and ethics of its members via sanctions), and has expert and moral qualities. His estimates are accepted as reliable by banks and securities exchanges. Competent persons are members of Recognized Overseas Professional Organizations (ROPO). A list of organisations is compiled by the Australasian Joint Ore Reserves Committee (JORC).

Although some national and international classifications are relatively complicated, the mining industry frequently still makes do with only the categories of proved and probable reserves. If it is seeking funds from banks or share issues (inirial public offering) on securities exchanges, it must respect the regulations for reporting its mineral reserves. The securities exchanges have reporting requirements which are particularly strict or even provided by law. In general they

Comparison of the mineral resource classification valid in the USA from 1980 [5] with the reserve and resource classifications valid in the territory of the Czech Republic from 1956



HISTORY OF RESERVE AND RESOURCE CLASSIFICATION ON THE TERRITORY OF THE CZECH REPUBLIC



* effective from 1989

Geological reserves = all reserves in their original state without considering mining losses and dilution

Exploitable reserves = economic reserves reduced by estimated mining losses

reserves of categories A + B + C (before 1991) = explored reserves (since 1991)
reserves of category C_2 (before 1991) = prospected reserves (since 1991)
disposable reserves = reserves mining of which is not made impossible by protection of surface objects and mining workings
bound reserves = reserves in protection pillars of surface objects and mining workings
exploitable reserves = economic geological reserves reduced by amount of prospective mining losses connecting with selected mining technology or with natural conditions
categories A, B, C_1 = so-called industrial categories of reserves (before 1991)
reserve of categories A + B + C_1 = so-called industrial reserves (before 1991), also - in the limited interpretation - economic explored disposable reserves

require adherence to the reporting codes of the international organizations such as those that cooperate in framing the European Code [1].

Comparison of Czech and international systems of classification

The following scheme and table compare the reserve and resource classifications of the Czech Republic with the international classifications discussed above.

Is to be noted that reserves in the Czech classification still include potentially economic reserves, i.e. reserves which are currently not recoverable and which are, therefore, potentially economic resources. The term reserves as used, by contrast, in standard international classifications represents only the parts of explored resources which are available for immediate or developed extraction. All other registered parts are resources, not reserves, of a given mineral.

Comparison of UNFC with the reserve and resource classifications of the Council of Mining and Metallurgical Industries (CMMI) [4] and of the Czech Republic

Code of the UNFC category	Proposed designation of the UNFC category	CMMI category	Czech categories up to 1981	Czech categories in 1981 – 1989	Czech categories in 1989 – 1991	Czech categories after 1991
111	Proved Mineral Reserve	Proved Mineral Reserve	economic reserves – part of exploitable part* A + B	economic reserves – part of exploitable part* A + B	economic reserves – part of exploitable part* A + B	part of exploitable part* of explored economic reserves
121 + 122	Probable Mineral Reserve	Probable Mineral Reserve	economic reserves – part of exploitable part* of A + B + C_1	economic reserves – part of exploitable part* of A + B + C_1	economic reserves – part of exploitable part* of A + B + C_1	part of exploitable part* of explored economic reserves
123		Inferred Mineral Resource	economic reserves – C_2	economic reserves – C_2	economic reserves – C_2	prospected economic reserves
211	Feasibility Mineral Resource	Measured Mineral Resource	potentially economic reserves – A + B	potentially economic reserves – A + B	potentially economic reserves – A + B	part of explored potentially economic reserves
221 + 222	Prefeasibility Mineral Resource	Indicated Mineral Resource	potentially economic reserves – C_1	potentially economic reserves – C_1	potentially economic reserves – C_1	part of explored potentially economic reserves
223		Inferred Mineral Resource	potentially economic reserves – C_2	potentially economic reserves – C_2	potentially economic reserves – C_2	prospected potentially economic reserves
331	Measured Mineral Resource	Measured Mineral Resource	potentially economic reserves – A + B	potentially economic reserves – A + B	potentially economic reserves – A + B	part of explored potentially economic reserves
332	Indicated Mineral Resource	Indicated Mineral Resource	potentially economic reserves – C_1	potentially economic reserves – C_1	potentially economic reserves – C_1	part of explored potentially economic reserves
333	Inferred Mineral Resource	Inferred Mineral Resource	potentially economic reserves – C_2 + part of prognostic reserves	potentially economic reserves + part of D_1	potentially economic reserves + part of P_1	prospected potentially economic reserves + part of P_1
334	Reconnais-sance Mineral Resource	not available	part of prognostic reserves	$D_2 + D_3$ + part of D_1	$P_2 + P_3$ + part of P_1	$P_2 + P_3$ + part of P_1

** geological reserves reduced by amount of prospective mining losses*

Conclusions

If they are to be of practical use national and international classifications have to respect the information base given by the reserve estimations of mining enterprises. It may be unsuitable to overly expand the classification requirements or expectations beyond the realistic means of this base. Combining a classification with a study (project), which classifies given resources or reserves, or with a prospecting and exploration phase, in which mineral resources and reserves were estimated, causes problems. For economic (acquiring financial means, taxes, market position) or political reasons, a prospector or a mining company developer may be led, for example, to move their exploration phase higher or lower in comparison with its actual position. In socialist (communist) Czechoslovakia with its completely nationalised industry, commerce and services, results of geological prospecting and exploration were judged not according to the mineral reserves prospected or verified by exploration, but according to the fulfillment of exploration work plans, whether planned investments in exploration were completely spent on "drilling and digging", or not. The wage of the employees of exploration and mining organisations depended on the fullfilment of plans. That is why at all levels**,** there was also an interest, that prospecting and exploration constantly continue. Consequently, prospecting strictly speaking and general exploration were the most frequent type of prospecting, and verified reserves were possibly never categorised under A. They were commonly only inserted into categories C_1 and C_2**.** That enabled their permanent verification. On the other hand, many mining organisations mined the reserves of category C_2 which however could have been ranked factually higher; they were over-explored.

References

[1] Code for reporting of mineral exploration results, mineral resources and mineral reserves (The Reporting Code). – http://geolsoc.org.uk/webdav/site/GSL/shared/pdfs/Fellowship/UK_Euro%20Reporting%20Code.pdf

[2]* Schejbal, C. (2003): Problematika výpočtu a klasifikace zásob a zdrojů pevných nerostných surovin. – Sborník vědeckých prací Vysoké školy báňské – Technické univerzity Ostrava, ročník XLIX, řada hornicko-geologická, monografie 9, s. 139–161 (Transactions of the VŠB – Technical University Ostrava, vol. XLIX, Mining and Geological Series, Monograph 9, pp. 139–161).

[3]** Směrnice č. 3/1981 Českého geologického úřadu pro hodnocení a evidenci geologických prognóz a prognózních zásob nerostných surovin. – Geologický průzkum, 23, 10:Zpravodaj ČGÚ, 5: 1–2.

[4] United Nations international framework classification for reserves/resources – solid fuels and mineral commodities. – United Nations Economic and Social Council, Economic Commission for Europe, Committee on Sustainable Energy, 1997. Geneva.

[5] U. S. Bureau of Mines and U. S. Geological Survey. Principles of a resource/reserve classification of minerals. – U. S. Geological Survey Circular 831, 1980.

[6]*** Lhotský, P. – Morávek, P. (2002): Ložiskový průzkum a hospodaření se zásobami výhradních ložisek (návrh k analýze třetí části horního zákona). – Uhlí, rudy, geologický průzkum, 5: 8–15.

[7]**** Nařízení vlády Československé socialistické republiky č.80/1988 Sb., o stanovení kondic, klasifikaci zásob výhradních ložisek a posuzování, schvalování a státní expertize jejich výpočtů.

Translations of Czech article (and legislation) titles:

* *Problems of evaluation and classification of reserves/resources of solid mineral raw materials*

** *Directive no. 3/1981 of the Czech Geological Office for evaluation and registration of geological prognoses and prognostic reserves of minerals*

*** *Mineral exploration and management of reserved deposit mineral reserves (proposal for analysis of the third part of the Mining Act)*

**** *Order of the Czechoslovak Socialist Republic Government, on setting of standards, classification of reserves of reserved deposits and on assessing, approval and the State expertise of their estimates*

INTRODUCTION

This year, the yearbook *Mineral Commodity Summaries of the Czech Republic* is being published for the twenty-first time in its history. It was published and distributed on behalf of the Ministry of Economy until 1996, and on behalf of the Ministry of the Environment from 1997 to 2010. The year 2011 marked the first time that the Ministry of the Environment did not commission the Czech Geological Survey – Geofond to compile and distribute the yearbook, and the necessary financial resources for this work were therefore unavailable.

In order to meet the present as well as future needs of the interested public at home and abroad, the Czech Geological Survey – Geofond nonetheless decided to publish the publication albeit with a minimum content and extent in both language versions (Czech and English), however only in electronic format on the Internet on its website. Its Czech and English editions (including publications since 1993) are available to the public at http://www.geology.cz/extranet/publikace/online/surovinove-zdroje.

After the dissolution of the state-funded organization Czech Geological Survey – Geofond on 31 December 2011, the semi-budgetary organization Czech Geological Survey was charged with compiling the publication *Mineral Commodity Summaries of the Czech Republic*. Last and this year, the Ministry of the Environment again commissioned the compilation and distribution of the publication, by increasing the budget of the Czech Geological Survey, under which Geofond Department 600 continues to compile the yearbook. This enabled the continuation of the unique research (and its publication) regarding the geological evolution of the area of the Czech Republic and the development of the Cech and global economies relate to minerals, economic situation of domestic mining companies and regarding the expenses of rectifying negative impacts of mining in the Czech Republic. The research of price development of aggregates namely in Central European countries could prosecute and be published too.

The yearbook is published and distributed predominantly in electronic format.

The publication continues to provide information for those interested in the research, exploration and mining of mineral deposits in the Czech Republic and in the environmental impact of mining in the Czech Republic. It of course continues to cover the most important minerals of the Czech Republic that are or have recently been of industrial importance, but also those minerals, whose reserves or (approved and unapproved) resources have not been mined in the Czech Republic in the past. The listed minerals also include minerals unmined in the present and past, without existing resources and reserves, which are items of Czech foreign trade that can be monitored via tariff items. The publication includes basic data on the status and changes in the mineral reserves of the Czech Republic taken from the Register of Mineral Deposit Reserves of the Czech Republic *(Bilance zásob výhradních ložisek nerostů České republiky)* (hereinafter "the Register"), which is published for a limited number of state administration agencies.

Additional information on domestic prices of minerals, imports and exports, major mining companies, and the location of mineral deposits is intended to assist in understanding the mineral potential of the Czech Republic and to stimulate investment in the minerals

industry. This is also aided by the listed prognostic resources, both officially approved by the Commission for Projects and Final Reports of the Ministry of the Environment *(Komise pro projekty a závěrečné zprávy – KPZ)* in categories P_1, P_2, P_3 and unapproved by KPZ (mentioned only in expert reports).

The mineral reserves presented are geological reserves, also called *total reserves,* i.e. original reserves (in situ) within individual deposits, estimated according to the given classification and technical-economic conditions of their exploitability. The initial data come from mineral reserve estimates, which were approved or verified in the past by the Commission for Classification of Mineral Reserves and/or by the Commission for Exploration and Mining of Reserved Minerals of the former MHPR ČR and MH ČR, or by former commissions for management of mineral reserves of individual mining and processing industries. Uranium reserves and reserve estimates were approved by the Commission for Classification of Radioactive Mineral Reserves of the former Federal Ministry of Fuels and Energy. Currently, an approval of a reserve estimation lies within authority of the subject financing the estimation. If the subject is a private company, the company itself approves its reserve estimation. If the subject is the state, the KPZ approves the estimation. In accordance with section 14, article 3) of the Mining Act no. 44/1988 Coll. as amended also the private company submits its reserved mineral reserve estimation to the KPZ via the Ministry of the Environment of the Czech Republic, so that the KPZ may review if the estimation report contents comply with the provisions of the Mining Act.

There are reserved and non-reserved minerals and deposits as defined by the Mining Act no. 44/1988 Coll., as amended. Reserved minerals always form reserved deposits which are owned by the Czech Republic. Non-reserved deposits are owned by landowners. Non-reserved minerals (construction minerals) can form both reserved and non-reserved deposits. Until 1991, reserved deposits of sufficient mineral quantity and quality were proclaimed "suitable for the needs and development of the national economy" as defined by the Mining Act at that time. Since 1991, the newly recognised and explored deposits of non-reserved minerals form non-reserved deposits.

In 1993–2001, the Ministry of the Environment along with the Ministry of Industry and Trade undertook a fundamental economic revaluation of the mineral wealth of the Czech Republic**.** In 2003–2006, the task has continued to a smaller extent. Therefore compared to past years, many considerable changes have occurred in the number of deposits and registered reserves of many minerals (especially metallic ores).

The *Mineral Commodity Summaries of the Czech Republic* includes selected minerals according to whether they are or were mined in the territory of the Czech Republic. Currently mined minerals also include approved prognostic resources, if existing. Currently unmined minerals are divided into those that were mined in the past and those that have never been mined. In both cases, it is distinguished whether their resources and reserves are known or not and, generally, also whether they are metallic ores or industrial minerals. Separate chapters are dedicated to each mineral, or mineral grouping common in its deposit. Each chapter is structured identically. The separate chapters of *currently mined minerals* listed – mineral fuels, industrial and construction minerals, and metallic ores, which are of economic importance and of substantial reserves in the territory of the Czech Republic – consist of six parts.

Part 1 – Registered deposits and other resources of the Czech Republic – is based on the inventory of mineral deposits of the Czech Republic and, for the majority of minerals, includes a list of deposits and their location. The names of exploited deposits are given in bold. As for energy minerals and some industrial minerals, only regions and basins rather than single

deposits are given. As for dimension stone and construction minerals, which are scattered in hundreds of deposits over the whole territory of the Czech Republic, their groupings are located in the subdivisions of reserved, non-reserved, exploited and unexploited deposits.

Part 2 – Basic statistical data of the Czech Republic as of December 31 – are extracted especially from the Register. There are 3 groups of minerals (ores, energy minerals, and reserved industrial and construction minerals) registered in the Czech Republic. Mine production of non-reserved deposits has been monitored since 1999. Approved prognostic resources are stated, too, if proved they exist.

NOTE: The **Register** *presents the* **reserves** *data in the categories on exploration (prospected, explored) and economic use (economic, potentially economic), as stipulated by relevant statutes starting with the Mining Act.* **Reserves** *include* **potentially economic reserves**, *i.e. reserves which are currently not recoverable and which are, therefore,* **potentially economic resources.** *Consequently,* **total mineral reserves** *are in reality* **total mineral resources**. *The term* **reserves** *as used, by contrast, in standard international classifications represents only the parts of explored resources which are available for immediate extraction. All other registered parts are resources, not reserves, of a given mineral.* ***The relationship of domestic and foreign classifications of mineral reserves and resources is described in the separate chapter of this yearbook*** **"Mineral reserve and resource classification in the Czech Republic and its evolutional comparison with international classifications".**

Part 3 – Foreign trade – provides information on import and export, and on average import and export prices of important tariff items of the given raw material (and cites international numeric codes of the tariff items). The foreign trade data are the latest (continuously reviewed) data of the Czech Statistical Office (ČSÚ) – without analyses of their reliability.

Part 4 – Prices of domestic market – provides indicative prices on domestic production, import and export prices. Domestic prices do not include VAT.

Part 5 – Mining companies in the Czech Republic as of December 31, 2013 – provides a list of companies mining the given mineral in the territory of the Czech Republic. The companies are listed according to the production level. Their addresses are available at the Czech Geological Survey.

Part 6 – World production and world market prices – provides data on mining and production of commercial products for the last 5 years, and lists sigificant world producers, i.e. the top 5–12 countries in world production. Data on resources and reserves of minerals is often used to be presented. Evolution of world prices is mentioned as current quoted or indicative prices in the last five years.

Numerous domestic and foreign data, used in compiling the present yearbook, came from journals, expert literature and the latest editions of various international statistical yearbooks.

MINERAL BASE OF THE CZECH REPUBLIC AND ITS DEVELOPMENT IN 2013

Tomáš Sobota, Jana Mentbergerová,
Ministry of the Environment of the Czech Republic

1. Legal framework for mineral resource use

1.1. Reserved and non-reserved minerals and their deposits

The minerals defined in Act No. 44/1988 Coll., on the Protection and Use of Mineral Resources (the Mining Act) as amended, are classified as being reserved and non-reserved. Natural accumulations of reserved minerals form reserved mineral deposits which constitute the mineral wealth of the country and are owned by the Czech Republic. Deposits of non-reserved minerals (especially sand and gravel, crushed stone and brick clay) are a constituent part of the land as stipulated in section 7 of the Mining Act. The possibility to declare significant non-reserved mineral deposits as reserved deposits, was cancelled by the amendment of the Mining Act in 1991. Decisions of administrative agencies in this matter, which had been issued before the amendment went into effect, remain valid based on transitional provisions (section 43 and 43a of the Mining Act). The deposits specified by these decisions are still reserved deposits, i.e. owned by the state, separated from the land itself.

1.2. Planning, approval and carrying out of mineral prospecting and exploration

1.2.1. Reserved minerals

Prospecting and exploration of reserved mineral deposits, by virtue of the ČNR Act No. 62/1988 Coll., on Geological Work (the Geological Act) as amended, may be conducted by an individual or organisation, providing that the work is managed and guaranteed by a qualified and certified person (certified responsible manager for the geological work). An organisation seeking to prospect for and explore these mineral deposits, to verify their reserves, and to process geological documents for their exploitation and protection, must make a request to the Ministry of the Environment to establish an exploration area. The proceedings, subject to administrative rules, are concluded by the establishment or non-establishment of an 'exploration area' (exploration permit). In the former case, the following must be determined: the survey area, the mineral to be prospected and explored for which the exploration area is being established, the conditions for the execution of the work, and the period of validity of the exploration area. The exploration area is not a territorial decision, but provides the entrepreneur or organisation (hereinafter "entrepreneur") with the exclusive privilege to prospect for the mineral in a given exploration area. In the first year, the entrepreneur is obliged by law to pay a tax of CZK 2,000 per km² or km² piece of exploration area, which increases annually by CZK 1,000 per km² and its piece (to CZK 3,000 in the second year, to CZK 4,000 in the third year, etc.). These taxes represent an income for the municipalities, in whose cadastral areas the exploration area is established.

Within the scope of planning and conducting the prospecting for and exploration of reserved mineral deposits, the organisation must consider the conditions and interests protected by

special regulations (section 22 of the Act on Geological Work). These primarily refer to the laws for the protection of landscape and nature, agricultural and forest land; to the Water and Mining Acts etc. The Ministry of the Environment can cancel the established exploration area, if the organisation repeatedly or severely violates the obligations set by the Geological Act.

1.2.2. Non-reserved minerals (and their mining)

The above-mentioned enactments apply to prospecting and exploration for non-reserved mineral deposits, only, if they were previously declared as reserved deposits according to the transitional provisions of the Mining Act. In other cases, an organisation can prospect and explore for non-reserved minerals only upon agreement with the landowner. The provision under section 22 of the Act on Geological Work is also valid in these cases. The mining of reserved deposits is considered a mining operation under section 2 of the Mining Act and the mining of non-reserved deposits, which constitutes a part of the land, an operation conducted according to the mining methods set by Act No. 61/1988 Coll., on Mining Operations, Explosives and the State Mining Administration, as amended.

1.3. Permit to mine a prospected and explored deposit

If, during prospecting and exploration, a reserved mineral is found to be of quality and quantity indicative of its accumulation (supported by a partial deposit reserve estimate given in the category of prospected reserves), the organisation must report it to the Ministry of the Environment, which issues a certificate for the reserved deposit owned by the state. At the same time, this certificate ensures the deposit against actions rendering its mining difficult or impossible by the establishment of a protected deposit area (CHLÚ) according to section 17 of the Mining Act.

The entrepreneur's right to mine the reserved deposit is provided by the grant of a mining lease. The submittal of a proposal for the grant of a mining lease must be preceded by an approval from the Ministry of the Environment, which may depend on the fulfilment of limiting conditions accounting for the interests of the state mineral policy, and on covering expenses of geological work already funded by the state. The organisation, on whose behalf the exploration was carried out, has priority in receiving the approval for the grant of the mining lease. If it fails to assert its mining lease, precedence is then given to the organisation which participated financially in the exploration. Somewhat different rules apply to cases concerning crude oil and natural gas based on a transposed EU directive.

The mining lease is only granted to an entrepreneur possessing a Certificate of Mining Operations issued by an authorised Regional Mining Office. This grant procedure takes place in cooperation with relevant administrative agencies, mainly in agreement with environmental, land use planning and building authorities. The entrepreneur's proposal for the grant of a mining lease must be furnished with documentation as stipulated by law. The procedure deals with landowner relations and settlement of conflicts of interests, which are protected by special regulations. The environmental impact assessment (EIA) represents a part of the documentation, too. The grant of a mining lease represents a mining as well as land use authorisation.

The entrepreneur, who has been granted a mining lease, may start mining operations only after obtaining a mining permit from the authorised Regional Mining Office. The issue of this permit is subject to an administrative procedure assessing the plans of the opening, the preparation and the mining of the deposit, and the plans for rehabilitation and reclamation after

termination of the mining. In justified cases, the Regional Mining Authority may combine the grant of a mining lease and of a mining permit into one administrative procedure.

1.4. Royalties on reserved minerals mined

The entrepreneur is obliged to pay royalties on the mining lease and the extracted reserved minerals. An annual lease payment of CZK 100–1,000 is assessed on every hectare opened within the mining lease area, which is marked off on the surface. The payment is graded with respect to the degree of environmental protection of the affected area, the type of activity conducted in the mining lease, and its environmental impact. The Regional Mining Authority fully transfers this payment to the municipalities, in whose territories the mining lease is located, according to the lease proportions in each municipal territory.

An annual royalties on minerals extracted in mining leases is given by the MPO Decrees No. 426/2001 Coll., and 63/2005 Coll., which amend the Decree No. 617/1992 Coll., detailing the payment of royalties on mining leases and extracted minerals.

Royalty rates by kind of extracted reserved mineral
(Annex no.1 to Decree no. 617/1992 Coll., as amended)

	Kind of extracted mineral	Rate %
1	Radioactive minerals	0.3
2	Crude oil in deposits, residual reserves of which are exploited to end by the help of secondary recovery methods	0.5
3	Crude oil and natural gas	5
4	Metallic ores	10
5	Graphite	1
6	Diatomite	2
7	Glass and foundry sand	6
8	Bentonite	2
9	Minerals used for stone-cutting manufacturing inclusive fissile shales	8
10	Technically usable mineral crystals and gemstones	10
11	Gypsum	5
12	Ceramic clays and claystones from underground mining	0.5
13	Ceramic clays and claystones from surface mining	4
14	Kaolin for production of porcelain	8
15	Kaolin for paper industry	6
16	Other kinds of kaolin	2
17	Feldspar pegmatites	1
18	Other feldspar raw materials	8
19	Quartz, quartzite, dolomite, marl, basalt, trachyte provided that these minerals are suitable for technochemical processing or melt treatment	4
20	High percentage limestone	10
21	Other limestones and corrective aditives for cement production	4
22	Coal from underground mining	0.5
23	Coal from surface mining	1.5
24	Other reserved minerals	5
25	Crushed stone	2
26	Sand and gravel	3
27	Brick clays and related minerals	1
28	Other non-reserved minerals	2“

The royalties on extracted minerals are calculated as

$$U = \frac{Nd}{Nc} \cdot T \cdot \frac{S}{100},$$

where by
Nd = costs of mineral extraction (ths CZK)
Nc = total costs of the enterprise for manufacture of products (ths CZK)
T = sales (ths CZK)
S = royalty rate (%)
U = royalties total (ths CZK)

The Regional Mining Authority transfers 25 % of the yielded royalties to the state budget of the Czech Republic to be purposefully used in remediation of environmental damage caused by the mining of reserved and non-reserved deposits, and the remaining 75 % to the budget of the relevant municipalities.

1.5. Reserves for mining damages and remediation during the mining of reserved minerals

During the course of mining, the entrepreneur is required to generate sufficient financial reserves for mining damages and for reclamation of areas affected by the deposit exploitation. Generating of the financial reserves is approved by the Regional Mining Authority during the mining permit procedure regarding the opening and extraction of the deposit. Drawing on the reserves is permitted by the Regional Mining Authority upon agreement with the Ministry of the Environment and upon notification by the relevant municipality. In the case of (partially) state-owned enterprises, the Regional Mining Authority decides in agreement with the Ministry of Industry and Trade.

2. Selected statistical data on exploration and mining on the territory of the Czech Republic

Statistical data/Year	2009	2010	2011	2012	2013
registered geological works – number	3248	2 902	2 900	3 000	3 340
protected deposit areas – number	1069	1 077	1 075	1 087	1 098
mining leases – total number	971	967	964	967	969
number of exploited reserved deposits	507	505	496	495	502
number of exploited non-reserved deposits	227	211	220	209	203
mine production of reserved deposits, mill t [a)]	125	118	124	114	107
mine production of non-reserved deposits, mill t [a)]	15	12	13	11	11
organizations managing reserved deposits	319	315	321	320	321
organizations mining reserved deposits	200	188	185	183	179
organizations mining non-reserved deposits	172	153	166	151	170

Note: [a)] conversions: natural gas 1 mill m^3 = 1 kt, dimension and crushed stones 1,000 m^3 = 2.7 kt, sand and gravel and brick clays and related minerals 1,000 m^3 = 1.8 kt.

3. Significance of mining in the Czech economy

Ratio/Year	2009	2010	2011	2012	2013
Annual GDP * growth	–4.5	2.5	1.9	–0.9	–0.9
Share of mining and quarrying in GDP, % of current prices	1.3	1.3	1.3	1.0[VSP]	1.0[VSP]
Share of mining and quarrying GVA in GVA of industrial production**, % of current prices	4.4	4.4	4.5	3.9	3.1

Source: Czech Statistical Office, [VSP] – Professor Vojtěch Spěváček's information

Note:

** GDP determined by production approach, volume indices, stable period of previous year = 100*

*** Industrial production = mining and quarrying + manufacturing + electricity, gas, steam and air conditioning supply*

4. Trends of reserves of minerals (economic explored disposable reserves)

Totals in mill t (if not otherwise stated)

Statistical data/Year	2009	2010	2011	2012	2013
Metallic ores [a)]	26	26	26	26	26
Energy minerals [b)]	2 879	2 724	2 939	2 891	2 847
of which: uranium (U) (kt)	1	1	1	1	1
crude oil	15	15	20	20	21
natural gas [b)]	3	4	6	6	6
Industrial minerals	2 669	2 732	2 718	2 718	2 684
Construction minerals [c)]	5 200	5 200	5 200	5170	5 153

Note:

a) metals in ores total, since 2004 only Au ores (25 642 kt)

b) natural gas – conversion into kt: 1 mill m^3 = 1 kt

c) at reserved mineral deposits including dimension stone, conversion into kt – dimension and crushed stones 1,000 m^3 = 2.7 kt, sand and gravel and brick clays and related minerals 1,000 m^3 = 1.8 kt

5. Summary of exploration licences valid in 2012 and newly issued in 2012 (listed according to minerals) – prospecting and exploration works financed by companies

Minerals and underground placement sites	Number of valid EA (min. 1)	Number of valid EA (min. 2)	Number of new issues in 2013	Start of validity in 2013
Bituminous coal	2	0	1	1
Crude oil and natural gas	18	0	1	1
Sn-W and Li ores	5	0	2	0
Li ore	0	5	2	0
Cu ore	0	2	2	0
Graphite	2	0	2	2
Gemstones	2	0	1	1
Kaolin	4	0	0	0
Clays	2	0	0	0
Bentonite	6	3	2	1
Feldspar and feldspar substitutes	2	3	2	1
Silica raw materials	1	0	0	0
Corrective additives for cement production	1	0	0	0
Dimension stone	0	0	0	0
Crushed stone	0	0	0	0
Sand and gravel	6	0	1	1
Underground placement sites, underground reservoirs	16	0	0	0
Total	**67**	**13**	**16**	**8**

EA – exploration area
Mineral 1 (min. 1) – in case that the raw material is the major one
Mineral 2 (min. 2) – in case that the raw materials is a by-product

6. State-funded geological projects

6.1. Economic geology projects

The Central Geological Authority of the state administration fulfils the duty involving the state register of reserved deposits – state property (section 29 of the Mining Act). Accordingly, it issues the register as one of the main sources for

- land use planning
- the raw material policy
- the energy policy
- the environmental policy
- the structural policy
- the employment policy

The register lists the latest status of the deposits as documented in the reserves estimate. The reserves estimate is prepared with respect to the conditions of exploitability expressing

- the state of the market, prices, business economy,
- the mining and technical conditions of exploitation,
- the conflicts of interests arising from the deposit exploitation (primarily environmental protection and other conflicts)

It is altogether entirely unstable factors reflecting political, economic and social change (in the largest sense).

The state funds spent in this area were dedicated to feldspathic raw materials of western Moravia, new possibilities of leucocratic granites, clays and feldspathic raw material utilisation plus evaluation of mineral economic potential of Be, Ga, Ge and Y anomalies in the Cheb Basin sediments. Further studies of possible utilisation of graphite resources in the northern Moravia area and of Co and Ni resources in the Czech Republic were realized.

Expenditures for state-funded exploration work related to economic geology (rounded values)

1993	CZK 248.7 mill
1994	CZK 249.8 mill
1995	CZK 242.3 mill
1996	CZK 163.0 mill
1997	CZK 113.2 mill
1998	CZK 114.2 mill
1999	CZK 110.8 mill
2000	CZK 26.3 mill
2001	CZK 21.5 mill
2002	CZK 17.0 mill
2003	CZK 7.0 mill
2004	CZK 26.2 mill
2005	CZK 12.0 mill
2006	CZK 1.7 mill
2007	CZK 3.0 mill
2008	CZK 9.9 mill
2009	CZK 10.1 mill
2010	CZK 4.2 mill
2011	CZK 4.0 mill
2012	CZK 1.0 mill
2013	CZK 1.5 mill

6.2. Other geological projects

Mainly geological work of a non-economic geology character was funded by the state. Individual projects were publicly commissioned in order to implement the following partial programmes:

- rectify the consequences of past geological (non-economic geology) work financed by the state (mine workings not yet liquidated, boreholes)
- geological informatics
- geological mapping
- geohazards of the environment
- hydrogeology
- engineering geology
- comprehensive geological studies

The following expenditures were spent on these geological projects since 2001:

2001	CZK 72.8 mill
2002	CZK 61.0 mill
2003	CZK 67.0 mill
2004	CZK 52.1 mill
2005	CZK 60.3 mill
2006	CZK 55.4 mill
2007	CZK 58.1 mill
2008	CZK 41.0 mill
2009	CZK 42.2 mill
2010	CZK 35.0 mill
2011	CZK 22.8 mill
2012	CZK 12.6 mill
2013	CZK 8,2 mill

7. Summary of selected legal regulations on mineral prospecting and exploration in force as of June 30, 2014

7.1. Acts

Act No. 44/1988 Coll., on Mineral Protection and Use (the Mining Act) – as amended by the Acts No. 541/1991 Coll., No. 10/1993 Coll., No. 168/1993 Coll., No. 132/2000 Coll., No. 258/2000 Coll., No. 366/2000 Coll., No. 315/2001 Coll., No. 61/2002 Coll., No. 320/2002 Coll., No. 150/2003 Coll., 3/2005 Coll., No. 386/2005 Coll., No. 186/2006 Coll., No. 313/2006 Coll., No. 296/2007 Coll., No. 157/2009 Coll., No. 227/2009, Coll., No. 281/2009 Coll., No. 85/2012 Coll. , No. 350/2012 Coll., No. 498/2012 Coll., 257/2013 Coll.

Act No. 61/1988 Coll., on Mining Operations, Explosives and the State Mining Administration as amended by the Acts No. 425/1990 Coll., No. 542/1991 Coll., No. 169/1993 Coll., No. 128/1999 Coll., No. 71/2000 Coll., No. 124/2000 Coll., No. 315/2001 Coll., No. 206/2002 Coll., No. 320/2002 Coll., No. 226/2004 Coll., No. 3/2005 Coll., No. 386/2005 Coll., No.186/2006 Coll., No. 313/2006 Coll., No. 342/2006 Coll., No. 296/2007 Coll., No.376/2007 Coll., No.124/2008 Coll., No.274/2008 Coll., 223/2009 Coll., No. 227/2009 Coll., No. 281/2009 Coll., No. 155/2010 Coll., No 184/2011 Coll. , No. 18/2012 Coll., 64/2014 Coll., 250/2014 Coll.

Act No. 62/1988 Coll., on Geological Work, as amended by the Acts No. 543/1991 Coll., No. 366/2000 Coll., No. 320/2002 Coll., No. 18/2004 Coll., No. 3/2005 Coll., No. 444/2005 Coll., No. 186/2006 Coll., No.124/2008 Coll., No. 223/2009 Coll., No. 227/2009 Coll., No. 281/2009 Coll., No. 85/2012 Coll., 64/2014 Coll.

Act No. 157/2009 Coll., on Mining Waste Treatment and Amendment of Some Acts, as ammended by the Act No. 168/2013 Coll.

7.2. Other legal regulations

7.2.1. Mineral deposits exploitation

Decree of the ČBÚ No. 104/1988 Coll., **on efficient use of reserved deposits, on permits and notification of mining operations and other activities employing mining methods,** as amended by the Decree No. 242/1993 Coll., No. 434/2000 Coll., and No. 299/2005 Coll.

Decree of the ČBÚ No. 415/1991 Coll., **on construction, the elaboration of documentation and the determination of safety pillars, rods and zones for the protection of underground and surface sites** in the wording of the Decree of the ČBÚ No. 340/1992 Coll., and No. 331/2002 Coll.

Decree of the ČBÚ No. 172/1992 Coll., **on mining leases** in the wording of the Decree No. 351/2000 Coll.

Decree of the ČBÚ No. 175/1992 Coll., **on the conditions of non-reserved mineral deposit exploitation** in the wording of the Decree No. 298/2005 Coll.

Decree of the MŽP ČR No. 363/1992 Coll., **on the survey and registry of old mine workings** in the wording of the Decree of the MŽP No. 368/2004 Coll.

Decree of the MŽP ČR No. 364/1992 Coll., **on protected deposit areas**

Decree of the ČBÚ No. 435/1992 Coll., **on mine surveying documentation during mining and during some operations employing mining methods** in the wording of the Decree of the ČBÚ No. 158/1997 Coll. and the Decree No. 298/2005 Coll. and the Decree No. 382/2012 Coll.

Decree of the MH ČR No. 617/1992 Coll., **detailing the payment of royalties on mining leases and extracted minerals**, in the wording of the Decree of the MPO No. 426/2001 Coll. and No. 63/2005 Coll.

Decree of the MHPR ČR No. 497/1992 Coll., **on the registration of reserves of reserved mineral deposits**

7.2.2. Geological work

Decree of the MŽP No. 282/2001 Coll., **on the registration of geological work**, in the wording of the Decree of the MŽP No. 368/2004 Coll.

Decree of the MŽP No. 368/2004 Coll., **on geological documentation**

Decree of the MŽP No. 369/2004 Coll., **on the planning, execution and evaluation of geological work, on announcing geohazards, and on the procedure for estimating reserves of reserved deposits** as amended by the Decree of the MŽP No.18/2009 Coll.

7.2.3. Regulations on licensing of mining operations and verification of qualification

Decree of the ČBÚ No. 298/2005 Coll., **on the requirements for professional qualification and competence in mining or operations employing mining methods, and on some legal regulation changes,** in the wording of the Decree No. 240/2006 Coll. and the Decree No. 378/2012 Coll.

Decree of the ČBÚ No. 15/1995 Coll., **on the licensing of mining operations and operations employing mining methods as well as on the development of sites and installations, which constitute these operations,** in the wording of the Decree No. 298/2005 Coll. and the Decree No. 380/2012 Coll.

Decree of the MŽP ČR No. 206/2001 Coll., **on the certificate of qualification for planning, executing and evaluating geological work**

ECONOMY AND MINERALS

Development of the Czech and global economies and the importance of minerals

Vojtěch Spěváček[1], *Václav Žďárek*[1,2]
[1] University of Economics and Management; [2] School of Economics and Management, ŠKODA AUTO University

1. Recession in the Czech economy

In the past five years, the Czech economy experienced two recessions, which were caused by an unfavourable trend in the global economy and by domestic factors as well. The **recession in 2009** was deep and the gross domestic product (GDP) **/1/** shrank by 4.4 % (see Figure 1). The main culprits were external factors connected with the crisis in western developed countries. The slowdown in economic activity was very strong in the eurozone countries, whose demand is critical for Czech exports. In Germany, the main trading partner of the Czech Republic, the quarter-on-quarter decline in GDP lasted for four quarters and the GDP declined by 5.1 % for the entire year of 2009. As a result of the recession in the global economy, **foreign demand** fell sharply and the Czech economy was hit by a strong external demand shock. The slump in foreign demand reflected a decline in the export of Czech products, which fell by 11.8 % in real terms in 2009. In the highly export-oriented Czech economy, the sharp decrease in foreign demand had to result in a decline in industrial production, primarily in the manufacturing industry. **Industrial production**, measured by the industrial production index, fell by 13.6 % for the entire year of 2009 and the decline in GDP on the supply side /**2**/ may be attributed primarily to industry.

After a slight revival in 2010 and 2011, a **second recession occurred in 2012 and 2013**, which was shallower but very long. The GDP fell by 0.9 % in both years. Another important difference lies in the fact that, while the 2009 recession was triggered by external factors, the prevailing effects in 2012 and 2013 were domestic factors, which sharply reduced domestic demand and, were it not for the positive influence of international trade in 2012, the GDP decline would have been considerably sharper (for more details, see section on the trend in demand). The impact of domestic factors prevailed in the combination of unfavourable internal and external circumstances and so did also the considerably restrictive fiscal policies of the government and concerns for the future, which, together with a decline in real wages, led households to lower consumption and businesses to reduce investments.

The GDP fell sharply at the beginning of 2013 (in the first quarter by 2.3 % year-on-year, see Figure 2). However, the economic performance gradually improved in 2013. The year-on-year declines eased in the second and third quarters and, in the last three months of the year, the GDP already grew by 1.1 % compared with the same period in 2012. However, the results for the first and last quarters were influenced by unusual factors connected with tax collection on the supply side of the economy. The revival of the Czech economy continued **in 2014.** In the first quarter of the year, the GDP rose 2.9 % year-on-year and 2.7 % in the second quarter.

The relatively high growth resulted from growing foreign and domestic demand, and also from a low comparative basis, because the first quarter of 2013 was, in terms of economic performance, the weakest in the past four years. The noticeable economic recovery at the end of 2013 and at the beginning of 2014 is in all probabilty more lasting and connected with the improvement of external circumstances, the easing of fiscal policy, growing wages and with a positive change in the expectations of domestic economic units.[1]

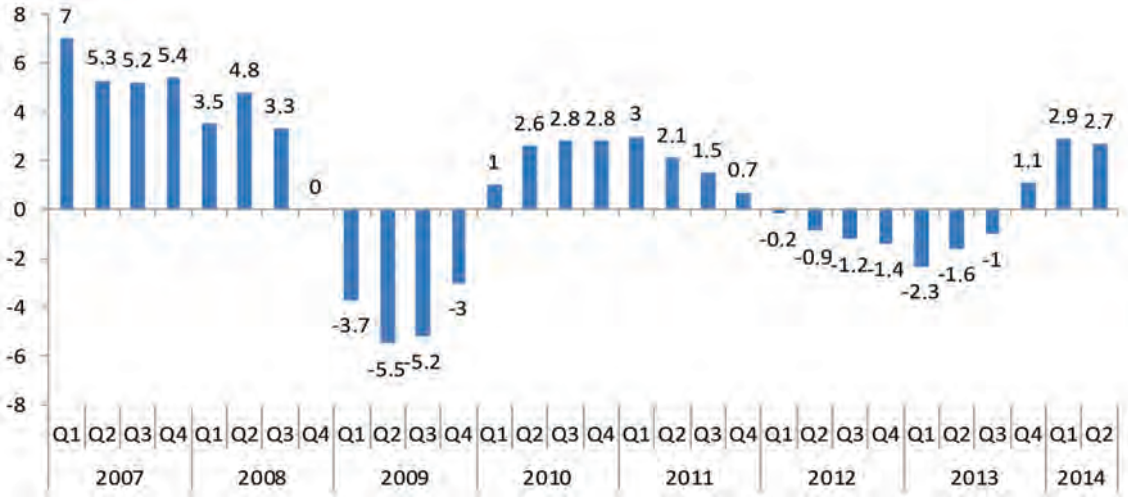
The economic performance measured by **quarter-on-quarter changes in GDP** was affected by considerable fluctuations in past years. The sharp decline of 5.6 %, which lasted for three quarters at the end of 2008 and in 2009, was followed by a gradual two-year recovery. The second wave of recession, beginning in the third quarter of 2011, was very long because it lasted six quarters. However, it was milder and the overall decline did not exceed 2.7 %. Beginning with the second quarter of 2013, the economy again grew quarter-on-quarter with a tendency toward a gradual acceleration of GDP growth. A quarter-on-quarter growth of zero in the second quarter of 2014 deviated from this trend, because it was influenced by high growth in the first quarter (among other things due to favourable weather) and by a decline in revenue from excise taxes on tobacco products as a result of stocking up at the end of 2013.

The negative aspects of the long-lasting recession were not reflected only in the decline of GDP, but also in rising unemployment, in a decline in lending activity by banks, in increased government debt, and in a dramatic slackening of investment activity. Real wages and consumption decreased, and not only did the economy worsen, but the political and social situation in the country as well.

Source: ČSÚ – quarterly national accounts (July 2014).

Figure 1: Real GDP growth in the years 2007-2013 (constant prices of previous year, in per cent)

[1] The given macroeconomic data were taken from the ČSÚ (Czech Statistical Office) national accounts, which were available at the end of September 2014. In this regard, it is necessary to point out that a new system of national accounts (so-called ESA 2010) will be implemented in October 2014, thus replacing the previous European System of National Accounts 1995. This change will not only affect the value of individual indices, but probably to a small extent also their dynamics.



Source: ČSÚ – quarterly national accounts (July 2014).

Figure 2: Real GDP growth (percentage change compared with the same quarter of the previous year)

The process of **convergence of the Czech economy** (convergence to the average per capita income level in EU countries) in 2001–2007 was successful because the Czech GDP per capita in purchasing power parity **/3/** increased in relation to the EU-27 from 71 % in 2000 to 83 % in 2007. On the other hand, in 2008–2013, the convergence process came to a halt and the Czech Republic fell behind the average EU level. According to EUROSTAT estimates from June 2014, the Czech GDP per capita in purchasing power parity in 2013 reached 80 % of the average level of EU countries, and the Czech Republic (CR) ranked 17th out of the 27 EU countries. Compared with the development of other Central European countries, the economic development of the CR measured according to this index was the second worst behind Slovenia. While the CR declined in 2013 compared to 2007 by 3 percentage points (p.p.) with regard to the EU average, Poland improved its economic status by 14 p.p., Slovakia by 8 p.p. and Hungary by 6 p.p.

The global financial crisis and ensuing economic crisis had a dramatic effect on the entire **European region**. The recession in 2009 was very deep (the GDP of the entire EU fell by 4.5 %) and only a slight recovery ensued in 2010. In 2011, a drop in growth dynamics was already evident in the majority of countries of the European Union, and many countries were hit by a new recession in 2012-2013. In the eurozone countries, the GDP declined by 0.7 % in 2012 and by 0.4 % in 2013 (see Table 1). However, there were considerable differences between countries. The deepest drop in economic activity occurred in the southern part of the EU. In 2013, the Greek GDP declined already for the sixth year and dropped overall by more than a quarter. A relatively strong recession in 2012 and 2013 occurred in Cyprus, Portugal, Croatia, Spain, Italy and Slovenia. The main reason for the double-dip recession in these countries were substantial imbalances (the debt crisis combined with austerity measures) and weakly competitive economies. The countries that registered negative GDP growth in 2012 and 2013 were also joined by the Czech Republic, which in contrast to the aforementioned countries did not have an excessive macroeconomic imbalance and whose GDP decline was primarily the result of a restrictive fiscal policy. On the other hand, there was a group of 12 countries that increased economic activity in both 2012 and 2013. A relatively high GDP

growth was registered by the Baltic states, Poland and Slovakia. In the Baltic states, domestic demand revived considerably after a sharp drop in 2009 and 2010, and foreign trade became an important factor of growth in the case of Poland and Slovakia. The Czech economy did not grow during the entire six-year period (2008-2013), and the annual GDP practically averaged zero growth (0.1 %). From an international perspective, the performance of the Czech economy was not satisfactory because 10 countries recorded a higher average annual growth rate. On the other hand, 15 EU countries registered a decline in economic activity (GDP in constant prices was lower in 2013 than the GDP in 2007).

Table 1: Real GDP growth in the member states of EU in the years 2008-2013 (percentage annual change)

	2008	2009	2010	2011	2012	2013	2008–2013
EU–28	0.4	–4.5	2	1.6	–0.4	0.1	–0.2
Euro area	0.4	–4.5	1.9	1.6	–0.7	–0.4	–0.3
Belgium	1	–2.8	2.3	1.8	–0.1	0.2	0.4
Bulgaria	6.2	–5.5	0.4	1.8	0.6	0.9	0.7
Czech Republic	3.1	–4.5	2.5	1.8	–1	–0.9	0.1
Denmark	–0.8	–5.7	1.4	1.1	–0.4	0.4	–0.7
Germany	1.1	–5.1	4	3.3	0.7	0.4	0.7
Estonia	–4.2	–14.1	2.6	9.6	3.9	0.8	–0.5
Ireland	–2.2	–6.4	–1.1	2.2	0.2	–0.3	–1.3
Greece	–0.2	–3.1	–4.9	–7.1	–7	–3.9	–4.4
Spain	0.9	–3.8	–0.2	0.1	–1.6	–1.2	–1.0
France	–0.1	–3.1	1.7	2	0	0.2	0.1
Croatia	2.1	–6.9	–2.3	–0.2	–2.2	–0.9	–1.8
Italy	–1.2	–5.5	1.7	0.4	–2.4	–1.9	–1.5
Cyprus	3.6	–1.9	1.3	0.4	–2.4	–5.4	–0.8
Latvia	–2.8	–17.7	–1.3	5.3	5.2	4.1	–1.5
Lithuania	2.9	–14.8	1.6	6	3.7	3.3	0.2
Luxembourg	–0.7	–5.6	3.1	1.9	–0.2	2.1	0.1
Hungary	0.9	–6.8	1.1	1.6	–1.7	1.1	–0.7
Malta	3.9	–2.8	4.2	1.5	0.8	2.6	1.7
Netherlands	1.8	–3.7	1.5	0.9	–1.2	–0.8	–0.2
Austria	1.4	–3.8	1.8	2.8	0.9	0.3	0.6
Poland	5.1	1,6	3,9	4,5	2	1,6	3,1
Portugal	0	–2.9	1.9	–1.3	–3.2	–1.4	–1.2
Romania	7.3	–6.6	–1.1	2.3	0.6	3.5	0.9
Slovenia	3.4	–7.9	1.3	0.7	–2.5	–1.1	–1.1
Slovakia	5.8	–4.9	4.4	3	1.8	0.9	1.8
Finland	0.3	–8.5	3.4	2.8	–1	–1.4	–0.8
Sweden	–0.6	–5.0	6.6	2.9	0.9	1.6	1.0
United Kingdom	–0.8	–5.2	1.7	1.1	0.3	1.7	–0.2

Source: EUROSTAT, National Accounts (August 2014).

Development **forecasts** for the Czech economy for 2014 and 2015 are difficult and change quickly during periods of rapidly changing conditions and continuing uncertainties. New predictions based on the statistical data from the end of 2013 and from the beginning of 2014 are more optimistic in compared with previous forecasts. The prevailing assumption is that the Czech economy will grow in 2014 at a rate exceeding 2 %, which should accelerate slightly in 2015. According to an economic forecast from April 2014, the European Commission expects a Czech GDP growth of 2 % in 2014 and 2.4 % in 2015. The International Monetary Fund predicts a GDP growth of 2.5 % in 2014. In its macroeconomic forecast from July 2014, the Ministry of Finance expects a GDP growth of 2.7 % in 2014 and 2.5 % in 2015. A forecast from July 2014 by the Czech National Bank is very optimistic and anticipates the GDP to rise by 2.9 % in 2014 and by 3 % in 2015.

The strength of the recovery of the Czech economy will depend on many factors, primarily on those affecting domestic and foreign demand. Household final consumption expenditures (private consumption, which represents one half of the use of GDP) are beginning to be affected positively by the improving situation in the labour market, primarily by the growing household income, low inflation and by a weaker trend in household saving. Fiscal policy is looking for room to stimulate growth by increasing government investment and the wages of government employees. With a more favourable trend in the economy and growing confidence in future trends, investment is reviving and becoming an important factor of growth after declining sharply in past years. However, the economic situation of the CR will depend on the government's ability to enforce a balanced economic policy, to introduce essential reforms, and to adapt to changing conditions. In this respect, the government's economic policy is not always clear and coherent, changes often, and necessary reforms are difficult to promote.

The trend in the global economy will be an important factor, particularly the economic situation in the European Union because of the close financial and economic connection between the CR and the countries of the EU. Even though the European economy began to grow and the situation in the financial markets has improved, many countries are still in a difficult economic situation. The European Commission expects the GDP of the entire EU to grow in 2014 by 1.6 % and to stregthen to 2 % in 2015. The German economy, which is our main trading partner, should grow by 1.8 % in 2014 and by 2 % in 2015. In general, foreign trade is expected to make a positive contribution to GDP growth. However, the deteriorating international political situation will have a negative impact, particularly the conflict in Ukraine and the enforcement of mutual sanctions between the European Union and Russia. However, it is difficult to estimate their impact on the Czech economy. That is why risks for future development still exist.

2. Changes on the demand side /4/

Fluctuations in supply and cyclical economic trends are usually determined by changes on the demand side. The growth or decline of individual demand components (private and public consumption, which represent final consumption **/5/**, investment and foreign trade) depend on many diverse factors (internal as well as external), whose variability affects GDP growth. Some demand segments (e.g. private consumption) are more stable, while reserves or investment in fixed capital are more variable and depend on how the economic cycle develops. Foreign trade, which plays an important part in the small open Czech economy, is heavily affected by global trends and by the demand of its main trading partners, primarily Germany.

After a reasonable increase in domestic demand **/6/** in previous years, the growth of all demand components (with the sole exception of public consumption) slowed down sharply **in 2008**. Total domestic demand increased only by 2.2 % in comparison with a 3.1 % growth of GDP, and the growth rate of foreign trade declined sharply as well (see Table 2).

Table 2: Growth of final demand components in the Czech Republic (percentage annual change)

	2008	2009	2010	2011	2012	2013	2008–2013
GDP	3.1	–4.5	2.5	1.8	–1.0	–0.9	0.1
Domestic demand	2.2	–5.1	1.9	–0.1	–2.8	–0.7	–0.8
Final consumption	2.3	1.3	0.7	–0.4	–2.1	0.6	0.4
Private consumption	3	0.2	1	0.5	–2.2	0.1	0.4
Public consumption	1.2	4	0.2	–2.7	–1.9	1.6	0.4
Gross capital formation	1.9	–20.2	5.4	0.8	–5	–4.4	–4.0
Gross fixed capital formation	4.1	–11	1	0.4	–4.5	–3.5	–2.4
Export	3.9	–10.9	15.5	9.5	4.5	0.2	3.4
Import	2.7	–12	15.5	7	2.3	0.6	2.3

Note: For the period 2008–2013 (6 years) is stated average annual rate of growth. Source: ČSÚ – quarterly national accounts (August 2014).

In 2009, the Czech Republic was hit by a deep recession accompanied by a GDP decline of 4.5 % and by an even sharper drop in domestic demand (-5.1 %). Gross capital formation took the biggest hit as reserves dropped drastically and as investment in fixed capital fell by 11 %. Foreign trade registered a double-digit decline as well. Government final consumption expenditures (public consumption) were the only demand component to soften the GDP slump. A recovery occurred **in 2010**, which was important for foreign trade and reserves. These demand components became the workhorses of GDP growth, whereas the effect of final consumption and investment in fixed capital were insignificant. **In 2011**, domestic demand declined slightly as a result of a drop in public consumption, and GDP growth was driven solely by foreign trade. However during the course of the year, foreign demand declined and investment decreased, and growth dynamics slowed sharply. A new recession caused by a relatively strong slump (-2.8 %) in domestic demand occurred **in 2012**. Private consumption, which carries the most weight in the use of GDP (around 50 %), declined by 3.6 %, thus representing a negative contribution to GDP growth in the amount of 1.8 percentage points (p. p.). Such a sharp drop in household final consumption expenditures was not registered in the past twenty years. Public consumption and gross capital formation had a negative impact as well. The overall GDP declined only 1 % due to a strong positive impact of foreign trade (its contribution to GDP growth amounted to 1.5 p. p.). **In 2013**, the recession in the Czech economy continued and was caused, on the domestic demand side, by the continuing sharp decline in investment. Final consumption (primarily public consumption) began to rise slowly and foreign trade began to contribute negatively as imports outgained exports. During the entire six-year period (**2008-2013**) in which the Czech economy stagnated (the average annual GDP growth was practically zero), gross capital formation (fixed capital as well as reserves) fell sharply and final consumption rose only slightly (on average by 0.4 % annually). Foreign trade became an important source of growth for the

Czech economy (the average annual contribution to GDP growth during this period was 0.9 %) because of its rising positive balance of exports and imports of goods and services.

Private consumption /7/ provided a relatively stable contribution to the growth of the Czech economy up until 2008. In 2009, it practically stagnated, which distinguished the course of the recession in the Czech Republic from the development in many EU countries, where precisely the decline in private consumption played a significant part in the slump in GDP. It was not until 2012 that private consumption, the main cause of the recession that year, fell sharply in the Czech Republic. But there are more factors involved in the drop in private consumption. They include growing unemployment, weak growth of wages and stagnation of disposable household income related to deteriorated labour market conditions, rising prices (primarily of energy and food), and also a growing tendency toward saving due to weak income growth and lower job security. A significant factor were fiscal restrictions, which led to lower wages in the government sector and to a cutback in social benefits. In 2013, household consumption stagnated completely (behaving differently during the course of the year, falling in the first half and rising in the second half of the year) and began to recover in 2014 due to an improved labour market (rising employment and wages) and a looser fiscal policy.

With the exception of 2009, the effect of **public consumption /8/** was insignificant and negative in 2011 and 2012 as a result of austerity measures. Public consumption has been rising again since 2013. However, it is necessary to realize that public consumption represents only a part of public expenditures (government final consumption expenditures had a 20.7 % share of GDP in 2013, whereas the share of public expenditures amounted to 42.3 % of GDP that same year). Fiscal restrictions as well as a loosening of fiscal policy were reflected in this way not only in public consumption, but also in household consumption and investment.

Gross fixed capital formation /9/ had a positive effect on GDP growth in 2000-2008, particularly in 2007, but it left its mark primarily during the recession in 2009. During the recovery of the Czech economy (2010 a 2011), its contribution was negligible and, during the second recession in 2012-2013, its contribution was again negative. There were many causes for the drop in investment – from a decline in foreign and domestic demand to a decline in business profits and lower expectations regarding future trends. Government cost-saving measures, which led to a steep drop in public investment (primarily in infrastructure), had a negative impact as well. A revival in captital construction projects did not occur until 2014.

Of all the demand components, changes in **reserves** fluctuated the most. During the recession, poor demand and an uncertain outlook led producers and consumers to draw on reserves, and an increase in reserves, which became an important growth factor, did not occur until the recovery point set in. The drop in reserves decreased the GDP in 2009 by nearly 3 percentage points and, by contrast, increased the GDP by 1.4 percentage points in 2010. In 2012 and 2013, reserves decreased once again and contributed to a new recession in the Czech economy.

Because of the considerable openness of the Czech economy, **foreign trade /10/** has an important impact on the development of the Czech economy. Since 2003 (with the exception of 2007 and 2013), changes in net exports have had a positive effect on GDP growth. A growing positive foreign trade balance contributed significantly in 2004-2006 in connection with the accession of the Czech Republic to the European Union. In 2011 and 2012, foreign trade was the only workhorse of the Czech economy because the influence of domestic demand was negligible in 2011 and even negative in 2012. The positive impact of foreign trade on GDP in 2012 was, however, not caused by a huge increase in exports of goods and services, which

rose by only 4.5 %, but primarily by a small increase in imports (2.3 %), which were affected by a decline in domestic demand. A slowdown in export growth, which was outgained by import growth, occurred in 2013 and foreign trade contributed negatively to GDP growth. In general, however, foreign trade became an important growth factor in 2008-2012 and increased the Czech GDP on average by more than 1 percentage point annually. The future impact of foreign trade is difficult to predict because the anticipated rise in domestic demand will increase imports, wheras export growth will be influenced by the changing foreign demand. Therefore, foreign trade is expected to have only a weak positive impact on GDP growth.

3. Structural changes in the Czech economy

Industry plays a key role in the development of the Czech economy**.** Its share of gross value added (GVA) **/11/** in the entire national economy is among the highest of all EU countries. This is due to the country's historical development and position in the international division of labour. The development in industry was influenced by the changing foreign and domestic demand, as well as by a restructuring phase connected with changes of ownership and with a growing number of private companies under foreign control, which distinguish themselves by higher productivity and by the ability to penetrate demanding markets.

Industry experienced high dynamics in 2005-2008 (with an annual average of 11.7 %), which by far surpassed the growth of other sectors and the average of EU countries as well. The recession in 2009 changed the supply side of the economy significantly. The strong real growth of industry GVA/**12/** from previous years was followed by a sharp decline of 13.4 % (see Table 3). This development was marked by a sharp drop in foreign demand, which was reflected immediately in a decrease in domestic production at a time characterized by considerable openness of the Czech economy and by an export-oriented manufacturing industry. Industrial production recovered in 2010 and 2011, but it declined again in 2012 and 2013, primarily in the automotive industry, in connection with the decline in domestic and foreign demand. Industrial production declined for 5 quarters (from the second quarter of 2012 until the second quarter of 2013) and its recovery, which also continued in 2014, did not occur until the second half of 2013. Agricultural production fluctuated considerably due not only to changes in demand but also due to the effects of weather. In 2009, it registered high growth rates and thus reduced the decline in GVA in the national economy. However, it fell sharply in 2010-2013. Construction has been in a crisis since 2008 as a result of a long-term decline in capital construction activities. Construction output did not begin to rise until 2014 as capital construction revived. Services as a whole registered a decline in GVA during the recession of the Czech economy (2009 and 2012-2013) and, thereby, together with industry, played a role in the lower output of the Czech economy. Nevertheless, the decline in GVA in the services sectors was significantly lower than the decline in industry, and this confirmed the fact that services are more resistant to cyclical economic fluctuations and less dependent on foreign demand. Trade and transportation accounted for the highest decrease in GVA, while considerable growth was maintained by banking and insurance.

In recent years, sectoral changes in the Czech economy drew closer to the structure prevalent in EU countries. Agriculture's share of total GVA continued to decline from 2.6 % in 2005 to 2.4 % in 2013 (see Table 4), which is near the average of the EU-27 (1.7 %). By contrast, industry's share grew and its share of total GVA in the national economy already surpassed 30 %. The nearly 32 % share in 2013 ranked behind Romania as one of the highest of the EU countries (the EU average in 2013 was only 19.1 %). The share of the mining and quarrying

Table 3: Growth of gross value added by industries (percentage annual change)

	2008	2009	2010	2011	2012	2013
Agriculture	7.3	26.4	–26.6	–2.0	–4.1	–9.8
Industry (total)	10.0	–13.4	6.2	5.5	–0.8	–0.7
Mining and quarrying	–12.0	–11.2	–5.6	–7.1	–3.1	–10.3
Manufacturing	10.7	–15.4	12.2	8.6	0.0	–0.4
Electricity, gas and water	16.6	–9.5	–9.7	–4.8	–3.1	0.6
Construction	–0.9	–1.5	5.3	–5.2	–5.8	–1.6
Services	1.3	–2.5	2.3	1.0	–0.4	–0.5
GVA total	4.1	–5.2	3.1	1.8	–1.0	–0.9

Note: GVA calculated at basic prices differs from GDP by taxes and subsidies on products. Source: ČSÚ – annual and quarterly national accounts (July 2014).

industry is very low and has in recent years been affected by the dramatic fall in GVA in 2008 and 2009, and by negative growth in subsequent years. The importance of construction has been declining as a result of the long-term crisis in this industry due to a strong decline in capital construction. The share of services in GVA hovers around 60 %, but it still remains low when compared internationally (the share of services in the EU-27 reached 73.5 % in 2013).

Table 4: Structure of gross value added (current prices) and employment (in per cent)

	Gross value added			Employment		
	2005	2010	2013	2005	2010	2013
Agriculture and forestry	2.6	1.7	2.4	3.8	3.2	3.2
Industry	31.3	29.7	31.8	29.5	26.5	27.2
Mining and quarrying	1.3	1.3	1.0	0.9	0.7	0.7
Construction	6.7	7.3	6.0	9.3	9.6	8.9
Services	59.5	61.3	59.8	57.4	60.7	60.7

Source: ČSÚ – annual and quarterly national accounts (August 2014), own calculations.

The importance of minerals

The importance of minerals, measured by this sector's share of gross value added and employment in the entire national economy of the CR, remains very small and has a declining trend. The mining and quarrying industry's share of total GVA decreased from 1.3 % in 2005 to 1 % in 2013. Employment in mining and quarrying has also been falling over the long term and the industry's share of total employment in the national economy fell to 0.7 % in 2013. Mining and quarrying's lower share of total employment in the national economy than its share of total GVA shows that labour productivity in this industry is higher compared with the average productivity in the entire national economy.

According to the index of industrial production **/13/** based on the production statistics for selected products, mining and quarrying underwent a complex development in 2008-2013 and production continued to decline with the exception of 2011. Compared to 2005, production in this industry fell by nearly 20 % (the fixed base index of industrial production 20013/2005

equalled 81.0). The fall in the production of energy minerals was even sharper. Production and processing of bituminous and brown coal fell by one-fourth in 2006-20013. On the other hand, production of crude oil and natural gas rose, but it carries very little weight in the entire mining and quarrying industry. The future trend in the production and processing of bituminous and brown coal, which has the largest share of production in mining and quarrying (nearly 70 %), will depend on the trend in demand and on resolving the issues of ecological limits in North Bohemia.

The position of mining and quarrying in the entire national economy is shown in Table 5. Gross value added in current prices in mining and quarrying grew in 2005-2008 and, as a result of a sharp rise in prices, the industry registered strong growth in 2008. However, the situation worsened dramatically during the double-dip recession and general stagnation of the Czech economy in 2009–2013, when prices rose only slightly and GVA declined in real terms.

Table 5: Gross value added in current prices (CZK billion)

	2008	2009	2010	2011	2012	2013
Agriculture	80.3	65.1	56.7	79.8	81.4	82.6
Mining and quarrying	50.4	43.0	44.0	46.3	40.5	33.3
Manufacture	846.3	764.6	785.5	825.3	852.9	869.5
Elektricity, gas and water	188.8	211.0	186.0	178.6	176.4	199.2
Construction	235.7	242.2	250.8	233.9	216.8	206.2
Services	2078.4	2064.3	2097.3	2080.6	2083.7	2073.3
GVA total at basic prices	3479.9	3390.2	3420.3	3444.5	3451.7	3464.1

Source: ČSÚ – annual national accounts (August 2014).

From a macroeconomic perspective **/14/**, the low and diminishing importance of mining and quarrying is due to the Czech Republic's mineral scarcity (with the exception of coal and construction minerals) and dependence on imports of important energy minerals and other raw materials (primarily crude oil and natural gas). Other additional factors are the ongoing structural changes and the declining importance of a mineral-dependent industry. According to the tables of inter-industry relations for 2010 **/15/**, a decisive part of resources (domestic production and imports) of the mining and quarrying industry was used for intermediate products (nearly 70 %), and the largest consumers are two industries – production of coke and petroleum refining, and the supply of electricity, natural gas and water. In the case of other minerals, there are three main consumers – production of other non-metallic mineral products, production of basic metals, and construction. Minerals used primarily for the production of construction materials such as stone, sand, limestone, kaolin thus reflect the situation in construction output. That is why it is necessary to also assess the importance of domestic minerals based on the weight of the mineral-based manufacturing branches in the national economy. Environmental aspects are also an indispensable factor because the mining industry has a predominantly negative effect on the environment.

4. Global economic development

The development in the global economy deteriorated rapidly in recent years and, after years of strong expansion, the world entered a very difficult period marked by the global financial crisis and recession in most countries. The economic crisis in 2008 and 2009 was the deepest

recession of the post-war era (the GDP in developed countries fell by 3.4 % in 2009). Only a weak recovery ensued in 2010 and 2011, and another recession (see Table 6) occurred in many European countries in 2012 and 2013. It is therefore possible to talk of a global economic crisis, which caused long-term economic stagnation with substantial losses in production, consumption, investment and foreign trade. It led to a rise in unemployment and to worsening public finances, and its consequences have yet to be overcome. The situation became critical in the European region, which became the weakest link in the global economy. The recovery that occurred in 2014 is optimistic, but it remains weak and considerably uneven. Positive aspects include greater financial sector stability, an improving labour market situation and a recovery in domestic demand. The situation of public finances remains complex. Economic policies therefore face difficult problems – stabilizing the financial system, stimulating economic growth, not worsening public finances, and reducing macroeconomic imbalances.

The recession in **2008 and 2009** was preceded by the global financial crisis, which was caused by many factors, such as prior sufficient liquidity, low interest rates, strong growth in credit and asset prices (primarily real estate) as well as grants of loans to clients incapable of making payments. Complex capital and high-risk transactions using sophisticated financial instruments and insufficient transparency in and regulation of the financial market had a negative effect as well. In a global and considerably liberalized financial system, the crisis spilled over into Europe and other countries from the USA. Even though there were signs of the unsustainability of existing trends (many overheating economies, financial market bubbles, growing macroeconomic imbalances), analysts were not able to recognize the looming dangers in time and even economic theory was not prepared for a collapse of financial markets and, as a result, appropriate economic policies were not available.

The world product declined **in 2009** by 0.4 % after an average annual growth of nearly 4 % in 1999-2008, and developed countries registered the sharpest drop in economic activity in the entire post-war era. The depth of the recession measured by the year-on-year decline in GDP was strongest in the first half of 2009, when the GDP fell according to seasonally adjusted data by 5.5 % in the EU-27 countries, by 7.9 % in Japan, and by 3.8 % in the USA. The length of the recession varied by country, but it mostly lasted 4–5 quarters. The crisis created unfavourable conditions for future growth. The financial system was rocked, businesses and households did not obtain loans, which they needed to revive investment and consumption, and the situation of public finances became critical as their deficits became unbearable and as government debts rocketed. The combination of the global financial crisis and the deep recession produced a recession of unprecedented depth as well as length when compared with previous recessions.

In 2010 a recovery occurred, which was driven in the first half of the year by an increase in reserves and by continuing pro-growth macroeconomic policies, but the strong effect of reserves weakened in the second half and fiscal consolidation policies began to be put into effect. A decent growth rate was maintained because of confidence in a long-term recovery, which led to growth in investment, consumption and foreign trade. For the entire year, the GDP grew by 2 % in the EU and by 2.5 % in the USA. The recovery was expected to last longer and growth was expected to gradually increase.

The year of 2011 began promisingly because GDP growth was relatively high in the first quarter, but the growth rate declined during the course of the year. In September 2011, international organizations lowered their economic outlook for the majority of countries and regions around the world. The reason was not only a declining growth trend but also growing risks for future development. These included the instability in financial markets, the ongoing

macroeconomic imbalance, the difficult labour market condition, and also the serious debt crisis in Greece, Portugal and Ireland, which began to spread to larger European economies (Spain and Italy) with a looming danger for banks holding bonds of vulnerable countries. Confidence declined and doubts rose among consumers and investors.

Economic growth weakened **in 2012 and 2013**, compared to 2010 and 2011, in both developed and emerging countries. However, the average numbers for the entire global economy or for its individual regions conceal considerable differences between countries, which have grown as a result of the crisis. The situation became serious in the EU countries, many of which experienced a new recession in 2012 and 2013. In 2012, the GDP declined by 0.4 % in the entire EU and by 0.7 % in eurozone countries. In 2013, the European Union stagnated and a weak GDP decline continued in eurozone countries, which was influenced by a recession in Greece, Cyprus, Italy, Portugal, Slovenia and Spain. On the other hand, economic growth was relatively strong (2.8 %) in the USA primarily in 2012. Emerging and developing countries grew fastest even though their growth rates declined.

Forecasts of global economic trends **for 2014 and 2015** made by international organizations predict accelerating growth in developed countries (1.8 and 2.4 %) and, by contrats to past years, weaker growth in emerging countries. The latest analyses indicate a three-speed global economic growth. Emerging economies are still experiencing relatively fast GDP growth nearing 5%, growth in the USA is expected to surpass the growth dynamics of European countries, and the European Union is expecting only a weak recovery.

Table 6: IMF projection of real GDP growth (annual percentage change)

	2008	2009	2010	2011	2012	2013	2014	2015
GDP – world	2.7	–0.4	5.2	3.9	3.5	3.2	3.4	4.0
United States	–0.3	–2.8	2.5	1.8	2.8	1.9	1.7	3.0
Euro area	0.4	–4.4	2.0	1.6	–0.7	–0.4	1.1	1.5
Japan	–1.0	–5.5	4.7	–0.5	1.4	1.5	1.6	1.1
China	9.6	9.2	10.4	9.3	7.7	7.7	7.4	7.1
India	3.9	8.5	10.3	6.6	4.7	5.0	5.4	6.4
Russia	5.2	–7.8	4.5	4.3	3.4	1.3	0.2	1.0
Developed countries	0.1	–3.4	3.0	1.7	1.4	1.3	1.8	2.4
Emerging and developing countries	5.9	3.1	7.5	6.3	5.1	4.7	4.6	5.2
Volume of world trade	2.8	–10.6	12.8	6.2	2.8	3.1	4.0	5.3

Note: The years 2014 and 2015 are projection of IMF. Source: IMF – World Economic Outlook, April 2014, p.2 and World Economic Outlook Update, August 2014.

An economic recovery occurred in **developed countries** in 2014 due to the stabilization of the financial sector, the revival in domestic demand and due to structural reforms. Economic activity grew in the **USA** in the second half of 2013, but the growth became negative in the first quarter of 2014 as a result of a harsh winter and other factors such as completion of stock replenishment, tightening of fiscal policy, and lacklustre foreign demand. A relatively strong growth is expected in subsequent quarters, but the GDP growth for the entire year will not be very high (1.7 %). It may not be until 2015 that the growth rate will have reached its highest values since 2005 (3 %) as a result of fast growth in household consumption, a rise in housing

construction and other investments, and due to greater credit availability. The **European Union**, which was hit by a debt crisis, became a problem and some countries of the eurozone (primarily its southern part) found themselves in a very serious economic situation. In its forecast from May 2014[2], the European Commission anticipates a recovery in 2014 and 2015 (GDP growth of 1.6 % and 2 %), which should be driven by a growth in domestic demand (household consumption and investment). The majority of countries registered positive growth in the first half of 2014. A relatively high GDP growth rate was registered in Poland, Hungary, Slovenia, Great Britain, Lithuania, Latvia, the Czech Republic and Germany. On the other hand, negative growth continued in Greece, Croatia, Italy and Cyprus. Following the earthquake in March 2011, the **Japanese economy** experienced a weak recovery, which should also continue in 2014 and 2015. It should be aided by a loose monetary policy and structural reforms, primarily in the labour market. The necessity of achieving fiscal stability as a result of a high government debt remains an obstacle to faster growth.

In recent years, the workhorse of the global economy were **emerging and developing countries**, accounting for half of the world's GDP. In 2008-2013, their average annual growth reached 5.4 %, while developed countries grew only by 0.7 %. Because of their growth in 2009 (2.7 %), the drop in global economic activity was not sharper that year. These countries were also the locomotive for the global economy in subsequent years. However, the growth dynamics are declining even in these countries. The fastest growing region became emerging Asia dominated by China, which became the world's second largest economy behind the USA and whose contribution to global growth was roughly one-fourth. However, the Chinese economy, which is heavily oriented on investments and export, is feeling the cooldown in the global economy, and its growth rates are declining and its economic policies need to shift towards stronger domestic consumption. In 2013, the GDP growth amounted to 7.7 % and a growth of 7.5 % is expected in 2014.

Public finances deteriorated considerably due to the worst post-war recession, and the development in public finances combined with a sharp increase in government deficit and debt became a risk factor for the development of the majority of developed countries. The financial crisis and recession led, on one hand, to a decrease in tax revenues and, on the other, to increased budget expenditures connected with growing unemployment, bank rehabilitation and

Table 7: General government deficit in selected advanced economies (as a percentage of GDP)

	2008	2009	2010	2011	2012	2013	2014
Big advanced economies	–5.1	–10.8	–9.6	–8.2	–7.3	–5.9	–5.1
USA	–7.8	–14.7	–12.5	–11.0	–9.7	–7.3	–6.4
Japan	–4.1	–10.4	–9.3	–9.8	–8.7	–8.4	–7.2
Euro area	–2.1	–6.4	–6.2	–4.2	–3.7	–3.0	–2.6
Germany	–0.1	–3.1	–4.2	–0.8	0.1	0.0	0.0
United Kingdom	–5.0	–11.3	–10.0	–7.8	–8.0	–5.8	–5.3

Note: the year 2014 is projection of IMF. Source: IMF World Economic Outlook, April 2014, p. 192.

[2] ECFIN: European Economic Forecast. Spring 2014. European Economy 3/2014.

fiscal stimulation of demand. The deteriorated fiscal situation was reflected in financial markets, in the private sector's willingness to finance huge government deficits, and in the growing costs of this financing. The rising deficits in public finances surpassed the limit for sustaining long-term fiscal stability and, after the crisis in 2009, the majority of countries began implementing austerity measures, which weakened growth but, on the other hand, helped reduce the high government deficits (see Table 7).

The rise in **government debt**, which has reached its highest level in developed countries since the end of World War II, became perilous. Government debt, which basically reflects accumulated government deficits, grew in 2013 compared to 2008 by nearly 32 percentage points in the USA and by 25 percentage points in the eurozone (see Table 8). The trend of another increase in government debts became dangerous. Of the largest developed countries, Japan had the highest debt in 2013 (243.2 %), followed by the USA (104.5 %). As government debt grows so does the debt service (payment of interest and principal), which puts a considerable strain on public budgets. That is why some countries got into a situation where obtaining financial resources became difficult and at a cost of high interest. The debt crisis mainly affected the southern part of the European Union. The most serious situation existed in Greece (government debt in 2013 reached 175.1 % of GDP), which was saved from bankruptcy by loans from the European Union, the European Central Bank and IMF. However, the financial help is tied to reduction of government deficits, to reforms promoting competitiveness, and to measures strengthening financial sector stability.

Table 8: General government gross debt in selected advanced economies (as a percentage of GDP)

	2008	2009	2010	2011	2012	2013	2014
USA	72.8	86.1	94.8	99.0	102.4	104.5	105.7
Japan	191.8	210.2	216.0	229.8	237.3	243.2	243.5
Euro area	70.3	80.1	85.7	88.1	92.8	95.2	95.6
Germany	66.8	74.5	82.5	80.5	82.0	80.4	78.3
United Kingdom	51.9	67.1	78.5	84.3	88.6	90.1	91.5

Note: the year 2014 is projection of IMF. Source: IMF World Economic Outlook, April 2014, p. 192.

Employment declined and **unemployment,** which represents a serious economic and social problem, grew as a result of the recession. The loss of jobs and household income during the recession led to lower household consumption and contributed to the decline in GDP, the repayment of loans declined and, thus, bank losses grew and the situation in the real estate market worsened. Growing unemployment had a negative effect on public budgets (higher expenditures and lower tax revenues). Long-term unemployment, which lowers the potential output, grew. Unemployment has a profound impact on young people, which threatens a country's social cohesion. Even though the situation in the labour market is different in various countries, growth in unemployment has, in recent years, been enormous and experience from past recessions shows that the labour market recovers slowly and that the unemployment rate will also remain high in 2014.

The long-term unemployment rate was lower in the USA than in Europe (except for a sharp rise during the recession in 2009). In July 2014, the unemployment rate in the EU was 10.2 %,

but only 6.2% in the USA (see Table 9). Among the countries of the European Union, Spain (24.5%) and Greece (27%) had the highest unemployment rate in July 2014. The lowest unemployment rate was recorded in Austria and Germany (4.9% in both countries). A drop in Germany's unemployment rate (from 7.8% in 2009 to 4.9% in July 2014) was brought about not only by a revival of economic avtivity, but also by the fact that the majority of businesses did not lay off their employees and tried to retain them at reduced hours. The Czech Republic was one of the countries with a relatively low unemployment rate. In July 2014, it reached only 6% and decreased by nearly 1 percentage point compared to the same period last year.

Table 9: Unemployment rate in selected countries (in per cent)

	2008	2009	2010	2011	2012	2013	2014
USA	5.8	9.3	9.6	8.9	8.1	7.4	6.2
Japan	4.0	5.1	5.1	4.6	4.3	4.0	3.8
EU-28	7.1	9.0	9.6	9.6	10.4	10.8	10.2
Germany	7.5	7.8	7.1	5.9	5.5	5.3	4.9
Greece	7.7	9.5	12.6	17.7	24.3	27.3	27.2
Spain	11.3	18.0	20.1	21.7	25.0	26.4	24.5

Note: the figures for the year 2014 are related to July 2014. Source: ECFIN European Economic Forecast, Spring 2014, p. 143 and EUROSTAT, newsrelease 129/2014, 29 August 2014.

The trend in **inflation** was affected by substantial fluctuations in demand. The sharp rise in commodity prices in 2007 and in the first half of 2008 was followed by their strong decline connected with dampened demand in the second half of 2008 and during the course of 2009, when the inflation rate fell sharply in developed countries. A revival of economic activity and demand in 2010 and 2011 led to a renewed rise in inflation, primarily due to a sharp increase in energy and commodity prices. The trend in 2012–2014 was marked by idle capacities, stagnating demand and moderate inflation expectations. As a result of this, the inflation rate fell to a historical low level (in developed countries, the average inflation rate measured by the consumer price index was only 1.5% in 2013 and, according to a forecast by the European Commission, the inflation rate in the EU should hover around 1% in 2014 and rise to 1.5% in 2015). In some countries, there were even concerns of deflation. That is why central banks proceeded to lower interest rates. In November 2013, the Czech Central Bank even decided to weaken the exchange rate of the Czech crown as an additional instrument for loosening monetary conditions.

However, the situation is more serious in emerging countries, most of which did not enter a recession and which maintain high growth. The inflation rate in these countries is significantly higher. In 2013, consumer prices rose by 4.5% in emerging Asia. China is experiencing a moderate rise in consumer prices at 3%. On the other hand, India has a high inflation rate hovering around 9%. The countries of the Commonwealth of Independent States are also facing a high inflation rate, which amounted to 6.4% in 2013. Belarus had an extremely high inflation rate (18.3 %).

The globalization and intensification of business and capital flows between countries helped produce considerable **external imbalances/16/** as reflected by high current account deficits in one group of countries and large surpluses in other countries. It was possible to cover the

current account deficits of one group of countries with the savings of the second group of countries during the expansion of the global economy, which occurred as a result of considerable expansion in the financial sector, liberalized capital flows and sufficient disposable financial resources. Ironically, capital did not flow from developed countries to developing ones, as may be expected, but the largest recipient of foreign savings was the US economy. The highest current account surpluses were reported by China, Japan and countries exporting crude oil. The financial crisis demonstrated the considerable danger resulting from high current account deficits because countries with high deficits had difficulties in financing them and were forced to adopt drastic austerity measures, which deepened the recession. Although the imbalances declined in recent years due to the recession and only weak economic growth, IMF still stresses the need for specific restructuring of economic growth and recommends that countries with sizeable current account surpluses strengthen domestic demand and the exchange rate, whereas deficit-plagued countries promote exports by reinforcing structural reforms.

5. Foreign trade and external economic balance[3]

In 2008-2012, the Czech economy faced some major external impacts, which were initially related to the global financial (economic) crisis or, more precisely, the European debt crisis. Although the Czech economy was not directly affected by the financial crisis (due to limited involvement of domestic financial institutions in international markets, particularly the US market), negative impacts were felt by its main trading partners and indirectly by the CR as well. The reason was that foreign demand and changes in foreign trade strongly influenced the development of the Czech economy, which may be characterized as a small open economy.[4] As the Czech economy became increasingly involved in multinational supply chains at the beginning of the new century due to an inflow of foreign investment, the share of imports and exports in GDP (and import intensity) grew. Nevertheless, domestic suppliers continue to play a different role in individual types of production cooperatives (only minimal in many cases of technically demanding production).[5] Thus, economic growth depends to a certain extent on the behavior of foreign capital because the number of foreign-controlled companies (tied to foreign direct investment, FDI) in some industries exceeds 50 % (see below). This was influenced to a large extent by a system of investment incentives, which was adopted after 2000, and an additional impulse was the accession of the CR to the EU in 2004, which translated to expansion and easier penetration of European markets (although the majority of barriers

[3] This section also contains data published in the ESA 1995 methodology, specifically according to the fifth edition of the Balance of Payments Manual (BPM5). New data in accordance with the sixth edition of the manual (BPM6) will be published by the Czech National Bank (CNB) in October 2014, specifically in connection with the transition to ESA 2010.

[4] In current prices, the share of imports and exports in GDP increased from about 125 % during the accession to the EU to 151 % in 2013, which is one of the highest values in the entire EU. (However, this comparison is not entirely correct because foreign and domestic prices are compared, and prices in domestic economies are usually undervalued in the case of transition economies. However, the openness of the Czech economy is relatively high even when comparative price levels (so-called parities) are used.

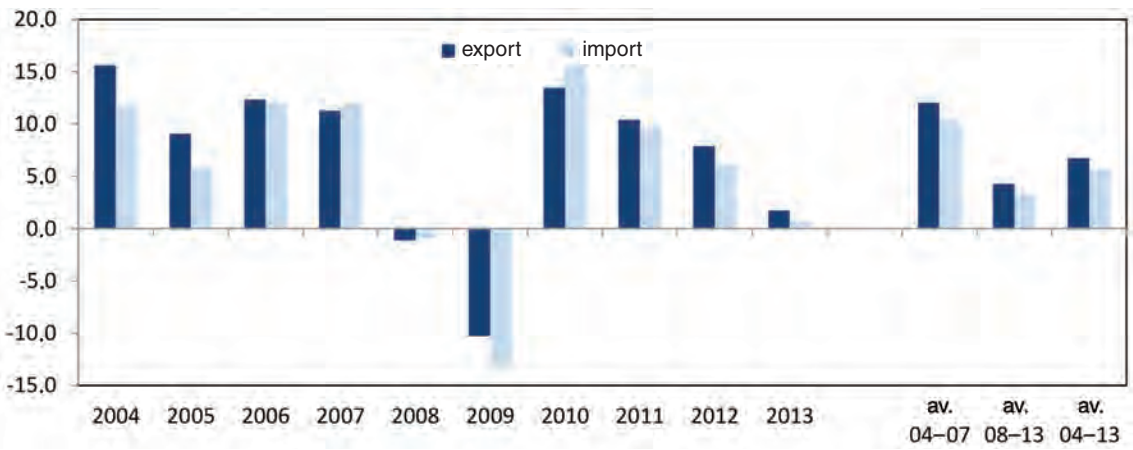
[5] The latest MPO CR estimate shows that in 2011–2012, on average, up to 50 % of imports were destined for manufacture, about 29 % for investment, and the rest for private consumption (breakdown according to anticipated use), see MPO: Analýza vývoje ekonomiky ČR za rok 2013/Survey of the Czech Economy in 2013. MPO, Prague, May 2014, p. 83.

were eliminated already prior to the actual accession) and also to a stimulus for non-European companies to branch out in the Czech Republic.[6]

Production and trade cooperation was also reflected very clearly in foreign trade data – exports grew rapidly, their structure, technical level as well as prices changed, and substantial changes in the terms of trade **/17/** occurred**.** On the other hand, this strong pro-export orientation represents a problem, which was reflected in an external demand shock accompanying the financial and debt crisis. The relatively long-lasting crisis, comparable to the crisis in the 1930s, and the need to resolve problems in many European economies also affected the main economic engine of the EU and eurozone – Germany, which is the main long-term trading partner of the CR and whose share of Czech imports and exports amounts to more than one-third. The renewed growth in exports was lower in 2010 than that of imports, and the year-on-year growth rates of imports and exports declined overall, and data for 2013 indicate year-on-year growth dynamics of only around 1 % (see Figure 3). The impacts of the crisis were also clearly evident in the average growth rate of imports and exports of goods, which reached about 12 % and 10 % in pre-crisis years, and only 4.3 % and 3.3 % after 2008.

The fundamental importance of foreign trade for the CR may be exemplified by the high GDP share of exports of goods and services, which has gradually been rising since 2004 and which approached 60 % for exports and imports of goods (at current prices) before the outbreak of the financial crisis in 2007. The crisis had an impact here as well, specifically in the form of an unusual year-on-year decline in 2009 of more than 5 and 7 p.p. in total exports and imports, respectively. However, the previous growth trend already revived the following year, and exports and imports of goods exceeded 78 % and 72 %, respectively, in relation to GDP in 2013.

In the decade after 2004, the development was characterized by strong growth dynamics in 2006 and 2007, as two-digit growth rates of exports and imports were registered, which were



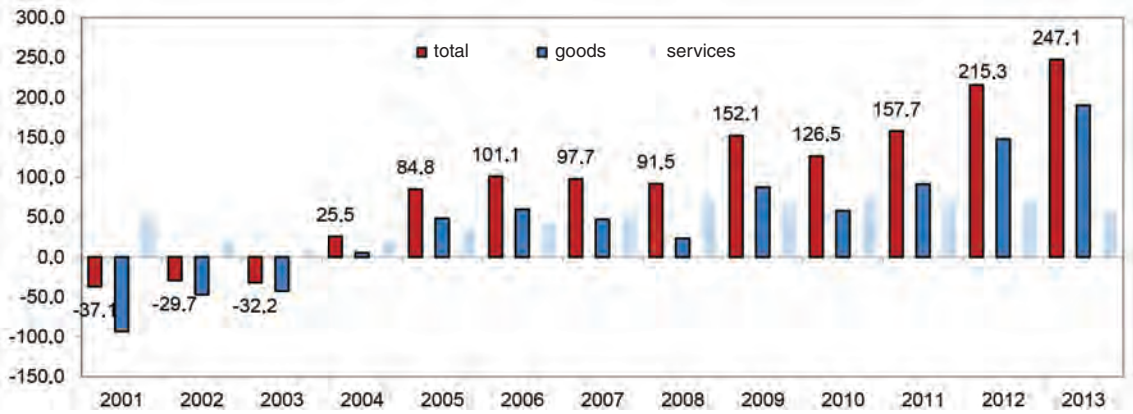
Note: av. = average of growth rates over a period. Source: ČSÚ, Quarterly GDP time series (September 2014), own calculation.

Figure 3: Growth rates of export and import, 2004–2013 (goods only, y-on-y changes, in %, current prices)

[6] The mentioned problem is tied in with the FDI structure, which was not very favourable because the dominant forms of cooperation were based on cost advantage, or connected with low value added. At the present time, it will be interesting to observe the behaviour of foreign investors, whose negotiated subsidies are slowly ending.

followed by year-on-year declines in the growth rates of imports and exports in 2008 to 2009 (accelerating in 2009 with a faster decline in imports, see Figure 3). However, the recovery that ensued in 2010, also partially due to a statistical effect, gradually slackened.[7] The comparison of long-term (ten-year) growth rates of both magnitudes (in 2004–2013) shows that, in the case of Czech export of goods, the average growth rate was 6.7 % and that it exceeded the average growth rate of imports (5.6 %) by more than 1 p.p. However, the effect of the crisis was also reflected very clearly in the pre- and post-crisis growth rates of the past six years.

Despite a temporary stagger during the first years of the crisis, which was exceptional on a global scale,[8] the impressive results of Czech foreign trade in recent years point to the growing competitive strength of domestic production, which is gaining ground in challenging markets (faster growth in exports than imports). This is also supported by the fact that the foreign trade balance has improved considerably (the overall balance entered the positive zone in 2004, see Figure 4) in spite of a slowdown in economic activity in 2008–2009 in the old EU countries, and primarily in Germany. From a macroeconomic perspective, it is also important that foreign trade has become an important factor of GDP growth on the demand side, specifically its positive contribution partially compensated the decline in domestic demand and, thus, softened the impacts on the overall economic performance in the past few years.



Note: values reflect the national accounts methodology. Source: ČSÚ, Quarterly GDP time series (September 2014), own calculation.

Figure 4: Balance of external trade, 2001–2013 (constant prices, billion CZK)

The trade balance surplus in 2013 surpassed the record level from 2012 and, thus, represents a new record high in the history of the Czech Republic (CZK 247.1 billion). The positive year-on-year foreign trade balance grew by one-seventh and, during the ongoing European debt crisis, surpassed the highest ever surplus generated in 2012 (about CZK 215 billion), or in 2009 (about CZK 152 billion), i.e. a period of relatively very weak global prosperity. This

[7] Although a more detailed breakdown or econometric analysis was not conducted, it seems that the given data clearly illustrate the import intensity of the Czech economy when time delays exist, as declining sales led to a faster decline in imports (2009) and, subsequently, to their growth during a revival in production (2010); other important factors were the effects of the crown's exchange rate and commodity prices.

[8] The largest worldwide decline in the post-war era occurred in 2009, as trade fell by 10.3 % accompanied by a slight fall in GDP and a one-third decline in FDI flow (see UNCTAD: World Investment Report 2013. UN, Geneva & New York, 2013).

result may be regarded as proof of the competitive strength of Czech exports even in a turbulent and highly unfavourable economic environment. The growth in the trade surplus in goods, which compensated the year-on-year lower services trade surplus, was reflected more strongly in the overall surplus. This result was also partially aided by the exchange rate of the Czech crown, which temporarily returned to the values in 2006 and 2007 and which remained in a relatively narrow range since mid-2010 (at an average of 25.1 CZK/euro) until the exchange rate intervention of the CNB at the beginning of November 2013 (introduction of an exchange rate "floor" of 27 CZK/Euro), after having appreciated considerably (overshooting long-run equilibrium paths) in 2000-2002 and primarily from mid-2007 to mid-2008. This artificial intervention into the exchange rate movement was reflected in a further weakening to 27.50. This temporary depreciation of the Czech crown was not immediately apparent in the behaviour of exporters vying for customers (due to existing contracts), but it created room to react to fluctuations in demand via price adjustments .[9] [10]

From a long-term perspective, it is possible to consider not only Czech Republic's accession to the EU as one of the **factors leading to favourable results** of Czech foreign trade, but primarily also the strong inflow of foreign direct investment directed at industries with a high share of exports (e.g. manufacture of transport equipment, telecommunication equipment, consumer electronics and computer technology),[11] and the process of gradually diversifying trading partners (and export markets), which allows for the weakening prosperity of the main Czech trading partner (Germany) to be compensated for by exporting to other markets in EU countries or the world.

In terms of **commodities**, the highest deficit in foreign trade is traditionally generated by group SITC 3 (mineral fuels, lubricants and related materials – see Figure 5). The surpluses from group SITC 7 (machinery and transport equipment) are still capable of compensating for the deficit without major problems.[12] Figure 5 shows the trend in the balance of group 3 and

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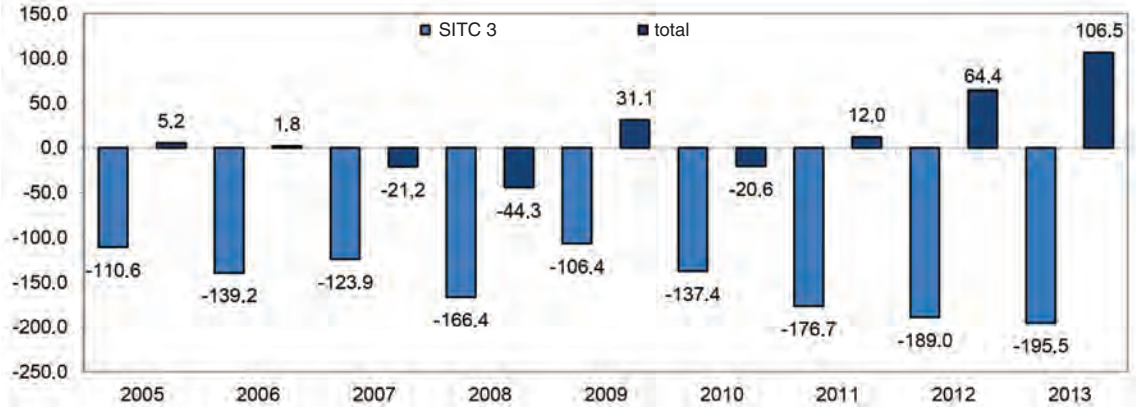
[9] However, this is a matter for future analysis of this intervention to see what the actual effects were. The initial information from exporters indicates that rather losses were generated from unsecured monetary standing, from the need to purchase more expensive raw materials abroad, or from being forced to provide discounts on products sold abroad. However, the so-called J-curve effect should occur in the long term, as exporters adapt to (and change because of) the new exchange rate conditions. This "textbook" behaviour will, however, be influenced by the fact that this is an artificial and temporary intervention in the exchange rate, partially increasing the already relatively high uncertainty, thus restricting potential positive effects (e.g. as a result of various considerations such as how long will the exchange rate be artificially "depressed", what will happen after the "floor" is eliminated, etc.).

[10] In connection with this, it cannot be overlooked that, in past years, Czech exports also profited partially from measures implemented to strengthen prosperity in some countries ("scrappage scheme"). See MPO: Analýza vývoje ekonomiky ČR a odvětví v působnosti MPO za rok 2009/Survey of the Czech Economy and MIT Sectors in 2009. Prague, MPO, April 2010, p. 53.

[11] To a certain extent, a factor may also be a change in the structure of investments, such as FDI, which were directed at more technologically demanding industries that withstand demand shocks more easily than "run-of-the-mill" companies belonging to the manufacturing industry. This is also reflected in the structure of imports and exports according to the degree of processing – the latest data for 2012 show that products with a higher degree of processing had a share of about 85 % of exports and 72 % of imports, see MPO: Analýza vývoje ekonomiky ČR za rok 2012/Survey of the Czech Economy in 2012. MPO, Prague, April 2013, p. 81.

[12] This surplus must also compensate the deficit in foods and live animals (SITC 0), hovering on average around CZK 30 billion (CZK 32 billion in 2013) since 2005, and primarily the sizeable deficit in chemicals (SITC 5), which has been hovering above CZK 100 billion annually (CZK 127.4 billion in 2013) since 2011.



Note: according to SITC Rev. 4, section 3 includes mineral fuels, lubricants and related products. Values for 2013 are preliminary. Values for export (FOB) and import (CIF) include estimates of the CZSO. Source: ČSÚ, Main external trade statistics indicators based on the national concept (the principle of change of ownership) (September 2014), own calculation.

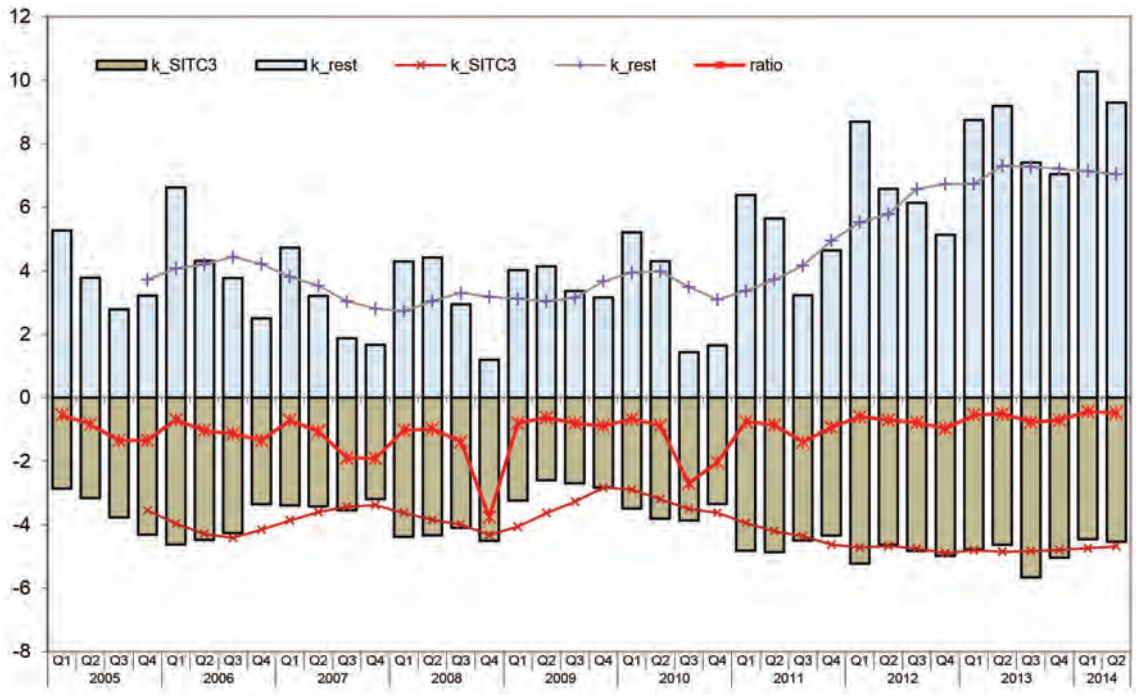
Figure 5: Balance of external trade (national concept), 2005–2013 (billion CZK)

of all other groups since 2005, specifically based on the so-called national concept.[13] Based on this concept, it is clear that both the effect of the crisis as well as the improvement in Czech exports are by far not as clear-cut as it seems to be above in Figure 4.

The foreign trade balance (surplus) based on the national concept increased year-on-year in 2013 by CZK 42.1 billion and, for the first time since being monitored, exceeded CZK 100 billion. However, the trend in individual commodity groups varied considerably. This was still influenced by factors connected with the ongoing financial crisis (uncertainty, heightened volatility), by many non-standard monetary policy measures aimed at strengthening economies, and also by the above-mentioned trend in the exchange rate of the Czech crown. In recent years, the relatively stronger exchange rate of the crown limited the rise in commodity prices at least to a partial extent – its artificial weakening led to an increase in imported commodity prices, which was compensated for by continued stability, specifically by the decline in the global prices of some commodities such as crude oil (for more details see below). In spite of that, the deficit level in the case of mineral fuel and lubricant imports was the highest since 2005 (about CZK 195.5 billion, a year-on-year increase of CZK 6.6 billion). The deficit in chemicals grew slightly as well (from CZK 123.2 billion to CZK 127.4 billion). The deficit in food and live animals grew slightly year-on-year (from CZK 30 billion to CZK 32 billion). Group 1 (beverages and tobacco) reached a surplus again in 2013 (rising from CZK 1 billion in 2012 to CZK 2.3 billion). The higher deficit in mineral fuel imports was compensated for by continued surplus growth in manufactured goods classified chiefly by material (group 6, rising year-on-year by CZK 5.3 billion to about CZK 32 billion) and in consumer goods (group 8) that grew by about CZK 15.5 billion. However, the main group consistently yielding surpluses in Czech foreign trade is group 7 (machinery and transport equipment), which registered a year-on-year increase of CZK 33.8 billion in its surplus, reaching a new record level of CZK 378.9 billion.

The trend in the foreign trade balance according to the two main groups is shown clearly in

[13] The national concept of foreign trade is based on the change of ownership between residents and non-residents and not only on the movement of goods across borders (customs statistics), which is traditionally used in foreign trade statistics. The national concept is compatible with the method of national accounts and balance of payments.



Note: according to SITC Rev. 4, Section 3 includes mineral fuels, lubricants and related products. Ratio is calculated as a fraction of total balance (without Section 3) and balance of Section 3; k_SITC3 is cumulative 12M balance of Section SITC3 (a simple (non-centered) four-quarter moving average), k_rest is cumulative 12M balance of all remaining sections (calculated in the same way). Values for 2013 and 2014 are preliminary. Source: ČSÚ, Main external trade statistics indicators based on the national concept (the principle of change of ownership) (September 2014); ČSÚ, GDP quarterly time series (September 2014), own calculation.

Figure 6: External trade, 2005:Q1–2014:Q2 (in % of GDP, moving annual average)

Figure 6 (quarterly and cumulative quarterly balances). While group SITC 3 had a relatively stable deficit value during the entire period monitored, which changed mostly due to imported raw material prices and exchange rate fluctuations (gradually growing to about 5 % of GDP, see line showing the cumulative balance according to quarterly data), a gradual improvement in the export performance of the Czech economy is apparent in the balance that includes other groups (data from the latest quarter already exceeded 8 % of GDP), but the cumulative trend already indicates that the surplus has leveled off.[14] A striking fact is the influence of energy mineral price changes, reflected in the rise in the balance deficit of group 3 in 2005–2006 (from nearly 3 % to 4.5 % of GDP), or since 2009 (from 2 % to nearly 5 % of GDP in the last quarters), which greatly influenced the total foreign trade balance. This was caused by two conflicting factors that changed over time – a continuing rise in raw material prices or their stagnation, and also a slight decline and gradual weakening of the Czech crown.

Structure of trade

In terms of the **territorial structure** of foreign trade**,** only small changes occurred after the accession of the CR to the EU (major changes occurred already during the transformation of

[14] The balance of other groups is included in one aggregate and does not show the trend of its individual components. The dominant item thus far has clearly been the trend in group SITC 7 (about 84 % of the total balance), which allows us to use this simplification.

the economy in the 1990s), and even the course of the financial and debt crisis did not have a more profound impact, which is evidence of the stable orientation of the Czech economy towards longer-term trade relations and also indirectly towards the structure of imports and exports (see Table 10). The dominant more than 80% share of exports are destined for EU-28 countries, or for eurozone countries (EU-18), and that has practically not changed for more than ten years (a decline of about 4 and 5 p.p. occurred between 2005 and 2013, respectively). Correspondingly, EU countries accounted for about a two-third share of Czech imports in 2013 and eurozone countries for a share of nearly 52%. Even in this case, the share of both main trading partners declined during the period monitored (by 5 and 8 p.p., respectively). This decline was compensated for by an increase in the share of countries outside the EU, specifically that of China, while Russia's share was roughly stable. The gradual decline in the share of EU countries in Czech exports may be regarded as positive because it indicates that export is gradually diversifying and that Czech exporters are capable of penetrating other markets.[15] As for the main trading partners, Germany and Slovakia maintain a priviledged position in terms of volume of exports and imports for the entire period with an average share of 33% and 9%, respectively. China's share remains substantially imbalanced because its average share of Czech exports is nearly 1%, but it accounts for 9% of Czech imports. The latest available data show that imports to China and Russia grew, while Russian imports stagnated and China's share declined slightly. The trade sanctions imposed by the EU and the Russian countermeasures will have a negative impact on trade with Russia. With regard to China, trade will depend on the economy's ability to react to the changing environment and to a change in the sources of growth (elimination of considerable regional and structural imbalances, which have developed in recent years).

Table 10: External trade in goods by group of countries, selected years (shares in %)

	Export						Import					
	2005	2007	2009	2011	2013	Average[1)]	2005	2007	2009	2011	2013	Average[1)]
EU-28	87.4	86.6	86.2	84.7	81.7	**85.3**	71.9	71.1	67.3	66.2	66.8	**68.7**
EA-18	70.6	67.8	69.1	67.2	63.6	**67.7**	59.4	57.0	53.8	51.9	51.7	**54.8**
Germany	*35.1*	*32.0*	*33.8*	*32.5*	*31.4*	***33.0***	*31.5*	*29.0*	*27.8*	*26.6*	*26.3*	***28.3***
Slovakia	9.0	*9.1*	*9.2*	*10.0*	*9.9*	***9.4***	*5.7*	*5.5*	*5.7*	*6.4*	*6.0*	***5.9***
Outside EU	12.5	13.4	13.7	15.2	18.2	**14.6**	28.0	28.8	32.4	33.5	32.7	**31.1**
Russia	*1.6*	*2.3*	*2.2*	*2.9*	*3.7*	***2.6***	*5.2*	*4.4*	*4.6*	*5.6*	*5.7*	***5.1***
China	0.3	0.6	*0.7*	*0.9*	*1.1*	***0.7***	*5.8*	*8.4*	*10.8*	*11.0*	*9.1*	***9.0***

Note: [1)] simple average of yearly values for the period 2005–2013. Source: ČSÚ, External trade in goods by group of countries (the principle of change in ownership), (September 2014), own adaptation.

With regard to **commodity structure**, two groups have dominated Czech exports in recent years according to the SITC classification – manufactured goods classified chiefly by material

[15] This cannot be taken for granted because of the substantial number of small and medium-sized businesses in the Czech economy, for which the costs associated with penetrating non-European markets may represent a very sidnificant budget item. To a certain extent, the renewed pro-export policies of Czech governments may have had an effect, as priority countries (12) and countries of interest (25) for the CR were defined; see Exportní strategie ČR pro období 2012–2020/Export Strategy of the Czech Republic for 2012–2020. MPO, Prague, March 2012. URL: http://databaze-strategie.cz/cz/mpo/strategie/exportni-strategie-cr-2012-2020?typ=struktura.

(group 6) and then primarily machinery and transport equipment (group 7). Group 7 increased its share of total exports from 50.9% in 2004 to 53.8% in 2013 (see Table 11), and its share stagnated in recent years. The share of other groups did not change very much during this period. Group 6 was the sole exception. The share of groups 2 and 3, which are closely linked to the mining and quarrying industry, remained practically unchanged – increasing from 5.6% in 2004 to 5.9% in 2013. In the case of imports, the share of mineral fuels, lubricants and related materials increased gradually in the past three years, reaching the existing maximum of 11.1% of total imports in 2012. A slight decline to 10.7% occurred in 2013. The share of chemicals and related products is relatively stable (on average about 11 %). The fluctuation in the share of group 3 was primarily caused by substantial changes in crude oil and natural gas prices and by the long-term strengthening of the Czech crown in 2004–2008, and also partially by the exchange rate change at the end of 2013 (this will, however, not show itself until 2014 and in subsequent years, and it will probably be suppressed by stagnating commodity prices). Group 3 had a considerably higher share of imports than exports (11.1% vs. 6.2 %), which also resulted in a very high and growing negative balance (see Figure 5 and Figure 6 above). Other structural changes included an increase in the share of food commodities (groups 0 and 1 in exports and imports), which reflect changes, specifically the specialization of Czech agriculture within the EU.

Table 11: External trade – commodity structure, selected years (SITC, Rev. 4, shares in %)

SITC Rev.4 Section (Code)	Export					Import				
	2004	2007	2010	2013	Average[1)]	2004	2007	2010	2013	Average[1)]
0, 1 – Food	**3.3**	3.5	**3.7**	4.3	**3.8**	**4.7**	5.0	**5.3**	5.8	**5.3**
2 – Crude materials, inedible, except fuels	**2.7**	2.6	**3.0**	2.7	**2.7**	**3.0**	2.4	**2.7**	2.8	**2.7**
3 – Mineral fuels, lubricants and related products	**2.9**	2.7	**3.7**	3.2	**3.3**	**7.0**	8.0	**9.6**	10.7	**9.5**
4 – Animal and vegetable oils, fats and waxes	**0.1**	0.1	**0.2**	0.3	**0.2**	**0.2**	0.1	**0.2**	0.2	**0.2**
5 – Chemicals and related products	**6.0**	5.8	**6.5**	6.4	**6.2**	**11.1**	10.4	**10.7**	11.4	10.9
6 – Manufactured goods classified chiefly by material	**22.6**	20.2	**17.2**	17.4	**19.2**	**20.6**	20.9	**17.8**	17.9	**19.1**
7 – Machinery and transport equipment	**50.9**	54.2	**54.6**	53.8	**53.4**	**42.3**	43.0	**43.4**	40.8	**41.7**
8,9 – Miscellaneous manufactured articles	**11.6**	10.9	**11.2**	12.0	**11.3**	**10.9**	10.2	**10.4**	10.4	**10.6**

Note: [1)] simple average of yearly values over the period 2004–2013. Values for 2013 are preliminary after end of June 2014 revision. Source: ČSÚ, Indicators of Social and Economic Development of the Czech Republic from the year 1990 to the end of first quarter 2014 (September 2014), own calculation.

A more detailed look at the trend in the trade of selected import and export commodities of the CR since 2004 is given in Table 12. The influence of the financial and debt crisis and of the structural changes, which were reflected in both imports and exports (e.g. in 2008 for passenger

cars and, during the "crisis" year 2009, primarily in import items), is clearly unveiled in this example as well. Looking at the long-term trend of the six main export and the four main import commodities, the sharp rise in exports of passenger cars (by 174 % exceeding 1 million units) or beer (31 % increase) is, in the case of exports, not as surprising as the relatively sharp decline and subsequent increase in hops exports, which potentially indicates both the export of higher value added products and changes in consumer preferences (return to traditional beer brewing methods) as well as the effects of weather.[16] The numbers for selected primary commodities indicate a different trend (exports of kaolin grew by 6 % and that of limestone by 28 %). In the case of imports, the structural changes in the economy were also reflected in the commodity structure, where, for example, the imports of cotton nearly ceased (falling by 90 %), iron ore imports declined (by 18 %) in connection with restructuring, but crude oil imports, on the other hand, grew slightly. However, raw material imports are subject to cyclical development, and it is possible that the iron ore imports were primarily connected to both less capital construction and to the decline in production because of poor demand due to weak global prosperity. On the other hand, the effects of climate and other changes, and not just the impact of changes in agricultural production structure, may have played a role in the case of agricultural commodities such as cereals.

Table 12: External trade – export and import of selected commodities, 2004–2013

	Export						Import			
	Cement[1]	Caolin[1]	Cement[1]	Caolin[1]	Cement[1]	Caolin[1]	Cement[1]	Caolin[1]	Cement[1]	Caolin[1]
2004	747	484	140	373 397	5 158	285	6 406	7 639	125	52
2005	559	271	124	522 364	4 895	314	7 730	6 807	102	45
2006	496	261	162	763 744	4 096	366	7 752	7 987	308	36
2007	646	249	98	853 956	3 428	372	7 147	6 592	345	32
2008	663	239	107	824 075	4 336	381	8 142	7 711	232	19
2009	676	380	100	860 247	4 145	346	7 452	4 810	160	10
2010	683	526	93	971 168	4 405	329	7 770	5 938	177	10
2011	862	542	176	1 059 296	4 100	323	6 969	7 366	197	7
2012	699	513	205	1 050 368	4 276	349	7 024	5 867	358	5
2013	620	515	179	1 022 811	3 533	372	6 631	6 273	329	5
Index[5]	0.82	1.06	1.28	2.74	0.68	1.31	1.04	0.82	2.63	0.10

Note: values for 2013 are preliminary. [1] Ths. tons, [2] pcs, [3] tons, [4] mil. l.; [5] Index 2004 = 100. Source: ČSÚ, Indicators of Social and Economic Development of the Czech Republic 1st quarter 2014 (September 2014), own calculation.

The trend in global prices of selected commodities and its impact on the Czech economy is illustrated in Table 13, which summarizes the trend in the prices of crude oil, natural gas and of three other selected commodities – wheat, copper and uranium in 2004–2013. The price fluctuations in 2007–2009 and the sharp price rise in 2010–2011 to pre-crisis levels (with a slight correction in 2012–2013 when comparing the price index with 2005) are clearly

[16] Czech agriculture is a traditional and important world producer of hops (ranked fifth in the world behind Germany, the USA, Ethiopia and China according to the latest available data for 2012; see FAOSTAT: Food and Agricultural commodities production. FAO, Rome, 2014, URL: http://faostat.fao.org/site/339/default.aspx.

evident. The impact on the trade balance and, indirectly, on businesses can be estimated based on the trend in the global price index in CZK, which not only reflects changes in crude oil prices but also the trend in the exchange rate of the Czech crown against the USD. The unfavourable trend in prices was thus compensated for by the strengthening crown in individual years (e.g. this trend is clearly noticeable in 2004–2005 by comparing the year-on-year indices in USD and CZK). The price indices for wheat or copper were influenced by a sharp rise in production costs due to growth in demand, which reflects rising consumption in many economies worldwide or the fact that non-energy commodities and food became investment instruments (underlying instruments for various financial instruments, so-called derivatives such as *futures* or *options*) for international investors in a low-yield environment. The end result was that this led to stronger price fluctuations in both directions, higher price volatility but also to growth in market liquidity (decreasing costs), thereby also increasing availability for those needing to hedge against unexpected events.

Table 13: Price indices of selected world commodities, 2004–2013

		2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Oil Brent	USD/barrel	38.3	54.4	65.4	72.7	93.6	61.9	79.6	111.0	112.0	108.8
	CPPR = 100	*132.7*	*142.1*	*120.1*	*111.2*	*128.7*	*66.1*	*128.7*	*139.3*	*100.9*	*97.2*
Index in CZK	2005 = 100	75.5	100.0	113.4	113.3	122.3	90.4	116.7	150.6	168.2	163.4
	CPPP = 100	*120.9*	*132.4*	*113.4*	*99.9*	*108.0*	*73.9*	*129.1*	*129.0*	*111.7*	*97.1*
Wheat	USD/t	156.9	152.4	191.7	255.2	319.3	223.4	223.7	316.2	313.3	312.2
	CPPP = 100	*107.3*	*97.2*	*125.8*	*133.1*	*125.1*	*70.0*	*100.1*	*141.4*	*99.1*	*99.7*
Index in CZK	2005 = 100	110.5	100.0	118.7	142.0	149.0	116.6	117.1	153.2	168.0	167.3
	CPPP = 100	*97.7*	*90.5*	*118.7*	*119.6*	*104.9*	*78.3*	*100.4*	*130.8*	*109.7*	*99.6*
Natural Gas	USD/ mil, BTU	3.8	5.9	8.2	8.1	13.4	8.9	8.2	10.6	12.0	11.2
	CPPP = 100	*107.7*	*157.5*	*138.8*	*99.1*	*164.1*	*66.3*	*92.9*	*128.9*	*113.1*	*93.4*
Index in CZK	2005 = 100	68.1	100.0	131.1	116.7	160.7	119.1	110.9	132.3	165.6	154.6
	CPPP = 100	*98.1*	*146.8*	*131.1*	*89.1*	*137.6*	*74.2*	*93.1*	*119.3*	*125.2*	*93.3*
Uranium	USD/pound	18.0	27.9	47.7	99.2	63.2	46.7	46.0	56.2	48.9	38.5
	CPPP = 100	*160.6*	*154.8*	*170.7*	*208.1*	*63.7*	*73.8*	*98.5*	*122.4*	*87.0*	*78.8*
Index in CZK	2005 = 100	69.3	100.0	161.2	301.3	161.0	133.0	131.3	148.7	143.2	112.7
	CPPP = 100	*146.2*	*144.2*	*161.2*	*186.9*	*53.4*	*82.6*	*98.8*	*113.2*	*96.3*	*78.7*
Copper	USD/t	2863.5	3676.5	6731.4	7131.6	6678.6	5165.3	7538.4	8823.5	7958.9	7331.5
	CPPP = 100	*160.9*	*128.4*	*183.1*	*105.9*	*93.6*	*77.3*	*145.9*	*117.0*	*90.2*	*92.1*
Index in CZK	2005 = 100	83.6	100.0	172.9	164.5	129.2	111.8	163.6	177.3	177.0	162.9
	CPPP = 100	*146.5*	*119.6*	*172.9*	*95.2*	*78.6*	*86.5*	*146.4*	*108.3*	*99.9*	*92.0*

Note: values are monthly averages of spot prices and annual averages of CZK/USD exchange rate. CPPP – constant prices of previous period = 100. Source: ČSÚ (2014); MMF (2014), own calculation.

As mentioned and illustrated above, the trend in the trade balance is, to a certain extent, influenced by the trend in the **prices of raw materials**, which are imported into the Czech Republic. The sharp rise in global prices of industrial commodities and food in the past few years (see Figure 7) resembles the situation at the beginning of the 1970s and the period of the

second oil shock.[17] A new aspect is that, so far, a sharp drop in prices across the spectrum of commodities has not occurred except for their stabilization at more or less "corrected" levels. A significant decrease cannot be expected due to higher demand in emerging (African, Asian, Near Eastern or Latin American) countries. The negative impact on foreign trade results was suppressed by movement in the exchange rate (appreciation **/18/** of the Czech crown against the dollar).[18] The continuously rising commodity prices began to fall in the second half of 2008, specifically in connection with the spread of the global financial crisis. However, even this decline was temporary due to strong demand in some economies (so-called BRICS), and the growth trend gradually resumed in the second half of 2009 (see Figure 7). Current prices reflect the levels at the start of 2008, thus a period when the global economy experienced the height of a prosperity phase. However, the figure shows the ongoing stagnation of indices, which has continued since the beginning of 2011 (except for the metals price index), as is illustrated in the lower panel with year-on-year changes in index values during the period monitored.[19]

The trend in raw material prices is, of course, also reflected in the trend in the terms of trade of the CR. The share of raw materials is higher in import than in export prices, and that is why a rise in raw material prices leads to a negative impact on the terms of trade and vice versa. In 2009 for example, the trend in the terms of trade (annual index 102.8) was very positive compared to

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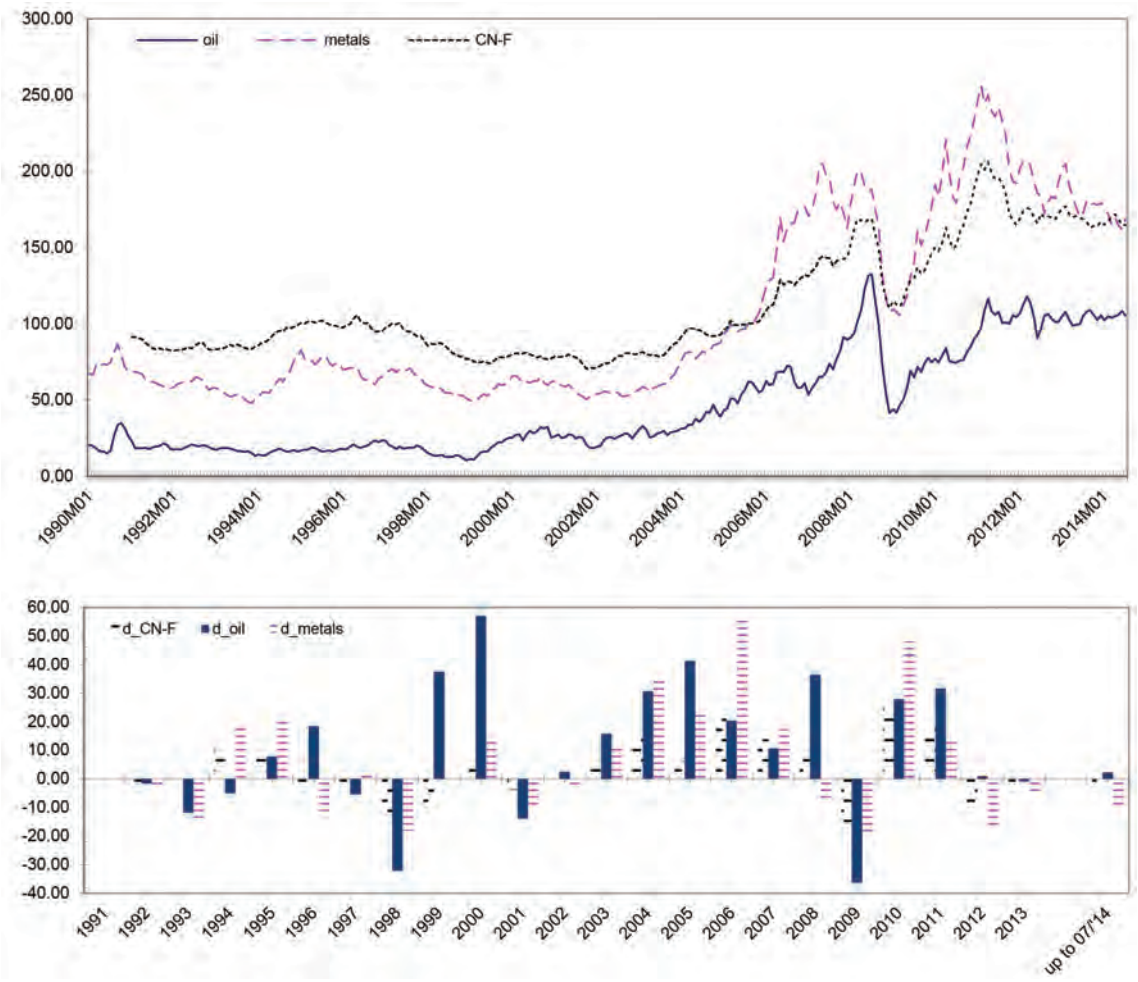
[17] If the highest price per barrel of Brent Crude (quoted on the New York Mercantile Exchange) during the second oil crisis in the amount of USD 39.50 from April 1980 is taken into account, then a barrel of crude oil would cost approximately USD 103.76, recalculated to reflect the present value of money (today, 1 USD from 1980 has a value of USD 2.61 – based on the consumer price index). During the first oil crisis, the price did increase from about USD 3 to USD 12 per barrel (1974), however at today's prices that amounts to only USD 52.29. The record from 1990, caused by the Persian Gulf War (USD 40.42 per barrel), amounts to only USD 66.44 per barrel after being recalculated at today's prices. The present record value was reached in June 2008 – USD 139.89 per barrel (the monthly price average for June and July was USD 133.05 and USD 133.90 per barrel, respectively). Since then, the price of crude oil has fallen sharply to values ranging between USD 40–50 per barrel (December 2008). The price remained in this range until May 2009, when it again began to rise gradually as renewed growth in the global economy and continued growth in emerging economies occurred as expected. In January 2011, it again exceeded the limit of USD 100 per barrel and gradually stabilized at around USD 120; at the time of writing, it hovered in a relatively narrow range of around USD 100. However in recent years, the price of crude oil became more volatile and its behaviour can no longer be defined by tapping global reserves or by geopolitical impacts such as regional conflicts. The reason for this is the use of alternative fuel resources (ethanol) as well as new methods of crude oil production such as hydraulic fracturing (fracking) and horizontal drilling (primarily in the USA and Canada). The expansion of production in Europe is blocked by environmental protests concerned about environmental impacts due to high water intensity (e.g. in the UK and Poland). As a result, the US economy became the largest energy producer (ahead of Saudi Arabia and Russia) and the production of 8.6 million barrels per day is the highest amount in the past 28 years (eclipsed only in 1985 – 9 million barrels per day). Side effects include impacts on the stability of the market for energy minerals (and pushing peak production) and achieving greater energy independence. On the other hand, these modern technologies are very capital intensive, leaving them more vulnerable to price fluctuations, and leading drillers to pile up debts; see Gold, R.: U.S. Energy Boom Retains Vigor. Wall Street Journal Europe, Business & Finance, Tuesday, September 16, 2014, p. 19; Ivry, B., Serrill, M., Roche, G., Neumann, J.: Drillers Piling Up More Debt Than Oil Hunting Fortunes in Shale. Bloomberg, (online), September 8, 2014. URL: http://www.bloomberg.com/news/2014-09-08/halcon-s-wilson-drills-more-debt-than-oil-in-shale-bet.html.

[18] However, the persisting high energy intensity of the Czech economy, also reflected in increased raw material imports, is problematic.

[19] A reason may be the fact that, for many investors, commodities are a very attractive investment instrument, which in many cases yields positive returns (cleansed of the rate of inflation) and is therefore preferred to traditional investment instruments such as bonds or stocks. This may have been the reason for the reduction of traditional commodity price fluctuations, which reflected global prosperity in the past.



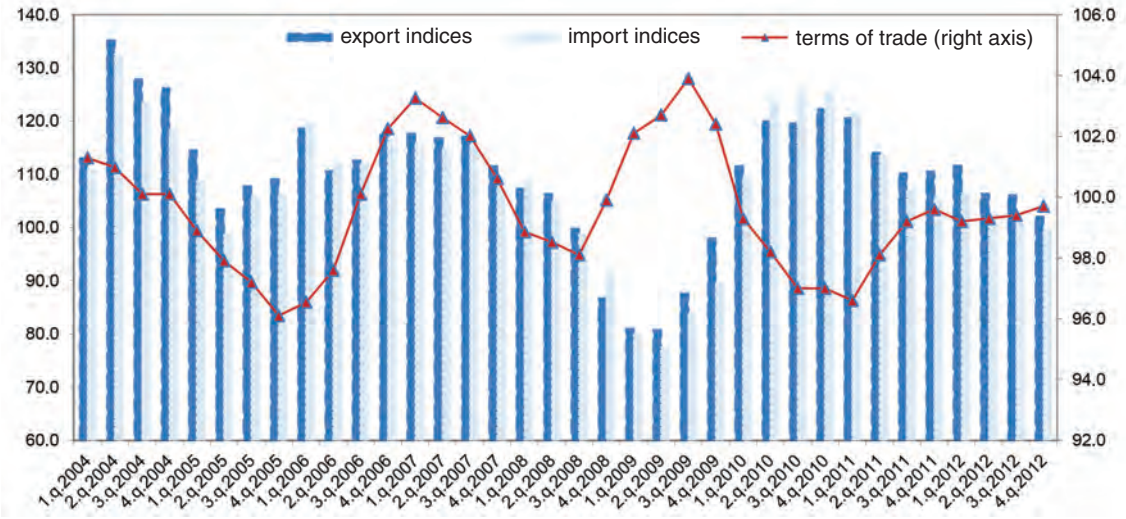
Note: Indices 2005 = 100. Oil – Crude Oil (petroleum, price index), simple average of three spot prices; Dated Brent, West Texas Intermediate, and the Dubai Fateh. CN-F – Non-Fuel Price Index, includes Food and Beverages and Industrial Inputs Price Indices, metals – Metals Price Index, 2005 = 100, includes Copper, Aluminium, Iron Ore, Tin, Nickel, Zinc, Lead, and Uranium Price Indices. MO1 – January of the given year. Y-on-y changes of indices (d_CN-F, d_oil, d_metals) are calculated from yearly averages of monthly values. Source: IMF, IMF database (September 2014), own calculation.

Figure 7: IMF Primary Commodity Prices Indices and their y-on-y changes, January 1990–July 2014

2008 (index 98.9), and it was not until the end of the year that the trend changed and the terms worsened considerably, with a correction occurring in 2010 (approximately to the 2005 level) and a gradual return occurring since the first quarter of 2011 to values nearing the neutral level, i.e. an index value of 100. (The trend in both years, including the worsening at the end of 2009, was nearly identical (slightly positive) when using the terms of trade without raw material prices.)

External economic balance

The **external economic balance** based on the current account balance, which indicates flows of goods, services, primary and secondary income between residents and non-residents, registered substantial changes in 2004–2013. Prior to the accession to the EU, strong net capital inflow (> 5 % GDP) occurred, which was reflected in the balance of the financial account and of the current account as well (due to double entries and many import-intensive activities such

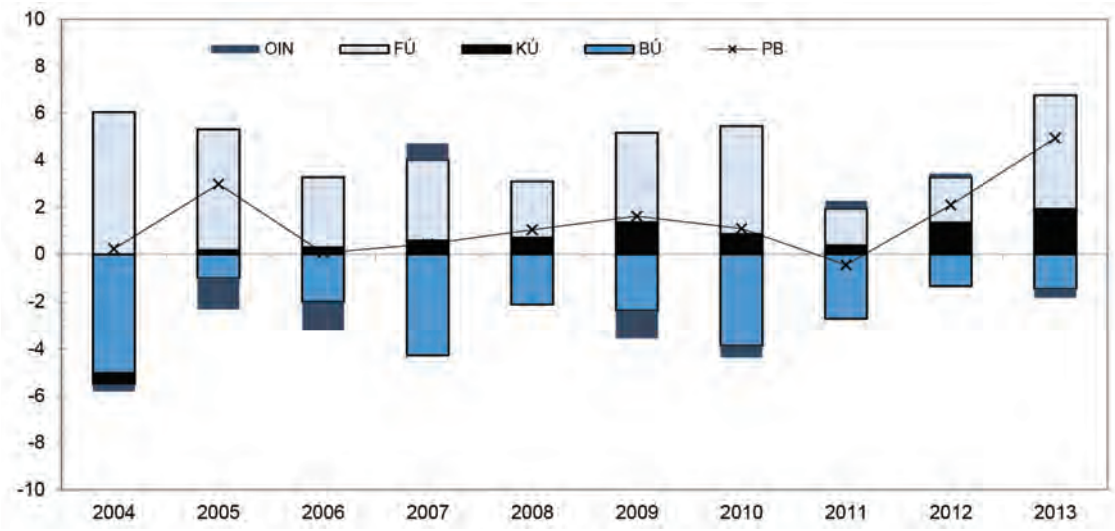


Note: export and import indices are in current prices. Source: ČSÚ, Statistical Yearbook of Czech Republic 2009; ČSÚ, Statistical Yearbook of Czech Republic 2013, own adaptation.

Figure 8: Export and import indices and terms of trade for the Czech Republic, 2004:1.Q.–2012:4.Q.

as direct investment, see Figure 9). While net capital inflow did not change much in 2005-2010, it fell sharply to 2 % of GDP in 2011 and 2012. Preliminary data for 2013 indicate a change in the trend and a resurgance of strong capital inflow. Changes in the financial account were accompanied by temporary declines in the negative balances of the current account, which allowed for a positive balance of payments and accumulation of reserves amounting to a temporary record level of 4 % of GDP, to be registered in 2013.

From a perspective of current account structure, the income balance replaced the trade balance (in deficit until 2004) as the main source of the deficit in 2004–2013, specifically due



Note.: BÚ – current account, FÚ – financial account, KÚ – capital account, OIN – errors and omissions, PB – balance of payments (= change in foreign reserves of the ČNB). Source: ČNB, database ARAD (September 2014); ČSÚ, Quarterly GDP time series (September 2014), own calculation.

Figure 9: Components of current account, 2004–2013 (values in % of GDP)

to net outflow of primary income in the form of salaries, repatriated and reinvested earnings, and interest amounting to as much as 7% of GDP (see Table 14).[20] The income balance deficit was not even compensated for by the gradually increasing trade balance surplus in goods and services (reaching 4.8% of GDP in 2013, a year-on-year improvement from 3.9% of GDP in 2012). The services balance (around 1.5% in recent years) registered a relatively stable surplus as well (despite having declined slightly in the past three years) and partially helped to compensate for the rise in the income balance deficit. However, individual trends resulted in a decline in the size of the current account deficit, which was consequently easily financed by a surplus in the financial account (except in 2011). The surpluses in the financial account fluctuated from year to year as privatization and FDI inflow into the Czech economy gradually declined. By contrast, the capital account gained in importance in 2008 to 2009 and primarily in 2012 and 2013 (1.4% and 1.9% in relation to GDP), specifically in connection with EU funding (drawing down funds within a seven-year programme, 2007–2013), which began to play a more significant role in the financing of investment activities in the CR. [21]

Table 14: Current account, 2001–2012 (in % of GDP)

	Current account	*Trade balance*	*Balance of services*	*Income balance*	*Current transfers*
2004	**–5.0**	*–0.5*	*0.6*	*–5.3*	*0.2*
2005	**–1.0**	*1.6*	*1.2*	*–4.1*	*0.4*
2006	**–2.0**	*1.8*	*1.5*	*–4.9*	*–0.3*
2007	**–4.3**	*1.3*	*1.6*	*–7.0*	*–0.2*
2008	**–2.1**	0.7	1.9	–4.5	–0.2
2009	**–2.4**	*2.3*	*2.0*	*–6.6*	*0.0*
2010	**–3.9**	*1.4*	*2.0*	*–7.5*	*0.2*
2011	**–2.7**	*2.4*	*1.5*	–6.7	0.1
2012	**–1.3**	*3.9*	*1.6*	*–6.8*	*–0.1*
2013	**–1.4**	*4.8*	*1.4*	*–8.0*	*0.4*
Av. 2004–2007 1)	**–3.1**	***1.0***	***1.2***	***–5.3***	***0.0***
Av. 2007–2013 1)	**–2.6**	***2.4***	***1.7***	***–6.7***	***0.0***
Av. 2004–2013 1)	**–2.6**	***2.0***	***1.5***	***–6.2***	***0.0***

Note: 1) simple averages of yearly values over the given period. Sources: ČNB, database ARAD (September 2014), ČSÚ, quarterly time series of GDP (September 2014), own calculation.

The current account deficit in the amount of 1.4% of GDP was influenced in 2013 by a year-on-year rise in the trade balance surplus to 4.8% of GDP and also by a year-on-year deepening

[20] The income balance also affects performance indicators, when traditional indicators such as GDP ("domestic perspective") lose their explanatory power and alternative indicators such as gross national income ("ownership perspective") have to be used. The implication for the countries of the Visegrád Group are briefly mentioned, for example, by Žďárský, V.: Vliv globalizace na zvýšení odchylek mezi HDP a HNP ve vybraných zemích v posledních dvou dekádách/ The *effect of globalisation* on deviations between GDP and GNP in selected countries over the last two decades. GEV, CNB, August 2013, p. 12–20.

[21] A record surplus reaching nearly CZK 75 billion was registered in 2013. MPO stated that net income from the EU budget represented about 60% of the surplus; see MPO: Analýza vývoje ekonomiky ČR za rok 2013/Survey of the Czech Economy in 2013. MPO, Prague, May 2014.

of the income balance deficit to -8.0 % of GDP (this was still an estimate at the time of writing this report). The balance on services worsened slightly (1.4 % of GDP) and the current transfers balance was slightly positive. As mentioned already above, the net outflow of primary income to foreign countries in 2013 in the form of salaries, reinvested or repatriated earnings and interest represented 8.0 % of GDP (the previous maximum was 7.5 % in 2012)[22] , thus lowering the gross national income **/19/** of the Czech Republic compared to the gross domestic product. The Czech Republic is thus joining some other countries such as Ireland, Hungary and now Slovakia as well, which are losing an important part of created value that cannot be used for consumption or investment. Reinvestment and repatriation of earnings will continue to be the main source of the current account deficit also because of expected restrictions on reinvestment of earnings in existing companies and due to continued income flow to parent companies abroad.[23]

In the past five years, the current account deficit of the CR stabilized at an annual average of 2.6 % of GDP (see Table 14). Although it was slightly higher than the average deficit of the developed countries of the EU-15, or eurozone countries, it is still an acceptable imbalance for an economy at a lower economic level, which is closing in on the income levels in developed countries. However, an important aspect is the current account structure, which may become a problem if the sharp rise in the income balance deficit and only a weak improvement in net exports continue. Of the thirteen new EU countries, the CR had the fourth-highest current account deficit in 2013.[24] With respect to the national economy, the current account deficit is the result of insufficient national savings in relation to investments. This gap has to be financed from foreign sources. While the entrepreneurial sector increased its ability to generate savings and improved its profitability, the measure of household savings is low compared to developed EU countries. The negative gap between savings and investments is generated primarily by the government sector.

Foreign investment and the Czech economy

Foreign direct investment became an important factor of growth in new Member States of the EU including the Czech economy.[25] In the case of the Czech economy, a substantial FDI inflow began after 1998 in connection with the implementation of investment incentives, the continuing privatization, and with the restructuring of businesses. A strong inflow was registered in 2002 (7.1 % of GDP, due to the privatization of banks), followed by an FDI inflow

[22] Analysts link this significant outflow (in 2009 as well) to the repatriation of earnings by parent companies during the European debt crisis.

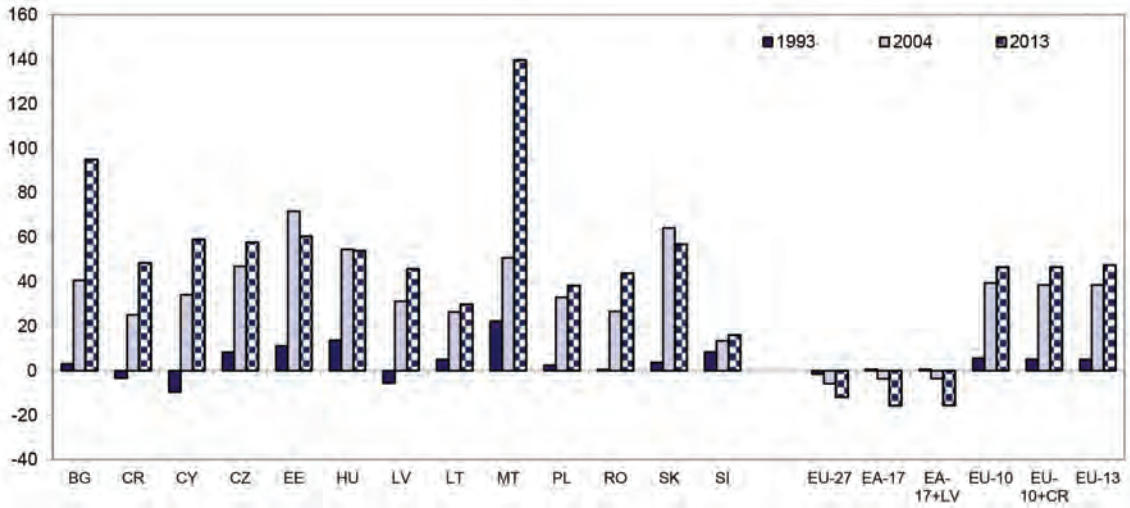
[23] The Czech Republic together with Russia, Kazakhstan and Kyrgyzstan were the only "European" and "Eurasian" countries ranked among countries with the highest FDI income in 2011 (double-digit values), see UNCTAD: World Investment Report 2013. UN, Geneva & New York, 2013.

[24] Many new member states registered higher current account surpluses, which represents a relatively radical change in comparison with the first decade of the new century. In 2013, only Estonia, Poland, Cyprus and Latvia registered deficits (1.8, 1.6, 1.4 and 0.8, % of GDP, respectively). On the other hand, countries with high current account deficits in past years experienced considerable improvement in the current account – deficit-plagued Lithuania (1.3 %), Slovakia (2.5 %) or Bulgaria (1.9 %), and Hungary (3.1 %) or Slovenia (5.3 %) registered positive and relatively high GDP values as well. Croatia and Malta had a nearly neutral current account (data according DG ECFIN: Statistical Annex of European Economy. Spring 2014. ECFIN, Brussels, April 2014).

[25] Foreign investment and balance of payments analyses usually also include an assessment of an economy's investment position, which however is not dealt with (merely indirectly in connection with the trend in mining and quarrying) in this report due to lack of space.

in 2005 in the amount of 6.8 % of GDP, and by a record level of 10.0 % of GDP at the height of the pre-crisis economic cycle in 2007. The effect of the financial crisis was reflected in a sharp decline in FDI (the annual average for 2008–2013 amounted to only 2.9 % of GDP), but an improvement in the economic climate as a whole led to renewed growth and the FDI inflow exceeded 5 % in 2012 and the estimate for 2013 is close to the average"crisis" level of 2.7 % of GDP.

The **cumulative net** FDI[26] in relation to GDP reached nearly 58 % in 2013, and the CR ranked third behind Bulgaria (94 %) and Estonia (60 %) among 11 new Member States of the EU excluding Malta and Cyprus (EU-11). Slovakia (56 %) ranked fourth and Hungary (54 %) fifth. The two Mediterranean countries mentioned above occupy a distinctive position reflecting the character of their economies and tax measures, which distinguish them from the rest of the new Member States (see Figure 9).[27] Nearly 31 % of the total FDI volume (this share has been declining in recent years, benefiting some service sectors such as factoring (about 22 %), real estate (8 %), and information and communication services over 5 %) was directed at the Czech



Note: EU-13 – all new EU member states including Croatia (CR), EU-11 – new EU member states (i.e. without Cyprus and Malta), EU-15 – old EU member states, EU-28 – all EU member states. Net stock – net FDI stock, i.e. differences between FDI inward and FDI outward stocks at the end of a particular year. Values for 2013 are preliminary, values for 1990 are not utilized since they are not available for some countries or are UNCTAD experts' estimates. Values for EU-15, EU-13 and EU-11 are simple averages of individual values. Source: UNCTAD, FDI database (September 2014); DG ECFIN, database Ameco (May 2014); MMF, WEO database (April 2014), own calculation.

Figure 10: FDI inward stock, new EU member states (net stock, in % of GDP)

[26] This is the so-called net position, i.e. the difference between investments by foreign companies in the CR and investments by Czech companies abroad.

[27] In terms of cumulative FDI (1990–2013, inward FDI) per capita, the CR (about USD 13.0 thousand) ranked second behind Estonia (USD 16 thousand) and ahead of Hungary (USD 11.2 thousand) and Slovakia (USD 10.9 thousand) among new Member States of the EU excluding Cyprus and Malta, based on preliminary data for 2013. The average for new Member States (NMS11) was USD 7.7 thousand, or USD 7.9 thousand for NMS13; for comparison purposes, the average for the old EU-15 countries exceeded USD 19.2 thousand and amounted to about USD 16.9 thousand for the entire EU-28 (own calculations based on the UNCTAD and ECFIN databases, 2014).

manufacturing industry. With the FDI inflow, the number of foreign-controlled companies in the Czech economy increased sharply as well. In 2009, in the sector of non-financial businesses (100 or more employees), these companies accounted for 74 % of income from the sale of goods and services, for nearly 62 % of employment, and salaries were 20 % higher than the average for all businesses. These companies also adjusted more easily to the impacts of the crisis because company sales fell sharply in the non-state sector, while growing slightly (just as employment) in the case of foreign-controlled companies.[28]

A qualitative change in the structure of FDI directed at the Czech economy occurred in the past five years. The major portion of investments are not financed with the capital of parent companies, but generated by the companies themselves in the CR (reinvested earnings minus other capital, which is monitored separately). The onset of reinvestment in the CR did not begin to be monitored until 1998, and its extent and importance for the total investment activity of foreign companies varied substantially from year to year. Initially, its importance was low (about ¼ until 2002), increasing gradually as the profits generated by foreign-controlled companies grew (in keeping with the so-called investment life cycle). In 2013 just as in 2009, reinvestments were practically the only source of FDI inflow (an inflow of about CZK 98 billion, reinvested earnings of about CZK 95 billion). They were again a substantial source for financing the investments of foreign-controlled companies in 2006 and 2011 (about 66 and 93 %, respectively). According to CNB data for 2013, the share of reinvested earnings reached 57 % (a substantial year-on-year growth from 50 %).[29] Major investors were businesses from the Netherlands, which replaced German businesses as the primary investors in the CR. They were followed distantly by investors from Austria, Cyprus, Belgium and the Republic of Korea.[30] The number of Asian investors from Japan and China was very small and only the Republic of Korea was represented more prominently. From a long-term perspective (from 2004 to the end of 2013), the dominant portion of investments comes from the Netherlands, Austria and Germany (cumulatively CZK 256, 211 and 189 billion), followed at a distance by investments from the USA, Switzerland, Belgium (roughly CZK 50 billion) and France (about CZK 33 billion); the shares of other countries were minor. With respect to structure, the manufacturing industry (related to the automotive industry and electronic products), transportation and telecommunications (both sectors over CZK 200 billion), various business services (financial services, facility management, etc.), trade and the hospitality industry were predominantly represented.

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[28] In the case of all foreign-controlled companies (financial and non-financial businesses, 2008, percentage of the total for the given item), production reached 42.5 % of the total, gross value added about 30 %, intermediate consumption 48 %, salaries and wages 33 % and net operating surplus 56 %; see Dubská, D.: Firmy se zahraniční majetkovou účastí v ekonomice ČR: oslabily nebo dále sílí?/Enterprises with Foreign Capital Participation in the Economy of the CR: Have they Weakened or are they Strengthening? Analysis report of the ČSÚ. ČSÚ, Prague, 2012.
The latest data for foreign-controlled companies are not yet available due to a transition to a new industrial classification (NACE Rev. 2.0).

[29] In some years, reinvestments reached higher values than the total volume of FDI (these years are not taken into account), caused by loan repayments by Czech companies to parent companies, e.g. 2003 or 2008; see MPO: Analýza vývoje ekonomiky a odvětví v působnosti MPO za rok 2009/ Survey of the Czech Economy and MIT Sectors in 2009. MPO, Prague, April 2010, p. 19.

[30] The reason for the high FDI inflow from the Netherlands and Cyprus are tax, legal and other advantages provided by these countries.

The importance of foreign capital in the mining and quarrying industry

The importance of foreign capital in the mining and quarrying industry, measured by the cumulative inflow of foreign direct investment, corresponded roughly to the industry's share of GDP (see Table 15). In 2013, investments in the industry rose slightly (inflow of CZK 1.7 billion, following an inflow of nearly zero in 2012 and an outflow of CZK 6.1 billion in 2011). Each year since 2004, the FDI inflow into the industry has reached negative values (except in 2004, 2010 and 2012), specifically in connection with the end of the multi-year commodity market boom and with the spread of the financial crisis to other countries and economic sectors worldwide as well as with the cutback on investments in new and existing capacities in the CR. Thus, many originally planned investments were held back or suspended due to sufficient existing capacities. This is reflected in a drop in the industry's share of total cumulative stock of capital (about 2.3 %) as well as its individual components: investment in equity capital (1.5 %), reinvested earnings (2.4 % of the total volume of reinvested earnings) and also other capital, whose importance in terms of total FDI is slightly growing (6.9 % in 2013).[31]

Table 15: FDI inward stock, as of 31. 12. 2013 (mil CZK)

	Equity capital	Reinvested earnings	Other capital	Total
Total	1 364 526	1 133 692	200 325	**2 698 543**
Mining and quarrying	*20 504*	*27 673*	*13 861*	***62 037***
Share of mining and quarrying (in %)	1.5	2.4	6.9	**2.3**

Note: figures for 2013 are preliminary (final figures for 2013 will be published in 2015). Source: ČNB (2014), Balance of Payments Statistics, own calculation.

With regard to the size and structure of the economy and to the size of Czech companies, the flow of **Czech foreign direct investment abroad** is substantially lower (see Table 13). However, in recent years, Czech capital has been penetrating foreign markets with increasing success and, therefore, also into foreign businesses, which allow for the supply of the local market (manufacturing industry) or which provide supplies of raw materials and intermediate products (coal mining in Poland, and exploration for and production of crude oil and natural gas in African and CIS countries). Here, however, they face strong competition from large often state-owned and therefore financially very strong enterprises from Russia, Brazil, the United Kingdom, China or India. Similarly to the previous year, the leading destinations for Czech FDI in 2013 were the Netherlands, Slovakia, France, Romania, Poland and Liechtenstein. Similar countries were targeted by Czech companies also in the past. As far as the long-term trend is concerned, the dominant position is held by the Netherlands, followed by Slovakia, Bulgaria, Romania, Cyprus, Poland, Ireland and Germany.

The impacts of the crisis were also reflected in the low volume of Czech FDI abroad. However, a change in the previous trend occurred in 2013 because the total FDI amount reached nearly CZK 64.5 billion (about 84 % higher when compared year-on-year, as investment in equity capital rose sharply). On average, CZK 37 billion have been invested annually since

[31] For example, intercompany loans used within the group – parent company vs. subsidiary are monitored precisely under other capital. Looking at preliminary CNB data for 2013, the share in total inflow was 1.8 %, in investment in equity capital 0.9 %; the other items registered an outflow.

2004. The maximum thus far was CZK 73.8 billion in 2008, primarily due to a one-time transaction, without which there would have been only a slight year-on-year increase. The increase in the FDI volume in 2013 indicates that healthy and stable companies took advantage of the turbulent economic environment to make investments that would otherwise have been impossible. Reinvested earnings amounted to CZK 19.1 billion, which represented investments made by several entities and not only a sharp one-time fluctuation caused by the investments of a single company belonging to the real estate and business services sectors.

The flow of Czech FDI abroad from the **mining and quarrying industry** was also minimal in 2013 (in terms of total volume amounting to nearly CZK 0.1 billion). Most of it was connected to investment in equity capital. The cumulative amount of Czech FDI up the end of 2013, shown in Table 16, indicates an entirely negligible share in the total structure of Czech FDI. This is due to a decline in the activities of Czech companies in this sector abroad in 2009–2011.

Table 16: FDI outward stock, (cumulative, as of 31. 12. 2013, mill CZK)

	Equity capital	Reinvested earnings	Other capital	Total
Total	208 778	171 938	14 698	**395 414**
Mining and quarrying	*116*	*49*	*0*	***165***
Share of mining and quarrying (in %)	0.1	0.0	0.0	**0.0**

Note: figures for 2013 are preliminary (final figures for 2013 will be published in 2015). Source: ČNB (2014), Balance of Payments Statistics, own calculation.

Glossary of selected economic terms

Vojtěch Spěváček[1], *Václav Žďárek*[1,2]
[1] University of Economics and Management; [2] School of Economics and Management, ŠKODA AUTO University

/1/ Gross domestic product (GDP) is one of the basic and widely used macroeconomic indicators characterizing economic activity and growth. It can be defined either as the sum of the gross value added of various sectors and branches of the national economy (the value of goods and services produced after subtracting intermediate consumption, i.e. the value of goods and services consumed during their production) or as the value of domestic final demand (final consumption and gross capital formation) plus exports minus imports.

/2/ Supply side of the economy relates to the basic factors of economic activity (labour, capital, and total factor productivity) and to the main branches of activity (agriculture, industry, construction, services).

/3/ Purchasing power parity is a notional, artificially calculated currency exchange rate, which corresponds to its purchasing power. It is a rate at which we would obtain the same amount of goods and services at home as well as in the country with which we compare ourselves. It is used in the international comparisons of real magnitudes, such as GDP per capita, for which the market exchange rates are not useful. For comparison purposes, prices of so-called reference countries are usually used. A so-called purchasing power standard (PPS), derived from average prices of European Union countries, is used for countries of the EU.

/4/ Demand side explores the basic components of demand in the use of GDP, which satisfy the basic needs of the population and society and which determine economic growth. They include final consumption, which is further divided into private and public consumption, gross capital formation (investments), and foreign trade.

/5/ Final consumption includes private consumption (household final consumption expenditures) and public consumption (government final consumption expenditures). It represents the decisive component in the final use of output and is the purpose of economic activity because its growth determines a rise in the standard of living.

/6/ Domestic demand is a sum of final consumption and gross capital formation.

/7/ Private consumption is given by household final consumption expenditures and determines the standard of living of the population. It contains household consumption of goods and services for final use, which is covered by the disposable income of the population. The general rule is the faster the GDP growth, the faster the rise in private consumption.

/8/ Public consumption is part of final consumption, which is covered by the disposable income of government institutions. It may be individual consumption (expenditures on health

care, education, culture) or collective consumption (military, police and state administrative expenditures).

/9/ Gross fixed capital formation is a basic component of investment and includes acquisitions of fixed assets (esp. machinery, equipment, buildings and structures) during a certain period. Accumulation of fixed assets (its growth, structure and technical level) is regarded as a significant growth factor, which is important for economic growth as well as for growth in the standard of living. Total investments include gross fixed capital formation, changes in reserves, and net acquisition of valuables.

/10/ Foreign trade is an important growth factor, primarily in small open economies dependent on foreign demand, such as the Czech Republic. The balance of foreign trade (so-called net export, which is the difference between the value of exports and imports of goods and services) influences GDP growth and the macroeconomic balance of a country. An increase in net exports speeds up economic growth and improves macroeconomic balance. On the other hand, a declining surplus or growing deficit of foreign trade has the opposite effect.

/11/ Gross value added (GVA) is a widely used indicator of the total economic performance of each branch. It is an indicator corresponding to the GDP in the entire national economy. It is calculated by subtracting intermediate consumption (consumption of raw materials, energy, materials) from the total value of production.

/12/ Real growth of gross value added is growth calculated in constant prices, which excludes the influence of price changes. In the past, real growth was expressed in the constant prices of a specific year (2000, 2005), and it was influenced by this year's relative prices. In order to improve the accuracy of data on the growth of GDP and GVA in a quickly changing economic structure, European Union countries switched to comparative price levels of the previous year, which better reflect current prices and economic structure.

/13/ Index of industrial production is calculated in accordance with international standards and based on statistics of selected products and a two-stage weighting system. It is a selective index representing the weighted arithmetic average of the indeces of selected indicators, which is used to characterize industrial production growth.

/14/ Macroeconomic point of view is a viewpoint based on the entire national economy and takes into account mutual linkages and connections.

/15/ Tables of inter-industry relations (input-output tables) are chessboard tables (in the form of matrices), which show flows of output of individual industries. Intermediate consumption (according to individual industries) and final use of the output of industries are given in the lines. Industry costs according to supplier industries are given in the columns.

/16/ External economic balance is given by the relationship of the total income of a country from abroad (incomes from the export of goods and services, and inflow of primary incomes and transfers) and expenses to foreign countries (import of goods and services, outflow of primary incomes and transfers). It can be assessed from the current account balance.

/17/ Terms of trade express the movement of prices in foreign trade (the ratio of changes of export prices to import prices). They are calculated by dividing the export price index by the import price index. When prices of exports grow more quickly than those of imports, a country can import a higher physical volume of imports for the same physical volume of exports.

/18/ Appreciation means valuation (strengthening) of the currency exchange rate of one country against another depending on the demand and supply on the foreign exchange market.

/19/ Gross national income is an indicator based on the gross domestic product, which takes into account inflow and outflow of primary income (income from labour, capital and ownership). Primary income balance towards foreign countries influences the so-called disposable income of a country, on which final consumption and savings depend. If the outflow of income is higher than the inflow, the possibility of increasing the standard of living is reduced. This indicator is therefore more appropriate for characterizing the growth of a country's welfare than GDP.

Mineral facts

Europe's mineral supplies and EU mineral policy

Phillip Crowson
University of Dundee, Centre for Energy, Petroleum and Mineral Law and Policy (CEPMLP), United Kingdom

1. Supply situation

The European Union and its twenty eight individual member states have long relied heavily on imports to supply their requirements for mineral raw materials of all types. Even where they existed in the first place domestic ore deposits were exhausted, or became unable to compete many years ago in many European countries. Their mineral consuming industries have increasingly relied on overseas sources of higher quality and lower cost materials. That trend has been far more pronounced for metallic than for non-metallic ores, where there is considerable European production of a range of products.

Table 1 shows the European Union's shares of the world's mine production of a wide range of minerals, including petroleum and natural gas, and their production as a percentage of apparent usage in 2012. There is no European Union mine production of a large range of minerals, including antimony, borates, iodine, molybdenum, niobium, rare earths, tantalum, tin, titanium, vanadium and zircon, and its output of lithium and platinum group minerals is negligible. Most European production of metallic minerals is now confined to the peripheral countries of Scandinavia, Iberia, Ireland and Poland.

Europe's mine production of non-metallic, or industrial, minerals is relatively much more important than its mine output of metallic minerals, although recycling makes a major additional contribution to Europe's usage of the latter. Domestic smelting and refining industries may meet a large share of European usage of many metals but they rely heavily on imports of ores and concentrates from other continents. Some by-product metals, such as cadmium, gallium, germanium, indium, selenium and tellurium, are only extracted from their host ores during the smelting and refining process. Within Europe, but not the EU, Norway is a major producer of titanium minerals. Turkey, an aspirant to EU membership, is a significant producer of a range of products including borates, chromite, magnesite and feldspar. It also mines non-ferrous metals and coal.

The figures for production as a percentage of usage are mainly based on apparent consumption (production plus imports less exports) and first uses and do not always take account of trade in semi-processed materials. Production from secondary sources is only included for copper, lead and zinc. Much recycled material, even of these three metals, is re-used in a semi-processed or finished form so that the table understates Europe's self-sufficiency for a number of products, such as iron ore and nickel, where iron and steel scrap may substitute for virgin materials.

Table 1. European Union's mineral production in 2012

	Production as % of world output	Production as % of usage
Metallic		
Aluminium (bauxite)	0.9	18
Chromium	2.2	51
Cobalt	1.1	c. 9
Copper [a]	4.9	55
Gold	1	b
Iron	1	16
Lead [a]	4.2	95
Manganese	0.2	8
Nickel	2.3	14
Silver	7.1	33
Tungsten	2.6	c. 10–15
Zinc [a]	5.6	51
Energy		
Coal	7.3	71
Uranium	0.6	2
Petroleum	2	13
Natural Gas	4.8	36
Non-metallic		
Barytes	1.1	16
Bentonite	16.4	71
Diatomite	14.8	95
Feldspar	31.9	73
Fluorspar	3.3	29
Graphite	0.3	9
Gypsum	13	100
Kaolin	30.8	90
Magnesite	11.3	81
Mica	10.6	56
Phosphate	0.3	13
Potash	12.8	100
Salt	21	96
Sulphur	11.5	100
Talc	13.8	95

Notes: [a] – Production includes secondary refined metal.
[b] – A substantial portion of gold is absorbed by investment rather than final demand.

The data are for the 28 member states of the European Union. The source shows shares for a wider 35 nation group that includes Norway, Switzerland, Iceland, Macedonia, Montenegro, Serbia and Turkey.
Sources: European Mineral Statistics 2008-12, British Geological Survey, Keyworth, Nottingham, 2014; World Mineral Statistics 2008-12, British Geological Survey, Keyworth, Nottingham, 2014; World Metal Statistics Yearbook 2014, World Bureau of Metal Statistics, Ware, 2014 .

To place its shares of global minerals output in context, the European Union accounts for 3.3 % of the world's land area and 7.3 % of its population. Perhaps more relevantly it produces about 19% of the world's gross domestic product, measured on a purchasing power parity basis.[1] That provides a yardstick against which to judge the EU's call on global resources.

European industry obtains its mineral raw materials through a variety of commercial transactions with mines and processing plants throughout the world. In some instances they may have financial stakes in their suppliers, but the bulk of their transactions are at arm's length, either under contracts of varying duration or on a spot basis. The contracts set out the quantities to be supplied and their pricing arrangements. Increasingly those have been based on prevailing market levels and have fluctuated in step with changing world market conditions.

Reductions in trade barriers of all types, and falling international shipping costs progressively widened Europe's sources of supply throughout the second half of the twentieth century. They also prompted the closure of some small scale and high cost mining operations within Europe. Even if their physical ore deposits were not completely exhausted such operations were unable to compete with lower cost supplies from overseas. Provided the quality and delivery arrangements were satisfactory, users of mineral products generally sought the cheapest sources of supply. Whilst there were periodic concerns about the security of supply of some materials, usually in response to a temporary disruption and a spike in prices, such concerns were usually of short duration. Users were unwilling to place themselves at a continuing competitive disadvantage against their competitors by paying over the market levels for their raw materials in order to increase their security of supply. Prices may have been volatile but genuine physical shortages over a sustained period have been extremely rare. End users benefitted from the willingness of mineral-rich countries to produce adequate materials to meet rising demand at prevailing prices.

2. Mineral policy

2.1. Principles – indifference and emphasis on environment

Against this background European governments have normally taken little, if any, interest in minerals procurement. Their policies towards their domestic mining industries have often been of indifference bordering on malign neglect. User industries were generally content with their reliance on global markets at prevailing prices. Concerns about protecting and enhancing the environment and minimising pollution became the dominant influences on government policy in most European countries rather than worries about the availability of raw materials. That is as true for policies for re-use and recycling as for attitudes to the development of new mining operations, including the expansion of existing mines. The planning and environmental conditions under which mines can operate have become increasingly stringent. In many European countries the extraction of minerals is no longer regarded as the pre-eminent user of land that it once was.

[1] Land Area from World Development Indicators 2013, World Bank, Washington, and population and GDP from World Economic Outlook Database, April 2014, International Monetary Fund, Washington. The EU's share of world GDP on a purchasing power parity basis was 19.2% in 2012 and 18.7% in 2013. Its share on the basis of current US dollar exchange rates, was 23.1% in 2012 and 23.5% in 2013.

2.2. Supply crises and the rise in China's importance

2.2.1. Lack of concern during the 1980s and 1990s

From time to time official indifference to mineral procurement has been punctured by political concerns, by unexpected disruptions to supply, or by adverse price movements. Civil war in Zaire (now the Democratic Republic of Congo) in the late 1970s, which disrupted cobalt supplies, was one such event which prompted a flurry of policy measures. During the later stages of the Cold War worries about dependence on Soviet and South African supplies of a range of key minerals led to a number of initiatives on minerals usage and supply in consuming countries on both sides of the Atlantic. The impetus behind these initiatives vanished with the breakup of the Soviet Union and the collapse of South Africa's apartheid regime. From the late 1980s until the mid-2000s the prevailing official attitude to mineral policy was one of nearly universal apathy. Demand was rising fairly slowly, there was ample capacity to supply and prices were on a generally declining trend. During this period China became an increasingly important supplier of a widening range of mineral products to global markets. Many mines elsewhere closed down, unable to compete on price with Chinese suppliers exporting material surplus to domestic requirements.

2.2.2. Market forces after 2000

During the past decade the minerals kaleidoscope has shifted once again, mainly because of developments in China. Strongly rising Chinese domestic demand placed global markets under increasing strain. Producers had become attuned to slowly rising demand and weakening prices and were unable to adjust supply rapidly enough to the changed market conditions. The burden of adjustment initially fell on prices which rose sharply, and over a lengthy period. For some minerals the period of adjustment was relatively brief, but for others it was protracted. The global financial problems and uncertainties of 2008–2009 delayed the restoration of underlying balance between supply and demand. Meantime, China's export surpluses dwindled in response to rising domestic needs and tightening official restrictions on China's small-scale and medium sized mines imposed for environmental and health and safety reasons.

Whereas both consumer governments and industrial users are readily acquiescent in market forces when they are moving in their favour, their attitudes often change when prices rise steeply. The combination of sharp price rises for nearly all metals and minerals and reduced Chinese supplies of a range of products re-awakened concerns about minerals availability in Japan, the United States and Europe during the late 2000s. The concerns were greatly exacerbated by China's imposition of export controls on some products, and notably on rare-earths, ostensibly to conserve supplies for domestic needs, but with strategic undertones. This was the background to the EU Raw Materials Initiative set out in the European Commission's document COM(2008)699 "The raw materials initiative – meeting our critical needs for growth and jobs in Europe". Those directly affected by sharp price rises and the prospect of potential shortages became acutely aware of the latent risks of increasing dependence on Chinese supplies that they had largely ignored for many years and sought government action to alleviate them. Worries about import dependence for so-called critical raw materials swiftly moved up the political agenda.

In the late 1970s attention was focussed on those minerals whose supply was vulnerable to disruption of one form or another and which met strategic uses. Many of those uses were in the defence industries. Modern concerns are similar, but with rather more attention paid to the essential raw material inputs of a wider range of industries. By no means all uses of a given

mineral may be critical to the European economy, no matter how important that mineral might be for a particular industry. The changing concerns and priorities of the past forty years reflect both changes in the global political economy but also economic and technological developments.

This dynamism, both in end uses and in sources of supply, highlights some of the problems for a proactive mineral policy. Actions taken to meet today's challenges and problems may be completely inappropriate for tackling future needs. By the time policy measures bear fruit the immediate crisis that triggered them may have passed, no matter how well-crafted they might be. In a fast changing industrial and technological landscape the nature of materials usage can change rapidly. What was once seen as a critical material vulnerable to supply disruptions may no longer be so regarded. Conversely, a mineral previously treated as relatively unimportant may have become a more vital element for key sectors of the economy as a consequence of technical change.

In a globally interdependent world critical minerals may not be traded as such but might be embodied in imported components or finished products. In some instances the basic ores may be relatively common but the technology of extraction and processing might be complex and capital intensive and difficult to replicate. Effective insurance against supply disruptions to the materials might theoretically require a wide range of autarchic industrial policies. Not only might those be politically unacceptable within Europe but they could involve conflicts with trading partners.

2.3. EU's raw material initiative

Written against a background of concern about China's involvement in both the supply and usage of minerals, the EU's Raw Materials Initiative stresses sustainable access to raw materials through international diplomacy, trade agreements and development policy. In general that falls squarely within the EU's remit, but mention is also made of 'sustainable management of raw materials' and of 'the use of budget support' in the field of development policy. These statements imply a degree of EU intervention in minerals procurement that goes beyond ensuring the proper functioning of global markets. To the extent that many companies trading in Europe have to follow them, the provisions of the United States' Frank-Dodd Act on conflict minerals demonstrate all too clearly that security of minerals supply is often not the main, or even subsidiary, objective of policy.

2.3.1. The importance of market prices

Usually market imbalances of all types are signalled by a sudden sharp surge in prices. Purchasers of the affected products may then seek government assistance to counter perceived threats to their raw material supplies. There is a pervasive belief in many quarters that market forces alone are too slow and possibly too weak to ensure the desired response to changing market needs. In practice those forces are usually much stronger and more far-reaching than is often believed, although they do not always act quickly. They are, however, largely outside bureaucratic control and governments often need to be seen to act vigorously in response to a perceived threat. They tend to be impatient with messy market mechanisms, and their impatience is reinforced by the clamour of those adversely affected. Yet historical experience demonstrates the powerful effects of the price mechanism in choking off demand, encouraging substitution and stimulating research, exploration and new mine development. Muting the effects of that mechanism through support for domestic production, subsidies and regulatory interventions of all types may delay or even subvert the necessary adjustments. That would not be in the best interests of European industry and consumers.

2.3.2. European mineral policy limits

Most of Europe's ore deposits have been exhausted by centuries of extraction and processing. Exploration techniques are continually developing, and geologists' understanding of ore genesis and distribution is steadily improving. This means that new discoveries may still be made in previously worked-out areas. The geology of much the European Union is not, however, conducive to the future discovery of competitive large scale deposits of metallic minerals. Where it is more suitable, as in Iberia and Scandinavia, companies are prepared to devote substantial resources to exploration and subsequent mine development. In general, however, discoveries are relatively small scale, and often potentially high cost compared with those being mined elsewhere. With a few exceptions, Europe lacks the type of rocks that host many of the materials that are considered to be critical.

Most minerals exploration is carried out by profit-seeking companies. They either hope to sell their interest in any viable discovery or to make profits from mining the ore they discover. As exploration is costly, both in time and resources, companies are not concerned with the ultimate size of the ore deposits they discover, but merely in proving sufficient reserves to justify their investment in extraction and processing facilities. Provided the basic geology and structure of a region are understood, drawing up national inventories of minerals is largely an academic exercise with relatively little practical worth.

In any case, promising geology is a necessary but not a sufficient condition for minerals exploration and development. Throughout the European Union there is widespread public antipathy towards new mine development, an antipathy shared by many officials and politicians. Their attitudes have been shaped by experience of outmoded mining practices and sites, and by an unwillingness to accept the short to medium term environmental disturbances caused by mining. Environmental and planning restrictions greatly inhibit new mine development at the regional and local level. In any conflict between industrial needs for minerals and environmental protection, the latter usually triumphs. The *banana* (build absolutely nothing anywhere near anything) usually comes up more often than the *plum* (people love us mining) in the official fruit machine. The difficulties and time involved in securing permission to mine throughout most European countries weaken the incentive to search for mineral deposits.

Most minerals exploration within Europe is carried out by foreign companies applying skills and experience acquired elsewhere. The main focus of research and development and technological innovation in both exploration and minerals processing is now outside Europe where the prospective rewards are much greater. Funds devoted to such activities within Europe are much more likely to benefit the organisations involved and overseas mineral producing countries than to improve the security of European supplies of critical materials. That is not to deny the potential contributions of European research organisations, but to question whether this is an appropriate use of scarce resources.

Some production of virgin material will always be needed. Unless demand for a particular material were to fall off dramatically in response to technical or regulatory change recycling will never meet total requirements. Increasing the efficiency of use of resources, fostering substitution, promoting recycling and facilitating the use of secondary raw materials, are all aspects of the Raw Materials Initiative. Devoting research spending to improving recycling techniques and to satisfying consumer requirements in less materials intensive ways are likely to prove much more fruitful avenues for European research and development spending and policy initiatives than devoting official resources to research into geological studies, mining or primary processing. Such spending can work with, rather than against the grain of

European public opinion. Even so, due care must be taken to ensure that European industry's competitiveness does not suffer by too slavish an insistence on recycling, regardless of cost.

2.4. The best Mineral Policy may be no specific policy

Since the Raw Materials Initiative was first promulgated global market conditions for all minerals, critical or otherwise, have changed considerably. Market mechanisms have once again demonstrated their effectiveness, albeit slowly in some instances. An EU mineral policy can mean many different things to different interest groups. Invariably all groups emphasise the need for spending on projects that they believe will further their own interests. Most minerals have substitutes, direct or indirect in most uses. A seemingly obvious means of dealing with a short-term market imbalance through some form of intervention may not be the most satisfactory in the longer run. The most effective means of ensuring substitution through the most cost-effective fashion has been demonstrated time after time to be via price movements rather than through market intervention of any type. Short term pain eventually leads to longer term benefits. In short, the best Mineral Policy may be no specific policy, but just a general pressure for minimising resource use.

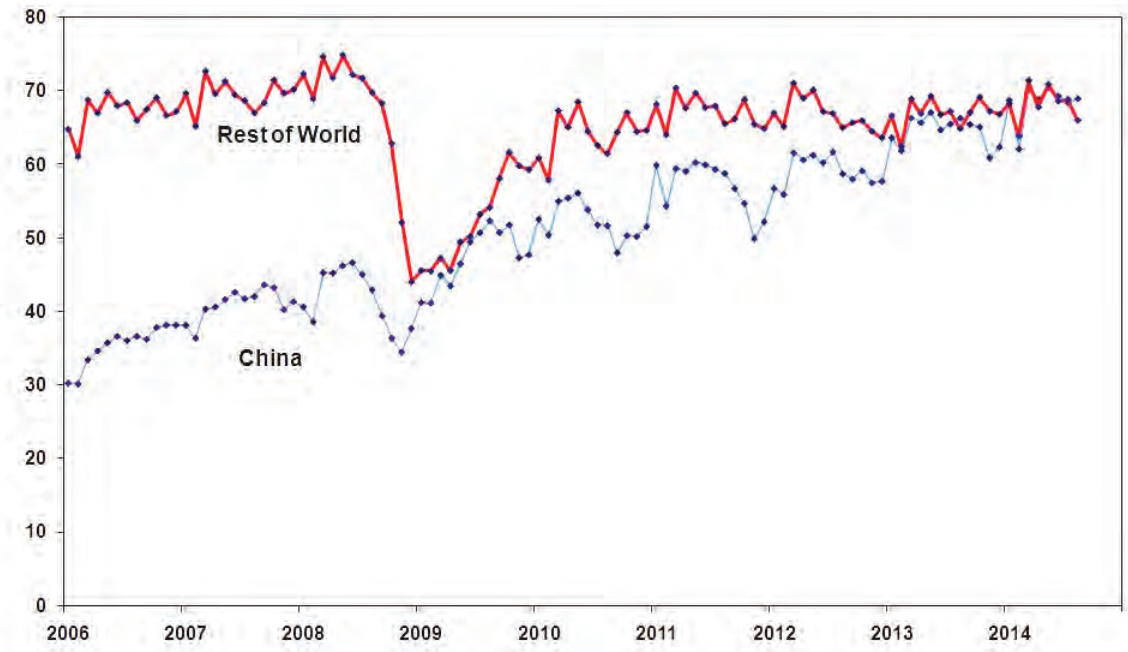
Recent trends in the global mining and metals industry

Phillip Crowson
University of Dundee, Centre for Energy, Petroleum and Mineral Law
and Policy (CEPMLP), United Kingdom

The main themes in the recent development of the global mining industries have been a slackening rate of growth of underlying economic activity, only partly because of changes within China, weakened prices even while costs remain high, generally rising fiscal burdens on the industry, and reduced profitability.

The growing importance of China

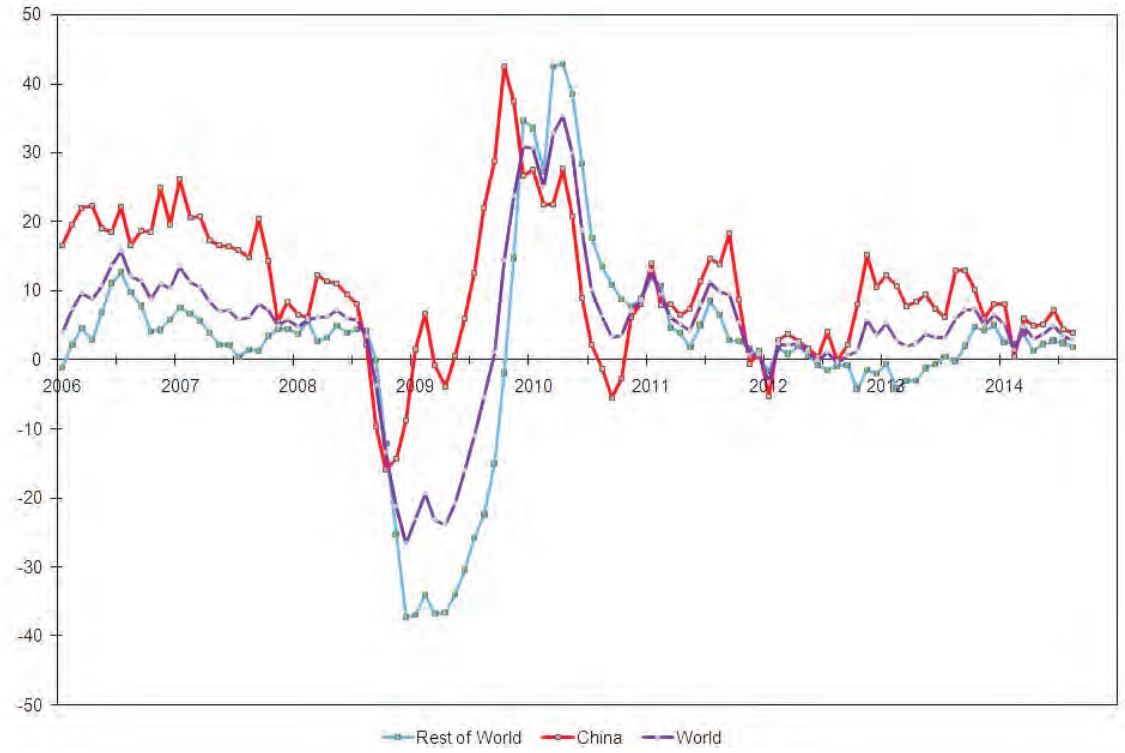
Trends in world steel production are a good barometer of demand for a wide range of mineral products. Those are either used in steel manufacture as raw materials or processing aids or they are incorporated with steel in fabricated products. China has become a progressively more important producer over the past decade. Figures 1 (volumes) and 2 (percentage changes) show how monthly production of crude steel has progressed since the beginning of 2006 separately for China and for the rest of the world. As figure 2 illustrates, China's output recovered rapidly from the 2008 recession and grew to equal the rest of the world's output by late 2013.



Source: World Steel Association.

Figure 1. World crude steel output, million tonnes monthly

The recession was much deeper and more prolonged in the rest of the world, whose output remains below its pre-recession peak. China's steel output dipped slightly in 2012, and its growth rate has eased again in 2014.



Source: World Steel Association.

Figure 2. World crude steel production monthly: % changes over previous year

China's rising share of global steel output shown in figure 1 is typical of its growing dominance of demand for all minerals during the past decade. This is brought out in table 1, which compares global and Chinese usage in 2003 and 2013 for some major products. The table shows output rather than consumption of steel, as that drives demand for minerals.

Table 1. Global and Chinese demand for minerals in 2003 and 2013

	2003			2013		
	World	China	China %	World	China	China %
Steel production (ths kt)	972	222	22.8	1606	779	48.5
Consumption:						
Aluminium (kt)	27 891	5 178	18.6	46 565	21 955	47.1
Copper (kt)	15 315	3 084	20.1	20 981	9 830	46.9
Lead (kt)	6 753	1 155	17.1	10 391	4 467	43.0
Nickel (kt)	1 249	133	10.6	1 799	909	50.5
Zinc (kt)	9 526	2 003	21.0	13 151	5 995	45.6
Coal (mtce)[a]	3 918	1 302	33.2	5 740	2 888	50.3

Note [a]: mtce – million tonnes of coal equivalent = 8.14 MWh.

Sources: Steel Statistical Yearbooks, World Steel Association, BP Statistical Review of World Energy 2014, World Mineral Statistics Yearbooks, WBMS.

China's share of the usage of all the listed products more than doubled between 2003 and 2013. In some instances the increase in the volume of its consumption exceeded the overall

growth of usage, as shown in table 2. That reflects the weakness of many of the advanced economies as well as China's rapid growth.

Table 2. Growth in volumes between 2003 and 2013 and China's share of that growth

	World	China	China %
Steel production (ths kt)	634	557	87.9
Consumption:			
Aluminium (kt)	18 674	16 777	89.8
Copper (kt)	5 666	6 746	119.1
Lead (kt)	3 638	3 312	91.0
Nickel (kt)	550	776	141.1
Zinc (kt)	3 625	3 992	110.1
Coal (mtce)	1 822	1 586	87.0

Note: mtce = million tonnes of coal equivalent = 8.14 MWh.
Source: Table 1.

In summary, however, developments in the global minerals industry during the past decade have been driven by the burgeoning needs of China for raw materials.

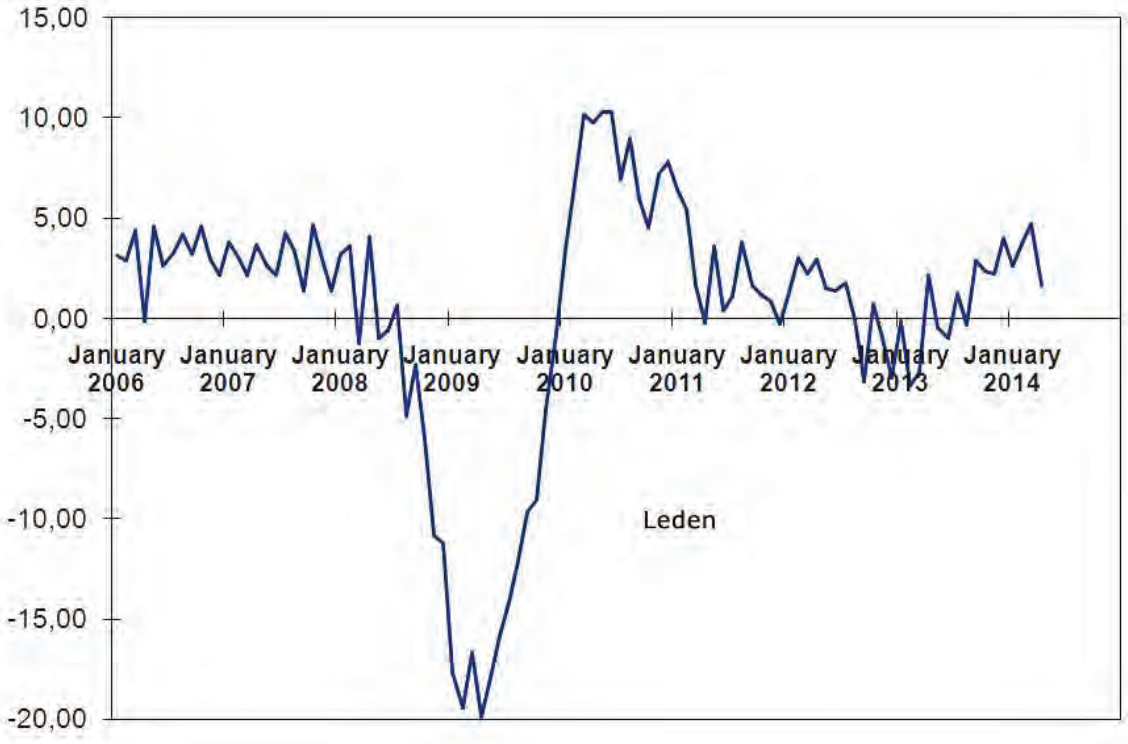
The influence of economic activity

Demand for all mineral products, even in China, primarily depends on rates of economic activity, especially in the construction industries and in the capital goods and consumer durables sectors. Although China has become the dominant user of mineral products, the advanced industrial countries remain important. Their recovery from the 2008–2009 recession has been both erratic and hesitant. Even by the first four months of 2014 their industrial production remained over 5% below its pre-crisis level in 2008. Figure 3 shows year-on-year percentage changes in their monthly industrial output.

After a relatively strong advance in 2010 recovery was not sustained in 2011–2013, largely because of weakness in Europe and Japan. A stronger showing in late 2013 and early 2014 has not been maintained. Meantime, rates of growth have eased back in China and the rest of the world. Figure 4 compares percentage annual changes in quarterly manufacturing output since mid-2011 for China and the rest of the world. Growth rates have been universally lower than in 2011, despite an upsurge in the first quarter of this year in China and the developing countries.

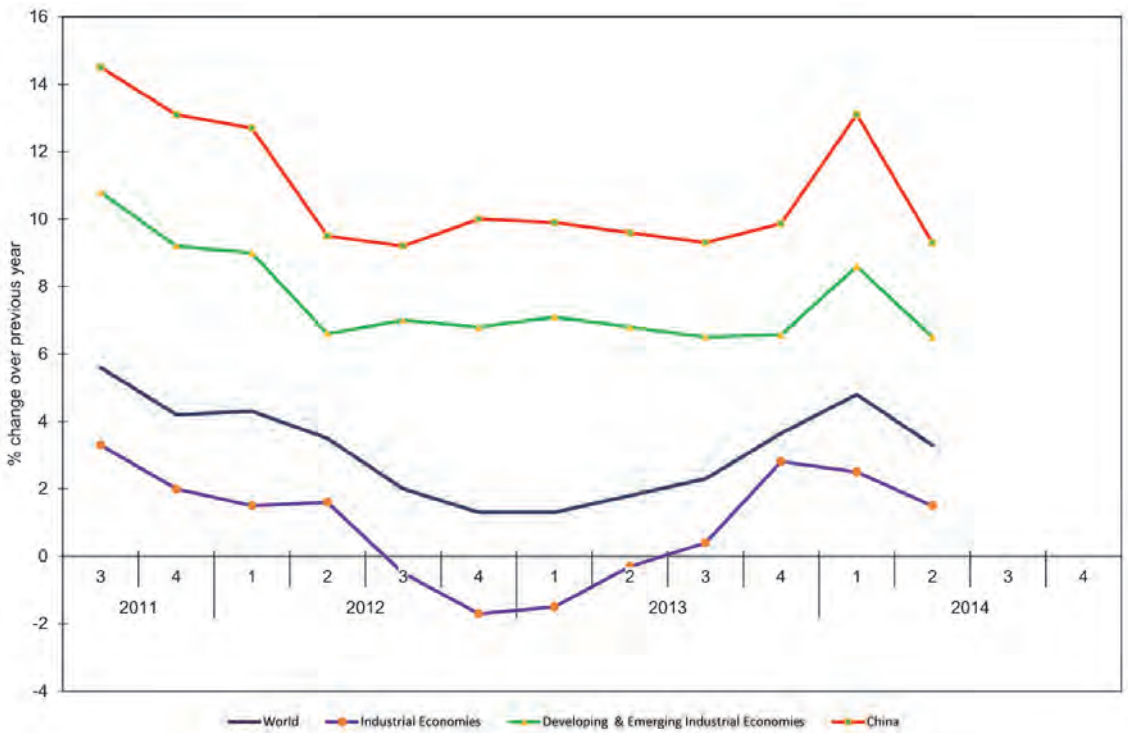
The International Monetary Fund (IMF) has recently downgraded its forecasts of global economic activity in 2014 and 2015, reflecting the strains and uncertainties still plaguing most regions. Table 3 compares its predictions of October 2014 for percentage changes in real gross domestic product in 2014 and 2015 with the changes since 2009.

China's rate of growth is expected to weaken as it rebalances total expenditure towards domestic consumption rather than exports and capital spending. The United States is on a slow recovery path, but the Japanese and European economies remain weak. GDP is expected to decline in France and Italy this year and Germany is slipping back into recession. Many commentators are more bearish about global activity than the IMF.



Source: International Financial Statistics, International Monetary Fund, Washington, October 2014.

Figure 3. Industrial Production in Advanced Economies: Percentage change on previous year



Source: Quarterly Report on Manufacturing, UNIDO, Geneva, successive issues.

Figure 4. Percentage annual changes in world manufacturing output

Table 3. Percentage annual changes in real gross domestic product 2010–15

	2010	2011	2012	2013	2014	2015
World	5.4	4.1	3.4	3.3	3.1	3.8
China	10.4	9.3	7.6	7.7	7.4	7.1
Advanced economies of which:	3.1	1.7	1.2	1.4	1.8	2.3
EU	2.0	1.8	–0.3	0.2	1.4	1.8
USA	2.5	1.6	2.3	2.2	2.2	3.1
Japan	4.6	-0.4	1.5	1.5	0.9	0.8

Source: World Economic Outlook Database, International Monetary Fund, Washington, October 2014.

Trends in individual products

Although demand for all metals and minerals is strongly influenced by overall economic activity, the end uses, geographical locations and market balances of each differ considerably. Given the sluggishness of economic activity, the reported rates of growth of demand in 2013–14 for some products, such as copper and zinc, are surprisingly robust.

Tables 4 and 5 draw together recent data about coal and a range of metallic products. Table 4 shows the volume of output, use and trade in the past six years, and Table 5 gives the annual percentage rates of change for the same items since 2011, with some estimates for 2014 to date.

Production and use have risen fairly consistently over the period, although the rates of change have varied between products. The production of iron ore, lead and zinc metal fell in 2012 but recovered in 2013, whilst the output of tin and brown coal fell in both 2012 and 2013. Mine output of copper, lead and gold rose more strongly in 2013 that in 2012, but lead output has fallen back in 2014. Production of copper and lead metal grew more slowly than mine output in both 2012 and 2013.

Aluminium and lead have remained in overall surplus throughout, although the lead market has moved back towards balance. The International Lead and Zinc Study Group forecasts small global deficits for lead in 2014 and 2015, largely because of a shortage of secondary lead. The tin market has been broadly balanced, but with a slight tendency towards deficit, whilst the nickel sector moved into surplus in 2012–13. That surplus has been offset by reductions in Indonesian exports of nickeliferous iron which is used in the Chinese steel industry in competition with primary nickel. The Indonesian government has banned exports of unprocessed minerals. The International Nickel Study Group expects the output of primary nickel to show little change between 2013 and 2015, but usage to grow by 7.9% in 2014. Further modest growth in 2015 will lead to a small market deficit, which can be comfortably met from a rundown in inventories.

Production of zinc metal exceeded usage throughout the 2008–12 period, leading to a sizeable build-up of inventories, but usage revived sufficiently strongly in 2013 through 2014 to move the market into a deficit that has enabled a reduction in reported stocks. The International Lead and Zinc Study Group forecasts a 5.1% rise in demand in 2014 followed by a 2.9% increase in 2015. Output is expected to show more modest growth so that there will be large deficits in both years that will reduce inventories to more normal levels.

The usage of copper metal has exceeded production since 2009, notwithstanding a strong rise in output since 2011. The deficit has been comfortably met by a rundown of inventories, many of which were unreported. The International Copper Study Group predicts a deficit of

Table 4. Production and use of metallic products and coal, 2008 to 2013

	2008	2009	2010	2011	2012	2013
Aluminium (kt)						
Primary metal output	39 960	37 162	41 504	44 776	46 339	47 693
Usage	36 900	34 572	40 181	42 471	45 543	46 236
Balance	3 059	2 590	1 323	2 305	796	1457
Copper (kt)						
Mine output	15 524	15 903	16 038	16 053	16 699	18 082
Metal output	18 239	18 270	18 986	19 596	20 137	20 930
Usage	18 054	18 088	19 129	19 697	20 387	21 230
Balance	185	182	–143	–101	–250	–300
Lead (kt)						
Mine output	39 805	3 810	4 161	4 636	5 007	5 386
Metal output	9 196	9 242	9 850	10 606	10 550	11 138
Usage	9 188	9 242	9 812	10 444	10 483	11 123
Balance	8	0	38	162	67	15
Nickel (kt)						
Metal output	1 382	1 317	1 440	1 613	1 751	1 941
Usage	1 278	1 234	1 465	1 607	1 659	1 772
Balance	104	82	–25	6	92	169
Tin (kt)						
Metal output	332	336	356	368	364	353
Usage	337	325	370	382	362	359
Balance	–5	10	–13	–14	2	–6
Zinc (kt)						
Mine output	11 882	11 601	12 354	12 644	13 130	13 201
Metal output	11 772	11 280	12 896	13 074	12 630	12 891
Usage	11 574	10 914	12 649	12 699	12 386	12 985
Balance	198	366	247	375	244	-94
Iron ore (Mt)						
Production	1 693	1 588	1 836	1 873	1 849	1 982
Trade	897	948	1 055	1 112	1 154	1 225
Steel(Mt)						
Production	1 330	1 220	1 416	1 518	1 537	1 602
Coal (Mt)						
Production						
Hard coal	4 997	5 126	5 452	5 843	6 039	6 120
Brown coal	867	840	841	891	889	840
Exports						
Metallurgical coal	236	212	282	286	294	302
Thermal coal	718	741	829	916	1 031	1 072
Gold (t)						
Mine production	2 430	2 612	2 739	2 838	2 862	3 024
Supply	4 014	4 381	4 462	4 517	4 477	3 887
Fabrication usage	3 027	2 519	2 787	2 760	2 613	2 937

Sources: Copper from International Copper Study Group (www.icsg.org), lead & zinc from International Lead & Zinc Study Group (www.ilzsg.org), steel from World Steel Association (www.worldsteel.org) and other products from Resources and Energy Quarterly Statistical Data September 2014, Bureau of Resources and Energy Economics, Canberra, Australia. (http://www.bree.gov.au/publications/resources-and-energy-quarterly).

0.3 million tonnes in 2014, much less than the 0.59 million tonnes recorded in the first eight months. Both mine and metal production are now rising more rapidly than usage, and, subject to any unforeseen shocks, supply is expected to outstrip usage in 2015.

Total exports of iron ore rose much faster than steel production in 2012 and 2013, with iron ore output growing strongly in 2013. The output of brown coal, very little of which is traded, peaked in 2011 and the rate of increase of hard coal production has eased back. Meantime, total exports of metallurgical coal have grown less rapidly than steel production, and the rate of growth of exports of thermal, or steam, coal has fallen substantially.

Mine output of gold changed very little in 2012, but increased by 5.7% in 2013 to exceed 3,000 tonnes for the first time. Mine production is supplemented as a source of supply of

Table 5. Annual percentage changes in production, use and trade 2011–2014

	2011	2012	2013	2014 to date[a]
Aluminium				
Metal	7.9	3.5	2.9	
Usage	5.7	7.2	1.5	
Copper				
Mine	0.1	4.0	8.3	3.2
Metal	3.2	2.8	3.9	7.0
Usage	3.0	3.5	4.1	12.1
Lead				
Mine	11.4	8.0	7.6	–4.1
Metal	7.7	–0.5	5.6	2.4
Usage	6.4	0.4	6.1	1.4
Nickel				
Metal	12.0	8.6	10.8	
Usage	9.7	3.3	6.8	
Tin				
Metal	3.3	–1.1	–3.0	
Usage	3.2	–5.0	–1.0	
Zinc				
Mine	2.3	3.8	0.5	2.3
Metal	1.4	–3.4	2.1	4.1
Usage	0.4	–2.5	4.8	7.7
Iron ore				
Production	2.0	–1.3	7.2	
Trade	5.4	3.8	6.1	
Steel production	7.2	1.3	4.2	3.7
Coal				
Production				
Hard coal	7.2	3.4	1.3	
Brown coal	5.9	–0.2	–5.5	
Exports				
Metallurgical coal	1.3	2.8	2.7	
Thermal coal	10.5	12.5	3.9	
Gold				
Mine production	3.6	0.8	5.7	
Supply	1.2	–0.9	–13.2	
Fabrication usage	–1.0	–5.3	12.4	

Note: [a] – First seven months for copper, lead and zinc and first eight months for steel.

Sources: As Table 4.

gold by recycling and by the release of hoarded stocks. Total supply is always more volatile than mine output. It peaked in 2011 when prices were at their strongest, but then fell back, especially in 2013. Usage of gold in fabrication followed an inverse path, falling in 2011, but recovering in subsequent years, with a strong showing in 2013.

Changes in London Metal Exchange inventories

Inventories of metal held in London Metal Exchange (LME) warehouses make up only a portion of total inventories, but they are normally the most visible and volatile portion. Consequently movements in them provide a reasonable indicator of shifts in global supply/demand balances. Table 6 shows the levels of inventories of the main metals held in LME warehouse at the end of September in the years 2011 to 2014.

Table 6. London Metal Exchange Stocks, '000 tonnes, end September

	2011	2012	2013	2014
Aluminium	4 563.8	5 049.8	5 374.6	4 613.8
Copper	475.0	223.5	533.3	152.3
Lead	374.1	265.1	239.4	225.5
Nickel	97.1	124.1	222.7	358.4
Tin	20.9	12.3	13.2	8.4
Zinc	818.8	989.5	1 024.0	750.7

Source: London Metal Exchange.

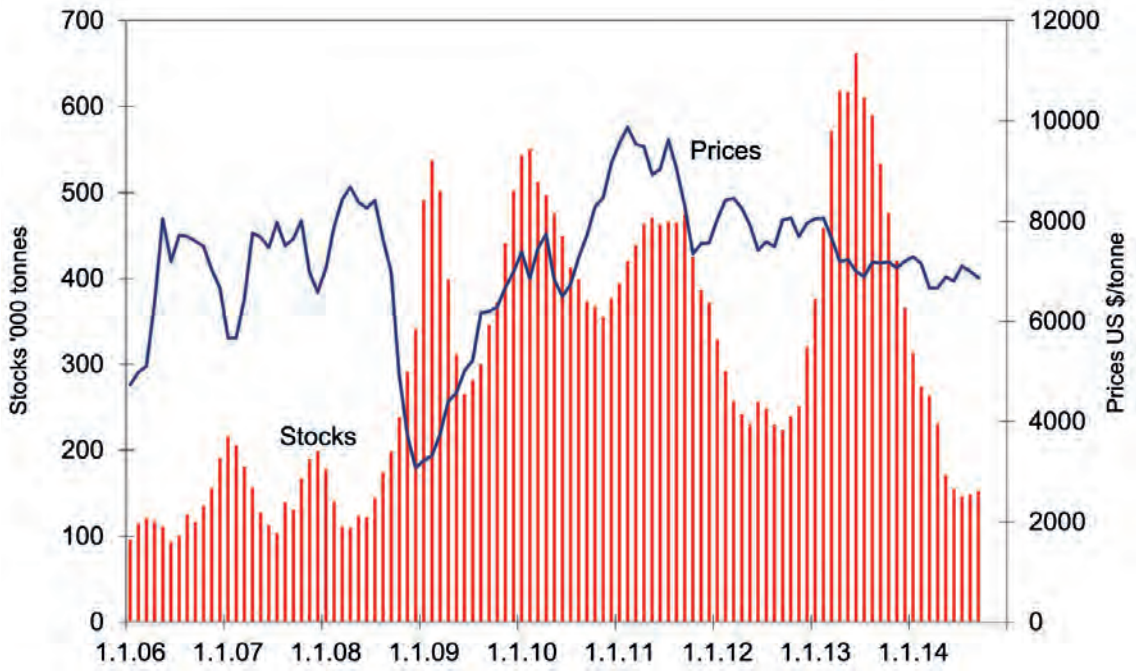
The trends illustrated emphasise the messages of tables 4 and 5 that the balances between supply and demand for the non-ferrous metals tightened during 2014. The relatively weak prospects for economic activity, combined with the start-up of capacity whose initiation commenced during the boom years, suggest that the tightening may not persist into 2015 for most metals.

Prices

Recent trends in prices highlight the relatively weak conjuncture. For example, figure 5 compares monthly average LME prices for copper with the end-month levels of stocks of copper in LME warehouses since January 2006. The steep decline in stocks during 2013–14 did not occasion a sharp rise in prices, as it had done in earlier years.

Prices of other mineral products followed similar paths to copper, subject to their individual supply/demand characteristics. Figures 6 and 7 show the behaviour of monthly average prices of iron ore and gold respectively since January 2006. Iron's price peak, like that of copper, was in early 2011 and the gold price peaked later in the same year. The spot price of iron ore is now well under half its peak level whilst the price of gold has dropped by almost one third.

The table brings out the sharp decline in most prices between 2011 and 2013 and their continuing weakness. Only nickel and zinc of the products covered in the table have experienced any strong recovery, mirroring their move towards deficits.

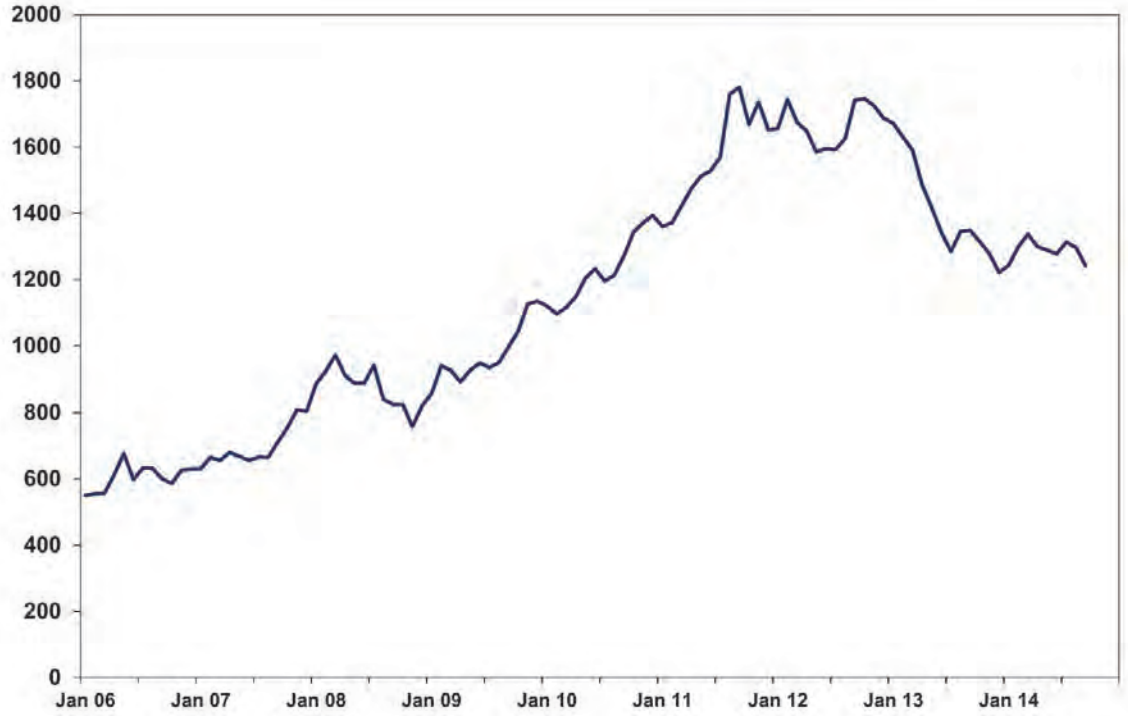


Source: London Metal Exchange.

Figure 5. Copper prices and London Metal Exchange stocks

Source: International Financial Statistics, IMF, Washington, September 2014.

Figure 6. Iron ore prices: Chinese import ore fines 62% Fe spot (CFR Tianjin port), USD per tonne



Source: London Bullion Market Association.

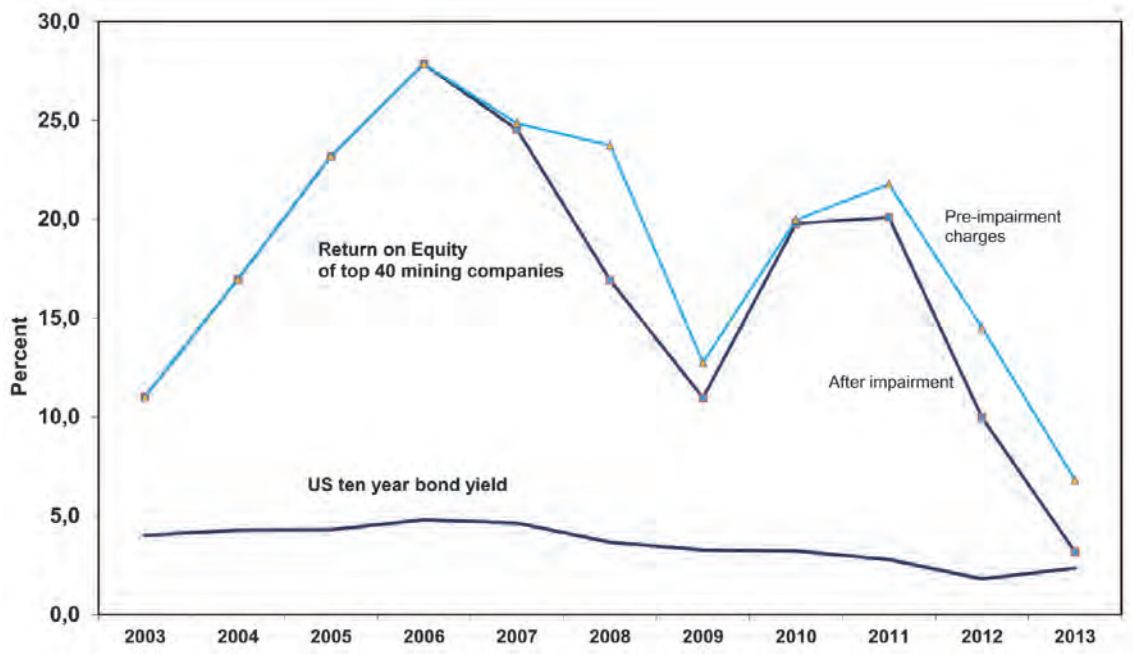
Figure 7. Gold prices London pm fix, USD/troy ounce

Table 7 summarises the performance of the prices of a range of products by comparing their September averages since 2010. The table brings out the sharp decline in most prices between 2011 and 2013 and their continuing weakness. Only nickel and zinc of the products covered in the table have experienced any strong recovery, mirroring their move towards deficits.

Table 7. September average prices, 2010–2014. USD/tonne, except gold and uranium

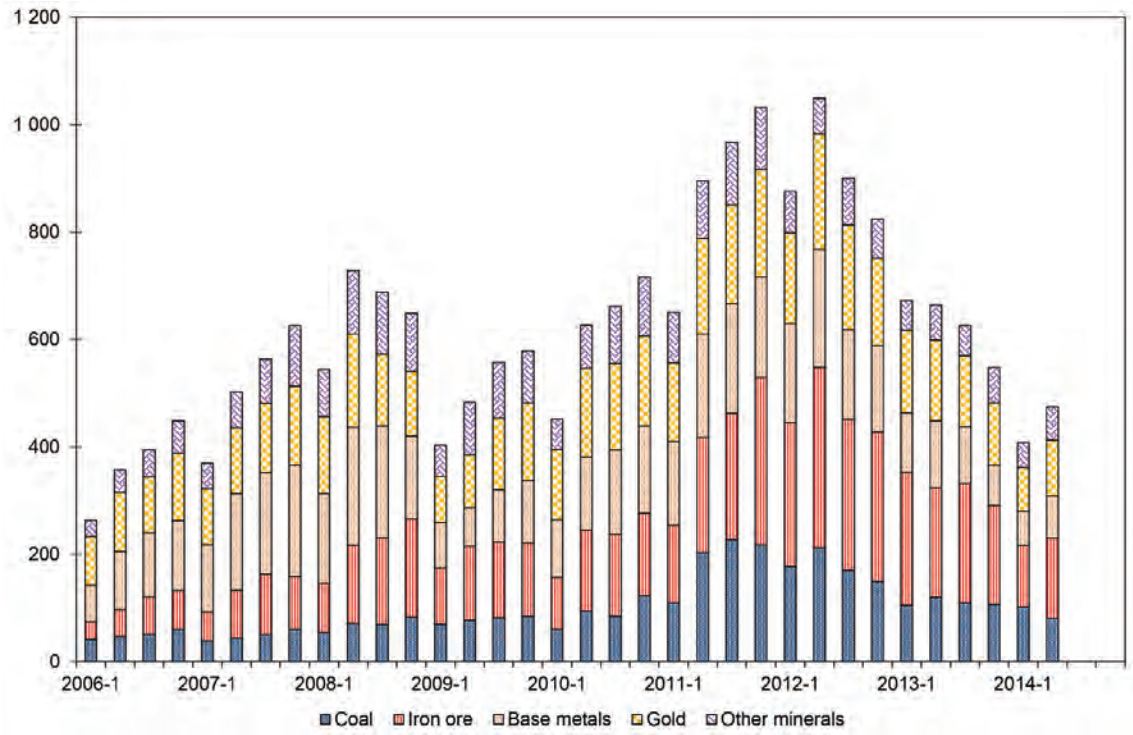
	2010	2011	2012	2013	2014
Copper	7 709	8 315	8 068	7 161	6 872
Lead	2 184	2 299	2 169	2 088	2 122
Nickel	22 643	20 392	17 215	13 780	18 079
Tin	22 701	22 655	20 697	22 747	21 125
Zinc	2 151	2 077	2 002	1 848	2 294
Iron ore	141	177	99	134	82
Coal	102	132	95	83	71
Uranium (USD/lb)	47	52	48	34	34
Gold (USD/troy ounce)	1 271	1 781	1 742	1 348	1 241

Sources and notes: Copper. Lead, nickel, tin and zinc; London Metal Exchange Settlement prices. Iron ore; Iron ore fines 62% Fe, Chinese spot prices, CFR Tianjin port from International Monetary Fund, Primary Commodity Report. Coal; Australian thermal coal, 12 000 Btu/lb, less than 1% sulphur, 14% ash FOB Newcastle/Port Kembla, from International Monetary Fund. Uranium; Nuexco exchange spot price from International Monetary Fund. Gold; London a.m. fix, from London Bullion Market Association.
1 lb (pound) = 0.4536 kg
1 troy ounce = 31.1035 g



Sources: Mine 2014: Realigning expectations, PWC 2014 and US Federal Reserve. The after tax returns are for the top 40 companies included each year in the PWC reports, rather than a constant sample. They are shown both before and after impairment charges, such as capital write-offs.

Figure 8. Mining Industry percentage returns on equity, after tax, and US 10 year bond yields.



Source: Mineral and Petroleum Exploration, Australia, June 2014, Series 8412, Table 5. Australian Bureau of Statistics, Canberra.

Figure 9. Australian private expenditure on minerals exploration, quarterly, AUD million.

Profitability

The collapse in prices in 2012–2013 was immediately reflected in the mining industry's profitability which had recovered well in 2010–2011 from 2009's recession. Figure 8 compares a measure of the industry's after-tax rate of return on equity with the yield on ten-year US treasury bonds. In 2013 the two were perilously close.

The unexpected sharpness of the fall in prices and profitability prompted mining companies to reassess their capital spending programmes and many cancelled or delayed projects. Also there were substantial write-downs of the value of assets as shown by the difference between rates of return on equity before and after impairment charges in figure 8. Shareholders pressed for companies to devote much greater attention to cost control and profitability and to boosting dividend payments than to the growth of volume that had previously been a major objective.

Exploration spending

One result of a focus on cost reductions was a substantial fall in expenditure on exploration. The annual survey of corporate exploration budgets carried out by Metals economics Group, part of SNL Metals and Mining, indicated that spending had been temporarily cut in 2009 from its 2008 peak in response to the financial crisis, but had risen strongly to a new level in 2012. In 2013, however, it had dropped by about 30%, and a further large fall is predicted for 2014. The reductions have been spread across all regions and countries. Accurate data are not available for most countries on a timely basis, but quarterly spending in Australia, illustrated in figure 9, gives a reasonable snapshot of global developments.

Total spending more than halved between the peak in the second quarter of 2012 and the first quarter of 2014, with reductions in all sectors. As well as cutbacks by companies seeking to reduce costs and conserve cash, weakening product prices and gloomier expectations of future demand adversely affected the ability of junior companies to raise finance for exploration spending.

Regional patterns of minerals output

Shortage of finance and cutbacks in capital spending may restrain the future growth of capacity, but that has risen considerably in recent years and many increases are too advanced to be halted. Moreover, China is now the world's largest producer of minerals as well as the largest user and its companies have not been constrained by shortages of finance like those companies quoted on the major stock markets. Chinese companies are investing in resource projects overseas, notably in Africa.

The geographical location of minerals production is constantly changing as ore deposits become depleted and new projects start up. The top half of table 8 shows the percentage changes between 2007, just before the global financial crisis, and 2013 in the mine production of a range of minerals. The final column gives the changes in global output, which compare with the regional changes in the other columns. China is separated out from the rest of Asia. The bottom half of the table shows the regional shares of global output in 2013.

The lower half of the table brings out China's role as a major supplier of minerals, complementing its position as the leading user. It is deficient in bauxite, copper and nickel,

Table 8. Global Mine Production: regional growth and shares

	Europe	Africa	China	Other Asia	North America	Latin America	Oceania	TOTAL
Percentage change 2007 to 2013								
Bauxite	–15.5	–1.1	110.8	89.6	–2.3	–7.8	29.9	35.3
Coal	–2.6	3.7	36.7	42.3	–13.3	17.3	21.1	19.8
Copper	6.5	126.0	83.9	3.6	–1.0	9.7	5.4	17.7
Gold	35.9	11.4	58.3	–11.2	3.7	39.2	9.7	19.3
Lead	15.3	–2.0	117.4	85.0	–31.3	19.9	10.9	50.7
Iron ore	–5.0	56.1	103.1	–10.9	11.8	–1.3	103.3	53.1
Nickel	6.5	54.6	48.2	251.4	–12.4	0.7	27.5	61.3
Silver	27.8	9.6	44.7	31.3	–22.3	32.6	–0.6	24.3
Zinc	3.3	–11.6	76.9	14.6	–15.3	10.8	0.6	23.3
Shares of world total in 2013								
Bauxite	3.1	7.1	15.5	28.4	0.0	17.2	28.6	100
Coal	14.0	3.3	46.6	16.3	12.2	1.5	6.1	100
Copper	8.9	10.4	9.3	11.1	10.3	44.0	6.0	100
Gold	8.7	19.4	15.4	10.3	12.7	21.2	12.4	100
Lead	6.2	1.7	54.4	7.1	6.4	11.4	12.7	100
Iron ore	6.5	2.9	46.2	7.6	1.9	13.8	19.7	100
Nickel	13.9	4.4	3.9	44.9	8.9	8.2	15.8	100
Silver	13.1	1.5	15.1	7.7	6.4	48.7	7.4	100
Zinc	7.9	2.0	39.3	11.5	8.8	19.4	11.1	100

Note: Europe includes Russia and Turkey.

Sources: World Metal Statistics Yearbook 2014, World Bureau of Metal Statistics, Ware, England, 2014. BP Statistical Review of World Energy 2014.

but is a major producer of the other products shown in the table, as of many other minerals. Imports are, however, increasingly needed to supplement domestic supplies. Latin America is the largest source of copper (mainly Chile and Peru) and silver (mainly Mexico and Peru).

In all products save nickel Chinese output grew much faster than the global total. That was because of a substantial increase in production of nickeliferous iron ore in Indonesia destined for Chinese pig iron plants. Increased production of bauxite and coal in Indonesia and Australia, and of iron ore in the latter was based on rising Chinese demand. Production of all products other than gold and silver either fell or increased more slowly than the total in Europe and North America. Experiences were mixed in the other regions, emphasising that the market characteristics of individual minerals can be as important as political and economic conditions in resource rich countries in driving investment.

One recurring theme of recent years has been the changing balance of power between host countries and companies. During the 1990s and early 2000s, when prices and profitability were subdued, fiscal provisions tended to favour investors. Governments were keen to attract

investment. The surge in prices and profitability during the late 2000s led to many countries revising their tax regimes, often through increasing royalties, in order to capture a greater share of profits. Unfortunately there is often a lag between official perceptions and policy changes and falling profitability has frustrated the ability to capture greater fiscal revenues in many instances.

Concluding comment

This lag between changing profitability and tax changes is merely one of the lags that bedevil the mineral industries. Producers were slow to react to rising demand and prices in the early to mid-2000s, having geared their production planning to the modest rates of growth and price levels of the 1990s. There were inevitably delays in expanding existing operations and developing new mines, even where ore reserves were available. Gradually new capacity was brought on stream, and with gathering momentum. Mineral producers became accustomed to the growth rates and price levels of the late 2000s and built those into their planning and capital spending programmes. The fall in prices of 2012–13 jolted those bullish projections and companies reacted accordingly. The next chapter in the evolving story has yet to be written, but the one certainty is that the minerals industry will remain cyclical. Each cycle is, however, subtly different from its predecessors, usually in unexpected ways. The future remains uncertain.

The economic situation of domestic mining companies

Inka Neumaierová, Ivan Neumaier
University of Economics, Prague

Tab. 1: Mining total

Indicator	Unit	2009	2010	2011	2012	2013
Number of enterprises		204	196	192	191	244
Number of employees		58 304	54 213	52 397	53 298	63 970
Sales	mill. CZK	131 443	140 459	144 583	141 021	171 564
Value added	mill. CZK	54 507	58 663	66 153	60 765	68 440
Sales per employee	ths. CZK/ employee	2 254	2 591	2 759	2 646	2 682
Labour productivity based value added	CZK/ employee	934 866	1 082 090	1 262 534	1 140 089	1 069 891
Hourly labour productivity	CZK/ working hour	562	647	743	672	637
Average salary	CZK/ employee	26 499	28 326	29 951	30 388	29 885
(Value added - salaries) per employee	CZK/ employee	908 367	1 053 763	1 232 582	1 109 702	1 040 006

Indexes	13/09	10/09	11/10	12/11	13/12
Number of enterprises	19%	-4%	-2%	-1%	28%
Number of employees	10%	-7%	-3%	2%	20%
Sales	31%	7%	3%	-2%	22%
Value added	26%	8%	13%	-8%	13%
Sales per employee	19%	15%	7%	-4%	1%
Labour productivity based value added	14%	16%	17%	-10%	-6%
Hourly labour productivity	13%	15%	15%	-10%	-5%
Average salary	13%	7%	6%	1%	-2%
(Value added - salaries) per employee	14%	16%	17%	-10%	-6%

Source: own calculations according to Ministry of Industry and Trade and Czech Statistical Office data

Table 1: Mining total shows the general data for selected mining companies. This procedure was chosen because the published data in the classification CZ-NACE B Mining and quarrying generally lack the detail needed to serve our purpose. It was therefore necessary to base calculations on selected companies involved in mining. The calculation includes four specific characteristics:

1. It is impossible to distinguish pure mining from other activities. All data are for the company as a whole, such as, for example, the manufacture of bricks and trade activity are combined. This problem also exists in the CZ-NACE industrial classification, where companies are classified according to their predominant activities.
2. The companies belong not only to the group CZ-NACE[1] B Mining and quarrying, but also to CZ-NACE 23 Manufacture of other non-metallic mineral products, specifically companies of the glass, ceramics and building material industries (glass and construction minerals), and several companies from other CZ-NACE groups, e.g. from CZ-NACE F construction (mining is one of the activities).
3. Companies that produce several minerals pose a problem as well. They are therefore listed for each mineral. That is why the total of sales, value added and the number of employees is higher

[1] *Translator's note:* CZ NACE – Czech adoption of the General Industrial Classification of Economic Activities within the European Communities (Nomenclature générale des Activités économiques dans les Communautés Européennes)

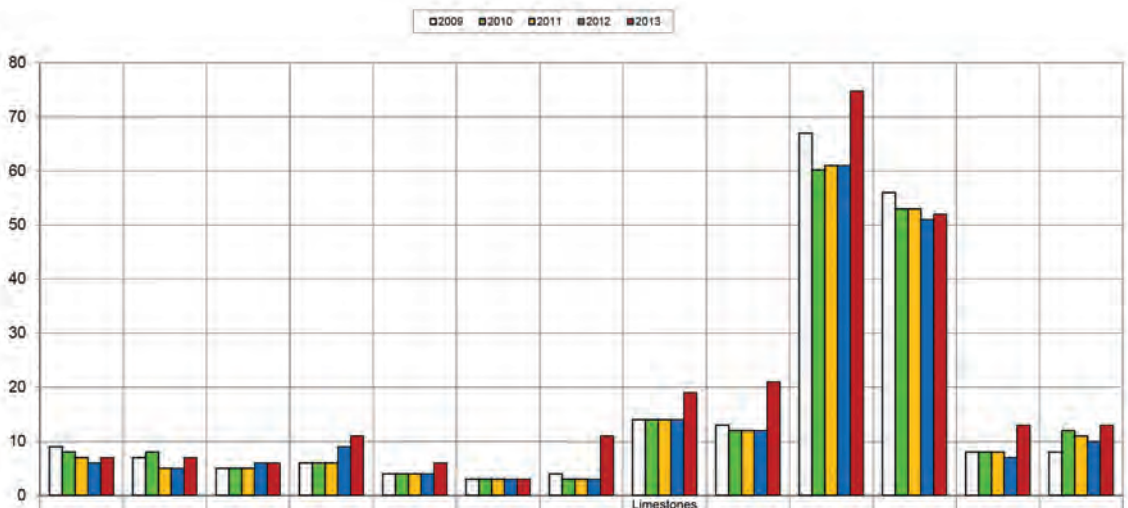
in "our" Mining total than what is listed for CZ-NACE B Mining and quarrying. Their values are easily comparable over time as far as relative indices are concerned, such as book value added per employee.

4. It is possible to collect many data (e.g. from annual reports) for large companies, but in the case of small ones data are not available. This affects the selection of indexes.
5. In view of confidential individual data, it was necessary to combine the mining companies into larger groups.

The selection of indicators in the tables is as follows:

– Number of companies
– Registered average number of employees
– Sales (sales of goods and sales of own goods and services)
– Book value added (VA) (= sales + change of stocks of own production + capitalization (production of a company for own consumption) – purchased goods – intermediate consumption (consumption of supplies and raw materials, energy and services))
– Sales per employee (labour productivity based on sales, i.e. sales per registered employee)
– Book value added per employee (labour productivity based on book value added, i.e. book value added per registered employee)
– Hourly labour productivity (book value added per working hour)
– Average salary
– (Book value added – salaries) per employee, i.e. book value added after deduction of salaries to cover other costs and formation of profits.

The period covers the years 2009–2013. Indicators for time series are supplied by chain



	Bituminous coal	Brown coal and lignite	Kaolin	Clays and bentonite	Feldspar	Glass sand	Foundry sand	Limestones and corrective sialic additives for cement production and dolomite	Dimension stone	Crushed stone	Sand and gravel	Brick clays and related minerals	Other minerals
2009	9	7	5	6	4	3	4	14	13	67	56	8	8
2010	8	8	5	6	4	3	3	14	12	60	53	8	12
2011	7	5	5	6	4	3	3	14	12	61	53	8	11
2012	6	5	6	9	4	3	3	14	12	61	51	7	10
2013	7	7	6	11	6	3	11	19	21	75	52	13	13

Source: own calculations according to Ministry of Industry and Trade and Czech Statistical Office data (CSA in this and following figures means "Corrective additives for cement production")

Fig. 1. Number of companies

indices and by average growth for a given period. Comparable indices for individual minerals are compared with values for Mining total that equals 100%.

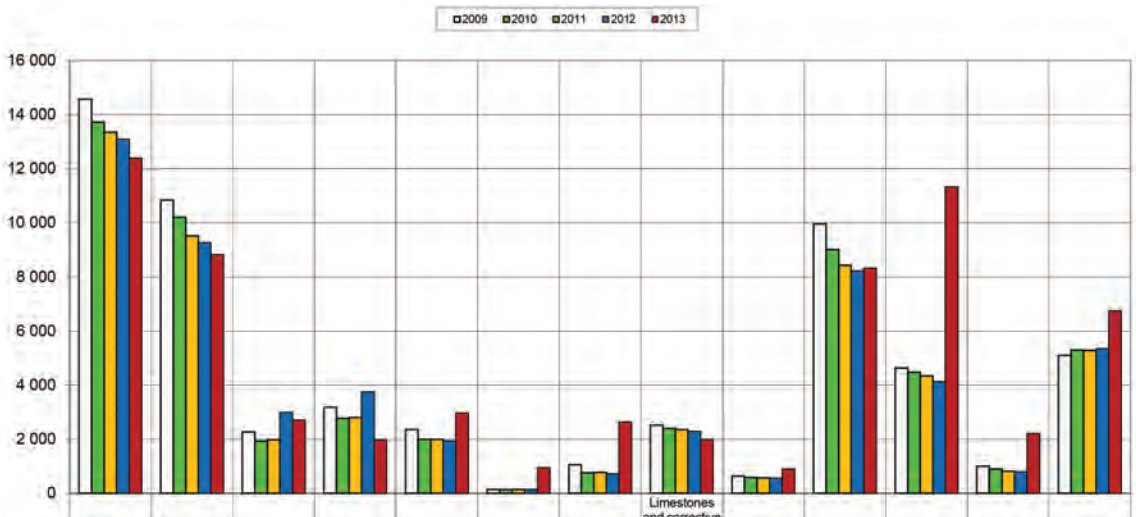
An effort was made to provide a brief summary of available economic data on mining companies (both large and small). It is only a small amount of data, but in view of the availability of data on small companies, this is the maximum possible.

Even though the following figures and tables are self-explanatory, a brief commentary is included.

It is generally possible to say that the number of companies (Fig. 1) was stable in 2009-2012. In 2013, the number of companies increased in practically all mineral industries.

There were many reasons for this development. However, the most important fact is that economic data on more companies involved in mining were available. The group CZ-NACE B Mining and quarrying included 356 companies in 2013. Our selection (with the repeated inclusion of companies producing several minerals and mining companies belonging to other CZ-NACE groups) comprises 244 companies. Calculations include all of the larger companies (more than 50 employees) from the CZ-NACE B group.

As expected in our sample of minerals, crushed stone and sand and gravel account for the highest number of companies. In reality this number will probably be significantly higher, because these mineral industries have many small companies, which we have not recorded. On the contrary for bituminous and brown coal we recorded all companies because there are big companies only in these commodities. The smallest number of companies is recorded for glass sand.

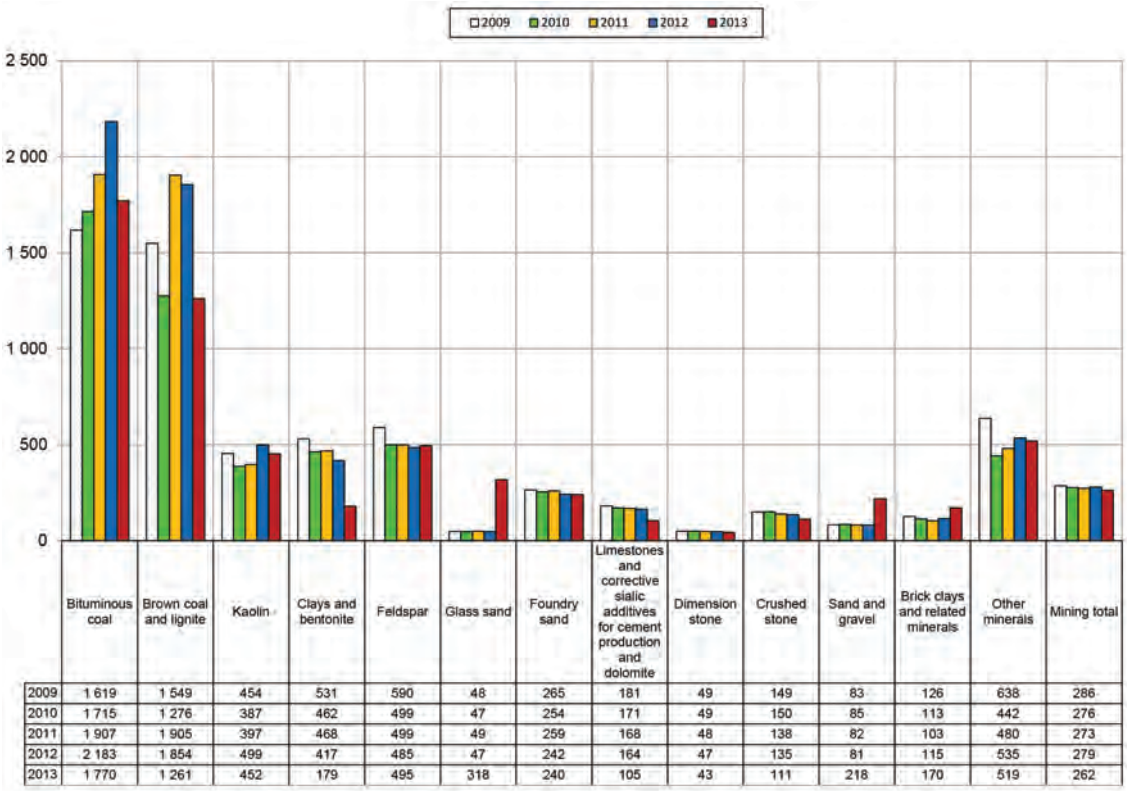


	Bituminous coal	Brown coal and lignite	Kaolin	Clays and bentonite	Feldspar	Glass sand	Foundry sand	Limestones and corrective sialic additives for cement production and dolomite	Dimension stone	Crushed stone	Sand and gravel	Brick clays and related minerals	Other minerals
2009	14 568	10 844	2 272	3 184	2 358	144	1 059	2 529	641	9 959	4 636	1 011	5 100
2010	13 716	10 206	1 934	2 774	1 996	141	761	2 397	594	9 010	4 482	903	5 299
2011	13 351	9 523	1 983	2 805	1 995	147	778	2 356	575	8 430	4 343	827	5 284
2012	13 098	9 271	2 996	3 751	1 940	142	725	2 294	565	8 228	4 134	803	5 350
2013	12 393	8 830	2 715	1 967	2 971	953	2 640	1 988	900	8 323	11 328	2 215	6 746

Source: own calculations according to Ministry of Industry and Trade and Czech Statistical Office data

Fig. 2. Number of employees

The recalculated number of employees (Fig. 2) in terms of Mining total declined in 2009–2011, increased slightly in 2012, but grew significantly in 2013 due to the inclusion of more companies. This is particularly obvious primarily in the case of sand and gravel and foundry sand, or brick clays and related minerals.



	Bituminous coal	Brown coal and lignite	Kaolin	Clays and bentonite	Feldspar	Glass sand	Foundry sand	Limestones and corrective sialic additives for cement production and dolomite	Dimension stone	Crushed stone	Sand and gravel	Brick clays and related minerals	Other minerals	Mining total
2009	1 619	1 549	454	531	590	48	265	181	49	149	83	126	638	286
2010	1 715	1 276	387	462	499	47	254	171	49	150	85	113	442	276
2011	1 907	1 905	397	468	499	49	259	168	48	138	82	103	480	273
2012	2 183	1 854	499	417	485	47	242	164	47	135	81	115	535	279
2013	1 770	1 261	452	179	495	318	240	105	43	111	218	170	519	262

Source: own calculations according to Ministry of Industry and Trade and Czech Statistical Office data

Fig. 3. Average number of employees

Bituminous coal, brown coal, lignite and crushed stone account for the highest number of employees, and foundry sand again for the lowest number. As a result of the clustering of the sales of various branches in 2013, sand and gravel accounted for a higher number of employees as well. The number of employees increased by five thousand in our Mining total. During 2009–2013, the number of employees for the entire CZ-NACE B group fell by more than five thousand.

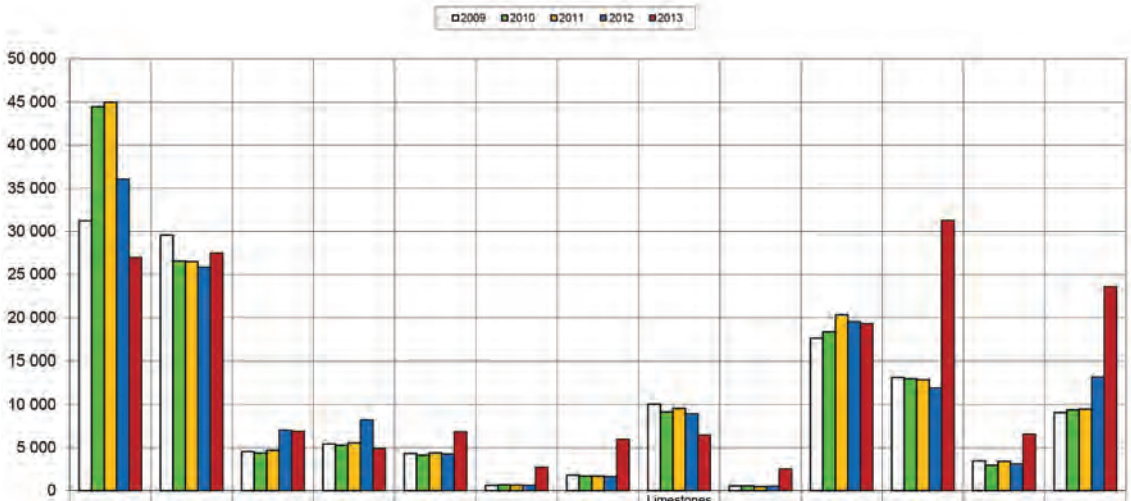
To provide more detailed information on the number of employees, Figure 3 has been incorporated so as to show the average number of employees of companies for a given mineral. The largest companies are in the bituminous and brown coal mining industries.

Companies producing foundry sand and crushed stone are smaller and include only mining operations. The smallest companies are those that produce glass sand (with the exception of 2013) and dimension stone.

As a result of the clustering, companies producing glass sand and sand and gravel grew in 2013.

Sales are shown in Figure 4. Sales define the overall productivity of companies producing individual minerals. If sales are non-existent, then the necessary money flow that covers expenses is non-existent as well. The lowest sales figure with regard to the Mining total was registered in 2009. Sales grew in 2010–2011, declined slightly in 2012, and increased sharply in 2013 (which was again influenced considerably by the clustering of more related branches in the companies category, i.e. an increase in the sales of specific companies).

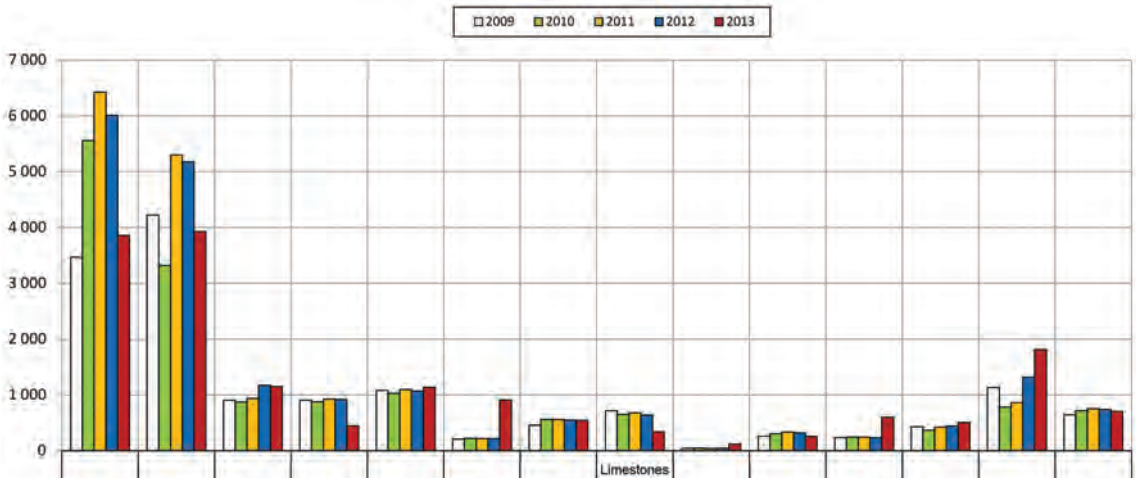
In 2009, production of bituminous coal, brown coal, crushed stone, and sand and gravel



	Bituminous coal	Brown coal and lignite	Kaolin	Clays and bentonite	Feldspar	Glass sand	Foundry sand	Limestones and corrective sialic additives for cement production and dolomite	Dimension stone	Crushed stone	Sand and gravel	Brick clays and related minerals	Other minerals
2009	31 223	29 574	4 530	5 433	4 327	627	1 830	10 032	560	17 622	13 142	3 463	9 078
2010	44 464	26 559	4 357	5 264	4 117	665	1 682	9 144	560	18 348	12 972	2 941	9 386
2011	44 991	26 513	4 688	5 555	4 391	656	1 681	9 549	483	20 327	12 867	3 406	9 475
2012	36 074	25 872	7 034	8 240	4 275	660	1 638	8 936	517	19 542	11 937	3 097	13 199
2013	26 999	27 487	6 907	4 890	6 834	2 730	5 971	6 460	2 519	19 328	31 272	6 579	23 587

Source: own calculations according to Ministry of Industry and Trade and Czech Statistical Office data

Fig. 4. Sales (CZK million)



	Bituminous coal	Brown coal and lignite	Kaolin	Clays and bentonite	Feldspar	Glass sand	Foundry sand	Limestones and corretive sialic additives for cement production and dolomite	Dimension stone	Crushed stone	Sand and gravel	Brick clays and related minerals	Other minerals	Mining total
2009	3 469	4 225	906	906	1 082	209	457	717	43	263	235	433	1 135	644
2010	5 558	3 320	871	877	1 029	222	561	653	47	305	245	368	782	716
2011	6 427	5 303	938	926	1 098	219	560	682	40	333	243	426	861	753
2012	6 012	5 174	1 172	916	1 069	220	546	638	43	320	234	442	1 320	738
2013	3 857	3 927	1 151	445	1 139	910	543	340	120	259	601	506	1 814	704

Source: own calculations according to Ministry of Industry and Trade and Czech Statistical Office data

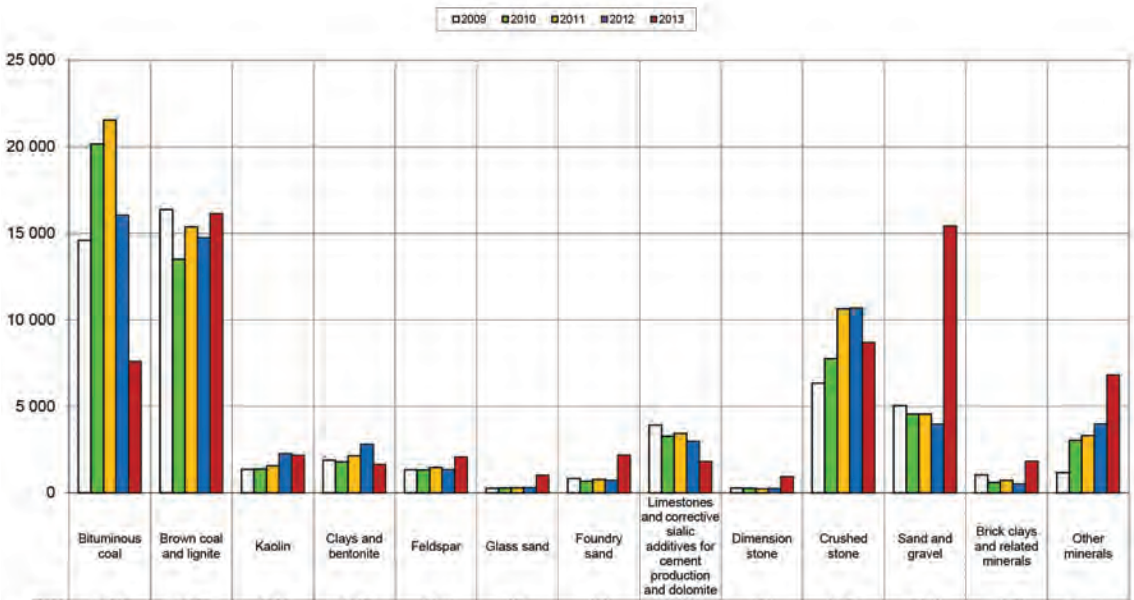
Fig. 5. Average sales (CZK million)

accounted for the largest share of Mining total sales. This situation continues to this day except for a sharp rise in the sales of sand and gravel and of the *Other minerals* group.

In 2009–2013, the strongest growth was registered by sand and gravel and by the *Other minerals* group, and bituminous coal conversely experienced the sharpest decline.

As in the case of the number of employees, average values per company (Fig. 5) have also been incorporated for sales. Clearly the largest companies in terms of sales are those involved in the production of coal. On the contrary, as may be expected, the smallest companies were those involved in the production of stone, gravel and sand.

In 2013, there was an obvious increase in the average sales figures in the case of glass sand, sand and gravel, and in the *Other minerals* group due to the clustering of the companies involved.



	Bituminous coal	Brown coal and lignite	Kaolin	Clays and bentonite	Feldspar	Glass sand	Foundry sand	Limestones and corrective sialic additives for cement production and dolomite	Dimension stone	Crushed stone	Sand and gravel	Brick clays and related minerals	Other minerals
2009	14 595	16 377	1 366	1 897	1 343	274	832	3 926	278	6 351	5 040	1 047	1 181
2010	20 170	13 511	1 381	1 800	1 333	291	679	3 273	271	7 758	4 555	597	3 044
2011	21 545	15 382	1 571	2 154	1 480	302	776	3 445	239	10 645	4 561	734	3 321
2012	16 061	14 755	2 270	2 827	1 358	316	733	2 984	263	10 692	3 980	527	3 996
2013	7 804	16 147	2 179	1 652	2 082	1 034	2 195	1 819	944	8 704	15 425	1 835	6 821

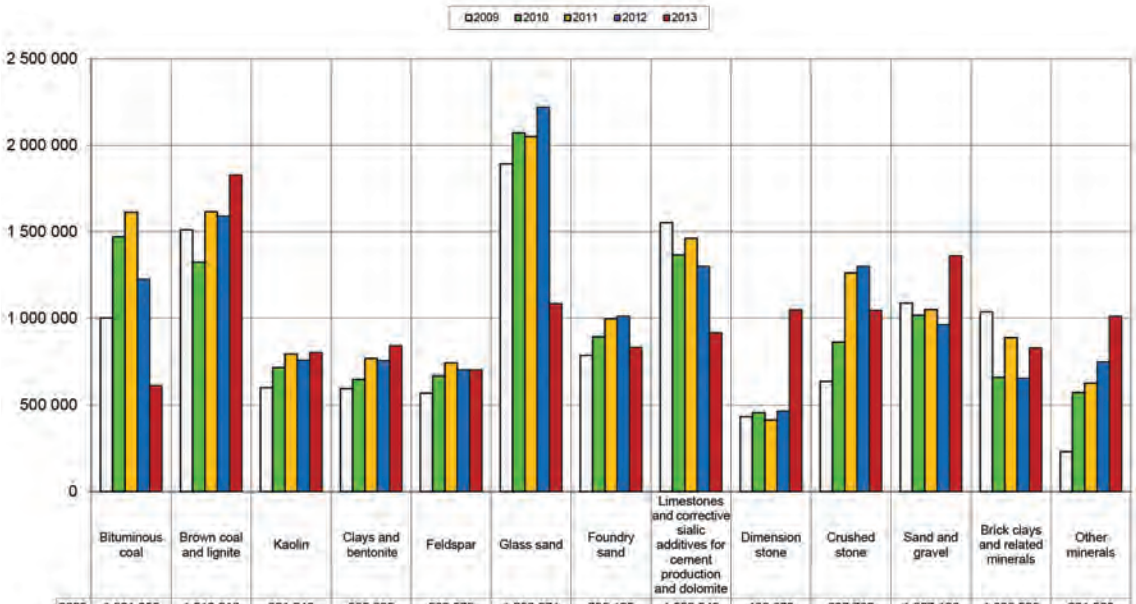
Source: own calculations according to Ministry of Industry and Trade and Czech Statistical Office data

Fig. 6. Book value added (CZK million)

There is a relationship between value added (Fig. 6) and GDP, or more precisely gross value added (GVA), which serves as a basis for calculating GDP. The advantage of value added compared to sales is that it does not change as a result of company break-ups and mergers. From this perspective, indices of value added are more informative than those of sales.

Until 2012, the mining of bituminous and brown coal clearly accounted for the highest share of value added. In 2013, value added grew in the case of sand and gravel and declined sharply in the case of bituminous coal, which is exactly why sand and gravel and brown coal registered the highest value added figures.

If we take into account the structure of the *Other minerals* group, where production of crude oil, natural gas and uranium prevail, than it is possible to state that the share of energy mineral production is crucial for GDP (or GVA) formation in mining and quarrying.



	Bituminous coal	Brown coal and lignite	Kaolin	Clays and bentonite	Feldspar	Glass sand	Foundry sand	Limestones and corrective sialic additives for cement production and dolomite	Dimension stone	Crushed stone	Sand and gravel	Brick clays and related minerals	Other minerals
2009	1 001 855	1 510 218	601 243	595 905	569 572	1 893 071	785 125	1 552 549	433 673	637 762	1 087 136	1 036 526	231 568
2010	1 470 521	1 323 745	713 941	648 747	667 789	2 072 001	892 290	1 365 593	457 050	861 074	1 016 338	661 356	574 370
2011	1 613 761	1 615 250	792 480	767 755	741 752	2 050 514	996 579	1 462 613	415 169	1 262 679	1 050 103	887 985	628 366
2012	1 226 184	1 591 536	757 576	753 580	700 403	2 220 664	1 011 319	1 300 964	465 932	1 299 436	962 880	656 684	746 998
2013	613 580	1 828 757	802 815	839 617	700 555	1 084 252	831 377	915 157	1 048 139	1 045 686	1 361 677	828 739	1 011 101

Source: own calculations according to Ministry of Industry and Trade and Czech Statistical Office data

Fig. 7. Labour productivity based on value added (CZK/employee)

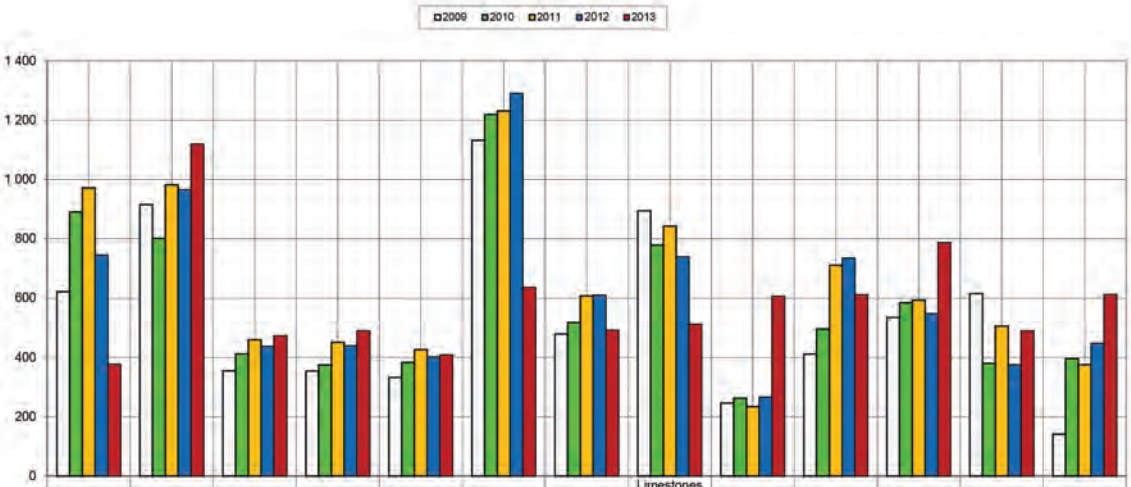
The set of relative indices will start off with labour productivity. Of all the chosen indicators, the value added labour productivity is one of the main indicators for evaluating companies. As is evident in Figure 7, great differences exist between different minerals. Glass sand, limestone and corrective additives for cement production , dolomites and both coal mining industries seem to be excellent. Dimension stone, kaolin, clays and bentonite, and feldspar rank at the opposite end.

Since it is a comparative indicator, a comparison of each mineral with the Mining total is possible as well as a comparison of the Mining total with larger units such as those of the industrial classification of companies (CZ-NACE).

In our selection of companies, the labour productivity of the Mining total in 2013 is 4% higher than the mining and quarrying (CZ-NACE B) classification. The productivity of our selection is 35% higher in comparison with CZ-NACE C Manufacturing industry, and the labour productivity of our selection is 17% higher when compared with industry, i.e. CZ-NACE B + C + D + E. It is evident that our selection of companies is partly connected with manufacture (e.g. part of CZ-NACE 23 Manufacture of porcelain and ceramic products), which lowers labour productivity.

In industry, in terms of value added labour productivity, mining and quarrying is in second place behind energy. This is due to the fact that consumption of materials in mining is very low – there are no manufactured products from purchased supplies.

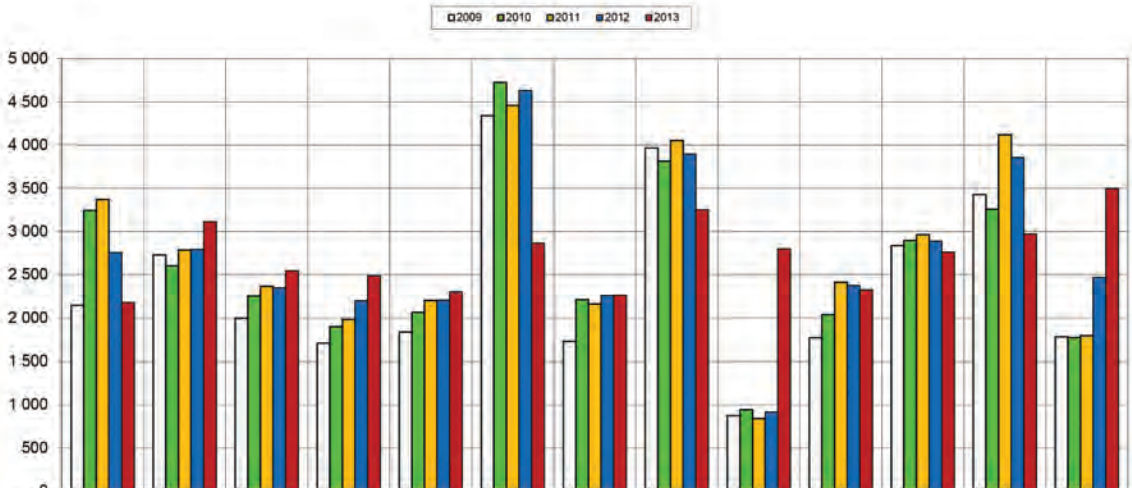
Hourly value added labour productivity (Fig. 8) has similar characteristics as productivity per employee (Fig. 7). On the other hand, it is a more precise expression of productivity, because it shows the book value added per working hour.



	Bituminous coal	Brown coal and lignite	Kaolin	Clays and bentonite	Feldspar	Glass sand	Foundry sand	Limestones and corrective sialic additives for cement production and dolomite	Dimension stone	Crushed stone	Sand and gravel	Brick clays and related minerals	Other minerals
2009	622	915	355	354	333	1 132	479	895	246	412	535	615	142
2010	890	801	412	374	383	1 220	518	779	262	496	585	380	396
2011	972	982	460	452	426	1 231	607	843	234	711	593	506	376
2012	745	966	437	440	402	1 290	610	740	266	735	548	376	448
2013	378	1 120	474	490	409	637	492	513	607	612	788	490	613

Source: own calculations according to Ministry of Industry and Trade and Czech Statistical Office data

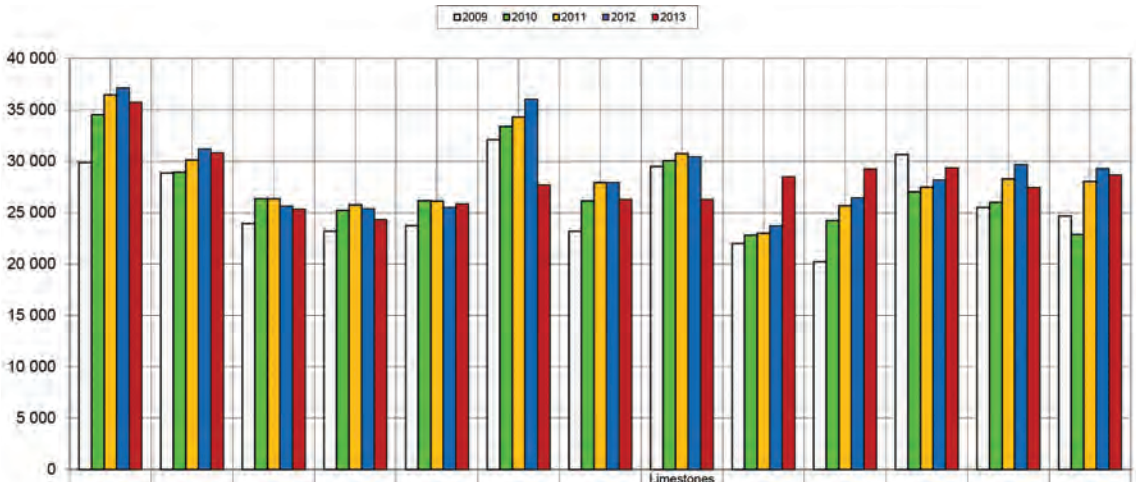
Fig. 8. Hourly labour productivity (CZK/working hour)



	Bituminous coal	Brown coal and lignite	Kaolin	Clays and bentonite	Feldspar	Glass sand	Foundry sand	Limestones and corrective sialic additives for cement production and dolomite	Dimension stone	Crushed stone	Sand and gravel	Brick clays and related minerals	Other minerals
2009	2 143	2 727	1 994	1 707	1 835	4 340	1 728	3 967	874	1 770	2 835	3 427	1 780
2010	3 242	2 602	2 253	1 897	2 062	4 725	2 209	3 815	943	2 036	2 895	3 257	1 771
2011	3 370	2 784	2 364	1 980	2 201	4 460	2 160	4 054	841	2 411	2 963	4 119	1 793
2012	2 754	2 791	2 348	2 197	2 204	4 632	2 258	3 896	915	2 375	2 888	3 856	2 467
2013	2 178	3 113	2 544	2 486	2 300	2 863	2 262	3 250	2 798	2 322	2 761	2 971	3 496

Source: own calculations according to Ministry of Industry and Trade and Czech Statistical Office data

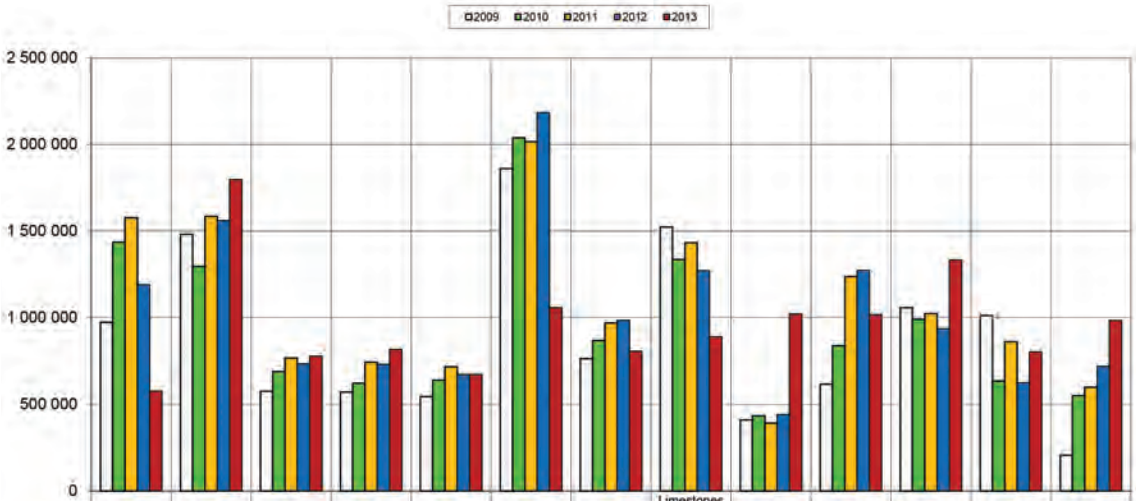
Fig. 9. Sales per employee (CZK thousand/employee)



	Bituminous coal	Brown coal and lignite	Kaolin	Clays and bentonite	Feldspar	Glass sand	Foundry sand	Limestones and corrective sialic additives for cement production and dolomite	Dimension stone	Crushed stone	Sand and gravel	Brick clays and related minerals	Other minerals
2009	29 856	28 858	23 932	23 191	23 734	32 077	23 205	29 482	21 979	20 224	30 651	25 510	24 674
2010	34 517	28 917	26 344	25 201	26 149	33 378	26 129	30 032	22 805	24 219	27 016	25 988	22 860
2011	36 445	30 108	26 348	25 737	26 120	34 294	27 927	30 729	22 988	25 662	27 468	28 271	28 035
2012	37 117	31 185	25 630	25 365	25 496	36 028	27 922	30 437	23 710	26 426	28 169	29 673	29 273
2013	35 723	30 823	25 344	24 307	25 885	27 692	26 265	26 259	28 478	29 232	29 343	27 431	28 664

Source: own calculations according to Ministry of Industry and Trade and Czech Statistical Office data

Fig. 10. Average salary (CZK/employee)



	Bituminous coal	Brown coal and lignite	Kaolin	Clays and bentonite	Feldspar	Glass sand	Foundry sand	Limestones and corrective sialic additives for cement production and dolomite	Dimension stone	Crushed stone	Sand and gravel	Brick clays and related minerals	Other minerals
2009	971 998	1 481 360	577 312	572 714	545 838	1 860 994	761 920	1 523 067	411 694	617 538	1 056 485	1 011 015	206 894
2010	1 436 004	1 294 827	687 598	623 545	641 640	2 038 623	866 161	1 335 561	434 244	836 854	989 322	635 368	551 510
2011	1 577 316	1 585 141	766 132	742 017	715 632	2 016 220	968 652	1 431 884	392 180	1 237 017	1 022 634	859 714	600 332
2012	1 189 067	1 560 350	731 947	728 214	674 906	2 184 636	983 397	1 270 527	442 222	1 273 010	934 711	627 010	717 724
2013	577 857	1 797 934	777 471	815 310	674 689	1 056 560	805 112	888 898	1 019 663	1 016 454	1 332 334	801 308	982 437

Source: own calculations according to Ministry of Industry and Trade and Czech Statistical Office data

Fig. 11. (Value added – salaries) per employee (CZK/employee)

When comparing our selection of companies with aggregates, sales per employee (Fig. 9) exhibits rather opposite results compared to value added labour productivity. Even though sales per employee for our selection were 1% higher in 2012 than for CZ-NACE B Mining and quarrying, they were considerably lower than those of CZ-NACE C Manufacturing industry (by 23 %) and 38% lower than those of industry (CZ-NACE B + C + D + E). The influence of subsequent manufacturing is not that great.

In general, the greater the integration of mineral extraction with subsequent manufacturing, the higher the sales per employee in relation to value added labour productivity. This clearly applies, for example, to brick clays and related minerals, where mining operations are usually carried out by companies manufacturing bricks and roof tiles.

Glass sand, limestone and corrective additives for cement production, dolomite and brick clays and related minerals are again at the top of the list. The integration with subsequent manufacturing is illustrated by dimension stone in 2013.

The average salary (Fig. 10) is more or less equal despite relatively big differences in labour productivity between individual minerals. Compared to CZ-NACE B Mining and quarrying, the average salary of our selection of companies is 6 % lower and, on the other hand, 22% higher in comparison with CZ-NACE C. The Mining total again corresponds to CZ-NACE B.

Bituminous coal registered the highest average salary figures, which is understandable because of underground mining. A slight surprise is glass sand, which ranked second. Dimension stone, clays and bentonite registered the lowest average salary figures.

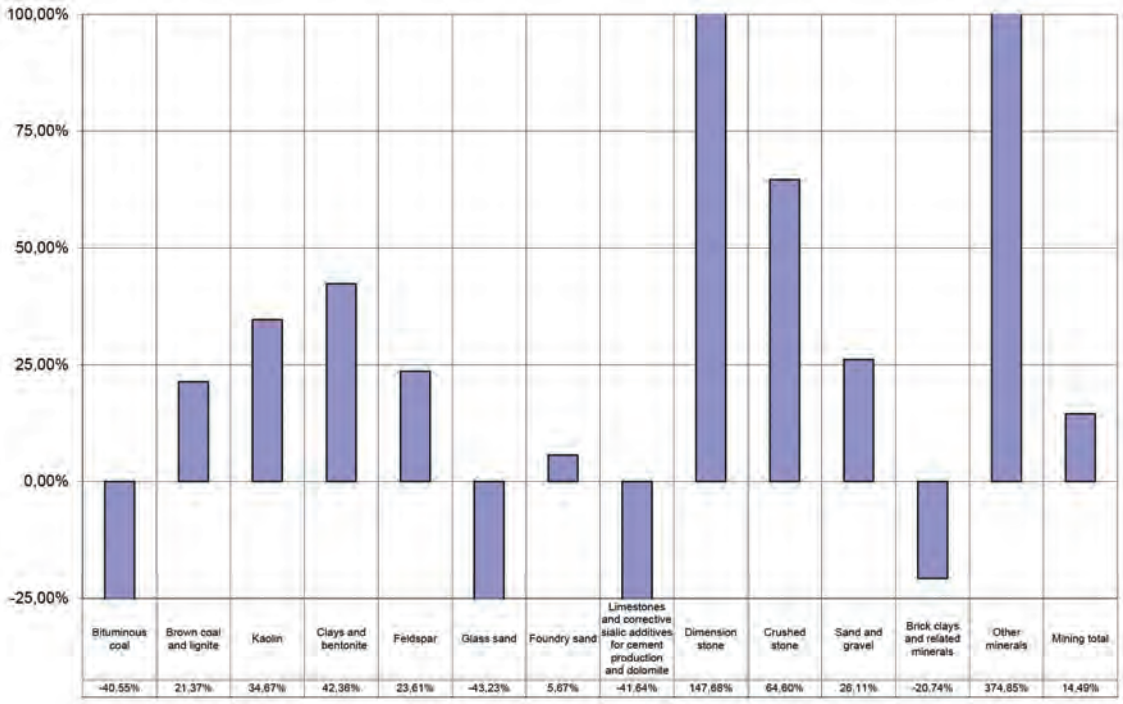
The difference between value added labour productivity and average salary (Fig. 11) is a deciding indicator for the evaluation of an enterprise‘s productivity (in our selection of indices). The higher the value, the better, i.e. it leaves more money for covering other costs (depreciation, social taxes, financial costs etc.) and for profit creation. In view of the fact that average salaries are not too variable, the result is due to differences in the book value added labour productivity. For company owners, this is the most important index from our selection of indices. The more an employee produces, the more remains at an owner´s disposal to cover costs and for formation of profits.

Glass sand is at the top of the list, followed by brown coal, limestone and corrective additives for cement production, and dolomite.

For a better understanding of the index (value added – salaries) per employee, the growth in the value of the 2013/2009 index (Fig. 12) was calculated. A positive aspect is that the Mining total registered a growth of 14 %. In other words, the mining business was more lucrative in 2013 than in 2009.

The production of other minerals is excellent. Unfortunately due to data protection, we cannot divulge the reasons for this fact. Crushed stone ranked second. Feldspar, sand and gravel, and bituminous coal ranked third. Bituminous coal, glass sand and corrective additives for cement production declined drastically. A review of individual minerals follows.

Even though bituminous coal is produced by two companies, or more precisely by one, the ČSÚ (Czech Statistical Office) lists more than three companies in the sector CZ-NACE 05.1 Mining and processing of bituminous coal. We have classified bituminous coal under researchedminerals.



Source: own calculations according to Ministry of Industry and Trade and Czech Statistical Office data

Fig. 12. Index 2013/2009 (book value added – salaries) per employee

The fewest number of companies are those that produce bituminous coal (Tab. 2) (2.87% share of the Mining total), but in terms of absolute financial indices it is one of the most important minerals because it accounted for 19.37% of employees, 15.74% of sales, and 11.11% of value added in 2013.

With regard to relative indices, this mineral industry ranked highest in 2013 only in terms of average salary (underground mining). However in 2009–2012, it also ranked above-average in other relative indices.

The trend in absolute indices in 2010-2011 was very unfavourable. Unfortunately, a very negative trend began in 2012 , which was caused by a decline in global coal prices. Production is being cut back as a result of uncompetitiveness due to high production costs. In addition, domestic demand for bituminous coal is decreasing, which is for example related to a decline in metallurgy.

Another problem is that these are companies involved in mining and auxiliary mining operations and that costs associated with reclamation, etc., practically do not decrease during a decline in mining that sustains the companies. In addition, organizational changes are also causing problems for this mineral industry.

There are again few companies that produce brown coal and lignite (Tab. 3) (2.87 % share of the Mining total), but in terms of absolute financial indices it is the third most important mineral, accounting for 13.80% of employees, and it ranks second in sales (16.02%) and first in value added (23.59%).

In terms of relative indices, this mineral ranks highest in both labour productivity categories and above-average in sales per employee.

Tab. 2: Bituminous coal

Indicator	Unit	2009	2010	2011	2012	2013
Number of enterprises		9	8	7	6	7
Number of employees		14 568	13 716	13 351	13 098	12 393
Sales	mill. CZK	31 223	44 464	44 991	36 074	26 999
Value added	mill. CZK	14 595	20 170	21 545	16 061	7 604
Sales per employee	ths. CZK/ employee	2 143	3 242	3 370	2 754	2 178
Mining total = 100%	*%*	*95%*	*125%*	*122%*	*104%*	*81%*
Labour productivity based value added	CZK/ employee	1 001 855	1 470 521	1 613 761	1 226 184	613 580
Mining total = 100%	*%*	*107%*	*136%*	*128%*	*108%*	*57%*
Hourly labour productivity	CZK/ working hour	622	890	972	745	378
Mining total = 100%	*%*	*111%*	*138%*	*131%*	*111%*	*59%*
Average salary	CZK/ employee	29 856	34 517	36 445	37 117	35 723
Mining total = 100%	*%*	*113%*	*122%*	*122%*	*122%*	*120%*
(Value added - salaries) per employee	CZK/ employee	971 998	1 436 004	1 577 316	1 189 067	577 857
Mining total = 100%	*%*	*107%*	*136%*	*128%*	*107%*	*56%*

Indexes	13/09	10/09	11/10	12/11	13/12
Number of enterprises	-22%	-11%	-13%	-14%	17%
Number of employees	-15%	-6%	-3%	-2%	-5%
Sales	-14%	42%	1%	-20%	-25%
Value added	-48%	38%	7%	-25%	-53%
Sales per employee	2%	51%	4%	-18%	-21%
Labour productivity based value added	-39%	47%	10%	-24%	-50%
Hourly labour productivity	-39%	43%	9%	-23%	-49%
Average salary	20%	16%	6%	2%	-4%
(Value added - salaries) per employee	-41%	48%	10%	-25%	-51%

Source: own calculations according to Ministry of Industry and Trade and Czech Statistical Office data

Tab. 3: Brown coal and lignite

Indicator	Unit	2009	2010	2011	2012	2013
Number of enterprises		7	8	5	5	7
Number of employees		10 844	10 206	9 523	9 271	8 830
Sales	mill. CZK	29 574	26 559	26 513	25 872	27 487
Value added	mill. CZK	16 377	13 511	15 382	14 755	16 147
Sales per employee	ths. CZK/ employee	2 727	2 602	2 784	2 791	3 113
Mining total = 100%	*%*	*121%*	*100%*	*101%*	*105%*	*116%*
Labour productivity based value added	CZK/ employee	1 510 218	1 323 745	1 615 250	1 591 536	1 828 757
Mining total = 100%	*%*	*162%*	*122%*	*128%*	*140%*	*171%*
Hourly labour productivity	CZK/ working hour	915	801	982	966	1 120
Mining total = 100%	*%*	*163%*	*124%*	*132%*	*144%*	*176%*
Average salary	CZK/ employee	28 858	28 917	30 108	31 185	30 823
Mining total = 100%	*%*	*109%*	*102%*	*101%*	*103%*	*103%*
(Value added - salaries) per employee	CZK/ employee	1 481 360	1 294 827	1 585 141	1 560 350	1 797 934
Mining total = 100%	*%*	*163%*	*123%*	*129%*	*141%*	*173%*

Indexes	13/09	10/09	11/10	12/11	13/12
Number of enterprises	0%	14%	-38%	0%	40%
Number of employees	-19%	-6%	-7%	-3%	-5%
Sales	-7%	-10%	0%	-2%	6%
Value added	-1%	-18%	14%	-4%	9%
Sales per employee	14%	-5%	7%	0%	12%
Labour productivity based value added	21%	-12%	22%	-1%	15%
Hourly labour productivity	22%	-12%	23%	-2%	16%
Average salary	7%	0%	4%	4%	-1%
(Value added - salaries) per employee	21%	-13%	22%	-2%	15%

Source: own calculations according to Ministry of Industry and Trade and Czech Statistical Office data

The trend in absolute indices in 2009–2013 was insignificant. The highest values were registered in 2009, followed by a decline in index values. Even though values have grown since 2011, they have not been able to reach the 2009 levels.

The trend in relative indices in 2009–2013 was very good.

Companies producing kaolin (Tab. 4), which again ranked among medium to less important mineral industries, accounted for 2.46% of the number of companies, for 4.29% of the number of employees, for 4.03% of sales, and for 3.18% of value added.

One company from CZ-NACE 23 Manufacture of other non-metallic mineral products (porcelain manufacture) was included, which lead to a higher value in sales and in the number of employees because of kaolin production being integrated with subsequent manufacturing. Unfortunately, the mining and subsequent processing operations cannot be separated. An effort was made to aquire data only on kaolin production from various sources. However the data obtained, according to which sales may hover around CZK billion 2.5, included only some companies.

In terms of relative indices, this is one of the least efficient mineral industries.

Compared to 2009, the trend in indices in 2013 was very good, with the exception of average salary.

In the case of clays and bentonite (Tab. 5), it is again impossible to separate mining from manufacturing – three companies from CZ-NACE 23 are included. These companies account for more than half of the number of employees and sales. According to sources available (which again do not include all companies), sales for the mineral itself may have hovered around CZK billion 1 in 2013.

Tab. 4: Kaolin

Indicator	Unit	2009	2010	2011	2012	2013
Number of enterprises		5	5	5	6	6
Number of employees		2 272	1 934	1 983	2 996	2 715
Sales	mill. CZK	4 530	4 357	4 688	7 034	6 907
Value added	mill. CZK	1 366	1 381	1 571	2 270	2 179
Sales per employee	ths. CZK/ employee	1 994	2 253	2 364	2 348	2 544
Mining total = 100%	*%*	*88%*	*87%*	*86%*	*89%*	*95%*
Labour productivity based value added	CZK/ employee	601 243	713 941	792 480	757 576	802 815
Mining total = 100%	*%*	*64%*	*66%*	*63%*	*66%*	*75%*
Hourly labour productivity	CZK/ working hour	355	412	460	437	474
Mining total = 100%	*%*	*63%*	*64%*	*62%*	*65%*	*74%*
Average salary	CZK/ employee	23 932	26 344	26 348	25 630	25 344
Mining total = 100%	*%*	*90%*	*93%*	*88%*	*84%*	*85%*
(Value added - salaries) per employee	CZK/ employee	577 312	687 598	766 132	731 947	777 471
Mining total = 100%	*%*	*64%*	*65%*	*62%*	*66%*	*75%*

Indexes	13/09	10/09	11/10	12/11	13/12
Number of enterprises	20%	0%	0%	20%	0%
Number of employees	19%	-15%	3%	51%	-9%
Sales	52%	-4%	8%	50%	-2%
Value added	60%	1%	14%	44%	-4%
Sales per employee	28%	13%	5%	-1%	8%
Labour productivity based value added	34%	19%	11%	-4%	6%
Hourly labour productivity	33%	16%	12%	-5%	8%
Average salary	6%	10%	0%	-3%	-1%
(Value added - salaries) per employee	35%	19%	11%	-4%	6%

Source: own calculations according to Ministry of Industry and Trade and Czech Statistical Office data

Tab. 5: Clays and bentonite

Indicator	Unit	2009	2010	2011	2012	2013
Number of enterprises		6	6	6	9	11
Number of employees		3 184	2 774	2 805	3 751	1 967
Sales	mill. CZK	5 433	5 264	5 555	8 240	4 890
Value added	mill. CZK	1 897	1 800	2 154	2 827	1 652
Sales per employee	ths. CZK/ employee	1 707	1 897	1 980	2 197	2 486
Mining total = 100%	%	*76%*	*73%*	*72%*	*83%*	*93%*
Labour productivity based value added	CZK/ employee	595 905	648 747	767 755	753 580	839 617
Mining total = 100%	%	*64%*	*60%*	*61%*	*66%*	*78%*
Hourly labour productivity	CZK/ working hour	354	374	452	440	490
Mining total = 100%	%	*63%*	*58%*	*61%*	*65%*	*77%*
Average salary	CZK/ employee	23 191	25 201	25 737	25 365	24 307
Mining total = 100%	%	*88%*	*89%*	*86%*	*83%*	*81%*
(Value added - salaries) per employee	CZK/ employee	572 714	623 545	742 017	728 214	815 310
Mining total = 100%	%	*63%*	*59%*	*60%*	*66%*	*78%*

Indexes	13/09	10/09	11/10	12/11	13/12
Number of enterprises	83%	0%	0%	50%	22%
Number of employees	-38%	-13%	1%	34%	-48%
Sales	-10%	-3%	6%	48%	-41%
Value added	-13%	-5%	20%	31%	-42%
Sales per employee	46%	11%	4%	11%	13%
Labour productivity based value added	41%	9%	18%	-2%	11%
Hourly labour productivity	38%	6%	21%	-3%	12%
Average salary	5%	9%	2%	-1%	-4%
(Value added - salaries) per employee	42%	9%	19%	-2%	12%

Source: own calculations according to Ministry of Industry and Trade and Czech Statistical Office data

In terms of absolute indices in 2013, this was again a moderately important mineral. It accounted for 4.51% of the number of companies, for 3.08% of the number of employees, for 2.85% of sales, and for 2.41% of value added.

This is again one of the least efficient mineral industries in terms of relative indices.

The trend in absolute indices in 2013 compared to 2009 was influenced by an increase in the number of companies in 2013. The trend was good until 2012, but the values of practically all indices fell sharply in 2013.

In the case of feldspar (Tab. 6), the index values also demonstrate the connection of mining with manufacturing. Two manufacturing companies from the CZ-NACE 23 sector and construction were included in 2013. These companies accounted for two-thirds of sales.

In terms of absolute indices, this is a less to moderately important mineral industry. It accounted for 2.46 % of the number of companies, for 4.64 % of the number of employees, for 3.98% of sales, and for 3.04% of value added.

This is again a less effective mineral in terms of relative indices.

The trend in absolute indices in 2013 was very positive compared to 2009.

The trend in relative indices was again very good in 2013 compared to 2009. With regard to relative and absolute indices, the best year for the mineral was 2011 and 2013, respectively.

Glass sand (Tab. 7) was the least important mineral industry in terms of absolute indices until 2012, yet the most efficient mineral with regard to relative indices with the exception of average salary. A change occurred in 2013 as a result of the inclusion of a company from CZ-NACE 23 instead of a company involved in mining. In spite of an increase in absolute values and a drop in relative values, this was still a good mineral industry.

Tab. 6: Feldspar

Indicator	Unit	2009	2010	2011	2012	2013
Number of enterprises		4	4	4	4	6
Number of employees		2 358	1 996	1 995	1 940	2 971
Sales	mill. CZK	4 327	4 117	4 391	4 275	6 834
Value added	mill. CZK	1 343	1 333	1 480	1 358	2 082
Sales per employee	ths. CZK/ employee	1 835	2 062	2 201	2 204	2 300
Mining total = 100%	*%*	*81%*	*80%*	*80%*	*83%*	*86%*
Labour productivity based value added	CZK/ employee	569 572	667 789	741 752	700 403	700 555
Mining total = 100%	*%*	*61%*	*62%*	*59%*	*61%*	*65%*
Hourly labour productivity	CZK/ working hour	333	383	426	402	409
Mining total = 100%	*%*	*59%*	*59%*	*57%*	*60%*	*64%*
Average salary	CZK/ employee	23 734	26 149	26 120	25 496	25 865
Mining total = 100%	*%*	*90%*	*92%*	*87%*	*84%*	*87%*
(Value added - salaries) per employee	CZK/ employee	545 838	641 640	715 632	674 906	674 689
Mining total = 100%	*%*	*60%*	*61%*	*58%*	*61%*	*65%*

Indexes	13/09	10/09	11/10	12/11	13/12
Number of enterprises	50%	0%	0%	0%	50%
Number of employees	26%	-15%	0%	-3%	53%
Sales	58%	-5%	7%	-3%	60%
Value added	55%	-1%	11%	-8%	53%
Sales per employee	25%	12%	7%	0%	4%
Labour productivity based value added	23%	17%	11%	-6%	0%
Hourly labour productivity	23%	15%	11%	-6%	2%
Average salary	9%	10%	0%	-2%	1%
(Value added - salaries) per employee	24%	18%	12%	-6%	0%

Source: own calculations according to Ministry of Industry and Trade and Czech Statistical Office data

Tab. 7: Glass sand

Indicator	Unit	2009	2010	2011	2012	2013
Number of enterprises		3	3	3	3	3
Number of employees		144	141	147	142	953
Sales	mill. CZK	627	665	656	660	2 730
Value added	mill. CZK	274	291	302	316	1 034
Sales per employee	ths. CZK/ employee	4 340	4 725	4 460	4 632	2 863
Mining total = 100%	*%*	*193%*	*182%*	*162%*	*175%*	*107%*
Labour productivity based value added	CZK/ employee	1 893 071	2 072 001	2 050 514	2 220 664	1 084 252
Mining total = 100%	*%*	*202%*	*191%*	*162%*	*195%*	*101%*
Hourly labour productivity	CZK/ working hour	1 132	1 220	1 231	1 290	637
Mining total = 100%	*%*	*202%*	*188%*	*166%*	*192%*	*100%*
Average salary	CZK/ employee	32 077	33 378	34 294	36 028	27 692
Mining total = 100%	*%*	*121%*	*118%*	*114%*	*119%*	*93%*
(Value added - salaries) per employee	CZK/ employee	1 860 994	2 038 623	2 016 220	2 184 636	1 056 560
Mining total = 100%	*%*	*205%*	*193%*	*164%*	*197%*	*102%*

Indexes	13/09	10/09	11/10	12/11	13/12
Number of enterprises	0%	0%	0%	0%	0%
Number of employees	560%	-3%	5%	-3%	570%
Sales	335%	6%	-1%	0%	314%
Value added	278%	7%	4%	5%	227%
Sales per employee	-34%	9%	-6%	4%	-38%
Labour productivity based value added	-43%	9%	-1%	8%	-51%
Hourly labour productivity	-44%	8%	1%	5%	-51%
Average salary	-14%	4%	3%	5%	-23%
(Value added - salaries) per employee	-43%	10%	-1%	8%	-52%

Source: own calculations according to Ministry of Industry and Trade and Czech Statistical Office data

Tab. 8: Foundry sand

Indicator	Unit	2009	2010	2011	2012	2013
Number of enterprises		4	3	3	3	11
Number of employees		1 059	761	778	725	2 640
Sales	mill. CZK	1 830	1 682	1 681	1 638	5 971
Value added	mill. CZK	832	679	776	733	2 195
Sales per employee	ths. CZK/ employee	1 728	2 209	2 160	2 258	2 262
Mining total = 100%	%	*77%*	*85%*	*78%*	*85%*	*84%*
Labour productivity based value added	CZK/ employee	785 125	892 290	996 579	1 011 319	831 377
Mining total = 100%	%	*84%*	*82%*	*79%*	*89%*	*78%*
Hourly labour productivity	CZK/ working hour	479	518	607	610	492
Mining total = 100%	%	*85%*	*80%*	*82%*	*91%*	*77%*
Average salary	CZK/ employee	23 205	26 129	27 927	27 922	26 265
Mining total = 100%	%	*88%*	*92%*	*93%*	*92%*	*88%*
(Value added - salaries) per employee	CZK/ employee	761 920	866 161	968 652	983 397	805 112
Mining total = 100%	%	*84%*	*82%*	*79%*	*89%*	*77%*

Indexes	13/09	10/09	11/10	12/11	13/12
Number of enterprises	175%	-25%	0%	0%	267%
Number of employees	149%	-28%	2%	-7%	264%
Sales	226%	-8%	0%	-3%	265%
Value added	164%	-18%	14%	-5%	199%
Sales per employee	31%	28%	-2%	5%	0%
Labour productivity based value added	6%	14%	12%	1%	-18%
Hourly labour productivity	3%	8%	17%	0%	-19%
Average salary	13%	13%	7%	0%	-6%
(Value added - salaries) per employee	6%	14%	12%	2%	-18%

Source: own calculations according to Ministry of Industry and Trade and Czech Statistical Office data

Because of the inclusion of the company from CZ-NACE 23, the absolute values soared in the 2013/2009 index and the values of relative indices fell sharply.

As in the case of glass sand, foundry sand (Tab. 8) was similarly influenced by the inclusion of five manufacturing companies, which in terms of absolute indices reflected a very positive trend in the 2013/2012 indices and a negative trend in the values of relative indices. However, the trend in indices in 2009–2012 was not good.

With regard to efficiency in 2013, this was a significantly less effective mineral industry compared to glass sand, the second least effective mineral regarding sales per employee, and third worst in labour productivity.

Limestone and corrective additives for cement production, and dolomite (Tab. 9) are industries that are highly integrated with manufacturing, specifically with CZ-NACE 23, 24 (chemical industry) and construction.

In 2013, these were rather moderately important mineral industries in terms of absolute indices. They accounted for a 7.79% share of the Mining total with regard to the number of companies, for 3.11% of the number of employees, for 3.77% of sales, and for 2.66% of value added.

The levels of relative indices in 2009-2012 were good. In 2013, the values of relative indices fell below the Mining total average with the exception of sales per employee.

The trend in sales is very unfavourable. These minerals are linked primarily to construction output. Construction is constantly declining. However, the decline in construction output is greater. Key subsequent manufacturing operations connected with these minerals (e.g. cement production) are probably optimizing production not only according to Czech demand.

Tab. 9: Limestone and corrective additives for cement production and dolomite

Indicator	Unit	2009	2010	2011	2012	2013
Number of enterprises		14	14	14	14	19
Number of employees		2 529	2 397	2 356	2 294	1 988
Sales	mill. CZK	10 032	9 144	9 549	8 936	6 460
Value added	mill. CZK	3 926	3 273	3 445	2 984	1 819
Sales per employee	ths. CZK/ employee	3 967	3 815	4 054	3 896	3 250
Mining total = 100%	*%*	*176%*	*147%*	*147%*	*147%*	*121%*
Labour productivity based value added	CZK/ employee	1 552 549	1 365 593	1 462 613	1 300 964	915 157
Mining total = 100%	*%*	*166%*	*126%*	*116%*	*114%*	*86%*
Hourly labour productivity	CZK/ working hour	895	779	843	740	513
Mining total = 100%	*%*	*159%*	*120%*	*114%*	*110%*	*81%*
Average salary	CZK/ employee	29 482	30 032	30 729	30 437	26 259
Mining total = 100%	*%*	*111%*	*106%*	*103%*	*100%*	*88%*
(Value added - salaries) per employee	CZK/ employee	1 523 067	1 335 561	1 431 884	1 270 527	888 898
Mining total = 100%	*%*	*168%*	*127%*	*116%*	*114%*	*85%*

Indexes	13/09	10/09	11/10	12/11	13/12
Number of enterprises	36%	0%	0%	0%	36%
Number of employees	-21%	-5%	-2%	-3%	-13%
Sales	-36%	-9%	4%	-6%	-28%
Value added	-54%	-17%	5%	-13%	-39%
Sales per employee	-18%	-4%	6%	-4%	-17%
Labour productivity based value added	-41%	-12%	7%	-11%	-30%
Hourly labour productivity	-43%	-13%	8%	-12%	-31%
Average salary	-11%	2%	2%	-1%	-14%
(Value added - salaries) per employee	-42%	-12%	7%	-11%	-30%

Source: own calculations according to Ministry of Industry and Trade and Czech Statistical Office data

A bad sign for these minerals are the continuous cutbacks in state-funded construction projects.

In 2013, dimension stone (Tab. 10) included nine new companies, specifically from the manufacturing and construction sectors. The operations of these companies are integrated with mining.

This is the least important mineral industry in terms of the number of employees (1.41%), sales (1.47%) and value added (1.38%).

With regard to relative indices, dimension stone is the least efficient mineral industry. This industry includes many small companies that are not classified. According to expert estimates, the economic efficiency would improve slightly if these companies were included.

With regard to indices for the 2013/2009 period, this was the best mineral industry, probably due to the addition of new mining companies.

The crushed stone (Tab. 11) industry accounts for the highest number of companies (30.67 % of the total), and ranks decently in the number of employees (13.01%), sales (11.27%) and value added (12.72%).

In terms of relative indices, it hovers around the average of the Mining total.

With regard to absolute values, this mineral industry grew until 2011 and then declined. On the other hand with regard to relative indices in 2013 compared to 2009, it registered sharp growth in labour productivity (Value added per employee), decent growth in average salary and hourly labour productivity, and growth in sales per employee.

This is again a mineral industry with a high number of small companies. Our selection includes larger companies. We do not have data for small companies.

Tab. 10: Dimension stone

Indicator	Unit	2009	2010	2011	2012	2013
Number of enterprises		13	12	12	12	21
Number of employees		641	594	575	565	900
Sales	mill. CZK	560	560	483	517	2 519
Value added	mill. CZK	278	271	239	263	944
Sales per employee	ths. CZK/ employee	874	943	841	915	2 798
Mining total = 100%	*%*	*39%*	*36%*	*30%*	*35%*	*104%*
Labour productivity based value added	CZK/ employee	433 673	457 050	415 169	465 932	1 048 139
Mining total = 100%	*%*	*46%*	*42%*	*33%*	*41%*	*98%*
Hourly labour productivity	CZK/ working hour	246	262	234	266	607
Mining total = 100%	*%*	*44%*	*41%*	*32%*	*40%*	*95%*
Average salary	CZK/ employee	21 979	22 805	22 988	23 710	28 476
Mining total = 100%	*%*	*83%*	*81%*	*77%*	*78%*	*95%*
(Value added - salaries) per employee	CZK/ employee	411 694	434 244	392 180	442 222	1 019 663
Mining total = 100%	*%*	*45%*	*41%*	*32%*	*40%*	*98%*

Indexes	13/09	10/09	11/10	12/11	13/12
Number of enterprises	62%	-8%	0%	0%	75%
Number of employees	40%	-7%	-3%	-2%	59%
Sales	350%	0%	-14%	7%	387%
Value added	239%	-2%	-12%	10%	258%
Sales per employee	220%	8%	-11%	9%	206%
Labour productivity based value added	142%	5%	-9%	12%	125%
Hourly labour productivity	146%	6%	-11%	14%	128%
Average salary	30%	4%	1%	3%	20%
(Value added - salaries) per employee	148%	5%	-10%	13%	131%

Source: own calculations according to Ministry of Industry and Trade and Czech Statistical Office data

Tab. 11: Crushed stone

Indicator	Unit	2009	2010	2011	2012	2013
Number of enterprises		67	60	61	61	75
Number of employees		9 959	9 010	8 430	8 228	8 323
Sales	mill. CZK	17 622	18 348	20 327	19 542	19 328
Value added	mill. CZK	6 351	7 758	10 645	10 692	8 704
Sales per employee	ths. CZK/ employee	1 770	2 036	2 411	2 375	2 322
Mining total = 100%	*%*	*78%*	*79%*	*87%*	*90%*	*87%*
Labour productivity based value added	CZK/ employee	637 762	861 074	1 262 679	1 299 436	1 045 686
Mining total = 100%	*%*	*68%*	*80%*	*100%*	*114%*	*98%*
Hourly labour productivity	CZK/ working hour	412	496	711	735	612
Mining total = 100%	*%*	*73%*	*77%*	*96%*	*109%*	*96%*
Average salary	CZK/ employee	20 224	24 219	25 662	26 426	29 232
Mining total = 100%	*%*	*76%*	*86%*	*86%*	*87%*	*98%*
(Value added - salaries) per employee	CZK/ employee	617 538	836 854	1 237 017	1 273 010	1 016 454
Mining total = 100%	*%*	*68%*	*79%*	*100%*	*115%*	*98%*

Indexes	13/09	10/09	11/10	12/11	13/12
Number of enterprises	12%	-10%	1%	0%	23%
Number of employees	-16%	-10%	-6%	-2%	1%
Sales	10%	4%	11%	-4%	-1%
Value added	37%	22%	37%	0%	-19%
Sales per employee	31%	15%	18%	-2%	-2%
Labour productivity based value added	64%	35%	47%	3%	-20%
Hourly labour productivity	49%	20%	43%	3%	-17%
Average salary	45%	20%	6%	3%	11%
(Value added - salaries) per employee	65%	36%	48%	3%	-20%

Source: own calculations according to Ministry of Industry and Trade and Czech Statistical Office data

Sand and gravel (Tab. 12) is an industry that accounts for the second highest number of companies (21.33% of the total in 2012). It ranked first in terms of other absolute indices, accounting for 17.71% (second-best) of the number of employees, for 18.23% (first) of sales, and for 22.54% (second-best) of value added in 2013. The relative index levels in 2013 were predominantly above-average.The sharp increase in sales in 2013 is due to a "change" in companies involved in mineral processing, from purely mining-oriented companies (lacking data for 2013) to those integrated with manufacturing (whose data was not available until 2013). However, a fact that remains is that the purely mining-oriented companies were swallowed up by subsequent manufacturing operations (primarily construction).

This mineral industry again had a high number of small companies (whose data are not available).

Brick clays and related minerals (Tab. 13) is one of the smaller mineral industries (3.83 % of sales in 2013, etc.).

In terms of relative indices, it ranks second best in labour productivity (Value added per employee). The problem is that this is again an industry with integrated mining and subsequent manufacturing operations, making it impossible to separate both items. This is evident when compared to the Mining total, as sales per employee were highly above-average in 2009–2012 and above-average in 2013.

In terms of the average growth rates of absolute indices, this mineral industry registered high growth during the 2013/2009 period. On the other hand, relative indices declined sharply.

Tab. 12: Sand and gravel

Indicator	Unit	2009	2010	2011	2012	2013
Number of enterprises		56	53	53	51	52
Number of employees		4 636	4 482	4 343	4 134	11 328
Sales	mill. CZK	13 142	12 972	12 867	11 937	31 272
Value added	mill. CZK	5 040	4 555	4 561	3 980	15 425
Sales per employee	ths. CZK/ employee	2 835	2 895	2 963	2 888	2 761
Mining total = 100%	*%*	*126%*	*112%*	*107%*	*109%*	*103%*
Labour productivity based value added	CZK/ employee	1 087 136	1 016 338	1 050 103	962 880	1 361 677
Mining total = 100%	*%*	*116%*	*94%*	*83%*	*84%*	*127%*
Hourly labour productivity	CZK/ working hour	535	585	593	548	788
Mining total = 100%	*%*	*95%*	*90%*	*80%*	*81%*	*124%*
Average salary	CZK/ employee	30 651	27 016	27 468	28 169	29 343
Mining total = 100%	*%*	*116%*	*95%*	*92%*	*93%*	*98%*
(Value added - salaries) per employee	CZK/ employee	1 056 485	989 322	1 022 634	934 711	1 332 334
Mining total = 100%	*%*	*116%*	*94%*	*83%*	*84%*	*128%*

Indexes	13/09	10/09	11/10	12/11	13/12
Number of enterprises	-7%	-5%	0%	-4%	2%
Number of employees	144%	-3%	-3%	-5%	174%
Sales	138%	-1%	-1%	-7%	162%
Value added	206%	-10%	0%	-13%	288%
Sales per employee	-3%	2%	2%	-3%	-4%
Labour productivity based value added	25%	-7%	3%	-8%	41%
Hourly labour productivity	47%	9%	1%	-8%	44%
Average salary	-4%	-12%	2%	3%	4%
(Value added - salaries) per employee	26%	-6%	3%	-9%	43%

Source: own calculations according to Ministry of Industry and Trade and Czech Statistical Office data

Tab. 13: Brick clays and related minerals

Indicator	Unit	2009	2010	2011	2012	2013
Number of enterprises		8	8	8	7	13
Number of employees		1 011	903	827	803	2 215
Sales	mill. CZK	3 463	2 941	3 406	3 097	6 579
Value added	mill. CZK	1 047	597	734	527	1 835
Sales per employee	ths. CZK/ employee	3 427	3 257	4 119	3 856	2 971
Mining total = 100%	%	*152%*	*126%*	*149%*	*146%*	*111%*
Labour productivity based value added	CZK/ employee	1 036 526	661 356	887 985	656 684	828 739
Mining total = 100%	%	*111%*	*61%*	*70%*	*58%*	*77%*
Hourly labour productivity	CZK/ working hour	615	380	506	376	490
Mining total = 100%	%	*109%*	*59%*	*68%*	*56%*	*77%*
Average salary	CZK/ employee	25 510	25 988	28 271	29 673	27 431
Mining total = 100%	%	*96%*	*92%*	*94%*	*98%*	*92%*
(Value added - salaries) per employee	CZK/ employee	1 011 015	635 368	859 714	627 010	801 308
Mining total = 100%	%	*111%*	*60%*	*70%*	*57%*	*77%*

Indexes	13/09	10/09	11/10	12/11	13/12
Number of enterprises	63%	0%	0%	-13%	86%
Number of employees	119%	-11%	-8%	-3%	176%
Sales	90%	-15%	16%	-9%	112%
Value added	75%	-43%	23%	-28%	248%
Sales per employee	-13%	-5%	26%	-6%	-23%
Labour productivity based value added	-20%	-36%	34%	-26%	26%
Hourly labour productivity	-20%	-38%	33%	-26%	30%
Average salary	8%	2%	9%	5%	-8%
(Value added - salaries) per employee	-21%	-37%	35%	-27%	28%

Source: own calculations according to Ministry of Industry and Trade and Czech Statistical Office data

Tab. 14: Other minerals (uranium + crude oil + graphite + gemstones + silica minerals + gypsum)

Indicator	Unit	2009	2010	2011	2012	2013
Number of enterprises		8	12	11	10	13
Number of employees		5 100	5 299	5 284	5 350	6 746
Sales	mill. CZK	9 078	9 386	9 475	13 199	23 587
Value added	mill. CZK	1 181	3 044	3 321	3 996	6 821
Sales per employee	ths. CZK/ employee	1 780	1 771	1 793	2 467	3 496
Mining total = 100%	%	*79%*	*68%*	*65%*	*93%*	*130%*
Labour productivity based value added	CZK/ employee	231 568	574 370	628 366	746 998	1 011 101
Mining total = 100%	%	*25%*	*53%*	*50%*	*66%*	*95%*
Hourly labour productivity	CZK/ working hour	142	396	376	448	613
Mining total = 100%	%	*25%*	*61%*	*51%*	*67%*	*96%*
Average salary	CZK/ employee	24 674	22 860	28 035	29 273	28 664
Mining total = 100%	%	*93%*	*81%*	*94%*	*96%*	*96%*
(Value added - salaries) per employee	CZK/ employee	206 894	551 510	600 332	717 724	982 437
Mining total = 100%	%	*23%*	*52%*	*49%*	*65%*	*94%*

Indexes	13/09	10/09	11/10	12/11	13/12
Number of enterprises	63%	50%	-8%	-9%	30%
Number of employees	32%	4%	0%	1%	26%
Sales	160%	3%	1%	39%	79%
Value added	478%	158%	9%	20%	71%
Sales per employee	96%	0%	1%	38%	42%
Labour productivity based value added	337%	148%	9%	19%	35%
Hourly labour productivity	333%	180%	-5%	19%	37%
Average salary	16%	-7%	23%	4%	-2%
(Value added - salaries) per employee	375%	167%	9%	20%	37%

Source: own calculations according to Ministry of Industry and Trade and Czech Statistical Office data

Because there were only few companies in the other mineral sectors, it is impossible to publish data on them. Therefore they were aggregated into the *Other minerals* group (Tab. 14). It includes production of uranium, crude oil, natural gas, graphite, gemstones, diatomite, silica minerals and gypsum. To comment on such a diverse group is problematic. It contains very efficient mineral industries (crude oil, natural gas), but also very problematic ones (uranium) due to near-zero or intermittent mining.

Outline of domestic mine production

		2009	2010	2011	2012	2013
Energy minerals						
Uranium	t U	286	259	252	222	232
	Concentrate production, t U [1]	243	237	216	219	206
Bituminous coal	kt	10 621	11 193	10 967	10 796	8 610
Brown coal	kt [2]	45 354	43 931	46 848	43 710	40 585
Lignite	kt	262	0	0	0	0
Crude oil	kt	217	173	163	150	152
Natural gas	mil m^3	180	201	187	204	207
Industrial minerals						
Graphite	kt	3	0	0	0	0
Pyrope bearing rock	kt	26	23	17	12	16
Moldavite (tectite) bearing rock	ths m^3	58	57	65	41	41
	kt (1 m^3 = 1.8 kt)	104	103	117	74	74
Kaolin	Raw, kt [3]	2 886	3 493	3 606	3 318	3 108
	Beneficiated, kt	488	636	660	624	609
Clays	kt	377	429	499	485	465
Bentonite [4]	kt	177	183	160	221	226
Diatomite	kt	0	32	46	43	49
Feldspar	kt	431	388	407	445	411
Feldspar substitutes	kt	23	19	22	15	15
Silica minerals	kt	16	14	24	17	15
Glass sand	kt	990	888	976	849	862
Foundry sand	kt	374	473	395	491	412
Limestones and corrective additives for cement production	kt	9 488	9 828	11 244	9 858	9 605
Dolomite	kt	337	385	369	440	392
Gypsum	kt	13	5	11	14	11
Construction minerals						
Dimension stone	Mine production in reserved deposits, ths m^3 [5]	209	262	192	138	140
	Mine production in reserved deposits, kt (1 m^3 = 2.7 kt) [5]	564	707	518	374	378
	Mine production in non-reserved deposits, ths m^3 [6]	54	43	46	44	31
	Mine production in reserved deposits, kt (1 m^3 = 2.7 kt) [6]	146	116	130	130	84
Crushed stone	Mine production in reserved deposits, ths m^3 [5]	13 947	12 350	12 299	10 950	11 420
	Mine production in reserved deposits, kt (1 m^3 = 2.7 kt) [5]	37 657	33 350	33 207	29 565	30 384
	Mine production in non-reserved deposits, ths m^3 [6]	1 350	1 450	1 300	1 100	970
	Mine production in non-reserved deposits, kt (1 m^3 = 2.7 kt) [6]	3 650	3 920	3 510	2 970	2 620
Sand and gravel	Mine production in reserved deposits, ths m^3 [5]	7 269	6 187	6 902	6 136	5 346
	Mine production in reserved deposits, kt (1 m^3 = 1.8 kt) [5]	13 084	11 140	12 424	11 045	9 623
	Mine production in non-reserved deposits, ths m^3 [6]	6 050	4 500	5 000	4 300	4 300
	Mine production in non-reserved deposits, kt (1 m^3 = 1.8 kt) [6]	10 890	8 100	9 000	7 740	7 740
Brick clays and related minerals	Mine production in reserved deposits, ths m^3 [5]	1 028	838	932	852	743
	Mine production in reserved deposits, kt (1 m^3 = 1.8 kt) [5]	1 850	1 508	1 678	1 534	1 337
	Mine production in non-reserved deposits, ths m^3 [6]	203	182	147	176	140
	Mine production in non-reserved deposits, kt (1 m^3 = 1.8 kt) [6]	365	328	265	317	252
Metallic ores (not mined)						

[1] corresponds to sales production (without beneficiation losses)
[2] ČSÚ (Czech Statistical Office) presents so-called sales mining production which is production of marketable brown coal and reaches on average about 95 % of given mine production
[3] raw kaolin, total production of all technological grades
[4] including mining of montmorillonite clays overburden of kaolins since 2004
[5] decrease of mineral reserves by mining production
[6] estimate

Domestic share in the world mine production

			2009	2010	2011	2012	2013
Energy minerals							
Uranium (U)		world: WNA	0.56 %	0.48 %	0.47 %	0.38 %	0.39 %
Bituminous coal		world: EIA, BP	0.18 %	0.18 %	0.16 %	0.16 %	0.12 %
Brown coal + Lignite		world: EIA, BP	5.30 %	5.10 %	5.14 %	4.83 %	4.83 %
Crude oil		world: WBD, BP	0.006 %	0.004 %	0.004 %	0.004 %	0.004 %
Natural gas		world: BP	0.006 %	0.006 %	0.006 %	0.006 %	0.005 %
Industrial minerals							
Graphite		world: WBD, MCS	–	–	–	–	–
Gemstones	Pyrope bearing rock	N	N	N	N	N	N
	Moldavite (tectite) bearing rock	N	N	N	N	N	N
Kaolin		world: MCS	9.43 %	10.27 %	10.64 %	9.76 %	8.40 %
Clays			N	N	N	N	N
Bentonite		world: MCS	1.81 %	1.83 %	1.55 %	2.21 %	2.19 %
Diatomite		world: MCS	–	1.75 %	2.19 %	2.05 %	2.28 %
Feldspar		world: MCS	2.28 %	1.94 %	1.92 %	2.34 %	1.79 %
Feldspar substitutes			N	N	N	N	N
Glass + Foundry sand		world: MCS	1.22 %	1.26 %	0.99 %	0.96 %	0.90 %
Limestones and corrective additives for cement production		world: MCS *	0.28 %	0.28 %	0.26 %	0.23 %	0.20 %
Dolomite			N	N	N	N	N
Gypsum		world: MCS	0.01 %	0.003 %	0.01 %	0.01 %	0.01 %
Construction minerals							
			N	N	N	N	N
Metallic ores (not mined)							

* *calculation based on lime and cement production. 2 t of limestone = 1 t of lime or 2 t of cement*

ENVIRONMENT AND MINERALS

Mining and nature protection

1,496 reserved and 854 non-reserved mineral deposits were registered in the Czech Republic as of December 31, 2013. The number of exploited deposits was markedly lower – 502 reserved and 203 non-reserved. Only 39 reserved and 15 non-reserved deposits were mined in the specially nature protected areas, which represents 7.8% and 7.4% of the total number, respectively.

Act No 114/1992 Sb. on nature and landscape protection in its present wording regulates activities in specially protected areas (ZCHÚ) of the Czech Republic (national parks – NP (Národní park), protected landscape areas – CHKO (Chráněná krajinná oblast), national nature reserves, nature reserves, national nature monuments and nature monuments). According to this Act, all mineral mining (section 16) in national parks (with exception of crushed stone and sand mining for construction in the territory of the national park), in the first zone of protected landscape areas (section 26) and in national nature reserves (section 29) is prohibited. Although the mining of mineral resources is not prohibited by law in other areas (2nd to 4th zones of the CHKO, nature reserves, national nature monuments and nature monuments), it is very difficult to obtain authorization. Legal regulations which mention prohibition of the "permanent damage of the soil surface" are the main reason – and they practically exclude mineral mining. A further reason is the civil activity in the field of environmental protection.

Mineral deposits are mined, and were in the past mined, in the CHKO in majority of cases where the mining claims were already determined before these CHKO were established. Mining in the CHKO declined after 1989 till 2002, after it rather grows till 2008 and after declines and stagnates respectively namely of registered deposits, which follows from the data in the table "Mining of reserved and non-reserved mineral deposits in CHKO" below and also from the fact that reserved deposits were mined in 19 from 25 CHKO in 2007 and 2008 (see the table "Mining of reserved and non-reserved mineral deposits in individual CHKO") compared to 17 from 25 CHKO in 2006. Deposits were mined only in 16 CHKO in 2009 and 2010 and in 14 CHKO in 2011 till 2013.

Specially protected areas (ZCHÚ) in the Czech Republic

Number/Year	2009	2010	2011	2012	2013
Total number	2 247	2 267	2 301	2 338	2 421
National parks (NP)	4	4	4	4	4
Protected landscape areas (CHKO)	25	25	25	25	25
Others	2 218	2 238	2 272	2 309	2 392

Source: AOPK ČR (2014)

Structure of ZCHÚ in 2013

Category of specially protected areas	Number	Area (km^2)	Proportion on the territory of the Czech Republic 78 864 km^2 (%)
LARGE-EXTENT ZCHÚ:			
National parks (NP) – mining explicitly prohibited	4	1 195	1.52
Protected landscape areas (CHKO)	25	10 867	13.78
– (in them the 1st zones of CHKO where mining is explicitly prohibited)	25	871	1.10
ZCHÚ with mining explicitly prohibited by the Act No. 114/1992 Sb.	29	2 066	2.62
SMALL-EXTENT ZCHÚ:			
National nature monuments (NPP)	113	45	0.06
National nature reserve (NPR)	110	281	0.36
Nature monuments (PP)	1 360	273	0.35
Nature reserves (PR)	809	412	0.52
NPP, NPR, PP, PR	2 392	1 011	1.28
– (from them NPP, NPR, PP, PR on the area of NP, CHKO)	740	520	0.67
LARGE-EXTENT AND SMALL-EXTENT ZCHÚ – total	**2 421**	**12 554**	**15.92**

Source: AOPK ČR (2014)

Mining of reserved and non-reserved mineral deposits in CHKO, kt

mineral	Reserved deposits					Non-reserved deposits				
	2009	2010	2011	2012	2013	2009	2010	2011	2012	2013
Gemstones*	26	23	17	12	16	–	–	–	–	–
Crude oil	0	0,5	0	0	0	–	–	–	–	–
Natural gas**	6	4,4	0	2	0	–	–	–	–	–
Quartz sand	0,9	0	0	0	0	–	–	–	–	–
Feldspar	230	214	240	286	279	–	–	–	–	–
Limestone	3 283	3 384	3 033	3 501	3 278	–	–	–	–	–
Dimension stone**	46	42	55	54	41	2	1	3	3	2
Crushed stone**, ***	3 941	3 027	3 146	2 685	3 041	94	67	586	219	173
Sand and gravel**	1 175	1 133	1 206	1046	980	40	45	36	43	28
Brick clay**	0	0	0	0	0	0	0	0	0	0
Total	8 708	7 827	7 697	7 586	7 636	136	113	625	265	203
Index, 1990=100	54	48	48	47	48	–	–	–	–-	–-
Index, 2000=100	–	–	–	–-	–	44	36	202	85	66

** pyrope bearing rocks, ** conversion to kt: natural gas (1,000,000 m^3 = 1 kt), dimension and crushed stone (1,000 m^3 = 2.7 kt), sand and gravel and brick clays (1,000 m^3 = 1.8 kt), *** increase in mine production of non-reserved crushed stone deposits in 2011 is caused by increase in production of non-reserved part of Měrunice deposit at the expense of its reserved one*

Mining of reserved and non-reserved mineral deposits in individual CHKO, kt*

Name of CHKO	2009	2010	2011	2012	2013
Beskydy Mts.	64	71	117	63	30
Bílé Karpaty Mts.	490	260	186	220	170
Blaník	0	0	0	0	0
Blanský les	490	604	516	536	663
Broumov region	145	110	100	104	149
České středohoří Mts.	1 788	1 142	1 383	1 231	1 439
Český kras (Bohemian Karst)	3 357	3 405	3 016	3 360	3 375
Český les Mts.	0	0	0	0	0
Český ráj	0	0	0	0	0
Jeseníky Mts.	138	103	103	136	94
Jizerské hory Mts.	0	0	0	0	0
Kokořín region	0	0	0	0	0
Křivoklát region	432	355	381	250	234
Labské pískovce (Elbe sandstones)	0	0	0	0	0
Litovelské Pomoraví region	54	7	0	0	0
Lužické hory Mts.	8	9	0	5	8
Moravský kras (Moravian Karst)	168	178	201	289	31
Orlické hory Mts.	0	0	0	0	0
Pálava region	0	0	0	0	0
Poodří region	0	0	0	0	0
Slavkovský les region	129	119	148	154	160
Šumava Mts.	78	70	78	54	63
Třeboň region	1 241	1 243	1 298	1 196	1 130
Žďárské vrchy Mts.	131	130	130	130	131
Železné hory Mts.	130	135	132	123	162
Total mine production (rounded)	**8 843**	**7 941**	**7 789**	**7 851**	**7 839**

As far as the impact of mining on the area is concerned, the CHKO Český kras (Bohemian Karst – limestone mining) is especially unfavourably affected. The impact on some other CHKO, especially CHKO Třeboň region, Poodří, České středohoří Mts., Blanský les and Moravský kras (Moravian Karst) is still rather high (see Tab. “Impact of mining of reserved deposits in CHKO”).

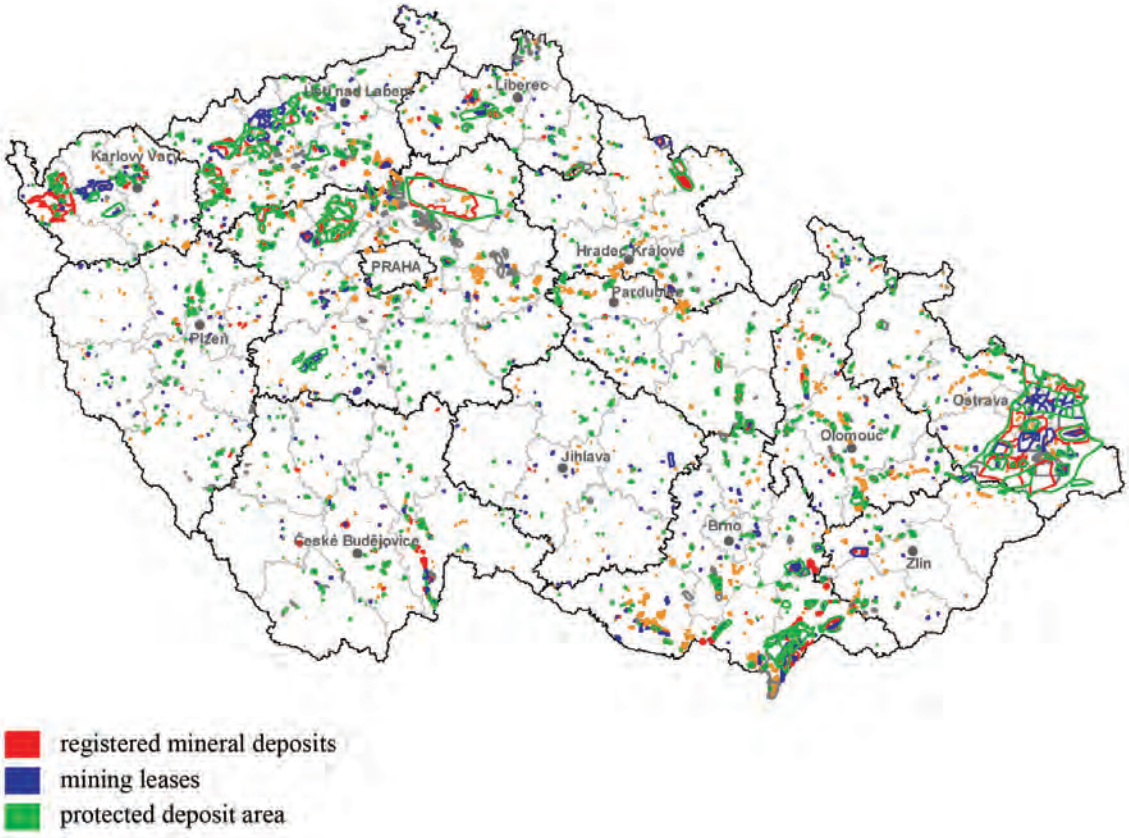
Impact of mining of reserved deposits in CHKO, t/km² in a year (areas of CHKO as of December 31)

Name of CHKO	area km² in 2013	2009	2010	2011	2012	2013
Beskydy Mts.	1 160	55	61	22	23	12
Bílé Karpaty Mts.	715	685	364	260	308	238
Blaník	40	0	0	0	0	0
Blanský les	212	2 311	2 849	2 434	2528	3 122
Broumov region	410	354	268	244	224	351
České středohoří Mts.	1 070	1 671	1 067	1 293	993	1 226
Český kras (Bohemian Karst)	132	25 432	25 795	22 848	25 288	25 485
Český les Mts.	473	0	0	0	0	0
Český ráj	182	0	0	0	0	0
Jeseníky Mts.	740	186	139	139	184	127
Jizerské hory Mts.	350	0	0	0	0	0
Kokořín region	270	0	0	0	0	0
Křivoklát region	630	686	563	605	390	365
Labské pískovce (Elbe sandstones)	245	0	0	0	0	0
Litovelské Pomoraví	96	563	73	0	0	0
Lužické hory Mts.	270	30	33	0	0	0
Moravský kras (Moravian Karst)	92	1 826	1 935	2 185	3 141	337
Orlické hory Mts.	200	0	0	0	0	0
Pálava region	70	0	0	0	0	0
Poodří region	82	0	0	0	0	0
Slavkovský les	640	202	186	231	241	250
Šumava Mts. (CHKO + NP)	1 684	46	42	46	32	37
Třeboň region	700	1 773	1 776	1 854	1 683	1 570
Žďárské vrchy Mts.	715	183	182	182	182	182
Železné hory Mts.	380	342	355	347	323	426
TOTAL (total mining/total area)	**11 558**	**814**	**731**	**666**	**656**	**661**

Note: an impact exceeding 10,000 t/km² in a year is regarded as critical

It is possible to get a clearer picture of mining activities in the Czech Republic from following map.

As well as the Act No. 114/1992 Sb. on nature and landscape protection, Act No. 100/2001 Sb. on environmental impact assessment and the Decree of the MŽP No. 175/2006 Sb. (formerly



Mining activities charge of the Czech Republic territory

No. 395/1992 Sb.), by which some provisions of the Act No. 114/1992 Sb. are applied, have a fundamental influence on permission for exploration and mining.

The Mining Act No. 44/1988 Sb. obliges the mining companies by its section 31 to reclaim the areas with mining impacts and to create financial means for this reclamation. These are considered as mining costs from the viewpoint of the profit tax. Table "Development of reclamations after mining" shows that the areas with mining impact decreased and those reclaimed increased in 2009–2013.

Methods of reclamation used in 2013 are shown in the table "Reclamation after mining of reserved minerals in 2013".

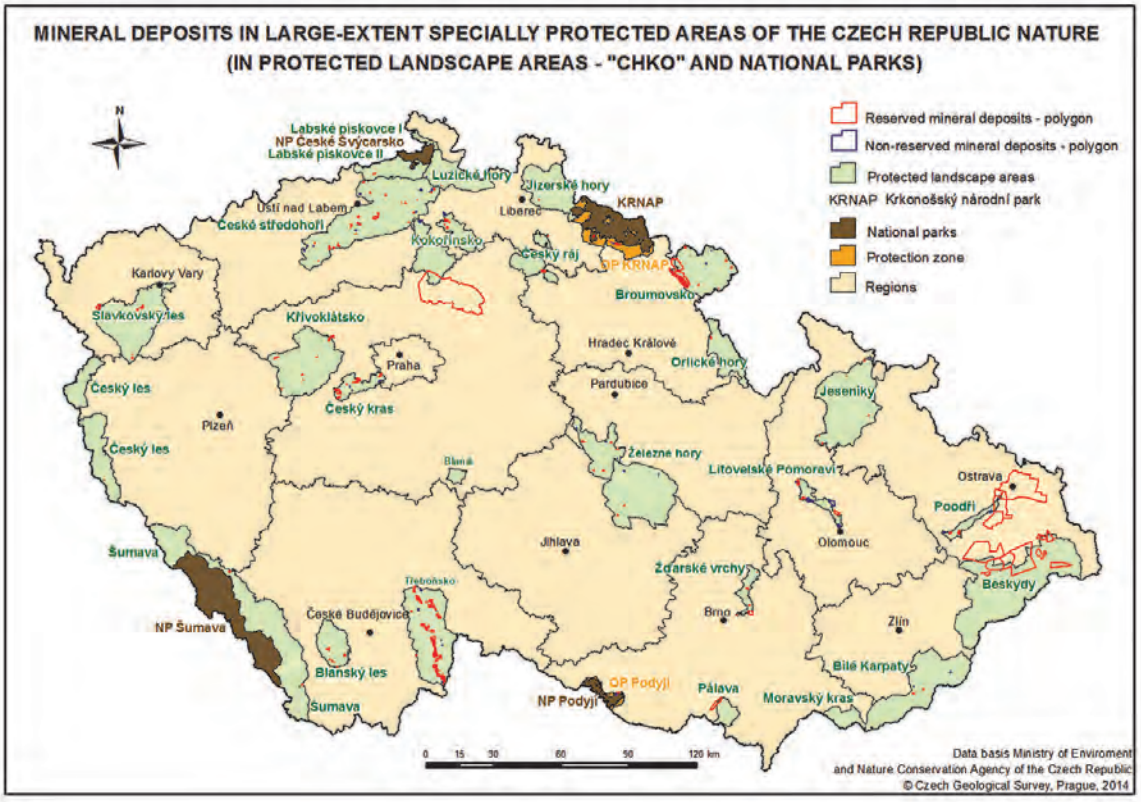
Development of reclamations after mining

	km²	2009	2010	2011	2012	2013
Reserved deposits	Area with manifestation of mining, not yet reclaimed	642	551	538	521	529
	Reclamations in process	115	105	109	95	93
	Reclamations finished since the start of mining	204	213	209	222	230
	Reclamations finished in the given year	11	11	11	5	5
Non-reserved deposits	Area with manifestation of mining, not yet reclaimed	15	17	13	13	12
	Reclamations in process	2	3	3	3	3
	Reclamations finished since the start of mining	2	3	2	2	3
	Reclamations finished in the given year	0.5	0.2	0.2	0.1	0.2

Reclamation after mining of reserved minerals in 2013

Region	Reclamations in process								Reclamations finished							
	agricultural		forest		water		other		agricultural		forest		water		other	
	in DP	out DP	in DP	out DP	in DP	out DP	in DP	out DP	in DP	out DP	in DP	out DP	in DP	out DP	in DP	out DP
Prague	1	0	0	0	0	0	7	0	2	4	0	0	0	0	2	1
Central Bohemia	205	1	173	13	50	0	64	2	389	38	69	8	157	31	74	16
South Bohemia	10	0	38	3	4	0	5	0	70	55	108	2	318	0	34	1
Plzeň	32	0	42	1	1	0	2	0	46	33	36	48	3	0	22	12
Karlovy Vary	70	137	738	1 213	1	6	54	18	327	1 047	748	1 576	563	26	107	33
Ústí nad Labem	857	921	1 470	1 338	359	31	855	571	1 251	1 280	2 491	2 642	386	193	895	1 468
Liberec	34	0	94	20	0	0	24	0	69	51	225	18	5	0	9	4
Hradec Králové	34	1	22	5	3	0	12	0	80	8	118	4	100	0	21	4
Pardubice	8	0	6	12	56	0	2	0	35	0	10	9	36	0	8	2
Vysočina	0	1	3	0	0	0	2	3	0	0	29	5	0	0	3	4
South Moravia	166	8	53	6	2	0	21	9	489	34	162	15	8	0	17	8
Olomouc	17	3	60	62	105	2	1	0	28	47	7	3	48	0	7	5
Zlín	30	0	1	0	3	0	5	0	89	54	40	0	130	6	100	4
Moravia and Silesia	33	1	520	23	68	2	154	12	865	67	635	34	336	3	307	13
Czech Republic in total	1 496	1 072	3 221	2 696	651	41	1 208	614	3 739	2 717	4 678	4 363	2 090	258	1 606	1 577

[ranked according to regions and way of reclamation; DP = mining lease (in = within, out = outside), areas in hectares (1 km² = 100 ha)]



Mining influences the environment, changes the character of the landscape, and alters ecological conditions for flora and fauna. In some areas mining activities can last several human generations. This way the impact of mining persists and a more permanent new arrangement of natural conditions and relationships in its area is not quickly evident. The new arrangement can be equal to or even better than the original one, of course on a different level. Examples include artificial lakes formed e.g. in south Bohemia by sand and gravel mining, constructions and sport grounds in former quarries or specially protected nature areas proclaimed paradoxically in the territory of former quarries, and also 35 hectares of new vineyards planted as agricultural reclamation of a closed brown coal mine in the north of Bohemia in the Most wine region. They represent by their area almost 6.5 % of the total 550 hectares of productive vineyards of the Czech wine region.

In Bavaria, Germany, they studied the plant biodiversity in local quarries (S.Gilcher-U. Tränkle (2005): Steinbrüche und Gruben Bayerns und ihre Bedeutung für den Arten- und Biotopschutz.-Bayerischen Industrieverband Steine und Erden e.V.,München.). Of the 2 533 known plant species (of which 701 are endangered) in Bavaria in quarries whose combined area amounts to 0.006 % of Bavaria's total area, they counted 1039 species (41 % of the total count), of which 87 species were endangered (12.4 % of all endangered plant species).

In Baden-Württemberg, Germany, (Schelkingen quarries – raw material for cement) an original research project was developed *(Brodkom E.-Benett P.-Jans D. (editors)(2001): Good environmental practice in the European extractive industry. A reference guide.-Environnement, hors-série no 1, p. 35. Société de l'industrie minérale.Paris.)*. "This consisted of using cut grass to encourage vegetation growth by spreading it over the floor of a closed-down quarry. In order to protect germination, the grass counteracts high soil temperatures. The moisture of the soil is retained much longer, and the air humidity under the grass is higher. ... Corresponding

tests on the following substrates were carried out at the quarry: raw soil substrate (unchanged quarry site), mixed substrate (screen residue and excavated material), excavated material. ... With regard to effectiveness, it can be stated that 50 to 60 % of the species established on the areas from which the cut grass was taken were introduced and naturalised in an single mowing process. The costs incurred by such the process range between a minimum of 0.43 – 0.61 EUR/ m^2 (without site preparation) and a maximum of 1.36 – 1.87 EUR m^2 (including distribution of substrate and further measures). In contrast to that, the costs occuring for recultivation for agricultural or forestry purposes, amount to between 1.02 – 3.07 EUR/m^2."

In 2009, participants in the workshop Obnova území narušených těžbou nerostných surovin ("Restoration of Mining-Impacted Land") organized by the citizens association Calla-Association for Preservation of the Environment and by the Department of Botany of the Faculty of Science at the University of South Bohemia set down principles of eco-friendly restoration of mining-impacted land (J.Řehounek (2010): Přírodovědci formulovali zásady ekologické obnovy po těžbě./Naturalists formulate principles of post-mining ecological restoration.-Minerální suroviny/Surowce mineralne (magazine),1:32-33.Mining Union of the Czech Republic,Brno.):

1. Prior to commencing mining, a qualified biological assessment not only of the mining area, but also of its surroundings is essential. It would be beneficial if the actual mining were to be managed, if possible, in such a way so as to preserve (possibly maintain and expand) as many (semi) natural habitats in the immediate vicinity of the mine site or dumping ground. A roughly 100-metre zone in an area that can be accessed by most of the species is key for the subsequent colonization of the mining-impacted land during spontaneous succession.
2. Environmental impact assessments, biological assessments and reclamation plans, which concern the restoration of mining-impacted land and dumping grounds, should be prepared by experts, who are not only familiar with the current state of knowledge in the field of ecological restoration, but also with realistic possibilities and limits of mining technology. These problems should henceforth be included in the examinations for persons authorized to prepare environmental impact assessments pursuant to Act No. 100/2001 Coll. (EIA), and for persons certified in preparing biological assessments pursuant to § 67 of Act No. 114/1992 Coll. and in preparing assessments evaluating impacts on bird areas and on Special Areas of Conservation (SAC) pursuant to § 45i of said Act. Ongoing training in ecological restoration should be mandatory for these persons.
3. A basic restoration plan (e.g. in the form of a remediation and reclamation summary) should already be known when a mining lease (in the case of reserved deposits) is granted, or when a planning permit that designates the area for mining (in the case of non-reserved deposits) is granted, and should take into account the potential possibilities of the area. Room must be left to make any possible changes according to current conditions during the mine planning phase (plan of mine development work /POPD/ including detailed rehabilitation and reclamation plans, mining permits, etc.) and during the actual mining and completion phases.
4. It is essential to conduct another continuous assessment of the locality (a scheduled monitoring programme) already during the course of mining and after its termination, which may discover the presence of rare and endangered species and communities, as well as important geological and geomorphological phenomena. The restoration plan will have to be modified with respect to this assessment, which should be provided by the mining company via or under supervision of a qualified person.

5. Prior to, during and after mining, it is necessary to monitor invasive species at the mine site and in its surroundings. If their presence may possibly jeopardize the intended restoration method, then they must be removed by sanitation methods.
6. The great majority of mining-impacted land can restore itself spontaneously – via spontaneous succession, which may in some cases also be guided (directed, blocked or reversed). As a rule, at least 20 % of a large mine site's total area should be left to spontaneous succession in the most bilogically valuable areas. Smaller mining sites and dumping grounds can usually be integrated into the landscape without problem, thus ecological succession may be implemented in their entire area.
7. If endangered and specially protected species and communities are highly dependent on the mine site environment, then their population and biotypes will have to be managed appropriately. This should be covered by mandatory funds generated by the mining company for reclamation, after its completion by public funds designated for landscape programmes.
8. The most valuable mine sites and dumping grounds should be declared specially protected areas (most often classified specifically as a nature monument) and managed accordingly, or declared temporary protected areas if only temporary protection is needed. Less valuable mine sites and dumping grounds left to eco-friendly restoration should almost always at least be registered as important landscape elements. Special attention should be paid to mine sites that may be incorporated into the territorial system of ecological stability.
9. Restoration of a mine site or dumping ground should primarily increase the observable landscape diversity. It is necessary to break up straight lines and surfaces (peripheries, shore lines, etc.) with uneven areas, at the very latest after termination of (or preferably during the course of) mining. Shallow shore areas are necessary at flooded mine sites.
10. Unsuitable pieces of equipment and waste should removed after mining is terminated, if the aim is to integrate a mine site or dumping ground into the environment.
11. The nutrient-rich top soil sections must be permanently removed from those parts of the mine site that are designated for eco-friendly restoration in the least amount of time. This already needs to be taken into account during the reclamation planning phase. As overburden is returned, so are excess nutrients, which mostly support the evolution of a few less abundant, agressive species, including invasive ones. Once mining commences it is therefore necessary to verify, in collaboration with protection of agricultural land resources authorities (hereinafter OZPF), if the overburden is being carefully and completely removed from areas designated for eco-friendly restoration. Otherwise it is necessary to modify the implementation of the reclamation plan, again however in collaboration with OZPF and mining authorities.
12. From an environmental protection perspective, phased mining and restoration works best at larger mine sites, specifically when spread out over a longer period so that abandoned areas of the mining area are gradually left to restoration. This procedure helps create more varied and higher-quality communities with regard to age and extent in restored areas.
13. It is beneficial to place permanent study areas designated for scientific research, testing of eco-friendly interventions and monitoring in all types of mining areas. These areas should be respected by the mining companies.

Conclusion of the workshop: Eco-friendly restoration of mining-impacted land is certainly not the only option of how to deal with the integration of these areas into the landscape. Our laws should however allow for this restoration method, which is common in many countries,

to become an equivalent alternative to the thus far predominant forest and agricultural reclamations.

In 2011, a final report on project VaV SP/2d1/141/07 "Rekultivace a management nepřírodních biotopů v České republice" ("Reclamation and Management of Non-Natural Biotypes in the Czech Republic") was published for the entire duration of the project in 2007 – 2011 carried out by the Institute for Environmental Policy, Public Benefit Corporation, by the Institute of Geology of the Academy of Sciences of the Czech Republic, Public Research Institution, and by the Czech University of Life Sciences Prague. Its findings and recommendations state among other things:

"Areas impacted by mining and by some other human activities such as quarries, sand pits, mining sites of kaolin and brick clays, waste piles/dumps and large waste depots, are by far not really devastated, dead "lunar landscapes". On the contrary, it is being demonstrated that, in terms of the protection of diverse biotypes, they are a very important refuge, where mushrooms and wild plants and animals are finding optimum living conditions, which they entirely lack in urbanized and industrial areas, and on land used intensively by agriculture. ...

It is absolutely vital that the relevant state administration authorities respond appropriately to the new scientific findings. In the next legislative session, they should in collaboration with experts prepare and put into practice appropriate changes to laws and executive regulations, which regulate mining and other related human activities, primarily remediation and reclamation. The following legal regulations must be amended:

- Act No. 44/1988 Coll., on mineral protection and use (the Mining Act) – subsequently amended
- Regulation of the ČBÚ No. 172/1992 Coll., on mining leases in the wording of the Regulation No. 351/2000 Coll.
- Regulation of the ČBÚ No. 104/1988 Coll., on efficient use of reserved deposits, on permits and notification of mining operations and other activities employing mining methods – subsequently amended
- Act No. 61/1988 Coll., on mining operations, explosives and the state mining – subsequently amended
- Act No. 334/1992 Coll. on protection of agricultural land resources – subsequently amended
- Regulation of the MŽP ČR No. 13/1994 Coll., governing some details of agricultural land resources protection – subsequently amended
- Act No. 289/1995 Coll., on forests, modifying and amending certain acts (the Forest Act);
- Regulation of the Ministry of Agriculture of the Czech Republic No. 77/1996 Coll., on necessary elements of applications for dispossession or curtailment of rights, and on details of protection of lands devoted to forest function performance – subsequently amended
- Act No. 114/1992 Coll., on nature and landscape protection – subsequently amended

These unavoidable changes should eliminate evident discrepancies and deficiences in the legislation concerning the areas in question and harmonize legal regulations, so that ecological and economic highly effective nature-friendly methods of restoration based on natural or directed ecological succession may be used to a greater extent. ..."

Share of specially Protected Areas of the Czech Republic nature (zvláště chráněná území přírody České republiky (ZCHÚs)) established in localities with former mining ("after mining") in all the ZCHÚs (compiled after data of the Agency for Nature Conservation and Landscape Protection of the Czech Republic – AOPK ČR in 2014)

Region	Number of ZCHÚs (without CHKOs)	Area of ZCHÚs (without CHKOs) (ha)	Number of ZCHÚs "after mining"	Area of ZCHÚs (without CHKOs) "after mining" (ha)	Share of ZCHÚ areas "after mining" in the all ZCHÚs area	Share of ZCHÚ number "after mining" in the all ZCHÚs number	Share of ZCHÚ areas "after mining" in the all ZCHÚs area in the Czech Republic	Share of ZCHÚ number "after mining" in the all ZCHÚs number in the Czech Republic
Central Bohemia	254	12 042	41	817.99	6.79%	16.14%	0.80%	1.69%
Prague	91	2 344	36	714.04	30.46	39.56%	0.70%	1.48%
Karlovy Vary	69	4 056	6	33.03	0.81%	8.70%	0.03%	0.25%
Olomouc	152	7 353	20	195.88	2.67%	13.16%	0.20%	0.82%
South Moravia	301	8 608	23	343.00	3.98%	7.64%	0.34%	0.95%
Pardubice	101	5 260	5	116.84	2.22%	4.95%	0.12%	0.21%
Plzeň	194	10 989	17	148.09	1.35%	8.76%	0.15%	0.70%
Zlín	177	2 139	6	23.72	1.11%	3.39%	0.02%	0.25%
Moravia and Silesia	162	8 262	17	264.81	3.21%	10.49%	0.26%	0.70%
Liberec	124	5 584	6	244.38	4.38%	4.84%	0.24%	0.25%
Vysočina	188	5 684	4	29.25	0.51%	2.13%	0.30%	0.16%
Ústí nad Labem	160	6 423	12	327.79	5.11%	7.50%	0.32%	0.25%
Hradec Králové	131	7 138	6	17.10	0.24%	4.58%	0.02%	0.25%
South Bohemia	327	15 265	18	247.24	1.62%	5.50%	0.24%	0.75%
Czech Republic total	**2 431**	**101 147**	**217**	**3 523.16**	**3.48%**	**8.93%**	**3.48%**	**8.93%**

Eliminating negative consequences of mining in the Czech Republic – main methods and financial resources

Vít Kaštovský
Ministry of Industry and Trade of the Czech Republic

Introduction

The process of restructuring coal and ore mining, and of eliminating negative environmental consequences of mining in the landscape and erasing these consequences in affected areas of the Czech Republic, is executed in several ways and with various financial resources. It specifically involves:

1. Use of funds from a financial reserve generated by mining companies for remediation, reclamation and mining damages
2. Use of funds from annual royalties paid by mining companies on mining leases and on extracted reserved minerals pursuant to the Mining Act
3. Phase-out programme of mining activities and erasing consequences of coal, ore and uranium mining funded by the national sources via the Ministry of Industry and Trade
4. Use of proceeds from privatisation of state assets in eliminating old ecological burdens caused by mining, existing prior to privatisation of mining companies
5. A programme which deals with ecological damage caused prior to privatisation of brown coal mining companies in the Ústí nad Labem Region and Karlovy Vary Region, with ecological revitalisation upon termination of mining operations in the Moravian-Silesian Region, with eliminating ecological burdens caused by the exploration for and extraction of crude oil and natural gas in designated areas of the South Moravian Region, and with reducing the impacts caused by the termination of coal mining in the Kladno Region based on Government resolutions in 2002. Funds are provided by proceeds from privatisation of national assets.
6. Sources of European Union – Operational Programme Environment (administered by the Ministry of Industry and Trade)

1. Use of funds from a financial reserve generated by mining companies for remediation, reclamation and mining damages

Financial reserve for remediation and reclamation

The most important source for funding the elimination of the consequences of mining operations in the Czech Republic is the financial reserve for remediation and reclamation, generated by mining companies during the exploitation of reserved mineral deposits.

An amendment of Mining Act No. 541/1991 Coll., under article 31 section 6, imposes on the mining company to generate a financial reserve in order to meet the obligation established under article 31 section 5 of the Mining Act, thus guaranteeing the remediation and reclamation of all plots of land affected by mining (hereinafter “reserves”). The reserves are part of the company’s expenses. Pursuant to article 32 section 2 of the Mining Act, the determination of anticipated expenses for remediation and reclamation is part of the plan for opening, preparation and exploitation of reserved deposits (hereinafter “POPD”), and the POPD must

also contain a proposal regarding the amount of, and the method for, generating the required financial reserve. However, the anticipated amount of financial costs for remediation and reclamation must for the first time already be included, pursuant to the provision under article 2, section 3, letter k) item 4 of Decree No. 172/1992 Coll., as amended, in the application for the grant of a mining lease. An interim provision of Act No. 541/1991 Coll. established that the required reserve amount should be provided in 10 years (i.e. by 20 December 2001) in the case of existing mines. In a subsequent amendment of the Mining Act by Act No. 168/1993 Coll., the time period for generating the reserve was changed to last for the duration of the economic life of the mine, quarry or their sections. However, that did not apply to companies with an announced or approved phase-out programme (ores, coal).

According to the provision under article 37a section 2 of the Mining Act, the generating of reserves is subject to approval by Regional Mining Authorities (OBÚ). Upon the request of a company, these also permit the drawing on funds from the generated reserve upon agreement with the Ministry of the Environment and upon notification by the relevant municipality. In the case of public enterprises, the OBÚ makes a decision regarding the drawing on the reserve upon agreement with the Ministry of Industry and Trade.

Generated and drawn reserves for remediation and reclamation (in CZK thousand)

Year	Bituminous coal		Brown coal		Crude oil and natural gas		Ores		Industrial minerals		Radioactive minerals		Total	
	gene-rated	drawn	gene-rated	drawn	gene-rated	drawn	gene-rated	drawn	gene-rated	drawn	gene-rated	drawn	gene-rated	drawn
1993	118 500	0	1 341 769	65 615	12 722	0	0	0	97 438	8 236	0	0	1 570 429	73 851
1994	123 750	18 600	573 242	259 929	6 836	0	0	0	255 155	30 335	0	0	958 983	308 864
1995	85 895	136 064	3 845 935	265 856	22 414	370	0	0	276 724	24 230	0	0	4 230 968	426 520
1996	143 500	97 993	1 436 957	831 817	25 811	113	0	0	270 432	31 829	0	0	1 876 700	961 752
1997	108 000	42 108	1 302 735	1 087 993	62 618	5 569	0	0	484 420	53 262	0	0	1 957 773	1 188 932
1998	51 594	48 033	1 226 036	994 133	22 112	9 541	0	0	466 649	59 913	0	0	1 766 391	1 111 620
1999	132 143	56 236	1 199 633	704 199	26 181	7 473	0	0	318 852	141 530	0	0	1 676 809	909 438
2000	42 747	52 029	1 119 474	683 179	23 487	600	0	0	307 433	140 225	0	0	1 493 141	876 033
2001	876 194	77 458	1 267 431	678 515	23 184	2 750	390	0	215 379	53 893	0	0	2 382 578	812 616
2002	887 250	129 600	1 007 561	653 557	100	250	0	0	157 721	50 604	0	0	2 001 946	822 491
2003	1 800	498	5 199 919	4 844 371	11 782	1 050	0	0	179 763	57 848	0	0	5 393 264	4 903 767
2004	65 002	54 162	1 031 828	720 168	4 770	0	0	0	160 102	73 177	0	0	1 261 702	847 507
2005	66 504	54 204	964 222	547 883	17 524	9 409	0	0	228 713	113 743	0	0	1 254 884	766 460
2006	74 178	113 691	845 008	663 055	17 893	3 300	0	0	144 665	92 489	0	0	1 081 744	872 535
2007	32 696	88 462	718 820	240 060	25 417	17 259	0	0	127 413	82 329	0	0	904 346	428 110
2008	17 660	66 941	626 649	330 397	24 828	16 372	0	0	233 615	99 610	0	0	1 008 637	513 320
2009	21 780	69 711	650 696	394 528	15 454	1 324	0	0	177 681	77 290	0	0	955 897	542 853
2010	22 800	147 848	298 205	133 171	16 302	461	0	0	96 207	94 517	0	0	433 515	375 997
2011	22 500	170 958	625 011	491 068	22 336	986	0	0	82 252	87 681	0	0	752 099	750 693
2012	22 500	141 432	632 601	364 264	9 871	1 693	0	0	96 263	91 721	0	0	761 235	599 110
2013	15 000	240 951	648 019	325 791	13 530	2 044	0	0	86 121	57 478	0	0	762 670	626 254

The issues mentioned are further regulated by FMF (Federal Ministry of Finance) Measure No. ref. V/20 100/1992 Coll., on the chart of accounts and on accounting procedures, which lays down the rules regarding the generating and use of financial reserves by companies with permitted mining operations. At the end of each accounting period, companies execute closings of books and carry out document inventories, which verify the balancing of books (Act No. 593/1992 Coll. and No. 563/1991 Coll.).

The last update of the legal regulation of reserves for remediation, reclamation as well as mining damage occurred after Act No. 223/2006 Coll. (amendement of the Reserves Act) and No. 313/2006 Coll. (amendment of the Mining Act) went into effect.

Financial reserve for mining damages

Pursuant to article 37a section 1 of the Mining Act, a mining company is obliged to generate a financial reserve to ensure settlement of mining damages. The reserve amount generated and charged to expenses must correspond to the needs for settling mining damages in the course of time depending on their creation, or prior to their creation (article 37 section 4).

Generating of reserves is subject to approval by the relevant Regional Mining Authority, which also approves the drawing on these reserves upon agreement with the Ministry of the

Generated and drawn reserves for mining damages (in CZK thousand)

Year	Bituminous coal		Brown coal		Crude oil and natural gas		Ores		Industrial minerals		Radioactive minerals		Total	
	gene-rated	drawn	gene-rated	drawn	gene-rated	drawn	gene-rated	drawn	gene-rated	drawn	gene-rated	drawn	gene-rated	drawn
1993	400 721	4 093	150 548	42 957	0	0	0	0	28 462	0	0	0	579 731	47 050
1994	105 650	38 813	50 000	32 223	0	0	0	0	9 328	28 852	0	0	164 978	99 888
1995	204 785	86 001	209 207	37 748	0	0	0	0	10 673	9 394	0	0	424 665	133 143
1996	151 643	74 952	259 779	84 258	0	0	0	0	13 100	3 407	0	0	424 522	162 617
1997	77 900	142 512	318 981	127 715	0	0	0	0	5 733	683	0	0	402 614	270 910
1998	185 723	174 640	252 920	112 852	0	0	0	0	16 043	3 638	0	0	457 686	291 130
1999	111 588	174 640	212 722	40 448	0	0	0	0	10 803	6 844	0	0	335 113	221 932
2000	110 088	107 852	240 655	188 685	0	0	0	0	11 414	1 020	0	0	362 157	297 557
2001	145 750	188 073	105 513	217 306	192	0	100	0	35 877	6 628	0	0	286 872	412 007
2002	102 750	168 531	102 700	510 200	0	0	0	0	2 327	2 338	0	0	207 777	681 069
2003	0	0	816 197	999 271	90	0	0	0	12 576	2 263	0	0	828 863	1 001 534
2004	187 700	139 714	164 700	315 321	0	0	0	0	3 007	4 560	0	0	355 407	459 595
2005	191 700	143 974	97 433	279 955	0	0	0	0	6 597	4 273	0	0	295 730	428 202
2006	285 780	251 941	522 908	1 334	150	0	0	0	4 517	6 846	0	0	813 355	260 121
2007	260 850	190 982	193 147	932 392	30	0	0	0	4 298	3 831	0	0	458 325	1 127 205
2008	304 700	308 593	64 601	155 924	0	0	0	0	3 739	2 788	0	0	373 040	467 305
2009	317 625	282 928	30 200	25 800	0	0	0	0	3 447	1 216	0	0	351 272	309 944
2010	283 008	173 686	25 034	15 730	100	0	0	0	2 644	1 514	0	0	310 786	190 930
2011	468 508	196 012	25 663	25 248	100	0	0	0	2 695	2 595	0	0	496 966	223 855
2012	811 202	741 987	30 000	5 818	100	0	0	0	6 157	3 325	0	0	847 459	751 130
2013	145 000	131963	30 000	0	0	0	0	0	3 378	2 724	0	0	178 378	134 686

Environment. Prior to making a decision on the drawing on theses reserves, the Regional Mining Authority requests a statement from the relevant municipality. In the case of public enterprises, the OBÚ decides in agreement with the Ministry of Industry and Trade.

A company's request to draw on the financial reserve for mining damages must be furnished with a list of mining damages, an expense estimate for their elimination and a time table of resource expenses for the elimination of mining damages.

2. Use of funds from annual royalties paid by mining companies on mining leases and on extracted reserved minerals pursuant to the Mining Act

Royalties on mining leases

Act No. 44/1988 Coll., on the protection and use of the mineral resources (the Mining Act), imposes an obligation on mining companies, under sect. 32a) par. 1, to pay to the account of the relevant Regional Mining Authority an annual royalties, on the mining lease. The amount of royalties on the mining lease is set at CZK 100 to CZK 1 000 per hectare, and graded with

Royalties from mining lease areas paid out to municipalities pursuant to article 32a) sect. 1 of the Mining Act (in CZK thousand)

Year	Number of municipalities	Total
1993	1 327	25 929
1994	1 194	22 752
1995	1 168	24 114
1996	1 225	24 032
1997	1 191	23 446
1998	1 269	22 885
1999	1 208	23 629
2000	1 178	23 780
2001	1 171	23 728
2002	1 168	22 899
2003	1 158	21 740
2004	1 161	21 511
2005	1 138	21 077
2006	1 127	16 178
2007	1 118	15 512
2008	1 305	15 127
2009	1 239	14 925
2010	938	14 032
2011	885	13 888
2012	939	13 809
2013	918	13 800
Total		**418 793**

respect to the environmental protection level of the relevant area, the type of activity conducted in the mining lease and its environmental impact.

The ultimate recipient of the mining lease royalties are the municipalities, in whose territory the mining lease is located. These resources are used, in large measure, as compensation for negative impacts of mining on the municipalities in question. As shown in the following table, a total of CZK cca 419 million was paid out to municipalities in 1993–2013 since the inception of royalties payments on mining leases.

Royalties on extracted reserved minerals

The royalties on extracted minerals established under article 32a) section 2 of Act No. 541/1991 Coll., amounts to 10 % of the market price of extracted minerals at the most and, under section 4, from the royalties yield, pursuant to section 2, the Regional Mining Authority transfers 50 % to the state budget of the Czech Republic and 50 % to the budget of the municipality in whose territory the mining lease is situated. If the mining lease is located in the territory of several municipalities, the Regional Mining Authority distributes the revenue according to the share in mining, similarly to the royalties on a mining lease.

Amendment No. 10/1993 Coll. of the Mining Act established that 50 % of the royalties transferred to the state budget will be used for the purpose of remediation of environmental damage caused by the mining of reserved deposits.

In 2000 a change occurred and article 32a), section 4 of Act No. 366/2000 Coll. established that, of the royalties pursuant to section 2, the Regional Mining Authority shall transfer only 25 % to the state budget of the Czech Republic, from which these funds will be used for the purpose of remediating environmental damage caused by the mining of reserved as well as non-reserved deposits, and that the Regional Mining Authority shall transfer the remaining 75 % to the municipality's budget. Simultaneously, Government Resolution No. 906/2001 and, again, Government Resolution No. 69/2008 approved to divide the 25% of royalties transferred to the state budget into 12.5 % for use by the Ministry of Industry and Trade in remediation of environmental damage caused by the mining of reserved as well as non-reserved deposits, and into 12.5 % for use by the Ministry of the Environment in liquidation of old mine workings.

At the same time, Government Resolution No. 69/2008 approved the transfer of the yield from royalties on extracted minerals pursuant to sect. 32a par. 4 of Act No. 44/1988 Coll., on the protection and use of mineral resources (Mining Act), as amended, via Regional Mining Authorities directly to the income accounts of the budget of the Ministry of Industry and Trade and the Ministry of the Environment starting in 2008.

The table above clearly shows the payment and use of funds for the 1993–2013 period. In 21 years mining companies paid a total of CZK 11.3 billion., of which municipalities received cca CZK 6.5 billion, and Regional Mining Authorities transferred to the state budget a total of CZK 3.8 billion for remediation of environmental damage caused by the mining of reserved as well as non-reserved minerals, which was subsequently released from the state budget and of which cca CZK 2.9 billion went to the Ministry of Industry and Trade and cca CZK 0.9 billion to the Ministry of the Environment.

Distribution of royalties on extracted reserved minerals pursuant to sect. 32a) par. 4 of the Mining Act (in CZK thousand)

Year	50 % SR (State budget)		50 % Municipalities	Total
1993	230 400		230 526	460 926
1994	245 762		245 276	491 038
1995	221 909		221 566	443 475
1996	229 703		229 703	459 406
1997	228 874		228 874	457 748
1998	220 885		220 886	441 771
1999	219 938		219 938	439 876
2000	227 778		227 859	455 637
Total	**1 825 249**		**1 824 628**	**3 649 877**
	12.5 % MPO (Ministry of Industry and Trade)	**12.5 % MŽP (Ministry of the Environment)**	**75 % Municipalities**	**Total**
2001	153 166	12 500	302 221	467 887
2002	55 000	59 500	356 724	471 224
2003	61 713	61 800	371 827	495 340
2004	70 000	69 500	393 695	533 195
2005	76 398	76 700	449 135	602 233
2006	76 305	76 400	455 947	608 652
2007	82 716	82 300	494 737	659 753
2008	84 367	84 250	505 782	674 399
2009	80 720	80 720	484 556	645 996
2010	73 023	73 023	435 103	581 149
2011	80 714	80 714	484 284	645 712
2012	78 711	78 711	472 266	629 688
2013	74 554	74 554	447 323	596 430
Total 2001–2013	**1 047 387**	**910 672**	**5 653 600**	**7 074 871**
Total 1993–2013	**2 872 636**	**910 672**	**6 478 228**	**11 261 535**

3. Phase-out programme of mining activities and erasing consequences of coal, ore and uranium mining funded by the national sources

The restructuring of industry in the Czech Republic, specifically of metallurgy and engineering, initiated after 1989, had an immediate impact on the mining sector. Uneconomic ore, coal and uranium mining, and a lower raw material demand were the decisive reasons for the restructuring and subsequent privatisation of mining companies. Part of the restructuring of

the mining industry was the announcement of a phase-out of mining activities in uneconomic underground mines and quarries.

The essential method of funding the restructuring of the mining sector is provided by subsidies from the state budget, in accordance with relevant Government resolutions, for the phase-out and to erase the consequences of mining operations.

In the initial phase, the phase-out in individual branches of mining occurred independently, mainly because mining companies reported to various departments.

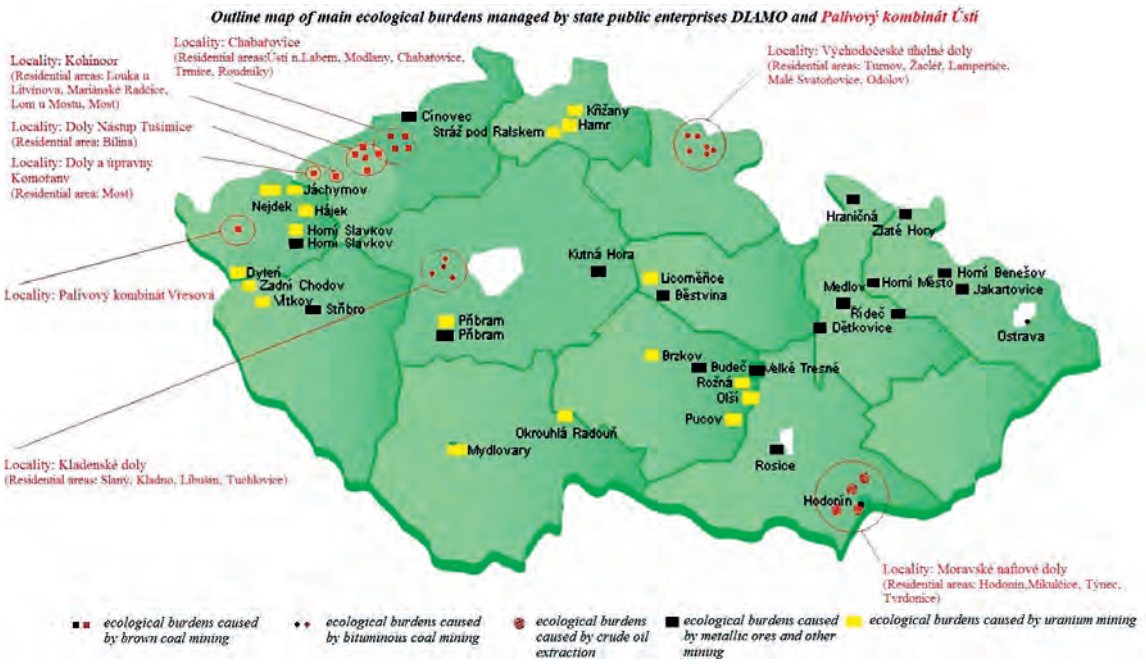
The phase-out of uranium mining was already decided upon in 1989, as based on documents processed by the Federal Ministry of Fuel and Energy, which was approved by ČSSR (Czechoslovak Socialist Republic) Cabinet Resolution No. 94/1989 on the concept of lowering the unprofitability of uranium mining in the ČSSR in 1990, in the 9th and 10th five-year plans by phasing it out. This Cabinet resolution from 1990 was subsequently amended by the Government of the ČSFR (Czechoslovak Federal Republic) with new Government Resolution No. 894/1990 regarding the modification of the phase-out concept for uranium mining in the ČSFR.

In 1990, ore mining was integrated into the Federal Ministry of Metallurgy, Engineering and Electric Engineering which, for the purpose of dealing with ore mining and the announcement of a phase-out programme for the ore mining industry as of 1 July 1990, processed documents for Government proceedings and Government Resolution No. 440/1990 was adopted.

The phase-out of coal mining was announced at the end of 1992 based on Government Resolution No. 691/1992 concerning the programme for restructuring the coal industry, and documents for Government proceedings were processed by the Ministry of Industry and Trade.

Even though the phase-out of ore mining was not completed, a merger of Rudné doly Příbram state enterprise with DIAMO state enterprise occurred as of 1 January 2001, thereby ending the industry-by-industry monitoring of the phase-out, i.e. ore and uranium mining.

Another modification of the reporting method concerning the drawing on state budget funds occurred in 2003, when, in addition to the proposed state participation in the completion of the



Use of national sources subsidies for the phase-out of mining and to erase consequences of mining and mandatory social health expenses (in CZK million)

Year	Mining in total			Coal mining			Ore mining			Uranium mining		
	TÚ	MSZN	Total	TÚ	MSZN	Total	TÚ	MSZN	Total	TÚ	MSZN	Total
1993	2 555.1	1 436.3	3 991.4	1 816.1	949.7	2 765.8	43.2	189.0	232.2	695.8	297.6	993.4
1994	3 940.1	1 528.0	5 468.1	2 333.4	1 011.7	3 345.1	35.1	179.6	214.7	1 571.5	336.7	1 908.2
1995	3 861.1	1 678.1	5 539.2	1 956.8	1 329.9	3 286.7	198.8	36.4	235.2	1 759.3	346.4	2 105.7
1996	3 755.5	1 823.2	5 578.7	2 168.3	1 422.7	3,591,0	126.7	33	159.7	1 486.9	367.0	1 853.9
1997	2 305.9	1 811.1	4 117.0	1 364.6	1 362.8	2 727.4	100.1	34.9	135.0	836.6	413.4	1 250.0
1998	2 571.7	1 862.9	4 434.6	1 690.2	1 403.7	3 093.9	94.8	30.2	125.0	979.7	422.9	1 402.6
1999	2 073.5	1 955.8	4 029.3	1 206.1	1 475.9	2 682.0	79.2	37.6	116.8	787.9	442.2	1 230.1
2000	2 064.2	1 986.1	4 050.3	1 193.8	1 475.2	2 669.0	158.0	30.2	188.2	712.3	474.9	1 187.2
2001	2 296.2	1 955.6	4 251.8	1 118.4	1 451.0	2 569.4	part of uranium mining			1 174.6	500.4	1 675.0
2002	1 729.9	1 913.8	3 643.7	574.9	1 359.2	1 934.1				1 154.8	553.3	1 708.1
2003	2 148.5	1 751.1	3 899.6	654.4	1 294.2	1 948.6				1 494.1	455.5	1 949.6
2004	2 576.1	1 713.2	4 289.3	With the merger of s. p. Rudné doly Příbram with s. p. DIAMO and the takeover of phased out areas of OKD, a. s., monitoring on an industry-by-industry basis was terminated								
2005	2 110.3	1 669.1	3 779.4									
2006	2 069.8	1609.3	3 679.1									
2007	1 917.9	1 574.1	3 492.0									
2008	1 971.9	1 465.7	3 437.6									
2009	2 027.4	1 383.5	3 410.9									
2010	2 281.0	1 257.6	3 538.6									
2011	2 557.1	1 149.6	3 706.7									
2012	2 717.8	979.4	3 697.2									
2013	2 428.0	855.9	3 283.9									
Total	**53 059.3**	**33 359.4**	**86 418.7**	**16 632.7**	**14 536.0**	**31 168.7**	**1 083.9**	**570.9**	**1 654.8**	**12 950.1**	**4 610.3**	**17 560.4**

TÚ – technical work related to phase-out and erasing consequences of mining operations
MSZN – mandatory social health expenses

restructuring of coal mining, Government Resolution No. 395/2003 authorised the transfer of the Barbora locality from OKD, a. s. company to DIAMO state enterprise, and the localities of Ležáky, Kohinoor and of Kladenské doly to Palivový kombinát Ústí state enterprise.

Since the initiation of the phase-out of mining in 1992, a total of cca CZK 86.4 billion was released from the state budget for the phase-out of mining and to erase the consequences of mining. As shown in the table above, cca CZK 53.1 billion were spent on technical work related to the phase-out of mining and on erasing the consequences of mining operations, and cca CZK 33.4 billion on social health benefits for miners.

4. Use of proceeds from privatisation of state assets in eliminating old ecological burdens originated prior to privatisation of mining companies

Based on a decision by the Czech Republic Government, the former National Property Fund of the Czech Republic (as of 1 January 2006 the Ministry of Finance, based on Act No. 179/2005 Coll.) pledged, by virtue of "ecological contracts" entered into with particular individual assignees of assets from privatisation, to eliminate, with its privatisation proceeds, old ecological burdens created prior to privatisation.

The procedures and process principles for implementing measures leading to remediation of old ecological burdens created prior to privatisation are established in accordance with Government Resolution No. 51 from 10 January 2001.

The process adheres primarily to the following Acts and Resolutions of the Czech Republic Government:

a) Act No. 92/1991 Coll., on the terms and conditions regarding the transfer of state assets to other persons, as amended;
b) Act. No. 178/2005 Coll., on the National Property Fund of the Czech Republic liquidation and on on the responsibility of Ministry of Finance during privatisation Czech Republic assets (Act on the National Property Fund liquidation), as amended;
c) Act No. 179/2005 Coll., which amends some laws in connection with adopting the Act on the National Property Fund liquidation
d) Government Resolution No. 51 from 10 January 2001, which contains the appendix entitled *Principles for Settlement of Ecological Obligations Arising during Privatisation* (hereinafter Principles), as amended;
e) Government Resolution No. 565/2006 on Principles during completion of privatisation pursuant Act No. 92/1991 Coll., on the terms and conditions regarding the transfer of state assets to other persons and Act No. 178/2005 Coll., on the National Property Fund of the Czech Republic liquidation and on on the responsibility of Ministry of Finance during privatisation Czech Republic assets, as amended;
f) Act No. 137/2006 Coll., on public contracts, as amended.

The processing of the programme is always provided by the Ministry of Finance. The Ministry of the Environment provides guaranteed expertise in the process and issues binding

Overview of entities with which "ecological contracts" were entered into, including guaranteed financial sums and their actual amount drawn (in CZK) – as of 31. 8. 2014

Name of mining company	Amount of guarantee	Drawn from guarantee	Amount available for drawing
DIAMO, státní podnik	4 200 000 000	2 599 133 765.21	1 600 866 234.79
DIAMO, státní podnik	3 797 000 000	3 787 286 690.79	9 713 309.21
DIAMO, státní podnik	**32 000 000 000**	3 769 027 000.00	28 230 973 000.00
OKK Koksovny, a.s.	27 800 000 000	2 649 542 078.45	25 150 457 921.55
Sokolovská uhelná, právní nástupce, a.s.	214 000 000	144 836 971.71	69 163 028.29
Severočeské doly, a.s.	172 265 000	4 812 509.37	167 452 490.63

opinions on individual process steps. Mutual collaboration of both authorities in this process is regulated by the "Rules for Mutual Collaboration of the Ministry of the Environment and the Ministry of Finance in the Awarding of 'Ecological Contracts' to Eliminate Old Ecological Damage".

The elimination of old ecological damage created prior to privatisation proceeds for the most part according to priorities established by the MŽP ČR (Ministry of the Environment).

5. A programme dealing with ecological damage caused prior to privatisation of brown coal mining companies in the Ústí nad Labem Region and the Karlovy Vary Region, with ecological revitalisation upon termination of mining in the Moravian-Silesian Region, with eliminating ecological burdens caused by the exploration for and extraction of crude oil and natural gas in designated areas of the South Moravian Region, and with reducing impacts caused by the termination of coal mining in the Kladno Region based on Government resolutions in 2002 and 2008. Funds are provided by proceeds from privatisation of state assets.

After the privatisation of mining companies, the financial settlement of related ecological damage was not resolved in an appropriate manner, within the scope of privatisation projects. However within the scope of privatisation, companies took over not only mining localities but also extensive areas from the state, which were designated for revitalisation and for which a required financial reserve was not generated in the past.

Mining companies are only obliged to generate a financial reserve for remediation and reclamation of areas affected by mining since 1994, and that on the basis of Amendment (No. 168/1993 Coll.) of the Mining Act.

In 2002, the Czech Republic Government being aware of this fact began to intervene financially in the ecological and partially economic revitalisation of regions with active or terminated mining operations. The goal was to eliminate environmental damage caused by mining operations prior to implemented legal regulation.

For this purpose it earmarked, from the proceeds from sale of assets designated for privatisation and from the profits of public enterprises, CZK 15 billion to deal with ecological damage created prior to privatisation of brown coal mining companies in the Ústí nad Labem Region and Karlovy Vary Region, CZK 20 billion to deal with ecological damage caused by mineral mining, primarly underground mining of bituminous coal in the Moravia and Silesia Region, CZK 1 billion to eliminate ecological burdens caused by the exploration for and extraction of crude oil and natural gas in the South Moravian Region, and CZK 1.177 billion to deal with reducing the impacts caused by the termination of coal mining in the Kladno Region.

The funds from the proceeds from privatisation are released in accordance with Government decisions to cover the expenses of eliminating environmental damage caused by present operations of mining companies, to cover the expenses of and support investment and non-investment activities connected with the remediation of environmental damage caused by mineral mining and to revitalise affected areas, and for financial support of development projects in areas designated for industrial use approved by the Government.

Dealing with ecological damage created prior to privatisation of brown coal mining companies in the Ústí nad Labem Region and the Karlovy Vary Region

For more than 150 years, the character of the landscape was affected significantly by intensive opencast and underground mining of brown coal in the Krušné Hory Mts. piedmont area of Northwest Bohemia. Undergroung mining primarily affected the territory with the deepest seams (up to 450m below the surface) in the central, Most-Bílina area of the basin as well as the Teplice area of the North Bohemian Basin. Opencast mining occurred primarily in areas of coal seam outcrops southwest of Chomutov, west and east of the City of Most, north of the City of Bílina, northwest of the City of Teplice, southwest and north of the City of Ústí nad Labem.

In 2002, the then National Property Fund of the Czech Republic was bound by resolutions of the Czech Republic Government to eliminate ecological damage caused by the activities of coal mining companies in the Ústí nad Labem Region and the Karlovy Vary Region, and to revitalise affected areas. The process was initiated that same year.

In accordance with a relevant resolution of the Czech Republic Government, the process dealing with ecological damage created prior to privatisation of brown coal mining companies in the Ústí nad Labem Region and the Karlovy Vary Region includes both of the Krušné hory Mts Basin situated in the territory of the Districts of Sokolov, Chomutov, Most, Teplice and of Ústí nad Labem, i.e. the Sokolov Basin and the North Bohemian Basin, or the mining leases of Sokolovská uhelná, a.s., Severočeské doly, a.s., Mostecká uhelná společnost, a.s. (currently mining companies Severní energetická, a.s. and Vršanská uhelná, a.s.), Kohinoor, a.s., and Palivový kombinát Ústí, s. p.

The programme mentioned specifies a group of projects aimed primarily at creating and renewing:

– forest stands,
– agricultural land,
– bodies of water,
– landscape vegetation,
– biocorridors and biocentres,
– areas for recreation,
– areas designated for ecology and natural science,
– building sites.

As of 31 December 2013, the funds actually spent on **213** concluded projects amounted to **CZK 8.161 billion**, and on **57** projects in progress they amounted to **CZK 3.917 billion** as of the specified date. The remaining financial amount required to secure additional money for the projects in progress amounts to about **CZK 1.207 billion** according to contracts.

List of companies included in the programme plan:

Sokolovská uhelná, legal successor, a.s. (SU)
Severočeské doly, a.s. (SD)
Mostecká uhelná společnost, a.s. (MUS), currently mining companies Severní energetická, a. s. a Vršanská uhelná, a. s.
Palivový kombinát Ústí, s.p. based in Hrbovice (PKÚ)

List of regions (projects of cities and municipalities) included in the programme plan:

Karlovy Vary Region – KK
Ústí nad Labem Region – ÚK

Projects concluded and projects in progress (in CZK)

Coal Companies	Projects concluded		Projects in progress		
	Number of projects	Project costs	Number of projects	Project prices	Amount drawn as of 31 Dec 2012
SU	8	1 334 225 740	18	1 886 682 440	1 693 826 130
SD	26	2 043 995 476	1	28 885 604	5 124 237
MUS	39	530 874 652	17	1 453 240 535	1 106 773 600
PKÚ	38	2 560 771 577	6	566 512 726	488 673 765
Total 1	**111**	**6 469 867 445**	**42**	**3 935 321 305**	**3 294 397 732**
Municipalities Total	**Projects concluded**		**Projects in progress**		
	Number of projects	**Project costs**	**Number of projects**	**Project prices**	**Amount drawn as of 31 Dec 2012**
KK	31	516 729 928	6	543 962 233	269 881 929
ÚK	71	1 173 987 678	8	645 104 842	352 574 442
Total 2	102	1 1 690 717 606	14	1 189 067 075	622 456 371
Total 1 + 2	**213**	**8 160 585 051**	**57**	**5 124 388 380**	**3 916 854 103**

Revitalisation of the Moravian-Silesian and South Moravian Region

Currently, the revitalisation of the Moravian-Silesian Region is aimed primarily at eliminating the consequences of ecological burden caused by bituminous coal mining and, in the South Bohemian Region, at eliminating ecological burdens caused by the exploration for and extraction of crude oil and natural gas.

As of 31 December 2013, the funds actually spent on **81** concluded projects amounted to about **CZK 1.171 billion**, and on **75** projects in progress they amounted to about **CZK 5.512 billion** as of the specified date.

Categories of priority projects, approved by the Government, which deal with eliminating environmental damage caused by mineral mining in the Moravian-Silesian and South Moravian Region

1. Reclamation work
2. Reducing thermal activity
3. Comprehensive site development
4. Comprehensive reduction of uncontrolled methane emissions
5. Eliminating old ecological burdens in OKD, a. s.
6. Land development upon termination of mining
7. Eliminating ecological burdens caused by the exploration for and extraction of crude oil and natural gas

Projects concluded (in CZK) – as 31. 12. 2013

Project name	Project costs
1. Reclamation work	
7/03 Reclamation of reservoirs and lands below the Stachanov reservoirs – additional construction work	8 824 451
7/04 Reclamation of the Žofie waste dump	1 950 601
7/06 Drainage of lands south of Kuboň Pond – site A and B	2 377 507
7/10 Remediation of the Václav waste dump – external review AR	36 000
7/15 Development along the Orlovská Stream	6 275 508
7/16 Development along the Sušanky Stream	5 957 512
7/16 Development along the Sušanky Stream – phase II.	2 026 032
7/16 Development along the Sušanky Stream – updated estimate of project documentation	17 850
Final assessment of the "Reclamation of reservoirs and lands below the Stachanov reservoirs – additional construction work" project	42 000
7/20 Drainage of waterlogged lands in Paskov	6 974 421
7/02 Rudná land reclamation, structure 5 (along Polanecká street)	5 727 264
Total 1	**40 209 147**
2. Reducing thermal activity	
8/01 Survey and monitoring of thermal activity in the Heřmanice waste dump	4 962 696
8/02 Survey and monitoring of thermal activity in the Hedvika waste dump	6 506 627
8/04 Survey and monitoring of thermal activity in the Heřmanice waste dump – site II	4 224 505
8/05 Survey and monitoring of thermal activity in the Ema waste dump	1 487 696
8/10 Comprehensive remediation of the contaminated area in the Trojice locality – phase I: updated risk assessments of the contaminated area	2 337 570
Examiner's report: Comprehensive remediation of the contaminated area in the Trojice locality – phase I: updated risk assessments of the contaminated area	46 800
8/08 Long term monitoring of thermal activity in the Hedvika waste dump	3 270 345
Total 2	**22 836 239**
3. Comprehensive site development	
9/01 Height measurement in areas with phased out mining operations managed by DIAMO (ODRA) – execution	5 109 270
Height measurement in areas with phased out mining operations	1 094 800
Examiner's report – Height measurement in areas with phased out mining operations	44 140
Extinguishing of local fire on the Ludvík waste dump in the cadastral area of Radvanice – project	513 600
Total 3	**6 761 810**
4. Comprehensive reduction of uncontrolled methane emissions	
Comprehensive analysis of the methane problem in connection with old mine workings – study	7 602 000
Examiner's report on the conceptual solution of the methane problem	35 000
Measures for removing emergency measures regarding methane emissions in the City of Orlová	62 873 211
Reducing verified methane emissions in the City of Orlová – Project Orlová 2 – additional construction work	6 933 219
35/1 Security provision of liquidated shaft Jan Maria and remediation of mine area	32 103 924
35/2 Elimination of uncontrolled natural gas emissions from deep exploration boreholes in the area of Trojanovice – survey	18 315 000

35/A Preparing individual methodical procedures of basic activities	1 856 400
Survey of mine gas emissions in areas with phased out coal mining and related health and environmental risks	2 344 300
Reducing verified methane emissions in the City of Orlová – Project Orlová 2	34 503 154
Expert assessment 35/AKT updated project no. 35 – Comprehensive analyses of the methane problem in connection with old mine workings	160 650
35/L1 "Economics of filling underground spaces"	2 261 000
35/L2 Geophysical and borehole survey	1 707 650
35/L3 Scientific-research support for important safety improvements regarding uncontrolled mine gas emissions from old workings, as a result of dealing with residual coal gas capacity and gas bearing capacity of phased out and abandoned mine sections	2 261 000
Reducing verified methane emissions in the City of Orlová from 1. 2. to 31. 5. 2010 – provision of essential safety measures	2 397 600
Reducing verified methane emissions in the City of Orlová from 1. 6. to 30. 9. 2010 – provision of essential safety measures	2 397 600
Reducing verified methane emissions in the City of Orlová from 1. 10. 2010 to 31. 1. 2011 – provision of essential safety measures	2 397 600
Reducing verified methane emissions in the City of Orlová from 1. 2. 2010 to 31. 5. 2011 – provision of essential safety measures	2 397 600
Reducing verified methane emissions in the City of Orlová from 1. 6. 2010 to 30. 9. 2011 – provision of essential safety measures	2 397 600
Methane emissions in locations of plugged shallow boreholes in the cadastral area of Trojanovice – project	780 000
Total 4	**185 724 508**
5. Eliminating old ecological burdens in OKD, a.s.	
Processing the "Remediation and reclamation of the Kašpárkovice lands" project	809 200
Processing the "Remediation of the Solca tailing ponds" project	1 224 510
Processing the "Development of lands including Karvinský Creek in the area of Špluchov – phase 3" project	1 860 565
Remediation and reclamation of the Křemenec area	113 929 281
Expert assessment of the legitimacy of OKD, a.s. request for approval of Method Changes No. 3 – Křemenec	39 668
Reclamation of waste dump D – reclamation of waste dump D1 and D2	51 126 441
Dolina I land decontamination and reclamation	19 393 615
Louky land reclamation – structure 8	60 525 001
Land development within the scope of revitalising the František locality	376 902 703
František locality – additional construction work	63 260 118
Remediation of Solec hill, structure 2 – additional construction work	4 389 633
Total 5	**693 460 735**
6. Land development upon termination of mining	
Demolition KOBLOV	6 914 610
Demolition HRUŠOV	6 845 432
Project documentation regarding land development within the scope of eliminating environmental damage upon termination of mining – executed in areas no. 1 and 3 of project no. 45	1 543 500
45/01 František premises, phase 1	13 917 808
45/02 František premises, phase 2 – demolition	1 229 793
Ostravice Dam – Hrabová km 12.05, no. st. 237	63 580 471
Remediation of the damaged Ostravice dam body – additional construction work	12 184 996
45/07 Přívoz premises, demolition	10 835 872

45/08 Pokrok premises, demolition	25 498 110
Landslide stabilisation and drainage modification in the area of Bučinský les in the cadastral area of Radvanice and Bartovice – project	1 591 030
Landslide stabilisation and drainage modification in the area of Bučinský les in the cadastral area of Radvanice and Bartovice – supplemental engineering-geological survey	235 620
45/09 Farma VKK 1 Rychvald premises	19 276 732
VKK Rychvald premises – additional construction work	3 321 357
45/11 Comprehensive development of the water channel and canal network on the premises of the Petr Bezruč mine – project documentation	1 920 000
45/12 Land development upon termination of mining by DIAMO, s. p., o. z. ODRA – Hlubina premises	7 057 921
45/14 Land development upon termination of mining by DIAMO, s. p., o. z. ODRA – Barbora premises, phase 2	2 268 698
Huminisation of the town centre of Orlová Lutyně – study	2 031 687
Reclamation of lands of the former František – Horní Suchá mine – additional construction work	17 729 490
Preparation of a biological assessment according to Act No. 114/1992 Coll., as amended, as part of the land development upon termination of sand and gravel mining – Hlučín	237 600
Realization of Mír Gardens in Svinov – project	201 600
45/15 Petr Bezruč mine premises, phase 2	3 519 309
Reclamation of former mining land in the cadastral area of Malá Štáhle for leisure and tourism purposes – project	2 208 000
Documentation according to article 6, Act No. 100/2001, on environmental impact assessment, noise and dispersion study to the project Huminisation of the town centre of Orlová	228 000
Huminisation of the town centre of Orlová Lutyně – project documentation	4 447 000
Reclamation of the waterbody in the historic Božena Němcová Park, affected by mining, for leisure activities of residents of the City of Karviná – project	2 352 000
Revitalization of former mining land in the cadastral area of Horní Benešov – project	2 358 440
Total 6	**222 933 026**
Total 1–6	**1 165 163 655**

Projects in progress (in CZK)

Project name	Project price	Project costs thus far
1. Reclamation work		
7/03 Remediation and reclamation of reservoirs and lands below the Stachanov reservoirs	54 190 395	39 595 086
7/05 Drainage of waterlogged land at Ščučí – project	7 349 654	7 282 789
7/09 Reclamation of NP 1 lands	117 400 280	38 443 430
7/10 Remediation of the Václav waste dump	19 615 573	18 658 833
7/13 Remediation SALMA	7 131 668	6 787 012
7/14 Reclamation of the Oskar waste dump	6 091 630	5 486 004
7/17 Remediation of the Urx lanslide area	6 948 771	6 926 827
7/18 Capacity increase of Sčučí floodway – project documentation	2 371 600	166 500
7/21 Anti-erosion measures Salma	877 212	688 670
7/23 Remediation of Lipina premises, land A	5 963 654	4 150 451
Total 1	**227 940 437**	**128 185 602**

2. Reducing thermal activity		
3. Comprehensive land development		
9/02 Monitoring, measuring and assessment of the area of the Slezkoostravsky and Bartovicky fault	533 520	489 060
Total 3	**533 520**	**489 060**
4. Comprehensive reduction of uncontrolled methane emissions		
Controlled methane drainage from underground areas in the City of Orlová (Project Orlová 3)	111 299 603	41 469 421
35/4 Humanization of foolproof or liquidated old mine workings and degasifying boreholes in Ostrava town residential area	193 140 597	92 677 871
35/5 Avoidance of uncontrolled leakages of gas from deep explorarion boreholes in Trojanovice territory, boreholes NP 546 and NP 805	48 295 233	42 478 164
35/6 Avoidance of uncontrolled leakages of gas from deep explorarion boreholes in Václavice, Soběšice-Dolní Domaslavice, Fryčovice-Příbor východ territory – exploration works	48 276 482	29 687 519
35/D3 Monitoring and maintaining the old mine working during the project execution, methane-screening	21 920 903	18 571 457
35/B "Land categorisation map OKR"	2 264 500	1 816 290
35/D3 Monitoring and maintenance of old mine working with continuous data transfer (4 old mine workings) – project	2 398 000	1 642 323
35/J Redesign of existing electrical monitoring system – project	37 855 151	31 093 934
Updated project no. 35 – Comprehensive reduction of methane connected with old mine workings in the Moravian-Silesian Region	1 271 961 696	287 696 695
35/7 Plugging of deep exploration oil and natural gas borehole Lm – 1 Dolní Lomná	15 471 008	0
Repeated liquidation of the old mining working Michálkovická jáma (Michálkovice shaft)	9 416 752	0
Total 4	**1 762 299 925**	**547 133 674**
5. Eliminating old ecological burdens in OKD, a.s.		
Decontamination and reclamation of sludge tanks – phase III., IV. and V.	261 721 195	239 156 396
Darkov land reclamation, phase I, locality C2	395 104 159	386 637 496
Decontamination and reclamation of the Lazy mine sludge tanks, phase I. and II.	33 773 258	27 703 704
Reclamation of the Lazy waste dump	101 268 628	89 703 807
Rehabilitation of the Zdeněk Nejedlý Park – phase I., remediation of land south of the Karvinský Stream	47 697 096	41 104 265
Reclamation at the former OKD Dopravy, site A – construction work	4 713 506	3 226 693
Reclamation of Solecký Hill, structure II	22 569 081	8 524 655
Regulation of the Stonávka River, km 0.00–2.90 phase A	177 037 484	152 597 059
Regulation of the Stonávka River, km 0.00–2.90 phase A - additional construction work	31 789 848	21 833 568
Reclamation of the D1 waste dump – slope adjustment	11 443 632	9 522 951
Total 5	**1 087 117 887**	**980 010 595**
6. Land development upon termination of mining		
Reclamation of lands of the former František – Horní Suchá mine	95 200 679	93 765 102
Land stabilisation and drainage modification in the area of the Šporovnice locality in the cadastral area of Radvanice – project	1 779 600	1 631 300
Remediation and reclamation of land upon termination of sand and gravel mining at Hlučín – project documentation	34 675 090	13 801 200
Remediation and reclamation of land upon termination of sand and gravel mining at Hlučína – project documentation	34 508 640	13 801 200
Revitalization of municipality Doubrava centrum – square – project	120 000	110 000

Revitalization of former sandpit lands and forest areas in the cadastral area of Sedlnice for recreation purposes – project	2 334 000	1 661 000
Reviclamation of the area of Volný Pond and forest lands in the cadastral area of Radvanice for leisure activities	4 912 661	4 396 893
Development of former mining land – Reconstruction of road no.III/472 (Doubrava-Dědina) damaged by mining activities – project documentation	2 403 790	1 636 690
Revitalisation of the centre of the Svinov District near the elementary school at Bílovecká 1 – project	270 810	158 400
Reclamation of former mining land in the cadastral area of Horní Benešov – Cycle Routes – project	2 157 330	809 600
45/19 Comprehensive development of the water channel and canal network on the premises Koblov – project documentation	2 110 700	1 508 350
45/20 Potable water conveyance to and from the Alexander premises – project documentation	368 200	215 600
Reclamation of former mining land in the cadastral area of Horní Benešov – Road Restoration – project	1 136 406	535 260
Reclamation of former mining land in the cadastral area of Bruntál – "Za mlékárnou" locality – project documentation	2 416 975	0
Reclamation of former mining land in the cadastral area of Bruntál – "Za mlékárnou" locality – EIA documentation	496 100	0
Reclamation of former mining land in the cadastral area of Bruntál – "Laguny" locality – project documentation	2 349 700	1 078 000
Remediation and reconstruction of the canal system due to the aftermath of mining impacts of coal mining in Petřvald	354 445 568	297 210 515
Documentation pursuant to article 6 of Act No. 100/2001 Coll., on environmental impact assessment; Noise Study and Dispersion Study for the project documentation	228 000	209 000
Reconstruction of bridge in Albrechtice	1 438 830	383 900
Reclamation of formenr mining land in Ostrava-Nová Ves cemetery locality	3 592 000	3 102 558
Development of former mining land – multifunctional area of former Důl Dukla mine	252 273 612	194 283 695
Revitalization (remediation) of Slezská Ostrva Castle in connection with damage control of former mining activity and land preparation for leisure activities	34 626 442	11 554 021
Revitalization and resocialization of lands affected by mining activity in Horní Město – Revitalization of community centre after mining – security provision of old mine workings	22 745 956	13 447 321
Revitalization and resocialization of lands affected by mining activity in Horní Město – Revitalization of community centre after mining – security provision of old mine workings – additional construction works	2 011 277	0
Revitalization of territory negative influenced by construction of water reservoirs for mines and iron works – Revitalization Žermanice dam territory – right bank protection – phase I. and II.	70 996 213	18 566 466
Revitalization (remediation) of Ostravice river Castle in connection with damage control of former mining activity	174 795 342	93 364 498
Lučina, revitalization of waterway after mining activity, river kilometrage 0.000–3.262, construction no. 5657 – project documentation	2 323 200	238 650
Ostravice river, check dam in river kilometrage 0.0–3.0 construction no. 5659 – project	2 328 040	943 500
Ostravice river, check dam in river kilometrage 0.0–3.0 construction no. 5659 – project	2 308 800	0
Remediation of mine damages at Bohumínská Stružka, Rychvaldy weir – Czech Railways track, kms 4.595-10.530, construction no. 5660 – project documentation	2 318 360	0
Documentation processing and engineering for project Remediation, reclamation and revitalization of territory after sand and gravel mining near Hlučín – additional services	3 840 672	1 722 446
Damage control of former mining activity and subsidence of ground – flood control Žabník in Ostrava – Koblová	58 657 519	0
Revitalization and resocialization of lands affected by mining activity in Horní Město – Revitalization of former mining land in Skály u Rýmařova, the cadastral area of Skály u Rýmařova – project	1 172 490	0

Revitalization of former mining land in the cadastral area of Brumtál – locality "Uhlířský vrch" – I. stage – project	145 200	0
Revitalization and resocialization of lands affected by mining activity in Horní Město – Preparation of industrial zone – project	1 089 000	0
Revitalization and resocialization of lands affected by mining activity in Horní Město – Preparation of industrial zone – Cycle track Rešov – Rešovské vodopády (Rešov waterfalls) – project	1 028 500	0
Revitalization and resocialization of lands affected by mining activity in Horní Město – Cycle track Dobřečov – Ferdinandov – project	907 500	0
Total 6	**1 143 695 762**	**756 333 965**
7. Eliminating ecological burdens caused by the extraction of crude oil and natural gas		
Remediation of old ecological burdens – insufficiently plugged probe holes upon termination of the extraction of crude oil and natural gas – Eliminating hazardous conditions at probe hole HR 43	238 149 638	238 144 159
Remediation of old ecological burdens – inadequately liquidated probe holes of past crude oil and natural gas production – Eliminating hazardous conditions at probe hole HR 44 – additional construction work	38 147 146	6 580 424
Remediation of old ecological burdens – inadequately liquidated probe holes of past crude oil and natural gas production in sector I CHOPAV of the Quaternary of the Morava River	828 284 357	667 664 835
Remediation of old ecological burdens – inadequately liquidated probe holes of past crude oil and natural gas production in sector II CHOPAV of the Quaternary of the Morava River	707 223 047	552 613 475
Remediation of old ecological burdens – inadequately liquidated probe holes of past crude oil and natural gas production in sector III CHOPAV of the Quaternary of the Morava River	526 483 998	409 744 030
Remediation of old ecological burdens – inadequately liquidated probe holes of past crude oil and natural gas production in sector IV CHOPAV of the Quaternary of the Morava River	812 284 527	268 316 792
Remediation of old ecological burdens – inadequately liquidated probe holes of past crude oil and natural gas production in sector V CHOPAV of the Quaternary of the Morava River	714 553 603	140 424 873
Remediation of old ecological burdens – inadequately liquidated probe holes of past crude oil and natural gas production in sector VI CHOPAV of the Quaternary of the Morava River	3 204 512 981	816 084 155
Total 7	**7 069 639 297**	**3 099 572 743**
Total 1–7	**11 291 246 528**	**5 511 725 639**

Reducing impacts caused by the termination of coal mining in the Kladno Region

In the middle of 2002, the Czech Republic Government decided to phase out underground mining of bituminous coal in the Kladno Region due to the economic ineffectiveness of mining. This hasty closure of mines in this region brought about, similarly as in the preceding coal districts, the need to deal with eliminating environmental damage caused by past mining operations in a special way.

In consideration of the situation which developed in the Kladno Region, the Czech Republic Government noted the need to reduce the impacts caused by the termination of coal mining in the Kladno Region, by issuing Resolution No. 552 on 4 June 2003, dealing with the reduction of impacts caused by the termination of coal mining in the Kladno Region. It agreed with the idea of gradually releasing, according to the means of the National Property Fund of the Czech Republic, an amount of up to CZK 1.177 billion from FNM resources starting in 2004 in order to deal with ecological impacts caused by coal mining in the past and with land reclamation. Considering the shortage of funds in order to carry out the "Reclamation of the Tuchlovice Mine Waste Dump" contract, the Czech Republic Government modified the above-mentioned resolution with Resolution No. 1467 on 20 December 2006, and agreed with the idea of gradually releasing, according to the means of the MF, funds in the amount of up to CZK 1.427 billion starting in 2004

from a special account managed by the MF pursuant to article 4 of Act No. 178/2005 Coll., on the termination of the National Property Fund, in order to deal with ecological burdens caused in the past and with land reclamation. From that time the sum was increased to CZK 1.727 billion pursuant Government Resolution No. 688 on 9 June 2008.

The following projects are considered essential:

- eliminating the dangerous conditions at the V Němcích Schöeller mine waste dump
- reclamation of the Tuchlovice mine waste dump

As of 31 December 2012, the funds actually spent on 4 concluded projects amounted to CZK 0.409 billion and on 3 projects in progress they amounted to CZK 1.277 billion as of the date specified. The remaining financial amount required to secure additional money for projects in progress amount to about CZK 0.025 billion according to contracts.

Projects concluded (in CZK)

Project name	Project costs
V Němcích Schoeller mine waste dump – eliminating dangerous conditions	234 429 193
Eliminating the dangerous conditions at the V Němcích Schoeller mine waste dump – stage 2, western section	106 862 466
Eliminating the dangerous conditions at the V Němcích Schoeller mine waste dump – additional construction work	46 608 677
Reclamation of Tuchlovice dump – Supplementno. 1 of the Project Erosion control measures	20 274 715
Total	**408 609 117**

Projects in progress (in CZK)

Project name	Project price	Project costs thus far
Reclamation of the Tuchlovice mine waste dump	1 024 256 235	1 023 565 669
Reclamation of the Schoeller mine waste dump in Libušín	271 177 604	253 959 392
Reclamation of the Schoeller mine waste dump in Libušín	9 625 428	
Total	**1 305 084 615**	**1 277 525 061**

6. Sources of European Union – Operational Programme Environment (administered by the Ministry of Industry and Trade)

The European Union funds used via Operational Programme Environment have been the important source of funding of ming activity damages and old environmental burden avoidance since 2008. Till present the sum **CZK 886 930 ths** has been used from the source at 10 concluded projects in the period 2008 – 2013, next 3 projects for realization in 2014–2015 are developed and utilization of EU funds is expected. Projects for subsequent periods are continuously prepared depending on bids offered by Ministry of the Environment.

Project name	Project realization term	Share of EU subsidy (issued RoPD) 85% (CZK)	Total project costs (incl. VAT) – as per attached invoices (CZK)	Project status
Territory risk analysis for lands managed by s.p. DIAMO – o.z. SUL Příbram, former mining and benefication plant Březové Hory – Příbram	2009–2010	2 509 246	3 705 571	Execution of the project finished, documents of ZVA na SFŽP
Risk analysis of dumps affected by internal burning managed by DIAMO s. p., o.z. Odra	2009–2010	11 547 099	16 673 582	Execution of the project finished, documents of ZVA na SFŽP
Remediation and reclamation of old environmental burden of DIAMO s.p. at Mydlovary premises – chemical treatment plant and tailing pond K IV/D	2008–2010	467 951 745	704 758 892	Execution of the project finished, documents of ZVA na SFŽP
Territory risk analysis for lands managed by s.p. DIAMO – o.z. SUL Příbram, former mining and benefication plant Kaňk – Kutná Hora	2009–2010	3 382 997	5 188 890	Execution of the project finished, documents of ZVA na SFŽP
Territory risk analysis for lands managed by s.p. DIAMO – o.z. TÚU Stráž pod Ralskem affected by uranium underground mining	2009–2010	14 337 972	20 240 150	Execution of the project finished, documents of ZVA na SFŽP
Risk analysis of uranium ore and aggregates loading area Milín	2011–2012	1 340 778	4 176 782	Execution of the project finished, documents of ZVA na SFŽP
Complex risk analysis of DIAMO s.p. at Mydlovary premise and tailing ponds, inclusive wider vicinity	2011–2012	11 039 922	17 005 730	Execution of the project finished, documents of ZVA na SFŽP
Risk analysis of withdrawal area endangering by incompletely liquidated drilled wells after oil and natural gas mining in “CHOPAV Kvartér řeky Moravy”	2009–2011	80 286 441	104 283 936	Execution of the project finished, documents of ZVA na SFŽP
Risk analysis of Bytíz premise after uranium underground mining	2012–2013	3 262 494	6 557 336	Execution of the project finished, documents of ZVA na SFŽP
Finalization of rock environment and groundwater polution exploration of lands managed by s.p. DIAMO – o.z. SUL Příbram, former mining and benefication plant Kaňk – Kutná Hora and its close vicinity	2012–2014	3 062 191	4 339 576	Execution of the project finished, documents of ZVA na SFŽP
Land remediation of former mining and benefication plant Příbram, Březové Hory – Phase 1	2012–2015 (2016)	92 530 127	114 878 912	Project is executed

Notes: RoPD = Rozhodnutí o poskytnutí dotace vydávané žadatelům Ministerstvem životního prostředí = Decision on subsidizing issued to applicants by Ministry of the Environment

CHOPAV = Chráněná oblast přirozené akumulace vod = Natural water accumulation protected area

“CHOPAV Kvartér řeky Moravy” = Natural water accumulation protected area of Morava River Quaternary

ZVA na SFŽP = Závěrečné vyhodnocení na Státní fond životního prostředí = Final assessment for the State Environmental Fund

GEOLOGY AND MINERALS

Geological evolution of the area of the Czech Republic

Arnošt Dudek

The Czech Republic is located in the very centre of Europe at the limit between the Hercynian Meso-Europe and the Neo-Europe (Fig. 1). There is hardly any country with such a variegated geological structure in such a small area and with such a complex geological evolution. Practically all known rocks and the majority of geological formations and known types of ores and industrial minerals occur on the state territory. Even though most ore deposits are interesting mainly from a scientific and mineral collectors' point of view, a number were of European importance during the Middle Ages and the beginning of modern time. The interesting and complex history of this area attracted attention of researchers already in early times and it strongly influenced the evolution of the mining and geological sciences. It was on this territory where one of the oldest mining laws, the Jihlava Mining Law (1260), and slightly later the mining law of the King Wenceslas II "Ius regale montanorum" (1300), which became basis of many mining laws in other states of the world especially in South America, came into being. The origin of the world-known works of Georgius Agricola, especially his book "Bermannus sive de re metallica dialogus" (1530), is also linked to the territory of the Bohemian Massif.

Three main structural complexes form the geological structure of Czech territory. The oldest one, consolidated already during the Precambrian orogenies, is **Brunia (Brunovistulicum)**, taking basically the area of Moravia. This segment of the Earth's crust probably represents an extremity of the East European platform, even though some researchers consider it as a part of the African plate. The influence of the younger – Paleozoic and Alpine – orogenies was only minor and it served as a foreland of the nappe structures which were thrust over it. The **Hercynian-consolidated Bohemian Massif**, overlapping to the area of the neighbouring Austria, Germany and Poland in the south, west and north, forms the major part of the state territory. Bohemian Massif belongs to the Paleo-Europe. The Hercynian orogeny in the end of the Carboniferous put the finishing touches on it, even though it also contains older building elements. It already behaved as a consolidated block after the Hercynian orogeny, only sometimes flooded by epi-continental sea and affected only by fault tectonics. As a crustal block rising from young sedimentary formations, it broke up only during the younger mountain-building processes, morphologically only in the end of the Neogene and in the Quaternary. Geological continuation of the Hercynides towards the west is indicated by other crustal blocks which were created later – Schwarzwald, Vosges Mountains, the French Massif Central and Iberian Meseta, in the northern branch then the Armorican Massif and massifs in southern England and Ireland. The eastern margin of the Bohemian Massif was thrust over the Cadomian unit of the Brunovistulicum during the Hercynian orogeny. The boundary between the hercynian Mesoeurope and alpine Neoeurope crosses the eastern part of the Czech Republic. The Alpides are represented there

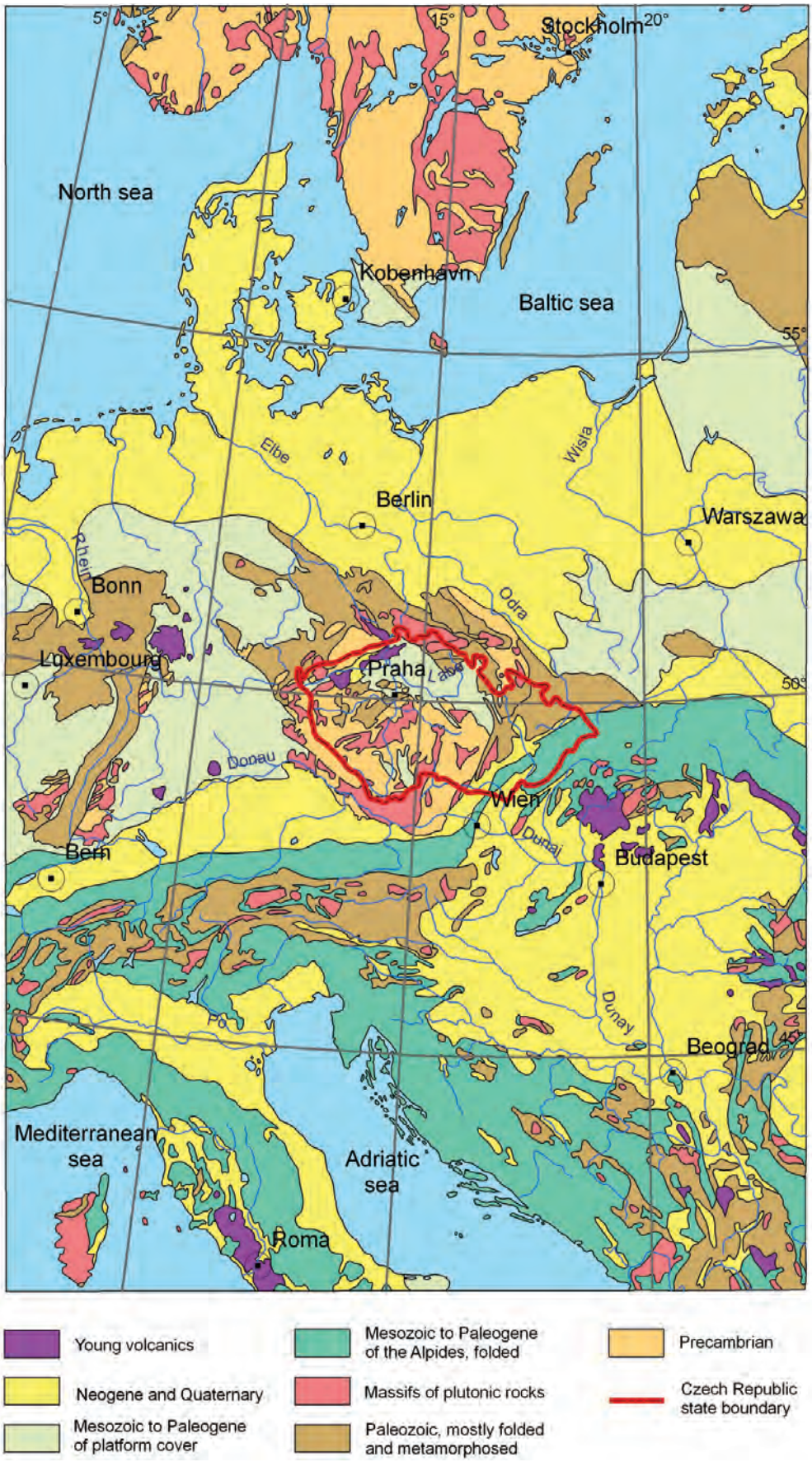


Fig. 1: Geological position of the Czech Republic in Europe

by the **West Carpathians**. They are built by an inner unit – Central West Carpathians, Outer Flysh Carpathians and the Carpathian Foredeep. The ***Central West Carpathians*** are formed by pre-Mesozoic volcanosedimentary complexes, mostly metamorphosed and penetrated by late-Hercynian granitoid plutons, and their sedimentary cover (Trias to Lower Cretaceous). At the beginning of Upper Cretaceous the Central Carpathians were intensively folded and in places also metamorphosed. A tectonic zone of first order – the ***Klippen Belt,*** built mostly by Mesozoic sedimentary rocks separates the Central Carpathians from the external Flysh Carpathians. The ***Outer Flysh Carpathians*** are formed (besides rare uppermost Jurassic sediments and local Cretaceous volcanics) predominantly by sedimentary complexes of Cretaceous and Paleogene age. These complexes were as horizontal nappes thrust over the Brunovistulian basement and its sedimentary cover over a distance of tens of kilometres partly even over the Neogene Carpathian Foredeep.

As in the study of the history of mankind, there is little information on the oldest periods of the evolution of the Earth we live on, and our findings are accompanied by a large number of uncertainties. This of course applies also for the Czech territory, even though it belongs to the areas where systematic geological research was in progress since the beginning of the 19th century.

Complexes of the **Brunia (Brunovistulicum)** crop out on the surface only in the western Moravia, but they reach far to the east below the overthrust nappes of the Outer Flysh Carpathians. They are formed by metamorphic rocks – mainly monotonous biotite paragneisses – which were altered during the Proterozoic orogenies, and intruded by huge massifs of abyssal magmatic rocks of about 550 Ma age at the boundary between the Proterozoic and Paleozoic. The Brno and Dyje Massifs represent the exposures of these rocks. Granitoid plutons covering large areas as well as smaller basic massifs of gabbros and norites compacted this unit and prevented its later reworking by younger mountain-building processes, which formed the Bohemian Massif. Western parts of the Brunovistulicum are built by variegated volcano-sedimentary complexes (involving limestones, graphitic rocks, quartzites, amphibolites and orthogneisses). These parts were strongly affected by the Hercynian tectonometamorphic processes. They crop out from beneath of the overthrust Hercynian complexes of the Moldanubicum and Lugicum in tectonic windows of the Dyje and Svratka Domes of the **Moravicum** and Desná Dome of the **Silesicum**. Their appurtenance to the Brunia (Brunovistulicum) has not been commonly accepted yet and these units are by some authors ranked to the Lower Paleozoic and to the Hercynian Bohemian Massif. Platform sediments – the Cambrian conglomerates and sandstones in limited areas, marine Silurian shales sporadically and extensive and important sediments of the Devonian, Mississippian (Lower Carboniferous) and continental sediments of the coal-bearing Pennsylvanian (Upper Carboniferous) – are deposited on the Cadomian basement. The younger platform cover is represented by sediments of the Jurassic, Cretaceous, Paleogene and the Neogene of the Carpathian Foredeep. This consolidated basement was overthrust by nappes of the Outer Flysh Carpathians from the east (Fig. 2).

The lower level (basement) of the **Bohemian Massif** – the epi-Variscan platform – is built by metamorphic rocks intruded by numerous and very large granitoids massifs, and by only weakly metamorphosed or unmetamorphosed but Hercynian-folded Lower Paleozoic. Regionally it is divided (Fig. 3) into the core, formed by the highly metamorphosed **Moldanubicum** and mostly only weakly metamorphosed **Bohemicum (Teplá-Barrandian domain).** This core is rimmed by the **Saxothuringicum** (Krušné hory Mts.) on the NW, **Lugicum** (Krkonoše Mts., Orlické hory Mts., Králický Sněžník) on the north and **Moravo-Silesicum** (Jeseníky Mts., eastern part

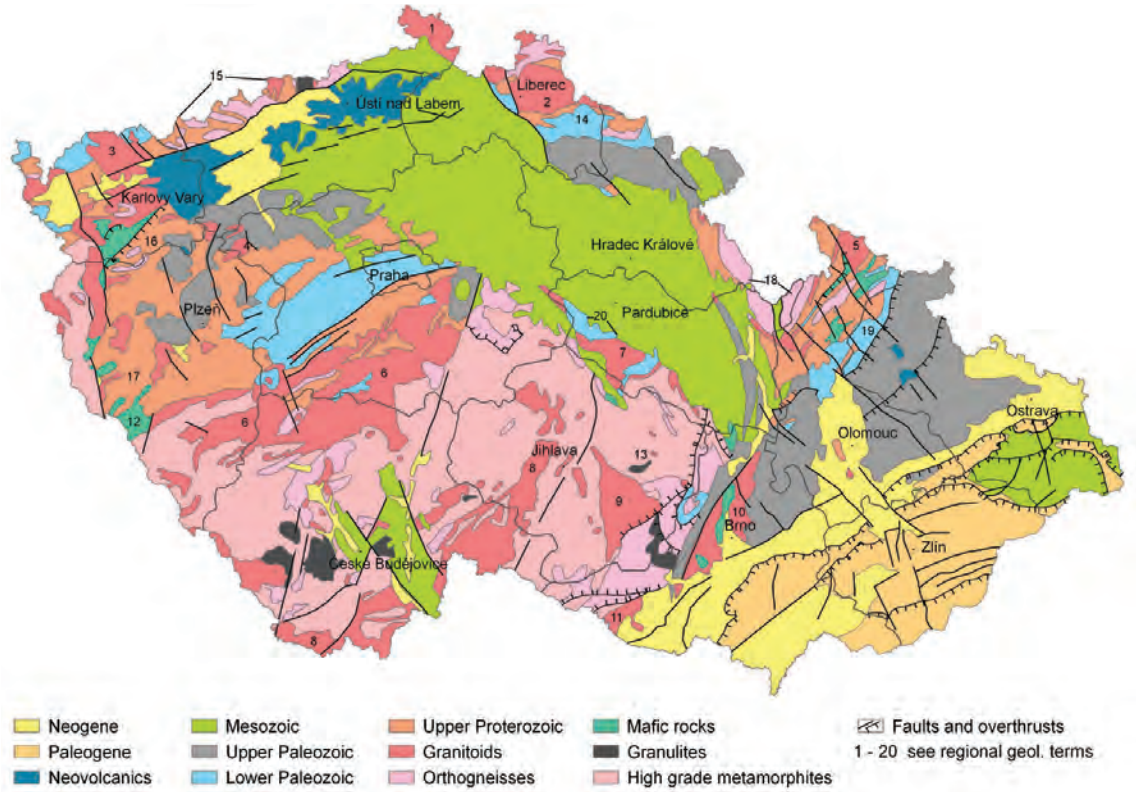


Fig. 2: Geology of the Czech Republic

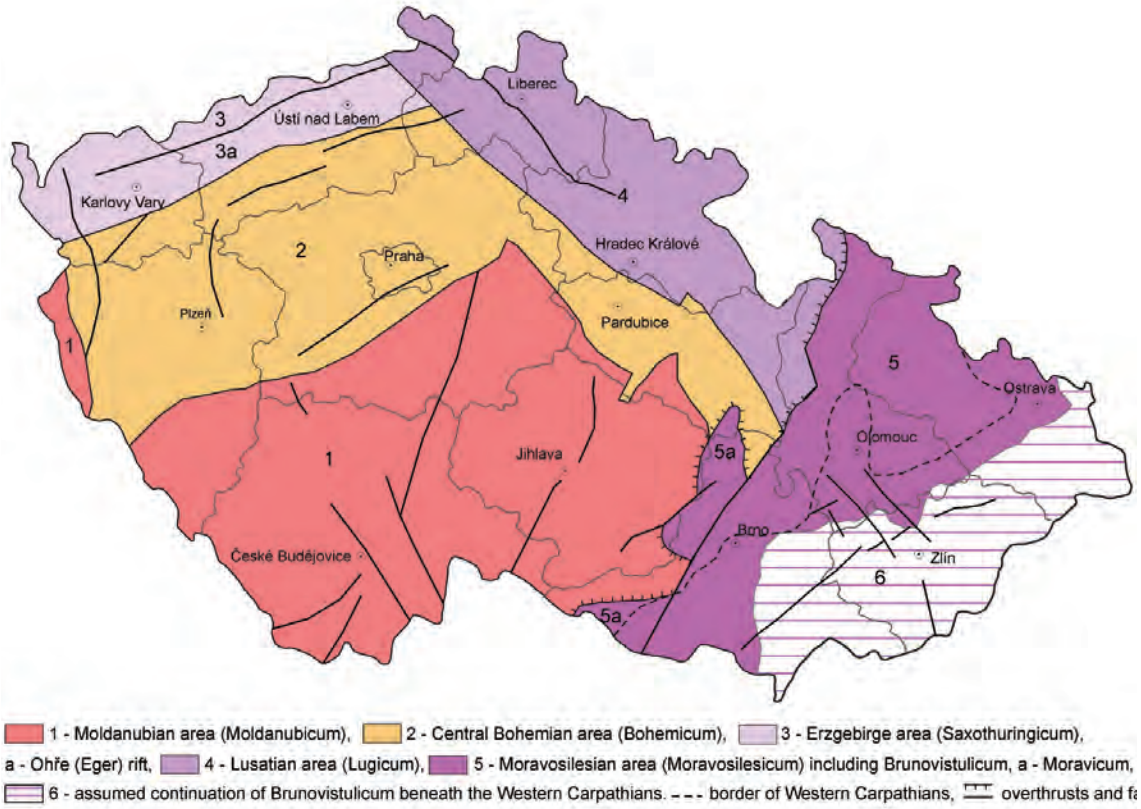


Fig. 3: Regional basement division of the Bohemian Massif on the territory of the Czech Republic

of the Českomoravská vrchovina Highlands) on the east (see Fig. 3). These marginal complexes are metamorphosed mostly less intensively than the central Moldanubicum.

The ***Moldanubicum*** is formed by rocks metamorphosed mainly in the amphibolite facies – sillimanite and cordierite gneisses and migmatites with intercalations of orthogneisses, marbles, quartzites, graphitic rocks and amphibolites. Bodies of high-temperature and high-pressure metamorphic rocks – granulites and garnet peridotites with eclogites – are numerous, too. Their occurrences mark the course of old tectonic zones, along which these rocks were exhumed from depth. They are exposed mainly in southern Bohemia (Blanský les, Prachatice, Křišťanov and Lišov granulite massifs) and western Moravia (Bory and Náměšť granulite massifs). The age of the protolith of Moldanubian complexes is probably Upper Proterozoic; their metamorphism under the amphibolite, granulite and eclogite facies conditions is linked to the Hercynian orogeny. Pre-Paleozoic, Cadomian metamorphism of regional extent, mostly overprinted by the Hercynian processes, is nevertheless documented. Minor bodies of old orthogneisses exhumed along deep-reaching faults in the southern Bohemia, the radiometric age of which is even 2.1 Ga, represent a single exception. They document the existence of the Lower Proterozoic in the deeper crustal structure of the Bohemian Massif. Some Moldanubian rocks, especially gneisses, granulites and amphibolites, represent common resources of building stone.

The metamorphic rock complexes of the central Bohemian ***Bohemicum (Teplá-Barrandian domain)*** as well as the marginal complexes of the Saxothuringicum, Lugicum and Moravo-Silesicum developed by regional metamorphism of mainly Upper Proterozoic protoliths (1,000–545 Ma). During this period, the area of today's Bohemian Massif was covered by a deep sea, in which sandy and clayey rocks were deposited. Surrounding continents, probably rather distant in the mainland formed by very old rocks, represented the source area of the deposited material. Some clastic minerals from metamorphic rocks of the southern Bohemia (up to 2.7 Ga old, in the neighbouring Bavaria even 3.8 Ga) were at least in part derived from the Archaic of the African shield. They were of course deposited much later. The sedimentation was accompanied by submarine volcanism of tholeiitic basalts, which formed linear structures tens of kilometres long, maybe in some cases standing out above the sea level (*island arcs*) as well as much less extensive acid volcanism. The volcanic activity was accompanied by deposition of black shales with abundant pyrite and of siliceous sediments – lydites. Finely banded structures resembling organogenic stromatolites, which would belong to the oldest organic remnants on the Czech territory, were found rarely in the latter. A set of these sediments and volcanic rocks was intensively folded and mostly also metamorphosed in the end of the Proterozoic. Very weakly metamorphosed Proterozoic rocks are nowadays exposed only in central Bohemia between Prague and Plzeň (in the so-called *Barrandian*). The intensity of their alteration increases towards the marginal mountains. A continuous succession of thin metamorphic zones of Barrovian type up to gneisses with kyanite and sillimanite developed especially towards the W and SW. Proterozoic rocks are altered into gneisses and amphibolites also in the Krušné hory Mts., Krkonoše Mts., Orlické hory Mts. and Hrubý Jeseník Mts. These complexes were intruded by numerous massifs of granites (especially Stod, Čistá-Jesenice and Lužice massifs) and gabbros (Kdyně and Poběžovice massifs) in the end of the tectonometamorphic processes especially in the western and northern Bohemia. The Pre-Paleozoic ***Cadomian orogeny*** represents one of the most important magmatogennic and tectonometamorphic processes in the evolution of the Bohemian Massif.

The Earth's crust in Czech territory was not completely solid after the Cadomian orogeny and it gradually broke into a number of smaller blocks, which moved away from each other and

were partly flooded by sea again during the ***Lower Paleozoic*** [Cambrian, Ordovician, Silurian, Devonian to Mississippian (Lower Carboniferous)]. Unaltered sediments were preserved especially in central Bohemia, in the area between Prague and Plzeň (Pilsen), named Barrandian, to a lesser extent also in other parts of the Bohemian Massif. In its marginal parts (excluding Brunovistulicum), Paleozoic complexes experienced strong metamorphism and therefore their identification and dating is commonly very difficult. In the Barrandian, sedimentation started already in the ***Lower Cambrian***, represented by a formation of conglomerates and sandstones up to several hundred to thousand meters thick. Sporadic occurrences of shales of fresh-water or brackish origin, in which the oldest fossils of arthropods in Bohemia were found, are known here. Sea penetrated to central Bohemia in the Middle Cambrian and deposited sandstones and especially shales, which are world-known for their occurrences of trilobite fauna. The evolution of the Cambrian was terminated by extensive rhyolites and andesite terrestrial volcanism.

The ***Ordovician*** started by the sea again transgressing in central Bohemia and by the formation of the so-called ***Prague Basin***, the evolution of which continued until the Middle Devonian. The Ordovician rocks are represented mainly by clastic sediments, mostly various types of shales with thick quartzite intercalations), the deposition of which was accompanied by intensive basaltic volcanism. Deposits of sedimentary iron ores (e.g. Nučice, Ejpovice etc.) which were of a high importance in the 19th and beginning of the 20th century originated in relation to the volcanic activity. The Bohemian Massif was located close to the southern polar circle in the Ordovician and sedimentation of rocks as well as volcanic activity proceeded in the sub-polar climate. This crustal segment moved rather rapidly to the north, into warmer waters of the tropic of Capricorn in the end of the Ordovician.

The change of the climate and by this also conditions of development of organisms and sedimentation during the ***Silurian*** resulted in formation of fine-grained black shales with abundant graptolite fauna, accompanied also by intensive volcanic activity and intrusions of numerous diabase sills. Mass development of organisms with carbonate shells occurred in its upper parts with regard to the increasing temperature and massive limestone formations were formed.

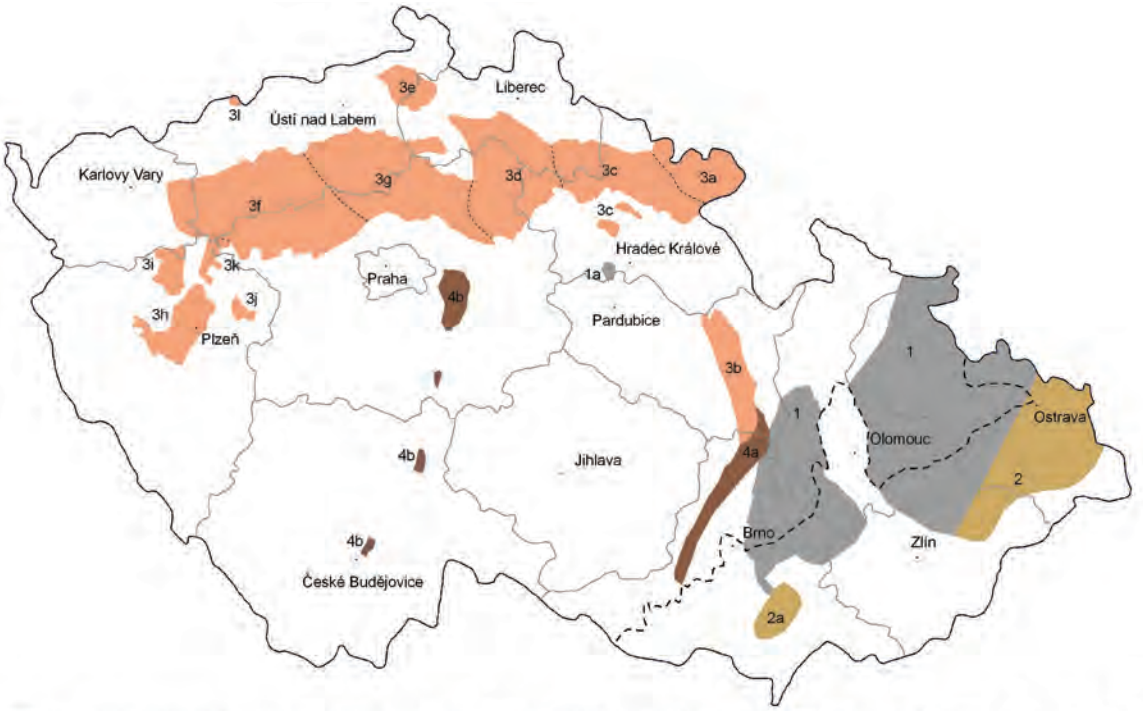
Continuous carbonate sedimentation in the Prague Basin lasted until the ***Devonian***, whereas in the surrounding parts of Europe as well as more distant areas the rock deposition was interrupted by the ***Caledonian orogeny***. Gradual unaffected evolution of both the sediments and organisms and their long-lasting detailed study by several generations of Czech paleontologists was a prerequisite for the determination of the first, globally valid ***stratotype*** between two systems (Silurian and Devonian) in Klonk u Suchomast SW of Prague. The limestone sedimentation in the Prague Basin terminated in the Middle Devonian and sandstones with terrestrial flora ended the Devonian sedimentation in this area.

Sedimentation of the Devonian rocks continued in the Upper Devonian only in the area of the Krkonoše Mts. (on Ještěd Mt.) and especially in Moravia in the Jeseníky Mts. and in the Moravian Karst. Evolution of the Devonian in Moravia differed from that on the Bohemian territory. Transgressive complex of the siliciclastic and volcanic rocks with stratiform deposits of Fe, Cu, Au, Zn and Pb overlie the old Brunovistulian basement in its western, more mobile part. This clastic sedimentation continues also in the Mississippian (Lower Carboniferous). The Devonian rocks on the more stable Brunovistulian basement in the south and east begin by clastic rocks, which in places reach over 1,000 m in thickness. Limestones appear only in the Upper Devonian and their evolution continues until the Mississippian (Lower Carboniferous). There is therefore no manifestation that the sedimentation was interrupted by the Hercynian

orogeny in Moravia. Sedimentation spaces just moved to the east to Ostrava region and to today's Carpathian basement. Limestones of the Upper Devonian form important deposits especially in central Moravia (e.g. Mokrá, Líšeň, Hranice etc.).

A change in the character of the sedimentation in the end of the Devonian is an expression of the ***Hercynian orogeny***, which affected (about 340–310 Ma ago) the majority of the Czech lands with a high intensity and expressed itself by the development of the nappe structure and a very strong metamorphism of large areas. Even the crystalline complexes formed during the Cadomian orogeny were metamorphosed again. Vast massifs of granitoid magmatic rocks of several thousand km^2 extent, not yet completely uncovered by denudation, formed practically simultaneously. Their intrusions were accompanied also by extensive surface volcanic activity and the development of very numerous deposits of variable genetic types (e.g. Krušné Hory Mts. massifs and Sn, W, Li, Ag, U, Co, Ni mineralization in the Saxothuringicum or Central Bohemian and Moldanubian Plutons in the Moldanubicum and Au, Sb, Ag, Pb, Zn, U mineralization). Granitoid massifs represent an important resource of building and dimension stone as well as feldspar raw materials. Weathered crusts of granitoids (e.g. Krušné hory Mts. massifs, Dyje Massif) are an important source of kaolin, too.

There are two different types of the ***Carboniferous*** and its rocks in the Bohemian Massif as a result of the Hercynian orogeny. The Mississippian (Lower Carboniferous) is represented in Bohemia only by restricted relics of marine sediments found by drillings under the Bohemian Cretaceous Basin E of Hradec Králové, and by weakly metamorphosed slates in the Ještěd



1 - Marine Mississippian (Lower Carboniferous - Culm); a - occurrence near Hradec Králové, 2 - Pennsylvanian (Upper Carboniferous) of the Upper Silesian Basin; a - occurrence in South Moravia, 3 - Limnic Permo - Carboniferous; partial basins: a - Intrasudetic B.; b - Orlice B.; c - Krkonoše Piedmont B.; d - Mnichovo Hradiště B..; e - Česká Kamenice B.; f - Kladno-Rakovník B.; g - Mšeno-Roudnice B. (Mělník B.); h - Plzeň B.; i - Manětín B.; j - Radnice B.; k - Žihle B; l - Brandov occurrence 4 - Permo - Carboniferous of the grabens: a - Boskovice G., b - Blanice G. – – – border of the Western Carpathians, ····· boundary of basins.

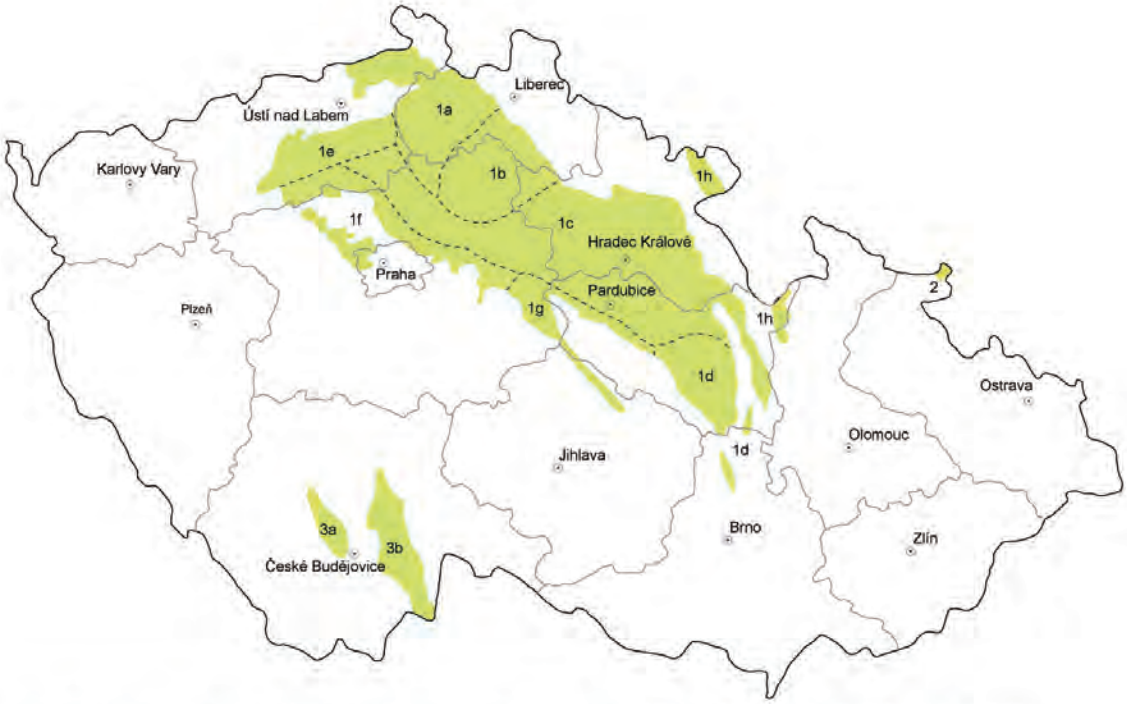
Fig. 4: Carboniferous and Permian in the Bohemian Massif and in the basement of the Western Carpathians on the territory of the Czech Republic

Ridge SW of Liberec. The sedimentation of the continental type begins in the intra-mountain basins only in the Pennsylvanian (Upper Carboniferous, Westphalian) and continues in the Permian. Basins with partly individual evolution extend in the Plzeň (Pilsen) surroundings towards the North and Northeast as far as the Broumov area in the NE tip of the Czech Republic (Fig. 4), where their stratigraphic extent is the largest and the sedimentation finishes as late as the Lower Triasic. They are to a large extent overlain by sediments of the Bohemian Cretaceous Basin. River and lake deposits – conglomerates, arkoses and shales with layers of tuffs, tuffites and lavas – are in many places accompanied also by formation of coal seams, which were and still are of a high economic importance. Some seams show an elevated U content making them even potential deposits. The Carboniferous arkoses in the Plzeň (Pilsen) and Podbořany regions gave rise to important deposits of kaolin. Carboniferous mainly refractory clay and claystone are important, too. The Bohemian Massif reached the equator on its way to the north and coal formation reflects the dominating tropical climate.

In Moravosilesian area, which was just weakly influenced by the Hercynian orogeny thanks to the solid Brunovistulian basement, the Devonian sedimentation was continuous until the Mississippian (Lower Carboniferous), when the formation of limestones terminated. It was followed by flyshoid sedimentation of conglomerates, greywackes and shales in multiple alternation of individual layers (Culm development). The greywackes represent a resource of a high-quality building stone. The depositional environment gradually changed from marine to fresh-water during the latest Mississippian and the Pennsylvanian (Upper Carboniferous) and important deposits of bituminous coal (paralic basins of the Ostrava, and limnic basins of the Karviná region) formed in the coastal marshes. The Czech part of the Upper Silesian Basin represents the most important bituminous coal mining district in the Czech Republic. The Carboniferous system in the Czech Republic was, and remains, not only an important energy base of the state but also a world-known classical area of Carboniferous flora and fauna.

The Hercynian mountains were rapidly lowered by erosion and denudation in the ***Permian***, and thick formations of red-brown conglomerates, sandstones, arkoses and shales formed. Sedimentation was accompanied also by basaltoid, andesitoid up to rhyolitic volcanism of the intra-plate type and sedimentation of clastic rocks with elevated Cu content. A substantial change of climate, caused by the shift of the lithospheric plate with the Bohemian Massif further north, into the belt between the equator and tropic of Cancer, resulted in the formation of deserts, which covered most of Europe. These sediments are today preserved in the Bohemian Massif only in relics. They reach the highest thickness – up to 3 km – in tectonic troughs of roughly N-S direction, so-called grabens (Boskovice and Blanice grabens). Coal seams (today already mined out) of Upper Stephanian age occur locally on the basis of the Permian in these grabens, and higher horizons contain restricted lake and river calcareous sediments. These are commonly overfilled by relics of Stegocephalians and especially of the Permian insects, which made the Boskovice Graben famous.

The Bohemian Massif was slowly uplifted as a compact block after the Hercynian consolidation and it remained mainly land almost until the end of Mesozoic. White lake sandstones of the ***Triassic*** are represented only to minor extent in NE Bohemia in the Krkonoše Mts. Piedmont and Intra-Sudetic Basins. Sea penetrated from the Carpathian area to northern Germany by a narrow channel across northern Bohemia (roughly between Brno and Dresden) in the ***uppermost Jurassic***. This channel linked the deep Tethys on the SE with the shallow shelf sea to the north from the Bohemian Massif. Limestones (Oxfordian–Kimmeridgian) are exposed only in small islands along the Lužice Fault. In the consolidated Bohemian Massif



1. Bohemian Cretaceous Basin and its facies areas (developments): a - Lužice a., b - Jizera a., c - Labe (Elbe) a., d - Orlice-Žďár a., e - Ohře (Eger) a., f - Vltava-Beroun a., g - Kolín a., h - Hejšovina and Bystřice a. 2. Cretaceous in environs of Osoblaha. 3. South Bohemian basins: a - České Budějovice b., b - Třeboň b. ---- boundary of facies areas (developments)

Fig. 5: Upper Cretaceous in the Bohemian Massif on the territory of the Czech Republic

was the ***Alpine orogeny*** represented mainly by origin of faults or rejuvenation of older fault systems. ***Transgression of the Upper Cretaceous sea***, which flooded all the northern and partly also the central part of the Bohemian Massif, was of much higher importance. Several hundreds meters thick strata of the Upper Cretaceous claystones, marlites, sandy marlites and sandstones (the Bohemian Cretaceous Basin – Fig. 5) developed there. The Bohemian Cretaceous Basin is divided into facies areas (developments) shown in Fig. 5 based on character of sedimentation in particular parts of the Basin. Rock complexes of the Basin represent the most important underground water reservoir in the Czech Republic and also an important raw material resource (ceramic and refractory clay, glass, foundry and mortar sand, cement raw materials, building and sculpture stone but also uranium). A small occurrence of Upper Cretaceous sediments near Osoblaha is an extremity of the Polish Opole Cretaceous Basin. Smaller, but fresh-water Upper Cretaceous basins formed also in southern Bohemia. It is the České Budějovice Basin localized more westward and the Třeboň Basin localized more eastward.

The evolution in Moravia was different. The Triassic is not represented at all, whereas in the ***Jurassic*** the sea penetrated from the Mediterranean area far to the NW and flooded the eastern margin of the Bohemian Massif. Jurassic sediments are nowadays to a large extent covered by rocks of the Neogene or the Outer Flysh Carpathian nappes. Tectonic blocks of the Jurassic limestones, exhumed from depth in front of the Carpathian nappes and forming isolated klippen by Štramberk and in the Pavlovské vrchy Hills, represent an important land-forming element and also an important resource of very pure carbonate raw material.

The character of the sedimentation in the Outer Carpathians markedly changed in the ***Cretaceous***. Sediments formed in deeper sea from submarine slides and turbidite currents,

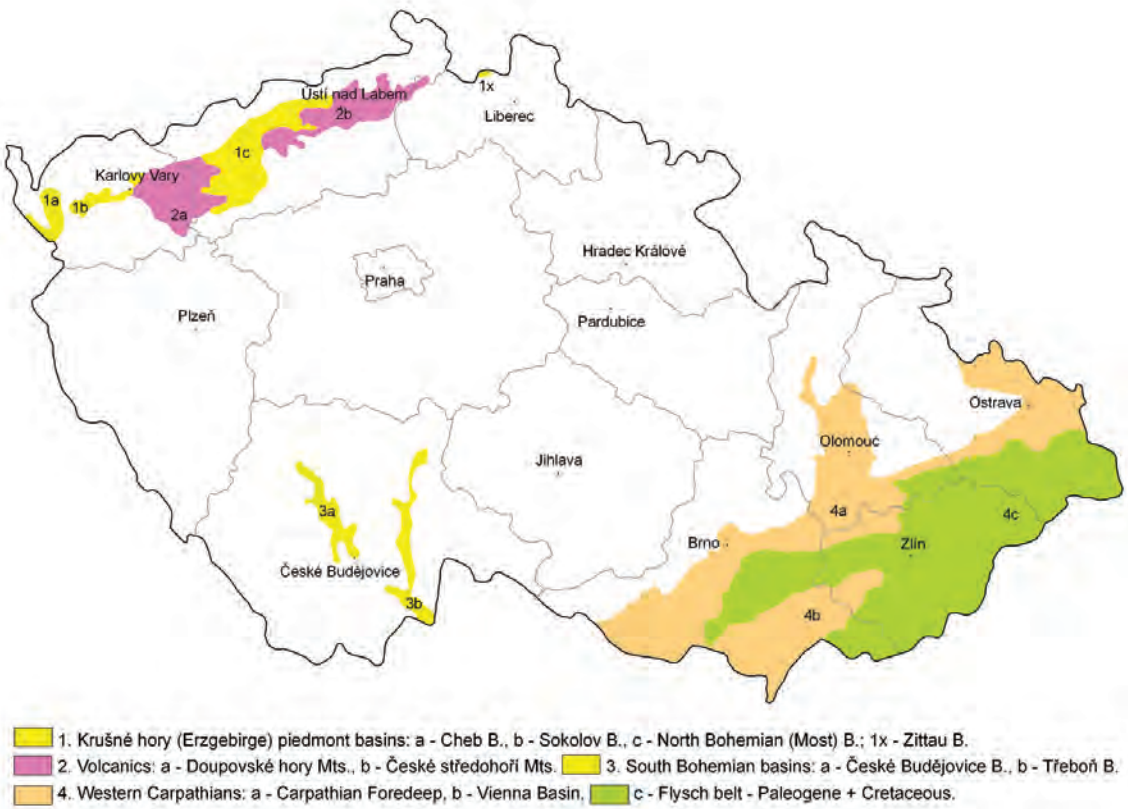


Fig. 6: Tertiary in the Bohemian Massif and Western Carpathians on the territory of the Czech Republic

transporting clastic material far from the land. They are characterized by multiple alternations of sandy and clayey layers of a low thickness (dm to m) and infrequently also sandstone benches, which are collectively called **flysh.** The sediments reach even many thousand meters in thickness. The flysh sedimentation continued in this area also in the Paleogene (Fig. 6).

The Bohemian Massif remained land which was only occasionally flooded in the east by shallow epicontinental sea from the Carpathian area. Nevertheless, several depressions with intensive freshwater sedimentation were formed as a result of strong tectonic movements in the Alpine and Carpathian space in the end of the ***Paleogene and in the Neogene***. This is the area of the South Bohemian basins (the České Budějovice Basin and the Třeboň Basin) with lignite, clay and diatomite deposits and also a marked tectonic trough of the SSW-NNE direction (Ohře Rift) in north-western Bohemia, where the Krušné Hory Piedmont basins (Cheb, Sokolov, North Bohemian and Zittau) formed – see Fig. 6. Sandstones and especially clays and claystones with thick (exceptionally and locally up to 60 m) brown coal seams sedimented in these basins. Brown coal deposits in the North Bohemian and Sokolov basins represent the most important brown coal deposits in the Czech Republic. Important deposits of Neogene clays then occur in the Cheb Basin. Formation of basins was accompanied by very intensive **volcanic activity** and a large accumulation of lavas and pyroclastics (the Doupovské hory Mts. Volcanic Complex, České středohoří). The rocks are mainly various types of olivine basalts and alkaline basaltic rocks, to lesser extent also more acid phonolites. Volcanic conduits and necks give today's landscape a beautiful character. The main volcanic activity took place 35–17 Ma ago, a younger phase 8 Ma ago and the last minor volcanoes are just several thousand years old (Komorní and Železná hůrka). The area represents a classical example of alkaline volcanism

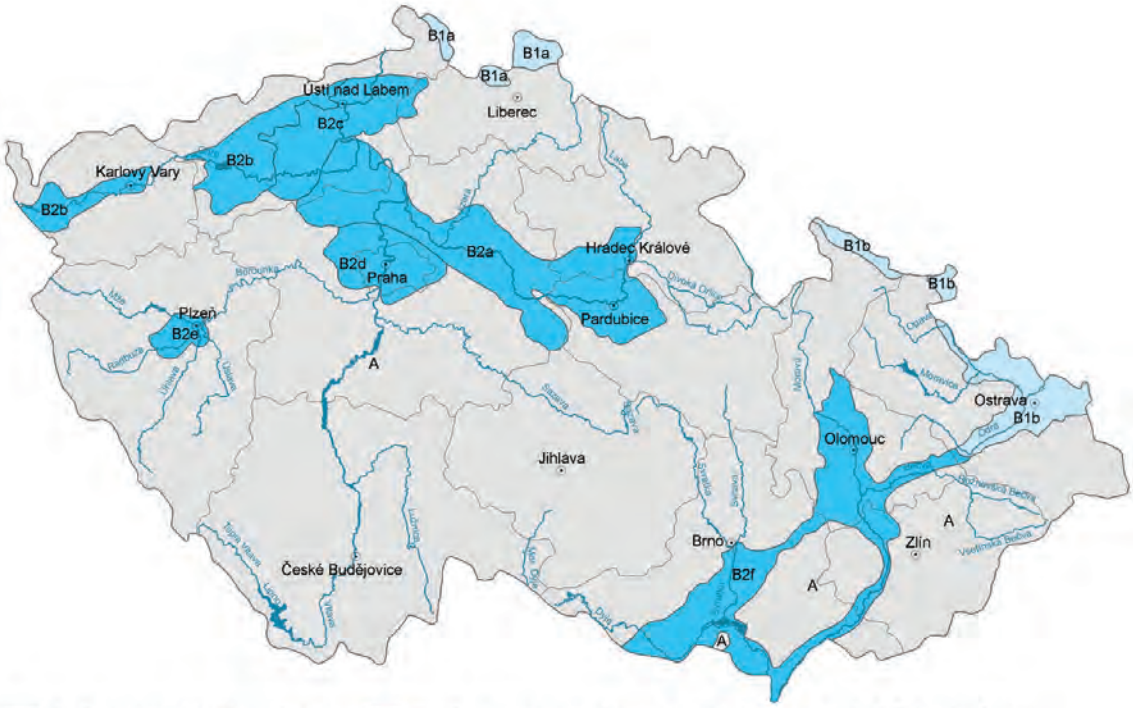


Fig. 7: Quaternary division on the territory of the Czech Republic

and it played an important role in the evolution of geosciences. The rocks are important not only as a building stone but also as a raw material for manufacture of molten basalt products. Deposits of the Bohemian garnets at the southern margin of České středohoří are related to the volcanic activity, too (pyropes were carried up by volcanic necks from the ultrabasic rocks in the crystalline basement). Weathering and decomposition of tuffs of the Doupovské hory and České středohoří Mts. resulted in the formation of important bentonite deposits.

The flysh complexes of the Carpathian area were folded and thrust in the form of nappes (verified by exploration) over a distance of several tens of kilometres towards the west and southwest over the Bohemian Massif in the end of the ***Paleogene***. The Carpathian Foredeep, partly still covered by the arriving nappes, formed in front of the thrust nappes in the ***Neogene*** (Miocene). The sediments of the Vienna Basin (of up to 5 km in thickness) were subsequently hardly folded. These are represented mainly by marine clay, marl and sand, just partially diagenetically consolidated, which contain smaller deposits of oil and gas. The depositional setting of the younger formations became progressively fresh-water. The youngest ones contain deposits of lignite.

Important tectonic processes expressing themselves by marked vertical movements of individual crustal segments operated in the Bohemian Massif in the end of the Tertiary and beginning of the Quaternary. In this way, the marginal mountains – Šumava Mts., Český les Mts., Krušné hory Mts., Krkonoše Mts., Orlické hory Mts. as well as Hrubý Jeseník Mts. – were uplifted by up to 1,000 m and the Bohemian basin was formed. This is sometimes considered as being formed by the impact of a large meteorite, but this is a nonsense resulting from the interpretation of satellite images without knowledge of the real structure of the massif. The Bohemian Massif was influenced by several phases of continental and mountain **glaciations**

during the ***Quaternary***. A periglacial climate dominated here, which resulted in the formation of massive stony debris and block-seas, terrace system of the rivers (Fig. 7) as well as really extensive loesses. Terrace sediments of rivers especially form important deposits of sand and gravel and feldspar raw materials, and loesses of brick clays. The continental ice sheet reached as far as the northern margin of the massif and left sediments of frontal moraines in the Ostrava region, on the northern piedmont of the Hrubý Jeseník Mts. and in the Šluknov and Frýdlant extremities. Mountain glaciers modified morphology of the marginal mountains, especially the Krkonoše Mts., to a lesser extent also the Jeseníky Mts. and Šumava Mts., where even minor glacier lakes formed.

Figures in this chapter were adapted by the author from:

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Regional geological units and minerals associated with them

Arnošt Dudek

Bíteš orthogneiss – mostly muscovitite orthogneiss of the Cadomian age, characteristic of the Moravicum of the Dyje and Svratka domes between Krems in Austria and Svojanov in the Czech Republic (opal, kaolin, crushed stone) – Fig. 3 – unit 5a

Blanice Graben – fault system of the NNE-SSW direction in central and southern Bohemia, marked also by downthrown islands of the uppermost Carboniferous and Permian with hard coal an anthracite seams. It continues as Rodel line in Austria (Au-Ag-ores) – Fig. 4 – unit 4b

Bohemian Cretaceous Basin – sediments of the Upper Cretaceous (Cenomanian to Santonian), overlying mainly crystalline complexes and Upper Paleozoic rocks in the northern part of the Bohemian Massif. Based on the lithological character, it has been regionally classified into facial developments as follows:

– *Lužice* (U-Zr-ores, glass and foundry sand) – Fig. 5 – unit 1a
– *Jizera* (glass and foundry sand, dimension stone) – Fig. 5 – unit 1b
– *Orlice-Žďár* (foundry sand) and its *east Bohemian* (clays) and *Moravian parts* (clay) Fig. 5 – unit 1d
– *Ohře (Eger)* – the Most, Teplice (quartzite, corrective additives for cement production) and Louny part (clay) Fig. 5 – unit 1e
– *Vltava-Beroun* including Prague surroundings (clay, dimension stone) Fig. 5 – unit 1f

Boskovice Graben – tectonic trench of the NNE-SSW direction in western Moravia filled with sediments of the uppermost Carboniferous and Permian (hard coal) Fig. 4 – unit 4a

Bory granulite massif – a small granulite body in the Moldanubicum N of Velké Meziříčí in western Moravia (feldspar, crushed stone) – Fig. 4 – unit 4a

Brno Massif – a large massif in western Moravia built by a variable series of both acid and basic plutonic rocks of the Cadomian age (feldspar, crushed stone) – Fig. 2 – unit 10

Carpathian Flysh – a part of the Outer Carpathians in eastern Moravia built by clayey and sandy Cretaceous and Paleogene sediments, with a marked nappe structure of the pre-Miocene age. It composes the Chřiby Mts. and the Ždánice Forest and mountain ranges on the border with Slovakia – the Beskydy, Javorníky and Bílé Karpaty Mts. (natural gas) – Fig. 6 – unit 4c

Carpathian Foredeep – the external part of the Carpathian mountain chain in eastern Moravia, which was formed in front of the Outer Carpathian nappes and overlies the south-eastern slope of the Bohemian Massif. It is filled with the Miocene sediments of the Egerian to Badenian (oil, natural gas, clay, bentonite, gypsum in the Opava Basin) – Fig. 6 – unit 4a

Central Bohemian Pluton – an extensive Hercynian granitoids pluton on the border between Bohemicum and Moldanubicum, more basic than the massifs of the Krušné hory Mts. and in Českomoravská vrchovina Highlands (granodiorites, tonalite, diorite). Important deposits in the exocontact (U, Au, Ag-Pb-Zn-ores, feldspar, quartz, dimension and building stone) – Fig. 2 – unit 6

Cheb Basin – the westernmost of the Tertiary basins, at the crossing of the Ohře rift and the Tachov Graben. Sedimentation continued from Eocene until Pliocene (brown coal, kaolin, clay, diatomite, glass and foundry sand – numerous conflicts of interest) – Fig. 6 – unit 1a

České Budějovice Basin – a smaller, western basin of South Bohemian basins, filled with fresh-water sediments of the Upper Cretaceous and to a minor extent Neogene and Quaternary. Episodic ingressions of the sea from the Alpine foredeep (lignite, tectites, diatomite, sand and gravel) – Fig. 6 – unit 3a

České středohoří Mts. – a classical area of the Tertiary alkaline volcanic rocks (olivine basalts to phonolites) exposed in the Ohře (Eger) rift between Chomutov and Nový Bor, with the main volcanic centre in Roztoky nad Labem (pyrope, diatomite, feldspar substitutes, crushed stone) – Fig. 6 – unit 2b

Čistá-Jesenice Massif – a minor granitoid massif in western Bohemia composed of both Cadomian and Hercynian bodies. It is covered from a large part by Carboniferous and Permian sediments (feldspar, dimension and building stone) – Fig. 2 – unit 4

Domažlice Crystalline Complex – south-western part of the upper Proterozoic of the Bohemicum in the Šumava piedmont, metamorphosed during both Cadomian and Hercynian orogeny, with minor massifs of granitoids and gabbroic rocks and abundant pegmatites (feldspar) – Fig. 2 – unit 17

Doupovské Hory Mts. – a volcanic complex of the Tertiary age at the crossing of the Ohře rift with the Jáchymov fault, between Karlovy Vary and Kadaň. Alkaline volcanic rocks are represented mainly by olivine basalt, "leucitic" tephrite and abundant tuffs. Phonolites are missing (bentonite, crushed stone) – Fig. 6 – unit 2a

Dyje Massif – a massif of the Cadomian granitoids in the Dyje Dome of the Moravicum in SW Moravia, extending from the northern vicinity of Znojmo almost to Danube. It was affected by a strong tropical weathering in the Jurassic and Neogene and from a large part covered by sediments of the Carpathian foredeep (kaolin, feldspar, building stone) – Fig. 2 – unit 11

Hroznětín Basin – the northern extremity of the Sokolov Basin N of Karlovy Vary (bentonite) – Fig. 6 – unit 1b

Intra-Sudetic Basin – southern extremity of the Lower Silesian Basin in the NE tip of Bohemia, with sedimentary fill from the Mississippian (Lower Carboniferous) to Upper Cretaceous about 3,000 meters in thicknes, and Pennsylvanian and Permian volcanites. (hard coal) – Fig. 4 – unit 3a

Islet zone of the Central Bohemian Pluton – a number of both large and minor blocks of the contact metamorphosed Proterozoic and Lower Paleozoic rocks from the mantle of the pluton, downthrown into granitoids (Au, building stone, barite, limestone) – Fig. 2 – unit 6

Jílové Belt – a belt of the Upper Proterozoic volcanic (basalt, andesite, boninite and rhyolites), subvolcanic and acid plutonic rocks extending over 120 km in NNE-SSW direction south of Prague, from a major part enclosed in granitoids of the Central Bohemian Pluton (Au-ores, building stone) – Fig. 2 – unit 6

Kdyně Massif – a complex of metabasic, gabbroic and dioritic rocks in the Domažlice Crystalline Complex on the border of Šumava and Bohemian Forest (dimension and building stone) – Fig. 2 – unit 12

Kladno-Rakovník Basin – one of the basins of the Central Bohemian limnic Carboniferous, partly covered by Cretaceous sediments (hard coal, kaolin, claystone) – Fig. 2 – unit 12

Krkonoše-Jizera Crystalline Complex – western part of the Lužice area built by metamorphic rocks of the Proterozoic and Lower Paleozoic age (limestone, dolomite) and intruded by

plutons of the Cadomian (Lužice) and Hercynian (Krkonoše-Jizera) age (feldspar, dimension and building stone). Fe-bearing skarns, Sn and W-ores, fluorite and barite occur in the exocontact of the plutons – Fig. 2 – unit 14

Krkonoše-Jizera Massif – Hercynian granitoid massif building the border range with Poland (excellent dimension stone, feldspar) – Fig. 2 – unit 2

Krkonoše Mts. piedmont basin – one of the Sudetic (Lugian) Upper Paleozoic basins partially covered with Cretaceous sediments. Formations encompass Westphalian C, Stephanian, whole Permian and extend up to the lowermost Triasic (Cu-ores, Au paleoplacers, bituminous coal, pyrope) – Fig. 4 – unit 3c

Krušné hory Mts. Piedmont basins – a group of limnic Tertiary basins associated with the Ohře Rift SE of the Krušné hory Mts. From WSW to ESE, these are: Cheb, Sokolov and North Bohemian basins. – Fig. 6 – unit 1

Krušné hory Mts. Pluton – a large Hercynian granitoid pluton underlying metamorphic rocks of the Krušné Hory and Smrčiny Mts., exposed by erosion only in numerous partial massifs (Sn-W-ores, kaolin, feldspar, quartz, building stone) – Fig. 2 – unit 3

Krušné hory Mts. Crystalline Complex – a part of the Saxothuringicum built by metamorphic complexes mostly of the Proterozoic, subordinately also of the Lower Paleozoic age (U, Ag, Bi, Co, As-ores, Cu-ores, Sn-skarns, fluorite, barite, kaolin) and intruded by Hercynian granitoids. – Fig. 3 – unit 3 (Fig. 2 – unit 15)

Lužice Massif – an extensive Cadomian granitoids massif predominantly on the German territory, extending into the Jizera Mts. (quartz, dimension and building stone) – Fig. 2 – unit 1

Moldanubian Pluton – the largest Hercynian granitoids complex in the Bohemian Massif in Českomoravská vrchovina Highlands, Šumava and Waldviertel (dimension and building stone; Au-W and U-ores and Ag-Pb-Zn-ores in the exocontact) – Fig. 2 – unit 8

Moldanubicum – basement of the southern part of the Bohemian Massif built by high-grade metamorphic complexes of Proterozoic and probably also Lower Paleozoic age. The cadomian tectonometamorphic processes were followed by hercynian high temperature and low pressure metamorphism and whole complex was penetrated by numerous late-Hercynian granitoid plutons. – Fig. 3 – unit 1

Moravian-Silesian Devonian – weakly metamorphosed volcano-sedimentary unites in the Jeseníky Mts. – *Vrbno Strata, Šternberk-Benešov Belt* (Fe-ores, Cu-ores, Pb-Zn-ores, barite, quartzite, dolomite) – Fig. 2 – unit 19

Moravian-Silesian Carboniferous – marine flyshoid Mississippian (Lower Carboniferous) of the Nízký Jeseník Mts. and Drahany Highlands (slate, quartz) and productive paralic Mississippian to limnic Pennsylvanian (Upper Carboniferous) of the Ostrava region (Upper Silesian Basin – hard coal, natural gas) – Fig. 4 – unit 1, 2

Mšeno-Roudnice Basin – one of the Central Bohemian Carboniferous to Permian basins, completely overlain by the Bohemian Cretaceous Basin (hard coal) – Fig. 4 – unit 3g

Nasavrky Massif – a minor however very complex Hercynian granitoid body exposed in the Železné hory Mts. (pyrite, dimension and building stone; fluorite and barite in the exocontact) – Fig. 2 – unit 7

North Bohemian Basin – the largest Tertiary basin of the Ohře Rift between the Doupov Mts. and České středohoří Mts. (brown coal, clay, bentonite, diatomite, quartzite) – Fig. 6 – unit 1c

Ohře rift – a prominent fault structure in the south-eastern piedmont of the Krušné hory Mts. delimited by the Krušné hory and Litoměřice faults and their directional continuations.

Tertiary alkaline volcanites, coal-bearing basins and mineral as well as thermal waters are associated with the rift – Fig. 3 – unit 3a

Orlické hory Mts.-Kłodzko Crystalline Complex – metamorphic complexes of probably Proterozoic age in the eastern part of the Lužice area in the Orlické hory and Rychleby Mts. and in Kłodzko – Fig. 2 – unit 18

Outer klippen zone of the Western Carpathians – extensive fragments of Jurassic and Cretaceous sediments brought up from depth in front of the flysh nappes – Štramberk, Pavlovské vrchy (limestone) – Fig. 2 and 6 – unit 4c

Plzeň Basin – an independent basin at the SW margin of the West Bohemian Carboniferous (hard coal, kaolin, clay) – Fig. 4 – unit 3a

Quaternary alluvia – alluvia and terraces of majority of larger water courses (feldspar, sand and gravel, in south Bohemia and SW Moravia also tectites) – Fig. 7 – units B2a, B2b, B2f

Quaternary placers – in piedmont of the Šumava and Jeseníky Mts. (Au), Krušné Hory Mts. (Sn), southern piedmont of the České středohoří Mts. (pyrope)

Sokolov Basin – the smallest Tertiary basin of the Ohře Rift WSW of the Doupovské hory Mts. with important deposits of energy minerals (brown coal, U, clay, bentonite) – Fig. 6 – unit 1b

South Bohemian Basins – freshwater sedimentation space of the Upper Cretaceous and Tertiary age, where the Rudolfov horst separates the smaller České Budějovice Basin in the west from the larger Třeboň Basin in the east – Fig. 6 – unit 3

Svratka Dome of the Moravicum – the northern of the domes built by metamorphic rocks of the Moravicum W of Brno (graphite, feldspar, limestone, building stone) – Fig. 3 – unit 5a

Syrovice-Ivaň terrace – a higher located Quaternary terrace between the Jihlava and Svratka rivers S of Brno (feldspar) – Fig. 7 – unit B2f

Teplá Crystalline Complex – the NW part of the Proterozoic of the Central Bohemian area (Bohemicum) with a rapid succession of metamorphic zones from SE to NW into the Slavkov les Forest (feldspar) – Fig. 2 – unit 16

Tertiary relics of the Plzeň region – relics of the formerly more extensive Tertiary sediments on the site of a river paleostream discharging into the North Bohemian Basin (clay, bentonite) – not shown on scale of the maps

Třebíč Massif – an extensive massif of the Hercynian melanocratic granitoids and syenitoids (durbachites) in the Českomoravská vrchovina Highlands (amethyst, morion, feldspar, dimension stone) – Fig. 2 – unit 9

Třeboň Basin – a larger, eastern basin of South Bohemian basins with continental Cretaceous and Teriary sediments (kaolin, clay, bentonite, diatomite) – Fig. 6 – unit 3b

Upper Silesian Basin – a Pennsylvanian (Upper Carboniferous) basin situated predominantly in Poland and extending to the Czech Republic only by its SW part. It is formed by volcanoclastic sediments with numerous hard coal seams. On the Czech territory, it is further subdivided into i) western, more mobile paralic Ostrava part, ii) eastern, platform limnic Karviná part and iii) southern Beskydy part (hard coal, natural gas) – Fig. 4 – unit 2

Variegated Group of the Moldanubicum – metamorphic complexes of paragneisses and migmatites with numerous intercalations of amphibolites, marbles, quartzites, graphitic rocks and skarns (Fe-skarns, graphite, feldspar, limestone, dolomite, fluorite, building stone) – part of the Modanubian unit 1, in Fig. 3

Vienna Basin – an extensive Tertiary Neogene basin with marine sedimentary fill gradually becoming freshwater of more than 5,000 m in thickness (lignite, oil, natural gas) – Fig. 6 – unit 4b

Železné hory Mts. area – part of Bohemicum built by weakly metamorphosed volcanosedimentary series of the Upper Proterozoic and sediments of the Lower Paleozoic (Mn-Fe-carbonates, pyrite, fluorite, barite, limestone) and the Hercynian granitoid Nasavrky Massif – Fig. 2 – unit 20

Zittau Basin – a Tertiary basin in the continuation of the Ohře Rift, extending only by a negligible south-eastern extremity into the Czech territory (brown coal, lignite, clay) – Fig. 6 – unit 1d

Žulová Massif – a minor Hercynian granitoid massif in the northern tip of the Moravian-Silesian area (kaolin, quartz, dimension and building stone) – Fig. 2 – unit 5

Geodynamics of the origin of the Bohemian Massif covering the territory of the Czech Republic

Karel Schulmann, Vojtěch Janoušek, Ondrej Lexa

The Bohemian Massif represents one of the largest exposure of the European Variscan belt located at its eastern extremity (Figure 1). The Variscan architecture of the Bohemian Massif can be defined by four major tectonic units: 1) The Saxothuringian Neoproterozoic continental basement with its Palaeozoic cover, 2) The Teplá-Barrandian (Bohemicum) Neoproterozoic basement and its Early Palaeozoic cover of the Prague Basin (the Bohemia Terrane of South Armorica), 3) The Moldanubian high- to medium-grade metamorphic unit intruded by numerous Carboniferous granitic plutons, altogether forming the high-grade core of the orogen, 4) The easterly Brunia Neo-Proterozoic basement with Early to Late Palaeozoic cover.

The Gondwana faunas of Lower Palaeozoic (Cambrian and Ordovician) sediments of the Saxothuringian and Teplá-Barrandian domains and numerous isotopic and U-Pb zircon data imply affinity to northern Gondwana margin. Schulmann et al. (2009) suggested that the Variscan structure of the Bohemian Massif resulted from Andean type convergence and formed as a typical upper plate orogen located above a long lasting Devonian-Carboniferous subduction system. These authors showed that all the current criteria defining an Andean type of convergent margin are present and surprisingly well preserved. In particular it is: 1) the development of blueschist facies metamorphism along the Saxothuringian margin, 2) calc-alkaline to potassium rich (shoshonitic) arc type magmatism in distance 150–200 km from the suture zone (Žák et al., 2005), 3) back-arc basin developed on continental upper plate crust later replaced by thick continental root (Schulmann et al., 2005), 4) deep granulite facies metamorphism associated with supposed underplating of the crust by mafic magmas at the bottom of the root and 5) continental lithosphere underthrust underneath the thickened root system. Based on these criteria, the architecture of the eastern Variscan belt is interpreted as the result of a large-scale and long-lasting subduction process associated with crustal tectonics, metamorphism, magmatic and sedimentary additions that developed over the width of at least 500 km, in present coordinates, and time scale of ~80 Ma.

Present day architecture of the Bohemian Massif and location of Palaeozoic sutures

Saxothuringian is represented by Neoproterozoic par-autochthon represented by migmatites and paragneisses dated at ~580 -550 Ma. These rocks are intruded by Cambro-Ordovician calc-alkaline porphyritic granodiorites converted to augen orthogneiss during the Variscan orogeny. The basement is unconformably covered by Cambrian and Ordovician sequences overlain by Late Ordovician to Fammenian pelagic sediments and Famennian to Visean flysh. The par-autochthon is thrust by allochthonous units containing deep water equivalents of the Ordovician to Devonian rocks of the para-autochthon and proximal flysh sediments.

The allochthonous are represented by pile of thrust sheets marked by decreasing pressure and metamorphic age from the top to the bottom (Franke, 2000; Konopásek and Schulmann, 2005).

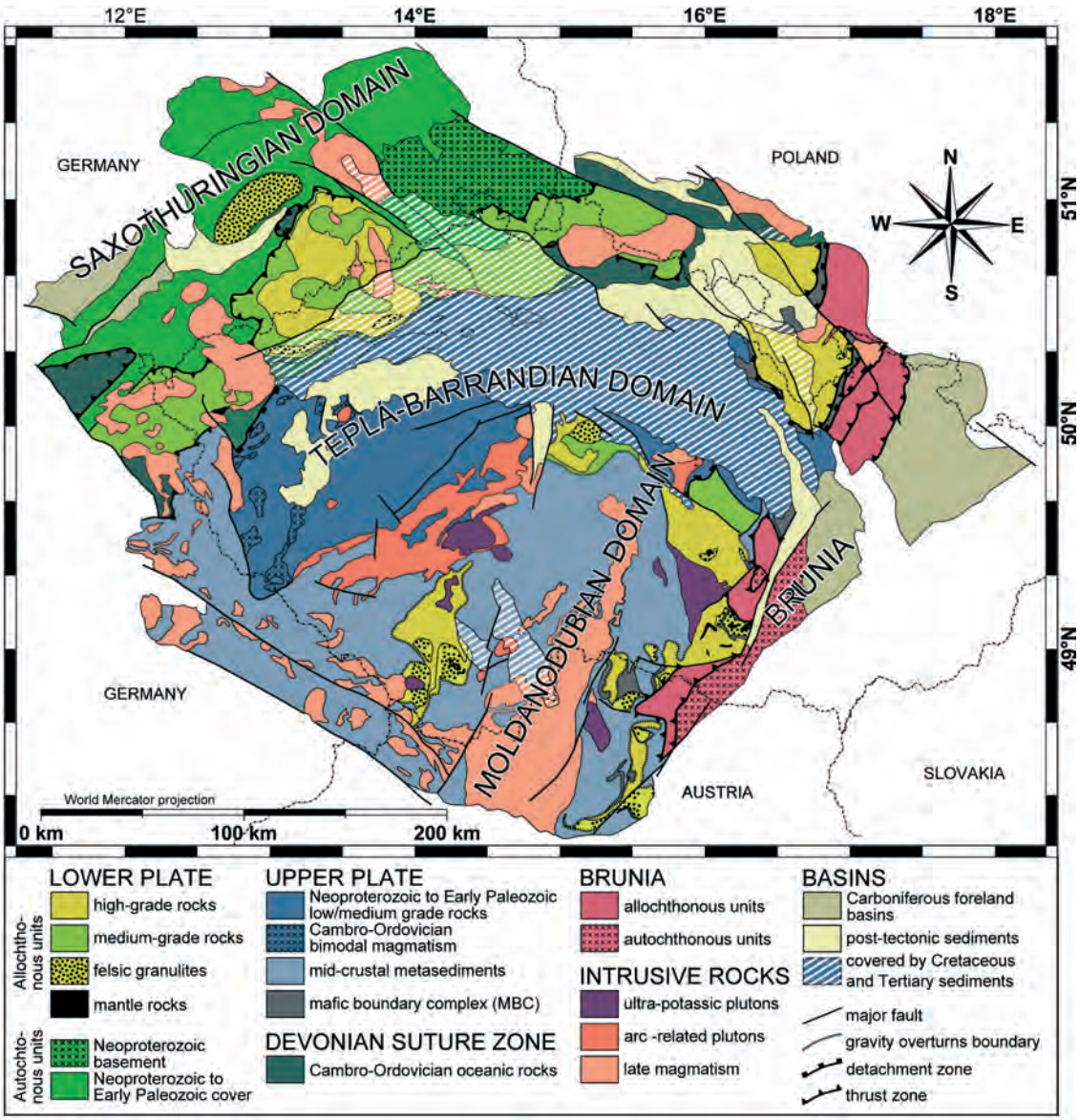


Figure 1. Plate tectonic map of the Bohemian Massif

In the highest structural position occur thrust sheets with metabasites of Ordovician protolith age eclogitized during Devonian (~395 Ma). Structurally deeper occur sheets associated with middle pressure assemblages and Late Devonian zircon and Hbl cooling ages (~365 Ma). This rock pile represents Late Ordovician to Devonian passive margin imbricated during Devonian convergence. In the Sudetic part (Figure 1, Figure 2a-c) of the Bohemian Massif, the Ordovician rift sequences are characterized by the presence of deep marine sediments and MORB type volcanics followed by Silurian and Devonian sedimentary sequences. The Ordovician oceanic rocks are metamorphosed at blueschist-facies conditions probably at Late Devonian.

The oceanic subduction stage was followed by Carboniferous continental subduction of the Saxothuringian continental rocks underneath easterly Teplá-Barrandian block which was responsible for the eclogitization of continental crust at ~350 – 340 Ma (Schmädicke et al., 1995). This event is responsible for the global reworking of the Saxothuringian at high pressure conditions, thrusting of subducted continental crust and exhumation of deep rocks.

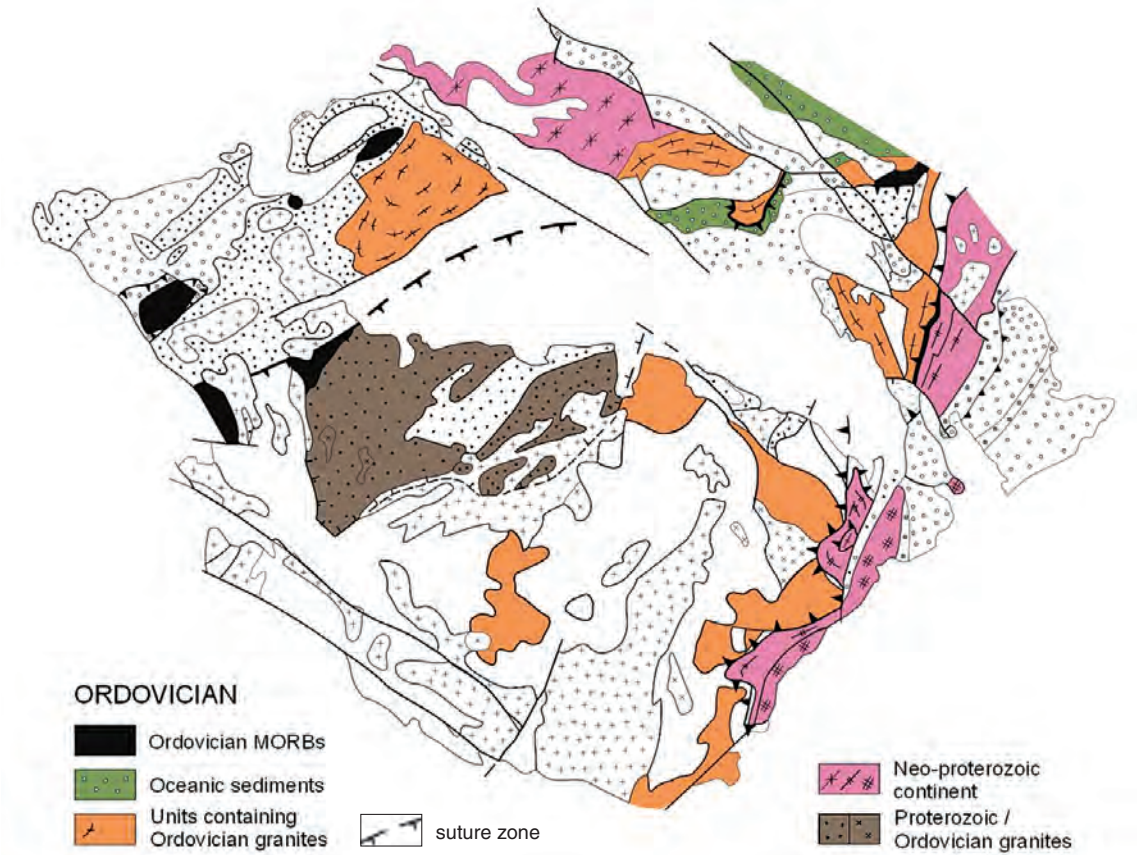


Figure 2a. Architectural evolution of the Bohemian Massif – Ordovician stage

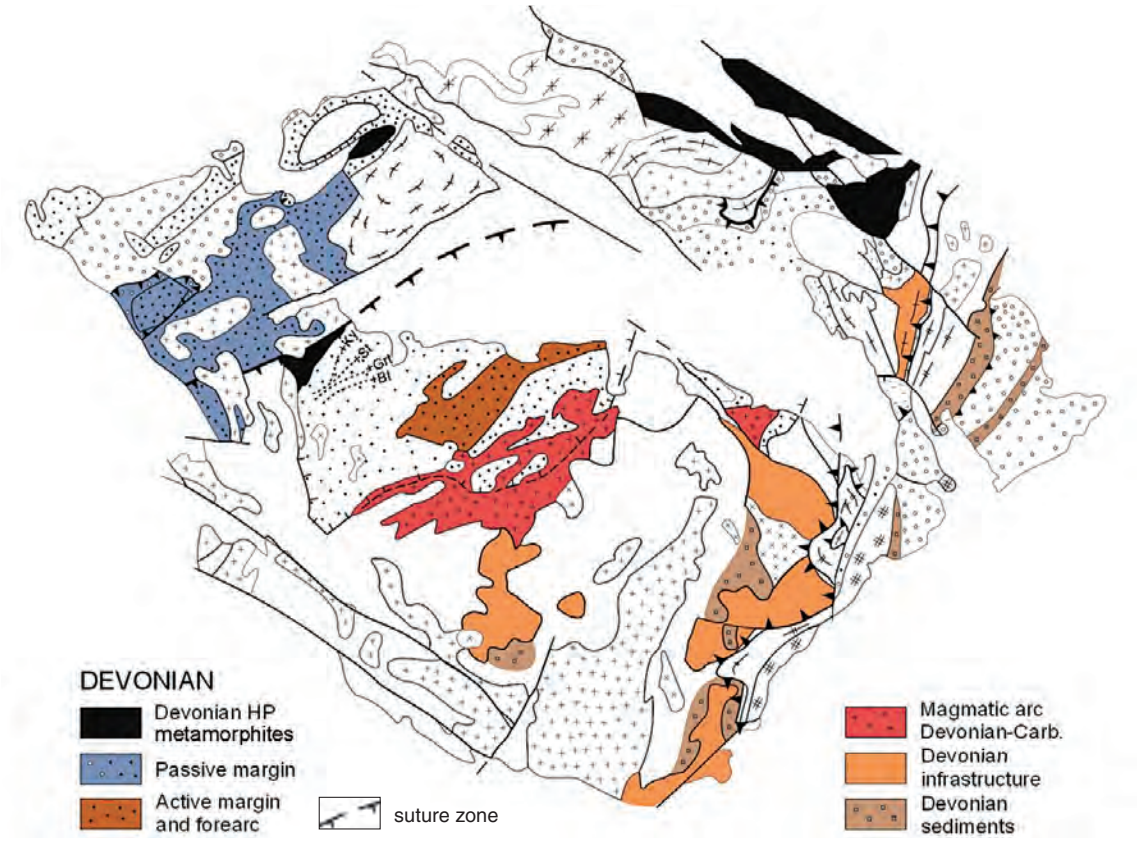
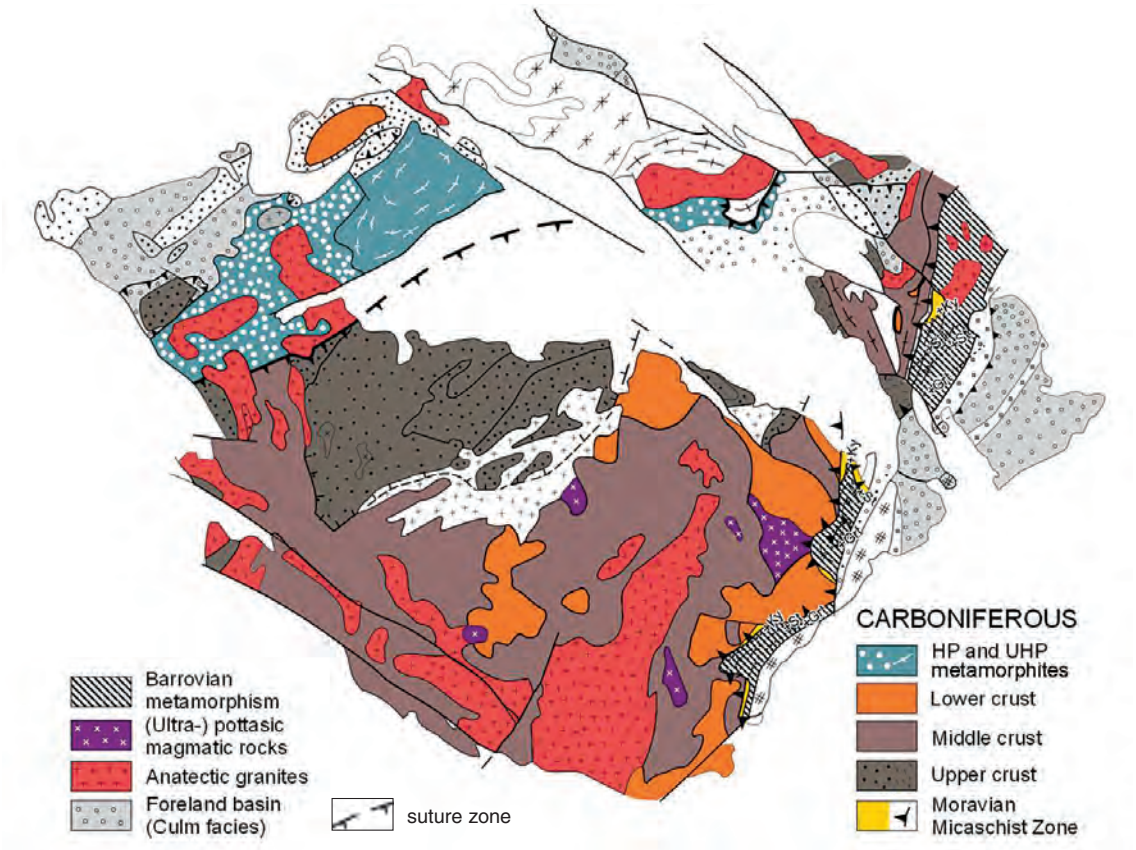


Figure 2b. Architectural evolution of the Bohemian Massif – Devonian stage



Metamorphic zones and facies: Ky – kyanite zone, St – staurolite zone, amphibolite facies, Grt – granulite facies, Bt – blueschist facies

Figure 2c. Architectural evolution of the Bohemian Massif – Carboniferous stage

The Saxothuringian – Teplá-Barrandian boundary is characterized by presence of units with high proportions of ultramafic and mafic high pressure rocks (Figure 1). Represented by serpentinites at the bottom and thick body of amphibolites, eclogites and metagabbros (Medaris et al., 1995). The protolith of gabbros and eclogites was dated as Cambrian and Ordovician while the Devonian metamorphic and cooling ages range between 410 and 370 Ma. The metamorphic evolution started with eclogite-facies metamorphism and terminated by granulite and amphibolite-facies retrogression. These rocks are interpreted as the oceanic fragment at suture position.

Teplá-Barrandian (the Bohemicum) consists of Neoproterozoic basement with the lower arc-related volcano-sedimentary sequence, followed by siliceous black shales and a flyshoid sequence (shales, greywackes and conglomerates. The Neoproterozoic basement is unconformably overlain by a thick sequence (1500–2000 m) of Lower Cambrian conglomerates, graywackes, and sandstones and Upper Cambrian volcanics. The Lower Palaeozoic Prague Basin is characterized by Early Ordovician (Tremadocian) transgression followed by mid-Ordovician rift related volcanics. Sedimentation of Silurian graptolite shales was associated with important volcanic activity accompanied by basaltic and ultramafic intrusions. The sedimentation continued from Upper Silurian to Devonian by carbonate dominated sequence and terminated at mid-Devonian with Givetian calc turbidites.

The whole sedimentary package is folded by steep folds presumably of Late Devonian age as indicated by Culm facies sediments unconformably deposited on folded Early Paleozoic strata.

The deformation affected also the underlying Neoproterozoic basement, with the intensity and age increasing progressively to the west (Zulauf, 2001). In the same direction rises also the metamorphic degree, reaching amphibolite-facies conditions close to the Teplá-Barrandian/Saxothuringian boundary. In this area is developed a typical Barrovian metamorphic zonation ranging from biotite zone in the east up to kyanite zone in the west dated at middle Devonian by $^{40}Ar/^{39}Ar$ method (Dallmeyer and Urban, 1988).

The Teplá-Barrandian and Moldanubian domain boundary is masked by the Central Bohemian Plutonic Complex. Its activity started with intrusions of calc-alkaline Devonian (~370 Ma) tonalites to granodiorites transformed into orthogneisses. The first unmetamorphosed plutonic rocks were Late Devonian (~354 Ma) calc-alkaline tonalites, granodiorites, trondhjemites, quartz diorites and gabbros. The source of the basic magmas was a slightly depleted mantle above a subduction zone. Further south/southeast occur Early Carboniferous (~349–346 Ma) high-K calc-alkaline plutonic bodies (mainly granodiorites with minor quartz monzonite and monzogabbro bodies). The intermediate rock types resulted from mixing of slightly enriched mantle-derived and crustal magmas. Finally, further east occur syn-deformational bodies or post-tectonic elliptical intrusions of magnesio-potassic rocks of mid-Carboniferous (~343–337 Ma) ages. The plutonic bodies contain numerous xenoliths, screens of the Barrandian-like Palaeozoic and Neo-Proterozoic rocks.The Central Bohemian Plutonic Complex is interpreted as a relatively shallow section (< 10 km) through the Devonian-Carboniferous magmatic arc, which widened and expanded to the east with time.

The Moldanubian is subdivided into two tectonic units: The Drosendorf Unit composed of the "Monotonous Group" represented by Proterozoic metasediments, with numerous Late Proterozoic to Early Palaeozoic orthogneisses, quartzites and amphibolites and the "Varied Group" composed of plagioclase-bearing paragneiss quartzites and marbles intercalated with amphibolites and leptynites (Tollmann et al., 1982). The protoliths of varied metasediments are supposed to be at least partly Early Palaeozoic in age. Structurally highest is the "Gföhl Unit" composed of orthogneiss with Ordovician protolith ages, amphibolitized eclogites, granulites, garnet- and spinel-bearing peridotites surrounded by felsic migmatites.

Two NW-SE trending belts of high-pressure rocks (granulites, eclogites and peridotites) are distinguished: the western belt located close to the Barrandian–Moldanubian boundary, and the eastern belt rimming the eastern margin of the Bohemian Massif (Medaris et al., 1995). These two belts alternate with NW-SE trending wide belts represented by the Varied and Monotonous groups.

The amphibolite-facies metamorphism developed on the regional scale in the Drosenforf Unit and reflects maximal pressures of 10 kbar at temperatures of 650–700 °C. However, higher grade (eclogitic) boudins have been identified, generally at the boundary between both groups. Metamorphism of the Gföhl unit is characterized by early eclogite facies followed with granulite-facies and amphibolite-facies retrogression (O'Brien and Rötzler, 2003). The age of early high-pressure metamorphism was probably Late Devonian and the granulite-facies overprint is of Viséan age as shown by a number of zircon ages.

The deformation history in the Moldanubian Zone reveals early vertical NNE-SSW trending fabrics, associated with crystallization of high-pressure mineral assemblages. These steep foliations are reworked by flat deformation fabrics that are associated with medium- to low-pressure and high-temperature mineral assemblages. The subhorizontal foliations bear intense NE-SW trending mineral lineation that is commonly associated with generalized ductile flow towards NE. The early sub-vertical fabrics is dated at 350 to 340 Ma, while the ages for the

sub-horizontal vary around 335 Ma. In the SW part of the Moldanubian domain, younger set of steep NW-SE metamorphic fabrics reworks the flat foliation, having been associated with low-pressure metamorphic conditions at around 325–315 Ma (Schulmann et al., 2005).

The Moldanubian metamorphic units are commonly intruded by numerous Variscan plutons including magnesio-potassic syenites to melagranites (durbachites), and S-type granitoids. The magnesio-potassic syenites to melagranites are spatially, structurally and temporally associated with high-pressure granulites (Janoušek and Holub, 2007). These rocks have isotopic signatures indicating a metasomatized lithospheric mantle source, presumably contaminated by subducted mature crustal material.

The Moldanubian – Brunia continental transition zone was defined as a zone of medium grade metamorphism called the Moravo-Silesian Zone (Suess, 1926). This zone of intense deformation resulted from thrusting of the Moldanubian over Brunia continent to the east. The contact between these units is marked by a particular unit, the Moravian "micaschist zone", which is composed of kyanite-bearing micaschists. This first order tectonic boundary contains boudins of eclogites, high-pressure granulites and peridotites embedded in the metapelites of both Moravian and Moldanubian parentage order tectonic boundary.

The underlying Moravo-Silesian Zone is characterized by two nappes composed of orthogneiss at the bottom and metapelite sequence at the top. This nappe sequence is overlying Neoproterozoic basement which is often imbricated with Pragian to Givetian cover. The orthogneisses of the Moravian Zone are derived from the underlying Brunia continent. This zone of intense deformation, 50 km wide and 300 km long, is marked by a tectonically inverted metamorphic sequence ranging from chlorite to kyanite-sillimanite zones. The metamorphism is interpreted as a result of continental underthrusting associated with intense top to the NNE oriented shearing. The subsequent deformation is connected with recumbent folding and imbrication of Neoproterozoic gneisses with Devonian cover. The age of this later phase is constrained at 340 – 325 Ma $^{40}Ar/^{39}Ar$ ages (Fritz et al., 1996).

The Brunia continent originally called the Brunovistulicum by Dudek (1980) consists of Neoproterozoic migmatites and schists dated at ~680 Ma and intruded by 550 Ma old granites. This basement is unconformably overlain by Cambrian and Ordovician strata followed by Lower Devonian quartzites and conglomerates and Givetian carbonate platform sedimentation. Since Early to Late Carboniferous (~350 – 300 Ma), foreland sedimentary environment developed resulting in deposition of 7.5 km thick Variscan flysch (Culm facies). Low-grade source rocks gradually pass to high-grade metamorphic source material marked by pyrope-rich mineral fraction and granulite pebbles dated at 340 – 330 Ma (Hartley & Otava, 2001, Kotková et al., 2007). Since 310 Ma deformation started of the flysch basin characterized by metamorphism and intense deformation in the west. The deformation terminated by folding of molasse sediments at ~ 300 Ma.

Geodynamic evolution of the Bohemian Massif

The succession of tectonic events (Figure 3) can be interpreted in terms of south-eastward (in the present-day coordinates) oceanic subduction of large Saxohuringian ocean underneath an active continental margin, obduction of the passive margin units, formation of a fore-arc region, growth of a magmatic arc and development of a large-scale back-arc system on the continental lithosphere. The early Saxothuringian oceanic subduction event was followed by a continental underthrusting of Saxothuringian continent leading to gradual flattening of the subduction

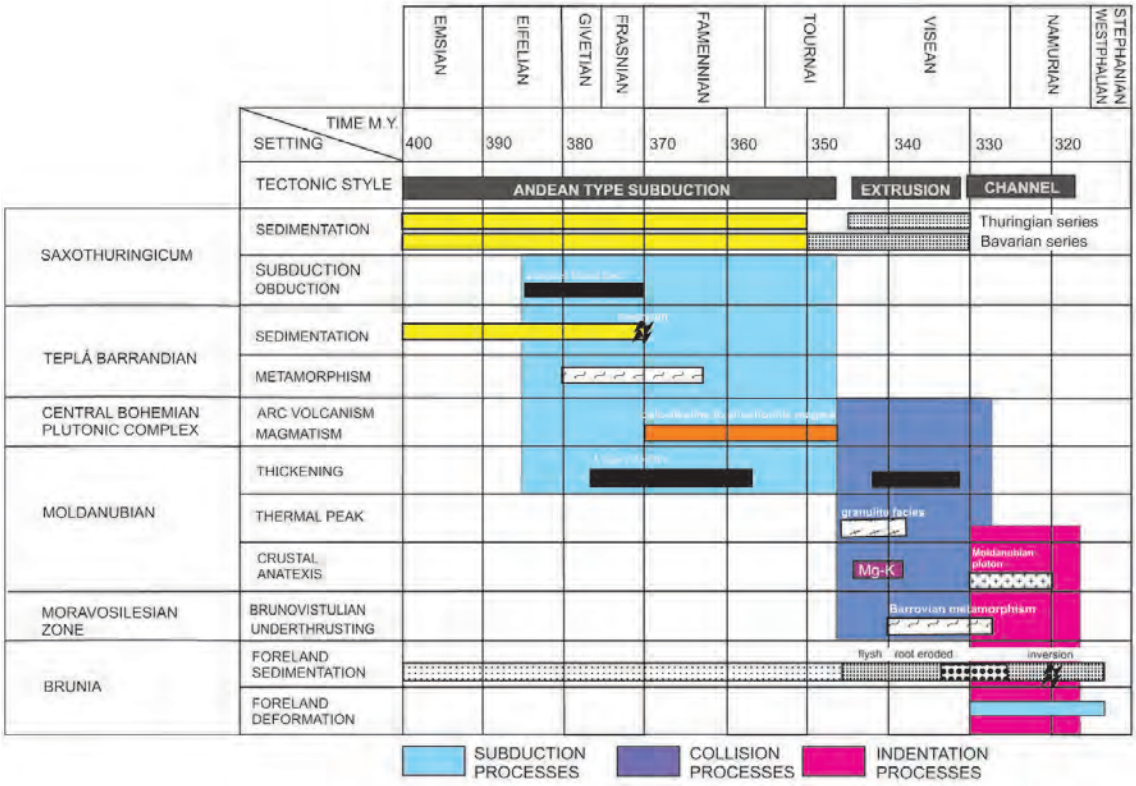


Figure 3. Chronological chart of tectonic events forming Bohemian Massif

zone marked by eastward migration of arc depocenters and subsequent crustal thickening. The latter event was responsible for the development of a thick continental root at the expense of the upper plate composed of the Teplá-Barrandian and Moldanubian units. The final evolution is marked by the continental indentation of easterly Brunia continent, exhumation of the Moldanubian lower crust, collapse of the Teplá-Barrandian and Moldanubian thrusting over Brunia platform.

Early Devonian oceanic subduction underneath the continental margin (Figure 4) is marked by relics of Ordovician to Lower Devonian passive margin metamorphosed under blueschist–eclogite facies conditions indicating a Mid-Devonian oceanic subduction. These units are obducted above a continuously underthrust continental Saxothuringian plate. The Barrovian metamorphic zonation and related deformation in the overriding Teplá-Barrandian continental margin are interpreted as ductile part of the Barrandian crust extruded during early stage of upper plate Late Devonian shortening. The steep folding of central part of anchimetamorphic Barrandian Neoproterozoic sequences is interpreted as a same deformation event but occurring in more shallow crustal levels. The subduction of a Saxothuringian oceanic crust underneath the Tepla-Barrandian crust is responsible for the origin of a magmatic arc represented by Devonian calc-alkaline orthogneisses and tonalities of the Central Bohemian Magmatic Complex and by isolated granodiorite stocks intruding Neoproterozoic sediments. At this stage the Barrandian basin operated as fore-arc domain as it is indicated by Devonian zircons in the sediments of the same age in the Prague basin. It is difficult to evaluate the original depositional origin of Moldanubian metasediments, metabasites and other high grade rocks due to severe and polyphase reworking.

Amphibolites derived from Siluro-Devonian tholeiitic basalts associated with carbonates, widespread in Lower Austria and south Bohemia, are interpreted as volcanic products of a large-scale back-arc system. In addition, the felsic metavolcanics and amphibolite layers in the Varied Group are regarded as continuity of back-arc bimodal volcanism till Givetian. The back-arc hypothesis corroborates with impressive amount of marbles with high Sr isotopic ratios that indicate shallow marine environment during Palaeozoic. A back-arc environment is further supported by bimodal volcanic activity in narrow Devonian basins developed on the north-eastern margin of the Brunia continent suggesting only minor thinning of continental crust at the easternmost termination of the back-arc system. In this concept the rest of Brunia represents a stable continental domain not affected by the back-arc spreading.

The Barrandian became a for-arc region, while the future Moldanubian continued to evolve as a crustal back-arc system. The position of high-pressure rocks, existence of the Mariánské Lázně Complex at suture position and location of calc-alkaline magmatic rocks confirm a polarity of the oceanic subduction underneath the easterly fore-arc and magmatic arc system during Late Devonian. The distance of the arc from the trench area represented by the suture indicates that the dip of subduction zone was probably moderate (30–40 degrees). The migration of magmatic centres to the east associated with temporal evolution of magma geochemistry from calc-alkaline to more potassic/shoshonitic affinities (from 370 to 336 Ma) are compatible with flattening of the subduction zone during Early Carboniferous.

The Carboniferous crustal thickening is recognized in all units except the Teplá-Barrandian. The Saxothuringian domain is characterized by the arrival of the continental crust and its subduction underneath the easterly Teplá-Barrandian–Moldanubian. The main thrust boundary migrated further west, so that the continent was thrust underneath the fossil Devonian suture and former fore-arc region. At the same time the deformation regime changed in the far field back-arc region, which recorded progressive thickening of the whole previously thinned and thermally softened domain. Recent structural studies have shown that the earliest preserved fabrics have been sub-horizontal, which may indicate that the lower crustal material was flowing horizontally from the area of subduction channel towards region of easterly back stop.

Indeed, the influx of lower crustal material transported by east dipping Saxothuringian continental subduction zone underneath the fore arc (Teplá-Barrandian) and subsequently towards the former back-arc domain is regarded to be at the origin of the future "Gföhl Unit". This hypothesis is in line with the whole-rock geochemical and Sr-Nd isotopic composition as well as the zircon inheritance patterns in the Moldanubian HP-HT granulites. Importantly, the crustal material involved in the subduction and extruded over the sub-arc and sub-back arc mantle lithosphere may have developed voluminous high-pressure granulites known from many regions of the Bohemian Massif. Alternatively, the back-arc domain with inherited high thermal budget from Devonian stretching may have been thickened and the partially molten lower crust may have been transported downwards and transformed to high-pressure granulites.

The onset of thickening of the root is not recorded in the Teplá domain, which behaved as a supra-structural domain at this time, but it is shown by deformation in the Barrandian domain. Here, the steep fabric is well dated by adjacent syntectonic calc-alkaline plutons at about 355–345 Ma. In contrast to the west, the eastern sector records onset of loading of the Brunia platform at Tournaisian manifested by sedimentation of coarse basal clastics and destruction of the Givetian carbonate platform.

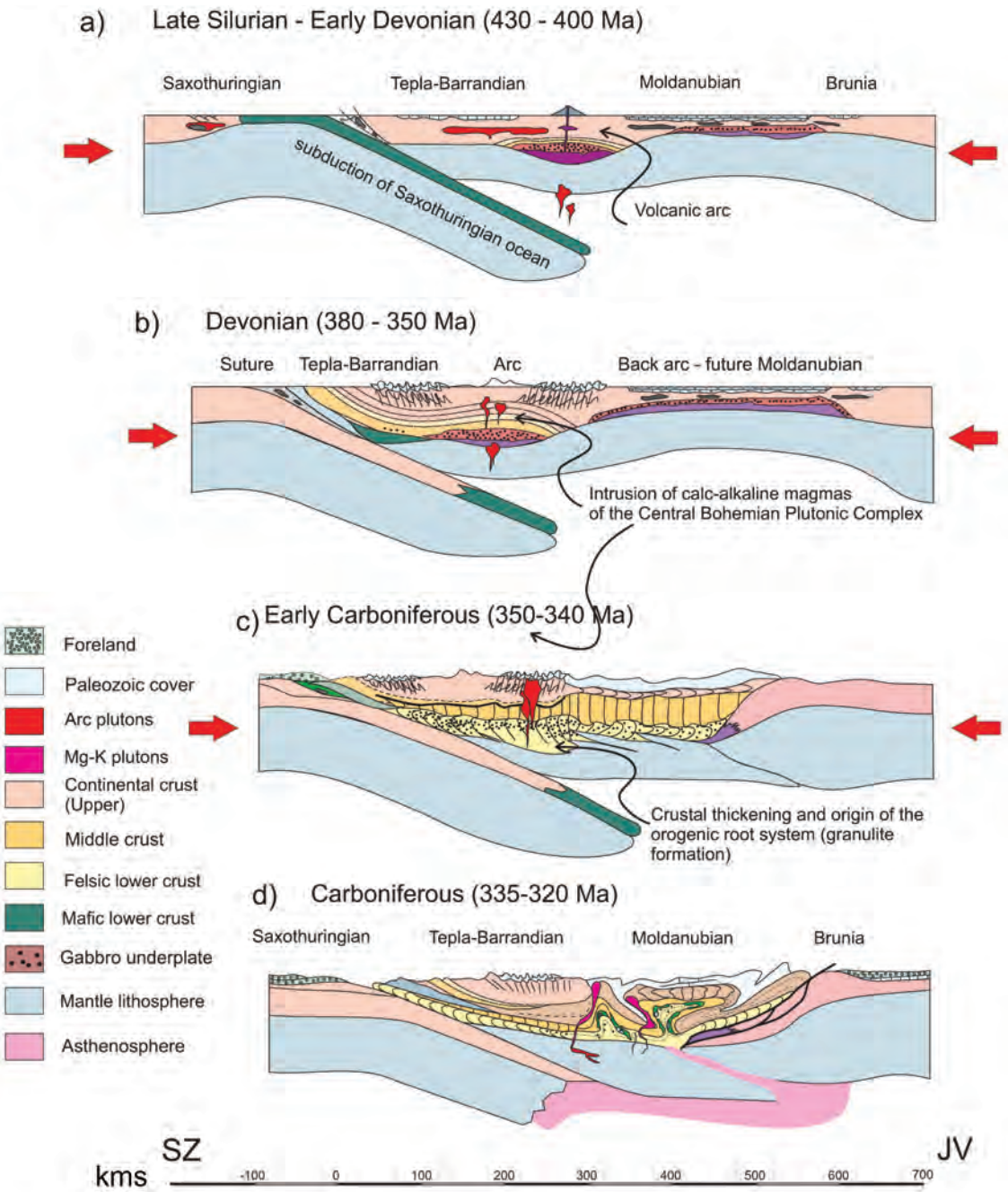


Figure 4. Geodynamics of the Bohemian Massif

Late Visean exhumation of orogenic lower crust of the upper plate during Early Carboniferous is exemplified by the two NE–SW trending belts of granulites, eclogites and peridotites initimately associated with the magnesio-potassic plutons. The first belt, recognized west of the magmatic arc, was exhumed along huge west dipping detachment zone, which was also responsible for collapse of the upper part of the magmatic arc system and downthrow of the whole Barrandian section. Such a huge vertical material transfer could have been responsible for vertical exchange of lower crustal and upper crustal material in a range of 50 km with final throw of 15 km. The cooling ages from the lower crustal domain show that the granulites passed the 300 °C isotherm during Carboniferous, suggesting that the lower crustal bulge reached very shallow position in the upper plate.

The second lower crustal belt rims the eastern margin of the Bohemian Massif, i.e. the boundary with the Brunia continent. Here the fabric of granulites is also vertical and is interpreted in terms of massive vertical exchanges with orogenic middle crust. The zone of lower crustal bulge is interpreted as enormous anticline extrusion surrounded by middle crust coevally transported downwards in form of huge crustal scale synforms. The model of vertical extrusion is based on the concept of buckling of lower and mid-crustal interface followed by growth of crustal scale antiforms. This process is thought to be triggered by rheological and thermal instabilities in the arc region, while to the east it is forced by rigid back-stop, preserved only locally.

However, the most important feature of the eastern Variscan front is the development of horizontal fabrics in the Moldanubian root zone, parallel to the Brunia continental margin. The intense deformation of the Brunia leading to the formation of Moravo-Silesian imbricated nappe system, the origin of crustal mélange forming the Moravian micaschist zone and mixed high-pressure rocks and migmatites in the overlying Moldanubian nappe have been recently interpreted in terms of indentation of the Brunia continent into the hot and thick continental root. This lower crustal indentation and flow of hot lower crustal rocks in supracrustal levels are consistent with the model of continental channel flow driven by arrival of crustal plunger, a model which is advocated for two decades for the deformation of the Eastern Cordillera in the Andes. Finally, the load of Brunia platform related to deep indentation process, leads to the development and easterly propagation of the foreland basin associated with progressive involvement of the early clastic basin infill into the channel flow process. In our model (Schulmann et al., 2008) as the hot Moldanubian rocks advances over the Brunia platform, the imbricate footwall nappe system of the Moravian zone is generated and thrust over the foreland basin rocks.

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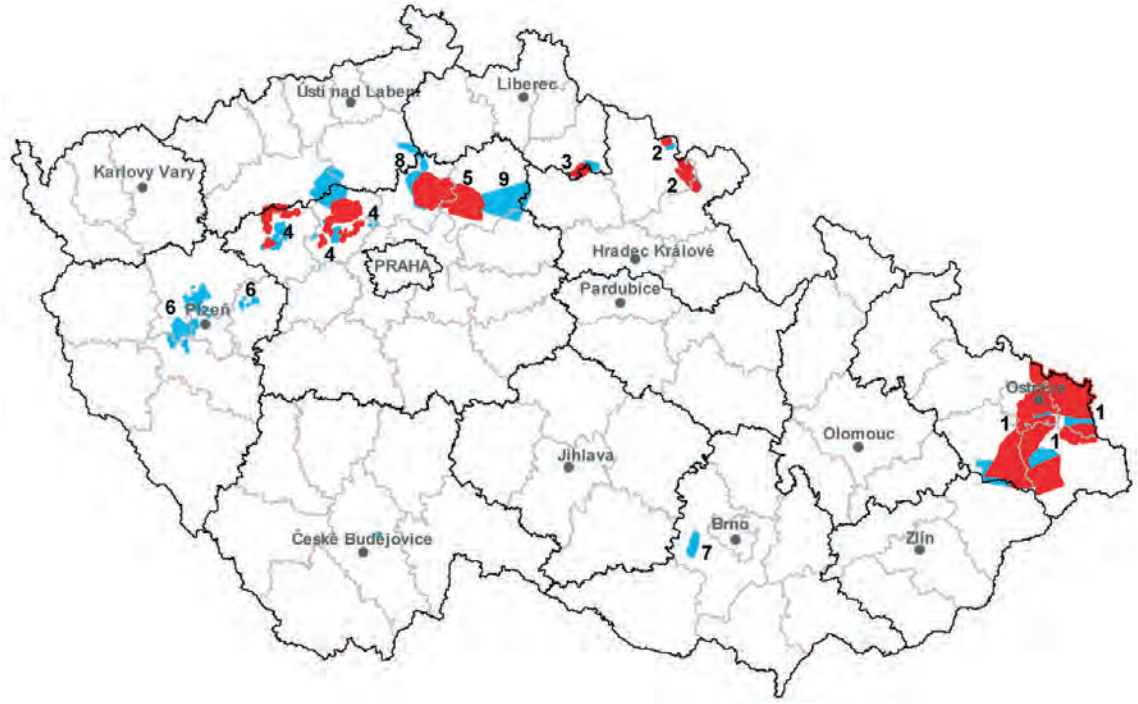
MINERALS CURRENTLY MINED IN THE CZECH REPUBLIC

ENERGY MINERALS

Bituminous coal

1. Registered deposits and other resources of the Czech Republic



reserved registered deposits exhausted deposits and other resources

Coal basins:

*(Names of basins with mined deposits are indicated in **bold type**)*

1 **Czech part of the Upper-Silesian Basin**
2 Czech part of the Intra-Sudetic Basin
3 Krkonoše Mts. Piedmont Basin
4 Central Bohemian Basins (namely Kladno-Rakovník Basin)
5 Mšeno Part of Mšeno-Roudnice Basin
6 Plzeň Basin and Radnice Basin
7 Boskovice Graben
8 Roudnice Part of Mšeno-Roudnice Basin
9 Mnichovo Hradiště Basin

2. Basic statistical data of the Czech Republic as of December 31

Number of deposits; reserves; mine production

Year	2009	2010	2011	2012	2013
Deposits – total number	62	62	62	62	62
exploited	8	8	8	8	8
Total mineral *reserves, kt	16 455 297	16 421 504	16 339 004	16 324 263	16 315 667
economic explored reserves	1 543 177	1 536 411	1 518 929	1 496 792	1 487 287
economic prospected reserves	6 011 672	6 009 407	5 998 902	5 995 983	5 993 801
potentially economic reserves	8 900 448	8 875 686	8 821 173	8 831 488	8 834 579
exploitable (recoverable) reserves	205 630	168 917	180 729	168 538	66 301
Mine production, kt	10 621	11 193	10 967	10 796	8 610

** See **NOTE** in the chapter **Introduction** above on a terminological difference between Czech official application of the term reserves and standard international application of the term. The relationship of domestic and foreign classifications of mineral reserves and resources is described in the separate chapter **Mineral reserve and resource classification in the Czech Republic** of this yearbook*

Approved prognostic resources P_1, P_2, P_3

Year		2009	2010	2011	2012	2013
P1,	kt	590 300	590 300	590 300	590 300	590 300
P2		–	–	–	–	–
P3		–	–	–	–	–

3. Foreign trade

2701 – Bituminous coal, briquettes and similar solid fuels made of bituminous coal

		2009	2010	2011	2012	2013
Import	kt	1 789	2 022	2 398	1 979	2 153
Export	kt	6 032	6 445	6 257	5 369	4 837

2701 – Bituminous coal, briquettes and similar solid fuels made of bituminous coal

		2009	2010	2011	2012	2013
Average import prices	CZK/t	2 390	2 775	3 534	3 146	2 468
Average export prices	CZK/t	2 612	3 015	3 349	3 010	2 380

2704 – Coke and semi-coke from bituminous coal, brown coal or peat, agglomerated retort coal

		2009	2010	2011	2012	2013
Import	kt	517	787	552	469	438
Export	kt	530	890	509	435	450

2704 – Coke and semi-coke from bituminous coal, brown coal or peat, agglomerated retort coal

		2009	2010	2011	2012	2013
Average import prices	CZK/t	3 365	6 387	6 494	5 205	4 696
Average export prices	CZK/t	9 580	8 396	9 572	8 394	7 395

4. Prices of domestic market

Average sale prices of bituminous coal EXW (EUR/tonne) recalculated to CZK/tonne with using of Czech National Bank CZK/EUR exchange rate annual averages

Coal type/Year		2009	2010	2011	2012	2013
coking coal	EUR/tonne	87	138	177	125	98
steam coal	EUR/tonne	72	60	67	74	56
exchange rate	CZK/EUR	26.4	25.3	24.6	25.1	26.0
coking coal	CZK/tonne	2 297	3 567	4 453	3 112	2 548
steam coal	CZK/tonne	1 901	1 594	1 722	1 857	1 456

Sources:

In 2009 - New World Resources Annual Report and Accounts 2011. New World Resources Plc, pp. 31, 35.

For 2010 - 2013 – New World Resources Annual Report and Accounts 2013. New World Resources Plc, p. 45.

OKD, a.s. bituminous coal sales

Coal type/Year			2009	2010	2011	2012	2013
coking coal	sales	tonnes	5 999 105	6 037 299	4 964 500	5 167 830	4 290 210
	revenue	ths CZK	15 425 261	23 103 968	22 390 420	16 574 935	11 147 387
	average price	CZK/ tonne	2 571	3 827	4 510	3 207	2 598
steam coal	sales	tonnes	4 939 502	5 477 941	5 849 660	4 726 870	5 079 459
	revenue	ths CZK	11 000 194	10 077 808	9 577 580	8 738 661	7 371 043
	average price	CZK/ tonne	2 227	1 840	1 637	1 849	1 451

Sources:
For 2009–2010 – OKD výroční zpráva 2010, OKD, a.s., p. 29.
In 2011 – OKD výroční zpráva 2012, OKD, a.s., pp. 17–18.
For 2012–2013 – OKD výroční zpráva 2013, OKD, a.s., p. 12.
Note: výroční zpráva – annual report

5. Mining companies in the Czech Republic as of December 31, 2013

OKD, a.s., Ostrava

6. World production and world market prices

World mine production

The trend in world production of bituminous coal for the last five years was as follows:

	2009	2010	2011	2012	2013[e]
Steam coal (WBD), mill tonnes	5 035.6	5 311.0	5 722.2	5 726.6	–
Steam coal (IEA), mill tonnes	5 199.1	5 437.3	5 763.4	5 918.4	5 979.3
Coking coal (WBD), mill tonnes	785.1	903.5	954.0	978.2	–
Coking coal (IEA), mill tonnes	783.5	914.1	972.7	987.2	1 003.5

[e] *– preliminary values*
Sources (IEA): Coal information 2013. International Energy Agency Statistics. OECD/IEA, 2013.
Coal information 2014. International Energy Agency Statistics. OECD/IEA, 2014.

In 2012, the total world production of bituminous coal amounted to 6 704.8 million tonnes, 14.6 % of which was coking coal, which is considered to be a strategic mineral in the EU.

Major producers (2012, according to WBD):

Steam coal		**Coking coal**	
China	50.6 %	China	52.2 %
USA	13.7 %	Australia	15.0 %
India	8.7 %	USA	8.3 %
Indonesia	7.1 %	Russia	7.4 %
RSA	4.5 %	India	4.8 %
Russia	3.6 %	Canada	3.2 %
Australia	3.5 %	Mongolia	2.1 %
Kazakhstan	1.9 %	Ukraine	1.8 %
Poland	1.2 %	Kazakhstan	1.3 %
Columbia	1.1 %	Poland	1.2 %

The World Coal Association published preliminary data on the world coal industry and trade for 2013 (Coal Facts 2014). According to these statistics, the following countries were the top ten producers of steam and coking coal by tonnage (mill tonnes):

Steam coal		**Coking coal**	
China	3 034	China	527
USA	756	Australia	158
India	526	USA	78
Indonesia	486	Russia	73
South Africa	255	India	42
Australia	239	Canada	34
Russia	201	Mongolia	20
Kazakhstan	103	Ukraine	20
Columbia	81	Kazakhstan	12
Poland	65	Poland	12

According to World Energy Resources: 2013 Survey, world recoverable reserves of bituminous coal at the end of 2013 reached 403 199 million tonnes.

According to Coal Facts 2014, 1 028 million tonnes of bituminous steam coal and 301 million tonnes of coking coal were traded worldwide in 2013. The top exporters of steam coal were Indonesia (423 mill t), Australia (182 mill t) and Russia (118 mill t), followed by Columbia (73 mill t), South Africa (72 mill t) and the USA (47 mill t). The top exporter of coking coal was Australia (154 mill t), followed by the USA (60 mill t), Canada (33 mill t) and Russia (22 mill t). The leading importers of bituminous coal were China (327 mill t, of which 77 mill t was coking coal), followed by Japan (196 mill t in total, 54 mill t of coking coal), India (180 mill t, of which 38 mill t was coking coal), and South Korea as the fourth leading importer (126 mill. t in total, 31 mill t of coking coal).

World market prices

World prices of bituminous coal, both contract and spot prices, have traditionally been determined largely by the prices of American and Australian coal. In recent years, bituminous coal prices at northwest European ports peaked in the summer of 2008 and then fell sharply due to the growing global economic crisis. Prices grew gradually again in 2010 and hovered

around a relatively high level of 120–130 USD/t in mid-2011. They reached an absolute long-term peak of 139.05 USD/t in January 2011. However by the second half of that year, they had already fallen to around 100 USD/t due to an unusually mild start to winter. Since then, primarily the inventories of thermal coal have grown. The prices of coking coal fared better. In 2011, the spot prices of US coking coal hovered on average around 280 USD/t FOB. This relatively high level was also influenced by disruptions in the supply of Australian coal as a result of flooding in Queensland. During the course of 2012, prices declined yet again, and bituminous coal prices fluctuated around 90 USD/t in the second half of the year. Although contracts on a quarterly basis are more prevalent, spot trades are gradually gaining in importance. This is also due to the weakening of the US dollar, making US coal more attractive for Europe. Coking coal is bought in relatively small volumes, which negatively effects the price stability of spot trades. In the third quarter of 2013, spot prices reached 152 USD/t. That same quarter, contract prices were 145 USD/t. NWR in Ostrava sold coking coal for around 100 EUR/t in the second quarter of 2013, and on average for 92 EUR/t in the third quarter. At the beginning of 2014, NWR sold coking coal for 91 EUR/t and steam coal for only 60 EUR/t.

According to Platts Market Data 2014, the long-term average price of bituminous coal in 2009–2014 was 94.01 USD/t.

In the first half of 2011, the spot prices of coke also rose to a very high level of 500 USD/t CIF ARA (ARA = Amsterdam, Rotterdam, Antverpen), but already fell at the end of the year to 395 USD/t.

According to information from the World Energy Council, the trends of average prices of some bituminous coal types in USD/tonne were as follows:

Year	2009	2010	2011	2012	2013
NW Europe marker price	70.66	92.50	121.52	92.50	81.69
US Central Appalachian coal spot price index	68.08	71.63	87.38	72.06	71.39
Japan coking coal import CIF price	167.82	158.95	229.12	191.46	140.45
Japan steam coal import CIF price	110.11	105.19	136.21	133.61	111.16
Asian marker price	78.81	105.43	125.74	105.50	90.90

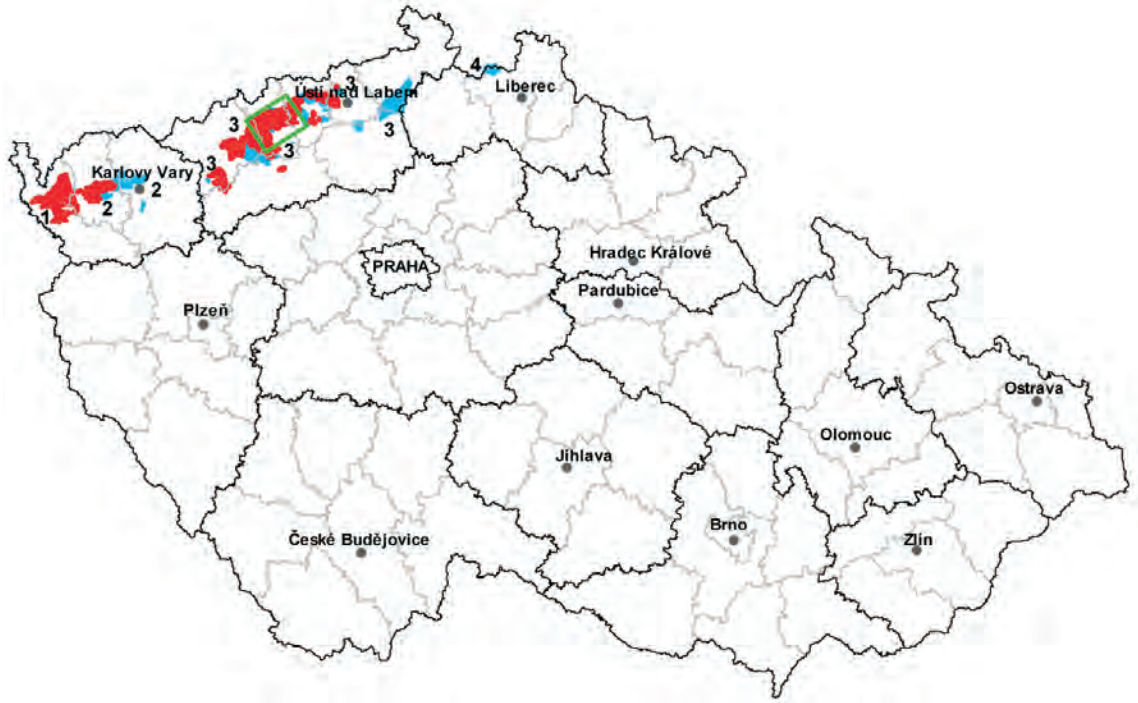
Steam coal export costs (average unit value, USD/tonne)

Year	2009	2010	2011	2012	2013
Colombia	58.26	77.31	110.38	83.30	71.40
Indonesia	55.29	71.03	87.32	68.13	62.40
South Africa	60.99	91.26	116.52	93.06	80.70

Source: Coal information 2014. International Energy Agency Statistics. OECD/IEA, 2014.

Brown coal

1. Registered deposits and other resources of the Czech Republic



reserved registered deposits

exhausted deposits and other resources

area of ecological territorial limits for mining (Government Resolution no. 444/1991)

Coal basin

*(Names of basins with mined deposits are indicated in **bold type**)*

1 Cheb Basin

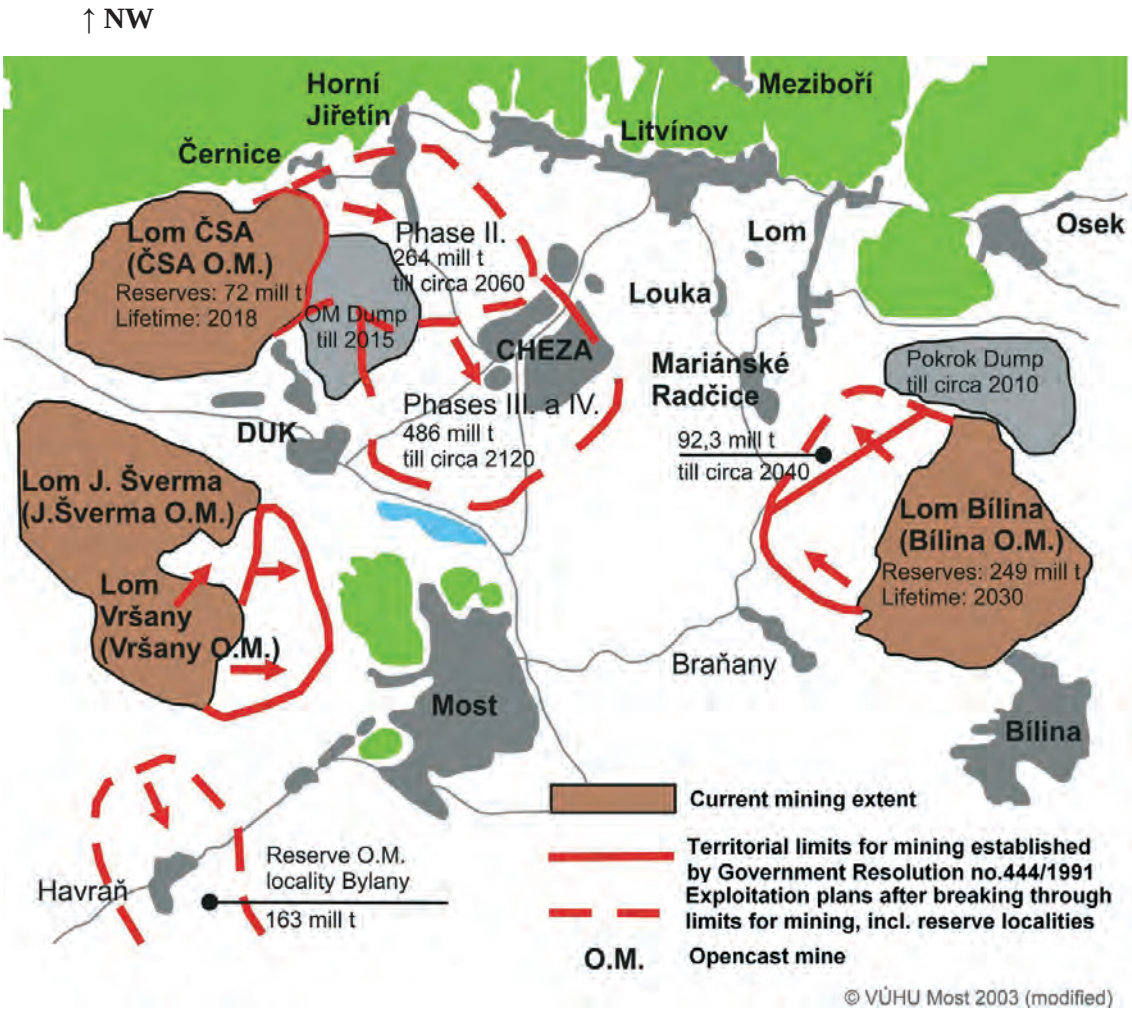
2 **Sokolov Basin**

3 **North-Bohemian Basin**

4 Czech part of the Zittau (Žitava) Basin

Ecological territorial limits

Rather large brown coal reserves in northern Bohemia (in North-Bohemian Basin) are blocked based on the announcement of the so-called ecological territorial limits of brown coal mining in northern Bohemia. These were established by the Czech Republic Government Resolution No. 444 from 1991. The resolution of the government defines mining leases and areas which should remain unexploited. Environmental and landscape protection in the area of northern Bohemia was the main reason for their establishment. Lifetime of reserves beyond the ecological territorial limits represents about 18-year mining and concerns namely the ČSA, Bílina and Vršany open-pit mines. Reserves of about 0.9 billion tonnes are bound by these so-called ecological territorial limits. There is an increasing pressure on revaluation or correction of the original decision from 1991 in relation to decreasing brown coal reserves in the mined localities. It remains a fact that brown coal is, along with nuclear power stations, a single relevant raw material for the Czech energy production. Brown coal represents also an essential raw material for the Czech heating plant industry. In terms of energy security, domestic raw material resources are also gaining in importance.



2. Basic statistical data of the Czech Republic as of December 31

Number of deposits; reserves; mine production

Year	2009	2010	2011	2012	2013
Deposits – total number	54	54	53	53	53
exploited	10	10	10	11	11
Total mineral* reserves, kt	9 055 290	8 998 999	8 948 767	8 936 157	8 859 890
economic explored reserves	2 789 379	2 405 345	2 361 825	2 347 268	2 308 649
economic prospected reserves	2 168 466	2 063 444	2 063 444	2 063 444	2 062 445
potentially economic reserves	4 097 445	4 530 210	4 523 498	4 525 445	4 488 796
exploitable (recoverable) reserves	862 633	915 100	871 142	862 202	825 322
Mine production, kt	45 354	43 931	46 848	43 710	40 585

*Notes: * See **NOTE** in the chapter **Introduction** above on a terminological difference between Czech official application of the term reserves and standard international application of the term. The relationship of domestic and foreign classifications of mineral reserves and resources is described in the separate chapter **Mineral reserve and resource classification in the Czech Republic** of this yearbook*

3. Foreign trade

2702 – Brown coal, also agglomerated, except jet

		2009	2010	2011	2012	2013
Import	kt	163	187	236	486	447
Export	kt	1 300	1 109	1 188	1 332	1 241

2702 – Brown coal, also agglomerated, except jet

		2009	2010	2011	2012	2013
Average import prices	CZK/t	1 763	2 106	2 017	1 203	1 263
Average export prices	CZK/t	1 400	1 432	1 426	1 540	1 641

Note: Jet is a compact black variety of brown coal used in (mourning) jewelry

4. Prices of domestic market

Domestic brown coal prices*

Product specification	2009	2010	2011	2012	2013
graded; cube coal II; 17.6 MJ/kg; Severočeské doly	1 847–2 143	1 868–2 143	1 900–2 150	1 930–2 170	2 135–2 150
graded; nut coal I; 17.6 MJ/kg; Severočeské doly	1 748–1 942	1 742–1 937	1 730–1 950	1 960–1 730	1 800–1 850
graded; nut coal II; 17.6 MJ/kg; Severočeské doly	1 461–1 782	1 461–1 782	1 470–1 790	1 810–1 490	1 700–1 800
coarse coal dust I, II; Severočeské doly; 16.9 MJ/kg	758–1 095	796–1 146	812–1 169	1 095–1 250	N
industrial mixture; 10.5–15.6 MJ/kg; Severočeské doly	511–915	691–943	538–962	570–1 010	N
graded; cube coal; Mostecká uhelná	2 015	N	N	N	N
graded; cube coal I; Mostecká uhelná	1 910	N	N	N	N
graded; cube coal II; Mostecká uhelná	995	N	N	N	N
graded; cobble; Sokolovská uhelná	950–1 120	N	N	N	N
graded; cube coal; Sokolovská uhelná	880–1 020	N	N	N	N
dried brown coal dust; Sokolovská uhelná	1 270–1 625	N	N	N	N

* *Prices given without taxes on solid fuels.*

Sokolovská uhelná Company has not been producing graded coal since 2009. Mostecká uhelná Company has been selling the coal in auctions, price lists will no longer be issued.

Price quotations*) (for home consumption) of Graded Brown Coal Most (THU**)) quoted on the Energy Exchange of the Czech Moravian Commodity Exchange Kladno (CZK/tonne)

		2009	2010		2011		2012	2013
Coal type***)	Calorific value Qir (MJ/kg)	1. 4. – 31. 12.	1. 1. – 31 .3.	1. 4. – 31. 12.	1. 1. – 31. 3.	1. 4. – 31. 12.	1. 1. – 21. 2.	
cube	19.90	1 720	1 720	1 737	1 737	1 775	1 786	–
nut 1	20.00	1 650	1 650	1 667	1 667	1 695	1 700	–
nut 2	19.80	920	920	929	929	1 173	1 310	–

Source: Czech Moravian Commodity Exchange Kladno

Explanations:

*) *Prices are quoted in CZK without VAT, solid fuels tax or any other indirect tax and do not include transport costs*

**) *THU = tříděné hnědé uhlí*

***) *Regular grain size (mm): cube = 40–100, nut 1 = 20–40, nut 2 = 10–20*

Czech Moravian Commodity Exchange Kladno closed down its market with graded brown coal on 31 December 2012 that was organized by independent branch Energy Exchange since 2009. Purpose of the trading in the marketplace was to meet demand for graded brown coal above frame of wholesale – coal depots long-term contracts. Operation of the market was programmed for a term of years 2009–2012 and its closure had controlled character.

5. Mining companies in the Czech Republic as of December 31, 2013

Severočeské doly, a.s., Chomutov
Vršanská uhelná a.s., Most
Sokolovská uhelná, právní nástupce, a.s., Sokolov
Severní energetická a.s., Most

6. World production and world market prices

World mine production

The trend in world production of brown coal for the last five years was as follows:

	2009	2010	2011	2012	2013[e]
Brown coal and lignite (WBD), mill tonnes	952.6	974.9	1 032.1	1 030.9	–
Brown coal and lignite (IEA), mill tonnes	856.1	841.2	890.7	888.8	840.1

[e] *– preliminary values*
Sources (IEA): Coal information 2013. International Energy Agency Statistics. OECD/IEA, 2013.
Coal information 2014. International Energy Agency Statistics. OECD/IEA, 2014.

Germany was the leading producer in 2012 with an 18% share of world production, followed by China (13.3 %). Other important producers were Turkey and the USA (7 %), Russia (6.8 %), Australia (6.4 %), Poland (6.2 %), Greece (6%) and India (4.5 %). The Czech Republic ranked tenth with 4.8%.

Coal Facts 2014 provided preliminary data on the top ten producers (mill t) in 2013.

Germany	183	Australia	63
Russia	73	Greece	54
USA	70	India	45
Poland	66	Czech Republic	40
Turkey	63	Serbia	40

Contrary to the above-mentioned data for 2012, this summary does not include China.

According to World Energy Resources: 2013 Survey, world recoverable reserves of brown coal amounted to 488 332 million tonnes at the end of 2013.

Market and prices

Global brown coal trade is very limited. According to Coal Facts, it totaled 3.7 million tonnes in 2011. In recent years, international trade peaked in 2012 with 6.9 million tonnes. In 2013, it declined again to 4.8 million tonnes. In comparison with the bituminous coal trade, brown coal is inefficient from an economic perspective to transport over long distances.

Therefore, trade takes place mainly between neighbouring countries based on contract prices, which are not published in available statistics.

Crude oil

1. Registered deposits and other resources of the Czech Republic

reserved registered deposits exhausted deposits and other resources

Principal areas of deposits presence:

*(names of areas with exploited deposits are indicated in **bold type**)*

1 **Vienna Basin**

2 **West-Carpathian Foredeep**

2. Basic statistical data of the Czech Republic as of December 31

Number of deposits; reserves; mine production

Year	2009	2010	2011	2012	2013
Deposits – total number	33	34	33	34	39
exploited	27	27	27	27	30
Total mineral *reserves, kt	31 031	29 015	30 891	30 781	28 811
economic explored reserves	15 440	15 424	20 326	20 108	21 236
economic prospected reserves	4 482	4 475	3 983	4 092	1 758
potentially economic reserves	11 109	9 116	6 582	6 581	5 817
exploitable (recoverable) reserves	1 535	1 415	1 664	1 628	1 534
Mine production, kt	217	173	163	150	152

** See **NOTE** in the chapter **Introduction** above on a terminological difference between Czech official application of the term reserves and standard international application of the term. The relationship of domestic and foreign classifications of mineral reserves and resources is described in the separate chapter **Mineral reserve and resource classification in the Czech Republic** of this yearbook*

3. Foreign trade

2709 – Petroleum oils and oils obtained from bituminous minerals, crude

		2009	2010	2011	2012	2013
Import	kt	7 452	7 770	6 969	7 024	6 630
Export	kt	22	18	19	21	25

2709 – Petroleum oils and oils obtained from bituminous minerals, crude

		2009	2010	2011	2012	2013
Average import prices	CZK/t	8 115	10 907	14 113	16 374	15 966
Average export prices	CZK/t	8 174	10 334	13 733	15 411	14 989

271011 – Petrol (Gasoline)

		2009	2010	2011	2012	2013
Import	kt	697	501	606	N	N
Export	kt	142	220	315	N	N

Notice: The conversion 1 000 litres of petrol = 750 kg was used

271011 – Petrol (Gasoline)

		2009	2010	2011	2012	2013
Average import prices	CZK/t	12 653	16 814	18 136	N	N
Average export prices	CZK/t	13 897	18 366	17 755	N	N

Notice: The conversion 1 000 litres of petrol = 750 kg was used

Czech Republic crude oil import by country and import costs

		2009	2010	2011	2012	2013
Kazakhstan	kt	499	563	597	518	620
Russian Federation	kt	5 097	4 945	4 102	4 545	4 213
Poland	kt	–	–	1	–	–
Italy	kt	–	–	–	11	–
Other non–OECD Europe/Eurasia	kt	1 530	2 008	2 038	1 859	1 659
Iran	kt	29	161	168	–	–
Algeria	kt	15	50	19	141	60
Nigeria	kt	17	–	–	–	–
Total	kt	7 170	7 727	6 925	7 074	6 552
Import costs, average unit value, CIF	USD/bbl	60.77	79.04	110.42	112.33	110.26
	USD/tonne*	447.87	582.52	813.80	827.87	812.62

*Note: * – 1 tonne = 7.37 bbl (in average)*
Sources: Oil information 2012. International Energy Agency Statistics. OECD/IEA, 2012.
Oil information 2013. International Energy Agency Statistics. OECD/IEA, 2013.
Oil information 2014. International Energy Agency Statistics. OECD/IEA, 2014.

4. Prices of domestic market

Prices of domestic producers are not open to public.

5. Mining companies in the Czech Republic as of December 31, 2013

MND a.s., Hodonín
LAMA GAS & OIL s.r.o., Hodonín

6. World production and world market prices

World mine production

The volume of the world´s crude oil production in recent years was as follows:

	2009	2010	2011	2012	2013
World crude oil production (WBD), million tonnes	3 729.0	3 800.0	3 847.2	4 051.2	–
World crude oil production (BP), million tonnes	3 890.9	3 979.3	4 010.6	4 117.4	4 130.2

Note: BP – BP Statistical Review of World Energy. June 2014.

Of the 97 producers of crude oil recorded in 2012, the top ten accounted for more than 64 % of world production. They are (according to WBD):

Saudi Arabia	13.5 %	Canada	4.0 %
Russia	12.8 %	United Arab Emirates	3.8 %
USA	9.8 %	Iraq	3.8 %
China	5.1 %	Kuwait	3.7 %
Iran	4.3 %	Mexico	3.6 %

Proved world crude oil reserves amounted 238.2 billion tonnes at the end 2013 (BP Statistical Review of World Energy. June 2014)

In comparison with previous years, the most significant changes that occurred involved Canada, which climbed from 18th place in 2011 to 7th place in 2012 with its production volume of 162.3 million tonnes, and also China, which moved ahead of Iran into 4th place in 2012 with its production of 207.5 million tonnes.

World market prices

During the monitored five-year period beginning with 2009, world prices rose from nearly 60 USD/bbl to roughly more than 80 USD/bbl in 2010 and then to a relatively high level of 95-110 USD/bbl in 2011-2013 as a result of the “Arab Spring“, the Russian aggression against Ukraine, and the Islamic State offensive in Northern Iraq. A more detailed view of these price changes is provided by the price quotes for Brent crude, which serve as benchmarks for the fuel prices in Europe. In 2010, these prices fluctuated from less than 75 USD/bbl to around 85 USD/bbl. From this level, they rose relatively sharply to more than 120 USD/bbl in the first half of 2011 and declined to less than 105 USD/bbl in the second half of the year. At the end of the winter of 2011/2012, prices jumped to nearly 125 USD/bbl. A decline to 100 USD/bbl may be observed in 2012 and in mid-2013. An increase to more than 115 USD/bbl occurred at the beginning of 2013.

Average spot prices of crude oil according to IEA and BP (USD/bbl)

Commodity/Year	Units	Conversion factor	2009	2010	2011	2012	2013
Brent Crude, CIF Rotterdam	USD/bbl	1 tonne = 7.560 bbl	61.67	79.50	111.26	111.67	108.66
	USD/ tonne		466.23	601.02	841.13	844.23	821.47
Dubai Crude, CIF Rotterdam	USD/bbl	1 tonne = 7.596 bbl	61.39	78.06	106.18	109.08	105.47
	USD/ tonne		466.32	592.94	806.54	828.57	801.15
West Texas Intermediate (WTI), CIF Rotterdam	USD/bbl	1 tonne = 7.400 bbl	61.92	79.45	95.04	94.13	97.99
	USD/ tonne		458.21	587.93	703.30	696.56	725.13
Nigerian Forcados Crude, CIF Rotterdam	USD/bbl	1 tonne = 7.500 bbl	63.35	81.05	113.65	114.21	111.95
	USD/ tonne		475.13	607.88	852.38	856.58	839.63
OPEC Basket, CIF Rotterdam	USD/bbl	1 tonne = 7.090 bbl	61.06	77.45	107.465	109.45	105.00
	USD/ tonne		432.92	549.12	761.93	776.00	744.45

Natural gas

1. Registered deposits and other resources of the Czech Republic

- reserved registered deposits of natural gas
- exhausted deposits and other resources of natural gas
- reserved registered deposits of natural gas adsorbed on coal seams
- other resources of natural gas adsorbed on coal seams
- underground gas reservoirs

Principal areas of deposits and underground gas reservoir Háje:

*(Names of regions with mined deposits are indicated in **bold type**)*

1 **South-Moravian region** | 2 **North-Moravian region** | 3 underground gas reservoir Háje

2. Basic statistical data of the Czech Republic as of December 31

Number of deposits; reserves; mine production

Year	2009	2010	2011	2012	2013
Deposits – total number	92	94	83	90	96
exploited	49	52	48	46	40
Total mineral *reserves, mill m^3	46 140	28 924	30 172	30 506	31 085
economic explored reserves	4 339	6 123	7 374	7 243	7 646
economic prospected reserves	39 895	2 281	2 335	2 791	2 981
potentially economic reserves	1 906	20 520	20 463	20 472	20 458
exploitable (recoverable) reserves	27 846	4 767	4 660	4 886	5 512
Mine production, mill m^3	180	201	187	204	207

** See **NOTE** in the chapter **Introduction** above on a terminological difference between Czech official application of the term reserves and standard international application of the term. The relationship of domestic and foreign classifications of mineral reserves and resources is described in the separate chapter **Mineral reserve and resource classification in the Czech Republic** of this yearbook*

Approved prognostic resources P_1, P_2, P_3

Year		2009	2010	2011	2012	2013
P_1,	mill m^3	16 767	16 767	16 767	16 767	16 767
P_2		–	–	–	–	–
P_3		–	–	–	–	–

3. Foreign trade

271121 – Natural gas

		2009	2010	2011	2012	2013
Import	ths m^3	N	N	N	N	N
Export	ths m^3	N	N	N	N	N

271121 – Natural gas

		2009	2010	2011	2012	2013
Average import prices	CZK/ths m^3	N	N	N	N	N
Average export prices	CZK/ths m^3	N	N	N	N	N

Czech Republic natural gas import by country and import costs

		2009	2010	2011	2012	2013
Norway	million m^3	3 000	1 057	280	3	4
Russian Federation	million m^3	6 683	7 453	9 041	7 468	8 475
Total	million m^3	9 683	8 510	9 321	7 471	8 479
Average pipeline import prices	USD/million Btu	8.67	8.74	11.14	13.22	12.10
	USD/MWh	29.59	29.83	38.02	45.12	41.30
	USD/m^3	0.32	0.32	0.41	0.49	0.45

Sources: Natural gas information 2013. International Energy Agency Statistics. OECD/IEA, 2013.
Natural gas information 2014. International Energy Agency Statistics. OECD/IEA, 2014.
Notes: 1) Own conversion of prices from USD/million Btu to USD/m^3 by equations 1 ft^3 (cubic foot) of natural gas = 1 050 Btu (British thermal unit); 1m^3 = 35,31ft^3; 1m^3 = 37 075,5 Btu
2) 3 412 969 Btu = 1 MWh

4. Prices of domestic market

Prices of domestic producers are open to public incompletely.

In period under consideration company MND a.s. stated (MND a.s. – Výroční zpráva 2010; výroční zpráva = annual report) for 2010 and 2009 that average price of own production gas was 6.80 CZK/m^3 in 2010 so it was by 9.5 % higher of that in 2009 (6.20 CZK/m^3).

Unigeo a.s. shows data in its Annual Reports for 2009–2013 which allow to deduct approximate average prices of natural gas supply to local gas distribution system.

	2009	2010	2011	2012	2013
Unigeo a.s. price – CZK/m^3	4.50	N	6.60	8.89	9.21

Trading on the Energy Exchange of the Czech Moravian Commodity Exchange Kladno (CMKBK) with the SSDP (composite natural gas supply services of gas products (commodity)) – price quotation*) averages weighted by realized quantity

		2010 (traded since 10th August)	2011	2012	2013
To 630 MWh/delivery point (630 MWh = 59 684 m^3)	CZK/MWh **)	570	696	705	715
	CZK/ths m^3 ***)	6 017	7 347	7 441	7 547
Over 630 MWh/delivery point (630 MWh = 59 684 m^3)	CZK/MWh **)	516	677	690	703
	CZK/ths m^3 ***)	5 447	7 146	7 146	7 420

Source: Czech Moravian Commodity Exchange Kladno

Explanations:
*SSDP (***sdružené služby dodávky zemního plynu***) = **c**omposite natural gas supply services of gas products (commodity) = natural gas physically delivered into the customers offtake point on the territory of the Czech Republic with obligation of the customer to take delivery of the gas from the distribution network (gas grid) and responsibility of the holder of the natural gas trading licence (supplier) for any deviations in line with relevant legal regulations according to the Energy Act and the relevant implementing and related regulations in force including distribution of natural gas and the system services.*

**) Prices are quoted in CZK without VAT, gas tax or any other indirect tax or similar payment and do not include distribution of natural gas and related services*

***) Original format of quoted prices*

****) Recalculated quoted prices with using of calorific value 1 MWh = 94.74 m³ of natural gas*

5. Mining companies in the Czech Republic as of December 31, 2013

MND a.s., Hodonín
Green Gas DPB, a.s., Paskov
LAMA GAS & OIL s.r.o., Hodonín
Unigeo a.s., Ostrava – Hrabová

6. World production and world market prices

World mine production

The volumes of world natural gas production in recent years were as follows:

	2009	2010	2011	2012	2013
World natural gas production (WBD), million m³	2 488.4	2 648.5	2 730.3	3 475.6	–
World natural gas production (BP), million m³	2 957.4	3 180.8	3 233.0	3 310.8	3 347.6
World natural gas production (IEA), million m³	3 060.8	3 279.3	3 380.0	3 436.8	3 479.0^{e}

Notes: BP – BP Statistical Review of World Energy. June 2014.
IEA – Natural gas information 2013. International Energy Agency Statistics. OECD/IEA, 2013.
Natural gas information 2014. International Energy Agency Statistics. OECD/IEA, 2014.
^{e} – preliminary values

According to WBD, natural gas was produced by 86 countries in 2012, of which the top ten accounted for nearly 66 % of world production. They were:

USA	19.6 %	Norway	3.3 %
Russia	18.8 %	China	3.1 %
Canada	4.9 %	Saudi Arabia	3.0 %
Iran	4.6 %	Indonesia	2.6 %
Qatar	4.5 %	Algeria	2.5 %

Proved world natural gas reserves amounted 185.7 trillion m³ at the end 2013 (BP Statistical Review of World Energy. June 2014)

Natural gas prices in various countries according to the BP Statistical Review of Energy 2014 (USD/million Btu converted to USD/m³ and USD/MWh)

Country/year		2009	2010	2011	2012	2013
Germany, average import price	USD/mill Btu	8.52	8.01	10.48	11.03	10.72
	USD/MWh	29.08	27.34	35.77	37.65	36.59
	USD/m³	0.32	0.3	0.39	0.41	0.4
United Kingdom, Heren NBP Index	USD/mill Btu	4.85	6.56	9.04	9.46	10.63
	USD/MWh	16.55	22.39	30.85	32.29	36.28
	USD/m³	0.18	0.24	0.34	0.35	0.39
USA, Henry Hub, spot price	USD/mill Btu	3.89	4.39	4.01	2.76	3.71
	USD/MWh	13.28	14.98	13.69	9.42	12.66
	USD/m³	0.14	0.16	0.15	0.1	0.14
Canada (Alberta)	USD/mill Btu	3.38	3.69	3.47	2.27	2.93
	USD/MWh	11.54	12.59	11.84	7.75	10.00
	USD/m³	0.13	0.14	0.13	0.08	0.11

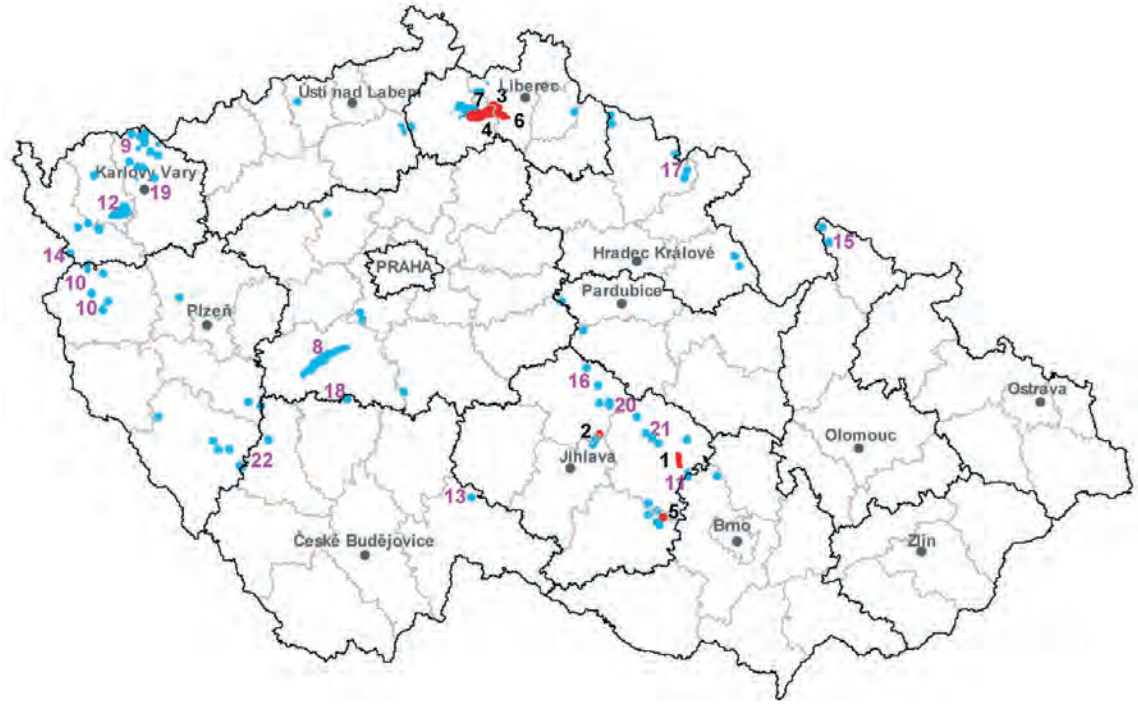
Notes:

1) Own conversion of prices from USD/million Btu to USD/m³ by equations 1 ft³ (cubic foot) of natural gas = 1 050 Btu (British thermal unit); 1m³ = 35,31ft³; 1m³ = 37 075,5 Btu

2) 3 412 969 Btu = 1 MWh

Uranium

1. Registered deposits and other resources of the Czech Republic



reserved registered deposits exhausted deposits and other resources

Reserved registered deposits

*(Names of mined deposits are indicated in **bold type**)*

1 **Rožná**	3 Břevniště pod Ralskem	5 Jasenice-Pucov	7 Stráž pod Ralskem*
2 Brzkov	4 Hamr pod Ralskem	6 Osečná-Kotel	

** uranium is recovered only as a byproduct from the treatment of groundwater and technological solutions during mine liquidation and reclamation work upon termination of in-situ leaching (ISL), otherwise in situ recovery (ISR), of uranium ores*

Exhausted deposits and other resources

8 Příbram	13 Okrouhlá Radouň	18 Předbořice
9 Jáchymov	14 Dyleň	19 Hájek + Ruprechtov
10 Zadní Chodov + Vítkov 2	15 Javorník	20 Chotěboř
11 Olší	16 Licoměřice-Březinka	21 Slavkovice
12 Horní Slavkov	17 Radvanice + Rybníček + Svatoňovice	22 Mečichov-Nahošín

2. Basic statistical data of the Czech Republic as of December 31

Number of deposits; reserves; mine production

Year	2009	2010	2011	2012	2013
Deposits – total number	7	7	7	7	7
exploited	1	1	1	1	1
Total mineral * reserves, t U	135 425	135 361	135 276	135 214	135 144
economic explored reserves	1 426	1 416	1 406	1 323	1 327
economic prospected reserves	19 420	19 427	19 402	19 458	19 427
potentially economic reserves	114 579	114 518	114 468	114 433	114 391
exploitable (recoverable) reserves	377	374	338	312	284
Mine production, t U	286	259	252	222	232
Production of concentrate, t U **	243	237	216	219	206

** See **NOTE** in the chapter **Introduction** above on a terminological difference between Czech official application of the term reserves and standard international application of the term. The relationship of domestic and foreign classifications of mineral reserves and resources is described in the separate chapter **Mineral reserve and resource classification in the Czech Republic** of this yearbook*
*** sales production (without ore milling losses)*

Approved prognostic resources P_1, P_2, P_3

Year		2009	2010	2011	2012	2013
P_1,	t U	19 025	19 025	19 025	19 025	19 025
P_2,	t U	2 181	2 181	2 181	2 181	2 181
P_3		–	–	–	–	–

Other* prognostic resources P_1, P_2, P_3

Year		2009	2010	2011	2012	2013
P_1,	t U	202 827	202 827	202 827	202 827	–
P_2,	t U	16 522	16 522	16 522	16 522	–
P_3		–	–	–	–	–

** Prognostic resources of uranium-bearing sandstones type in the Bohemian Cretaceous Basin, unexploitable at the present time*

3. Foreign trade

28441030 – Natural uranium – wrought

		2009	2010	2011	2012	2013
Import	t U	0	0	0	0.001	0
Export	t U	103	169	176	243	264

28441030 – Natural uranium – wrought

		2009	2010	2011	2012	2013
Average import prices	CZK/kg U	–	–	–	96 000	–
Average export prices	CZK/kg U	3 771	3 522	3 032	3 228	2 878

4. Prices of domestic market

Extracted uranium is exported.

5. Mining companies in the Czech Republic as of December 31, 2013

DIAMO, s. p., Stráž pod Ralskem

6. World production and world market prices

World mine production

In recent years, the volume of world production of uranium content of ores was as follows:

	2009	2010	2011	2012	2013
Uranium production, tonnes U_3O_8 (WBD)	59 736	64 460	63 398	68 746	N
Uranium production, tonnes U (WNA*)	50 722	53 663	54 610	58 394	59 673

Notes:

*1) * Uranium production figures, 2003–2013. World Nuclear Association. December 2014.*

2) 1 t U = 1.179 t U_3O_8

According to WBD, the top ten producers of uranium in 2012 were:

Kazakhstan	36.6 %	Russia	4.9 %
Canada	15.4 %	Uzbekistan	4.1 %
Australia	12.0 %	USA	2.7 %
Niger	8.3 %	China	2.6 %
Namibia	7.3 %	Malawi	1.9 %

A noteworthy fact is that the first five countries produced nearly 85 % of the world´s uranium. The top ten producers accounted for more than 95 % of mined uranium.

According to the World Nuclear Association (2011), the world´s known recoverable resources of uranium amounted to 5327 kt. The leading producers´ shares of these resources were as follows:

Australia	31 %	Brazil	5 %
Kazakhstan	12 %	Namibia	5 %
Russia	9 %	USA	5 %
Canada	9 %	Ukraine	2 %
Niger	8 %	Uzbekistan	2 %
South Africa	5 %		

Distribution of worldwide identified conventional uranium resources (thousand tonnes U) by categories and cost ranges according to „Red Book 2014“ in 2013.

Resource category	2013
Identified (total)	
<USD 260/kg U	7 635.2
<USD 130/kg U	5 902.9
<USD 80/kg U	1 956.7
<USD 40/kg U	682.9
RAR (reasonably assured resources)	
<USD 260/kg U	4 587.2
<USD 130/kg U	3 698.9
<USD 80/kg U	1 211.6
<USD 40/kg U	507.4
Inferred resources	
<USD 260/kg U	3 048.0
<USD 130/kg U	2 204.0
<USD 80/kg U	745.1
<USD 40/kg U	175.5

Notes:

1) Identified resources = RAR + Inferred resources

2) Resources in the cost category of < USD 40/kgU are likely higher than reported, because some countries have indicated that detailed estimates are not available, or the data are confidential.

3) „Red Book 2014“ – Uranium 2014: Resources, production and demand. OECD Nuclear Energy Agency and the International Atomic Energy Agency. OECD Nuclear Energy Agency 2014.

In recent years, there has been a change in the overall ratio of primary uranium extraction methods, mainly as a result of a sharp and continuous rise in production in Kazakhstan, and also due to a slight decline in production in Australia and Canada. Underground mining accounted for 32 % of primary uranium production in 2010, but for roughly only 30 % (about 16 100 t) already in 2011. By contrast, uranium production from in-situ leaching increased significantly. Its share of production of around 30 % in 2009 grew to roughly 40 % in 2010, and in-situ leaching accounted for around 45 % (about 24 650 t) of primary uranium production in 2011. The share of open pit uranium mining declined from 25 % in 2005 to nearly 19 % in 2012 (about 10 150 t). The share of uranium recovered as a by-product from the processing of other ores, usually Au and Cu, basically depends on the production of two deposits, specifically Olympic Dam (Australia) and Vaal River (South Africa), and hovers at no more than 10 % (3 990 t). Other uranium recovery methods include, for example, heap leaching, remediation (mainly clean-up of contaminated mine water), etc.

Since 2011, the state-owned Kazakh company KazAtomProm has been the largest mining company as a result of a sharp rise in Kazakhstan´s production. The French company AREVA and Canada´s CAMECO share second and third place. AREVA has a major stake in two deposits mined in Niger, in two in Kazakhstan and in Canada. CAMECO operates deposits in Canada, and has a 70 % stake in the world´s richest deposit McArthur River (the remainder is held by AREVA). Together, these three companies produce roughly 50 % of the world´s uranium. They are followed distantly by the Australian company BHP Billiton, which operates the Olympic Dam deposit.

After reaching a historic peak in 2007, prices fell relatively sharply and approached the 100 USD/kg threshold in the first quarter of 2009. They remained practically unchanged in the following one and a half years, fluctuating between 110 and 120 USD/kg. However, they began to rise in the last quarter of 2010 and peaked between 180 and 190 USD/kg in January and February 2011. They declined slightly during the next three months and stabilized between 130 and 140 USD/kg since the second half of 2011. This period of price stability continued until July 2012; since then, prices declined and hovered around 113 USD/kg at the end of 2012. The trend in prices continued with another decline in 2013 and the price stabilized at around 80-85 EUR/kg U.

ESA average annual prices of natural uranium (EUR/kgU) according to EU Nuclear Observatory

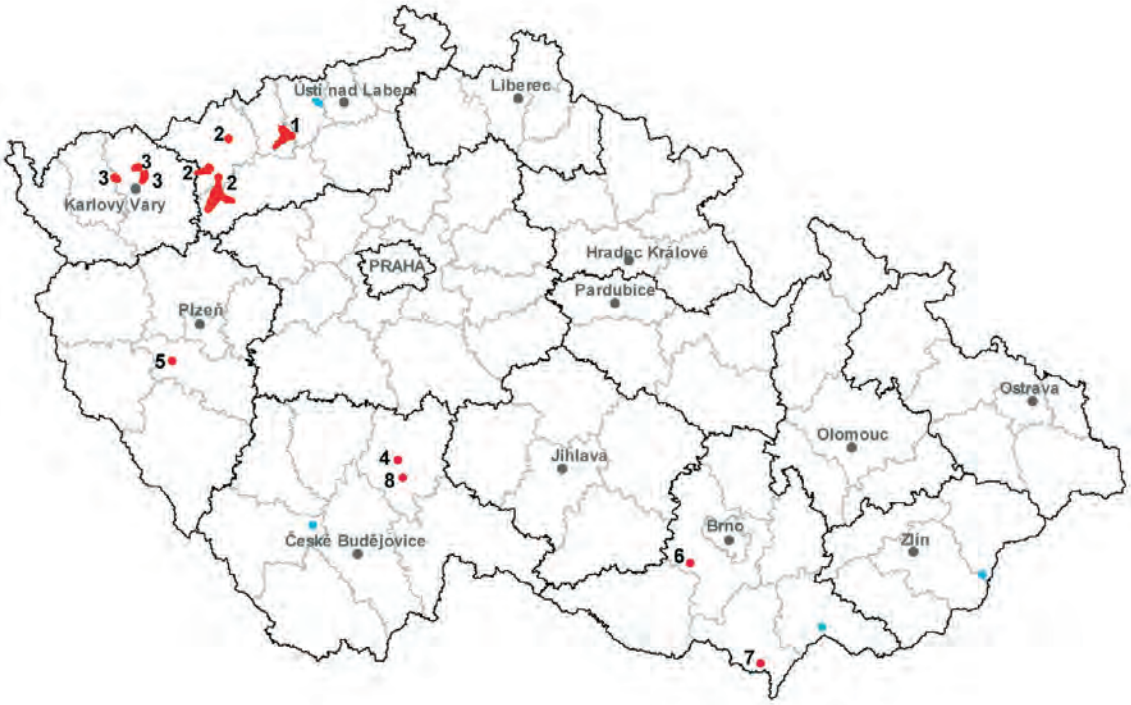
Rok	2009	2010	2011	2012	2013
Long-term price	55.70	61.68	83.45	90.03	85.19
Spot price	77.96	79.48	107.43	97.80	78.24

Note: ESA – Euratom Supply Agency, European agency for common supply policy on the principle of regular and equitable supply of nuclear fuels for European Community users

INDUSTRIAL MINERALS

Bentonite

1. Registered deposits and other resources of the Czech Republic



reserved registered deposits exhausted deposits and other resources

Principal areas of deposits and deposits outside them

*(Names of areas and the mined deposit outside are indicated in **bold type**)*

1 **České středohoří**

2 **Doupovské hory**

3 **Sokolovská pánev**

4 **Maršov u Tábora**

5 Dněšice – Plzeňsko jih

6 Ivančice – Réna

7 Poštorná

8 Rybova Lhota

2. Basic statistical data of the Czech Republic as of December 31

Number of deposits; reserves; mine production

Year	2009	2010	2011	2012	2013
Deposits – total number	30	32	33	35	35
exploited	4	6	6	6	6
Total mineral *reserves, kt	303 313	304 673	292 159	302 946	294 885
economic explored reserves	60 598	62 401	73 849	73 832	73 703
economic prospected reserves	139 809	139 670	116 400	126 365	128 326
potentially economic reserves	102 906	102 602	101 910	102 749	105 151
exploitable (recoverable) reserves	27 434	28 402	29 599	29 438	30 493
Mine production, kt**	181	183	160	221	226

** See **NOTE** in the chapter **Introduction** above on a terminological difference between Czech official application of the term reserves and standard international application of the term. The relationship of domestic and foreign classifications of mineral reserves and resources is described in the separate chapter **Mineral reserve and resource classification in the Czech Republic** of this yearbook*
*** Including montmorillonite clays from kaolin deposits overburden*

Approved prognostic resources P_1, P_2, P_3

Year		2009	2010	2011	2012	2013
P_1,	kt	23 792	23 792	23 792	27 017	27 017
P_2,	kt	36 874	36 874	36 874	36 874	36 361
P_3		–	–	–	–	–

3. Foreign trade

250810 – Bentonite

		2009	2010	2011	2012	2013
Import	kt	25	19	39	39	45
Export	kt	100	120	144	152	162

250810 – Bentonite

		2009	2010	2011	2012	2013
Average import prices	CZK/t	3 370	2 738	5 500	3 322	2 747
Average export prices	CZK/t	2 760	2 626	3 134	2 675	2 843

250820 – Decolourizing earths and fuller's earth

		2009	2010	2011	2012	2013
Import	kt	0	0	0	0	0
Export	kt	0	0	0	0	0

250820 – Decolourizing earths and fuller's earth

		2009	2010	2011	2012	2013
Average import prices	CZK/t	–	–	–	–	–
Average export prices	CZK/t	–	–	–	–	–

4. Prices of domestic market

Bentonite prices are not quoted.

5. Mining companies in the Czech Republic as of December 31, 2013

Sedlecký kaolin a.s., Božičany
KERAMOST a.s., Most

6. World production and world market prices

World mine production

	2009	2010	2011	2012	2013[e]
World mine production (according to MCS), kt	9 660	10 600	10 300	9 950	10 300
World mine production (according to WBD), kt	13 209	15 244	15 775	10 300	N

[e] – *preliminary values*

World bentonite production in 2013 according to the two most important statistical sources differs significantly and, at first glance, inexplicably. According to MCS, the share of the top ten producers is as follows:

USA	48.0 %	Czech Republic	2.1 %
Greece	11.2 %	Ukraine	2.0 %
Brazil	5.5 %	Spain	1.1 %
Turkey	3.9 %	Italy	1.0 %
Germany	3.4 %	Mexico	0.9 %

The leading producers´shares of world production in 2012 according to both sources seem to be contradictory as well.

According to MCS		According to BWD	
USA	50.0 %	USA	29.1 %
Greece	8.0 %	China	21.2 %
Brazil	5.7 %	Greece	7.5 %
Turkey	4.0 %	Turkey	6.0 %
Germany	3.8 %	Mexico	5.8 %
Czech Rep.	2.2 %	India	3.6 %
Ukraine	2.1 %	Russia	3.0 %
Spain	1.2 %	Japan	2.6 %
Italy	1.1 %	Iran	2.4 %
Mexico	0.5 %	Germany	2.2 %

However the main difference, which is evident, is that the MCS statistics do not include data on China. Incorrect statistical procedures are also another reason for the discrepancies, for example when MCS provides figures for sales (USA, Germany, United Kingdom), alongside those for crude bentonite (Czech Republic, Greece, Ukraine, Uzbekistan) or for beneficiated bentonite (Brazil). These distinctions in quality are not listed for the rest of the countries. According to WBD, the CR (Czech Republic) ranked fourteenth with a share of 1.34 %.

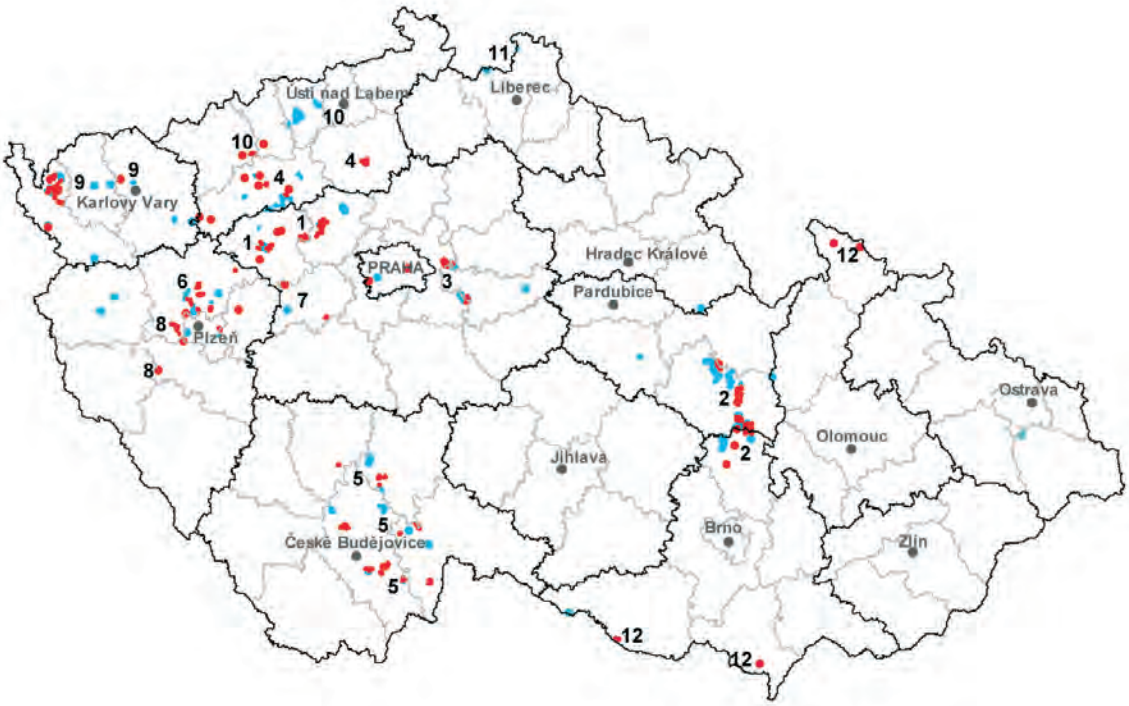
Prices of traded commodities (according to IM)

Commodity/Year		2009	2010	2011	2012	2013
Bentonite, cat litter, grade1–5 mm, bulk, FOB main European port	EUR/t	47–70	42–60	42–60	42–60	42–60
Bentonite, Indian, cat litter grade, crushed, dried, loose in bulk, FOB Kandla	USD/t	34–53	34–38	34–38	34–38	34–38
Bentonite, API grade, bagged, rail-car, ex-works Wyoming	USD/st	70–100	70–100	70–120	90–130	90–130
Bentonite, foundry grade, bagged, railcars, ex-works Wyoming	USD/st	70–90	90–115	90–115	90–124	97–124
Bentonite, IOP grade, crude, bulk, ex-works Wyoming	USD/st	42–100	48–55	55–60	66–72	66–72
OCMA/Foundry grades, crude & dried, bulk, FOB Milos	EUR/t	50–76	50–75	50–75	50–80	60–80
Bentonite, dried material in bulk, FOB Greece	EUR/t	N	N	N	50–75	65–75
Bentonite, cat litter grade, ex-works Wyoming	USD/st	N	N	N	50–60	50–60

The price range includes the lowest and highest monthly price quotes for a given year.
Note: st – short ton; 1 st = 0.9072 tonne

Clays

1. Registered deposits and other resources of the Czech Republic



reserved registered deposits exhausted deposits and other resources

Major deposit areas:

*(Names of areas with exploited deposits are in **bold**)*

1 **Kladno-Rakovník Carboniferous**
2 **Moravian and East Bohemian Cretaceous**
3 **Cretaceous around Prague**
4 **Louny Cretaceous**
5 **South Bohemian Basins**
6 **Plzeň Basin**
7 **Tertiary relicts of Central Bohemia**
8 **Tertiary relicts of West Bohemia**
9 **Cheb Basin and Sokolov Basin**
10 **North Bohemian Basin**
11 Zittau Basin
12 Tertiary and Quaternary in Moravia

2. Basic statistical data of the Czech Republic as of December 31

Number of deposits; reserves; mine production

Year	2009	2010	2011	2012	2013
Deposits – total number	106	108	108	108	108
exploited	18	18	17	18	18
Total mineral *reserves, kt	925 714	924 112	925 554	920 624	923868
economic explored reserves	180 311	180 945	180 393	175 184	176 926
economic prospected reserves	402 944	401 419	401 667	399 478	399 072
potentially economic reserves	342 459	341 748	343 494	345 962	347 870
exploitable (recoverable) reserves	47 273	46 990	51 742	43 680	42 839
Mine production, kt	377	429	498	485	465

** See **NOTE** in the chapter **Introduction** above on a terminological difference between Czech official application of the term reserves and standard international application of the term. The relationship of domestic and foreign classifications of mineral reserves and resources is described in the separate chapter **Mineral reserve and resource classification in the Czech Republic** of this yearbook*

Approved prognostic resources P_1, P_2, P_3

Year		2009	2010	2011	2012	2013
P_1,	kt	330 710	330 710	330 710	330 710	331 988
P_2,	kt	38 196	38 196	38 196	38 196	38 196
P_3		–	–	–	–	–

3. Foreign trade

2508 – Other clays (not including expanded clays of heading 6806), andalusite, kyanite and sillimanite, whether or not calcined; mullite; chamotte or dinas earth

		2009	2010	2011	2012	2013
Import	t	47 192	52 332	78 294	34 048	38 873
Export	t	223 080	242 640	293 909	134 806	132 978

2508 – Other clays (not including expanded clays of heading 6806), andalusite, kyanite and sillimanite, whether or not calcined; mullite; chamotte or dinas earth

		2009	2010	2011	2012	2013
Average import prices	CZK/t	4 384	3 978	4 807	4 922	5 676
Average export prices	CZK/t	2 435	2 374	2 568	2 200	2 736

250830 – Refractory (fire) clay

		2009	2010	2011	2012	2013
Import	t	9 459	12 332	13 242	7 347	11 350
Export	t	20 996	22 361	22 536	22 059	10 869

250830 – Refractory (fire) clay

		2009	2010	2011	2012	2013
Average import prices	CZK/t	3 024	3 092	3 264	3 146	3 353
Average export prices	CZK/t	1 294	1 226	1 197	1 272	2 043

250840 – Other clays

		2009	2010	2011	2012	2013
Import	t	4 840	12 667	14 856	13 333	10 869
Export	t	50 494	51 453	73450	62 590	71 729

250840 – Other clays

		2009	2010	2011	2012	2013
Average import prices	CZK/t	4 334	1 759	1 602	2 549	3 048
Average export prices	CZK/t	857	916	846	844	1 472

250870 – Chamotte or dinas earth

		2009	2010	2011	2012	2013
Import	t	3 035	4 422	5 005	8 627	6 812
Export	t	52 005	48 679	54 068	49 980	50 377

250870 – Chamotte or dinas earth

		2009	2010	2011	2012	2013
Average import prices	CZK/t	4 609	5 341	5 845	6 245	5 971
Average export prices	CZK/t	3 806	3 822	3 958	4 243	4 681

4. Prices of domestic market

Various qualities of clay have different market prices. Prices are made public in the limited extent only (some producers do not publish them at all). They fluctuate generally between CZK 70–4 400 per tonne.

5. Mining companies in the Czech Republic as of December 31, 2013

Whiteware clays
LB MINERALS, s.r.o., Horní Bříza
KERACLAY, a.s., Brník

Refractory clays for grog
KERACLAY, a.s., Brník
České lupkové závody a.s., Nové Strašecí
P-D Refractories CZ a.s, Velké Opatovice
RAKO - LUPKY s.r.o., Lubná u Rakovníka

Other refractory clays (ball clays)
LB MINERALS, s.r.o., Horní Bříza

Non-refractory ceramic clays
LB MINERALS, s.r.o., Horní Bříza
Kaolin Hlubany, a.s.

6. World production and world market prices

World mine production

There are no authoritative figures for world production and trade in ball clays because of the difficulty of classifying these clays in a uniform and directly comparable way in terms of quality and use. However, the United Kingdom is a leading world producer and exporter of high-quality ball clays (*Source:* Ball clay. Mineral Planning Factsheet.-British Geological Survey-National Environment Research Council 2011).

Mine production of clays in the United Kingdom

		2009	2010	2011	2012
Clays	kt	5 130	5 934	6 154	5 497
Ball clays	kt	727	900	930	748

Source: United Kingdom minerals yearbook 2013.- British Geological Survey, Keyworth, Nottingham, 2014.

In the world-wide scale mine production of the fuller's earth is indicated, the fuller's earth also has variable composition and in addition to clay minerals it may incorporate zeolites, carbonates, micas.

World mine production of fuller's earth (MCS):

	2012			2013[e]	
	ths tonnes	%		ths tonnes	%
USA	1 980	66.4	USA	2 040	68.0
Spain	591	19.8	Spain	590	19.7
Other countries	299	10.0	Other countries	270	9.0
Mexico	108	3.6	Mexico	100	3.3
Italy	3	0.1	Italy	3	0.1
World total	2 980	100.0	World total	3 000	100.0

[e] - *preliminary values*

Statistics indicate in clay group even mineral raw materials formed by minerals and rocks which are not clays but serve production of refractory materials: kyanite, sillimanite, shale, quartzose sandstone (quartzite) – ganister.

World resources of clays are extremely large.

World market prices

Prices of clays mostly are not indicated. In the 2009–2013 period under consideration Industrial Minerals quoted indicative prices of sillimanite group minerals and in January – March 2009 only prices of some refractory clays too:

commodity/year	2009	2010	2011	2012	2013
Andalusite, 55 %–59 % Al_2O_3, FOB European port, EUR/t	325–385	335–385	335–400	345–425	350–425
Andalusite, 57 %–58 % Al_2O_3, 2 000 tonne bulk, FOB Transvaal, EUR/t	225–255	225–255	225–265	230–280	235–280
Kyanite, 54 %–60 % Al_2O_3, 18–22 ton lots, raw, ex-works USA, USD/st	167–309	211–301	211–320	224–320	224–320
Kyanite, 54 %–60 % Al_2O_3, 18-22 ton lots, calcined, ex-works USA, USD/st	295–423	351–414	351–439	373–439	373–439
Chinese flintclay, 45 % Al_2O_3, FOB China, USD/t	80–88	–	–	–	–
European calcined kaolinitic clay, 47 % Al_2O_3, FOB, USD/t	130–150	–	–	–	–
Mulcoa *products, 47 % Al_2O_3, bulk bags, FOB USA, USD/t	130–147	130–198	198	198	198

Notes:

st – short ton; 1 st = 0.9072 tonne

** – Mulcoa is a registered trade name for alumina silica calcines made in Georgia, USA. It is a high mullite chamotte produced by calcining low alkali clays for consistant quality and chemistry.*
Mulcoa products have trade marking nos 45, 60, 70 and are utilised in the manufacture of high quality fired and monolithic refractory products.

Diatomite

1. Registered deposits and other resources of the Czech Republic

reserved registered deposits exhausted deposits and other resources

Exploited deposit: 1 Borovany-Ledenice

2. Basic statistical data of the Czech Republic as of December 31

Number of deposits; reserves; mine production

Year	2009	2010	2011	2012	2013
Deposits – total number	1	1	1	1	1
exploited	1	1	1	1	1
Total mineral *reserves, kt	4 401	4 367	4 318	2 573	2 520
economic explored reserves	4 073	4 039	3 990	1 859	1 808
economic prospected reserves	328	328	328	0	0
potentially economic reserves	0	0	0	714	712
exploitable (recoverable) reserves	4 381	4 349	4 303	1 673	1 624
Mine production, kt	0*	32	46	43	49

** See **NOTE** in the chapter **Introduction** above on a terminological difference between Czech official application of the term reserves and standard international application of the term. The relationship of domestic and foreign classifications of mineral reserves and resources is described in the separate chapter **Mineral reserve and resource classification in the Czech Republic** of this yearbook*

*** Production from previously mined raw material*

3. Foreign trade

2512 – Siliceous fossil meal*, siliceous earth

		2009	2010	2011	2012	2013
Import	t	3 175	2 753	3 263	3 829	3 693
Export	t	3 599	4 230	5 182	6 770	6 569

2512 – Siliceous fossil meal*, siliceous earth

		2009	2010	2011	2012	2013
Average import prices	CZK/t	8 292	8 690	8 155	8 690	8 784
Average export prices	CZK/t	8 072	6 671	5 684	6 103	7 031

*Note: * diatomite*

6901 – Bricks, blocks, tiles and other ceramic goods of siliceous fossil meals

		2009	2010	2011	2012	2013
Import	t	2 173	726	2 452	15 014	12 425
Export	t	43	19	50	3 173	72

6901 – Bricks, blocks, tiles and other ceramic goods of siliceous fossil meals

		2009	2010	2011	2012	2013
Average import prices	CZK/t	6 977	6 298	2 913	1 250	1 394
Average export prices	CZK/t	60 533	12 389	62 086	43 135	23 430

4. Prices of domestic market

Diatomite was sold domestically for CZK 9 600–15 700 per tonne.

5. Mining companies in the Czech Republic as of December 31, 2013

LB MINERALS, s.r.o., Horní Bříza

6. World production and world market prices

World mine production

World production of diatomite in the past five years was as follows:

	2009	2010	2011	2012	2013[e]
World mine production (according to MCS), kt	1 840	1 820	2 100	2 120	2 150
World mine production (according to WBD), kt	1 558	1 793	1 964	1 968	N

[e] – *preliminary values*

There are nine major producers:

USA	55.8 %	France	3.5 %
China	19.5 %	Peru	3.4 %
Denmark	15.1 %	Argentina	2.8 %
Japan	4.7 %	Spain	2.3 %
Mexico	4.0 %		

The statistics do not include the extent of world resources. According to MCS, the USA has 250 000 kt of resources and China 110 000 kt.

Prices of traded commodities (USD/t) according to IM

Commodity/Yeark	2009	2010	2011	2012	2013
US, calcined filter-aid grade, FOB plant	370–580	546–610	575–640	555–640	575–640
US, flux-calcined filter-aid grade, FOB plant	380–750	540–786	580–825	580–825	580–825

The price range includes the lowest and highest monthly price quotes for a given year.

Dolomite

1. Registered deposits and other resources of the Czech Republic

reserved registered deposits exhausted deposits and other resources

Principal areas of deposits presence:

*(Names of regions with mined deposits are indicated in **bold type**)*

1 **Bohdaneč**
2 **Lánov**
3 Bystročice
4 Čelechovice na Hané
5 Hněvotín
6 Horní Rokytnice
7 Jesenný-Skalka
8 Koberovy
9 Kryštofovo Údolí
10 Křížlice
11 Machnín-Karlov pod Ještědem
12 Podmokly

2. Basic statistical data of the Czech Republic as of December 31

Number of deposits; reserves; mine production

Year	2009	2010	2011	2012	2013
Deposits – total number	12	12	12	12	12
exploited	2	2	2	2	2
Total mineral *reserves, kt	513 382	512 996	512 627	527 219	526 826
economic explored reserves	78 277	77 959	77 608	85 709	85 316
economic prospected reserves	340 843	340 843	340 843	348 288	348 288
potentially economic reserves	94 262	94 194	94 176	93 222	93 222
exploitable (recoverable) reserves	4 381	4 349	10 229	12 615	12 212
Mine production, kt	337	385	369	440	392

** See **NOTE** in the chapter **Introduction** above on a terminological difference between Czech official application of the term reserves and standard international application of the term. The relationship of domestic and foreign classifications of mineral reserves and resources is described in the separate chapter **Mineral reserve and resource classification in the Czech Republic** of this yearbook*

Approved prognostic resources P_1, P_2, P_3

Year		2009	2010	2011	2012	2013
P_1,	kt	23 946	23 946	23 946	23 946	23 946
P_2		–	–	–	–	–
P_3		–	–	–	–	–

3. Foreign trade

2518 – Dolomite calcined, roughly trimmed or cut; agglomerated

		2009	2010	2011	2012	2013
Import	t	417 189	432 068	455 545	399 668	431 159
Export	t	18 303	15 133	7 209	30	76

2518 – Dolomite calcined, roughly trimmed or cut; agglomerated

		2009	2010	2011	2012	2013
Average import prices	CZK/t	244	202	182	201	303
Average export prices	CZK/t	2 563	2 569	2 626	5 145	2 618

4. Prices of domestic market

Average domestic prices of traded commodities

Product specification	2009	2010	2011	2012	2013
Dolomite aggregates, CZK/t	210–350	210–350	210–695	190–364	200–371
Ground calcitic dolomite, bulk, CZK/t	600–700	620–700	622–694	622–694	634–695
Ground calcitic dolomite, bagged, CZK/t	1 615	1 615	1 615	1 615	1 615

5. Mining companies in the Czech Republic as of December 31, 2013

Krkonošské vápenky Kunčice, a.s.
UNIKOM a.s., Kutná Hora

6. World production and world market prices

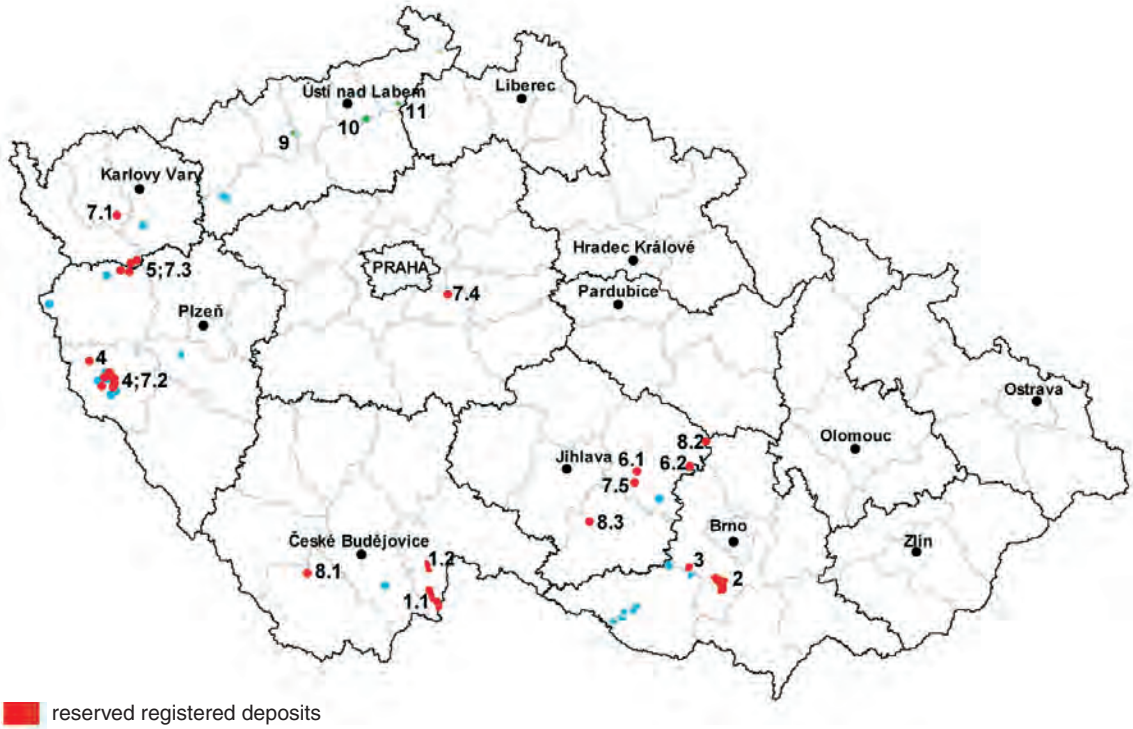
World mine production

World dolomite production is not listed in the statistics. Its world reserves, as a source of magnesia, are estimated at billions of tonnes. Even though dolomite is considered to be a main potential source of magnesium in the litosphere, it is currently not used for the production of magnesium. Otherwise, calcined dolomite with a minimum magnesium content of 8 % is suitable for this purpose.

World prices of dolomite are not quoted.

Feldspar

1. Registered deposits and other resources of the Czech Republic



reserved registered deposits
exhausted deposits and other resources
feldspar mineral substitutes (reserved registered deposit and other resources)

Feldspar minerals:

*(Names of exploited deposits are in **bold type**)*

1 Sediments of the Lužnice River region:
1.1 **Halámky**
1.2 Dvory nad Lužnicí – Tušť
1.1 Krabonoš
1.2 Majdalena
1.1 Tušť – Halámky

2 Sediments of the Jihlava River (the Syrovice-Ivaň Terrace):
2 **Bratčice**
2 **Hrušovany u Brna**
2 **Hrušovany u Brna – Protlas**
2 **Ledce – Hrušovany u Brna**
2 Medlov
2 Medlov – Smolín
2 Smolín – Žabčice

3 Sediments of the Jihlava River (the Ivančice region):
3 Ivančice – Němčice

4 Pegmatites (the Poběžovice-Domažlice region):
4 **Luženičky**
4 Ždánov
4 Bozdíš
4 Luženičky – WE
4 Meclov 2
4 Meclov – Airport
4 Meclov – West
4 Mutěnín
4 Ohnišťovice – Za Kulichem

5 Pegmatites (the Teplá region):
5 Beroun – Tepelsko
5 Křepkovice – Nezdice
5 Zhořec 1
5 Zhořec 2 – Hanov zone

6 Pegmatites (the western Moravia region):
6.1 Bory – Olší
6.2 Smrček

7 Granitoids:
7.1 **Krásno – Vysoký kámen**
7.2 **Mračnice**
7.3 Hanov u Lestkova
7.4 Štíhlice
7.5 Velké Meziříčí – Lavičky

8 Others:
8.1 Chvalšiny
8.2 Malé (Velké) Tresné
8.3 Markvartice u Třebíče

Feldspar mineral substitutes:

9 **Želenice**	10 Tašov-Rovný	11 Valkeřice-Zaječí vrch

2. Basic statistical data of the Czech Republic as of December 31

Feldspar

Number of deposits; reserves; mine production

Year	2009	2010	2011	2012	2013
Deposits – total number	34	35	35	37	37
exploited	8	8	9	9	9
Total mineral *reserves, kt	68 788	68 696	68 276	70 191	70 184
economic explored reserves	28 176	27 784	27 392	26 574	25 8898
economic prospected reserves	26 804	27 107	27 079	29 621	30 815
potentially economic reserves	13 808	13 805	13 805	13 996	13 480
exploitable (recoverable) reserves	16 666	15 960	24 940	24 444	24 299
Mine production, kt	431	388	407	445	411

** See **NOTE** in the chapter **Introduction** above on a terminological difference between Czech official application of the term reserves and standard international application of the term. The relationship of domestic and foreign classifications of mineral reserves and resources is described in the separate chapter **Mineral reserve and resource classification in the Czech Republic** of this yearbook*

Approved prognostic resources P_1, P_2, P_3

Year	2009	2010	2011	2012	2013
P_1, kt	19 737	48 530	48 530	48 530	48 530
P_2	–	–	–	–	–
P_3	–	–	–	–	–

Feldspar substitutes (nepheline phonolites)

Number of deposits; reserves; mine production

Year	2009	2010	2011	2012	2013
Deposits – total number	3	3	3	3	3
exploited	1	1	1	1	1
Total mineral *reserves, kt	199 946	199 927	199 905	199 891	199 876
economic explored reserves	0	0	0	0	0
economic prospected reserves	199 946	199 927	199 905	199 891	199 876
potentially economic reserves	0	0	0	0	0
exploitable (recoverable) reserves	24 376	24 357	24 335	24 321	24 306
Mine production, kt	23	19	22	15	15

** See **NOTE** in the chapter **Introduction** above on a terminological difference between Czech official application of the term reserves and standard international application of the term. The relationship of domestic and foreign classifications of mineral reserves and resources is described in the separate chapter **Mineral reserve and resource classification in the Czech Republic** of this yearbook*

Approved prognostic resources P_1, P_2, P_3

Year		2009	2010	2011	2012	2013
P_1		–	–	–	–	–
P_2,	kt	52 900	52 900	52 900	30 300	30 300
P_3		–	–	–	–	–

3. Foreign trade

252910 – Feldspar

		2009	2010	2011	2012	2013
Import	t	5 358	6 308	6 551	4 800	5 944
Export	t	88 476	115 260	166 859	171 188	173 282

252910 – Feldspar

		2009	2010	2011	2012	2013
Average import prices	CZK/t	3 205	2 972	2 865	3 225	1 959
Average export prices	CZK/t	875	889	947	1 032	1 045

252930 – Leucite, nepheline and nepheline syenite

		2009	2010	2011	2012	2013
Import	t	1 282	1 912	2 252	1 325	2 326
Export	t	38	2	2	0	2

252930 – Leucite, nepheline and nepheline syenite

		2009	2010	2011	2012	2013
Average import prices	CZK/t	6 893	6 170	6 636	6 802	6 736
Average export prices	CZK/t	7 132	9 709	10 000	–	11 566

4. Prices of domestic market

Feldspars are sold domestically for CZK 97 – 4 800 per tonne depending on their chemism and usage.

5. Mining companies in the Czech Republic as of December 31, 2013

Feldspar
LB MINERALS, s.r.o., Horní Bříza
KMK GRANIT, a.s., Krásno
Družstvo DRUMAPO, Němčičky
České štěrkopísky spol. s r.o., Praha
AGRO Brno - Tuřany, a.s.

Feldspar substitutes
KERAMOST a.s., Most

6. World production and world market prices

World mine production

The data on world feldspar production and on the production of countries from various sources differ considerably:

Commodity/Year	2009	2010	2011	2012	2013[e]
World mine production of feldspar (according to MCS), kt	20 000	20 600	21 200	22 700	23 000
World mine production of feldspar (according to WBD), kt	22 347	23 944	24 297	25 470	N

[e] – *preliminary values*

According to WBD, the top producer is Germany with a 20.9 % share of production, followed by Italy (18.5 %) and Turkey (14 %). Of the 47 producers, the CR ranks fourteenth with 1.8 %. However, the German statistics do not include any domestic production data at all.

According to MCS, Turkey ranked first in feldspar production in both 2012 and 2013. The list of the top ten producers in 2013 is as follows:

Turkey	30.4 %	Iran	2.8 %
Italy	20.4 %	Spain	2.6 %
China	9.1 %	Japan	2.6 %
Thailand	4.8 %	India	2.3 %
France	2.8 %	Poland	2.2 %

Total world resources of feldspar are not published. Countries with the largest reserves include Brazil with 320 000 kt and Turkey with 240 000 kt.

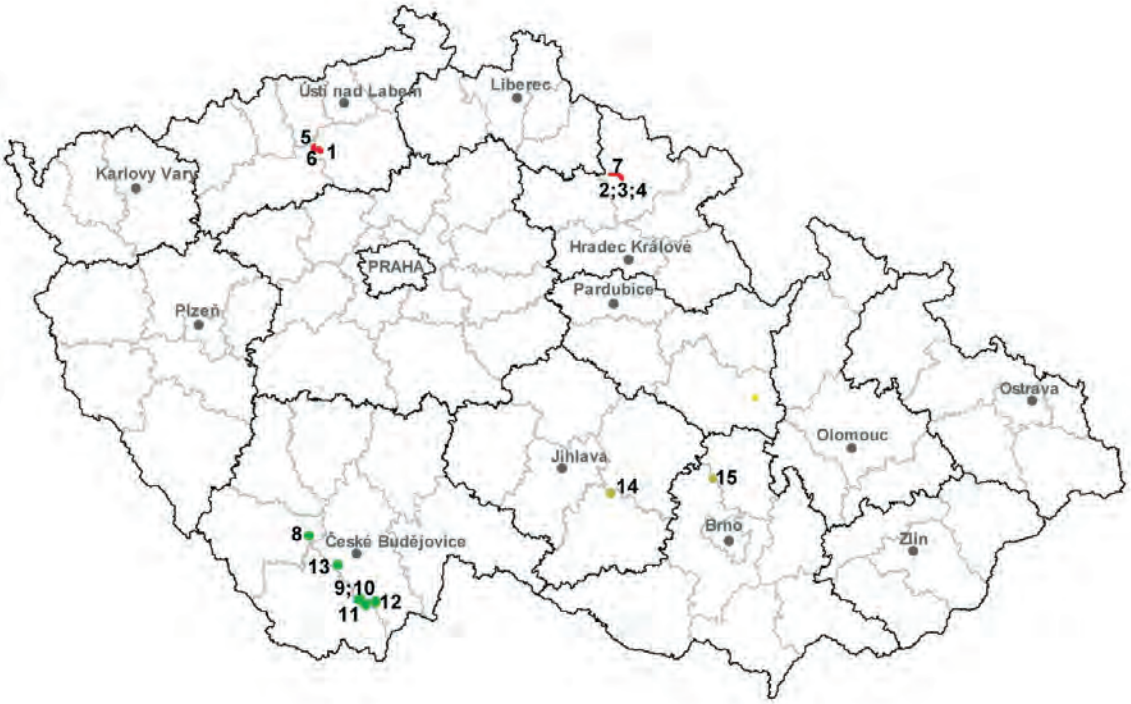
Prices of traded commodities (USD/t) (according to IM)

Commodity/Year		2009	2010	2011	2012	2013
Turkish, Na feldspar, crude, max. 10 mm size bulk, FOB Gulluk	USD/t	22–23	22–23	22–23	22–23	22–23
Turkish, Na feldspar, glass grade, max. 500 microns, bagged, FOB Gulluk	USD/t	70	70	70	70	70
Ceramic grade South African, bagged, FOB Durban	USD/t	112–145	N	N	168	168
Ceramic grade, 170–200 mesh, (Na), bagged, ex-works USA	USD/st	60–75	N	N	150–180	150–180
Na feldspar, floated –150 microns, bagged, FOB Gulluk, Turkey	USD/t	N	N	N	53–55	53–55
Na feldspar, floated –500 microns, bulk, FOB Gulluk, Turkey	USD/t	N	N	N	38–40	38–40

The price range includes the lowest and highest monthly price quotes for a given year.

Gemstones

1. Registered deposits and other resources of the Czech Republic



- reserved registered deposits of pyrope-bearing rock
- exhausted deposits and other resources of pyrope-bearing rock
- reserved registered deposits of moldavite-bearing rock
- exhausted deposits and other resources of moldavite-bearing rock
- reserved registered deposits of other gemstones
- exhausted deposits and other resources of other gemstones

Pyrope-bearing rock:	Moldavite-bearing rock:	Other gemstones:
1 **Podsedice-Dřemčice**	8 **Hrbov u Lhenic**	14 Bochovice *
2 Dolní Olešnice	9 **Chlum nad Malší-východ**	15 Rašov **
3 Horní Olešnice 1	10 **Ločenice-Chlum**	
4 Horní Olešnice 2	11 Besednice	
5 Linhorka-Staré	12 Slavče-sever	
6 Třebívlice	13 Vrábče-Nová Hospoda	
7 Vestřev		

** amethyst, ** opal*

*Names of mined deposits are indicated in **bold type***

2. Basic statistical data of the Czech Republic as of December 31

Number of deposits; reserves; mine production

Year	2009	2010	2011	2012	2013
Deposits – total number [a)]	14	14	14	14	15
exploited [b)]	2	2	3	3	3
Total mineral *reserves, kt [a)]	19 510	19 487	19 471	19 459	19 443
economic explored reserves	3 328	3 305	3 288	3 276	3 260
economic prospected reserves	13 283	13 283	13 002	13 002	13 002
potentially economic reserves	2 899	2 899	3 181	3 181	3 181
exploitable (recoverable) reserves	1 216	1 193	1 176	1 164	1 148
Total mineral *reserves, m^3 [c)]	339 132	793 865	729 718	692 072	686 591
economic explored reserves	0	190 078	169 362	154 596	141 638
economic prospected reserves	336 033	600 688	557 257	534 377	541 854
potentially economic reserves	3 099	3 099	3 099	3 099	3 099
exploitable (recoverable) reserves	159 625	732 136	667 589	642 270	636 789
Total mineral *reserves, kt (1 m^3=1.8 t) [c)]	610	1429	1 313	1 246	1 236
economic explored reserves	0	342	305	278	255
economic prospected reserves	605	1 081	1 003	962	975
potentially economic reserves	6	6	6	6	6
exploitable (recoverable) reserves	287	1 318	1 202	1 156	1146
Mine production, kt [a)]	26	23	17	12	16
Mine production, ths m^3 [c)]	58	57	65	41	41
Mine production, kt [c)] (1 m^3 = 1.8 t)	104	103	117	74	74

** See **NOTE** in the chapter **Introduction** above on a terminological difference between Czech official application of the term reserves and standard international application of the term. The relationship of domestic and foreign classifications of mineral reserves and resources is described in the separate chapter **Mineral reserve and resource classification in the Czech Republic** of this yearbook*

[a)] *pyrope-bearing rock*

[b)] *one deposit of pyrope , two deposits of moldavite in 2008, one deposit of pyrope, one deposit of moldavite in 2009 and 2010, one deposit of pyrope, two deposits of moldavite in 2011 - 2013.*

[c)] *moldavite-bearing rock*

Approved prognostic resources P_1, P_2, P_3

Year			2009	2010	2011	2012	2013
P_1			–	–	–	–	–
P_2,	a)	t	100	100	100	100	100
P_2,	b)	kt	749	749	749	749	749
P_2,	c)	ths m^3	66 000	66 000	66 000	66 000	66 000
P_2,	c)	kt	119	119	119	119	119
P_3			–	–	–	–	–

Notes:
a) *jasper*
b) *pyrope-bearing rock*
c) *moldavite-bearing rock*

3. Foreign trade

7102 – Diamonds, whether or not worked, but not mounted or set

		2009	2010	2011	2012	2013
Import	kg	283	156	325	1 086	636
Export	kg	55	67	32	746	444

7102 – Diamonds, whether or not worked, but not mounted or set

		2009	2010	2011	2012	2013
Average import prices	CZK/kg	851 025	2 129 526	1 517 606	712 274	543 063
Average export prices	CZK/kg	1 605 673	1 885 761	7 862 188	466 015	339 054

7103 – Precious (other than diamond) and semi-precious stones, whether or not worked or graded but not strung, mounted or set

		2009	2010	2011	2012	2013
Import	kg	173 606	311 474	375 345	231 767	255 550
Export	kg	1 495	1 346	1 284	4 146	1 135

7103 – Precious (other than diamond) and semi-precious stones, whether or not worked or graded but not strung, mounted or set

		2009	2010	2011	2012	2013
Average import prices	CZK/kg	230	126	122	226	279
Average export prices	CZK/kg	16 012	3 779	178 794	7 768	9 978

251320 – Emery, natural corundum, natural garnet and other natural abrasives

		2009	2010	2011	2012	2013
Import	t	987	1 213	1 393	2 419	3 103
Export	t	45	47	68	121	375

251320 – Emery, natural corundum, natural garnet and other natural abrasives

		2009	2010	2011	2012	2013
Average import prices	CZK/t	7 385	6 281	6 467	6 230	6 640
Average export prices	CZK/t	17 394	39 921	32 576	11 592	52 624

4. Prices of domestic market

The international gemstone trade is currently so globalized that no substantial price differences exist anywhere in the world including the Czech Republic. The only difference is that rather lower-quality gemstones are imported due to lower purchasing power as well as to less experienced jewellers and customers; high-quality gemstones in the Czech market are rare.

Company Granát, cooperative of art manufacturing in Turrnov, purchased Czech garnets (pyropes) under following conditions in 2011–2013:

Purchase prices of raw Czech garnets by size classes:

Class	Screen size (mm)	Minimum thickness (mm)	Price CZK/g
IV.	2.6–2.9 mm	2.6 mm	6
III.	3.0–3.9 mm	2.6 mm	18
II.	4.0–4.9 mm	3.0 mm	44
I.	5.0–5.9 mm	3.5 mm	negotiated price from CZK 100 /g
E0 and bigger	From 6.0 mm and more	4.5 mm	negotiated price from CZK 150 /g

Internet wholesale E-vltaviny offered moldavites in the following size–shape-number-price relations (each moldavite was packaged separately in a plastic box with its description):

Mine locality	Weight (g)	Number of pieces	Price (CZK)
Besednice *	2.3–3.1	1	1 422–1 884
mostly Chlum nad Malší	0.1–0.5	10	599
	0.1–0.5	25	1 325
	0.1–0.5	50	2 450
	0.1–0.5	100	4 550
	0.5–1	10	990
	0.5–1	25	2 375
	0.5–1	50	4 450
	0.5–1	100	7 999
	1–5	–	–
	5–10	–	–
	10–15	1	1 253–1 488
	15–20	1	2 251–2 955
	20–45	1	4 770–6 539

*Note: * moldavites from this locality are visually regarded as the best*

5. Mining companies in the Czech Republic as of December 31, 2013

Pyrope-bearing rock
Granát, družstvo umělecké výroby, Turnov

Moldavite-bearing rock
MAWE CK s.r.o., Český Krumlov
Monday Morning s.r.o., Praha

6. World production and world market prices

World mine production

World statistics primarily include diamond production of both gem-grade and industrial diamonds.

World mine production of jeweller diamonds was as follows:

	2009	2010	2011	2012	2013[e]
World mine production (according to MCS), ths ct (ct = carat; 1 ct = 0,2 g)	74 100	79 900	69 900	91 700	91 800
World mine production (according to MCS), kg	14 820	15 980	13 980	18 340	18 360
World mine production (according to WBD), ths ct (ct = carat; 1 ct = 0,2 g)	71 891 294	73 444 088	71 006 716	71 908 024	N
World mine production (according to WBD), kg	14 378	14 689	14 201	14 382	N

[e] – *preliminary values*

World mine producers share in mine production of jeweller diamonds (MCS):

	2012			2013[e]	
	ths carats	%		ths carats	%
Congo (Brazzaville)	21 500	23.4	Congo (Brazzaville)	21 500	23.4
Russia	20 700	22.6	Russia	20 700	22.5
Botswana	14 400	15.7	Botswana	14 000	15.3
Zimbabwe	11 000	12.0	Zimbabwe	11 000	12.0
Canada	10 500	11.5	Canada	10 800	11.8
Angola	7 500	8.2	Angola	7 900	8.6
South Africa	2 830	3.1	South Africa	2 800	3.1
Namibia	1 630	1.8	Namibia	1 500	1.6
Lesotho	479	0.5	Lesotho	480	0.5
Sierra Leone	325	0.4	Sierra Leone	300	0.3

[e] – *preliminary values*

World mine producers share in mine production of industrial diamonds (MCS):

	2012			2013[e]	
	ths carats	%		ths carats	%
Botswana	20 000	26.7	Botswana	22 000	27.5
Congo (Kinshasa)	17 000	22.7	Congo (Kinshasa)	17 000	21.3
Russia	15 000	20.0	Russia	15 000	18.8
Other countries	11 000	14.7	Australia	11 000	13.8
Australia	8 000	10.7	Other countries	11 000	13.8
South Africa	4 000	5.3	South Africa	4 000	5.0
World total	75 000	100.0	World total	80 000	100.0

[e] – *preliminary values*

World market prices

Gemstone prices are based on type, size and quality in large price ranges.

Rough diamond price: Global average price USD per carat (plus five-year forecast). Excludes lab created diamonds.

Year	Average price USD/carat
2004	64
2005	66
2006	68
2007	71
2008	78
2009	69
2010	89
2011	115
2012	99
2013	108
2014	103
2015 (P. Zimnisky forecast)	103
2016 (P. Zimnisky forecast)	107
2017 (P. Zimnisky forecast)	114
2018 (P. Zimnisky forecast)	117
2019 (P. Zimnisky forecast)	120
2020 (P. Zimnisky forecast)	120

Source: Zimnisky P.(2015): Global diamond output to rise in 2015. Mining Journal special publication-PDAC 2015, pp. 17–18.

Gypsum

1. Registered deposits and other resources of the Czech Republic

reserved registered deposits exhausted deposits and other resources

1 **Kobeřice ve Slezsku-jih**	3 Rohov-Strahovice	5 Třebom
2 Kobeřice ve Slezsku-sever	4 Sudice	

*(Names of mined deposits are indicated in **bold type**)*

2. Basic statistical data of the Czech Republic as of December 31

Number of deposits; reserves; mine production

Year	2009	2010	2011	2012	2013
Deposits – total number	5	5	5	5	5
exploited	1	1	1	1	1
Total mineral *reserves, kt	504 276	504 269	504 256	504 240	504 227
economic explored reserves	119 149	119 142	119 129	119 113	119 100
economic prospected reserves	302 990	302 990	302 990	302 990	302 990
potentially economic reserves	82 137	82 137	82 137	82 137	82 137
exploitable (recoverable) reserves	2 308	2 301	2 288	2 272	2 259
Mine production, kt	13	5	11	14	11

** See **NOTE** in the chapter **Introduction** above on a terminological difference between Czech official application of the term reserves and standard international application of the term. The relationship of domestic and foreign classifications of mineral reserves and resources is described in the separate chapter **Mineral reserve and resource classification in the Czech Republic** of this yearbook*

3. Foreign trade

252010 – Gypsum, anhydrite

		2009	2010	2011	2012	2013
Import	t	86 641	55 096	57 962	49 245	42 413
Export	t	12 677	48 606	103 362	63 751	70 706

252010 – Gypsum, anhydrite

		2009	2010	2011	2012	2013
Average import prices	CZK/t	2 006	2 017	2 094	2 300	2 396
Average export prices	CZK/t	1 180	132	88	157	173

4. Prices of domestic market

Average prices of traded commodities on the domestic market

	2009	2010	2011	2012	2013
mined gypsum, CZK/t	330	N	N	N	N
grey gypsum binder, bagged in 30 kgs, pallets, CZK/t	2 766	3 460	3 460	3 460	3 574
white gypsum binder, bagged in 30 kgs, pallets, CZK/t	4 675	5 851	5 851	5 851	6 044

5. Mining companies in the Czech Republic as of December 31, 2013

GYPSTREND s.r.o., Kobeřice

6. World production and world market prices

World mine production

Data on world production of primary gypsum in recent years:

	2009	2010	2011	2012	2013[e]
World mine production of gypsum (according to MCS), kt	148 000	147 000	149 000	152 000	160 000
World mine production of gypsum (according to WBD), kt	138 253	140 822	139 068	155 968	N

[e] – *preliminary values*

According to MCS, of the 83 producing countries, the shares of the top ten in 2013 were as follows:

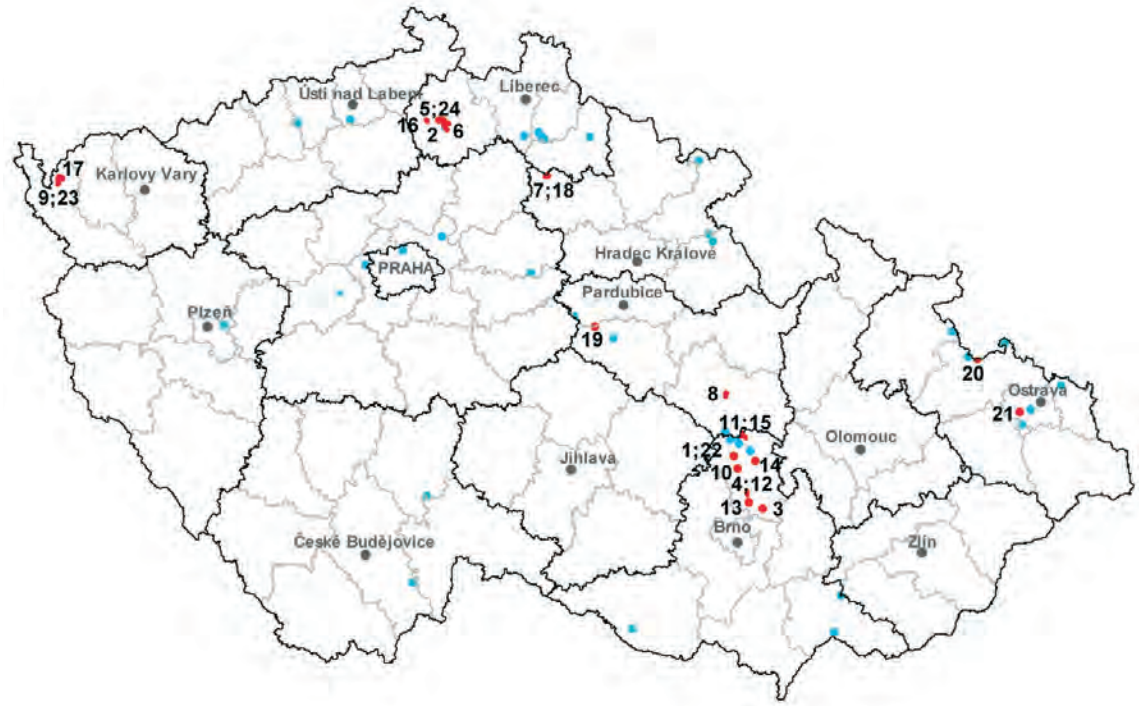
China	31.3 %	Russia	3.7 %
USA	10.2 %	Japan	3.4 %
Iran	8.8 %	Mexico	3.1 %
Thailand	5.6 %	Italy	2.5 %
Spain	4.4 %	India	2.3 %

The total world resources of gypsum are not known. The USA has 700 million tonnes, 450 million tonnes are estimated for Canada, and 230 million tonnes for Brazil.

Gypsum has no worldwide indicative prices.

Industrial sands

1. Registered deposits and other resources of the Czech Republic



reserved registered deposits exhausted deposits and other resources

1	**Nýrov****	9	**Velký Luh***	17	Lomnička u Plesné**
2	Provodín*	10	**Voděrady****	18	Mladějov v Čechách*
3	**Rudice-Seč****	11	Babolky**	19	Načešice**
4	**Spešov-Dolní Lhota****	12	Blansko 1-Jezírka**	20	Palhanec-Vávrovice**
5	**Srní-Okřešice***	13	**Blansko 2-Mošna****	21	Polanka nad Odrou**
6	**Srní 2-Veselí***	14	Boskovice-Chrudichromy**	22	Rudka-Kunštát**
7	**Střeleč***	15	Deštná-Dolní Smržov**	23	Velký Luh 1**
8	**Svitavy-Vendolí****	16	Holany**	24	Zahrádky-Srní**

** deposits of glass and foundry sands*
*** deposits of foundry sands*

(Names of exploited deposits are in **bold type***)*

2. Basic statistical data of the Czech Republic as of December 31

Glass sand

Number of deposits; reserves; mine production

Year	2009	2010	2011	2012	2013
Deposits – total number	6	6	6	6	6
exploited	5	5	5	5	4
Total mineral *reserves, kt	259 344	258 366	254 942	254 007	254 872
economic explored reserves	89 378	88 415	86 844	86 004	84 755
economic prospected reserves	25 538	25 523	23 523	23 523	25 077
potentially economic reserves	144 428	144 428	144 575	144 480	145 040
exploitable (recoverable) reserves	81 671	80 782	79 873	79 183	78 429
Mine production, kt	990	888	976	849	862

* *See **NOTE** in the chapter **Introduction** above on a terminological difference between Czech official application of the term reserves and standard international application of the term. The relationship of domestic and foreign classifications of mineral reserves and resources is described in the separate chapter **Mineral reserve and resource classification in the Czech Republic** of this yearbook*

Approved prognostic resources P_1, P_2, P_3

Year		2009	2010	2011	2012	2013
P_1,	kt	21 750	0	0	0	0
P_2,	kt	14 927	14 927	14 927	14 927	14 927
P_3		–	–	–	–	–

Foundry sand

Number of deposits; reserves; mine production

Year	2009	2010	2011	2012	2013
Deposits – total number	23	23	23	23	23
exploited	10	11	11	9	8
Total mineral *reserves, kt	376 774	409 668	409 618	409 079	408 726
economic explored reserves	133 071	129 561	128 903	128 442	127 937
economic prospected reserves	97 066	133 470	133 460	133 448	133 377
potentially economic reserves	146 637	146 637	147 255	147 189	147 412
exploitable (recoverable) reserves	75 520	75 026	78 642	78 535	78 250
Mine production, kt	374	473	395	491	412

* *See **NOTE** in the chapter **Introduction** above on a terminological difference between Czech official application of the term reserves and standard international application of the term. The relationship of domestic and foreign classifications of mineral reserves and resources is described in the separate chapter **Mineral reserve and resource classification in the Czech Republic** of this yearbook*

Approved prognostic resources P_1, P_2, P_3

Year		2009	2010	2011	2012	2013
P_1,	kt	23 157	15 157	15 157	15 157	15 157
P_2,	kt	14 723	14 723	14 723	14 723	14 723
P_3		–	–	–	–	–

3. Foreign trade

250510 – Silica sands and quartz sands

		2009	2010	2011	2012	2013
Import	t	284 932	285 692	294 073	235 230	262 866
Export	t	445 608	421 217	472 223	388 953	388 052

250510 – Silica sands and quartz sands

		2009	2010	2011	2012	2013
Average import prices	CZK/t	491	500	535	553	591
Average export prices	CZK/t	475	498	475	548	560

7001 – Cullet and other waste and scrap of glass; glass in the mass

		2009	2010	2011	2012	2013
Import	t	101 287	89 298	141 524	120 129	133 465
Export	t	11 080	8 931	8 092	13 565	7 280

7001 – Cullet and other waste and scrap of glass; glass in the mass

		2009	2010	2011	2012	2013
Average import prices	CZK/t	2 449	2 874	2 169	1 965	1 933
Average export prices	CZK/t	847	621	1 082	1 496	2 405

4. Prices of domestic market

Prices of industrial sands are not open to public.

5. Mining companies in the Czech Republic as of December 31, 2013

Glass sand
Sklopísek Střeleč, a.s., Mladějov
Provodínské písky a.s., Provodín
LB MINERALS, s.r.o., Horní Bříza

Foundry sand
Provodínské písky a.s., Provodín
Sklopísek Střeleč, a.s., Mladějov
LB MINERALS, s.r.o., Horní Bříza
SEDOS doprava a.s., Drnovice
Kalcit s.r.o., Brno
PEDOP s.r.o., Lipovec
SETRA s.r.o., Brno

6. World production and world market prices

World mine production

Publicly-available statistical data on industrial sand production are not broken down into glass and foundry sand. The total production in recent years was as follows:

	2009	2010	2011	2012	2013[e]
Industrial sand and gravel (according to MCS), kt	106 000	121 000	138 000	139 000	141 000

[e] – *preliminary values*

According to MCS, the top ten producers in 2013 were:

USA	37.2 %	Australia	4.0 %
Italy	11.6 %	Spain	3.5 %
Germany	5.2 %	Mexico	2.6 %
Turkey	5.0 %	Japan	2.3 %
France	4.5 %	Moldava	2.1 %

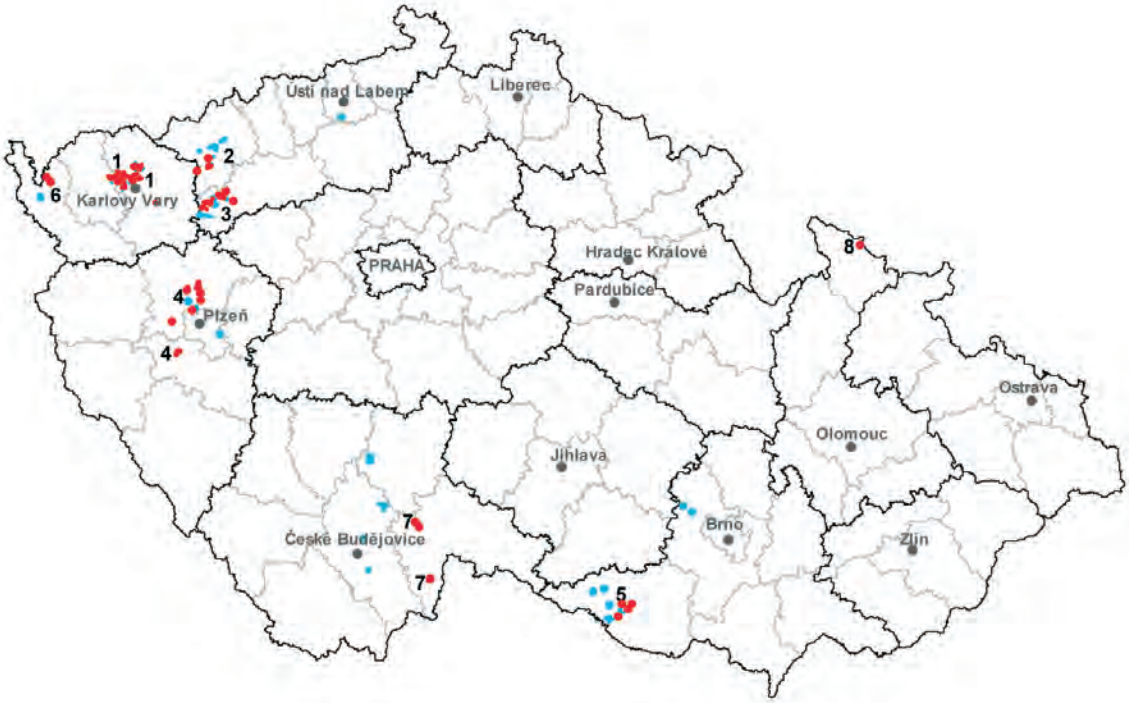
Resources of glass and foundry sand are large and distributed around the world.

Commodity/Year		2009	2010	2011	2012	2013
SiO_2 sand, minus 20 micron, bagged, > 92 brightness, FOB Durban	USD/t	295	295	295	295	295
Glass sand, container, ex-works USA	GBP/t	14–26	20–26	20–26	20–26	20–26

The price range includes the lowest and highest monthly price quotes in IM for a given year.

Kaolin

1. Registered deposits and other resources of the Czech Republic



reserved registered deposits exhausted deposits and other resources

Major deposit areas:

*(Names of areas with exploited deposits are in **bold**)*

1 **Karlovy Vary Region**	4 **Plzeň Region**	7 Třeboň Basin
2 **Kadaň Region**	5 Znojmo Region	8 Vidnava
3 **Podbořany Region**	6 Cheb Basin	

2. Basic statistical data of the Czech Republic as of December 31

Number of deposits; reserves; mine production

Year	2009	2010	2011	2012	2013
Deposits – total number	70	70	70	70	70
exploited	13	13	14	15	15
Total mineral *reserves, kt	1 208 331	1 207 631	1 204 751	1 194 922	1 191 129
economic explored reserves	244 636	240 673	234 061	228 510	225 092
economic prospected reserves	504 720	506 213	507 488	506 058	506 010
potentially economic reserves	458 975	462 222	463 202	460 354	460 027
exploitable (recoverable) reserves	80 024	93 055	102 257	101 277	98 199
Mine production, kt [a)]	2 886	3 493	3 606	3 318	3 108
Beneficiated (water-washed) kaolin production, kt	488	636	660	624	609

* *See **NOTE** in the chapter **Introduction** above on a terminological difference between Czech official application of the term reserves and standard international application of the term. The relationship of domestic and foreign classifications of mineral reserves and resources is described in the separate chapter **Mineral reserve and resource classification in the Czech Republic** of this yearbook*

[a)] *Raw kaolin, total production of all technological grades;*

Approved prognostic resources P_1, P_2, P_3

Year		2009	2010	2011	2012	2013
P_1,	kt	24 627	29 708	29 708	29 708	25 115
P_2,	kt	4 998	4 998	4 998	4 998	–
P_3		–	–	–	–	–

The data of kaolin for production of porcelain and fine ceramics and kaolin used as fillers in paper industry have been stated separately due to great varieties of end use and prices of the individual kaolin types.

Number of deposits; reserves; mine production

Kaolin for production of porcelain and fine ceramics	2009	2010	2011	2012	2013
Deposits – total number	30	30	30	30	30
exploited	6	7	7	7	7
Total mineral *reserves, kt	256 023	253 228	252 791	252 445	252 089
economic explored reserves	52 748	50 196	49 833	49 556	49 242
economic prospected reserves	111 713	111 713	111 713	111 713	111 713
potentially economic reserves	91 562	91 319	91 245	91 176	91 134
exploitable (recoverable) reserves	6 314	17 919	17 612	17 391	17 122
Mine production, kt [a)]	257	297	368	302	308

** See **NOTE** in the chapter **Introduction** above on a terminological difference between Czech official application of the term reserves and standard international application of the term. The relationship of domestic and foreign classifications of mineral reserves and resources is described in the separate chapter **Mineral reserve and resource classification in the Czech Republic** of this yearbook*

[a)] Exploited deposits: Božičany-Osmosa-jih, Jimlíkov, Krásný Dvůr-Podbořany, Mírová, Podlesí 2, Podlesí-Čapí hnízdo, Ruprechtov

Number of deposits; reserves; mine production

Kaolin for paper industry	2009	2010	2011	2012	2013
Deposits – total number	25	25	26	25	25
exploited	6	6	6	7	7
Total mineral *reserves, kt	301 670	300 649	301 326	295 572	294 576
economic explored reserves	58 589	57 614	55 350	53 186	52 228
economic prospected reserves	183 999	184 015	185 290	183 929	183 929
potentially economic reserves	59 082	59 020	60 686	58 457	58 419
exploitable (recoverable) reserves	27 341	26 468	34 261	33 393	31 319
Mine production, kt [a)]	700	901	973	877	851

** See **NOTE** in the chapter **Introduction** above on a terminological difference between Czech official application of the term reserves and standard international application of the term. The relationship of domestic and foreign classifications of mineral reserves and resources is described in the separate chapter **Mineral reserve and resource classification in the Czech Republic** of this yearbook*

[a)] Exploited deposits: Horní Bříza-Trnová, Chlumčany-Dnešice, Kaznějov-jih, Lomnička-Kaznějov, Otovice-Katzenholz, Rokle

3. Foreign trade

2507 – Kaolin and other kaolinic clays, whether or not calcined

		2009	2010	2011	2012	2013
Import	t	13 744	14 124	19 352	17 045	15 815
Export	t	379 593	485 427	537 962	507 696	504 180

2507 – Kaolin and other kaolinic clays, whether or not calcined

		2009	2010	2011	2012	2013
Average import prices	CZK/t	3 658	4 375	3 563	3 976	4 552
Average export prices	CZK/t	2 263	2 519	2 629	2 834	2 925

25070020 – Kaolin

		2009	2010	2011	2012	2013
Import	t	6 558	7 991	12 285	12 841	11 747
Export	t	379 117	484 843	537 231	506 766	503 580

25070020 – Kaolin

		2009	2010	2011	2012	2013
Average import prices	CZK/t	4 995	5 180	4 222	3 976	4 943
Average export prices	CZK/t	2 260	2 517	2 627	2 830	2 923

25070080 – Kaolinic clay (other than kaolin)

		2009	2010	2011	2012	2013
Import	t	7 186	6 133	7 068	4 204	4 068
Export	t	476	583	731	929	599

25070080 – Kaolinic clay (other than kaolin)

		2009	2010	2011	2012	2013
Average import prices	CZK/t	2 437	3 325	2 418	2 824	3 422
Average export prices	CZK/t	4 723	4 015	4 509	5 343	4 615

4. Prices of domestic market

Average prices of traded kaolin on the domestic market

Product specification	2009	2010	2011	2012	2013
Ceramic grade kaolin, CZK/t	2 200–2 950	N	1 100–3 500	2 000–3 000	2 200–3 000
Paper grade kaolin, CZK/t	1 700–2 500	N	N	2 100–3 400	2 100–3 500
Kaolin for chemical industry, microground, CZK/t	nad 3 000	N	N	N	N
Kaolin for porcelain manufacture from Sedlec, CZK/t	N	N	N	N	N
Beneficiated kaolin from Podbořany KD, CZK/t	1 949	1 949	1 300 – 3 040	N	N
Kaolin for manufacture of fine porcelain and glazes, CZK/t	2 392	2 392	2 300 – 3 200	2 600–4 600	3 000–4 800
Activated kaolin from Podbořany KDA, CZK/t	2 900	2 900	N	N	N

5. Mining companies in the Czech Republic as of December 31, 2013

Kaolin for manufacture of porcelain and fine ceramics
Kaolin Hlubany, a.s.
Sedlecký kaolin a.s., Božičany
KSB s.r.o., Božičany

Kaolin for ceramics manufacturing
LB MINERALS, s.r.o., Horní Bříza
Sedlecký kaolin a.s., Božičany
KSB s.r.o., Božičany

Kaolin for paper industry
LB MINERALS, s.r.o., Horní Bříza
KERAMOST a.s., Most
Sedlecký kaolin a.s., Božičany

Titanium-bearing kaolin
Sedlecký kaolin a.s., Božičany
KSB s.r.o., Božíčany

Feldspar-bearing kaolin
In 2013 there were no companies mining feldspar-bearing kaolin on the territory of the Czech Republic

6. World production and world market prices

World mine production

World kaolin production in recent years was as follows:

	2009	2010	2011	2012	2013[e]
World mine production (according to MCS), kt	33 000	33 100	33 900	36 200	37 000
World mine production (according to WBD), kt	29 023	30 873	32 301	34 347	N

[e] – *preliminary values*

The data from both sources cited clearly differ as follows:

Production in kt	2012 according to WBD		2012 according to MCS		2013 according to MCS	
USA	(1)	5 900	(2)	5 980	(2)	5 950
Germany	(2)	4 347.6	(3)	4 900	(3)	4 500
India	(3)	3 678		N		N
Czech Rep.	(4)	3 318	(4)	3 320	(4)	3 300
Chaina	(5)	3 300		N		NA
Brazil	(6)	2 189	(5)	1 950	(5)	2 050
South Korea	(7)	1 910.9		N		N
Ukraine	(8)	1 736	(6)	1 300	(7)	1 600
England	(9)	1 150	(8)	900	(8)	900
Turkey	(10)	980.9	(7)	1 200	(6)	2 000
Italy	(20)	200	(9)	640	(9)	640
Spain	(15)	332	(10)	303	(10)	300
Uzbekistan	(?)	N	(1)	7 000	(1)	7 000

According to MCS statistics, the largets producer of kaolin is Uzbekistan, which is not listed among the 54 producers in the WBD statistics at all. Both statistics do not include China, which is known to be one of the world´s leading producers of kaolin. The CR ranks fourth in both statistics. Its share of world production is 9.7 % according to WBD, and 8.9 % according to MCS.

Prices of traded commodities (according to IM)

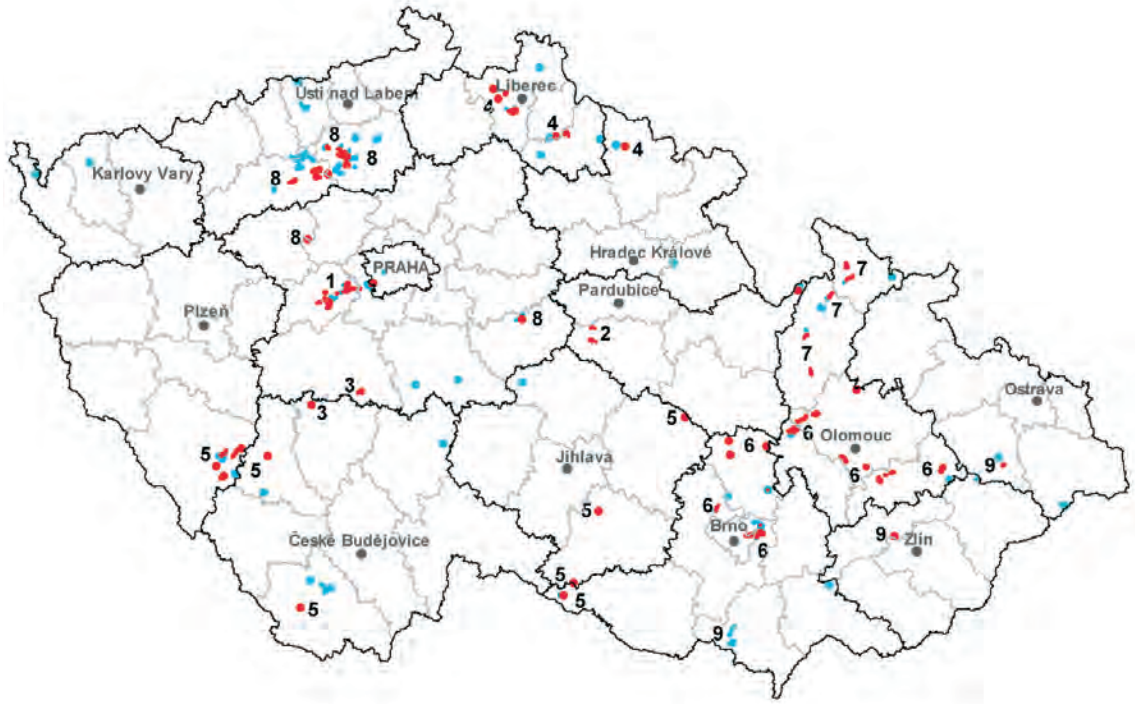
Commodity/Year		2009	2010	2011	2012	2013
Kaolin № 1 paper coating grade, Ex-Georgia plant	USD/st	146–185	146–185	150–195	150–209	167.44–217.36
Kaolin № 2 paper coating grade, Ex-Georgia plant	USD/st	85–147	95–147	100–155	100–166.70	111.8–173.3

Note: st – short ton; 1 st = 0.9072 tonne.

The price range includes the lowest and highest monthly price quotes for a given year.

Limestones and corrective additives for cement production

1. Registered deposits and other resources of the Czech Republic



reserved registered deposits exhausted deposits and other resources

Major deposit areas:

*(Names of areas with exploited deposits are in **bold**)*

1 **Devonian of the Barrandian**
2 **Paleozoic of the Železné hory Mts.**
3 **Central Bohemian Islet Zone**
4 **Krkonoše Mts.-Jizerské hory Mts. Crystalline Complex**
5 **South-Bohemian and Moravian Moldanubicum**
6 **Moravian Devonian**
7 **Silesicum (Branná Group), Orlické hory Mts.-Kladsko Crystalline Complex and Zábřeh Group**
8 **Bohemian Cretaceous Basin**
9 **Outer Klippen Belt of the Western Carpathians**

2. Basic statistical data of the Czech Republic as of December 31

Limestones – total number
Number of deposits; reserves; mine production

Year	2009	2010	2011	2012	2013
Deposits – total number	85	85	85	85	85
exploited	21	21	21	22	22
Total mineral *reserves, kt	4 286 327	4 265 944	4 252 835	4 242 250	4 232 061
economic explored reserves	1 762 240	1 742 290	1 730 722	1 720 472	1 710 231
economic prospected reserves	1 777 754	1 777 529	1 777 351	1 777 016	1 776 915
potentially economic reserves	746 333	746 125	744 762	744 762	744 752
exploitable (recoverable) reserves	1 385 719	1 361 101	1 353 361	1 342 133	1 335 540
Mine production, kt	9 117	9 828	10 859	9 549	9 269

** See **NOTE** in the chapter **Introduction** above on a terminological difference between Czech official application of the term reserves and standard international application of the term. The relationship of domestic and foreign classifications of mineral reserves and resources is described in the separate chapter **Mineral reserve and resource classification in the Czech Republic** of this yearbook*

Limestones – total number
Approved prognostic resources P_1, P_2, P_3

Year		2009	2010	2011	2012	2013
P_1,	kt	114 292	114 292	114 292	114 292	82 489
P_2,	kt	427 057	427 057	427 057	427 057	350 957
P_3		–	–	–	–	–

Owing to the importance and considerable differences in technological use and prices, high-percentage limestones, corrective additives for cement production and other limestones are monitored separately.

High-percentage limestones containing 96 % or more of $CaCO_3$
Number of deposits; reserves; mine production

Year	2009	2010	2011	2012	2013
Deposits – total number	27	27	27	27	27
exploited	10	10	10	10	10
Total mineral *reserves, kt	1 369 283	1 368 089	1 361 548	1 356 816	1 351 882
economic explored reserves	635 737	634 543	629 347	624 615	619 681
economic prospected reserves	546 096	546 096	546 096	546 096	546 096
potentially economic reserves	187 450	187 450	186 105	186 105	186 105
exploitable (recoverable) reserves	741 601	737 094	733 125	727 700	726 258
Mine production, kt	4 174	4 389	4 684	4 188	4 491

* *See **NOTE** in the chapter **Introduction** above on a terminological difference between Czech official application of the term reserves and standard international application of the term. The relationship of domestic and foreign classifications of mineral reserves and resources is described in the separate chapter **Mineral reserve and resource classification in the Czech Republic** of this yearbook*

High-percentage limestones containing 96 % or more of $CaCO_3$
Approved prognostic resources P_1, P_2, P_3

Year		2009	2010	2011	2012	2013
P_1,	kt	5 400	5 400	5 400	5 400	5 400
P_2,	kt	26 345	26 345	26 345	26 345	26 345
P_3		–	–	–	–	–

Other limestones
Number of deposits; reserves; mine production

Year	2009	2010	2011	2012	2013
Deposits – total number	48	48	48	48	48
exploited	16	16	16	17	17
Total mineral *reserves, kt	2 279 853	2 273 803	2 268 240	2 263 378	2 259 004
economic explored reserves	966 455	960 653	955 286	950 759	946 496
economic prospected reserves	796 115	795 890	795 712	795 377	795 276
potentially economic reserves	517 283	517 260	517 242	517 242	517 232
exploitable (recoverable) reserves	570 302	563 610	560 804	555 957	551 654
Mine production, kt	4 115	4 300	5 205	4 399	3 932

* *See **NOTE** in the chapter **Introduction** above on a terminological difference between Czech official application of the term reserves and standard international application of the term. The relationship of domestic and foreign classifications of mineral reserves and resources is described in the separate chapter **Mineral reserve and resource classification in the Czech Republic** of this yearbook*

Other limestones
Approved prognostic resources P_1, P_2, P_3

Year		2009	2010	2011	2012	2013
P_1,	kt	103 070	103 070	103 070	103 070	71 267
P_2,	kt	50 000	50 000	50 000	50 000	–
P_3		–	–	–	–	–

Corrective additives for cement production
Number of deposits; reserves; mine production

Year	2009	2010	2011	2012	2013
Deposits – total number	15	15	15	15	14
exploited	3	3	3	3	4
Total mineral *reserves, kt	621 989	621 629	621 236	618 267	617 930
economic explored reserves	340 794	340 434	340 041	337 072	336 735
economic prospected reserves	156 785	156 785	156 785	156 785	156 785
potentially economic reserves	124 410	124 410	124 410	124 410	124 410
exploitable (recoverable) reserves	187 292	186 932	186 538	183 745	183 408
Mine production, kt	372	343	385	310	336

** See **NOTE** in the chapter **Introduction** above on a terminological difference between Czech official application of the term reserves and standard international application of the term. The relationship of domestic and foreign classifications of mineral reserves and resources is described in the separate chapter **Mineral reserve and resource classification in the Czech Republic** of this yearbook*

Corrective additives for cement production
Approved prognostic resources P_1, P_2, P_3

Year		2009	2010	2011	2012	2013
P_1,	kt	86 880	86 880	86 880	86 880	84 493
P_2		–	–	–	–	–
P_3		–	–	–	–	–

In many limestone deposits, high-percentage limestones and other limestones are extracted together. Five out of fourteen corrective additives for cement production deposits make part of other limestones deposits.

3. Foreign trade

2521 – Limestone flux; limestone and other calcareous stone, of kind used for the manufacture of lime or cement

		2009	2010	2011	2012	2013
Import	t	441 951	520 502	458 373	438 035	527 745
Export	t	99 693	84 696	155 118	187 743	147 783

2521 – Limestone flux; limestone and other calcareous stone, of kind used for the manufacture of lime or cement

		2009	2010	2011	2012	2013
Average import prices	CZK/t	173	167	168	192	185
Average export prices	CZK/t	474	493	466	472	510

2522 – Quicklime, slaked lime and hydraulic lime

		2009	2010	2011	2012	2013
Import	t	88 026	106 266	105 506	99 723	98 963
Export	t	126 743	153 391	178 510	133 900	167 085

2522 – Quicklime, slaked lime and hydraulic lime

		2009	2010	2011	2012	2013
Average import prices	CZK/t	1 691	1 604	1 615	1 719	1 824
Average export prices	CZK/t	2 098	1 989	1 925	2 117	2 247

2523 – Portland cement, aluminous cement, slag cement, supersulphate cement and similar hydraulic cements, whether or not coloured or in the form of clinkers

		2009	2010	2011	2012	2013
Import	t	1 058 852	890 708	842 311	753 898	754 966
Export	t	616 926	670 725	845 320	676 506	596 748

2523 – Portland cement, aluminous cement, slag cement, supersulphate cement and similar hydraulic cements, whether or not coloured or in the form of clinkers

		2009	2010	2011	2012	2013
Average import prices	CZK/t	1 791	1 692	1 672	1 662	1 572
Average export prices	CZK/t	1 587	1 434	1 470	1 398	1 416

4. Prices of domestic market

Average prices of traded commodities on the domestic market

Product specification	2009	2010	2011	2012	2013
Cement CEM I, 42,5 R, on pallets, CZK/t	2 400	2 400–2 640	2 640	2 640	2 640
Cement CEM I, 42,5 R, on pallets, covered with foil, CZK/t	2 750	2 700	2 700	2 700	2 700
Cement CEM III A, 32,5 R, on pallets, CZK/t	N	2 300	2 300	2 300	2 300
Cement CEM III A, 32,5 R, on pallets, covered with foil, CZK/t	N	2 360	2 360	2 360	2 360
Dolomitic hydrated lime, bulk, CZK/t	N	N	3 540	3 790	3 790
Quicklime, ground, bulk, CZK/t	N	1 560	1 722	1 773	1 773
Limestone, ground, bulk, CZK/t	480–1 000	390–690	592–643	592–643	570–650
Limestone, crushed, CZK/t	175–320	210–1 408	185–1 408	157–1 408	157–1 408

5. Mining companies in the Czech Republic as of December 31, 2013

High-percentage limestones

Velkolom Čertovy schody a.s., Tmaň
Holcim (Česko) a.s., člen koncernu, Prachovice
Vápenka Vitošov s.r.o., Leština
LOMY MOŘINA spol.s r.o., Mořina
Českomoravský cement, a.s., Mokrá - Horákov
Omya CZ s.r.o.
Vápenka Vitoul s.r.o., Mladeč
Agir spol. s r.o., Petrovice

Other limestones
Českomoravský cement, a.s., Mokrá - Horákov
Cement Hranice, a.s.
Holcim (Česko) a.s., člen koncernu, Prachovice
HASIT Šumav. vápenice a omítkárny, s.r.o., Vel. Hydčice
Velkolom Čertovy schody a.s., Tmaň
Omya CZ s.r.o.
LOMY MOŘINA spol. s r.o., Mořina
Krkonošské vápenky Kunčice, a.s.
Kalcit s.r.o., Brno
LB Cemix, s.r.o., Borovany
LOM SKALKA, s.r.o., Ochoz u Brna

Clayey limestones
Lafarge Cement, a.s., Čížkovice

Carbonates for agricultural use
PRACTIC 99, s.r.o., Brno

Corrective additives for cement production
Českomoravský cement, a.s., Mokrá - Horákov
Cement Hranice, a.s.
Holcim (Česko) a.s., člen koncernu, Prachovice

6. World production and world market prices

World mine production

World limestone production may be estimated at billions of tonnes. Its amount may be inferred from data on lime and cement manufacture. According to MCS data, world production of these two commodities in recent years was as follows:

	2009	2010	2011	2012	2013[e]
World cement production, mill tonnes	3 060	3 310	3 600	3 800	4 000
World lime production, mill tonnes	299	311	330	348	350

[e] – *preliminary values*

The same table as above converted to limestone; calculation based on relations 2 tonnes of limestone = 1 tonne of lime or 2 tonnes of cement (mining of limestone for construction purposes is not considered)

	2009	2010	2011	2012	2013[e]
World limestone production derived from cement production, mill tonnes	3 060	3 310	3 600	3 800	4 000
World limestone production derived from lime production, mill tonnes	598	622	660	696	700
World limestone production derived from lime and cement production, total mill tonnes	3 658	3 932	4 260	4 496	4 700

[e] – *preliminary values*

The top ten producers of these commodities in 2013 are listed below:

Cement in 2013 (MCS)		**Lime in 2013 (MCS)**	
China	37.5 %	China	69.9 %
India	7.0 %	USA	5.4 %
USA	1.9 %	India	4.6 %
Iran	1.9 %	Russia	3.0 %
Brazil	1.8 %	Brazil	2.4 %
Turkey	1.8 %	Japan	2.1 %
Vietnam	1.6 %	Germany	1.9 %
Russia	1.6 %	Italy	1.7 %
Japan	1.3 %	Korea, Republic of	1.5 %
Saudi Arabia	1.3 %	Turkey	1.3 %

Total world resources of limestone are large, but not recorded statistically.

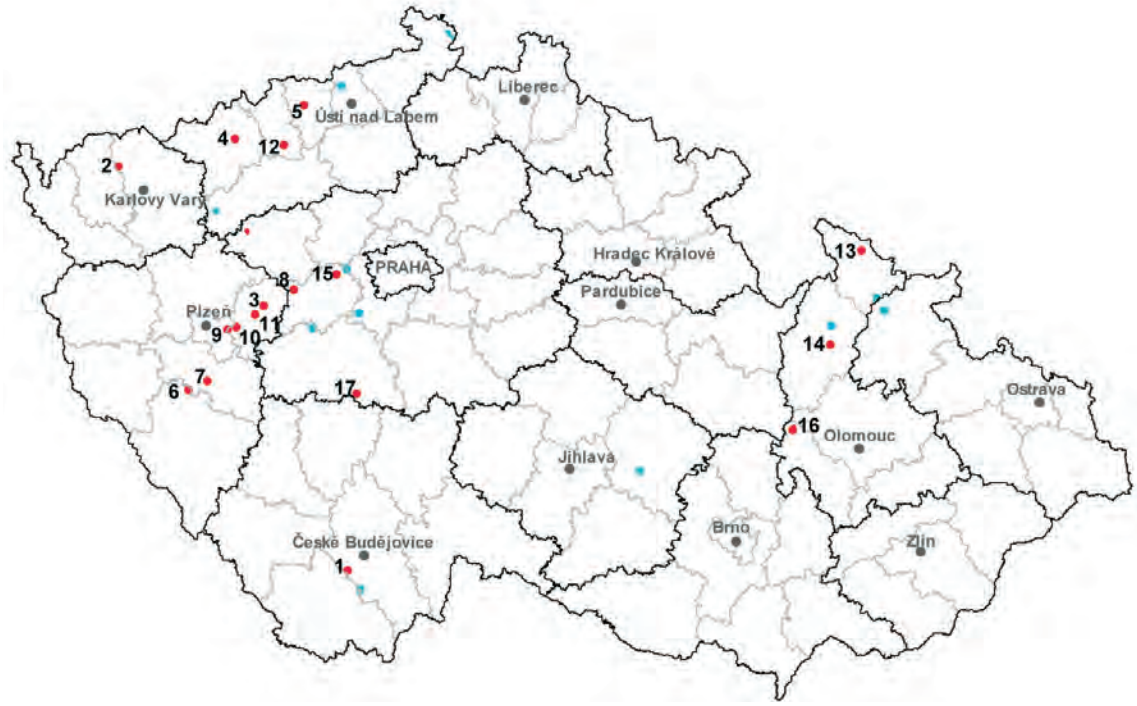
Prices of traded commodities – calcium carbonate (according to IM)

Commodity/Year		2009	2010	2011	2012	2013
$CaCO_3$, (GCC), fine grade, coated, ex–works UK	GBP/t	80–103	80–103	80–103	80–103	80–103
$CaCO_3$, (PCC), coated, ex–works UK	GBP/t	320–550	350–550	370–550	370–550	370–550
$CaCO_3$, (PCC), uncoated, ex–works UK	GBP/t	320–480	320–480	340–550	340–550	340–550

The price range includes the lowest and highest monthly price quotes for a given year.

Silica minerals

1. Registered deposits and other resources of the Czech Republic



reserved registered deposits exhausted deposits and other resources

Quartz – quartzites:

1 **Vrábče-Boršov**	6 Kaliště	11 Sklená Huť
2 Černava-Tatrovice	7 Kbelnice	12 Stránce
3 Drahoňův Újezd-Bechlov	8 Kublov-Dlouhá Skála	13 Velká Kraš
4 Chomutov-Horní Ves	9 Kyšice-Pohodnice	14 Vikýřovice
5 Jeníkov-Lahošť	10 Litohlavy-Smrkový vrch	15 Železná

Quartz for special glass:

16 Dětkovice	17 Krašovice

*(Names of exploited deposits are in **bold type**)*

2. Basic statistical data of the Czech Republic as of December 31

Number of deposits; reserves; mine production

Year	2009	2010	2011	2012	2013
Deposits – total number	18	18	17	15	15
exploited	1	1	1	1	1
Total mineral *reserves, kt	28 640	28 626	26 166	26 149	25 749
economic explored reserves	907	907	907	907	763
economic prospected reserves	22 981	22 967	20 507	20 490	20 297
potentially economic reserves	4 752	4 752	4 752	4 752	4 689
exploitable (recoverable) reserves	553	540	515	498	528
Mine production, kt	16	14	24	17	15

** See **NOTE** in the chapter **Introduction** above on a terminological difference between Czech official application of the term reserves and standard international application of the term. The relationship of domestic and foreign classifications of mineral reserves and resources is described in the separate chapter **Mineral reserve and resource classification in the Czech Republic** of this yearbook*

Approved prognostic resources P_1, P_2, P_3

Year		2009	2010	2011	2012	2013
P_1,	kt	4 533	4 533	4 533	4 533	4 533
P_2		–	–	–	–	–
P_3		–	–	–	–	–

3. Foreign trade

2506 – Quartz (other than natural sands); quartzite, whether or not roughly trimmed or merely cut

		2009	2010	2011	2012	2013
Import	t	10 483	12 507	13 352	8 295	8 232
Export	t	55	29	13	15	15

2506 – Quartz (other than natural sands); quartzite, whether or not roughly trimmed or merely cut

		2009	2010	2011	2012	2013
Average import prices	CZK/t	2 946	2 535	2 818	3 154	3 099
Average export prices	CZK/t	20 600	15 253	37 780	58 510	66 933

720221 – Ferrosilicon

		2009	2010	2011	2012	2013
Import	t	22 181	28 758	28 227	26 438	27 869
Export	t	4 282	9 492	5 704	7 344	6 915

720221 – Ferrosilicon

		2009	2010	2011	2012	2013
Average import prices	CZK/t	25 859	30 562	32 466	28 641	26 030
Average export prices	CZK/t	23 801	30 284	30 396	26 082	25 634

4. Prices of domestic market

Prices of silica minerals are not open to public.

5. Mining companies in the Czech Republic as of December 31, 2013

Budějovické štěrkopísky spol. s r.o., Vrábče

6. World production and world market prices

World mine production

World production of silicon in recent years:

	2009	2010	2011	2012	2013[e]
Silicon production (according to MCS), kt	6 310	7 290	7 370	7 770	7 700

[e] – *preliminary values*

The leading producer of silicon (1 500 kt) and ferrosilicon (5 600 kt) in 2013 was China. Its overall output accounted for 66.2l % of world production, followed by Russia (9.1 %), the USA (4.7 %), Brazil (3.0 %) and Norway (2.3 %). With regard to ferrosilicon production, China was followed by Russia, the USA, Brazil and Ukraine.

World resources of silicon are abundant, in view of available reserves of quartzite and silica gravel.

Prices of traded commodities:
– silicon carbide (EUR/tonne) according to Industrial Minerals

Commodity/Year	2009	2010	2011	2012	2013
FEPA 8–220, black, Grade 1, CIF United Kingdom	1 700–2 100	1 900–2 100	1 900–2 100	1 900–2 100	1 900–2 100
FEPA 8–220, black, Grade 2, CIF United Kingdom	1 500–1 900	1 500–1 650	1 500–1 650	1 500–1 650	1 500–1 650
Refractory grade, min. 98 % SiC, CIF United Kingdom	900–2 100	1 400–1 800	1 500–1 800	1 500–1 800	1 500–1 800
Refractory grade, min. 95 % SiC, CIF United Kingdom	1 200–1 800	1 250–1 650	1 350–1 450	1 350–1 450	1 350–1 450

The price range includes the lowest and highest monthly price quotes for a given year.

– ferrosilicon (EUR/t) according to Metal Bulletin

Commodity/Year	2009	2010	2011	2012	2013
Lumpy basis, 75% Si (scale pro rata)	750–1 200	950–1 550	1 080–1 550	1 080–1 260	1 060–1 180

The price range includes the lowest and highest daily price quotes for a given year.

CONSTRUCTION MINERALS

Aggregates

Aggregates market analysis of selected countries in Central Europe

Nishchay Dayal, Günter Tiess
MinPol, Agency for International Minerals Policy, Strasshof an der Nordbahn, Austria

1. INTRODUCTION & MARKET DESCRIPTION

1.1 GRAVEL & SAND, CRUSHED STONE: GENERAL MARKET DYNAMICS

The sand, gravel and crushed stone industry together with the construction industry can be considered the most resource-intensive sector throughout Europe in terms of the volume of material used. According to Eurostat, they are representing about 40 % of the Direct Material Inputs (DMI) into the European economy (European Environment Agency, 2008).

Construction sand and gravel, which is one of the most accessible natural resources and a major basic raw material, is used mostly by the construction industry. The construction sand and gravel industry is a major contributor to and an indicator of the economic well-being of the Nation, by producing a high volume of basic products with a low unit value. Transportation is a major factor in the delivered price of construction sand and gravel. The cost of moving construction sand and gravel from the plant to the market often exceeds the sales price of the product at the plant. Because of the high cost of transportation, construction sand and gravel continues to be marketed locally. Economies of scale, which might be realized if fewer, larger operations served larger marketing areas, would probably not offset the increased transportation costs. Future demand for construction sand and gravel will continue to be dependent mostly on the growth of construction activity

Crushed stone is a high-volume, low-value commodity. The industry is highly competitive and is characterized by lot of operations serving local or regional markets. Production costs are determined mainly by the cost of labour, equipment, energy, and water, in addition to the costs of compliance with environmental and safety regulations. These costs vary depending on geographic location, the nature of the deposit, and the number and type of products produced. The demand for crushed stone is determined mostly by the level of construction activity, and, therefore, the demand for construction materials. Most crushed stone is used for construction purposes, mainly as aggregate with or without a binder. Road base or road surfacing material, macadam, riprap, and railroad ballast are the major uses without a binder. Aggregate for cement and bituminous concrete in highway and road construction and repair and in residential and non residential construction are the major uses for aggregates with a binder. Other uses include cement and lime manufacture, agriculture, metallurgical flux, and fillers and extenders.

1.2 MARKET RESEARCH: APPLIED METHODOLOGY

In this report a market analysis has been performed for selected Central European Union countries for the Sand and Gravel, as well as the Crushed stone industry. Price data has been collected for the mentioned minerals for various European Union countries from 2009–2013. The analysis part involves comparing the change in prices for these minerals in the following years and further a comparison has also been made with the United States of America's (U.S.A) Market. For the analysis list of countries which have been considered is as follows: Austria, Czech Republic, Poland, Slovakia, Germany, UK, France and Hungary.[1]

The data for price of aggregate minerals in the various markets has been collected from various sources which have been mentioned in the reference section. At the same time there has been the issue of missing data, wherein the prices were unavailable in some cases the following methodology was applied

1. Pricing index for United Kingdom (UK) base as 2005 data and France base as 2009 data[2].
2. Linear interpolation/regression of the data, when data is missing for a few years.
3. Based on consumption data[3], estimating price (using basic demand- price theory*)

In the third methodology, consumption data was calculated empirically (Production + Import – Export) of the primary aggregates (sand and gravel and crushed stone).

After collecting and observing the data for price of gravel and sand, crushed stone, average price was calculated for the European countries and compared with the price in U.S.A from 2009–2013. Important changes and observed trends in the price are provided as a part of analysis. For better understanding of the analysis, the countries are analyzed after segregating them into developed and developing economies.

2. MARKET ANALYSIS

2.1 COUNTRYWISE MARKET RESEARCH AND ANALYSIS: EU

2.1.1 SAND AND GRAVEL

Prices quoted are (net) ex-works sand and gravel prices per tonne. The Hungarian, British, Slovak and Polish prices are converted into euro (Slovakia adopted the euro in 2009). The exchange rates resulted from the daily information of the Austrian National Bank, as on 27. 8. 2014:

1 EUR	312.55 Hungarian Forint
1 EUR	4.20 Polish Zloty
1 EUR	0.79 British Pound
1 EUR	30.3 Slovak Koruna

* A theory relating to the relationship between consumer demand for goods and services and their prices. Demand theory forms the basis for the demand curve, which relates consumer desire to the amount of goods available. As more of a good or service is available, demand drops and therefore so does the equilibrium price. However, if demand is high and the quantity of supply is scarce in that case the prices may rise. (Source: Investopedia)

TABLE 1: Price of sand and gravel in various EU nations in EUR/tonne from 2009–2013

Country name	2009	2010	2011	2012	2013
Austria[4]	9.6	10.77	11.7	11	12.3
Czech[5]	8.74	7.09	8.66	6.96	8.71
Poland	9.3	14.75	20	21.2	24.6
Slovakia	7.1	7.9	8.9	8.3	8.8
Germany[6]	10.2	11.1	11.71	12.78	13.1
UK[7]	12.8	13.8	13.9	15.05	16.4
France	8.1	8.2	8.3	8.5	8.6
Hungary[8]	3.8	8.7	6.1	6.7	6.1
Average	8.7	10.3	11.2	11.3	12.3
	Using Price Indices with base as 2005 data for UK and 2009 data for France				
	Interpolated				

(Source: Market evaluation conducted by MinPol)

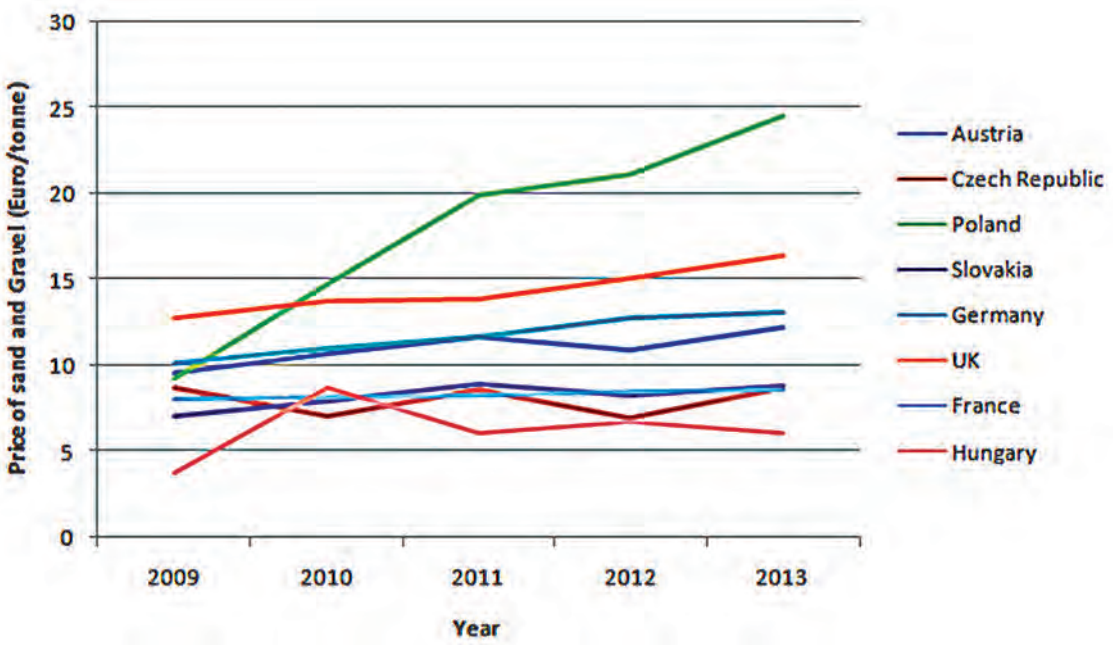


Figure 1: Sand and gravel price trend in selected EU nations 2009-2013

(Source: Market evaluation conducted by MinPol)

Sand and gravel price development between 2009 and 2013 in percentage in terms of developed economies and developing respectively emerging economies is as follows

Developed economies:

Austria	+28.13 %
Germany	+28.43%
France	+6.79 %
United Kingdom	+28.13 %

Developing economies:

Czech Republic	–0.34 %
Poland	+164.51 %
Slovakia	+23.94 %
Hungary	+60.52 %

It is evident from the provided data that the prices have not fluctuated much in the developed economies. The change in the prices in case of developing economies also has not been too steep with the exception of Poland and Hungary. It is observed that Poland saw the highest swell in prices which soared over twice their value relative to that in 2009 in the given period of five years. Poland was followed by Hungary which showed a marked increase in prices during the period. For the other countries like Germany, UK, Austria and Slovakia the increment has been moderate over the five years. For France the prices have increased by a slight amount over the past years.

It must be noted that the price/ton in UK since 2009 has been estimated using price indices (with base as 2005), thus the value provided is a close approximation to the actual prices prevailing in the UK market. Similar methodology has been applied for France with base as prices prevailing in 2009.

For Germany there has been a nominal increase of about 28 % in 5 years. Lack of investments in the construction sector was the outcome of the 2009 recession. However, despite the debt crisis Germany is showing positive signs of solid economic growth as the GDP has been showing a noticeable increase ever since 2009 and the construction sector is expected to show a decent growth of 1.6 % in 2014.[9]

For Poland, the price has consistently showed an increasing trend in the given span. The price in 2009 was hovering around 9 euro/ton which has skyrocketed to 24.6 euro/tonne in 2013, an increase by over 150 %.[10] The accession of Poland in EU led to the start of modernisation and development of many sectors of the economy. A large proportion of the funds received were spent on infrastructure, mainly roads, with the aim of synchronising them with the European transport system[11]. Aggregate producers were located in the Southern Poland and the road construction plan was being executed in the Northern part. This led to an additional increase in the prices of sand and gravel.[12, 13]

Similarly for Hungary the price has increased by almost 61 % from 2009 to 2013.

For Austria, the price has shown a modest increase of about 28 % comparable to most of the other nations.[14] We observe a decrease in prices in the year 2012 caused due to fall in the Austrian Economy in the corresponding year shown by a decrease in demand of sand and gravel.[15]

We observe a decrease in prices by a marginal amount in the Czech Republic.

Czech construction output continued to fall in 2013, the fifth consecutive year of decline. The reason for the drop was mainly due to decreasing demand for construction brought on by the economic situation. Moreover, in 2013, the Czech construction output saw its steepest decline in the last six years. In 2014 the Czech construction industry is expected to stabilise before seeing the first signs of recovery in 2015.[16]

United Kingdom recorded a significant increase in sales volumes of sand and gravel thanks to the incipient recovery in residential construction.[17]

Price trend for **United States and average price in Europe** can be seen in Figure 2. The development of prices in the USA and EU indicate (continuous) increasing prices, however, with price differences of about 4-6 €. European sand and gravel prices indicate a considerable higher price level and stronger increasing in terms of percentage. In 2013 for U.S was 5.9 euro/tonne[18] and EU average was around 12.3 euro/tonne.

The increase in case of European Nations is much steeper compared to the USA. This can be attributed to the price change in developing economies (Poland, Hungary, Czech Republic and Slovakia), which have been higher than their developed counterparts in Europe and the USA. It is rather an expected result since in developing nations the demand for construction materials have an increasing trend, due to the expanding economy. Thus the average price of a set of developed and developing nations (European Union) is giving a higher value than a developed nation (United States).

EXCHANGE RATE AS ON 27. 8. 2014

1 Euro	1.32 U.S Dollar

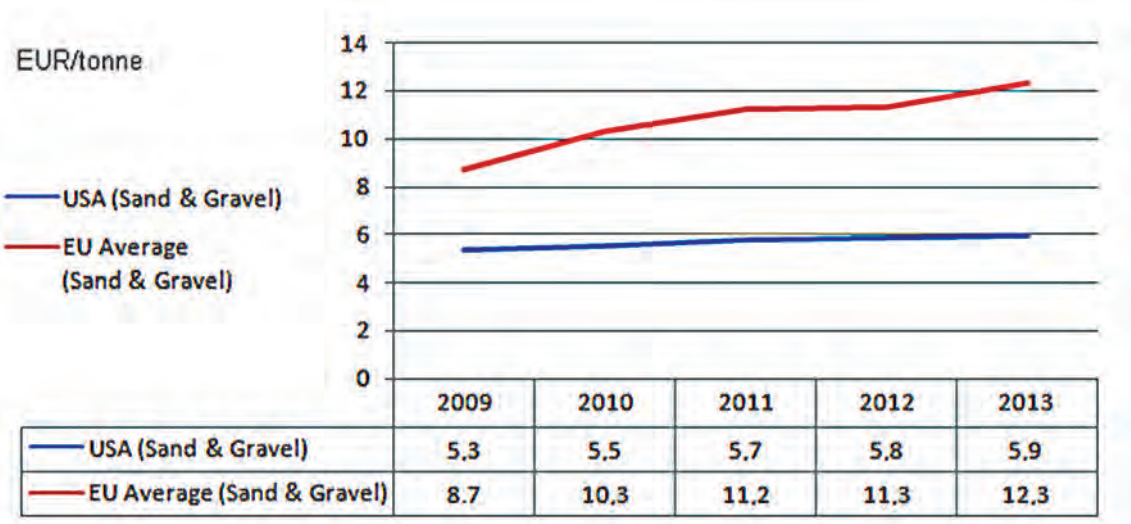


Figure 2: Sand and gravel trend comparison between USA and EU 2009-2013

(Source: Market evaluation conducted by MinPol, USGS)

2.1.2 CRUSHED STONES

TABLE 2: Price of crushed stone in various EU nations in EUR/tonne from 2009–2013

Country name	2009	2010	2011	2012	2013
Austria[19]	10.7	10.52	10.36	10.2	12.8
Czech[20]	10.93	10.48	10.88	11	9.65
Poland	9.8	10.93	12.1	13.2	14.32
Slovakia	9.1	8.1	8.6	8.8	10.4
Germany	10.1	12.3	14.5	13.3	18.4
UK[21]	12.8	13.1	13.7	13.6	18.48
France	7.1	7.2	7.4	7.6	7.6
Hungary[22]	11.8	12.2	12.5	14.7	14.05
Average	10.3	10.6	11.2	11.5	13.2
	Based on Price Indices with base as 2005 data				
	Interpolated				
	Approx, based on production stats				

(Source: Market evaluation conducted by MinPol)

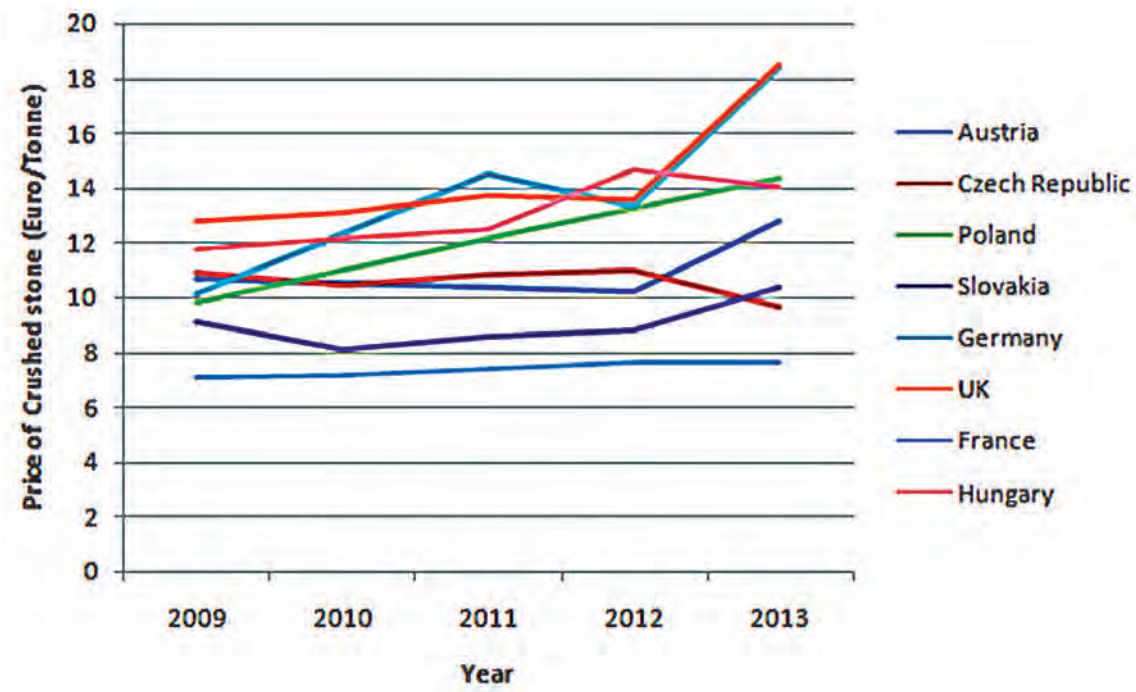


FIGURE 3: Crushed stone price trend in selected EU nations 2009–2013

(Source: Market evaluation conducted by MinPol)

Prices quoted are (net) ex-works crushed stone prices per ton. The Hungarian, British, Slovak and Polish prices are converted into Euro (Slovakia adopted the Euro in 2009). The exchange rates resulted from the daily information of the Austrian National Bank, as on 27. 8. 2014:

1 Euro	312.55 Hungarian Forint
1 Euro	4.20 Polish Zloty
1 Euro	0.79 British Pound
1 Euro	30.3 Slovak Koruna

Crushed stone price development between 2009 and 2013 in percentage in terms of developed economies and developing respectively emerging economies is as follows

Developed economies:

Austria	+19.62 %
Germany	+82.17 %
France	+6.76 %
United Kingdom	+44.38 %

Developing economies:

Czech Republic	–11.71 %
Poland	+46.12 %
Slovakia	+14.29 %
Hungary	+19.06 %

As is evident from the provided data the prices have not shown an appreciable increase in most of the developing economies. The maximum increase is observed in the case of Germany, followed by Poland and UK France showed a constant trend in case of crushed stone as well.

There has been a decrease in price of crushed stone in the Czech Republic from 10.93 euro/tonne in 2009 to 9.65 euro/tonne in 2013. This can be related to the decrease in construction activity also reflecting in the decreased GDP/capita of the nation.[23] The Czech construction market continued to decline at single-digit pace and certain growth in output is only likely to return in 2014–2015. Cancelled civil engineering construction, particularly in the road infrastructure sector, combined with weaker development in the non-residential segment caused for low demand; a consequence of which was the low price of crushed stone.[24]

Austria shows a moderate increase in price during 2009–13. The outlook for the construction industry is favourable, as a result of the government's focus on country's infrastructure and residential construction.[25]

Private residential construction was also the growth driver in the United Kingdom. Construction activity in the United Kingdom increased by 1.3 % after a decline in 2012. While deliveries of aggregates rose in the United Kingdom, they remained significantly below the previous year in Germany.

Construction in Germany benefited from the strong economic development, but activities were impaired by the prolonged winter and the floods in the east of the country. Total

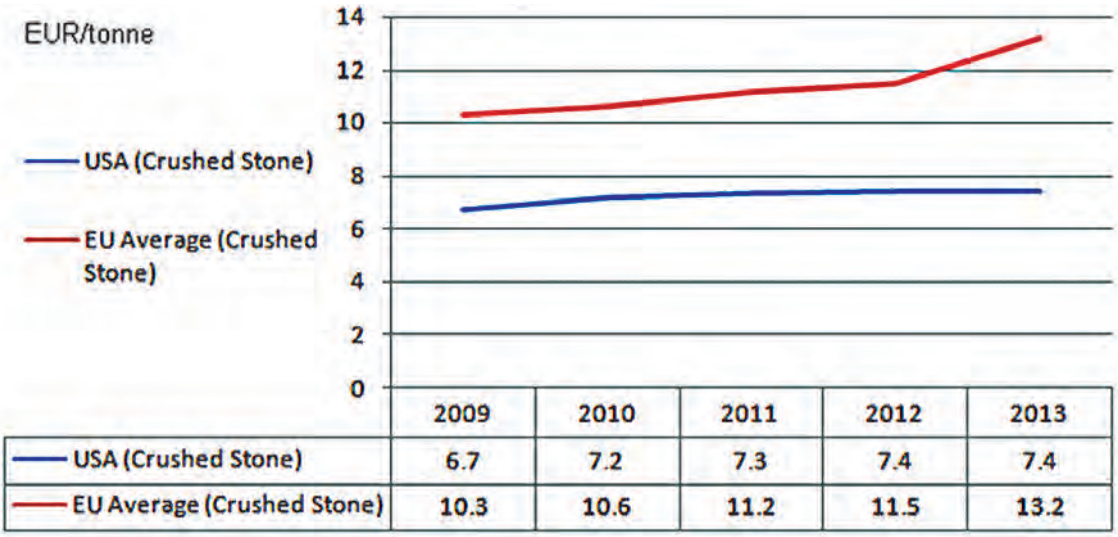


Figure 4: Crushed stone trend comparison between U.S.A & EU, 2009–2013

(Source: Market evaluation conducted by MinPol, USGS)

construction investments in Germany rose only slightly in 2013 compared with the previous year, despite continued strong demand from residential construction. This is evidently reflected in the price rise as demand was more however the supply fell short.[26]

France's construction industry is undergoing a period of weakness. The economy is experiencing downfall due to economic troubles in the Eurozone, and this will result in a similar trend in construction activity in the early part of 2014.[27]

Price trend for **United States and average price in Europe** can be seen to follow almost a similar trend with price differences of about 4–5 EUR. In 2013, for US the average price of crushed stone was 7.4 euro/tonne and for EU it was 13.2 euro/tonne.[28]

This is rather an expected observation as the demand for crushed stone in the EU countries has been on the rise owing to inclusion of developing nations (Hungary, Poland, Czech Republic and Slovakia) even as the capacity of the European construction sector remains near depression levels giving rise to high prices. The USA market shows a more or less constant increase in the prices.

EXCHANGE RATE AS ON 27. 8. 2014

1 Euro	1.32 U.S Dollar

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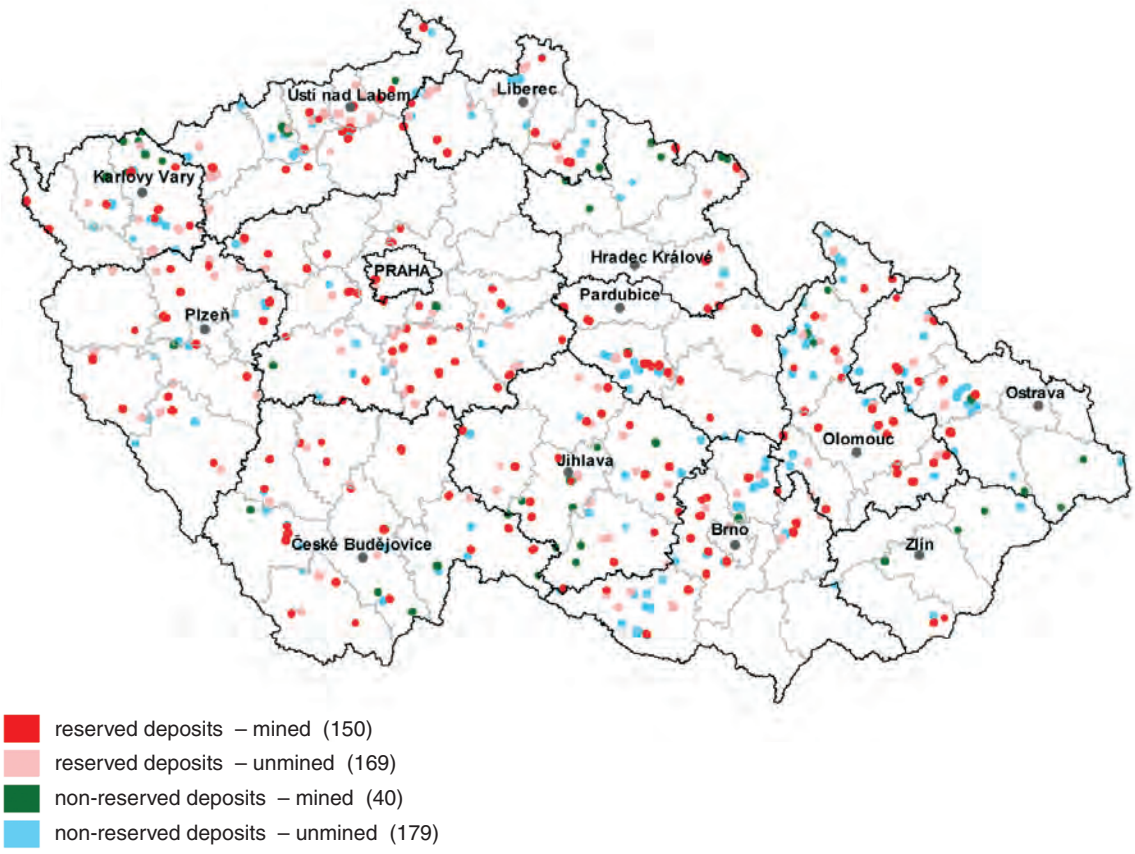
Crushed stone

1. Registered deposits and other resources of the Czech Republic



Because of the large number of crushed stone deposits in the Czech Republic, they are not listed.

2. Basic statistical data of the Czech Republic as of December 31

Reserved deposits: Number of deposits; reserves; mine production

Year	2009	2010	2011	2012	2013
Deposits – total number	317	318	320	319	319
exploited	166	164	165	170	169
Total mineral *reserves, ths m^3	2 346 363	2 392 813	2 392 105	2 391 958	2 383 849
economic explored reserves	1 153 009	1 156 294	1 157 255	1 155 910	1 089 703
economic prospected reserves	1 043 741	1 089 355	1 090 044	1 091 875	1 149 727
potentially economic reserves	149 613	147 164	144 806	144 173	144 419
exploitable reserves	718 922	715 142	717 064	715 299	704 187
Mine production in reserved deposits, ths m^3	13 947	12 350	12 299	10 950	11 420

** See **NOTE** in the chapter **Introduction** above on a terminological difference between Czech official application of the term reserves and standard international application of the term. The relationship of domestic and foreign classifications of mineral reserves and resources is described in the separate chapter **Mineral reserve and resource classification in the Czech Republic** of this yearbook*

Approved prognostic resources P_1, P_2, P_3

Year		2009	2010	2011	2012	2013
P_1,	ths m^3	78 950	78 950	78 950	78 950	61 357
P_2,	ths m^3	399 314	399 314	399 314	399 314	408 807
P_3		–	–	–	–	–

Non-reserved deposits: Number of deposits; reserves; mine production

Year	2009	2010	2011	2012	2013
Deposits – total number	215	213	214	219	219
exploited	50	48	47	47	40
Total mineral *reserves, ths m^3	1 038 869	1 011 792	1 019 574	1 029 457	1 022 363
economic explored reserves	45 772	43 376	43 075	46 617	42 452
economic prospected reserves	912 925	888 377	892 905	899 291	896 645
potentially economic reserves	80 172	80 039	83 594	83 549	83 266
exploitable reserves	34 710	36 000	46 300	43 500	45 084
Mine production in non-reserved deposits, ths m^3 [a)]	1 350	1 450	1 300	1 100	969

** See **NOTE** in the chapter **Introduction** above on a terminological difference between Czech official application of the term reserves and standard international application of the term. The relationship of domestic and foreign classifications of mineral reserves and resources is described in the separate chapter **Mineral reserve and resource classification in the Czech Republic** of this yearbook*

[a)] estimate

3. Foreign trade

251710 – Pebbles, gravel, broken or crushed stone

		2009	2010	2011	2012	2013
Import	t	229 132	214 440	221 539	223 321	290 563
Export	t	344 972	364 457	695 285	384 132	432 645

251710 – Pebbles, gravel, broken or crushed stone

		2009	2010	2011	2012	2013
Average import prices	CZK/t	342	403	345	333	297
Average export prices	CZK/t	187	249	283	234	168

4. Prices of domestic market

Domestic prices of crushed stone – nationwide

Product specification	2009	2010	2011	2012	2013
crushed stone, spilite, fraction 4–8mm, CZK/t	284	259	269	292	274
crushed stone, amphibolite, fraction 4–8 mm, CZK/t	345	336	340	334	345
crushed stone, granite, fraction 4–8 mm, CZK/t	288	305	323	309	332
crushed stone, gneiss, fraction 4–8 mm, CZK/t	319	308	319	321	317
crushed stone, porphyry, fraction 4–8 mm, CZK/t	319	300	316	307	290
crushed stone, granodiorite, fraction 4–8 mm, CZK/t	311	323	298	311	319
crushed stone, greywacke, fraction 4–8 mm, CZK/t	297	298	315	309	315
crushed stone, basalt, fraction 4–8 mm, CZK/t	294	230	293	298	299
crushed stone, hornfels, fraction 4–8 mm, CZK/t	248	248	248	255	239
crushed stone, limestones, fraction 4–8 mm, CZK/t	271	255	258	261	259
crushed stone, spilite, fraction 8–16 mm, CZK/t	278	244	262	268	269
crushed stone, amphibolite, fraction 8–16 mm, CZK/t	276	269	275	273	270
crushed stone, granite, fraction 8–16 mm, CZK/t	265	248	241	242	248
crushed stone, gneiss, fraction 8–16 mm, CZK /t	258	247	255	255	252
crushed stone, porphyry, fraction 8-16 mm, CZK/t	–	220	248	245	–
crushed stone, granodiorites, fraction 8–16 mm, CZK /t	250	243	256	254	263
crushed stone, greywacke, fraction 8–16 mm, CZK /t	259	261	268	267	263
crushed stone, basalt, fraction 8–16 mm, CZK /t	261	240	267	271	269
crushed stone, hornfels, fraction 8–16 mm, CZK /t	238	238	238	216	224
crushed stone, limestones, fraction 8–16 mm, CZK /t	235	220	230	230	232

Domestic prices of crushed stone in 2013 – subdivided by rocks and regions which the rocks are mined in

		Average prices of (listed) fractions (CZK/t)								
		Single								
	Size fraction (mm)	0-4	0-32	0-63	4-8	8-16	32-63	LK unsorted	In region	In all regions
Rock-mineral	Rock/average of fraction price									
opoka-sandstone	Central Bohemia	FN	FN	140	FN	FN	FN	FN	140	
	Zlín	FN	140	150	FN	FN	FN	FN	145	
	Average of fraction price	-	140	145	-	-	-	-		143
serpentine	Central Bohemia	140	159	165	291	241	204	200	200	
	Average of fraction price	140	159	165	291	241	204	200		200
limestone	Central Bohemia	170	150	165	250	200	FN	FN	187	
	Prague	160	175	175	260	250	230	400	236	
	Olomouc	FN	200	200	FN	FN	200	180	195	
	South Bohemia	138	200	FN	252	FN	FN	181	193	
	Moravia and Silesia	155	170	178	273	245	187	170	197	
	Average of fraction price	156	179	180	259	232	206	233		206
basaltic rocks	Karlovy Vary	252	172	190	297	261	215	168	222	
	Hradec Králové	FN	190	FN	FN	FN	235	85	170	
	Central Bohemia	165	173	155	278	254	241	275	220	
	Plzeň	201	174	175	287	285	224	175	217	
	Prague	165	155	160	255	240	230	370	225	
	Liberec	164	192	220	357	315	229	246	246	
	Ústí nad Labem	216	215	202	283	279	216	205	231	
	Average of fraction price	194	182	184	293	272	227	218		224
greywacke	South Bohemia	200	105	120	315	255	195	FN	198	
	South Moravia	160	130	143	315	255	208	FN	173	
	Olomouc	174	172	164	337	268	205	153	210	
	Moravia and Silesia	182	169	178	294	272	202	180	211	
	Average of fraction price	179	144	151	315	263	203	167		203
skarn	Central Bohemia	150	150	170	320	230	220	220	209	
	Average of fraction price	150	150	170	320	230	220	220		209
gneiss	Plzeň	69	178	172	279	241	187	108	176	
	South Moravia	68	143	163	303	235	195	190	185	
	Vysočina	120	168	175	230	230	203	185	187	
	Pardubice	168	145	163	323	253	205	205	209	
	Central Bohemia	135	198	220	320	280	265	288	244	
	Olomouc	120	188	187	405	245	207	181	219	
	Hradec Králové	205	180	175	360	280	245	195	234	
	Average of fraction price	126	171	179	317	252	215	193		208
hornfels	Pardubice	170	160	158	330	210	195	168	199	
	Central Bohemia	143	158	158	148	238	215	380	206	
	Average of fraction price	157	159	158	239	224	205	274		202
amphibolite	Plzeň	249	179	177	269	252	172	135	205	
	South Bohemia	120	185	205	340	255	210	190	215	
	Central Bohemia	150	225	225	390	290	230	210	246	
	Hradec Králové	215	185	175	360	280	245	195	236	
	Vysočina	205	120	165	365	275	230	195	222	
	Average of fraction price	188	179	189	345	270	217	185		225
granitic rocks	South Moravia	124	162	172	317	241	198	184	200	
	Karlovy Vary	178	155	175	318	244	206	156	247	
	Pardubický	151	163	166	340	249	198	157	203	
	Central Bohemia	108	165	188	271	257	192	206	198	
	South Bohemia	190	202	196	351	278	210	181	230	
	Vysočina	139	182	187	345	263	219	204	220	
	Ústí nad Labem	FN	FN	FN	FN	FN	FN	330	330	
	Average of fraction price	151	170	181	321	252	203	181		208
granulite	South Bohemia	230	225	223	367	289	237	188	251	
	Average of fraction price	230	225	223	367	289	237	188		251

Explanations:

FN:	Fraction is not produced
LK:	Quarry stone
basaltic rocks:	melaphyre+spilite+basalt+phonolite
granitic rocks:	granodiorite+granite+syenite+diorite+porphyry
limestone:	limestone+dolomite+marble
gneiss:	orthogneiss+paragneiss

Domestic prices of crushed stone in 2013 – subdivided by regions and rocks mined in them

		Average prices of (listed) fractions (CZK/t)							
		Single							In region
	Size fraction (mm)	0-4	0-32	0-63	4-8	8-16	32-63	LK unsorted	
Region	Rock-mineral/price								
Plzeň	gneiss	69	178	172	279	241	187	108	
	granitic rocks	180	185	185	280	230	204	185	
	amphibolite	249	179	177	269	252	172	135	
	basaltic rocks	201	174	175	287	285	224	175	
	meta-greywacke	220	180	222	290	277	230	190	
	Average of fraction prices in the region	**189**	**179**	**179**	**284**	**267**	**208**	**160**	**209**
South Moravia	greywacke	160	130	143	315	255	208	FN	
	gneiss	68	143	163	303	235	195	190	
	granitic rocks	124	162	172	317	241	198	184	
	amphibolite	120	185	205	340	255	210	190	
	Average of fraction prices in the region	**119**	**155**	**168**	**316**	**243**	**200**	**186**	**198**
Karlovy Vary	granitic rocks	178	155	175	318	244	206	156	
	basaltic rocks	252	172	190	297	261	215	168	
	Průměr ceny frakce v kraji	**215**	**163**	**186**	**305**	**251**	**210**	**162**	**213**
Moravia and Silesia	vápenec	155	170	178	273	245	187	170	
	greywacke	182	169	178	294	272	202	180	
	Average of fraction prices in the region	**176**	**169**	**178**	**286**	**266**	**198**	**181**	**208**
Pardubice	gneiss	168	148	163	323	253	205	205	
	granitic rocks	151	163	166	340	249	198	157	
	basaltic rocks	205	155	199	365	FN	185	195	
	hornfels	170	160	158	330	210	195	168	
	Average of fraction prices in the region	**161**	**161**	**167**	**335**	**246**	**197**	**168**	**205**
Olomouc	limestone	FN	200	200	FN	FN	200	180	
	greywacke	174	172	164	337	268	205	153	
	gneiss	120	188	187	405	245	207	181	
	basaltic rocks	203	191	203	344	286	225	195	
	Average of fraction prices in the region	**172**	**178**	**172**	**344**	**268**	**205**	**167**	**215**
Central Bohemia	limestone	170	150	165	250	200	FN	FN	
	gneiss	135	198	220	320	280	265	288	
	granitic rocks	108	165	188	271	257	192	206	
	basaltic rocks	150	225	225	390	290	230	210	
	hornfels	143	158	158	148	238	215	380	
	basaltic rocks	165	173	155	278	254	241	275	
	opoka-sandstone	FN	FN	140	FN	FN	FN	FN	
	serpentine	140	159	165	291	241	204	200	
	skarn	150	150	170	320	230	220	220	
	Average of fraction prices in the region	**140**	**169**	**170**	**285**	**248**	**216**	**242**	**210**
Prague	basaltic rocks	165	155	160	255	240	230	370	
	limestone	160	175	175	260	250	230	400	
	Average of fraction prices in the region	**163**	**165**	**168**	**258**	**245**	**230**	**385**	**231**
South Bohemia	limestone	138	200	FN	252	FN	FN	181	
	greywacke	200	105	120	315	255	195	FN	
	granitic rocks	190	202	196	351	278	210	181	
	granulite	230	225	223	367	289	237	188	
	Average of fraction prices in the region	**185**	**198**	**195**	**336**	**272**	**211**	**182**	**226**
Ústí nad Labem	granitic rocks	FN	FN	FN	FN	FN	FN	330	
	basaltic rocks	216	215	202	283	279	216	205	
	Average of fraction prices in the region	**216**	**215**	**202**	**283**	**279**	**216**	**216**	**232**
Liberec	basaltic rocks	164	192	220	357	315	229	246	
	Average of fraction prices in the region	**164**	**192**	**220**	**357**	**315**	**229**	**246**	**246**
Vysočina	gneiss	120	168	175	230	230	203	185	
	granitic rocks	139	182	187	345	263	219	204	
	basaltic rocks	205	120	165	365	275	230	195	
	Average of fraction prices in the region	**143**	**169**	**180**	**315**	**255**	**216**	**197**	**211**
Hradec Králové	limestone	357	FN	225	FN	FN	FN	FN	
	gneiss	205	180	175	360	280	245	195	
	granitic rocks	155	190	225	285	285	225	199	
	amphibolite	215	185	175	360	282	245	195	
	basaltic rocks	FN	190	FN	FN	FN	235	85	
	Average of fraction prices in the region	**233**	**186**	**191**	**335**	**282**	**238**	**169**	**233**
Zlín	opoka-sandstone	FN	140	150	FN	FN	FN	FN	
	Average of fraction prices in the region	**-**	**140**	**150**	**-**	**-**	**-**	**-**	**145**

Explanations:

FN:	Fraction is not produced
LK:	Quarry stone
basaltic rocks:	melaphyre+spilite+basalt+phonolite
granitic rocks:	granodiorite+granite+syenite+diorite+porphyry
limestone:	limestone+dolomite+marble
gneiss:	orthogneiss+paragneiss

Average domestic prices of crushed stone in 2013 – by regional units

	Average prices of (listed) fractions (CZK/t)																		
	Single																		In regions
Size fraction (mm)	0-4	0-8	0-16	0-32	0-63	0-125	4-8	8-16	8-32	11-22	16-22	16-32	32-63	63-125	unsorted material	pit material	overburden	for backfills	
Region																			
Hradec Králové	233	95	FN	186	191	155	335	262	FN	245	FN	FN	238	228	169	FN	FN	FN	214
Plzeň	189	174	140	179	179	178	284	267	FN	252	271	253	208	195	160	289	45		204
Central Bohemia	140	157	158	169	170	147	285	248	FN	247	249	240	216	199	242	368	55	65	197
Liberec	164	207	FN	192	220	FN	357	315	FN	296	323	286	229	206	246	356	80	FN	248
Pardubice	161	108	FN	161	167	141	335	246	200	240	218	202	197	178	168	204	FN	FN	195
Ústí nad Labem	216	175	184	215	202	196	283	279	219	263	286	230	216	209	216	271	80	50	211
South Moravia	119	73	58	155	168	140	316	243	FN	234	260	209	200	192	186	220	51	20	167
Karlovy vary	215	86	75	163	186	170	305	251	FN	197	279	230	210	195	162	515	72	FN	207
South Bohemia	185	137	194	198	195	182	336	272	227	269	260	244	211	193	182	233	81	FN	212
Olomouc	172	145	FN	178	172	137	344	268	215	251	266	224	205	196	167	391	67	217	213
Zlín	FN	100	FN	140	150	FN	FN	FN	FN	FN	FN	200	FN	FN	FN	350	FN	70	168
Moravia and Silesia	176	128	145	169	178	148	286	266	224	265	250	225	198	191	181	227	85	FN	197
Vysočina	143	111	FN	169	180	166	315	255	190	242	FN	220	216	200	197	FN	FN	FN	200
Prague	163	FN	165	165	168	160	258	245	FN	230	235	245	230	200	385	FN	FN	FN	219
Czech Republic total	175	130	140	174	180	160	311	264	213	249	263	231	213	199	205	311	68	84	198

Explanation: FN – fraction is not produced

5. Mining companies in the Czech Republic as of December 31, 2013

Crushed stone – registered deposits

Českomoravský štěrk, a.s., Mokrá
KAMENOLOMY ČR s.r.o., Ostrava – Svinov
EUROVIA Kamenolomy, a.s., Liberec
KÁMEN Zbraslav, spol. s r.o. 716.00 71732
COLAS CZ, a.s., Praha
Kámen a písek s.r.o., Český Krumlov
M – SILNICE a.s., Pardubice
BASALT CZ s.r.o, Všechlapy
CEMEX Sand, k.s., Napajedla
BÖGL a KRÝSL, k.s., Praha
Berger Bohemia a.s., Plzeň
GRANITA s.r.o., Skuteč
Skanska a.s., Praha
Kámen Brno s.r.o.
Silnice Čáslav – Holding, a.s.
ZAPA beton a.s., Praha
C4SC78 s.r.o., Praha
SHB s.r.o., Bernartice
RENO Šumava a.s., Vlachovo Březí
Basalt s.r.o., Zabrušany
Lom Klecany, s.r.o., Praha 9
LOMY MOŘINA spol.s r.o., Mořina
DOBET s.r.o., Ostrožská Nová Ves
Rosa s.r.o., Drásov
Žula Rácov, s.r.o., Batelov
BES s.r.o., Benešov
Ludvík Novák, Komňa
OLZ, a.s., Olomouc
Zemědělské družstvo Šonov u Broumova
ŽPSV a.s., Uherský Ostroh
František Matlák, Mochov
PEDOP s.r.o., Lipovec
Stavební recyklace s.r.o., Sokolov
LOM DEŠTNO a.s., Sedlčany
Madest s.r.o., Pavlice
Froněk s.r.o., Rakovník
HUTIRA – OMICE, s.r.o., Omice
ČNES dopravní stavby a.s., Kladno
PETRA – lom Číměř, s.r.o.
KARETA s.r.o., Bruntál
EKOZIS spol. s r. o., Zábřeh
FORTEX – AGS, a.s., Šumperk
Kozákov – družstvo, Záhoří
Weiss s.r.o., Děčín
LB spol. s r.o., Nová Role
JHF Heřmanovice spol. s r.o.
NATRIX, a.s., Bojkovice
Thorssen s.r.o., Kamenolom Mladecko
Kamenolom KUBO s.r.o., Malé Žernoseky
EKOSTAVBY Louny s.r.o.
Pavel Dragoun, Cheb
Daosz, s.r.o., Jesenec

Crushed stone – non-registered deposits

Sokolovská uhelná, právní nástupce, a.s., Sokolov
Kámen a písek s.r.o. Český Krumlov

Českomoravský štěrk, a.s., Mokrá
SILNICE MORAVA s.r.o., Krnov
KÁMEN Zbraslav, spol. s r.o.
COLAS CZ, a.s., Praha
ZETKA Strážník a.s., Studenec
Basalt s.r.o., Zabrušany
LOM Babí, a.s., Trutnov
Kamenolom Žlutava, s.r.o.
DOBET s.r.o., Ostrožská Nová Ves
KAMENOLOMY ČR s.r.o., Ostrava – Svinov
RENO Šumava a.s., Vlachovo Březí
Lesy České republiky, s.p., Hradec Králové
Stavoka Kosice a.s.
LB spol. s r.o., Nová Role
EUROVIA Kamenolomy, a.s., Liberec
LOMY MOŘINA spol.s r.o., Mořina
SENECO s.r.o., Polná
GRANITA s.r.o., Skuteč
EKOZIS spol. s r. o., Zábřeh
Kozákov – družstvo, Záhoří
ZUD a.s., Zbůch
Lesostavby Frýdek-Místek, a.s.
Kalcit s.r.o., Brno
Obec Hošťálková
Petr Vaněk – Lomstav, Horní Maršov
Kamena výrobní družstvo Brno
Lesní družstvo obcí, Přibyslav

6. World production and world market prices

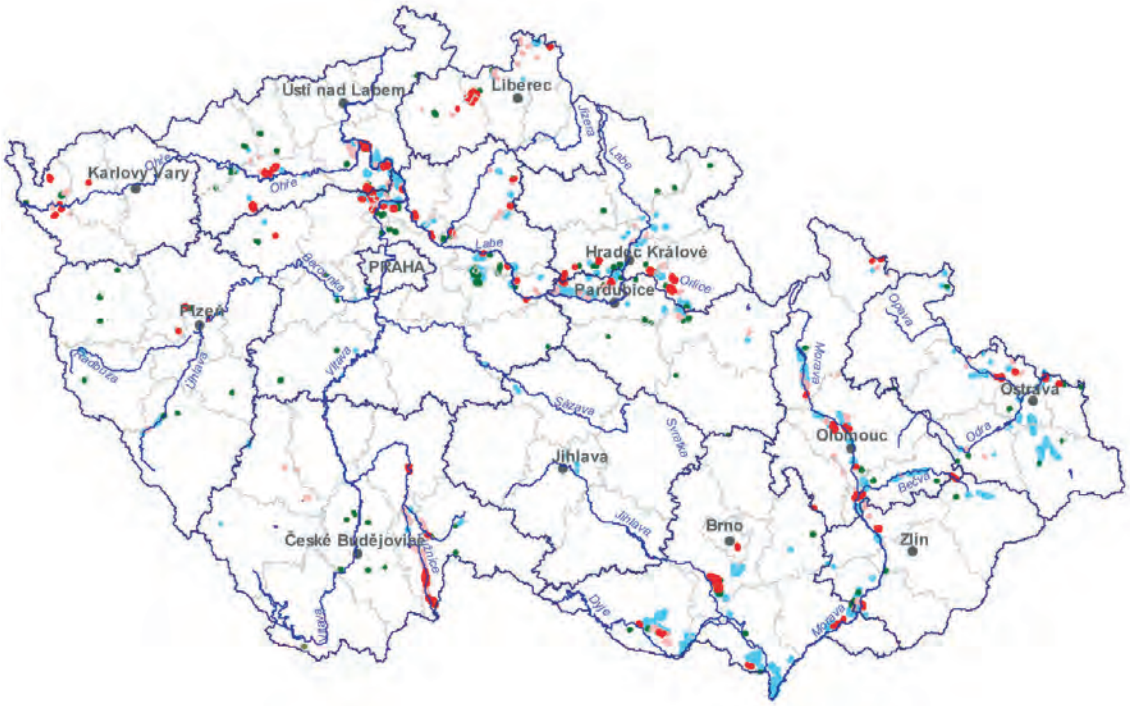
Mine production of the crushed stone is frequently reported together with sand and gravel under the term aggregates.

Crushed stone prices are not formed on the international market. Neither indicative regional prices are quoted.

Aggregates market and prices in the European Union, especially in the Central European countries, are described in „Aggregates market analysis of selected countries in Central Europe“ subchapter of this yearbook.

Sand and gravel

1. Registered deposits and other resources of the Czech Republic



reserved deposits – mined (80)
reserved deposits – unmined (127)
non-reserved deposits – mined (84)
non-reserved deposits – unmined (258)

Because of their large number, deposits of sand and gravel are not listed.

2. Basic statistical data of the Czech Republic as of December 31

Reserved deposits: Number of deposits; reserves; mine production

Year	2009	2010	2011	2012	2013
Deposits – total number	208	206	206	207	207
exploited	72	72	72	74	80
Total mineral *reserves, ths m^3	2 112 759	2 134 304	2 126 991	2 120 076	2 138 208
economic explored reserves	1 123 164	1 129 913	1 126 123	1 114 756	1 102 371
economic prospected reserves	765 626	782 190	780 987	785 479	813 918
potentially economic reserves	223 969	222 201	219 881	219 841	221 919
exploitable reserves	356 412	358 569	362 676	379 201	381 649
Mine production in reserved deposits, ths m^3	7 269	6 187	6 902	6 136	5 346

** See **NOTE** in the chapter **Introduction** above on a terminological difference between Czech official application of the term reserves and standard international application of the term. The relationship of domestic and foreign classifications of mineral reserves and resources is described in the separate chapter **Mineral reserve and resource classification in the Czech Republic** of this yearbook*

Approved prognostic resources P_1, P_2, P_3

Year		2009	2010	2011	2012	2013
P_1,	ths m^3	146 177	146 177	146 177	146 177	149 027
P_2,	ths m^3	1 007 985	1 007 985	1 007 985	1 007 985	946 239
P_3		–	–	–	–	–

Non-reserved deposits: Number of deposits; reserves; mine production

Year	2009	2010	2011	2012	2013
Deposits – total number	338	340	338	339	342
exploited	96	94	95	90	84
Total mineral *reserves, ths m^3	2 097 034	2 080 639	2 078 255	2 079 420	2 107 576
economic explored reserves	110 585	107 925	107 945	107 478	106 863
economic prospected reserves	1 745 512	1 734 314	1 731 910	1 733 544	1 760 824
potentially economic reserves	240 937	238 400	238 400	238 398	239 889
exploitable reserves	50 350	50 300	54 600	52 100	50 695
Mine production in non-reserved deposits, ths m^3 [a)]	6 050	4 550	5 000	4 300	4 297

** See **NOTE** in the chapter **Introduction** above on a terminological difference between Czech official application of the term reserves and standard international application of the term. The relationship of domestic and foreign classifications of mineral reserves and resources is described in the separate chapter **Mineral reserve and resource classification in the Czech Republic** of this yearbook*

[a)] estimate

3. Foreign trade

250590 – Other sand (natural sand of all kinds, also coloured, except sand containing metals and except silica sand and quartz sand)

		2009	2010	2011	2012	2013
Import	kt	29 396	10 665	19 977	29 827	88 389
Export	kt	422	616	4 928	362	2 979

250590 – Other sand (natural sand of all kinds, also coloured, except sand containing metals and except silica sand and quartz sand)

		2009	2010	2011	2012	2013
Average import prices	CZK/t	1 070	2 721	1 826	1 336	486
Average export prices	CZK/t	7 732	7 463	683	8 330	767

4. Prices of domestic market

Domestic prices of sand and gravel in 2013 – by regional units

	Average prices of (listed) fractions (CZK/t)																		
	Single																		In regions
Size fraction (mm) / Region	0-1	0-2	0-4	0-8	0-16	0-32	0-63	4-8	8-16	8-32	11-22	16-32	22-63	32-63	unsorted material	pit material	overburden	for backfills	
Hradec Králové		100	109	85	82	73	125	262	185	60		194	64	250	86	67	59	40	115
Plzeň	100	165	169	100	90	190	190	207	197	150	250	342			71		15	76	154
Central Bohemia	95	118	123	117	97	200	85	177	162		150	199	119	132	124	60	109	56	125
Liberec		185	162	146	104	107				175					113	145	104		138
Pardubice	83	204	178	137		81		289	181			211		84	60				149
Ústí nad Labem	185	175	155	143		119	159	246	173		246				97		90	114	159
South Moravia	40	116	131	203	152	146	96	207	206		232	287	231	230	77	174	55	75	156
Karlovy Vary		225	116	60		118	160	265	293	135	280			170	113		60	90	160
South Bohemia	208	227	192	175		60	110	248	290			349		397	129	154	55		200
Olomouc	145	255	221	228	238	144	176	295	268		247	253	170	200	118		51	110	195
Zlín	135	235	231			245	100	339	336		232	305	155	280					236
Moravia and Silesia	205	219	236	210	280	210	160	295	268		247	253	170	200	118		51	110	202
Vysočina	Sand and gravel are not mined in these regions																		
Prague																			
Czech Republic total	133	185	169	146	149	141	136	255	233	130	236	266	152	216	101	120	65	84	166

5. Mining companies in the Czech Republic as of December 31, 2013

Sand and gravel – registered deposits

Českomoravský štěrk, a.s., Mokrá
Holcim (Česko) a.s., člen koncernu, Prachovice
LB MINERALS, s.r.o., Horní Bříza
KÁMEN Zbraslav, spol. s r.o.
CEMEX Sand, k.s., Napajedla
EUROVIA Kamenolomy, a.s., Liberec
České štěrkopísky spol. s r.o., Praha
Družstvo DRUMAPO, Němčičky
TVARBET Moravia a.s., Hodonín
KAMENOLOMY ČR s.r.o., Ostrava – Svinov
Štěrkovny Olomouc a.s.
Písky – J.Elsnic s.r.o., Postoloprty
TEKAZ s.r.o., Cheb
Městské lesy Hradec Králové a.s.
realma-pískovna dolany s.r.o., Zlín

Kinský dal Borgo, a.s., Chlumec nad Cidlinou
Písek – Beton a.s., Veltruby-Hradištko
Budějovické štěrkopísky spol. s r.o., Vrábče
Jana Lobová, Pardubice
Pískovna Sojovice, s.r.o.
Lubomír Kruncl, Travčice
Obec Kostomlátky
Pískovny Hrádek a.s., Hrádek nad Nisou
Václav Maurer, Lužec nad Vltavou
Pískovna Černovice, s.r.o., Brno
MIROS MAJETKOVÁ a.s., Pardubice
DOBET s.r.o., Ostrožská Nová Ves
Těžba štěrkopísku s.r.o., Brodek
Zemědělské obchodní družstvo Zálabí, Ovčáry
Kaolin Hlubany, a.s.
ZAPA beton a.s., Praha
Oldřich Psotka, Mikulovice u Jeseníka
KM Beta Moravia s.r.o., Hodonín
Ladislav Šeda, Turnov
NZPK s.r.o., Podbořany
Zechmeister, spol. s r.o., Praha
UNIM s.r.o., Všestudy u Veltrus
ZOD Brniště a.s.
František Dvořák, Dolní Dunajovice
KARETA s.r.o., Bruntál
Sokolovská uhelná, právní nástupce, a.s., Sokolov

Sand and gravel – non-registered deposits

František Jampílek, Lázně Toušeň
České štěrkopísky spol. s r.o., Praha
CEMEX Sand, k.s., Napajedla
Vltavské štěrkopísky s.r.o., Chlumín
Holcim (Česko) a.s., člen koncernu, Prachovice
Písek Žabčice, s.r.o.
Pískovny Hrádek a.s., Hrádek nad Nisou
Severočeské pískovny a štěrkovny s.r.o., Žatec
ZEPIKO spol. s r.o., Brno
Písník Kinský, s.r.o., Kostelec nad Orlicí
Václav Maurer, Lužec nad Vltavou
Lubomír Kruncl, Travčice
ZS Kratonohy a.s.
AGRO Brno – Tuřany, a.s.
Luděk Měchura, Kyjov
AZI spol. s r.o., Břeclav
Rovina Písek, a.s., Písek u Chlumce nad Cidlinou
FRISCHBETON s.r.o., Praha
AG Skořenice, akciová společnost
Agropodnik Humburky, a.s.
Plzeňské štěrkopísky s.r.o., Plzeň
DOBET s.r.o., Ostrožská Nová Ves
Sušárna a.s. Kratonohy
LIKOD s.r.o., Lípa
NIKA Chrudim, s.r.o.
ACHP s.r.o., Hradec Králové
ROBA štěrkovny Nové Sedlo, s.r.o.
Českomoravský štěrk, a.s., Mokrá
SPONGILIT PP, spol. s r.o., Praha
ZEPOS a.s., Radovesice
Martin Čermák, Jablonné v Podještědí
Pískovna Klíčany HBH s.r.o.
INGEA realizace s.r.o., Ostrava – Svinov
VRAMAT CZ s.r.o., Tusko
Hradecký písek a.s., Brno
Kobra Údlice s.r.o.
Obecní lesy Bludov s.r.o.
Ing. Václav Luka, Český Brod
MAPO, s.r.o., Písty
Ing. Milan Tichý – Inženýrské stavby VOKA, Zahrádky
Václav Merhulík, Lety
Kateřina Zachová, Markvartice
STAVOKA Hradec Králové, a.s.
Technické služby města Strakonice s.r.o.
Ing. František Klika, Kladno
Správa a údržba silnic Jihoč. kraje, Č. Budějovice
Unigeo a.s., Ostrava – Hrabová
Písky – Skviřín, s.r.o., Tachov
MORAS a.s., Moravany
Ilona Seidlová, Jetřichov
Recyklace-štěrkovna Frýdlant s.r.o.
Mgr. Milan Roček, Moravany
SABIA s.r.o., Bohušovice nad Ohří
Václav Mašek, Hýskov
Silnice Čáslav – Holding, a.s.

Pražské vodovody a kanalizace a.s.
Ing. Josef Varhulík, Lány
Obec Rabštejnská Lhota
META Servis s.r.o., Černošice
Jiří Bartoš, Poříčí u Litomyšle
TEKAZ s.r.o., Cheb
Zemědělské družstvo v Pňovicích
Obec Police
STAKUS – písek s.r.o., Tachov
Městské lesy Jaroměř s.r.o., Proruby
Technické služby města Úpice
AGROSPOL HRÁDEK, spol. s r.o.

6. World production and world market prices

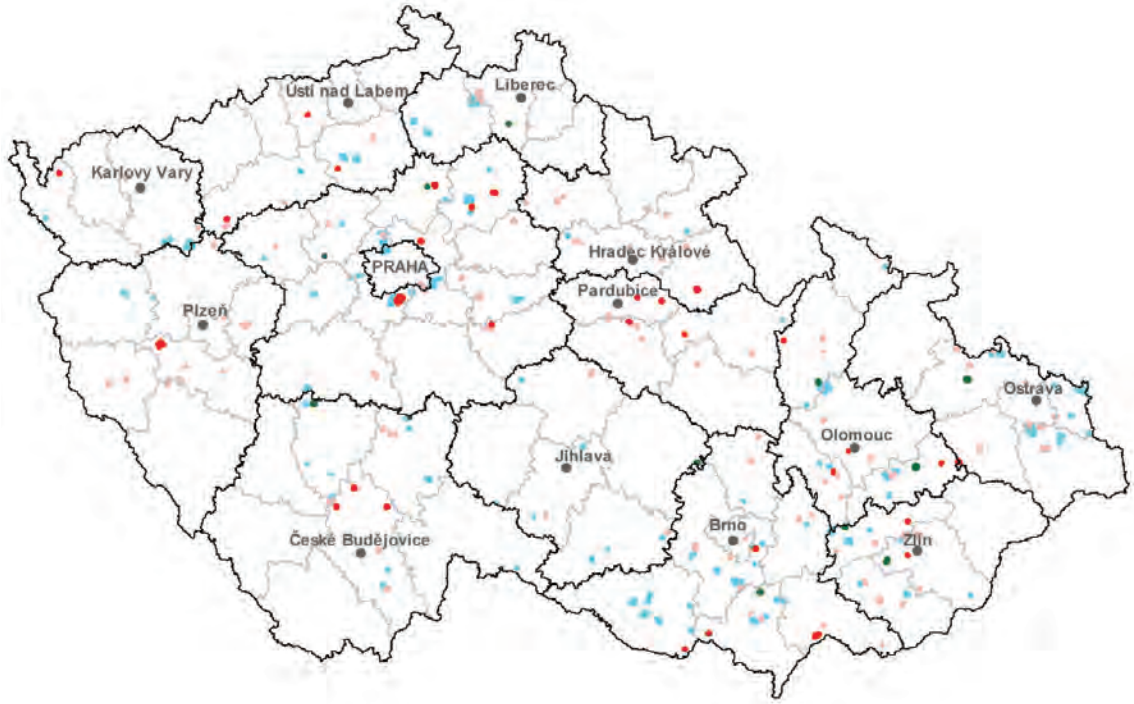
Mine production of sand and gravel is frequently reported together with crushed stone under the term aggregates.

Sand and gravel prices are not formed on the international market. Neither indicative regional prices are quoted.

Aggregates market and prices in the European Union, especially in the Central European countries, are described in ***Aggregates market analysis of selected countries in Central Europe*** subchapter of this yearbook.

Brick clays and related minerals

1. Registered deposits and other resources of the Czech Republic



reserved deposits – mined (14)
reserved deposits – unmined (117)
non-reserved deposits – mined (4)
non-reserved deposits – unmined (119)

There are large numbers of brick mineral deposits registered in the Czech Republic and thus they are not listed in this overview. Their distribution over the Czech territory is rather uneven and consequently in some regions there is a shortage of these minerals (e.g. Českomoravská vrchovina Highlands covering most of the area of Vysočina Region with capital Jihlava).

2. Basic statistical data of the Czech Republic as of December 31

Reserved deposits: Number of deposits; reserves; mine production

Year	2009	2010	2011	2012	2013
Deposits – total number	134	134	131	131	131
exploited	22	18	18	16	14
Total mineral *reserves, ths m^3	548 769	546 392	542 022	540 964	538 997
economic explored reserves	217 977	212 276	206 577	203 549	201 808
economic prospected reserves	232 709	231 886	232 827	232 746	232 522
potentially economic reserves	98 083	102 230	102 618	104 669	104 667
exploitable reserves	67 775	64 070	64 217	61 798	64 385
Mine production in reserved deposits, ths m^3	1 028	838	932	852	743

** See **NOTE** in the chapter **Introduction** above on a terminological difference between Czech official application of the term reserves and standard international application of the term. The relationship of domestic and foreign classifications of mineral reserves and resources is described in the separate chapter **Mineral reserve and resource classification in the Czech Republic** of this yearbook*

Approved prognostic resources P_1, P_2, P_3

Year		2009	2010	2011	2012	2013
P_1,	ths m^3	27 122	27 122	27 122	27 122	25 691
P_2,	ths m^3	245 494	245 494	245 494	245 494	245 459
P_3		–	–	–	–	–

Non-reserved deposits: Number of deposits; reserves; mine production

Year	2009	2010	2011	2012	2013
Deposits – total number	122	123	122	123	123
exploited	4	4	3	5	4
Total mineral *reserves, ths m^3	686 873	686 264	686 513	687 338	688 639
economic explored reserves	65 114	63 622	63 622	63 622	63 622
economic prospected reserves	515 285	515 789	516 038	516 863	518 164
potentially economic reserves	106 474	106 853	106 853	106 853	106 853
exploitable reserves	725	544	707	1 617	2 834
Mine production in non-reserved deposits, ths m^3 [a)]	203	182	147	176	140

** See **NOTE** in the chapter **Introduction** above on a terminological difference between Czech official application of the term reserves and standard international application of the term. The relationship of domestic and foreign classifications of mineral reserves and resources is described in the separate chapter **Mineral reserve and resource classification in the Czech Republic** of this yearbook*

[a)] estimate

3. Foreign trade

690410 – Building bricks

		2009	2010	2011	2012	2013
Import	ths pcs	21 425	15 544	18 070	14 258	11 844
Export	ths pcs	12 459	12 914	9 781	11 312	12 375

690410 – Building bricks

		2009	2010	2011	2012	2013
Average import prices	CZK/piece	14	12	12	14	15
Average export prices	CZK/piece	18	20	22	23	25

690510 – Roof tiles

		2009	2010	2011	2012	2013
Import	ths pcs	4 633	7 834	9 296	8 613	7 311
Export	ths pcs	7 594	6 554	12 207	12 108	12 240

690510 – Roof tiles

		2009	2010	2011	2012	2013
Average import prices	CZK/piece	18	13	15	18	18
Average export prices	CZK/piece	18	17	17	17	18

4. Prices of domestic market

Domestic prices of brick clay and brick products

Product specification	2009	2010	2011	2012	2013
Brick clay; CZK/t	80–180	80–180	90–180	95–180	60–120
Full brick; CZK/piece	6–12	6–9	6–7	6–7	6–7
Honeycomb brick; CZK/piece	10–14	11–16	11–14	11–14	11–15
Facing bricks; CZK/piece	10–17	17–33	8–51	17–34	17–30
Brick blocks Porotherm; CZK/piece	35–135	24–114	21–85	22–105	22–90
Clay (ground clay bricks for tennis courts); CZK/t	1 500	900–2 400	900–2 400	1 450–2 400	1 450–2 140
Roof tiles; CZK/t	19–39	19–43	20–44	20–46	21–46
Ventilating, boundary tile; CZK/t	78–183	79–184	81–123	86–205	86–205
Classical shingle tile; CZK/t	12–26	11–38	12–57	12–60	12–60

5. Mining companies in the Czech Republic as of December 31, 2013

Brick clays and related minerals – reserved deposits
HELUZ cihlářský průmysl v.o.s., Dolní Bukovsko
TONDACH Česká republika s.r.o., Hranice
Wienerberger Cihlářský průmysl, a.s., Č. Budějovice
Cihelna Kinský s.r.o., Kostelec n. Orlicí
Cihelna Hodonín, s.r.o.
Zlínské cihelny s.r.o., Zlín
Cihelna Vysoké Mýto s.r.o.
LB MINERALS, s.r.o., Horní Bříza

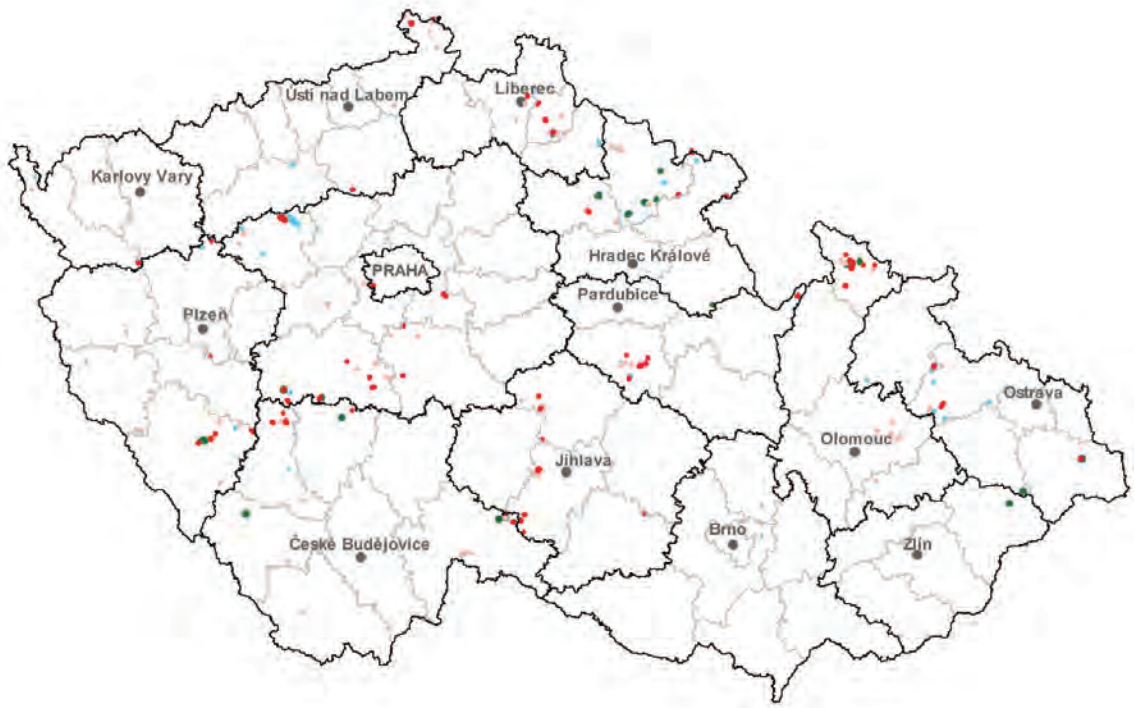
Brick clays and related minerals – non-reserved deposits
Wienerberger Cihlářský průmysl, a.s., Č.Budějovice
HELUZ cihlářský průmysl v.o.s., Dolní Bukovsko
Ing. Jiří Hercl, cihelna Bratronice, Kyšice

6. World production and world market prices

Production of brick clays is not recorded on the global scale, many countries do not record it. Brick clays are not subjects of the world trade.

Dimension stone

1. Registered deposits and other resources of the Czech Republic



reserved deposits – mined (52)
reserved deposits – unmined (107)
non-reserved deposits – mined (15)
non-reserved deposits – unmined (54)

There are many registered dimension stone deposits in the Czech Republic and therefore they are not listed.

2. Basic statistical data of the Czech Republic as of December 31

Reserved deposits: Number of deposits; reserves; mine production

Year	2009	2010	2011	2012	2013
Deposits – total number	161	160	159	159	159
exploited	60	61	61	55	52
Total mineral *reserves, ths m^3	183 752	183 677	182 753	182 573	181 396
economic explored reserves	79 955	79 950	79 287	77 575	77 414
economic prospected reserves	65 826	65 757	65 421	65 408	64 393
potentially economic reserves	37 971	37 970	38 045	39 590	39 589
exploitable reserves	81 958	82 224	79 099	79 153	79 985
Mine production in reserved deposits, ths m^3	209	262	192	138	140

** See **NOTE** in the chapter **Introduction** above on a terminological difference between Czech official application of the term reserves and standard international application of the term. The relationship of domestic and foreign classifications of mineral reserves and resources is described in the separate chapter **Mineral reserve and resource classification in the Czech Republic** of this yearbook*

Approved prognostic resources P_1, P_2, P_3

Year		2009	2010	2011	2012	2013
P_1,	ths m^3	5 043	5 043	5 043	5 043	5 043
P_2,	ths m^3	12 701	12 701	12 701	12 701	12 701
P_3		–	–	–	–	–

Non-reserved deposits: Number of deposits; reserves; mine production

Year	2009	2010	2011	2012	2013
Deposits – total number	70	70	70	69	69
exploited	19	19	18	17	15
Total mineral *reserves, ths m^3	33 546	33 498	33 437	33 391	33 362
economic explored reserves	2 293	2 280	2 264	2 257	2 257
economic prospected reserves	28 297	28 262	28 217	28 177	28 146
potentially economic reserves	2 956	2 956	2 956	2 956	2 956
exploitable reserves	2 760	2 690	2 120	1 810	1 582
Mine production in non-reserved deposits, ths m^3 [a)]	54	47	46	44	31

** See **NOTE** in the chapter **Introduction** above on a terminological difference between Czech official application of the term reserves and standard international application of the term. The relationship of domestic and foreign classifications of mineral reserves and resources is described in the separate chapter **Mineral reserve and resource classification in the Czech Republic** of this yearbook*

[a)] estimate

3. Foreign trade

2514 – Slate, also rougly worked or cut

		2009	2010	2011	2012	2013
Import	t	10 888	7 173	12 135	39 445	28 344
Export	t	31 441	28 542	12 488	3 694	4 201

2514 – Slate, also rougly worked or cut

		2009	2010	2011	2012	2013
Average import prices	CZK/t	655	2 220	1 209	693	1 200
Average export prices	CZK/t	1 134	995	1 260	1 250	1 369

2515 – Marble, travertine, ecaussine and other calcareous stone

		2009	2010	2011	2012	2013
Import	t	1 657	832	859	733	745
Export	t	147	2	86	35	47

2515 – Marble, travertine, ecaussine and other calcareous stone

		2009	2010	2011	2012	2013
Average import prices	CZK/t	9 549	13 094	18 690	12 636	17 238
Average export prices	CZK/t	10 576	212 486	170 356	180 489	34 714

2516 – Granite, porphyry, basalt, sandstone and other stone

		2009	2010	2011	2012	2013
Import	kt	14	18	13	9	10
Export	kt	9	5	6	16	7

2516 – Granite, porphyry, basalt, sandstone and other stone

		2009	2010	2011	2012	2013
Average import prices	CZK/t	18 484	18 023	10 365	10 139	8 755
Average export prices	CZK/t	7 054	8 365	15 932	6 652	7 468

6801 – Setts, curbstones and flagstones of natural stone (except slate)

		2009	2010	2011	2012	2013
Import	t	15 449	5 431	4 517	8 731	12 705
Export	t	74 752	56 818	73 078	65 130	68 891

6801 – Setts, curbstones and flagstones of natural stone (except slate)

		2009	2010	2011	2012	2013
Average import prices	CZK/t	18 851	26 938	133 345	235 770	138 091
Average export prices	CZK/t	5 422	1 854	1 782	1 966	2 069

6802 – Worked monumental and crushed stone (except slate) and stonework

		2009	2010	2011	2012	2013
Import	t	29 813	29 954	33 2019	34 322	27 220
Export	t	61 779	54 356	41 044	42 918	56 574

6802 – Worked monumental and crushed stone (except slate) and stonework

		2009	2010	2011	2012	2013
Average import prices	CZK/t	17 084	18 053	31 508	58 752	31 222
Average export prices	CZK/t	4 455	6 823	21 795	39 239	15 703

6803 – Worked slate and articles of slate or of agglomerated slate

		2009	2010	2011	2012	2013
Import	t	2 664	3 068	3 335	3 350	3 194
Export	t	79	62	182	132	80

6803 – Worked slate and articles of slate or of agglomerated slate

		2009	2010	2011	2012	2013
Average import prices	CZK/t	11 927	10 576	8 004	12 015	12 113
Average export prices	CZK/t	14 795	29 607	21 671	29 717	27 108

4. Prices of domestic market

Product specification			Unit	2009	2010	2011	2012	2013
greyish blue Hlinec granite	cobblestones		CZK/t	2 400-3 400	2 400-3 400	2 100-3 250	2 100-3 250	2 100-3 250
	margin stones		CZK/bm	340-440	340-440	320-400	320-400	320-400
	cleaved prisms		CZK/m²	2 400	2 400	2 100	2 100	2 100
	curbstones		CZK/bm	1 250-1 400	1 250-1 400	1 000-1 200	1 000-1 200	1 000-1 200
	slabs	polished, thickness 2-8 cm	Kč/m²	1 800-3 800	1 800-3 800	1 800-3 800	1 800-3 800	1 800-3 800
		emery grounded, thickness 2-8 cm	Kč/m²	1 600-3 600	1 600-3 600	1 600-3 600	1 600-3 600	1 600-3 600
		sand blasted finish, thickness 2-8 cm	Kč/m²	1 400-3 100	1 400-3 100	1 400-3 100	1 400-3 100	1 400-3 100
		formatted suitable as pavement, thickness 3 cm	Kč/m²	1 560-2 260	1 560-2 260	1 560-2 260	1 560-2 260	1 560-2 260
light Silesian granite	cobblestones		CZK/t	1 750-3 000	1 750-3 000	1 750-3 000	N	N
	margin stones		CZK/bm	290-320	290-320	290-320	N	N
	cleaved prisms		CZK/m²	1 100-1 800	1 100-1 800	1 100-1 800	N	N
Mrákotín type granite – pavement slabs	sand blasted finish, thickness 2-8 cm		CZK/m²	1 450-2 250	1 450-2 250	1 450-2 250	1 450-2 250	N
	emery grounded, thickness 2-8 cm		CZK/m²	1 580-2 480	1 580-2 480	1 580-2 480	1 580-2 480	N
	polished, thickness 2-8 cm		CZK/m²	1 900-2 700	1 900-2 700	1 900-2 700	1 900-2 700	N
granite blocks			Kč/m³	CZK/m³	≥ 4 200	≥ 5 500	≥ 5 500	≥ 5 500
sandstone – cut slabs	thickness 5 cm		CZK/m²	1 386-1 930	1 380-1 930	1 000-1 930	1 000-1 930	1 000-1 930
	thickness 10 cm		CZK/m²	2 766-3 410	2 770-3 410	2 770-3 410	2 770-3 410	2 770-3 410
	thickness 15 cm		CZK/m²	4 186-5 182	4 190-5 180	4 190-5 180	4 190-5 180	4 190-5 180
marble - pavement	cut	Supíkovice marble	CZK/m²	300-1 080	300-1 080	N	300-1 080	N
		Lipová marble	CZK/m²	300-1 180	300-1 180	N	300-1 180	N
	smoothed	Supíkovice marble	CZK/m²	400-1 220	400-1 220	N	400-1 220	N
		Lipová marble	CZK/m²	400-1 340	400-1 340	N	400-1 340	N
	polished	Supíkovice marble	CZK/m²	440-1 500	440-1 500	N	440-1 500	N
		Lipová marble	CZK/m²	440-1 630	440-1 630	N	440-1 630	N

Notice: bm (běžný metr) – running metre

5. Mining companies in the Czech Republic as of December 31, 2013

Dimension stone – reserved deposits

Granit Lipnice s.r.o., Dolní Město
HERLIN s.r.o., Příbram
MEDIGRAN s.r.o., Plzeň
Slezský kámen, a.s., Jeseník
Průmysl kamene a.s., Příbram
Česká žula s.r.o., Strakonice
KAVEX – GRANIT HOLDING a.s., Plzeň
CREDITFORFEIT, a.s., Praha
Plzeňská žula, Plzeň
Malkov Granit Baumann s.r.o., Drahenický Málkov
SATES ČECHY, s.r.o., Telč
SLEZSKÁ ŽULA spol. s r.o., Brno
Těžba nerostů a.s., Plzeň
Obec Studená
Ligranit a.s., Liberec
BÖGL a KRÝSL, k.s., Praha
RALUX s.r.o., Uhelná
Kámen Hudčice s.r.o.
GRANIO s.r.o., Chomutov
COMING PLUS, a.s., Praha
LOM DEŠTNO a.s., Sedlčany
Josef Máca, Třešť
Kamenoprůmyslové závody s.r.o., Šluknov
JIHOKÁMEN, výrobní družstvo, Písek
Lom Matula Hlinsko, a.s.
GRANITES, s.r.o., Žulová
Granit Zedníček s.r.o., Kamenná
Jindřich Zedníček, Kamenná
KÁMEN OSTROMĚŘ s.r.o.
Krákorka a.s., Červený Kostelec
Anna Mrázová, Mukařov
M. & H. Granit s.r.o., Plzeň
Mšenské pískovce s.r.o., Mšené – lázně
K - Granit s.r.o., Jeseník
REVLAN s.r.o., Horní Benešov
BioGinGo s.r.o., Kostelec nad Orlicí

Dimension stone – non-reserved deposits

KOKAM s.r.o., Kocbeře
HERLIN s.r.o., Příbram

Jiří Sršeň – TEKAM, Záměl
Obec Studená
K - Granit s.r.o., Jeseník
Lom Horní Dvorce, s.r.o., Strmilov
KAVEX – GRANIT HOLDING a. s., Plzeň
Alfonz Dovičovič, Hořice
Josef Máca, Třešť
SPONGILIT PP, spol. s r.o., Praha
Lesostavby Frýdek-Místek, a.s.
PROFISTAV Litomyšl, a.s.
Ing. Danuše Plandorová, Hážovice
Krákorka a.s., Červený Kostelec

6. World production and world market prices

Production of dimension stone is not recorded on the global scale, many countries do not record it. Dimension stone is subject of the world trade. Prices of dimension stone in international market depend on mineral quality and degree of working. In general they are not officially published. Price level on the US market can give a certain idea (Source: Minerals Yearbook 2012. Stone, Dimension, pp.72.1-72.14.-U.S. Geological Survey, U.S. Department of Interior, Washington, DC, August 2014.):

Dimension stone sold or used in the USA in 2012, by type

	Quantity, tonnes	Value, ths USD	Average price, USD/t
Granite	500 000	118 000	236
Limestone (and dolomite and calcareous stone)	882 000	176 000	200
Marble	54 600	23 600	432
Sandstone (and quartzite)	324 000	51 700	160
Slate	35 900	17 700	493
Miscellaneous stone	348 000	65 300	188

U.S. Exports of dimension stone by type in 2012

	Quantity, ths tonnes	Value, ths USD	Average value, USD/t	Major destination, by value
Marble, travertine, alabaster, worked (more than simply cut with a flat surface)	80	9 430	118	Canada, 47%
Marble, travertine, crude or roughly trimmed	1	800	800	Italy, 42%
Marble, travertine, merely cut by sawing or otherwise (blocks or slabs)	5	4 880	976	Italy, 52%
Granite, crude or roughly trimmed	55	23 500	427	China, 55%
Granite, merely cut by sawing or otherwise (blocks or slabs)	22	6 830	310	Canada, 56%
Slate, worked and articles of slate	N	4 010	N	Canada, 70%
Slate, whether or not roughly trimmed or merely cut (blocks or slabs)	N	507	N	Indonesia, 35%
Other calcareous monumental or building stone; alabaster (other than marble and travertine. Crude, roughly trimmed, or merely cut into blocks or slabs)	35	11 100	317	Canada, 97%
Other calcareous monumental or building stone (other than calcareous stone and alabaster, granite, sandstone, slate, dolomite, quartzite, and steatite. Crude, roughly trimmed, or merely cut into blocks or slabs)	14	3 790	271	Canada, 92%

U.S. Imports for consumption of dimension stone, dressed, by type, in 2012

		Quantity	Value, ths USD	Average value, USD/t, or USD/sq ft (USD/m²)	Major source, by value
Marble and alabaster (simply cut with a flat surface)	tonne	18 600	21 700	1 167	Italy, 31%
Slate, roofing	million sq ft	8	9 230	1 (12)	China, 33%
Slate, roughly trimmed or simply cut (rectangular blocks or slabs)	million sq ft	7 960	3 320	0.0004 (0.004)	China, 54%
Slate, worked and articles of slate, and other (other than roofing, including agglomerated slate)	million sq ft	N	51 500	N	China, 50%
Travertine, monumental or building stone and articles thereof (simply cut with a flat surface, other than tiles and granules)	million sq ft	16 200	14 300	0.0009 (0.01)	Mexico, 33%
Travertine, worked monumental or building stone (dressed or polished but not further worked)	million sq ft	28 500	17 100	0.0006 (0.006)	Turkey, 36%

MINERALS CURRENTLY UNMINED IN THE CZECH REPUBLIC

MINERALS MINED IN THE PAST WITH RESOURCES AND RESERVES

ENERGY MINERALS

Lignite

1. Registered deposits and other resources of the Czech Republic

reserved registered deposits exhausted deposits and other resources

Principal areas of deposits presence:

(Names of regions with mined deposits are indicated in **bold type***)*

1 Vienna Basin	2 České Budějovice Basin	3 Czech part of the Zittau (Žitava) Basin

2. Basic statistical data of the Czech Republic as of December 31

Number of deposits; reserves; mine production

Year	2009	2010	2011	2012	2013
Deposits – total number	9	9	5	5	5
exploited	1	0	0	0	0
Total mineral reserves*, kt	975 261	975 261	997 229	997 229	997 229
economic explored reserves	203 780	203 780	619 652	619 652	619 652
economic prospected reserves	615 273	615 273	229 932	229 932	229 932
potentially economic reserves	156 208	156 208	147 645	147 645	147 645
exploitable (recoverable)	1 903	1 903	1 903	1 903	1 903
Mine production, kt	262	0	0	0	0

** See **NOTE** in the chapter **Introduction** above on a terminological difference between Czech official application of the term reserves and standard international application of the term. The relationship of domestic and foreign classifications of mineral reserves and resources is described in the separate chapter **Mineral reserve and resource classification in the Czech Republic** of this yearbook*

Lignite mining ended in 2009.

Approved prognostic resources P_1, P_2, P_3

Year		2009	2010	2011	2012	2013
P_1,	kt	232 867	232 867	232 867	169 262	177 351
P_2	kt	–	–	–	7 531	37 531
P_3		–	–	–	–	–

3. Foreign trade

No separate tariff item exists for lignite.

4. World production and world market prices

World mine production

Worldwide, lignite production is included in brown coal (lignite) production.

Prices of traded commodities

There are no international market for lignite commodities as lignite is generally not traded outside a producing country.

INDUSTRIAL MINERALS

Barite

1. Registered deposits and other resources of the Czech Republic

reserved registered deposits exhausted deposits and other resources

Registered deposits and other resources are not mined

1 Běstvina	2 Bohousová	3 Křižanovice

2. Basic statistical data of the Czech Republic as of December 31

Number of deposits; reserves; mine production

Year	2009	2010	2011	2012	2013
Deposits – total number [a)]	3	3	3	3	3
exploited	0	0	0	0	0
Total mineral *reserves, kt	569	569	569	569	569
economic explored reserves	0	0	0	0	0
economic prospected reserves	0	0	0	0	0
potentially economic reserves	569	569	569	569	569
Mine production, kt	0	0	0	0	0

** See **NOTE** in the chapter **Introduction** above on a terminological difference between Czech official application of the term reserves and standard international application of the term. The relationship of domestic and foreign classifications of mineral reserves and resources is described in the separate chapter **Mineral reserve and resource classification in the Czech Republic** of this yearbook*

[a)] Deposits with registered barite reserves

3. Foreign trade

251110 – Natural barium sulphate (barite

		2009	2010	2011	2012	2013
Import	t	4 797	7 079	7 456	7 037	6 574
Export	t	142	239	283	318	464

251110 – Natural barium sulphate (barite

		2009	2010	2011	2012	2013
Average import prices	CZK/t	6 807	6 497	7 494	8 181	9 023
Average export prices	CZK/t	11 868	12 340	11 804	4 243	15 371

251120 – Natural barium carbonate (witherite)

		2009	2010	2011	2012	2013
Import	t	0.4	113	108	0.001	0
Export	t	0	0	0	0	0

251120 – Natural barium carbonate (witherite)

		2009	2010	2011	2012	2013
Average import prices	CZK/t	11 111	8 849	9 583	N	–
Average export prices	CZK/t	–	–	–	–	–

4. World production and world market prices

World mine production

World barite production in recent years was as follows:

	2009	2010	2011	2012	2013[e]
World mine production of barite (according to MCS), kt	6 130	7 850	8 370	9 200	8 500
World mine production of barite (according to WBD), kt	7 633	9 179	9 242	10 440	N

[e] – *preliminary values*

According to MCS, the top ten producers in 2013 were:

China	44.7 %	Turkey	3.1 %
India	17.5 %	Kazakhstan	2.9 %
Morocco	10.0 %	Mexico	1.5 %
USA	7.8 %	Vietnam	1.1 %
Iran	3.9 %	Peru	0.9 %

The MCS estimated total world resources in all categories at 2 000 million tonnes, but identified resources at only 740 million tonnes.

Prices of traded commodities (according to IM)

Barite is traded in three different quality grades: as a weighting agent in drilling muds and as white paint-grade and chemical-grade barite.

Commodity/ Year		2009	2010	2011	2012	2013
Drilling grade, unground lump OCMA/API, bulk, specific gravity 4.20						
FOB Chennai	USD/t	N	72–74	72–146	140–145	145–155
FOB Morocco	USD/t	64–69	66–89	84–113	108–152	105–130
FOB China	USD/t	57–72	64–75	72–127	127–148	120–140
C&F North Sea (Moroccan)	USD/t	82–86	97–108	100–113	124–160	145–160
API, CIF Gulf Coast: Chinese Indian	USD/t	87–118 75–100	97–108 105–112	100–150 107–170	140–162 157–171	147–154 157–171
Drilling-grade, ground						
OCMA, bulk, del. Aberdeen	GBP/t	77–78	77–98	95–105	95–105	95–105
OCMA, bulk, del. Gt Yamouth	GBP/t	99–100	99–114	110–120	110–120	110–120
OCMA/API, bulk (15t): FOB S. Turkey	USD/t	135	125–135	125–135	130–155	150–155
SG 4.22, bagged, FOB Morocco	USD/t	110–128	120–147	135–147	135–147	110–170
Paint grade, white 96-98 % $BaSO_4$:						
350 mesh, 1–5 lots, del. UK	GBP/t	195–220	195–220	195–220	195–220	195–220
Chinese, lump CIF Gulf Coast	USD/t	180–240	230–240	230–260	235–290	235–275
325–350 mesh, 1–5 lots, ex-works USA	USD/st	N	N	N	315–400	315–400
Chemical grade						
Chinese, CIF Gulf Coast	USD/t	92–140	92–145	135–145	135–180	161–180

The price range includes the lowest and highest monthly price quotes for a given year.

Fluorspar

1. Registered deposits and other resources of the Czech Republic

reserved registered deposits exhausted deposits and other resources

Registered deposits and other resources are not mined

1 Běstvina	2 Jílové u Děčína	3 Kovářská	4 Moldava

2. Basic statistical data of the Czech Republic as of December 31

Number of deposits; reserves; mine production

Year	2009	2010	2011	2012	2013
Deposits – total number [a)]	4	4	4	4	4
exploited	0	0	0	0	0
Total mineral *reserves, kt	2 033	2 033	2 033	2 033	2 033
economic explored reserves	0	0	0	0	0
economic prospected reserves	0	0	0	0	0
potentially economic reserves	2 033	2 033	2 033	2 033	2 033
Mine production, kt	0	0	0	0	0

** See **NOTE** in the chapter **Introduction** above on a terminological difference between Czech official application of the term reserves and standard international application of the term. The relationship of domestic and foreign classifications of mineral reserves and resources is described in the separate chapter **Mineral reserve and resource classification in the Czech Republic** of this yearbook*

a) Deposits with registered fluorspar reserves

3. Foreign trade

252921 – Fluorspar, containing 97 wt % or less of calcium fluoride

		2009	2010	2011	2012	2013
Import	t	4 247	5 752	4 851	5 772	6 101
Export	t	4 707	5 584	3 025	1 686	1 729

252921 – Fluorspar, containing 97 wt % or less of calcium fluoride

		2009	2010	2011	2012	2013
Average import prices	CZK/t	4 358	4 969	6 455	6 298	6 620
Average export prices	CZK/t	8 634	7 842	7 807	8 176	9 160

252922 – Fluorspar, containing more than 97 wt % of calcium fluoride

		2009	2010	2011	2012	2013
Import	t	4 379	8 743	10 971	9 616	11 031
Export	t	1 431	5 003	7 539	7 948	8 993

252922 – Fluorspar, containing more than 97 wt % of calcium fluoride

		2009	2010	2011	2012	2013
Average import prices	CZK/t	6 030	5 252	6 560	9 888	8 515
Average export prices	CZK/t	9 030	8 650	9 955	12 640	12 272

4. World production and world market prices

World mine production

World fluorspar production in recent years was as follows:

	2009	2010	2011	2012	2013[e]
World mine production of fluorspar (according to MCS), kt	5 460	6 010	7 520	7 070	6 700
World mine production of fluorspar (according to WBD), kt	6 412	7 193	7 193	6 018	N

[e] – *preliminary values*

The following statistical data on the top five producers in 2013 are provided by the MCS:

The largest producer of fluorspar by far is China with a share of 64.2 %. Mexico ranks second with 18.5 %, followed by Mongolia with 5.2 % and South Africa with 2.7 %. The largest European producer was Spain, which accounted for only 1.6 % of world production. Leading producers also include the USA, which does not however publish statistical data on fluorspar.

Identified world resources are estimated at 500 million tonnes of calcium fluoride in fluorspar ores. World resources of phosphate rock contain approximately another 4.7 billion tonnes of calcium fluoride.

Prices of traded fluorspar commodities (USD/t) according to IM

Two grades of fluorspar are listed in market quotations: filtercake for the production of hydrofluoric acid and metallurgical fluorspar.

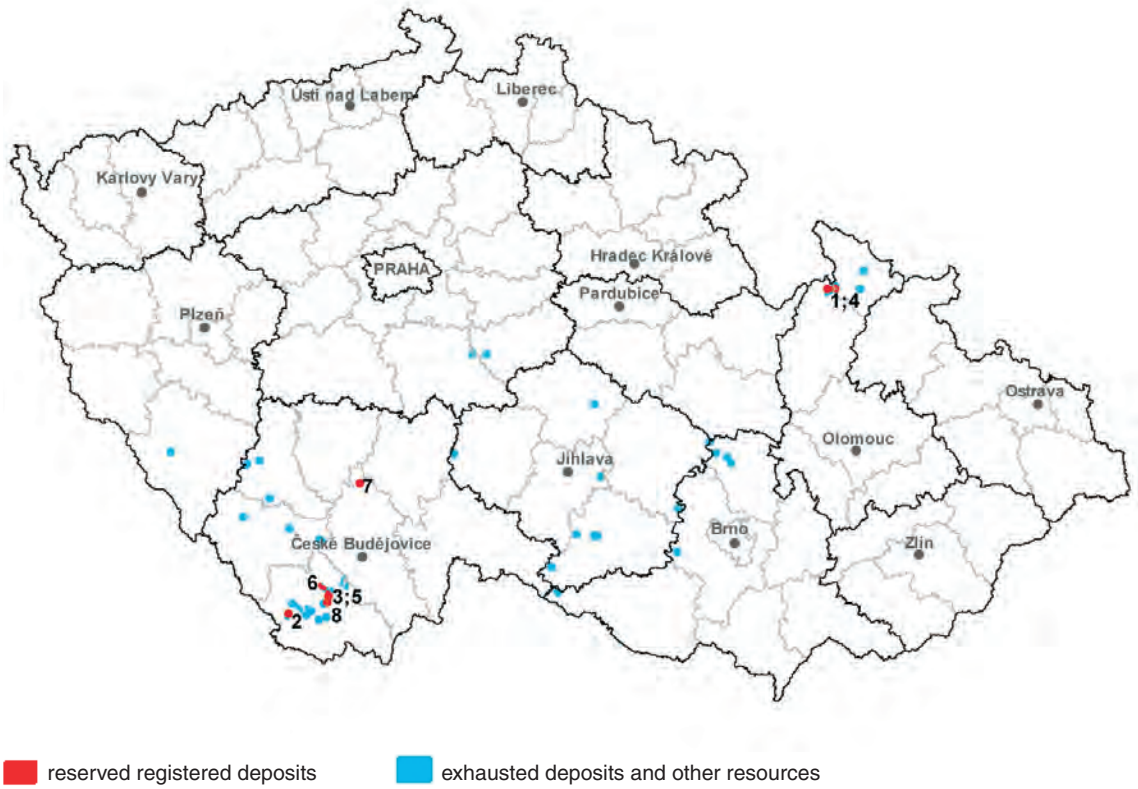
Commodity/ Year	2009	2010	2011	2012	2013
Filtercake, bulk, for production of hydrofluoric acid					
Mexican, < 5ppm As FOB Tampico	300–420	280–360	320–550	540–550	540–550
Mexican, FOB Tampico	260–350	260–290	290–450	400–450	350
Chinese, wet filtercake, CIF Rotterdam	310–350	310–370	340–650	500–650	310–330
Chinese,wet filtercake, FOB China	250–430	280–300	500–600	400–415	290–320
South African, dry basis, FOB Durban	230–300	230–310	330–350	380–450	380–450
Chinese, dry basis, CIF US Gulf Port	350–380	350–380	370–650	480–650	480–530
Metallurgical fluorspar					
Chinese, min. 85 % CaF_2, CIF Rotterdam	235–245	235–290	280–310	310	N
Mexican, FOB Tampico	140–195	140–200	170–270	230–270	230–270
Chinese, min.80 % CaF_2, wet bulk, FOB China	130–140	130–220	230–331	305–331	200–220
Chinese, min. 85 % CaF_2 CIF Rotterdam	N	N	310–359	310–375	290–310
Chinese, min. 85 % CaF_2, bulk, FOB China	N	N	359–381	359–385*	250–275*

** min. 90 % CaF_2*

The price range includes the lowest and highest monthly price quotes for a given year.

Graphite

1. Registered deposits and other resources of the Czech Republic



Registered deposits and other resources are not mined

Amorphous graphite:	Crystalline graphite:	Mixed (from amorphous to crystalline) graphite:
1 Velké Vrbno-Konstantin	5 Český Krumlov-Městský vrch	8 Spolí
2 Bližná-Černá v Pošumaví	6 Lazec-Křenov	
3 Český Krumlov-Rybářská ulice	7 Koloděje nad Lužnicí-Hosty	
4 Velké Vrbno-Luční hora 2		

2. Basic statistical data of the Czech Republic as of December 31

Number of deposits; reserves; mine production

Year	2009	2010	2011	2012	2013
Deposits – total number	8	8	8	8	8
exploited	1	1	1	1	0
Total mineral *reserves, kt [a)]	14 159	14 159	14 159	14 159	14 159
economic explored reserves	1 321	1 321	1 321	1 321	1 106
economic prospected reserves	4 041	4 041	4 041	4 041	2 606
potentially economic reserves	8 797	8 797	8 797	8 797	10 447
Mine production, kt [a)]	3	0	0	0	0

** See **NOTE** in the chapter **Introduction** above on a terminological difference between Czech official application of the term reserves and standard international application of the term. The relationship of domestic and foreign classifications of mineral reserves and resources is described in the separate chapter **Mineral reserve and resource classification in the Czech Republic** of this yearbook*

[a)] Reserves and mine production are given for crude graphite (graphite "ore"); average graphite contents in the raw material range between 15 and 20% (crystalline grade) and 25–35% (amorphous grade), respectively

Approved prognostic resources P_1, P_2, P_3

Year		2009	2010	2011	2012	2013
P_1,	kt	3 878	3 878	3 878	3 878	3 997
P_2,	kt	5 279	5 279	5 279	5 279	5 279
P_3,	kt	1 505	1 505	1 505	1 505	1 505

3. Foreign trade

2504 – Natural graphite

		2009	2010	2011	2012	2013
Import	t	2 679	3 634	5 145	4 757	5 632
Export	t	2 151	3 155	3 418	3 109	2 674

2504 – Natural graphite

		2009	2010	2011	2012	2013
Average import prices	CZK/t	22 657	21 381	21 940	24 311	21 416
Average export prices	CZK/t	28 905	25 880	31 649	37 539	39 286

3801 – Artificial graphite; colloidal or semi-colloidal graphite; preparations based on graphite

		2009	2010	2011	2012	2013
Import	t	5 500	3 583	4 396	2 880	2 434
Export	t	1 178	1 656	1 178	1 428	1 483

3801 – Artificial graphite; colloidal or semi-colloidal graphite; preparations based on graphite

		2009	2010	2011	2012	2013
Average import prices	CZK/t	27 187	35 737	35 931	50 275	55 170
Average export prices	CZK/t	23 760	25 841	34 035	31 711	33 034

6903 – Other refractory ceramic goods (for example, retorts, crucibles, muffles, nozzles, plugs, supports, cupels, tubes, pipes, sheaths and rods)

		2009	2010	2011	2012	2013
Import	t	4 606	5 598	6 756	5 416	5 265
Export	t	10 564	11 419	12 471	13 923	20 066

6903 – Other refractory ceramic goods (for example, retorts, crucibles, muffles, nozzles, plugs, supports, cupels, tubes, pipes, sheaths and rods)

		2009	2010	2011	2012	2013
Average import prices	CZK/t	98 596	99 956	86 450	97 406	105 012
Average export prices	CZK/t	117 344	127 577	121 179	120 157	94 797

4. World production and world market prices

World mine production

World graphite production has again been rising gradually after reaching its latest lowest level in 2009:

	2009	2010	2011	2012	2013[e]
World mine production of graphite (according to MCS), kt	1 100	925	1 150	1 170	1 190
World mine production of graphite (according to WBD), kt	742	1010	1 166	1 193	N

[e] – *preliminary values*

In 2013, the largest producer by far was China with a 68.1 % share of production, followed by India with 13.4 %. China, Canada and Madagascar were the leading producers of flake graphite.

The world´s inferred resources of graphite exceed 800 million tonnes. In the EU, graphite is considered a strategic mineral. According to Industrial Minerals (February 2009), the following countries have the largest graphite reserves (in mill tonnes):

Crystalline graphite		**Amorphous graphite**	
China	400	India	180
Ukraine	100	China	100
Madagascar	100	Mexico	100
Sri Lanka	80	Sri Lanka	100
Brazil	15	Austria	100
		South Korea	100

Prices of traded commodities (USD/t) according to IM

Commodity/ Year	2009	2010	2011	2012	2013
Crystalline graphite, large flake, 94–97 % C, +80 mesh, CIF main European port*	950–1 350	1 250–2000	1 450–3 000	1 400–1 800	1 250–1 300
Crystalline graphite, medium flake, 94–97 % C, +100–80 mesh CIF main European port	880–1 250	1 100–1 600	1 350–2 500	1 050–1 400	1 050–1 150
Crystalline graphite, fine, 94–97 % C, +100 mesh, CIF main European port	620–1 100	700–1 700	1 250–2 400	1 200–1 600	850–950
Crystalline graphite, large flake, 90 % C,+80 mesh, CIF UK port*	700–800	800–1 350	1 100–2 500	1 200–1 600	1 100–1 150
Crystalline graphite, medium flake, 90 % C, +100–80 mesh, CIF main European port*	650–780	700–1 300	1 050–2 000	950–1 200	900–1 000
Crystalline graphite, fine, 90 % C, –100 mesh, CIF main European port	450–1 050	550–1 300	950–1 800	850–1 050	750–850
Crystalline graphite, medium flake, 85–87 % C, +100–80 mesh, CIF main European port	650–770	700–1 400	1 000–1 900	900–1 150	700–800
Amorphous graphite, powder, 80–85 % C, Chinese del Europe	310–460	430–450	400–800	600–800	500–550

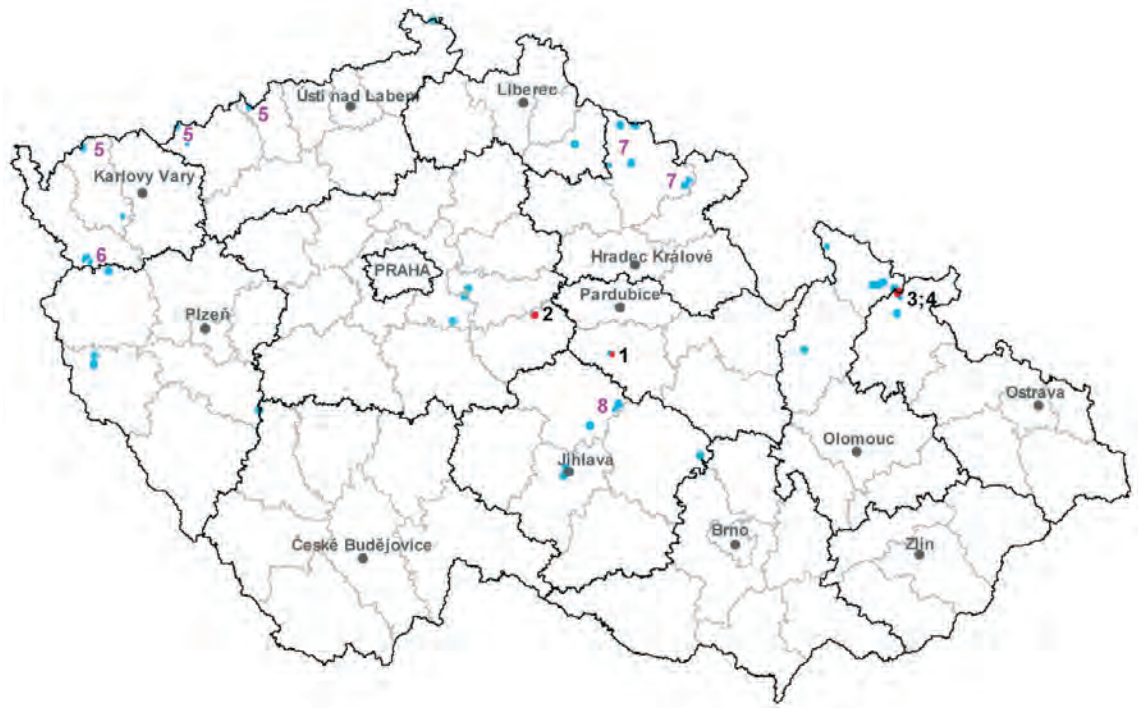
** in 2009 CIF UK port*

The price range includes the lowest and highest monthly price quotes for a given year.

METALLIC ORES

Copper

1. Registered deposits and other resources of the Czech Republic



reserved registered deposits exhausted deposits and other resources

Registered deposits and other resources are not mined

Reserved registered deposits:

1	Křižanovice	3	Zlaté Hory-Hornické Skály
2	Kutná Hora	4	Zlaté Hory-východ

Exhausted deposits and other resources:

5	in Krušné hory Mts. (Erzgebirge Mts.) and Tisová	7	in Krkonoše Mts. Piedmont Basin and Intrasudetic Basin
6	Tři Sekery and surroundings	8	Staré Ransko

2. Basic statistical data of the Czech Republic as of December 31

Number of deposits; reserves; mine production

Year	2009	2010	2011	2012	2013
Deposits – total number [a)]	4	4	4	4	4
exploited	0	0	0	0	0
Total mineral *reserves, kt Cu	49	49	49	49	49
economic explored reserves	0	0	0	0	0
economic prospected reserves	0	0	0	0	0
potentially economic reserves	49	49	49	49	49
Mine production, kt Cu	0	0	0	0	0

** See **NOTE** in the chapter **Introduction** above on a terminological difference between Czech official application of the term reserves and standard international application of the term. The relationship of domestic and foreign classifications of mineral reserves and resources is described in the separate chapter **Mineral reserve and resource classification in the Czech Republic** of this yearbook*

[a)] deposits with registered Cu content

3. Foreign trade

2603 – Copper ores and concentrates

		2009	2010	2011	2012	2013
Import	t	1	0	0.001	16	93
Export	t	0	0	0	7	4

2603 – Copper ores and concentrates

		2009	2010	2011	2012	2013
Average import prices	CZK/t	258 114	–	1 000	25 435	113 821
Average export prices	CZK/t	–	–	–	9 738	24 750

7402 – Unrefined copper

		2009	2010	2011	2012	2013
Import	t	116	91	86	55	112
Export	t	24	7	1	N	N

7402 – Unrefined copper

		2009	2010	2011	2012	2013
Average import prices	CZK/t	79 605	174 269	193 912	193 225	170 907
Average export prices	CZK/t	97 858	185 656	6 000 000	N	N

7403 – Refined copper and copper alloys

		2009	2010	2011	2012	2013
Import	t	24 320	10 506	9 540	18 558	34 932
Export	t	14 606	14 627	13 492	21 848	52 726

7403 – Refined copper and copper alloys

		2009	2010	2011	2012	2013
Average import prices	CZK/t	68 492	144 568	148 043	160 070	151 988
Average export prices	CZK/t	108 761	135 058	160 395	158 336	149 799

7404 – Copper waste and scrap

		2009	2010	2011	2012	2013
Import	t	9 666	12 297	18 952	19 318	14 158
Export	t	105 562	124 927	86 654	74 571	66 820

7404 – Copper waste and scrap

		2009	2010	2011	2012	2013
Average import prices	CZK/t	77 378	113 233	132 373	121 375	121 997
Average export prices	CZK/t	76 924	98 614	116 018	108 644	101 305

740311 – Copper cathodes and sections of cathodes unwrought

		2009	2010	2011	2012	2013
Import	t	20 696	5 298	4 962	16 455	32 291
Export	t	10 628	11 082	10 347	20 566	51 079

740311 – Copper cathodes and sections of cathodes unwrought

		2009	2010	2011	2012	2013
Average import prices	CZK/t	58 097	148 406	158 838	162 026	154 143
Average export prices	CZK/t	105 370	137 459	154 955	159 355	150 084

740321 – Copper-zinc base alloys, unwrought

		2009	2010	2011	2012	2013
Import	t	2 925	3 330	3 021	1 527	2 243
Export	t	2 802	3 313	2 642	1 046	1 154

740321 – Copper-zinc base alloys, unwrought

		2009	2010	2011	2012	2013
Average import prices	CZK/t	130 401	129 518	126 077	130 457	108 803
Average export prices	CZK/t	127 860	126 691	125 465	138 262	141 639

740322 – Copper-tin base alloys, unwrought

		2009	2010	2011	2012	2013
Import	t	97	277	245	192	53
Export	t	1 082	102	71	132	98

740322 – Copper-tin base alloys, unwrought

		2009	2010	2011	2012	2013
Average import prices	CZK/t	183 113	123 581	192 082	128 013	281 980
Average export prices	CZK/t	93 775	118 481	254 361	167 144	158 235

4. World production and world market prices

World mine production

World production of primary copper continued to increase and, according to preliminary MCS estimates, production in 2013 exceeded output in 2012 by one million tonnes.

	2009	2010	2011	2012	2013[e]
World mine production of copper (according to MCS), kt	15 900	15 900	16 100	16 900	17 900
World mine production of copper (according to WBD), kt	15 859	16 256	16 133	16 827	N

[e] – *preliminary values*

Metal Bulletin (12 March 2012) published an overview of the world´s copper production capacities (kt)

Commodity/ Year	2011	2012	2013	2014
Hydrometallurgy (SX-BW)	4 655	4 751	4 837	5 227
Concentrates	15 649	16 123	16 978	18 378
Total mine production	**20 304**	**20 874**	**21 815**	**23 605**
Total metallurgical production	18 528	19 113	19 823	20 353
Elektrolytic production	19 155	20 116	20 981	21 551
Total refinery production	**24 569**	**25 586**	**26 537**	**27 497**

The largest producers in 2013 were:

Chile	31.8 %	Russia	5.2 %
China	9.2 %	Congo (Kinshasa)	5.0 %
Peru	7.3 %	Zambia	4.6 %
USA	6.8 %	Canada	3.5 %
Australia	5.5 %	Kazakhstan	2.5 %

World reserves are estimated at 690 million tonnes of metal in ore. The most significant resources are porphyry ores, whose identified resources were estimated at 1.8 billion tonnes and undiscovered resources at 3.1 billion tonnes by the USGS. Deep-sea nodules and submarine massive sulfide ores represent other large unconventional resources.

Prices of traded commodities

According to the German summaries Deutschland—Rohstoffsituation 2009–2013 (D-R) and Metal Bulletin (MB), world copper prices (USD/t) were as follows:

Commodity/ Year	2009	2010	2011	2012	2013
Electrolytic Cu, grade A, min. 99.9 %, in LME warehouse, cash (according to D-R)	5 149.04	7 534.18	8 820.53	7 949.44	N
Copper, grade A, LME cash (according to MB)	7 345.50–3 050.25	9 739.25–6 090.75	6 784.50–10 147.75	7 251.25–8 656.50	6 637.25–8 242.25
Copper, grade A, 3-month contract, LME (according to MB)	7 377.00–3 086.00	9 665.00–6 125.00	6 812.00–10 124.00	7 270.00–8 647.00	6 676.00–8 286.00

The price range according to MB includes the lowest and highest monthly price quotes for a given year.

Germanium

1. Registered deposits and other resources of the Czech Republic

reserved registered deposits

The registered deposit is not exploited

1 Lomnice u Sokolova

2. Basic statistical data of the Czech Republic as of December 31

Number of deposits; reserves; mine production

Year	2009	2010	2011	2012	2013
Deposits – total number	1	1	1	1	1
exploited	0	0	0	0	0
Total * reserves, t Ge	479	479	479	476	473
economic explored reserves	0	0	0	0	0
economic prospected reserves	0	0	0	0	0
potentially economic reserves	479	479	479	476	473
Mine production, t Ge	0	0	0	0	0

** See **NOTE** in the chapter **Introduction** above on a terminological difference between Czech official application of the term reserves and standard international application of the term. The relationship of domestic and foreign classifications of mineral reserves and resources is described in the separate chapter **Mineral reserve and resource classification in the Czech Republic and its evolutional comparison with international classifications** of this yearbook*

3. Foreign trade

81129295 – Unwrought germanium, germanium powders; excluding waste and scrap

		2009	2010	2011	2012	2013
Import	kg	2	7	13	4	40
Export	kg	0	0	0	< 1	1

81129295 – Unwrought germanium, germanium powders; excluding waste and scrap

		2009	2010	2011	2012	2013
Average import prices	CZK/kg	11 000	14 286	3 692	50 790	16 825
Average export prices	CZK/kg	–	–	–	N	57 000

4. World production and world market prices

World mine production

World germanium production in recent years was as follows:

	2009	2010	2011	2012	2013[e]
World germanium production (according to MCS), t	120	118	118	150	155
World germanium production (according to WBD), t	53	63	66	111	N

[e] – *preliminary values*

The cited sources do not give any insight into their data, which differ considerably. It can only be assumed that the MCS records refinery production and the WBD only primary production. China was the world´s largest producer and consumer of germanium again in 2013. It accounted for 70 % of world production with existing refinery capacities operating at only 55 %, which amounted to 200 t/yr.

The most important recoverable resources of germanium are associated with zinc and Pb-Zn-Cu sulfide ores. However on a global scale, only 3 % of germanium contained in processed zinc concetrates are recovered. Another resource are coal deposits, with germanium being recovered from ash and flue dust during combustion. According to the Critical Metals Handbook (ed. G. Gunn, Wiley, 2014), China produces around 30 tonnes of germanium annually from these resources.

In 2012, the prices of germanium dioxide rose from 925 USD/kg in March to 1 375 USD/kg in September. The oxide prices did not change much in 2013. The prices of germanium metal increased in 2013 from 1 640 USD/kg to 1 875 USD/kg at the end of the year.

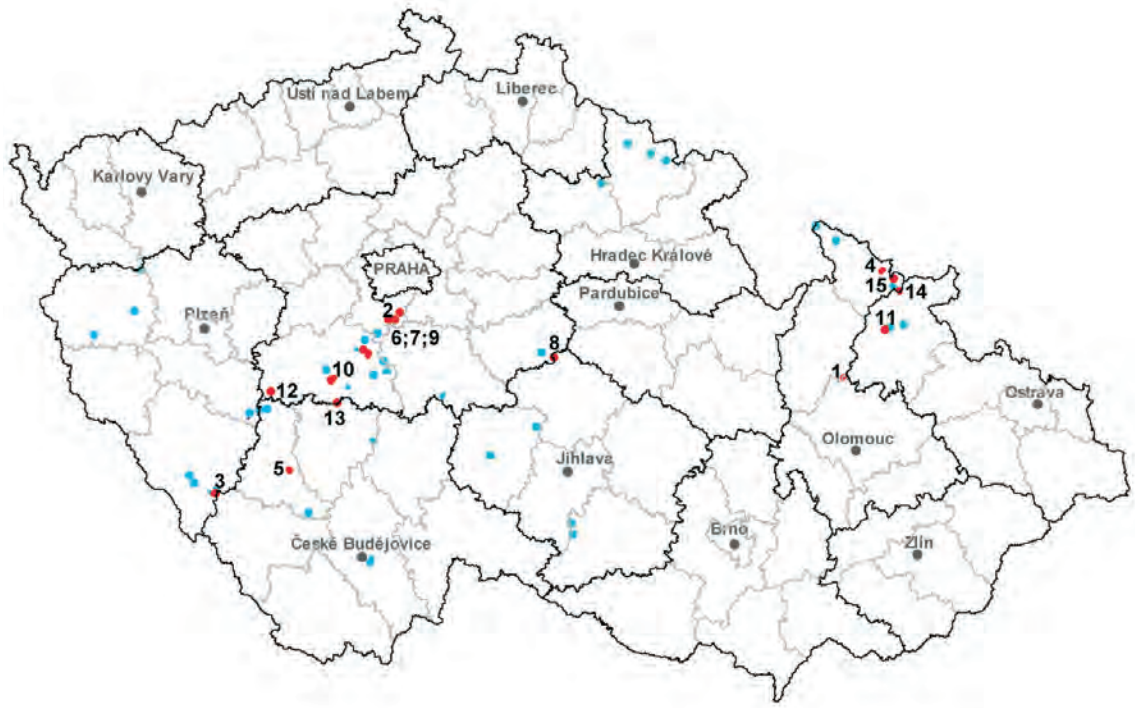
Average annual prices of germanium dioxide in USD/kg

according to the German summaries Deutschland-Rohstoffsituation 2009–2013

	2009	2010	2011	2012	2013
GeO_2, min. 99.99 %, MB free market, in warehouse Rotterdam	768.68	640.23	1 219.61	1 214.32	1 313.54

Gold

1. Registered deposits and other resources of the Czech Republic



reserved registered deposits exhausted deposits and other resources

Registered deposits and other resources are not mined

1 Břevenec	6 Mokrsko	11 Suchá Rudná-střed
2 Jílové u Prahy	7 Mokrsko-východ	12 Vacíkov
3 Kašperské Hory	8 Podmoky	13 Voltýřov
4 Mikulovice u Jeseníka	9 Prostřední Lhota-Čelina	14 Zlaté Hory-východ
5 Modlešovice	10 Smolotely-Horní Líšnice	15 Zlaté Hory-Zlatý potok

2. Basic statistical data of the Czech Republic as of December 31

Number of deposits; reserves; mine production

Year	2009	2010	2011	2012	2013
Deposits – total number	15	15	15	15	15
exploited	0	0	0	0	0
Total mineral *reserves, kg Au	238 900	238 900	238 900	238 900	238 900
economic explored reserves	48 740	48 740	48 740	48 740	48 740
economic prospected reserves	28 644	28 644	28 644	28 644	28 644
potentially economic reserves	161 516	161 516	161 516	161 516	161 516
Mine production, kg Au	0	0	0	0	0

* *See **NOTE** in the chapter **Introduction** above on a terminological difference between Czech official application of the term reserves and standard international application of the term. The relationship of domestic and foreign classifications of mineral reserves and resources is described in the separate chapter **Mineral reserve and resource classification in the Czech Republic** of this yearbook*

Approved prognostic resources P_1, P_2, P_3
Au metal in ores

Year		2009	2010	2011	2012	2013
P_1,	kg	60 221	60 221	60 221	60 221	60 221
P_2,	kg	65 846	65 846	65 846	65 846	52 246
P_3,		–	–	–	–	–

Au ore

Year		2009	2010	2011	2012	2013
P_1,	kt	16 700	16 700	16 700	16 700	16 700
P_2,	kt	20 341	20 341	20 341	20 341	23 191
P_3,	kt	2 850	2 850	2 850	2 850	–

3. Foreign trade

7108 – Gold in unwrought or semi-manufactured form, gold powder

		2009	2010	2011	2012	2013
Import	kg	2 915	3 693	20 268	5 291	6 823
Export	kg	10 649	477	9 851	6 953	91 426

7108 – Gold in unwrought or semi-manufactured form, gold powder

		2009	2010	2011	2012	2013
Average import prices	CZK/g	416	566	172	789	839
Average export prices	CZK/g	71	3 187	227	409	47.6

4. World production and world market prices

World mine production

Trend in the world´s primary gold production

	2009	2010	2011	2012	2013[e]
Mine production of gold, t (according to MCS)	2 450	2 560	2 660	2 690	2 770
Mine production of gold, t (according to WBD)	2 504	2 616	2 621	2 701	N

[e] – *preliminary values*

According to MCS, the top ten countries in 2013 were:

China	15.2 %	South Africa	5.2 %
Australia	9.2 %	Canada	4.5 %
USA	8.2 %	Mexico	3.6 %
Russia	7.9 %	Uzbekistan	3.4 %
Peru	5.4 %	Ghana	3.1 %

The ranking provided by the WBD for 2012 was nearly identical, except that Ghana was ninth with 3.7 % and Uzbekistan tenth with 3.3 %.

The USGS estimated world reserves of gold in ore at 54 000 tonnes, of which more than 18 % are accounted for by Australia, around 11 % by South Africa, and about 9 % by Russia. By contrast, China´s reserves are estimated at only 3.5 %. The reserves of the USA and Ghana exceed 5.5 %. However, US gold resources are estimated at 66 000 tonnes of gold, of which nearly one-quarter is contained in porphyry copper deposits.

Prices of traded commodities

Average annual gold price in USD/tr oz (1 tr oz (troy ounce) = 31.1035 g) according to the German summaries Deutschland- Rohstoffsituation 2009–2013

Commodity/ Year	2009	2010	2011	2012	2013
99.9 %, fine, in London warehouse	972.97	1 225.46	1 569.52	1 668.54	1 410.80

Lead

1. Registered deposits and other resources of the Czech Republic

reserved registered deposits exhausted deposits and other resources

Registered deposits and other resources are not mined

Reserved registered deposits:

1 Horní Benešov
2 Horní Město
3 Horní Město-Šibenice
4 Křižanovice
5 Kutná Hora
6 Oskava
7 Ruda u Rýmařova-sever
8 Zlaté Hory-východ

Exhausted deposits and other resources:

9 Březové Hory + Příbram-Bohutín
10 Oloví
11 Stříbro
12 Havlíčkův Brod (Dlouhá Ves + Bartoušov + Stříbrné Hory)
13 Ratibořské Hory + Stará Vožice
14 Černovice

2. Basic statistical data of the Czech Republic as of December 31

Number of deposits; reserves; mine production

Year	2009	2010	2011	2012	2013
Deposits – total number [a)]	8	8	8	8	8
exploited	0	0	0	0	0
Total mineral *reserves, kt Pb	152	152	152	152	152
economic explored reserves	0	0	0	0	0
economic prospected reserves	0	0	0	0	0
potentially economic reserves	152	152	152	152	152
Mine production, kt Pb	0	0	0	0	0

** See **NOTE** in the chapter **Introduction** above on a terminological difference between Czech official application of the term reserves and standard international application of the term. The relationship of domestic and foreign classifications of mineral reserves and resources is described in the separate chapter **Mineral reserve and resource classification in the Czech Republic** of this yearbook*

[a)] Deposits with registered Pb content

Approved prognostic resources P_1, P_2, P_3
Polymetallic (Pb – Zn ± Cu) ores

Year		2009	2010	2011	2012	2013
P_1,	kt	786	786	786	786	786
P_2,	kt	5 340	5 340	5 340	5 340	5 340
P_3,		–	–	–	–	–

3. Foreign trade

2607 – Lead ores and concentrates

		2009	2010	2011	2012	2013
Import	t	238	0	254	0.08	192
Export	t	0	0	0	0.003	120

2607 – Lead ores and concentrates

		2009	2010	2011	2012	2013
Average import prices	CZK/t	15 653	500 000	354 331	626 506	48 036
Average export prices	CZK/t	152 174	541 176	–	346 154	50 642

7801 – Unwrought lead

		2009	2010	2011	2012	2013
Import	t	65 846	82 402	35 971	60 258	104 330
Export	t	70 071	32 863	21 104	23 623	27 893

7801 – Unwrought lead

		2009	2010	2011	2012	2013
Average import prices	CZK/t	34 426	43 444	45 535	43 874	46 206
Average export prices	CZK/t	7 804	35 682	45 242	43 822	48 663

7802 – Lead waste and scrap

		2009	2010	2011	2012	2013
Import	t	4 199	2 901	2 770	2 560	4 179
Export	t	4 832	2 116	1 116	1 157	1 139

7802 – Lead waste and scrap

		2009	2010	2011	2012	2013
Average import prices	CZK/t	25 175	32 004	37 005	34 971	33 301
Average export prices	CZK/t	26 561	33 899	39 418	31 118	28 207

4. World production and world market prices

World mine production

According to MCS and WBD, global lead production in recent years was as follows:

	2009	2010	2011	2012	2013[e]
World mine production of lead (according to MCS), kt	3 860	4140	4 700	5 170	5 400
World mine production of lead (according to WBD), kt	3 848	4 360	4 680	4 793	N

[e] – *preliminary values*

In 2013, China accounted for more than 50 % of global production, specifically about 3 million tonnes. According to MCS, the top ten producers and their shares of production in 2013 were:

China	55.6 %	India	2.2 %
Australia	12.7 %	Bolivia	1.7 %
USA	6.3 %	Russia	1.7 %
Peru	4.6 %	Sweden	1.1 %
Mexico	4.1 %	South Africa	1.0 %

The USGS estimated world reserves at 89 million tonnes. Identified resources are listed at around 2 billion tonnes. Significant lead reserves have been demonstrated in association with polymetallic ore deposits in Australia, China, Ireland, Mexico, Peru, Portugal, Russia and in the USA (Alaska).

Prices of traded commodities

World lead prices (USD/t) according to the German summaries Deutschland-Rohstoffsituation 2009–2013 (D-R) and Metal Bulletin (MB)

Commodity/ Year	2009	2010	2011	2012	2013
99.97 % Pb, LME (according to D-R)	1 722.24	2 147.81	2 401.21	2 067.29	N
Lead, LME cash (according to MB)	2 447.25–991.25	2 593.25–1 558.25	1 791.25–2 938.75	1 743.50–2 339.75	1 948.50–2 447.50
Lead, LME 3-month contract, (according to MB)	2 489.00–1 000.00	2 620.00–1 580.50	1 832.00–2 853.00	1 760.00–2 342.00	1 961.00–2 455.00

The price range according to MB includes the lowest and highest monthly price quotes for a given year.

Manganese

1. Registered deposits and other resources of the Czech Republic

reserved registered deposits exhausted deposits and other resources

Registered deposits and other resources are not mined

1 Chvaletice	2 Chvaletice – tailing ponds No 1 & No 2	3 Řečany – tailing pond No 3

2. Basic statistical data of the Czech Republic as of December 31

Number of deposits; reserves; mine production

Year	2009	2010	2011	2012	2013
Deposits – total number	3	3	3	3	3
exploited	0	0	0	0	0
Total mineral *reserves, kt ores	138 801	138 801	138 801	138 801	138 801
economic explored reserves	0	0	0	0	0
economic prospected reserves	0	0	0	0	0
potentially economic reserves	138 801	138 801	138 801	138 801	138 801
Mine production, kt Mn	0	0	0	0	0

** See **NOTE** in the chapter **Introduction** above on a terminological difference between Czech official application of the term reserves and standard international application of the term. The relationship of domestic and foreign classifications of mineral reserves and resources is described in the separate chapter **Mineral reserve and resource classification in the Czech Republic** of this yearbook*

3. Foreign trade

2602 – Manganese ores and concentrates

		2009	2010	2011	2012	2013
Import	t	16 089	25 546	28 905	287	14 189
Export	t	0	0.3	50	383	65

2602 – Manganese ores and concentrates

		2009	2010	2011	2012	2013
Average import prices	CZK/t	8 112	9 409	8 108	14 641	6 511
Average export prices	CZK/t	–	14 545	14 069	9 738	14 430

720211; 720219 – Ferro-manganese

		2009	2010	2011	2012	2013
Import	t	23 642	26 259	25 281	24 834	22 830
Export	t	5 257	2 617	1 704	1 776	2 107

720211; 720219 – Ferro-manganese

		2009	2010	2011	2012	2013
Average import prices	CZK/t	26 432	29 897	26 716	24 121	23 545
Average export prices	CZK/t	23 525	30 899	26 007	23 740	18 578

720230 – Ferrosilicomanganese

		2009	2010	2011	2012	2013
Import	t	34 425	39 793	45 035	39 572	45 719
Export	t	1 892	4 560	1 754	3 711	4 676

720230 – Ferrosilicomanganese

		2009	2010	2011	2012	2013
Average import prices	CZK/t	23 992	26 142	24 500	24 025	22 286
Average export prices	CZK/t	22 137	25 774	23 404	23 940	21 799

8111 – Manganese and articles thereof, including waste and scrap

		2009	2010	2011	2012	2013
Import	t	2 229	1 014	911	521	629
Export	t	177	6	24	12	34

8111 – Manganese and articles thereof, including waste and scrap

		2009	2010	2011	2012	2013
Average import prices	CZK/t	47 027	60 893	62 416	60 980	55 899
Average export prices	CZK/t	52 096	58 599	65 337	79 561	39 706

2820 – Manganese oxides

		2009	2010	2011	2012	2013
Import	t	1 347	2 146	1 107	1205	962
Export	t	331	44	55	218	24

2820 – Manganese oxides

		2009	2010	2011	2012	2013
Average import prices	CZK/t	22 542	22 605	22 278	21 756	20 088
Average export prices	CZK/t	22 294	21 721	21 072	5 834	20 042

4. World production and world market prices

World mine production

The world´s primary production of manganese in mined ores in recent years was as follows:

	2009	2010	2011	2012	2013[e]
World mine production of manganese (according to MCS), kt	10 800	13 900	16 000	15 800	17 000
World mine production of manganese (according to WBD), kt	12 388	16 767	19 073	18 910	N

[e] – *preliminary values*

According to MCS, South Africa had the largest share of production in 2013, amounting to nearly one-fourth, followed by Australia and China with roughly one-fifth. The following is a list of the top ten producers of primary manganese in 2013 according to the MCS:

South Africa	22.4 %	India	5.0 %
Australia	18.2 %	Kazakhstan	2.3 %
China	18.2 %	Ukraine	2.1 %
Gabon	11.8 %	Malaysia	1.5 %
Brazil	8.2 %	Mexico	1.2 %

According to WBD, Ghana still ranked among the top ten in 2012 with a share of 2.8 % and Mexico was eleventh with 1.0 %.

Land-based reserves of manganese in ore are estimated at about 570 million tonnes. South Africa accounts for around 75 % of resources and Ukraine for about 10 %. The USA as well as Russia do not have any suitable manganese deposits and rely on imports. Manganese nodules on the sea floor represent practically limitless resources.

Prices of traded commodities

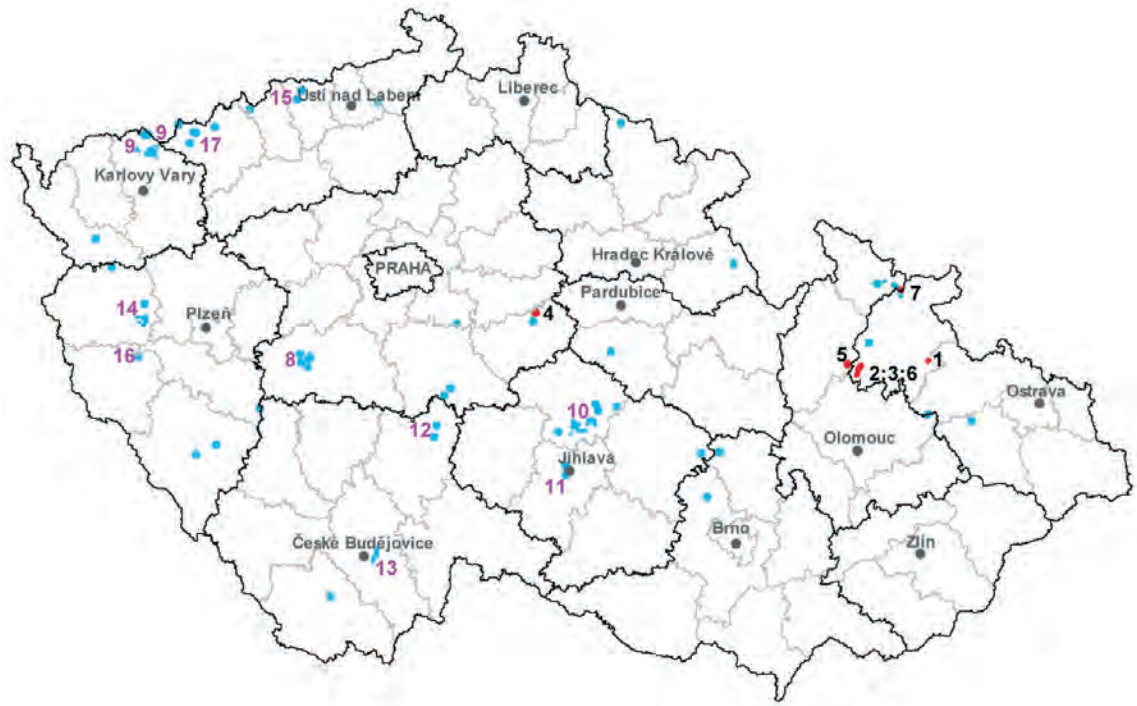
According to the summaries Deutschlend-Rohstoffsituation 2009–2013, the average world prices of manganese commodities in recent years were as follows:

Commodity/ Year		2009	2010	2011	2012	2013
Manganese, MB free market, in warehouse	USD/t	20 786.67	2 549.17	3 316.46	2 786.67	2 319.71
Metallurgical ore, 48–50 % Mn, max. 0.1 % P, FOB	USD/ /mtu	5.33	7.78	5.93	4.88	N
Ferro-Manganese, basis 78 % Mn, standard 7.5 % C, del. consumers´ works	EUR/t	905.42	1 081.25	970.83	909.38	769.88

Notice: mtu – metric ton unit; 1 mtu = 1 % = 10 kg Mn in 1 tonne of ore

Silver

1. Registered deposits and other resources of the Czech Republic



reserved registered deposits exhausted deposits and other resources

Registered deposits and other resources are not mined

Reserved registered deposits:

1 Horní Benešov
2 Horní Město
3 Horní Město-Šibenice
4 Kutná Hora
5 Oskava
6 Ruda u Rýmařova-sever
7 Zlaté Hory-východ

Exhausted deposits and other resources:

8 Příbram surroundings
9 Jáchymov surroundings
10 Havlíčkův Brod surroundings
11 Jihlava surroundings
12 Ratibořské hory + Stará Vožice
13 Rudolfov
14 Stříbro
15 Hrob + Mikulov
16 Nalžovské hory
17 Vejprty + Hora sv. Kateřiny

2. Basic statistical data of the Czech Republic as of December 31

Number of deposits; reserves; mine production

Year	2009	2010	2011	2012	2013
Deposits – total number [a)]	7	7	7	7	7
exploited	0	0	0	0	0
Total mineral *reserves, t Ag	532	532	532	532	532
economic explored reserves	0	0	0	0	0
economic prospected reserves	0	0	0	0	0
potentially economic reserves	532	532	532	532	532
Mine production, t Ag	0	0	0	0	0

** See **NOTE** in the chapter **Introduction** above on a terminological difference between Czech official application of the term reserves and standard international application of the term. The relationship of domestic and foreign classifications of mineral reserves and resources is described in the separate chapter **Mineral reserve and resource classification in the Czech Republic** of this yearbook*

[a)] Deposits with registered Ag content

Approved prognostic resources P_1, P_2, P_3
Ag metal in ores

Year		2009	2010	2011	2012	2013
P_1,	t	33	33	33	33	33
P_2,	t	4	4	4	4	4
P_3,		–	–	–	–	–

3. Foreign trade

261610 – Silver ores and concentrates

		2009	2010	2011	2012	2013
Import	kg	5 660	990 207	0	2	0
Export	kg	2	990 205	3	2	1

261610 – Silver ores and concentrates

		2009	2010	2011	2012	2013
Average import prices	CZK/kg	64	347	–	4 500	–
Average export prices	CZK/kg	6 000	357	11 667	11 000	37 000

7106 – Silver, unwrought or in semi-manufactured or powder form

		2009	2010	2011	2012	2013
Import	kg	163 482	430 226	1 499 355	147 233	868 439
Export	kg	78 127	75 352	270 147	184 987	433 090

7106 – Silver, unwrought or in semi-manufactured or powder form

		2009	2010	2011	2012	2013
Average import prices	CZK/g	4.49	2.40	0.78	9.22	1.69
Average export prices	CZK/g	9.87	13.02	12.30	15.38	5.72

4. World production and world market prices

World mine production

According to statistics, world production of primary silver in recent years was as follows:

	2009	2010	2011	2012	2013[e]
World mine production of silver (according to MCS), t	21 800	23 100	23 300	25 500	26 000
World mine production of silver (according to WBD), t	22 427	23 441	23 521	25 097	N

[e] – *preliminary values*

According to MCS, the share of production of individual countries in 2013 was as follows:

Mexico	20.8 %	Bolivia	4.6 %
China	15.4 %	Chile	4.6 %
Peru	13.5 %	Poland	4.4 %
Australia	6.5 %	USA	4.2 %
Russia	6.5 %	Canada	2.8 %

The USGS estimated world reserves at 520 kt of silver in ore. Polymetallic ores accounted for nearly two-thirds of that amount, and silver and gold-silver ores for the rest.

Prices of traded commodities

According to the German summaries Deutschland-Rohstoffsituation 2009–2013, the world silver price in USD/tr oz (1 tr oz (troy ounce) = 31.1035 g) in recent years was as follows:

Commodity/ Year	2009	2010	2011	2012	2013
99.5 %, in LME warehouse	14.65	20.115	35.11	31.15	23.83

Tin

1. Registered deposits and other resources of the Czech Republic

reserved registered deposits exhausted deposits and other resources

Registered deposits and other resources are not mined

1 Cínovec-jih	2 Krásno	3 Krásno-Horní Slavkov

2. Basic statistical data of the Czech Republic as of December 31

Number of deposits; reserves; mine production

Year	2009	2010	2011	2012	2013
Deposits – total number [a)]	3	3	3	3	4
exploited	0	0	0	0	0
Total mineral *reserves, t Sn	163 809	163 809	163 809	163 809	164 299
economic explored reserves	0	0	0	0	0
economic prospected reserves	0	0	0	0	0
potentially economic reserves	163 809	163 809	163 809	163 809	163 809
Mine production, t Sn	0	0	0	0	0

* *See* ***NOTE*** *in the chapter* ***Introduction*** *above on a terminological difference between Czech official application of the term reserves and standard international application of the term. The relationship of domestic and foreign classifications of mineral reserves and resources is described in the separate chapter* ***Mineral reserve and resource classification in the Czech Republic*** *of this yearbook*

[a)] *Sn-W ore deposits*

Approved prognostic resources P_1, P_2, P_3
Sn – W ores

Year		2009	2010	2011	2012	2013
P_1,	kt	2 195	2 195	2 195	2 195	2 195
P_2,		–	–	–	–	–
P_3,		–	–	–	–	–

3. Foreign trade

2609 – Tin ores and concretates

		2009	2010	2011	2012	2013
Import	t	0	101	0	0.002	N
Export	t	0	0.001	0	0	0.002

2609 – Tin ores and concretates

		2009	2010	2011	2012	2013
Average import prices	CZK/t	–	841	–	500 000	0
Average export prices	CZK/t	–	2 000 000	1 000	–	–

8001 – Unwrought tin

		2009	2010	2011	2012	2013
Import	t	569	449	652	631	1 449
Export	t	81	275	17	7	2 037

8001 – Unwrought tin

		2009	2010	2011	2012	2013
Average import prices	CZK/t	286 726	343 332	400 572	403 589	207 750
Average export prices	CZK/t	256 503	376 223	464 074	330 661	465 680

8002 – Tin waste and scrap

		2009	2010	2011	2012	2013
Import	t	90	4	5	0.4	1
Export	t	118	44	168	193	133

8002 – Tin waste and scrap

		2009	2010	2011	2012	2013
Average import prices	CZK/t	67 536	92 672	176 397	124 638	485 614
Average export prices	CZK/t	93 951	166 868	105 777	52 719	179 494

4. World production and world market prices

World mine production

World production of primary tin in recent years was as follows:

	2009	2010	2011	2012	2013[e]
World mine production of tin (according to MCS), kt	260	265	244	240	230
World mine production of tin (according to WBD), kt	295	345	333	248	N

[e] – *preliminary values*

According to MCS, China was the largest producer and Indonesia the largest exporter in 2013. The top ten producers´ shares of production (not including the unpublished data for the USA) were as follows:

China	43.5 %	Burma	5.2 %
Indonesia	17.4 %	Australia	2.6 %
Peru	11.3 %	Vietnam	2.3 %
Bolivia	7.8 %	Congo (Kinshasa)	1.7 %
Brazil	5.2 %	Malaysia	1.6 %

World reserves (not including the USA and others) are estimated at 4 700 kt.

Prices of traded commodities

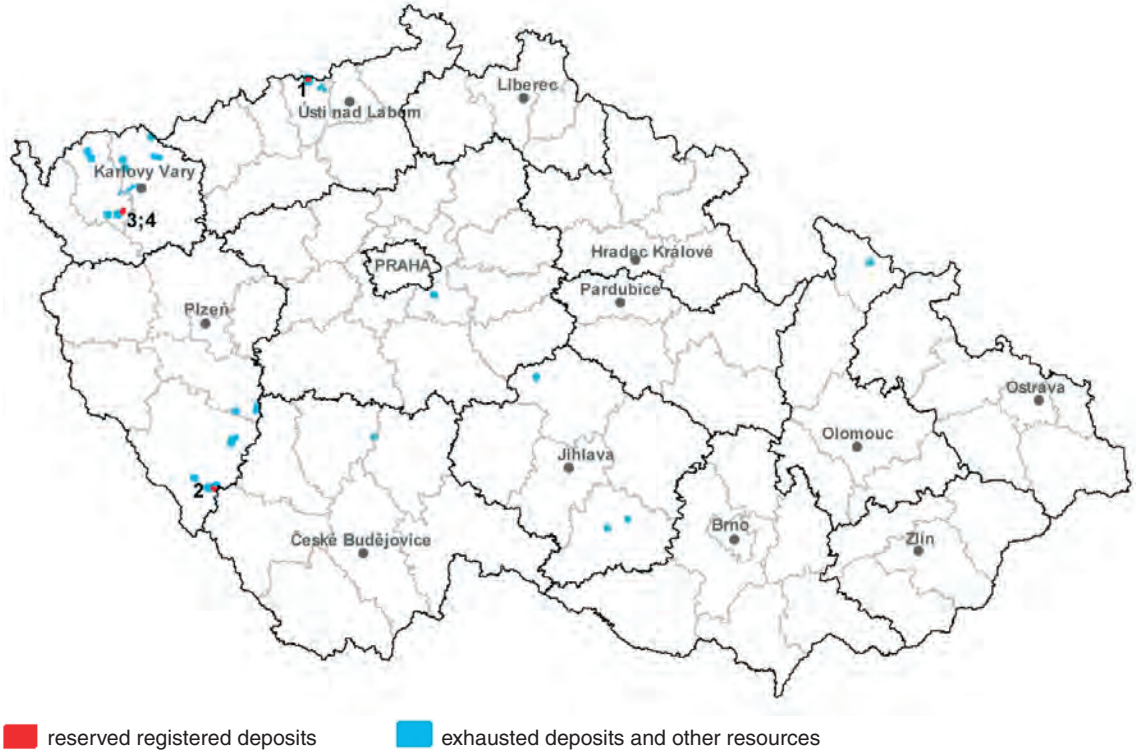
According to the summaries Deutshland-Rohstoffsituation 2009–2013 (D-R) and Metal Bulletin (MB), the world´s tin prices in USD/t were as follows:

Commodity/ Year	2009	2010	2011	2012	2013
Min. 99.85 %, in LME warehouse, cash (according to D-R)	13 561.62	20 396.10	25 687.41	21 104.01	N
LME cash (according to MB)	16 742.50–10 052.50	27 575.00–14 937.50	18 607.50–33 252.50	17 637.50–25 625.00	9 262.50–25 175.00
LME 3-month contract (according to MB)	16 795.00–9 950.00	27 350.00–15 000.00	18 700.00–33 210.00	17 675.00–25 700.00	19 300.00–25 750.00

The price range according to MB includes the lowest and highest monthly price quotes for a given year.

Tungsten

1. Registered deposits and other resources of the Czech Republic



Registered deposits and other resources are not mined

1 Cínovec-jih
2 Kašperské Hory
3 Krásno-Horní Slavkov
4 Krásno-Horní Slavkov

2. Basic statistical data of the Czech Republic as of December 31

Number of deposits; reserves; mine production

Year	2009	2010	2011	2012	2013
Deposits – total number [a)]	4	4	4	4	4
exploited	0	0	0	0	0
Total mineral *reserves, t W	70 253	70 253	70 253	70 253	70 253
economic explored reserves	0	0	0	0	0
economic prospected reserves	0	0	0	0	0
potentially economic reserves	70 253	70 253	70 253	70 253	70 253
Mine production, t W	0	0	0	0	0

** See **NOTE** in the chapter **Introduction** above on a terminological difference between Czech official application of the term reserves and standard international application of the term. The relationship of domestic and foreign classifications of mineral reserves and resources is described in the separate chapter **Mineral reserve and resource classification in the Czech Republic** of this yearbook*

[a)] Sn-W and W ore deposits

Approved prognostic resources P_1, P_2, P_3 W metal in ores

Year		2009	2010	2011	2012	2013
P_1,	t	3 252	3 252	3 252	3 252	3 252
P_2,	t	10 703	10 703	10 703	10 703	10 703
P_3,		–	–	–	–	–

3. Foreign trade

2611 – Tungsten ores and concentrates

		2009	2010	2011	2012	2013
Import	kg	0	73 660	292 634	799 328	100 090
Export	kg	0	0	0	0	20 000

2611 – Tungsten ores and concentrates

		2009	2010	2011	2012	2013
Average import prices	CZK/t	–	9	14	12	12
Average export prices	CZK/t	–	–	–	–	244

8101 – Tungsten and its products, including waste and scrap

		2009	2010	2011	2012	2013
Import	kg	13 458	259 357	369 249	969 114	506 720
Export	kg	25 106	208 928	612 381	1 012 962	1 111 635

8101 – Tungsten and its products, including waste and scrap

		2009	2010	2011	2012	2013
Average import prices	CZK/kg	2 624	534	978	699	803
Average export prices	CZK/kg	919	507	961	857	791

720280 – Ferro-tungsten and ferrosilicotungsten

		2009	2010	2011	2012	2013
Import	kg	34 092	42 732	83 918	39 116	14 701
Export	kg	8 550	7 412	22 201	5 214	6 592

720280 – Ferro-tungsten and ferrosilicotungsten

		2009	2010	2011	2012	2013
Average import prices	CZK/kg	406	491	520	546	698
Average export prices	CZK/kg	479	525	517	836	797

810196 – Tungsten wires

		2009	2010	2011	2012	2013
Import	kg	4 172 737	419 343	101 918	67 543	70 056
Export	kg	6 430	8 756	32 881	7 193	10 080

810196 – Tungsten wires

		2009	2010	2011	2012	2013
Average import prices	CZK/kg	36	475	1 766	3 134	2 429
Average export prices	CZK/kg	5 671	5 671	1 388	6 412	3 992

4. World production and world market prices

World mine production

World production of primary tungsten

	2009	2010	2011	2012	2013[e]
Mine production, kt (according to MCS)	61.3	68.8	73.1	75.7	71.0
Mine production, kt (according to WBD)	60.8	77.6	82.3	81.1	N

[e] – *preliminary values*

MCS data on world production of primary tungsten in 2013 does not include the USA. Production and exports were dominated by China. As a result of the Chinese government´s measures restraining exports, the market is experiencing a shortage of tungsten, which is leading to expanded exploration and production in various parts of the world, primarily in EU countries. According to MCS, the leading producers´ shares of the world´s primary tungsten production in 2013 were:

China	84.5 %	Bolivia	1.7 %
Russia	3.5 %	Austria	1.1 %
Canada	3.1 %	Portugal	1.1 %

The WBD ranked Vietnam fifth in 2011 and 2012, and Rwanda and Portugal sixth in 2012 and 2011, respectively. Accordting to this source, the top ten countries´ shares of world tungsten production in 2012 were:

China	83.4 %	Rwanda	1.3 %
Russia	4.6 %	Portugal	0.9 %
Canada	3.1 %	Austria	0.9 %
Bolivia	1.5 %	Spain	0.5 %
Vietnam	1.4 %	Brazil	0.5 %

According to MCS, world tungsten reserves are estimated at 3 500 kt, of which 54 % are in the territory of China, 4.1 % in Canada, 3.6 % in Russia, and 2 % in the USA.

Prices of traded commodities

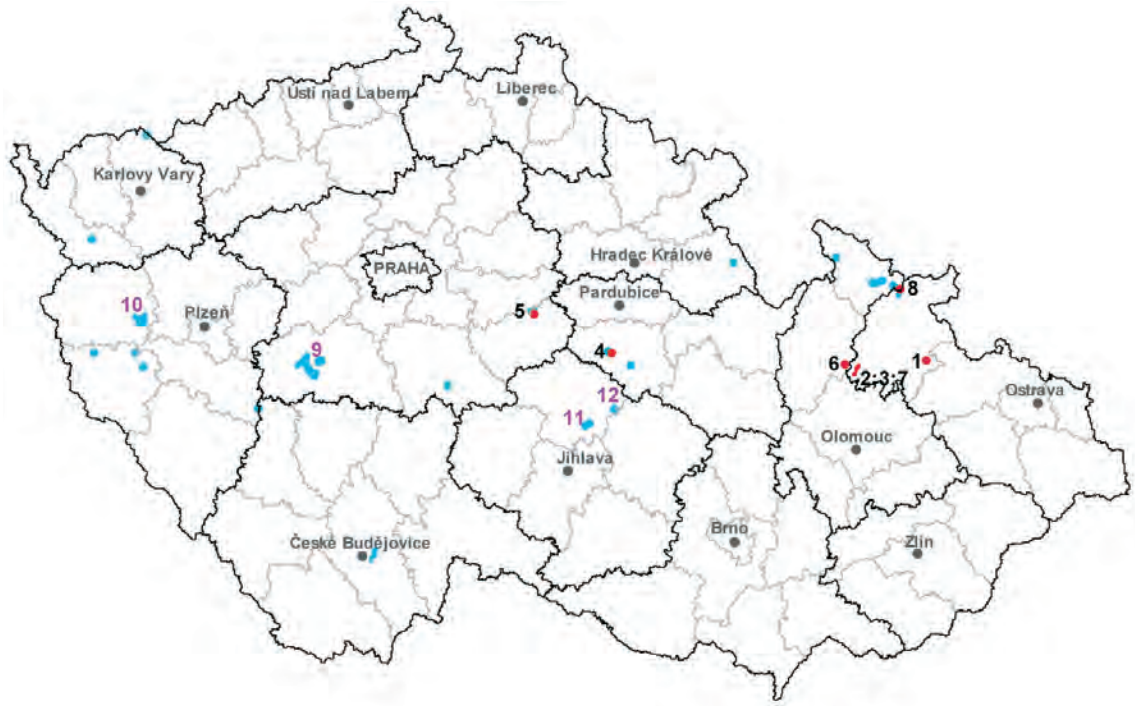
According to the summaries Deutschland-Rohstoffdsituation 2009–2013, world prices of tungsten commodities in recent years were as follows:

Commodity/ Year		2009	2010	2011	2012	2013
Concentrate, min. 65 % WO_3, CIF main European port	USD/ mtu WO_3	150.00	150.00	150.00	149.50	N
Ferro-Tungsten, basis min. 75 % W, in warehouse Rotterdam	USD/kg	26.71	31.48	48.69	48.67	45.37

Notice: mtu – metric ton unit; 1 mtu = 1% = 10 kg WO_3 in 1 tonne of concentrate

Zinc

1. Registered deposits and other resources of the Czech Republic



reserved registered deposits exhausted deposits and other resources

Registered deposits and other resources are not mined

Reserved registered deposits:

1 Horní Benešov	4 Křižanovice	7 Ruda u Rýmařova-sever
2 Horní Město	5 Kutná Hora	8 Zlaté Hory-východ
3 Horní Město-Šibenice	6 Oskava	

Exhausted deposits and other resources:

9 Březové Hory + Příbram + Bohutín	11 Havlíčkův Brod (Dlouhá Ves + Bartoušov + Stříbrné Hory)
10 Stříbro	12 Staré Ransko

2. Basic statistical data of the Czech Republic as of December 31

Number of deposits; reserves; mine production

Year	2009	2010	2011	2012	2013
Deposits – total number [a)]	9	8	8	8	8
exploited	0	0	0	0	0
Total mineral *reserves, kt Zn	477	472	472	472	472
economic explored reserves	0	0	0	0	0
economic prospected reserves	0	0	0	0	0
potentially economic reserves	477	472	472	472	472
Mine production, t Zn	0	0	0	0	0

** See **NOTE** in the chapter **Introduction** above on a terminological difference between Czech official application of the term reserves and standard international application of the term. The relationship of domestic and foreign classifications of mineral reserves and resources is described in the separate chapter **Mineral reserve and resource classification in the Czech Republic** of this yearbook*

[a)] Deposits with registered Zn content

3. Foreign trade

2608 – Zinc ores and concentrates

		2009	2010	2011	2012	2013
Import	t	1	5	37	3	4
Export	t	0,3	0,3	0,9	0,3	3

2608 – Zinc ores and concentrates

		2009	2010	2011	2012	2013
Average import prices	CZK/t	355 799	57 930	39 643	129 520	148 826
Average export prices	CZK/t	122 047	185 185	52 928	79 245	53 387

7901 – Unwrought zinc

		2009	2010	2011	2012	2013
Import	t	32 016	27 961	27 974	31 011	30 435
Export	t	19 987	6 245	5 146	7 407	13 137

7901 – Unwrought zinc

		2009	2010	2011	2012	2013
Average import prices	CZK/t	34 518	44 319	41 499	39 071	42 766
Average export prices	CZK/t	33 777	36 341	30 964	36 531	41 257

7902 – Zinc waste and scrap

		2009	2010	2011	2012	2013
Import	t	2 434	900	909	583	187
Export	t	2 717	4 800	4 189	4 452	3 375

7902 – Zinc waste and scrap

		2009	2010	2011	2012	2013
Average import prices	CZK/t	28 439	34 247	30 650	26 721	21 425
Average export prices	CZK/t	19 855	23 258	25 683	26 508	25 233

4. World production and world market prices

World mine production

World production of primary zinc in recent years was as follows:

	2009	2010	2011	2012	2013[e]
Mine production, kt (according to MCS)	11 200	12 000	12 800	13 500	13 500
Mine production, kt (according to WBD)	11 634	12 484	12 806	13 458	N

[e] – *preliminary values*

According to MCS, the shares of production in 2013 of the leading producers were as follows:

China	37.0 %	Mexico	4.4 %
Australia	10.4 %	Canada	4.1 %
Peru	9.6 %	Bolivia	3.0 %
India	5.9 %	Kazakhstan	2.7 %
USA	5.6 %	Ireland	2.4 %

The MCS etsimated world reserves at 250 million tonnes, of which 25% were accounted for by Australia, around 17% by China, and about 10% by Peru. Identified resources are estimated at 1.9 billion tonnes.

Prices of traded commodities

According to the summaries Deutschland-Rohstoffsituation 2009–2013 (D-R) and Metal Bulletin (MB), world zinc prices in USD/t were as follows:

Commodity/ Year	2009	2010	2011	2012	2013
Special high grade, min. 99.995 %, cash, in LME warehouse (according to D-R)	1 654.69	2 160.36	2 192.90	1 947.73	N
Zinc, LME cash (according to MB)	2 569.50– 1 059.25	2 634.25– 1 594.75	1 749.00– 2 545.25	1 759.25– 2 178.25–	1 783.75– 2 187.25
Zinc, LME 3-month contract (according to MB)	2 596.00– 1 088.00	2 660.00– 1 618.00	1 770.00– 2 574.00	1 756.50– 2 065.55	1 820.50– 2 214.00

The price range according to MB includes the lowest and highest monthly price quotes for a given year.

MINERALS MINED IN THE PAST WITHOUT RESOURCES AND RESERVES

Antimony

Foreign trade

261710 – Antimony ores and concentrates

		2009	2010	2011	2012	2013
Import	kg	37 021	53 035	69 054	89 009	48 174
Export	kg	0	0	0	0	N

261710 – Antimony ores and concentrates

		2009	2010	2011	2012	2013
Average import prices	CZK/kg	91	112	192	189	119
Average export prices	CZK/kg	–	–	6 000	–	N

8110 – Antimony and articles thereof, including waste and scrap

		2009	2010	2011	2012	2013
Import	t	54	75	64	31	42
Export	t	12	19	0.02	0.5	N

8110 – Antimony and articles thereof, including waste and scrap

		2009	2010	2011	2012	2013
Average import prices	CZK/t	98 434	141 136	263 697	283 072	216 831
Average export prices	CZK/t	117 657	143 763	238 095	339 623	N

World production and world market prices

World mine production

Trend in the world´s primary antimony production in 2009–2013

	2009	2010	2011	2012	2013[e]
Mine production of antimony, kt (according to MCS)	155	167	178	174	163
Mine production of antimony, kt (according to WBD)	129	150	149	163	N

[e] – *preliminary values*

China was by far the largest poducer of antimony ore and accounted for nearly 80 % of global production in 2013 (MCS). Russia ranked second with about 4 %. Other leading producers in 2013 were also Bolivia, Tajikistan and South Africa with shares of around 3 %.

According to MCS, world reserves are estimated at 1 800 kt, of which nearly 53 % is accounted for by China, around 19 % by Russia, 17.5 % by Bolivia. The MCS did not provide any data on US production and reserves of antimony ore.

Prices of traded commodities (USD/t) according to IM

Commodity/ Year	2009	2010	2011	2012	2013
Antimony trioxide, typically 99.5%, 5 tonne lots, CIF Antwerp/Rotterdam	N	N	12 000–14 600	8 750–12 850	9 000–1 000
Antimony trioxide, typically 99.5%, 20 tonne lots, FOB China	N	N	12 000–14 500	9 500–12 800	9 000–10 100
Antimony trioxide, min. 99.65%, ingot, CIF Rotterdam	N	N	N	10 000–13 700	9 950–12 500
Antimony trioxide, min. 99.65%, ingot, FOB China	N	N	N	11 200–17 000	9 550–10 800

The price range includes the lowest and highest monthly price quotes for a given year.

Arsenic

Foreign trade

280480 – Arsenic

		2009	2010	2011	2012	2013
Import	kg	232	56	19	27	6 032
Export	kg	0	0	0	0	0

280480 – Arsenic

		2009	2010	2011	2012	2013
Average import prices	CZK/kg	1 819	11 661	9 000	9 148	102
Average export prices	CZK/kg	–	–	–	–	–

World production and world market prices

World mine production

The world´s primary production of arsenic in recent years was as follows:

	2009	2010	2011	2012	2013[e]
World production of arsenic, kt (according to MCS)	54.4	52.8	45.8	46.7	45.0
World production of arsenic, kt (according to WBD)	49.4	54.2	47.8	53.5	N

[e] – *preliminary values*

According to MCS, the leading producers of arsenic trioxide in 2013 were:

China	55.6 %	Russia	3.3 %
Chile	22.2 %	Belgium	2.2 %
Morocco	15.6 %		

Other producers, whose production data was not provided, also include Bolivia, Japan, Portugal, Mexico and Peru. According to WBD, the following countries accounted for the world´s primary production of arsenic in 2012:

China	48.6 %	Russia	2.8 %
Chile	18.7 %	Belgium	1.9 %
Morocco	16.5 %	Philippines	0.8 %
Namibia	7.6 %	Bolivia	0.2 %
Kazakhstan	2.8 %	Iran	0.2 %

The MCS estimated global resources of arsenic contained in copper and lead ores at 11 million tonnes.

Prices of traded commodities

Metal Bulletin quoted prices as follow:

Commodity/ Year	2009	2010	2011	2012	2013
Arsenic, USD/lb	0.60–0.65	0.60–0.65	0.60–0.80	0.70–0.80	0.70–0.80

Note: lb – pound; 1 lb = 0,4536 kg

Cobalt

Foreign trade

2605 – Cobalt ores and concentrates

		2009	2010	2011	2012	2013
Import	kg	426	3 428	600	275	410
Export	kg	7 000	0	0	0	0

2605 – Cobalt ores and concentrates

		2009	2010	2011	2012	2013
Average import prices	CZK/kg	937	357	1 535	1 596	1 515
Average export prices	CZK/kg	43	–	–	–	–

8105 – Cobalt mattes and other intermediate products of cobalt metallurgy; cobalt and articles thereof, including waste and scrap

		2009	2010	2011	2012	2013
Import	t	220	60	60	74	60
Export	t	10	9	17	14	24

8105 – Cobalt mattes and other intermediate products of cobalt metallurgy; cobalt and articles thereof, including waste and scrap

		2009	2010	2011	2012	2013
Average import prices	CZK/t	167 820	939 289	1 038 238	910 368	938 381
Average export prices	CZK/t	706 335	694 102	567 321	479 832	648 369

World production and world market prices

World mine production

Statistical data on world cobalt production according to MCS (t)

	2009	2010	2011	2012	2013[e]
Mine production of cobalt (according to MCS)	72 300	89 500	109 000	103 000	120 000
Mine production of cobalt (according to WBD)	65 169	104 542	113 386	128 624	N

[e] – *preliminary values*

According to MCS statistics, the leading producers in 2013 were:

DR Congo (Kinshasa)	42.5 %	Zambia	4.3 %
Canada	6.7 %	Cuba	3.6 %
China	5.9 %	Brazil	3.3 %
Russia	5.6 %	New Caledonia	2.8 %
Australia	5.4 %	Morocco	1.8 %

According to MCS, world reserves of primary cobalt amount to 7 200 kt, of which around 50 % are in the DR Congo. Identified world terrestrial cobalt resources are estimated at 25 million tonnes.

Prices of traded commodities

Annual prices according to the summaries Deutschland-Rohstoffsituation

Commodity/ Year		2009	2010	2011	2012	2013
Cobalt, min. 99.8%, free market, in warehouse, Rotterdam	USD/kg	38.03	45.33	38.60	30.75	29.01

Iron

Foreign trade

2601 – Iron ores and concentrates

		2009	2010	2011	2012	2013
Import	t	4 809 745	5 936 926	7 365 406	5 866 844	6 268 059
Export	t	0.1	8	984	1 098	1 797

2601 – Iron ores and concentrates

		2009	2010	2011	2012	2013
Average import prices	CZK/t	1 752	2 469	2 657	2 686	2 566
Average export prices	CZK/t	N	14 740	16 266	17 640	18 232

7201 – Crude iron

		2009	2010	2011	2012	2013
Import	t	47 171	55 347	76 817	68 380	65 307
Export	t	24 040	65 473	45 652	82 771	82 515

7201 – Crude iron

		2009	2010	2011	2012	2013
Average import prices	CZK/t	6 825	8 924	10 222	9 551	9 462
Average export prices	CZK/t	6 575	9 550	10 285	8 585	8 190

7204 – Ferrous waste and scrap, remelted scrap ingots or iron or steel

		2009	2010	2011	2012	2013
Import	t	379 381	403 373	473 843	477 439	554 034
Export	t	1 443 523	1 823 724	2 056 046	2 052 360	1 911 717

7204 – Ferrous waste and scrap, remelted scrap ingots or iron or steel

		2009	2010	2011	2012	2013
Average import prices	CZK/t	4 540	6 048	7 489	7 845	7 193
Average export prices	CZK/t	4 870	7 840	7 840	7 472	6 807

World production and world market prices

World mine production

World production of iron ore in recent years according to published statistics

	2009	2010	2011	2012	2013[e]
World mine production of iron ore (according to MCS), mill t	2 240	2 590	2 940	2 930	2 950
World mine production of iron ore (according to WBD), mill t	1 110	1 283	1 411	1 408	N

[e] – *preliminary values*

According to MCS, the largest producers in 2013 were the following countries:

China	44.7 %	Ukraine	2.8 %
Australia	18.0 %	South Africa	2.3 %
Brazil	13.5 %	USA	1.8 %
India	5.1 %	Canada	1.4 %
Russia	3.5 %	Venezuela	1.0 %

The MCS point out that the data for China are based on the production of crude ore, rather than usable ore, as reported for other countries. There is a considerable discrepancy between the numbers of both statistics due to different methods of calculating the iron content of mined ores. This is confirmed by the fact that there is a correspondence in the discrepancy, which in terms of global production in 2012 amounts to 108 % and is nearly identical with the difference of 113 % in terms of the total production for the top ten countries. A corresponding difference amounting to 110 % also exists in the case of reserves, which the MCS list under separate columns for crude ore and iron content, amounting to 170 000 million tonnes of crude ore with a total iron content of 81 000 million tonnes, i.e. 48 % Fe. According to MCS, world resources are estimated at more than 230 billion tonnes of iron contained in more than 800 billion tonnes of crude ore, which represents an iron content of only 29 %.

Prices of traded commodities

Average annual prices of iron ore according to the summaries Deutschland-Rohstoffsituation

Commodity/ Year		2008	2009	2010	2011	2012
Iron ore, Hamersley fines, 64 % Fe, contract price, FOB Australia/Japan	USc/mtu	108.90	N	N	N	N
Iron ore, CVRD fines (SSF), 64.5 % Fe, FOB Europe	USc/mtu	105.20	N	N	N	N
Iron ore, fines, 63.5 % Fe, spot price, CFR China	USD/t	N	152.37	175.22	133.80	N
Iron ore, any origin, spot price, MBA (according to the World Bank)	USD/dmt	N	N	135.55–187.18*	99.47–147.64*	114.82–154.64*

*Notes: * The price range includes the lowest and highest monthly price quotes for a given year.*
mtu – metric ton unit; 1 mtu = 1% = 10 kg Fe in ore
dmt – dry metric ton

Spot prices of iron ore according to Platts Market Data (USD/dmt)

Commodity/ Year	2011	2012	2013
Iron ore, any origin	135.54–187.18	99.47–147.64	114.82–154.64

The price range includes the lowest and highest monthly price quotes for a given year.

In view of the fact that the leading importers of iron ore are China, Japan and South Korea and the main suppliers Australia (the companies BHP Billiton, RTZ, FMG) and Brazil (Vale DR), vast amounts of iron ore, pellets and concentrates are transported by sea. In 2012, sea transport of iron ore exceeded 1 billion tonnes for the first time. It surpassed 1.1 billion tonnes in 2013.

Mercury

Foreign trade

280540 – Mercury

		2009	2010	2011	2012	2013
Import	kg	4 319	2 561	4 385	2 676	3 260
Export	kg	6 521	1 241	19	141	129

280540 – Mercury

		2009	2010	2011	2012	2013
Average import prices	CZK/kg	247	162	356	213	581
Average export prices	CZK/kg	993	598	770	830	1 124

World production and world market prices

World mine production

World mine production of mercury (t)

	2009	2010	2011	2012	2013[e]
World mine production of mercury (according to MCS)	1 920	2 250	2 010	1 810	1 810
World mine production of mercury (according to WBD)	1 916	3 955	3 887	1 850	N

[e] – *preliminary values*

The MCS listed world reserves of primary mercury at 94 kt and did not take into account the reserves of Spain´s Almaden Mine in particular, which by far exceed the reserves at other global deposits. World resources of primary mercury were estimated at 600 kt.

Prices of traded commodities

Annual prices according to the summaries Deutschland-Rohstoffsituation

Commodity/ Year		2009	2010	2011	2012	2013
Mercury, min. 99.99%, free market, in warehouse	USD/ flask	619.37	1 000.49	1 656.71	2 701.27	3 438.89

A flask of mercury is the equivalent of 34 kg.

Sulphur

Foreign trade

2503 – Sulphur of all kinds, other than sublimed, precipitated and colloidal

		2009	2010	2011	2012	2013
Import	t	20 986	14 761	14 947	3 848	54 002
Export	t	20 153	12 227	949	1 852	9 195

2503 – Sulphur of all kinds, other than sublimed, precipitated and colloidal

		2009	2010	2011	2012	2013
Average import prices	CZK/t	5 703	9 314	11 068	14 777	5 020
Average export prices	CZK/t	765	977	4 886	4 078	1 494

2802 – Sulphur, sublimed or precipitated; colloidal sulphur

		2009	2010	2011	2012	2013
Import	t	71 032	82 355	93 461	39 458	27 869
Export	t	83	429	316	253	N

2802 – Sulphur, sublimed or precipitated; colloidal sulphur

		2009	2010	2011	2012	2013
Average import prices	CZK/t	602	1 136	2 684	3 384	2 845
Average export prices	CZK/t	51 361	11 813	19 335	35 541	N

2807 – Sulphuric acid

		2009	2010	2011	2012	2013
Import	t	33 519	34 206	35 531	25 480	68 076
Export	t	56 145	43 778	46 371	45 123	29 465

2807 – Sulphuric acid

		2009	2010	2011	2012	2013
Average import prices	CZK/t	1 055	1 379	1 421	2 121	1 819
Average export prices	CZK/t	1 091	1 743	1 896	1 707	1 759

World production and world market prices

World mine production

World production of sulphur, primarily from the processing of liquid and gaseous hydrocarbons, has over the years had an upward trend. The trend in recent years was as follows:

	2009	2010	2011	2012	2013[e]
World sulphur production (according to MCS), kt	67 900	68 100	70 500	68 100	69 000
World sulphur production (according to WBD), kt	59 868	61 947	61 200	66 346	N

[e] – *preliminary values*

The following is a list of the top ten producers in 2013:

China	14.5 %	Germany	5.5 %
USA	13.2 %	Japan	4.8 %
Russia	10.6 %	Kazakhstan	3.9 %
Canada	8.7 %	United Arab Emirates	2.9 %
Saudi Arabia	5.9 %	Iran	2.8 %

Reserves of sulphur in crude oil, naural gas and sulphide ores are large. As a result of the processing of crude oil and sulphides in industrial countries with limited mineral resources, production of sulphur is not strongly dependent on sulphur reserves (e.g. Germany). According to MCS, resources of elemental sulphur in evaporite and volcanic deposits and sulphur in the deposits of natural gas, crude oil, tar sands and sulphides amount to around 5 billion tonnes. The sulphur in gypsum and anhydrite is practically limitless. The MCS estimated that about 600 billion tonnes of sulphur is contained in coal and oil shale.

Prices of US sulphur USD/lt according to INTER-CHEM

Commodity/ Year	2009	2010	2011	2012
Alberta M. T. FOB	10–20	N	45	60–70
US West coast FOB	3–15	30–85	180–192	162,50–185
Houston del	5–15	75–145	170–205	145–157
Nola FOB	1–19	79–134	174–209	145–169
Florida, contract del	5–30	90–160	185–220	160–180
Tampa, spot FOB	20–80	N	230	165

Note: 1 lt (long ton) = 1.016 tonne

MINERALS UNMINED IN THE PAST WITH RESOURCES AND RESERVES

Lithium, rubidium and cesium

Registered deposits and other resources of the Czech Republic

reserved registered deposits

The registered deposit is not exploited

1 Cínovec-jih*	2 Krásno-Koník

Note:
** Deposit of also potentially economic reserves of Sn-W ores and contents of Ta and Nb in experimental concentrates*

Basic statistical data of the Czech Republic as of December 31

Number of deposits; reserves; mine production

Year	2009	2010	2011	2012	2013
Deposits – total number	1	1	1	1	1
Exploited	0	0	0	0	0
Total *reserves, t Li	112 775	112 775	112 775	112 775	112 775
economic explored reserves	0	0	0	0	0
economic prospected reserves	0	0	0	0	0
potentially economic reserves	112 775	112 775	112 775	112 775	112 775
Mine production, t Li	0	0	0	0	0

** See **NOTE** in the chapter **Introduction** above on a terminological difference between Czech official application of the term reserves and standard international application of the term. The relationship of domestic and foreign classifications of mineral reserves and resources is described in the separate chapter **Mineral reserve and resource classification in the Czech Republic and its evolutional comparison with international classifications** of this yearbook*

In the Czech Republic, it is possible to consider the entire Krušné hory Mts. as a lithium province. Around 300 million tonnes of ore with elevated lithium contents were identified in Cínovec and its surroundings alone. As for the potentially economic deposit of tin-tungsten ores of Cínovec-jih, 112,775 tonnes of lithium in 53.4 million tonnes of ore with an average lithium content of 0.117 % are recorded in the *Balance of Reserves of Reserved Mineral Deposits of the Czech Republic*. In addition, byproduct amounts of 56 kt of rubidium and 1.8 kt of cesium were also evaluated in this deposit. Beside the *Balance of Reserves of Reserved Mineral Deposits of the Czech Republic* Li reserves are estimated also at former deposits Cínovec-sever-lomová těžba (79 kt), Cínovec-starý závod (3.8 kt), Vernéřov u Aše (15.2 kt) and Krásno-Koník (2 kt).

Brine reserves with anomalous bromine and lithium contents were calculated at 453.6 million m³ in the mining lease of the Slaný deposit of bituminous coal. These groundwater reserves contain 123 kt of bromine, 15 kt of lithium and more than 18 million tonnes of NaCl.

Foreign trade

280519 – Lithium, potassium, rubidium, cesium

		2009	2010	2011	2012	2013
Import	kg	39 422	21 566	20 383	232 363	65 388
Export	kg	205	0	117	1 097	1

280519 – Lithium, potassium, rubidium, cesium

		2009	2010	2011	2012	2013
Average import prices	CZK/kg	351	744	862	58	168
Average export prices	CZK/kg	122	–	316	39	2000

28369100 – Lithium carbonates

		2009	2010	2011	2012	2013
Import	kg	34 706	66 075	71 775	88 801	75 096
Export	kg	116	1 208	1 738	2 284	2 095

28369100 – Lithium carbonates

		2009	2010	2011	2012	2013
Average import prices	CZK/kg	130	118	121	131	129
Average export prices	CZK/kg	440	406	455	427	629

World production and world market prices

World mine production

World lithium production in recent years had an upward trend:

	2009	2010	2011	2012	2013[e]
World mine production of lithium (according to MCS), t	18 800	28 100	34 100	35 000	35 000
World production of lithium oxide (according to WBD), t	34 594	51 422	62 231	73 276	N

[e] – *preliminary value*

According to MCS, world lithium production (not including the USA) in 2013 was distributed as follows:

Chile	38.6 %	Zimbabwe	3.1 %
Australia	37.7 %	Portugal	1.6 %
China	11.4 %	Brazil	0.4 %
Argentina	8.6 %		

According to WBD, the USA ranked fifth in 2015 with a 4.1% share of production. WBD statistics did not include Zimbabwe among lithium producers in 2012 at all. Data on world production of rubidium and cesium were not provided. According to MCS, Zimbabwe produced small quantities of cesium as a by-product of the processing of lithium ores.

According to MCS, Chile accounted for nearly 58% and China for almost 27% of world lithium reserves, which totaled 13 million tonnes. Australia (7.7%) was next, followed by Argentina (6.5 %). Identified world resources of lithium, as listed in the MCS, amounted to 40 million tonnes, of which 9 million tonnes were accounted for by Bolivia, 7.5 million tonnes by Chile, and 6.5 million tonnes by Argentina. The resources of the USA and China were nearly identical, amounting to 5.5 and 5.4 million tonnes, respectively.

According to MCS, world reserves and resources of rubidium and cesium are unknown.

Prices of traded commodities containing lithium according to IM

Commodity/Year		2009	2010	2011	2012	2013
Petalite, 4.2% LiO_2, FOB Durban	USD/t	165–260	165–260	165–260	165–220	165–260
Spodumene concentrate, > 7.25 LiO_2, FOB West Virginia	USD/st	620–700	650–700	400–770	720–770	N
Spodumene, glass trade, 5% LiO_2, FBO West Virginia	USD/st	340–450	430–480	460–530	N	N
Spodumene concentrate, 5% LiO_2, CIF USA	USD/st	N	N	N	460–510	460–510
Spodumene concentrate. 7.5% LiO_2, CIF Europe	USD/t	N	N	N	750–800	750–800
Spodumene concentrate, > 7.5 % LiO_2, bulk, CIF Asia	USD/t	N	N	N	720–770	720–770*
Spodumene concentrate, 5% LiO_2, CIF Asia	USD/t	N	N	N	300–400	460–510*
Lithium carbonate, del continental, USA large contracts	USD/lb	2.8–3	2.3–2.4	2.3–2.4	2.5–3	3–3.5
Lithium hydroxide, 56.5–57.5% LiOH, large contracts, packed in drums or bags, CIF Europe or USA	USD/kg	N	N	N	6.5–7.5	5.5–7
Lithium hydroxide, Chinese (56.5-57.5% LiOH), packed in drums or bags, large contracts, CIF Europe	USD/kg	N	N	N	6–6.6	7–8

*Notices: * CIF USA v USD/st*

st – short ton; 1 st = 0.9072 tonne

lb – pound; 1 lb = 0.4536 kg

The price range includes the lowest and highest monthly price quotes for a given year

Molybdenum

Registered deposits and other resources in the Czech Republic; basic statistical data of the Czech Republic as of December 31

In the Czech Republic, 80 million tonnes of prognostic resources (unapproved) of molybdenum ores with an average molybdenum content of 0.176 %, i.e. 14 037 tonnes of molybdenum, were estimated in the Hůrky locality in the Čistá-Jeseník Massif (L. Kopecký 1983).

Foreign trade

81029400 – Unwrought molybdenum, including bars, rods obtained by simple sintering

		2009	2010	2011	2012	2013
Import	kg	15 060	8 555	18 393	4 649	3 359
Export	kg	4 443	3 160	14 409	213	936

81029400 – Unwrought molybdenum, including bars, rods obtained by simple sintering

		2009	2010	2011	2012	2013
Average import prices	CZK/kg	557	766	677	1 626	334
Average export prices	CZK/kg	649	824	695	643	601

World production and world market prices

World mine production

According to statistics, world production of primary molybdenum in 2009–2013 was as follows:

	2009	2010	2011	2012	2013[e]
World mine production of molybdenum (according to MCS), kt	221	242	264	259	270
World mine production of molybdenum (according to WBD), kt	226	242	254	254	N

[e] – *preliminary value*

According to MCS, the leading producers that accounted for global production in 2013 were:

China	40.1 %	Canada	3.3 %
USA	25.9 %	Armenia	2.4 %
Chile	13.5 %	Iran	2.3 %
Peru	6.3 %	Turkey	1.9 %
Mexico	4.1 %	Russia	1.7 %

The top three producers accounted for almost 80 % of the world´s molybdenum production. These three countries also have nearly 90 % of estimated world reserves, which amount to 11 million tonnes according to MCS. Identified resources are listed at 20 million tonnes, of which one-fourth are in the USA.

Prices of traded commodities

According to the summaries Deutschland-Rohstoffsituation 2009–2013, world prices of molybdenum commodities (USD/kg) in recent years were as follows:

Commodity/Year	2009	2010	2011	2012	2013
Ferro-Molybdenum, basis 65–70 % Mo, Europe, free market	27.48	40.13	38.32	31.41	25.87
Molybdic oxide, drummed, Europe, free market, in warehouse	25.34	35.07	34.32	28.16	22.80

Rare earths

Registered deposits and other resources in the Czech Republic; basic statistical data of the Czech Republic as of December 31

In the Czech Republic, there are descriptions of estimated resources (unapproved) of rare earth oxides from various mineralisations and geological formations. For example, the cerium content in uranium ores of uranium-bearing sandstone of the Stráž block in the Bohemian Cretaceous Basin was evaluated at 4,750 tonnes of cerium. Anomalous rare earth oxide contents are also assumed to occur in the Hůrky locality in the Čistá-Jeseník Massif (along with resources of Mo, Ta, Nb, Zr, and Hf), in alkaline volcanic rocks in the České Středohoří, in volcanic rocks of the Šternberk-Horní Benešov belt in the Nízký Jeseník Mts., in graphitic phyllites of the Železné Hory Mts. Proterozoic, in argillitised tuffs of the Upper Silesian Basin etc.

Foreign trade

28461000 – Cerium compounds

		2009	2010	2011	2012	2013
Import	kg	88 136	94 438	86 832	284 075	84 059
Export	kg	3 099	2 247	2 808	2 991	2 517

28461000 – Cerium compounds

		2009	2010	2011	2012	2013
Average import prices	CZK/kg	367	381	1 055	409	913
Average export prices	CZK/kg	512	933	1 366	1 259	1 249

28053010 – Rare earth metals, scandium and yttrium, intermixed or interalloyed

		2009	2010	2011	2012	2013
Import	kg	200	3 597	4 270	2 780	150
Export	kg	0	435	1 720	2 805	20

28053010 – Rare earth metals, scandium and yttrium, intermixed or interalloyed

		2009	2010	2011	2012	2013
Average import prices	CZK/kg	200	718	1 962	1 365	1 427
Average export prices	CZK/kg	–	423	1 982	1 484	2 050

28053090 – Rare earth metals, scandium and yttrium, not intermixed or interalloyed

		2009	2010	2011	2012	2013
Import	kg	29	11 698	30 428	139	375
Export	kg	2	1	3	3	2

28053090 – Rare earth metals, scandium and yttrium, not intermixed or interalloyed

		2009	2010	2011	2012	2013
Average import prices	CZK/kg	11 862	577	638	5 871	3 667
Average export prices	CZK/kg	159 000	1 000	2 000	1 333	7 000

World production and world market prices

World mine production

Statistical data on world production of rare earths for the past five years

	2009	2010	2011	2012	2013[e]
World mine production, t (according to MCS)	133 000	133 000	111 000	110 000	110 000
World production of concentrates, t (according to WBD)	132 244	122 140	100 261	103 942	N

[e] – *preliminary values*

In view of the close numbers, the content of rare earth oxides was taken into account in both cases. The MCS listed the top five largest producers for 2013:

China	90.9 %	Russia	2.2 %
USA	3.6 %	Australia	1.8 %
India	2.6 %		

According to WBD statistics, China´s share of production in 2012 was decisive, amounting to 91.4 %, followed by second-ranked Australia with 5.4 % and Russia in third with 2.1 %. The USA ranked fourth with a share of 0.8 %.

The MCS estimated world reserves at 140 million tonnes, of which 55 million tonnes are in China and 22 million tonnes in Brazil.

The MCS listed the data on the production of yttrium separately. Its production in recent years was as follows:

	2009	2010	2011	2012	2013[e]
World production of yttrium oxide, t	8 900	8 900	8 900	7 100	7 100

[e] – *preliminary values*

China was by far the largest producer in 2013 with a share of 98.6 %.

Prices of traded commodities

According to the summaries Deutschlad-Rohstoffsituation 2009–2013, world prices (USD/kg) of commodities with rare earths in recent years were as follows:

Commodity/Year	2009	2010	2011	2012	2013
Cerium oxide, 99 %, bulk, FOB China	N	20.17	98.44	24.97	7.90

According to Industrial Minerals, the prices of rare earth oxides (USD/kg) were as follows:

Commodity/Year		2009	2010	2011	2012	2013
Rare earth	Ce	3.2–4.60	3.2–53	52–90	16–21	4–6
oxides,	Dy	N	N	N	890–1000	310–350
min. 99 %,	Eu	450–495	490–610	3650–4300	2020–2300	700–900
large purchases,	La	5.2–8.0	5.80–53	50–95	15–21	4–6
FOB China	Nd	14.50–145	19.50–80	240–320	95–105	40–60
	Pr	14.50–145	19–76	85–235	95–105	75–90
	Sm	N	N	N	60–80	5–7

The price range includes the lowest and highest monthly price quotes for a given year.

Selenium, tellurium

Registered deposits and other resources in the Czech Republic; basic statistical data of the Czech Republic as of December 31

In the Czech Republic unapproved prognostic resources of Se, in the Zn-Pb-Cu deposit Zlaté Hory-západ, were evaluated tentatively at more than 13 tonnes (K. Stuchlíková – I. Frolíková 1988).

Foreign trade

280490 – Selenium

		2009	2010	2011	2012	2013
Import	kg	3 750	5 807	5 513	10 940	6 003
Export	kg	1 200	1 200	350	> 0	511

280490 – Selenium

		2009	2010	2011	2012	2013
Average import prices	CZK/kg	905	1 612	2 468	2 402	1 556
Average export prices	CZK/kg	887	1 694	2 471	> 2 000	1 705

28045090 – Tellurium

		2009	2010	2011	2012	2013
Import	kg	3	25	26	14	2
Export	kg	0	0	0	0	1

28045090 – Tellurium

		2009	2010	2011	2012	2013
Average import prices	CZK/kg	5 000	24 560	16 462	19 143	18 500
Average export prices	CZK/kg	–	–	–	–	48 000

World production and world market prices

World mine production

Statistical data on the production of selenium and tellurium are very fragmentary. The only data available in terms of a time series were provided by the WBD for tellurium in 2008–2012.

	2008	2009	2010	2011	2012
World production of tellurium according to WBD, t	226	242	254	254	N

In view of the fact that selenium and tellurium are by-products of the processing of copper ores, information on production and resources are based on the status of copper ore deposits. According to MCS, the largest producer of selenium in 2012 and 2013 was Japan, followed by Germany and Belgium. According to WBD, 2 175 tonnes of selenium were produced in 2012 and the leading producers were:

Germany	29.9 %	Kazakhstan	6.0 %
Japan	9.9 %	Sweden	4.6 %
Belgium	9.2 %	Mexico	4.4 %
Russia	6.7 %	Finland	4.3 %
Canada	6.6 %	Poland	4.1 %

The WBD lists the following five producers of tellurium for 2012:

USA	37.6 %	Canada	8.3 %
Japan	26.3 %	Sweden	5.3 %
Russia	22.6 %		

The MCS estimated world reserves of selenium at 120 kt, of which about 20 % are accounted for by China and roughly 17 % by Russia.

The MCS estimated world reserves of tellurium at 24 kt. Peru and the USA account for the biggest share, rougly 15 %.

Prices of global commodities

According to the summaries Deutschland-Rohstoffsituation 2009–2013, the average world prices of selenium (USD/kg) were as follows:

Commodity/Year	2009	2010	2011	2012	2013
Selenium, min. 99.5 %, free market	50.85	82.10	136.24	114.33	72.95

Some data in the summaries indicate that tellurium prices peaked in 2011, fluctuating around 350 USD/kg. In 2012, the world´s tellurium prices ranged between 100–300 USD/kg and between 100–140 USD/kg in 2013.

Tantalum, niobium

Registered deposits and other resources in the Czech Republic; basic statistical data of the Czech Republic as of December 31

In the Czech Republic, prognostic resources (unapproved) were evaluated at 3,238 tonnes in uranium deposits and uranium-bearing sandstone of the Stráž block in the Bohemian Cretaceous Basin (along with TR, Zr and Hf), and another 568 tonnes in the Hůrky locality in the Čistá-Jeseník Massif (along with Mo, TR, Zr and Hf), where 57 tonnes of prognostic tantalum resources were also calculated. Recoverable contents of tantalum and niobium are also known to occur in tungsten and tin concentrates, which were recovered experimentally during the exploration of the tin-tungsten ore deposit of Cínovec-jih (along with Li, Rb and Cs).

Foreign trade

26159010 – Tantalum and niobium ores and concentrates

		2009	2010	2011	2012	2013
Import	kg	0	0	100	20 122	2 604
Export	kg	0	0	0	19 878	75

26159010 – Tantalum and niobium ores and concentrates

		2009	2010	2011	2012	2013
Average import prices	CZK/kg	–	–	120	425	91
Average export prices	CZK/kg	–	–	–	421	61

810320 – Unwrought tantalum

		2009	2010	2011	2012	2013
Import	kg	105 657	240 040	173 469	145 368	184 971
Export	kg	50 096	76 647	79 048	60 940	81 263

810320 – Unwrought tantalum

		2009	2010	2011	2012	2013
Average import prices	CZK/kg	7 348	8 426	11 710	10 935	9 530
Average export prices	CZK/kg	6 839	6 642	5 972	8 830	9 528

World production and world market prices

World mine production

World production of tantalum and niobium in 2009–2013 was as follows:

	2009	2010	2011	2012	2013[e]
World production of tantalum (according to MCS), t	665	681	767	670	786
World production of niobium (according to MCS), t	62 900	62 900	63 400	87 969	59 400

	2009	2010	2011	2012	2013[e]
World production of tantalum (according to WBD), t	976	772	786	934	N
World production of niobium (according to WBD), t	93 498	67 979	69 580	87 969	N

[e] – *preliminary values*

According to WBD, the largest producers of niobium in 2012 were:

Brazil	93.5 %	DR Congo	0.22 %
Canada	5.5 %	Rwanda	0.2 %
Russia	0.51 %		

According to MCS, Brazil accounted for 88.2 % and Canada for 9.8 % of world niobium production in 2013.

As published by the WBD, the leading producers of tantalum in 2012 were:

Rwanda	28.2 %	Nigeria	8.4 %
DR Congo	21.5 %	Russia	3.2 %
Brazil	12.6 %	Mozambique	2.6 %
Ethiopia	12.6 %	Bolivia	1.4 %
Burundi	8.6 %	Malaysia	1.0 %

With regard to tantalum production in 2013, the MCS ranked Rwanda (31.8 %) in first place as well. DR Congo (18.6 %) was next, followed by Mozambique (14.6 %), Brazil (12.4 %) and China (7.6 %). World tantalum (identified) resources are reported to about 260 ths t Ta (USGS 2012 Minerals Yearbook) and reserves of niobium in leading world producers to 4 100 ths t in Brazil and 200 ths t in Canada (MCS 2014).

Prices of traded commodities

	2009	2010	2011	2012	2013
Tantalite ore, USD/t Ta_2O_5*	81–99	81	84–245	207–273	273–178
Ferroniobium, USA import, USD/t**	37 298	37 781	41 825	43 658	44 000

* – *based on InfoMine.com and MetalPrices.com charts*

** – *MCS data*

Zirconium, hafnium

Registered deposits and other resources in the Czech Republic; basic statistical data of the Czech Republic as of December 31

In the Czech Republic, prognostic resources of zirconium and hafnium in uranium ores in uranium deposits of uranium-bearing sandstone of the Stráž block in the Bohemian Cretaceous Basin (along with TR, Ta, Nb) were estimated at 71,800 tonnes of zirconium and 2,520 tonnes of hafnium. Another 122,370 tonnes of zirconium and 2,446 tonnes of hafnium are assumed to occur in fenites in the Hůrky locality in the Čistá-Jeseník Massif (along with Mo, TR, Ta, Nb). All the resources are unapproved.

Foreign trade

26151000 – Zirconium ores and concentrates

		2009	2010	2011	2012	2013
Import	kg	268 062	308 098	959 101	595 291	684 598
Export	kg	2	0	5 000	7 360	7 213

26151000 – Zirconium ores and concentrates

		2009	2010	2011	2012	2013
Average import prices	CZK/kg	28	38	47	69	55
Average export prices	CZK/kg	0	–	63	78	53

81129210 – Unwrought hafnium, hafnium waste and scrap, hafnium powders

		2009	2010	2011	2012	2013
Import	kg	450	8	2	0	N
Export	kg	0	0	0	0	N

81129210 – Unwrought hafnium, hafnium waste and scrap, hafnium powders

		2009	2010	2011	2012	2013
Average import prices	CZK/kg	109	12 875	27 500	–	N
Average export prices	CZK/kg	–	–	–	–	N

World production and world market prices

World mine production

Statistical data on zirconium production provided by the MCS

	2009	2010	2011	2012	2013[e]
World production, kt	1 160	1 250	1 620	1 460	1 440

[e] – *preliminary values*

The largest producers in 2013 were Australia with a share of 41.6 %, South Africa in second place with 25 %, and China third with 9.7 %.

The USGS estimated world reserves at 67 million tonnes, of which nearly two-thirds are in Australia. Quantitative estimates of world resources of both elements were not available.

Prices of traded commodities

The average annual prices of zircon in USD/t (according to the summaries Deutschland-Rohstoffsituation 2009–2013) were as follows:

Commodity/Year	2009	2010	2011	2012	2013
Zircon, standard, bulk shipments, FOB Australia	875.83	850.21	1 720.83	2 393.75	1 375.00

The following prices (USD/t) were provided by Industrial Minerals:

Commodity/Year	2009	2010	2011	2012	2013
Zircon, bulk shipments, standard, FOB Australia	825–900	850–950	900–2 600	2 000–2 150	1 250–1 550
Zircon, bulk shipments, premium, FOB Australia	875–950	800–1 050	1 100–2 640	2100–2 300	1 350–1 550
Zircon, bulk shipments, standard, FOB USA	775–860	830–890	850–2 750	2 550–2 750	2 550–2 750
Zircon, bulk shipments, premium, FOB USA	775–990	880–1 020	950–3 000	2 600–3 000	2 600–3 000
Zircon, ceramic grade, bulk shipments, FOB South Africa	750–880	825–890	1 100–2 650	2 300–2 650	2 300–2 650
Micronised zircon, 99.5 % < 4 µ, average particle size < 0,95 µ, C&F Asia	1 415–1 465	1 100–1 445	2 750–2 800	2 750–2 800	2 750–2 800
Fused zirconia, monoclinic, refractory/abrasive, contract price, CIF main European port	4 100–4 400	4 100–5 200	6 500–7 800	6 500–7 800	6 500–7 800
Fused zirconia, monoclinic, ceramic pigment grade, contract price, CIF main European port	N	N	N	3 800–4 800	3 800–4 800
Fused zirconia, monoclinic, structural ceramic/electronic grade, contract price, CIF main European port	N	N	N	4 600–6 000	4 600–6 000
Fused zirconia, monoclinic, technical ceramic grade, contract price, CIF main European port	N	N	N	15 900–21 000	15 900–21 000
Fused zirconia, stabilised, refractory grade, contract price, CIF main European port	N	N	N	6 500–7 800	6 500–7 800
Fused zirconia, stabilised, technical ceramic grade, contract price, CIF main European port	N	N	N	5 000–10 000	5 000–10 000
Zircon opacifier, micronised, 100 % < 6 microns, average 1–2 microns, bagged, CFR Asia	N	N	N	2 845–3 400	2 845–3 400
Zircon opacifier, micronised, 100 % < 6 microns, average 1–2 microns, bagged, ex-works Europe	N	N	N	2 770–3 400	2 770–3 400
Baddeleyite, ceramic grade (98 % $ZrO_2 + HfO_2$), contract price, CIF main European port	3 000–3 300	3 000–3 300	N	3 000–3 300	3 000–3 300
Baddeleyite, refractory/abrasive grade, contract price, CIF main European port	2 500–3 100	2 500–3 100	N	2 500–3 100	2 500–3 100
Baddeleyite, ceramic pigment grade, contract price, CIF main European port	N	N	N	3 200–3 500	3 200–3 500

Notices: micron (µ) – micrometre (µm); 1 µm = 1/1 000 000 m

The price range includes the lowest and highest monthly price quotes for a given year.

MINERALS UNMINED IN THE PAST WITHOUT RESOURCES AND RESERVES

INDUSTRIAL MINERALS

Andalusite, kyanite, sillimanite, mullite

Foreign trade

250850 – Andalusite, kyanite and sillimanite

		2009	2010	2011	2012	2013
Import	t	4 227	3 682	4 089	4 451	7 986
Export	t	1	2	10	16	3

250850 – Andalusite, kyanite and sillimanite

		2009	2010	2011	2012	2013
Average import prices	CZK/t	10 451	10 114	10 440	10 681	9 925
Average export prices	CZK/t	14 286	19 512	29 110	10 816	31 343

250860 – Mullite

		2009	2010	2011	2012	2013
Import	t	502	776	829	612	1 152
Export	t	0.7	0.4	28	140	0.4

250860 – Mullite

		2009	2010	2011	2012	2013
Average import prices	CZK/t	29 097	23 495	23 726	19 688	23 773
Average export prices	CZK/t	22 069	40 000	12 532	25 015	57 778

Asbestos

Foreign trade

2524 – Asbestos

		2009	2010	2011	2012	2013
Import	t	0	3	2	1	10
Export	t	0	0	0	0	0

2524 – Asbestos

		2009	2010	2011	2012	2013
Average import prices	CZK/t	868 853	10 333	20 000	572 398	1 057 745
Average export prices	CZK/t	–	–	–	–	–

Magnesite

Foreign trade

251910 – Natural magnesium carbonate (magnesite)

		2009	2010	2011	2012	2013
Import	t	3 460	7 108	4 579	5 270	3386
Export	t	10	8	4	0.003	0.006

251910 – Natural magnesium carbonate (magnesite)

		2009	2010	2011	2012	2013
Average import prices	CZK/t	4 498	5 426	7 534	5 938	3 798
Average export prices	CZK/t	189 740	200 870	68 241	153 846	607 143

251990 – Magnesia*, fused, dead-burned, other magnesium oxides

		2009	2010	2011	2012	2013
Import	t	38 046	38 891	40 982	43 239	46 433
Export	t	3 718	3 803	7 093	5 998	4 691

*Note: * – MgO*

251990 – Magnesia*, fused, dead-burned, other magnesium oxides

		2009	2010	2011	2012	2013
Average import prices	CZK/t	8 434	8 771	8 329	12 482	8 712
Average export prices	CZK/t	8 131	10 501	9 457	9 995	10 808

*Note: * – MgO*

Perlite

Foreign trade

25301010 – Perlite

		2009	2010	2011	2012	2013
Import	t	4 528	0	0	0	N
Export	t	114	0	0	0	N

25301010 – Perlite

		2009	2010	2011	2012	2013
Average import prices	CZK/t	3 966	–	–	–	N
Average export prices	CZK/t	44 716	–	–	–	N

Rock salt

Foreign trade

2501 – Salt (inclusive table and denaturated salt), and pure sodium chloride; also in water solution

		2009	2010	2011	2012	2013
Import	t	711 503	960 330	865 911	564 702	1 046 592
Export	t	40 055	51 290	41 680	25 882	79 400

2501 – Salt (inclusive table and denaturated salt), and pure sodium chloride; also in water solution

		2009	2010	2011	2012	2013
Average import prices	CZK/t	1 459	1 480	1 439	1 562	1 386
Average export prices	CZK/t	3 133	2 900	3 152	4 304	2 902

Talc

Foreign trade

2526 – Natural steatite; talc

		2009	2010	2011	2012	2013
Import	t	9 406	9 570	12 754	8 826	9 749
Export	t	182	169	297	214	269

2526 – Natural steatite; talc

		2009	2010	2011	2012	2013
Average import prices	CZK/t	7 089	6 639	5 851	5 588	8 036
Average export prices	CZK/t	14 726	16 148	13 094	17 664	17 409

Other raw materials used in industrial fertilizers production

Foreign trade

3102 – Nitrogenous fertilizers

		2009	2010	2011	2012	2013
Import	t	429 687	556 146	652 708	645 779	691 551
Export	t	540 846	579 923	582 234	596 569	485 196

3102 – Nitrogenous fertilizers

		2009	2010	2011	2012	2013
Average import prices	CZK/t	4 426	4 388	5 599	6 102	6 265
Average export prices	CZK/t	4 678	4 010	5 593	5 922	5 717

2510 – Natural phosphates

		2009	2010	2011	2012	2013
Import	t	559	15 021	13 165	210	35
Export	t	817	1	0.1	0.1	1

2510 – Natural phosphates

		2009	2010	2011	2012	2013
Average import prices	CZK/t	7 242	4 802	7 251	19 871	13 057
Average export prices	CZK/t	27 807	N	55 944	8 000	18 723

2809 – Phosphoric oxides and acids

		2009	2010	2011	2012	2013
Import	t	3 328	3 091	3 289	6 172	4 557
Export	t	34 028	46 290	51 186	> 33 817	55 215

2809 – Phosphoric oxides and acids

		2009	2010	2011	2012	2013
Average import prices	CZK/t	20 132	20 068	19 504	10 753	11 293
Average export prices	CZK/t	17 621	14 054	16 446	≠16 458	17 698

3103 – Phosphatic fertilizers

		2009	2010	2011	2012	2013
Import	t	10 848	17 269	17 769	23 076	16 252
Export	t	895	1 098	920	275	304

3103 – Phosphatic fertilizers

		2009	2010	2011	2012	2013
Average import prices	CZK/t	6 375	6 419	7 963	9 141	8 033
Average export prices	CZK/t	5 735	8 948	14 261	16 532	20 036

3104 – Potassic fertilizers

		2009	2010	2011	2012	2013
Import	t	41 560	87 735	90 669	79 028	70 847
Export	t	7 027	4 234	4 707	3 861	3 322

3104 – Potassic fertilizers

		2009	2010	2011	2012	2013
Average import prices	CZK/t	14 129	7 949	8 843	9 587	9 320
Average export prices	CZK/t	15 532	19 122	19 349	21 026	27 249

3105 – Fertilizers containing several elements

		2009	2010	2011	2012	2013
Import	t	53 757	100 466	116 802	133 272	144 562
Export	t	17 494	18 031	15 497	17 263	7 117

3105 – Fertilizers containing several elements

		2009	2010	2011	2012	2013
Average import prices	CZK/t	9 446	8 713	10 677	11 835	10 980
Average export prices	CZK/t	9 445	8 214	11 141	11 595	23 527

METALLIC ORES

Aluminium

Foreign trade

2606 – Aluminium ores and concentrates

		2009	2010	2011	2012	2013
Import	t	9 875	33 795	32 555	27 514	24 765
Export	t	589	1	97	2	5

2606 – Aluminium ores and concentrates

		2009	2010	2011	2012	2013
Average import prices	CZK/t	3 386	2 973	3 172	4 000	4 000
Average export prices	CZK/t	14 321	31 915	6 420	616 758	37 960

281820 – Aluminium oxide (other than synthetic corundum)

		2009	2010	2011	2012	2013
Import	t	6 011	7 473	8 045	7 735	9 094
Export	t	3 069	3 785	97	4 069	5 389

281820 – Aluminium oxide (other than synthetic corundum)

		2009	2010	2011	2012	2013
Average import prices	CZK/t	21 717	21 361	22 542	23 206	21 695
Average export prices	CZK/t	6 385	6 464	8 499	10 199	7 863

281830 – Aluminium hydroxide

		2009	2010	2011	2012	2013
Import	t	6 493	9 534	10 062	8 893	9 574
Export	t	88	77	27	29	26

281830 – Aluminium hydroxide

		2009	2010	2011	2012	2013
Average import prices	CZK/t	9 329	7 034	7 013	9 631	9 752
Average export prices	CZK/t	13 036	15 120	21 611	18 527	15 749

7601 – Raw (unwrought) aluminium

		2009	2010	2011	2012	2013
Import	t	171 248	222 566	242 861	218 551	238 915
Export	t	59 988	51 489	53 610	60 943	65 007

7601 – Raw (unwrought) aluminium

		2009	2010	2011	2012	2013
Average import prices	CZK/t	37 064	46 311	49 495	46 776	45 057
Average export prices	CZK/t	33 487	45 935	48 020	44 291	44 984

7602 – Aluminium waste and scrap

		2009	2010	2011	2012	2013
Import	t	50 381	61 805	87 218	103 580	81 478
Export	t	49 145	71 562	89 711	86 004	56 311

7602 – Aluminium waste and scrap

		2009	2010	2011	2012	2013
Average import prices	CZK/t	20 709	31 521	32 354	30 937	30 213
Average export prices	CZK/t	22 742	32 565	32 593	29 862	27 634

Beryllium

Foreign trade

811212 – Unwrought beryllium, beryllium powders

		2009	2010	2011	2012	2013
Import	kg	0	1	0	0	3
Export	kg	0	0	0	0	N

811212 – Unwrought beryllium, beryllium powders

		2009	2010	2011	2012	2013
Average import prices	CZK/kg	–	2 000	–	–	49 000
Average export prices	CZK/kg	–	–	–	–	N

Bismuth

Foreign trade

81060010 – Unwrought bismuth, including waste and scrap, powders

		2009	2010	2011	2012	2013
Import	kg	50 557	94 522	267 387	108 014	83 334
Export	kg	51	17 945	2 295	4 172	2 885

81060010 – Unwrought bismuth, including waste and scrap, powders

		2009	2010	2011	2012	2013
Average import prices	CZK/kg	315	375	214	429	364
Average export prices	CZK/kg	686	277	392	310	324

81060090 – Wrought bismuth, articles of bismuth, excluding unwrought bismuth, waste, scrap and powders

		2009	2010	2011	2012	2013
Import	kg	2 142	11 452	1 708	2 691	19 319
Export	kg	407	1 087	1 188	> 221	6 414

81060090 – Wrought bismuth, articles of bismuth, excluding unwrought bismuth, waste, scrap and powders

		2009	2010	2011	2012	2013
Average import prices	CZK/kg	699	506	2 405	1 552	545
Average export prices	CZK/kg	1 484	1 339	2 183	≠ 8185	750

Cadmium

Foreign trade

810720 – Unwrought cadmium, cadmium powders

		2009	2010	2011	2012	2013
Import	kg	43	67	697	18 141	58
Export	kg	0	0	< 1	0	0

810720 – Unwrought cadmium, cadmium powders

		2009	2010	2011	2012	2013
Average import prices	CZK/kg	2 674	3 015	264	10	1 069
Average export prices	CZK/kg	–	–	1 000	–	–

Chromium

Foreign trade

2610 – Chromium ores and concentrates

		2009	2010	2011	2012	2013
Import	t	8 244	7 975	8 032	8 413	6 897
Export	t	369	764	1 410	1 061	839

2610 – Chromium ores and concentrates

		2009	2010	2011	2012	2013
Average import prices	CZK/t	9 191	9 164	11 210	10 255	9 752
Average export prices	CZK/t	5 912	4 336	7 534	7 088	7 225

811881 – Unwrought chromium

		2009	2010	2011	2012	2013
Import	kg	0	0	0	0	0
Export	kg	0	0	0	0	0

811881 – Unwrought chromium

		2009	2010	2011	2012	2013
Average import prices	CZK/kg	–	–	–	–	–
Average export prices	CZK/kg	–	–	–	–	–

Gallium

Foreign trade

81129289 – Unwrought gallium, gallium powders

		2009	2010	2011	2012	2013
Import	kg	9	4	11	4	3
Export	kg	1	0	0	0	0

81129289 – Unwrought gallium, gallium powders

		2009	2010	2011	2012	2013
Average import prices	CZK/kg	1 267	2 200	27 090	42 250	17 667
Average export prices	CZK/kg	2 300	–	–	–	–

Indium

Foreign trade

81129281 – Unwrought indium, indium powders

		2009	2010	2011	2012	2013
Import	kg	2	9	97	14	13
Export	kg	0	0	96	85	0

81129281 – Unwrought indium, indium powders

		2009	2010	2011	2012	2013
Average import prices	CZK/kg	1 500	9 556	12 990	5 786	14 767
Average export prices	CZK/kg	–	–	12 534	7 659	–

Magnesium

Foreign trade

810411 – Unwrought magnesium, containing at least 99.8 % by weight of magnesium

		2009	2010	2011	2012	2013
Import	t	892	1 992	1 449	12 456	2 056
Export	t	179	0,2	0	0,2	17

810411 – Unwrought magnesium, containing at least 99.8 % by weight of magnesium

		2009	2010	2011	2012	2013
Average import prices	CZK/t	55 579	55 849	57 946	64 644	59 244
Average export prices	CZK/t	72 226	215 569	–	84 000	95 705

810419 – Unwrought magnesium, containing less than 99.8 % by weight of magnesium

		2009	2010	2011	2012	2013
Import	t	545	754	647	7 615	719
Export	t	5 486	5 914	7 699	7 147	8 118

810419 – Unwrought magnesium, containing less than 99.8 % by weight of magnesium

		2009	2010	2011	2012	2013
Average import prices	CZK/t	95 232	87 246	85 681	94 541	93 410
Average export prices	CZK/t	55 809	47 030	48 092	52 691	60 197

Nickel

Foreign trade

2604 – Nickel ores and concentrates

		2009	2010	2011	2012	2013
Import	t	7	7	14	6	129
Export	t	180	254	268	20	151

2604 – Nickel ores and concentrates

		2009	2010	2011	2012	2013
Average import prices	CZK/t	319 651	400 000	376 438	464 688	310 710
Average export prices	CZK/t	N	N	3 407	352 128	314 198

7502 – Unwrought nickel

		2009	2010	2011	2012	2013
Import	t	2 165	2 560	3 757	2 799	2 367
Export	t	228	126	273	724	1 667

7502 – Unwrought nickel

		2009	2010	2011	2012	2013
Average import prices	CZK/t	386 745	450 766	432 625	368 258	317 661
Average export prices	CZK/t	230 220	352 907	471 424	318 601	284 929

Thallium

Foreign trade

811251 – Unwrought thallium

		2009	2010	2011	2012	2013
Import	kg	0	1	< 1	0	0
Export	kg	0	0	0	0	4

811251 – Unwrought thallium

		2009	2010	2011	2012	2013
Average import prices	CZK/kg	–	4 000	> 17 000	–	–
Average export prices	CZK/kg	–	–	–	–	2 750

Thorium

Foreign trade

28443061 – Thorium bars, rods, angles, shapes, sections, wire, sheets, strips

		2009	2010	2011	2012	2013
Import	kg	41 959	4	0	< 1	< 1
Export	kg	360	0	0	< 1	0

28443061 – Thorium bars, rods, angles, shapes, sections, wire, sheets, strips

		2009	2010	2011	2012	2013
Average import prices	CZK/kg	46	3 250	–	> 1 280 000	> 82 000
Average export prices	CZK/kg	47	–	–	> 354 000	–

28443069 – Thorium other, not crude, waste, scrap, bars, rods, shapes, wire, sheets

		2009	2010	2011	2012	2013
Import	kg	1	0	< 1	0	< 1
Export	kg	0	0	0	0	0

28443069 – Thorium other, not crude, waste, scrap, bars, rods, shapes, wire, sheets

		2009	2010	2011	2012	2013
Average import prices	CZK/kg	5 000	–	2 000	–	2 000
Average export prices	CZK/kg	–	–	–	–	–

28443099 – Thorium salts

		2009	2010	2011	2012	2013
Import	kg	0	0	0	1	1
Export	kg	0	0	0	0	0

28443099 – Thorium salts

		2009	2010	2011	2012	2013
Average import prices	CZK/kg	–	–	–	5 000	3 000
Average export prices	CZK/kg	–	–	–	–	–

Titanium

Foreign trade

2614 – Titanium ores and concentrates

		2009	2010	2011	2012	2013
Import	t	140 394	155 505	146 778	98 050	100 317
Export	t	452	2 378	504	684	758

2614 – Titanium ores and concentrates

		2009	2010	2011	2012	2013
Average import prices	CZK/t	3 395	3 236	3 876	7 947	6 467
Average export prices	CZK/t	20 254	5 935	23 369	55 468	48 398

8108 – Titanium and products of it, including waste and scrap

		2009	2010	2011	2012	2013
Import	t	925	1 030	1 341	1 723	1 886
Export	t	340	359	268	390	369

8108 – Titanium and products of it, including waste and scrap

		2009	2010	2011	2012	2013
Average import prices	CZK/t	564 007	541 650	645 106	507 213	464 455
Average export prices	CZK/t	110 433	90 892	133 014	139 101	255 165

Vanadium

Foreign trade

81129291 – Unwrought vanadium, vanadium powders, excluding waste and scrap

		2009	2010	2011	2012	2013
Import	kg	0	0	0	1	1 928
Export	kg	236		0	0	0

81129291 – Unwrought vanadium, vanadium powders, excluding waste and scrap

		2009	2010	2011	2012	2013
Average import prices	CZK/kg	–	–	–	4 000	285
Average export prices	CZK/kg	297	–	–	–	–

MINERAL COMMODITY SUMMARIES
OF THE CZECH REPUBLIC

2014 Yearbook

Published by the Czech Geological Survey
Prague 2014
Printed by the Czech Geological Survey
Klárov 131/3, 118 21 Praha 1
First edition, 396 pages
03/9 446-408-15

ISSN 1801-6707
ISBN 978-80-7075-883-0

The publication was supported by the financial contribution
from the Ministry of the Environment of the Czech Republic