Ministry of Industry and Trade of the Czech Republic
and
Ministry of Environment of the Czech Republic

The Raw Material Policy of the Czech Republic

in the Field of Mineral Materials and Their Resources

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Contents

Introduction

The raw material policy is a summary of all activities through which the state exerts its influence on the seeking and utilisation of domestic raw material resources (with respect to public interests and protection of natural, cultural and landscape values), and acquisition of raw materials from abroad with the intention to secure operation of the domestic economy.

The subject of the raw material policy includes fuels, ores, industrial and building materials from both primary and secondary sources. This policy does not deal with materials from renewable sources, such as water, timber, agricultural materials, etc. On the other hand it deals with secondary materials from the viewpoint of their influence on savings the primary raw materials as well as from the viewpoint of savings of energy spent on processing of the primary materials and their further utilisation. The raw material policy is directly related to energy policy and from the view of definition and solution of certain issues the two are closely connected.

A specific quality of raw materials is the impossibility to recover or move them. Utilisation of raw materials therefore requires a special regime, i.e. a certain extent of state regulation in the otherwise liberal market environment and definition of rules, scope and forms of regulatory measures intended to provide protection and secure sensitive utilisation of raw material resources available on the territory of the country, with respect to the importance of individual materials as well as the interests concerned and principles of sustainable development.

The intention of this paper is to analyse the present state, define goals and propose tools to achieve these goals. With respect to raw material predispositions, the current structure of the national economy is scrutinised and support for meticulous restructuralisation is expressed.

1. Definition of terms

Generally the term **raw material** is used for material input to production. As **mineral raw materials** all usable parts of the crust of the Earth besides water are considered. That does not reflect any ignorance of the growing strategic importance of water and its sources; on the other hand it is a proof that water requires a separate approach. **Primary materials** are natural materials and substances of organic and non-organic origin intended for further processing. **Secondary materials** are materials or substances obtained from waste that is fit for further utilisation. Aggregation of a mineral raw material is considered a **mineral source**. Such deposits are depleted by consumption yet a portion of the material content remains, e.g., in the form of a built house.

If a mineral source is explored and its reserves are quantified it becomes a **deposit**. In the terms of mining legislature, there are deposits of reserved and non-reserved minerals. **Reserved deposits** include deposits of **reserved minerals** that consist of all minerals with the exception of building stone, gravel and brick-materials that belong to **non-reserved minerals**. The state has in the past declared several industrially significant deposits of non-reserved minerals as reserved. Reserved deposits are **state owned**. Other deposits of non-reserved minerals, so-called non-reserved deposits of stone, gravel, and brick materials are **part of the land**. **Geological reserves** of deposits of reserved or non-reserved minerals are formed by the actual physical volume of the minerals in the original state. **Industrial reserves** are the reserves that can be utilised with the use of technologies available at the moment of termination of explorational works.

Besides their natural bases, the terms ”raw material” and ”source of raw material” have their economic and social meanings. From this viewpoint, the raw material and its source represent an economic category. The category reflects the human demand for raw materials in order to satisfy their need as well as the instability of the sources in time and space. In practice, that means that the same natural object is valued differently in varying social and economic circumstances (i.e., it either represents a usable source or not). It means that the main criteria for definition of raw materials and their sources are economic.

The state cares for the sensitive utilisation of natural sources and the protection of its mineral wealth. This principle is a transcript of the Article 7 of the Constitution of the Czech Republic. As **sensitive** such **utilisation of natural sources** is considered that employment of available modern technology and equipment in exploitation and processing of raw materials secures their optimum utilisation and appreciation; mineral resources are the sources of mineral raw materials in the territory of the country. The principle of sensitive utilisation represents the obligation to economically utilise natural resources with respect to the preservation of adequate opportunities for following generations. **Protection of mineral wealth** in the light of raw material policy stands for the protection of prospected and explored deposits of mineral resources from any factors forbidding their utilisation in the future, as well as the protection from unauthorised use and consumption that is inefficient from the social point of view.

Sustainable development is that which that meets the requirements of the current generation and at the same time does not limit satisfaction of the needs of generations to come. Utilisation of limited natural resources of raw materials decreases their volumes and therefore the possibilities of utilisation by future generations. The degree of present consumption of such resources must therefore heed their scarcity, level of technological development, and availability of replacement resources. The sustainable development requires leaving the choice of full consumption to future generations. The possibilities of exploitation and consumption of mineral raw materials are primarily defied by existing limitations of land and environment.

2. Analysis of the present level of utilisation of mineral raw materials in the Czech Republic

2.1 Inclusion of the economic category ”exploitation of mineral resources” into the economic structure of the country. Reserves of mineral resources on the territory of the Czech Republic and their exploitation.

The Czech Republic and the preceding states on the territory in recent history have not belonged among the mining countries. Such is the definition – in accordance with the methodology the UNCTAD (United Nations Conference for Trade and Development) – countries in which the exploitation of mineral resources forms at least 25% of the gross domestic product (GDP). The branch structure of the GDP has been as follows, according to the latest available data of the Czech Statistic Office, in 1998 (common prices, in %):

·	agriculture, forest economy		5.1
·	industry total		38.1
	of that -exploitation of mineral resources	1.8	
	- processing industry	31.4	
	- production and distribution of electric power, gas and water	4.9	
·	civil engineering		4.9
·	services total		51.9

The share of exploitation of mineral resources in creation of the GDP reached in the year of creation of the Czech Republic was only 3.7 per cent and **in the year 1998 dropped to 1.8 per cent**. The economy of the Czech Republic is dependent on the import of many raw materials from abroad.

The **reserves** of some mineral resources appearing on the territory of the country have been to a certain extent depleted. Presently the Czech Republic has in fact no utilisable reserves of ores and has limited reserves of fuels. On the other hand, it has sufficient reserves of industrial and building materials, whose lifetime amounts to tens and hundreds years (see table No. 1).

Table No. 1

Reserved deposits as to December 31, 1998 – industrial and geological reserves

Material	Number of deposits	Available industrial reserves explorated	Geological reserves	Unit of quantity
Ores total	80	32	161,045	Kt
Ores Fe	8	0	20,764	kt
Ores Mn	3	0	138,801	kt
Ni – metal	0	0	0	t
Cu – metal	15	0	182	kt
Pb – metal	17	7	195	kt
Zn – metal	18	22	801	kt
Sn – metal	11	3,014	208,076	t
W – metal	18	0	93,948	t
Ag – metal	19	0	590	t
Au – metal	27	48,740	249,660	kg
Fuels total	201	3,738,617	23,742,423	kt
Uranium – metal	13	21,219	139,528	t
Crude oil	27	11,403	37,862	kt
Natural gas	59	1,706	20,889	mil m^3
Hard coal	67	1,697,827	13,941,612	kt
Brown coal and lignite	62	2,027,660	9,741,936	kt
Industrial and building materials total	1,360	8,791,134	22,423,837	kt
Fluorite-barite substance	8	0	10,234	kt
Fluorite	6	0	3,078	kt
Barite	9	44	2,920	kt
Graphite	16	1,792	14,337	kt
Kaolin total	66	241,479	1,148,848	kt
Porcelain kaolin	29	45,204	198,936	kt
Clays total	113	209,143	1,035,854	kt
Bentonite	24	47,174	253,700	kt
Spars	30	35,668	81,913	kt
Glass and foundry sands	36	235,174	708,809	kt
Limestone total	108	2,157,842	6,160,101	kt
High-content limestone	27	670,513	1,705,246	kt
Gypsum	5	104,985	505,051	kt
Dimension stone	175	89,136	231,740	thous. m^3
Building stone	342	1,136,409	2,376,271	thous. m^3
Gravel	219	1,050,366	2,349,188	thous. m^3
Brick material	203	310,113	689,012	thous. m^3
Selected raw materials total	1,641	12,529,783	46,327,305	kt

Source: Geofond Czech Republic

Currently, (1998 – last available statistical data), 260 mining companies annually exploit 136 million tons of mineral raw material from 588 reserved deposits. This **exploitation** represents an average of 0.9 per cent of currently located industrial reserves of mineral raw materials and 0.3 per cent of currently registered total geological reserves of mineral raw materials (see Table 2). The exploited amounts presented in the material represent decrements of reserves through reserved deposits as stated by miners in their annual statistic reports. This observation is centrally reviewed every April for the previous year. The data are identical with so-called consumption exploitation (the portion sold of the exploited material in the respective year), which is usually lower. Significant are the differences, particularly in the case of coal. Consumption in 1998 for hard coal was 16.1 million tons and 50.8 million tons in the case of brown coal and lignite.

Table No. 2

Exploitation of reserved deposits

Year Material	unit	1980	1985	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Ores total	kt	791	800	771	738	603	328	111	15	0	0	0	0
Ores Fe	kt	13	124	84	93	102	64	0	0	0	0	0	0
Ores Mn	kt	0	0	0	0	0	0	0	0	0	0	0	0
Ni – metal	t	0	0	0	0	0	0	0	0	0	0	0	0
Cu – metal	t	1,700	1,500	1,200	800	600	500	200	0	0	0	0	0
Pb – metal	t	2,500	2,100	4,600	2,300	2,100	1,100	100	0	0	0	0	0
Zn – metal	t	7,800	5,100	6,500	7,500	9,600	4,400	1,500	100	0	0	0	0
Sn – metal	t	197	585	625	590	15	0	0	0	0	0	0	0
W – metal	t	40	92	75	84	13	0	0	0	0	0	0	0
Ag – metal	kg	13,800	18,100	20,800	16,200	8,900	6,200	500	100	0	0	0	0
Au – metal	kg	0	0	105	187	548	521	512	75	0	0	0	0
Fuels total	kt	126,296	132,434	124,054	111,093	103,448	94,426	92,230	81,920	80,353	82,527	79,365	70,766
Uranium – metal	kt		3	3	2	2	2	1	1	1	1	1	1
Crude oil	kt	53	58	45	47	64	80	107	131	149	155	159	172
Natural gas	kt	191	113	125	125	125	132	106	154	165	146	118	137
Hard coal	kt	36,124	35,697	34,935	30,714	25,769	24,961	23,862	20,910	21,309	21,784	20,847	19,521
Brown coal and lignite	kt	89,928	96,563	88,946	80,205	77,488	69,521	68,145	60,724	58,729	60,441	58,142	51,935
Industrial and building materials total	kt	117,855	111,952	121,223	108,637	69,911	65,794	61,919	62,062	62,709	67,726	72,247	65,315
Fluorite-barite substance	kt	32	40	113	38	29	42	40	15	0	0	0	0
Fluorite – utility compound	kt	16	20	45	18	32	22	22	10	0	0	0	0
Barite – utility compound	kt	2	3	2	1	18	0	0	0	0	0	0	0
Graphite	kt	51	57	66	39	47	20	27	25	27	30	25	28
Kaolin total	kt	3,206	3,307	3,642	3,455	2,913	2,530	2,336	2,706	2,800	2,798	2,982	3,049
Porcelain kaolin	kt	505	442	495	523	441	419	343	380	373	420	271	433
Clays total	kt	2,108	2,108	1,476	1,438	967	903	1,018	823	915	738	759	1,030
Bentonite	kt	838	107	168	159	125	135	63	65	54	59	110	125
Spars	kt	96	117	139	115	137	152	203	170	183	211	243	266
Glass and foundry sands	kt	3,750	2,741	2,739	2,758	1,837	1,963	1,735	1,955	1,990	2,209	1,763	1,642
Limestone total	kt	15,850	15,460	16,277	15,489	11,472	11,134	10,491	10,205	10,092	10,610	11,304	11,880
High-content limestone	kt	8,190	7,446	8,043	7,439	5,651	4,854	4,590	4,224	4,151	4,406	4,536	4526
Gypsum	kt	623	651	720	661	569	660	560	591	542	443	241	222
Dimension stone	kt	764	678	543	478	535	478	505	602	567	513	697	822
Building stone	kt	41,191	44,218	48,921	43,764	25,709	22,712	20,218	22,205	24,357	26,703	29,281	25,726
Gravel	kt	44,328	38,515	42,240	35,785	21,889	21,813	21,218	19,497	17,893	20,060	21,109	16,702
Brick material	kt	5,018	3,951	4,179	4,457	3,682	3,252	3,505	3,203	3,290	3,352	3,733	3,823
Raw materials total	kt	244,942	245,185	246,047	220,522	173,962	160,548	154,260	143,997	143,061	150,225	151,512	136,081

Source: Geofond Czech Republic

Data in the table converted to kt:

Natural gas	1 t/1000 m^3
Dimension and building stone	2.7 t/ m^3
Gravel and brick materials	1.8 t/ m^3

After 1989, the country´s economic development underwent significant structural changes. As a result, in the years 1990-1998, the exploitation of mineral raw materials decreased in both physical and financial terms by more than 38 per cent. The market economy led to the termination of exploitation of deposits with low reserves of usable compounds and of deposits with unfavourable mining and geological conditions for exploitation that could have been used before only due to heavy state subventions. Exploitation of all ores, barite and fluorite had been terminated. Uranium deposit exploitation had been greatly diminished and many brown coal and lignite areas closed their operations. The environmental burden decreased proportionately. An increase came after the year 1989 due to the exploitation of crude oil and natural gas, yet it holds an insignificant share of the consumption of these resources. As of 1993 the exploitation of dimension stone has increased. The volume of this output in relation to other materials is relatively low and is characteristic of a high degree of finishing processes. Overall output of spars has increased as well as spar replacements. This is a part of a positive worldwide trend in the increasing consumption of energyally economic raw materials.

2.2 Foreign trade with mineral raw materials (tables 3a, 3b, 3c, 3d)

Export

After the year 1990 domestic demand decreased and so did the exploitation of the vast majority of mineral raw materials. The total decrease of output has not been appreciably changed by the increased export of some materials compared to the situation before 1989. The disputable increase of export, assisted by comparative advantages, including devaluation of the domestic currency, has slowed down or even returned to its original values. A temporary increase in exports had helped refuse the negative impact of the decreased domestic consumption and output that might have otherwise been painful for the concerned companies (e.g., loss of jobs, investments, absence of resources to recover the effects of mining on the environment). The increase of exports after 1993 was caused by the split of the Czech and Slovak Federative Republic and the inclusion of export of mineral exports (especially coal) to Slovakia in foreign trade statistics. The main export commodities in 1998 were hard coal (40 per cent of the total volume of exported mineral raw materials and products), brown coal and lignite (22 per cent), coke (5.4 per cent), cement (8.2 per cent) and kaolin (2.4 per cent). The main receiving countries of mineral raw materials and products in 1998 were Slovakia (23.6 per cent of financial volume), Germany (21.5 per cent) and Austria (21.5 per cent). The main exporting commodities had been until the end of the year 1996 subject to licensing with volume limitations. In some cases the limits had even been exceeded. The termination of enforcement of limits in 1997 in relation to the observance of the association agreement with the EU has not caused any undesired increase of exports. Volume limitations of mineral raw materials exports had played a very positive role in the overall development of export in the years 1992-1996.

The overall share of mineral raw materials on the domestic export in CZK is about 2 per cent. Through inclusion of some products demanding in inputs (cement, lime, coke) this share would increase to about 2.6 per cent. The worldwide share of export of mining industry products in the overall export is about 12 per cent (in countries of western Europe it is about 7 per cent). These numbers reflect the raw material potentials of the respective countries and can therefore be compared to the situation of the Czech Republic only with limitations.

Table No. 3a

Import and export of mineral raw materials

Year	1980	1985	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
import mil CZK	N	N	N	N	N	45,,112	36,269	37,946	47,385	58,711	64,736	50,955
export mil CZK	N	N	4,015	4,467	8,972	9,523	18,343	15,365	16,728	16,829	17,086	10,602
import mil USD	N	N	N	N	N	1,596	1,244	1,318	1,785	2,148	2,041	1,583
export mil USD	N	N	260	263	304	337	629	534	630	616	536	531

Source: Geofond Czech Republic and Czech Statistic Office

Legend to tables 3a, 3c, 3d

1. Iron ores and pellets
2. Ferro-nickel ores (1% Ni + 44% Fe)
3. Cu-concentrates
4. In conversion to tons of Pb in concentrate
5. Zn-concentrates
6. Exports to Mongolia in joint venture not included
7. In conversion to tons of W in concentrate
8. Only concentrate exported
9. Including lignite and oxihumolite
10. Lump and concentrate fluorite
11. Barite concentrate and bleached barite
12. Amorphous and crystalline graphite, including refined and processed graphite
13. Limestone and gypsum (in 1980 and 1985) – in case of export including natural stone

N Unknown or unreliable data

Data in the table converted: natural gas 1 t = 1000 m^3; dimension and building stone 2.7 t = 1 m^3; gravel and brick materials 1.8 t = 1 m^3

Kaolin for porcelain production and high-content limestone are not observed separately. Reserves of their import and export are included in the superior category of kaolin and limestone.

Import

In the Czech Republic not only the domestically mined raw materials are processed but also a wide variety of imported materials (e.g. iron ore, metals, crude oil and natural gas, sulphur, salts, phosphates). The Czech Republic is completely dependent on the import of these raw materials. Imports of mineral raw materials and products represents about 5.5 per cent share of the total imports of the country.

The securing of mineral resources requires, due to the unevenness of their spread over the Earth, a wide international cooperation and a developed raw material market, since not all countries are self-sufficient in terms of raw materials. The supply is a reflection of the market demand, which is well documented by the long-term development of common prices of raw materials on the world markets. For example, the London Metal Exchange is very significant for the prices of metals in the European region. Transformation into a standard democratic country as well as integration into structures of NATO and the EU provide the Czech Republic with guarantees that the world raw material market will not be closed to the country. A limiting condition is the export-import balance, or the foreign trade balance, that shall secure the required and economically bearable import of raw materials and energy. In the long-term development, it is necessary to achieve an even trade balance increase of the indebtedness of the country.

The negative balance of foreign trade in mineral raw materials in 1998 reached the amount of CZK 34.4 billion, of a total budget deficit CZK 79.5 billion. This balance has been decreasing in recent years, as the Czech Republic becomes more dependent on import of mineral raw materials from abroad. The most significant is the dependence of the Czech industry on the import of crude oil and natural gas, which form a major portion of total imports in Class 3 as per classification SITC (Standard International Trade Classification) – mineral fuels, lubricants and related materials. The long-term trend of decrease and stagnation of world prices of mineral raw materials, as well as the decreased domestic demand, lead to the restriction of uncompetitive domestic exploitation of mineral resources and a policy of inhibiting of the coal and ore mining in the Czech Republic. Although there are possibilities of export of industrial and building materials available in sufficient reserves in the Czech Republic to assist decreasing the value of the negative balance of the mineral

raw materials foreign trade, the export of such raw materials would face various obstacles (e.g., exceeding the capacity of areas, limiting exploitation of industrial and building materials in natural reserves). Therefore, the idea of favouring the export of mineral resources through tools of a pro-export policy cannot be taken into account. The state revises possibilities of extension of the inhibition period for mining in the Czech Republic with the intent to decrease the value of the negative balance of the mineral raw materials foreign trade and to support social stability in sensitive regions with aggregated mining operations.

Table No. 3b

Imports and exports of products demanding in outputs, in kt

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
cement											
export	89	102	240	1524	2364	2077	2131	1470	1418	1318	1482
Import						52	161	280	336	482	671
consumption	6400	6300	6100	4100	3800	3368	3333	3636	3891	4057	3909
production	6873	6795	6434	5610	6145	5393	5303	4826	4973	4893	4599
lime											
export	16	20	22	55	133	146	180	169	199	201	240
import						210	58	281	581	442	175
consumption	2228	2258	2131	1335	1204	1211	1090	1267	1560	1442	1361
production	2244	2278	2153	1390	1337	1147	1212	1157	1178	1201	1143

Source: Union of cement and lime manufacturers, and the Czech Statistic Office

Table No. 3c

Imports and exports of mineral raw materials in CZK

Year	unit		1980	1985	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Ores and concentrates	mil CZK	import	N	N	N	N	N	3,688	4422	4501	5756	5137	6525	7131
total		export	109	76	82	104	129	130	60	38	45	31	26	19
Fe - ores	mil CZK	import	N	N	N	N	N	3,547	4345	4461	5679	5088	6469	7088
and concentrates 1)		export	0	0	0	0	0	0	0	3	1	3	5	3
Mn - ores	mil CZK	import	31	37	56	34	40	82	40	37	64	42	52	26
and concentrates		export	0	0	0	0	0	0	0	0	1	0	1	1
Ni – ores	mil CZK	import	230	195	278	52	0	10	5	3	8	6	1	6
and concentrates 2)		export	0	0	0	0	0	0	0	10	0	0	0	0
Cu – ores	mil CZK	import	11	144	30	0	53	0	0	0	4	0	0	0
and concentrates 3)		export	7	4	0	0	0	0	0	2	0	2	1	1
Pb – ores	mil CZK	import	0	0	0	0	0	0	0	0	0	0	0	0
and concentrates 4)		export	63	25	18	16	18	1	1	0	0	0	0	1
Zn – ores	mil CZK	import	0	0	0	0	4	1	0	0	0	0	0	0
and concentrates 5)		export	39	47	65	88	104	60	0	0	9	0	0	0
Sn – ores	mil CZK	import	N	N	19	0	1	0	0	0	0	0	0	0
and concentrates 6)		export	0	0	0	0	1	0	1	0	0	0	0	0
W – ores	mil CZK	import	490	334	0	0	47	0	0	0	0	1	3	11
and concentrates 7)		export	N	N	0	0	0	0	6	13	33	26	19	13
Ag – ores	mil CZK	import	0	0	163	137	41	28	33	0	0	0	0	0
and concentrates		export	0	0	0	0	8	19	0	0	0	0	0	0
Au – ores	mil CZK	import	0	0	N	N	N	0	0	0	0	0	0	0
and concentrates		export	0	0	0	0	N	50	52	10	0	0	0	0
Fuels total	mil CZK	import	N	N	17,810	44,046	45,915	41,111	31,108	32,688	40,584	52,489	57,25	42,794
total		export	N	N	3,196	3,517	69,845	6,025	13,486	12,871	14,086	14,293	14,41	13,722
Uranium – ores	mil CZK	import	0	0	0	0	0	0	0	0	0	0	0	0
and concentrates 8)		export	N	N	N	N	N	N	N	N	N	N	N	N
Crude oil	mil CZK	import	N	23,070	N	26,203	27,501	24,779	17,686	19,287	27,155	28,454	28,45	19,937
		export	0	0	0	0	0	37	247	233	352	327	327	389
Natural gas	mil CZK	import	N	N	16,311	16,727	14,049	13,393	11,732	11,807	17,038	26,579	26,58	21,300
		export	N	N	469	849	280	504	209	192	190	211	211	2

Continued

Year	unit		1980	1985	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Hard coal	mil CZK	import	N	N	1,499	1,116	4,362	2,940	1,678	1,591	2,280	2,216	2,216	1,557
		export	N	N	1,940	1,659	4,260	4,622	8,307	8,738	9,510	10,586	10,59	10,746
Brown coal and lignite	mil CZK	import	N	N	N	N	2	0	12	3	0	1	1	0
9)		export	N	N	788	1,009	2,444	862	4,723	3,708	4,033	2,381	3,281	2,585
Industrial and building	mil CZK	import	107	133	45	59	103	333	740	758	1,045	922	922	1,030
materials total		export	215	248	737	846	1,858	3,369	4,797	2,456	2,597	2,696	2,696	2,861
Fluorite	mil CZK	import	68	92	N	N	52	7	50	71	217	161	161	164
10)		export	0	0	0	0	9	28	2	1	2	127	127	153
Barite	mil CZK	import	10	1	0	0	0	40	65	69	91	45	45	37
11)		export	6	3	0	0	N	0	1	0	0	0	0	0
Graphite	mil CZK	import	8	13	21	24	12	6	14	17	20	20	20	25
12)		export	16	24	43	41	22	22	40	48	54	61	61	62
Kaolin total	mil CZK	import	N	N	11	15	8	23	10	19	22	29	43	69
		export	N	N	693	803	1,117	1,058	905	685	812	793	898	948
Porcelain kaolin	mil CZK	import	11	9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		export	97	108	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Clays total	mil CZK	import	3	3	N	N	7	18	59	72	77	86	79	97
		export	46	54	N	N	267	272	363	283	305	307	315	332
Bentonite	mil CZK	import	2	1	0	0	8	4	14	14	13	23	29	37
		export	15	18	0	0	27	33	40	47	59	69	70	82
Spars	mil CZK	import	3	2	N	N	4	7	2	2	3	14	20	18
		export	6	13	N	N	31	46	60	64	71	82	67	78
Glass and foundry sands	mil CZK	import	3	8	8	8	4	5	24	28	36	33	31	25
		export	9	16	2	2	14	66	122	222	142	184	191	219
Limestone total	mil CZK	import	0	3	N	N	0	2	13	81	60	60	76	58
13)		export	4	3	N	N	43	71	99	37	47	46	82	96
High-content limestone	mil CZK	import	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		export	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Gypsum	mil CZK	import			0	0	2	1	0	1	5	12	16	24
13)		export			0	0	4	2	28	48	52	36	30	17
Dimension stone	mil CZK	import	N	N	5	13	2	204	427	315	411	520	295	349
		export	N	N	0	0	0	314	444	496	573	568	633	724
Building stone	mil CZK	import	N	N	N	N	3	6	20	28	42	43	34	35
		export	N	N	N	N	326	712	1318	230	204	167	105	73
Gravel	mil CZK	import	0	0	N	N	N	9	42	42	50	60	73	92
		export	17	9	N	N	N	746	1,377	269	277	189	117	77
Brick material	mil CZK	import	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		export	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Raw materials total	mil CZK	import	N	N	N	N	N	45,112	36,269	37,946	47,385	58,711	64,70	50,955
		export	N	N	4,015	4,467	8,972	9,523	18,343	15,365	16,728	16,829	17,13	16,602

Source: Geofond Czech Republic and Czech Statistic Office

Table No. 3d

Imports and exports of mineral raw materials in reserves

Year	unit		1980	1985	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Ores and concentrates	kt	import	N	N	N	N	N	6,761	7,552	7,297	9,188	8274	7,401	7,400
total		export	10	10	6	7	17	10	0	3	2	2	3	1
Fe - ores	kt	import	N	N	N	N	N	6,658	7,533	7,277	9,140	255	7,383	7,396
and concentrates 1)		export	0	0	0	0	0	0	0	2	1	2	3	1
Mn - ores	kt	import	53	50	92	29	16	43	13	13	47	19	18	4
and concentrates		export	0	0	0	0	0	0	3	0	0	0	0	0
Ni – ores	t	import	404,48	307,33	2,738	875	0	50	5,600	7,225	34	30	7	42
and concentrates 2)		export	0	0	0	0	0	0	0	287	17	1	0	0
Cu – ores	t	import	3,820	7,191	975	0	4,480	45	20	12	10	0	0	0
and concentrates 3)		export	106	230	0	0	0	0	24	160	15	163	0	128
Pb – ores	t	import	0	0	0	0	0	0	0	0	0	0	0	0
and concentrates 4)		export	2,779	2,802	1,082	1,021	2,934	393	156	0	110	0	50	263
Zn – ores	t	import	0	0	0	0	126	26	0	4	0	10	0	1
and concentrates 5)		export	7,030	6,760	4,526	6,110	13,586	9,481	0	0	1,800	0	0	0
Sn – ores	t	import	N	N	130	0	13	2	5	0	1	1	0	0
and concentrates 6)		export	0	0	0	0	114	0	0	0	0	0	0	0
W – ores	t	import	2,025	1,813	0	0	498	47	0	0	0	5	14	52
and concentrates 7)		export	N	0	0	0	0	0	34	119	94	127	137	105
Ag – ores	t	import	0	0	57	167	12	107	9	0	0	0	0	0
and concentrates		export	0	0	0	0	2	4	9	0	0	0	0	0
Au – ores	kg	import	0	0	3,349	3,029	425	6,320	N	0	0	1	0	0
and concentrates		export	0	0	2	198	13	7	8,552	N	0	50	0	0
Fuels	mil t	import	12	13	18	15	17	17	14	14	18	20	19	19
total		export	6	6	4	0	6	6	10	10	14	13	12	11

Continued

Year	unit		1980	1985	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Uranium – ores		import	0	0	0	0	0	0	0	0	0	0	0	0
and concentrates 8)		export	N	N	N	N	N	N	N	N	N	N	N	N
Crude oil	kt	import	9,157	8,658	8,674	6,435	6,510	7,049	5,610	5,610	7,051	7671	7,050	6,948
		export	0	0	0	0	0	9	66	66	108	84	90	104
Natural gas	mil m3	import	3,085	4,520	7,143	6,361	6,787	6,850	6,805	6,805	8,049	9499	9,524	9,573
		export	0	0	624	N	N	128	46	46	43	49	1	0
Hard coal	mil t	import	N	N	2	2	4	3	2	2	3	3	2	2
		export	4	3	2	0	3	3	5	5	7	7	7	7
Brown coal and lignite	mil t	import	0	0	N	N	0	0	0	0	0	0	0	0
9)		export	2	3	2	0	3	3	5	5	7	6	5	4
Industrial and building	kt	import	154	147	116	0	35	48	413	413	1,740	1225	1,690	1,840
materials total		export	1,583	1,151	677	600	997	4,181	3,495	3,495	4,307	8181	3,393	6,840
Fluorite	kt	import	38	54	0	0	20	2	20	20	68	42	51	42
10)		export	0	0	0	0	1	6	14	14	26	2	23	25
Barite	t	import	13	2	N	N	0	24	32	32	40	15	10	8
11)		export	8	2	N	N	0	0	1	1	0	0	0	0
Graphite	t	import	1,730	890	14,802	1,409	348	200	654	654	977	1176	634	839
12)		export	3,195	4,630	5,459	2,928	1,224	896	2,120	2,120	2,697	2720	2,831	2,670
Kaolin total	t	import	N	N	2,318	80	928	1,385	1,353	1,353	3,824	5847	10,087	16,028
		export	367,00	386,00	570,04	487,83	374,56	439,98	426,46	426,46	383,55	361915	297,72	418,95
Porcelain kaolin	t	import	3,540	3,310	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		export	88,090	74,580	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Clays total	t	import	4,810	6,660	N	N	530	1719	566	566	7,007	13,907	14,896	23,250
		export	235,82	204,20	N	N	176,52	168,64	239,42	239,42	199,89	220,70	203,92	188,54
Bentonite	kt	import	68	72	N	N	0	1	4	4	3	5	7	9
		export	23	20	N	N	10	10	14	14	18	22	21	23
Spars	kt	import	2	1	N	N	1	3	5	5	6	4	6	5
		export	9	21	N	N	28	43	64	64	74	68	54	58
Glass and foundry sands	kt	import	33	5	3	0	0,4	2	103	103	160	128	121	58
		export	121	111	102	109	243	297	540	504	661	692	785	763
Limestone total	kt	import	0	2	N	N	0	3	16	16	623	513	623	411
13)		export	28	20	N	N	109	143	191	191	72	88	151	200
High-content limestone	kt	import	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		export	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Gypsum	kt	import	N	N	0	0	12	5	0	0	8	22	27	35
13)		export	N	N	0	0	54	10	113	113	101	86	60	68
Dimension stone	th. m^3	import	N	N	1	0	0	0	1	1	N	N	64	108
		export	N	N	0	0	0	11	6	6	N	N	299	212
Building stone	th. m^3	import	N	N	0	0	0	2	84	84	139	192	392	159
		export	N	N	0	0	0	1,123	964	694	427	3,634	447	1,001
Gravel	th. m^3	import	0	0	0	0	0	N	N	N	247	264	1,318	284
		export	389	171	0	0	0	N	N	N	898	3,687	493	1,010
Brick material	th. m^3	import	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		export	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Raw materials total	mil t	import	N	N	N	N	N	24	22	22	29	28	28	28
		export	N	N	5	1	7	10	13	13	18	21	15	18

Source: Geofond Czech Republic and Czech Statistic Office

*) Item of customs tariff No. 251710 – pebbles, broken and grinded gravel, flint-stone, etc., included
**) Calculated only once in the total sum of the customs tariff 251710

2.3 Legal environment and land development planning

The process of the exploration of reserved minerals deposit and subsequent exploitation of the reserved deposits is subject to administration proceedings:

- **Geological prospecting and exploration** is authorised by the Ministry of Environment through an administration proceeding. The decision specifies the area, mineral and conditions of the prospecting. The authorisation secures the holder the exclusive right to conduct work under the specified conditions and priority for receiving approval for definition of mining claim, yet it does not automatically grant the exploitation right to the discovered and verified deposit of a mineral raw material. Such approval is issued in a separate administration proceeding. If the Ministry of Environment holds a tender proceeding for prospecting and exploration in the interest of uniform raw material policy for selected minerals and areas, the above mentioned authorisation will be issued to the winning applicant in the tender (as per Article 4, paragraph of

the Exploration Act). In preparation and implementation of such tender proceeding the Ministry of Environment proceeds in concurrence with the Ministry of Industry and Trade.[1]

- **Certificate of reserved deposit** is issued by the Ministry of Environment in the event the exploration reveals mineral in quality and quantity that provides grounds for competent expectation of its accumulation.

- The Ministry of Environment (ME) declares **protected deposit area** in order to prevent disabling or hindering of its utilisation.

- **Prior consent with application for declaration of mining claim** is issued by the ME upon negotiation with the Ministry of Industry and Trade (MIT). The ME may condition issuing of the prior consent to meeting the conditions related to the uniform raw material policy of the Czech Republic. Such conditions are published in the decision on declaration of mining claim (Article 24, paragraph 2, of the Mining Act). The conditions are defined by the MIT as a part of its statement. The MIT is the concerned body in this proceeding.[1] The ME defines the condition of remuneration of costs of geological exploration conducted by the state. Acquisition of prior consent authorises the mining entrepreneur to issue an application to declare the mining claim.

- **The mining claim** is declared by the appropriate district mining authority in concurrence with concerned bodies of land development planning and the civil engineering authority. Other participants of the proceeding are natural and legal persons whose rights to the area may be directly influenced by the decision on declaration of mining claim, the municipality in whose cadastre the area is, and municipalities, whose cadastres may be influenced by the declaration of the mining claim. The declaration of mining claim is at the same time a decision on the use of the surface area in the scope of the declaration. The decision furthermore specifies conditions to the observed by the miner in subsequent exploitation works. The mining claim must be reviewed from the viewpoint of environmental impacts – EIA, in accordance with the Czech National Council Act No. 244/1992, of the Collection, on assesment of impacts on environment. If not, the impacts on environment are assessed in the next phase during authorisation of mining activity. Costs of the assessment are borne by the entrepreneur.

- **The mining activity, inclusive of initiation, preparation and exploitation of reserved deposits, securing and recovery of mines and quarries** is approved by the appropriate regional mining office. It is a similar proceeding to authorisation of construction, when the plan of preparation, initiation and exploitation is reviewed. Similarly, the decision is made in cases of securing and recovery of mines and quarries upon termination of exploitation. Another attendant issue is the recovery of land affected by the exploitation and landscaping. The amount of the financial reserve for recovery and landscaping is approved. The obligation to create such a reserve is defined by law. Other participants in the proceeding besides the applicant are owners of the real estates and the municipalities concerned.

Exploitation may be initiated by the entrepreneur only after receiving approval in all of the above stated administration proceedings. As apparent from the above, exploitation cannot be approved without the consent of municipalities, agreement with the environmental agencies, land development planning body and the civil engineering office, and without settlement of all legally required obligations.

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[1] The Ministry of Industry and Trade is the central body responsible for creating of uniform raw material policy (as per the Article 13, paragraph 1 of the so-called Competency Act)

In cases of exploitation of non-reserved minerals that are part of land, land development planning, consent must be issued by the appropriate civil engineering office as well as approval obtained for activities conducted, such as mining, issued by the appropriate district mining office in a proceeding under conditions similar to those of proceeding on mining activity (see subchapter 5.2 Legislative tools below).

The raw material policy is defined with the help and in concurrence with **land development planning**, whose outputs – land development documentation and land development groundwork, can be considered a form of declared public interest that is compliant with interests protected by various regulations. The raw material policy for land is one of the basic foundations of the elaboration of land development documentation. The documentation is based on the principle of sustainable development, observed in the practice of EU and OECD, that creates conditions for a balanced relation between economic (qualitative economic development), social (social coherence and stability) and environmental (sensitivity to natural resources and environmental protection) aspects. Therefore, the land development planning documentation, in accordance with law, enables the following:

- apply protective areas for known deposits of mineral resources in order to provide protection from hampering and/or disabling their future utilisation (principle of protection of mineral raw material resource);
- define areas where exploitation cannot be conducted or must be limited with respect to legally protected interests, namely environmental;
- define time consequence of utilisation of mineral raw material resources in area to prevent extension of the area physically consumed by exploitation, with concentrated exploitation (principle of consequent utilisation of mineral resources);
- resolve conflicts of interests caused by protection and utilisation of mineral raw material resources, including assessment of impacts on environment;
- define conditions of recovery of the exploited area (see subchapter 5.4 Land development planning bellow).

2.4 Historical aspects of the dependence of the national economy on mineral resources

The current structure of the domestic economy had been to a certain extent laid already at the period of the Austro-Hungarian Empire, when the countries of the Czech Crown represented the most industrially developed part of the monarchy. There had been sufficient material and energy resources for the development of heavy industry. There had been deposits of iron ore, coloured and precious metals as well as vast reserves of coal fit for coke production on the territory of the Crown. The originally sufficient domestic resources of iron ore, although poor in iron content, had been later replaced by imported high-quality ores, for example, from the magnetite mines in Sweden that had been until the year 1948 in the possession of the Czech government.

Besides heavy industry other industrial segments had been developing until World War II that had had enough qualified workforce (various branches with high added value) or suitable natural resources (lime and cement production, glassworks and porcelain manufacture). The natural development of effective structure of the national economy had been enabled by qualified economic policy of the government (Rasin, Englis).

After significant exhaustion of the economy during World War II, the fundamental negative breakpoint of the economy came with the socialist doctrine and practice of economic policy within the Council for Mutual Economic Aid (Comecon). Despite the natural dispositions of the country and the resources available, the national economy was forced to assume economic structure based

on metallurgy and heavy machinery building, demanding both in terms of energy and resources. In the Czech Lands, the economic policy of Comecon inhibited or destroyed the traditional and successful branches of industry and caused aging of production technologies in the surviving branches. The energy and resource consuming economy became gradually more dependent on import of mineral resources from the Soviet Union and the extensive exploitation of the scarce domestic resources which were also increasingly harmful to the environment of the country. To an unnatural extent, poor and insufficient domestic resources had been exploited, even at the price of subventions supporting the mining as well as adjustments of deference of solutions to environmental issues. On the other hand, the low level of technological development led to the exploitation of the best parts of deposits, while other sufficient portions had been left unused, causing an incomparable shortening of deposit lifetimes.

2.5 Characteristics of the exploring stage of the territory of the Czech Republic

The previous political regime had put emphasis on raw material self-sufficiency within Comecon and had exerted vast financial resources on extensive prospecting and assessment of the mineral potential of the country. That had also been reflected in the education system, with a large output of graduates in geology-oriented fields as well as the founding of many organisations of prospecting orientation, headed by a central geological authority that had been provided resources of the national budget to conduct prospecting and exploration of mineral raw materials deposits. At the same time, there was a government body charged with the verification and approval of calculations of mineral deposit´s reserves.

This regime assumed the mineral base to be in a state of comparably high degree of exploration. The results of the geological exploration conducted in the past can be used not only for present exploitation, but also for elaboration of raw material policy for the future, since the geological and industrial reserves are assessed in a rather extensive way, with lifetimes specified in tens and hundreds of years (see table No. 4). After the year 1998, the government assumed the policy of a major reduction of budgetary resources designated for geological exploration.

In accordance with the principle of sustainable development of the mineral resource base, it is desirable to support future prospecting and exploration of mineral resources on the territory of the Czech Republic. It can be expected that the participation of the government in financing it will further diminish. The use of the national budget will depend on the evaluation of the efficiency of the resources invested in prospecting and exploration since 1990. It is necessary to stimulate mining organisation to finance prospecting and exploration on their own accounts through economic tools of raw materials policy (see subchapter 5.3 Economic tools bellow).

Table No. 4

The lifetime of geological and industrial reserves of raw materials

material	Unit	Exploitation 1998	Geological reserves total	Lifetime of geological reserves		Available industrial reserves	Lifetime of industrial reserves	
				Option A	Option B		Option A	Option B
Uranium	t	611	139528	228	235	21219	35	36
Crude oil	kt	172	37846	220	247	11403	66	74
Natural gas	mil m^3	137	20889	152	145	1706	12	12
Hard coal	kt	19521	12941612	714	667	1697827	87	81
Brown coal and lignite	kt	51935	10767656	207	172	2144709	41	34
Graphite	kt	28	14337	498	543	17922	64	68
Kaolin	kt	3049	1148848	376	401	241479	79	84
Clays	kt	1030	1035854	1006	1337	209143	203	270
Bentonite	kt	125	253700	2030	3056	47174	377	176
Spar	kt	266	81913	308	382	35668	134	166
Glass and foundry sands	kt	1642	708809	432	371	235174	143	123
Limestone	kt	11880	6160101	519	573	2157842	182	201
Dimensiom stone	thous. m^3	305	231740	760	975	89735	294	378
Building stone	thous. m^3	9528	2376271	249	250	1136409	119	119
Gravel	thous. m^3	9279	2349188	253	215	1050366	113	69
Brick materials	thous. m^3	2124	686012	323	343	310113	146	155

Source: Geofond Czech Republic

Note:
The lifetime is calculated as ratio of the geological and industrial reserves, the denominator is:
Option A – decrement of reserves by exploitation in 1998
Option B – average decrement of reserves by exploitation in 1994-1998.
Decrements by exploitation do not include losses of exploitation and depreciation.
These factors are of importance especially for specification of the lifetime of hard coal reserves, which is therefore somewhat lower than the table states.
In case of conversion of dimension stone the coefficient 2.7 t/m^3 is used;
in case of gravel and brick clays it is 1.8 t/m^3; for natural gas 1 t/1000 m^3.

2.6 Current issues

Structure of the national economy and its raw material demand

The economic development of the Czech Republic after 1989 is characteristic of the inhibition of inefficient operations, yet the structure of the industry still reflects a number of problems in separate branches as reflected in the transformation and unfinished restructuring. Inhibition of production in general impacted on the raw material market and resulted in an alteration of long-term trends in domestic resources utilisation. A general trait after 1989 is a decrease in mining by 20 to 50 per cent in the case of majority of mineral raw materials. The structure of the domestic economy gradually turned from mining industry branches towards others, especially services. The **material and energy demand** of the Czech economy still remains higher than in developed economies, which is conditioned by the inherited structure of the economy, former extensive manner of utilisation of mineral resources, connected with deformation of prices in the field, and, last but not least, the insufficient rate of replacement of aging technologies in some industry branches.

The structure of the Czech economy has been, on the one hand, turning towards services, yet on the other, the domestic industry has retained its irreplaceable role. In 1989, the share of industry in the GDP reached 38.1 per cent, civil engineering 4.9 per cent. That corresponds with the development in Europe. The industrial share in the GDP was developing as follows (in %):

year/country	Austria	Germany	Italy	Spain	Belgium	Finland	Ireland
1993	35.3	35.2	31.5	33.6	27.8	31.2	33.2
1996	31.6	32.5	31.5	2201	28.5	34.4	41.4

The lowest industrial share in Europe can be found in Iceland, 21.7 per cent in 1996. The Czech Republic, as an industrial country, intends to retain its present share.

Energy demand in the Czech economy (in energy consumption per unit of GDP) is 2-3 times higher than in EU countries. Even under these circumstances, consumption measures have not been given priority, in use and savings of energy, but to the contrary, the imbalance between the supply and demand for energy, aggravated especially due to the dramatic increase in household electric power consumption (in relation to electric heating) has created considerations of the construction of more nuclear and coal power plants. While in 1997 the government subsidised prices of heating for the population by CZK 4.7 billion (1995 – CZK 7.3 billion, 1996 – CZK 7.0 billion, as of May 31, 1998, subsidy cancelled), the Czech Energy Agency (CEA) had the amount of CZK 350 million to support energy savings (1995 – CZK 200 million, 1996 – CZK 230 million). In 1998, the agency received CZK 325 million and in the year 1999 the amount dropped further to CZK 300 million. In the years 1991-1998, programmes of governmental subsidies swallowed up a total of CZK 2.5 billion. Not even lower prices of electric power for households than for industrial consumers which are even a relative exception among the post-communist countries have not stimulated energy savings in the desired way. The necessary decision to set energy prices right, which would have most likely been the ultimately most effective measure, has been postponed several times for social as well as political reasons. Fundamental correction of prices is now, in accordance with the elaborated energy policy, expected to be concluded by the year 2002. Some of the principles designed to prevent wasting and stimulate energy savings are formulated by the MIT in the draft of the update of the Act No. 222/1994 of the Collection, on conditions of undertaking and exercise of state administration in energy branches, and on State Energy Inspection, as well as the new Energy Act.

The issue of doubling or tripling the energy demand of the economy does not have its basis in energy consumption but in the low output of the Czech economy, reflected also by the exchange ratio of the domestic currency to those of individual EU countries. In 1996, the GDP share per head was:

- Germany 28.8 thousand USD
- Belgium 26.3 thousand USD
- Greece 11.7 thousand USD
- Portugal 11.4 thousand USD
- Czech Republic 5.1 thousand USD

The present value of the indicator places the Czech Republic, by the EU criteria, among the developing countries.

Export of mineral raw materials

The rather significant decrease of domestic demand for raw materials had not immediately caused a drop in exploitation, due to partial balancing through increased export of materials. Export of some minerals (e.g. building materials) recorded a dramatic growth after 1989, especially between the years 1991 and 1992, compared to 1989. Companies dealing in mineral raw materials attempted to counterbalance the drop of the domestic demand caused by extensive transformation of the economy through increased export. Domestic producers of materials took the advantage

provided especially in the years 1991-92 by the pro-export exchange rate of the domestic currency. Due to value and price deformations of the past, the domestic prices of mineral raw materials were quite favourable for foreign markets. In the case of building materials, many producers rode the wave of the civil engineering boom in the eastern part of Germany. The above-mentioned conditions and circumstances so typical, especially for the years 1991 and 1992, changed with the course of the transformation, due to the fact that domestic mining companies had adjusted their production structure to actual market demands, as well as straightening raw material prices through inclusion of all costs of production, including modernisation and environmental issues, into the price as well as domestic inflation under stable exchange rate of the CZK (by mid 1997), transportation costs increased too.

Observance of obligations resulting from association agreements with the EU assumes the existence of free trade with mineral materials. In the field of export the Czech Republic has pledged to abandon export limitation by signing the association agreement with the EU, which resulted in passing of the decree No. 56/1998 of the Collection by the Ministry of Industry and Trade that changes and amends the decree No. 560/1991 of the Collection, on conditions of awarding of approval for import and export of products and services, in the wording of later amendments. Problems with the level of output of some mineral raw materials in environmentally sensitive areas shall be, with regards to the agreement, attended to individually within the frame of enforcement of valid legislation and tools of land development planning (definition of land limitations of exploitation). Tools of direct impact on import of mineral raw materials (e.g. volume limits, import duties) shall be applied only in exceptional cases, fully in accordance with international treaties. If, in some cases, comparative advantages lead to increased exploitation of domestic mineral resources, and subsequently to excessive export of the materials, such economic tools shall be used to favour the export of products with added value. On the contrary, export of raw mineral raw materials shall be handicapped, e.g., through increased taxes from extracted minerals in the case of particular materials or the concerned entity being charged a higher environmental duty (see subchapter 5.3 Economic tools bellow).

Exploitation of mineral resources in natural reserves

The total scope of large natural reserves – national forests and reserves – in the Czech Republic is 11,535 km^2. Of this amount, the area where law forbids any kind of exploitation is 19.3 per cent. The area of large natural reserves in the Czech Republic represents 14.6 per cent of the area of the state. The Environmental Protection Act No. 114/1992 of the Collection, strictly forbids exploitation within national forests and in the first zone of reserves, and in fact disallows any exploitation also in the second zone of reserves. The currently defined mining claims more or less respect the provisions of this act. Exceptions have been made where the mining claim had been declared before the virtue of the act. They are time-limited, upon agreement with the administration of the reserves concerned.

Exploitation of mineral resources in the territory of national forests was completely terminated after 1989. In large reserves, the output of mineral resources decreased in ratio similar to that of the overall decrease in the country after 1990, i.e., by about 50 per cent.

There still remain problems of environmental protection presented by the ongoing exploitation of limestone in the natural reserve ”Cesky kras”, building stone in the reserve ”Ceske stredohori” and gravel in reserve ”Trebonsko”. The reason for the continuing exploitation is the geological composition of the Czech Republic and the inherited way of utilisation of mineral resources. Areas on limestone are mostly declared as protected natural reserve due to their morphology and comparatively high biodiversity and therefore any exploitation in such areas faces strong opposition. Securing of utilisable deposits of limestone in the desired quality completely out

of these areas is impossible. Exploitation of building stone and gravel represent intensive utilisation of natural resources of high quality building materials in the given regions whose output and consumption are limited by transportation costs. The reserve ”Ceske stredohori” contains volcanic rock suitable as a source of superior grinded stone. There are substitute sources outside the reserve, but they usually represent individual elevations forming dominant elements of local landscape. The reserve ”Trebonsko” is a source area of gravel for a significant part of the southern and western Bohemian region. As of the year 1991, there has been a substantial decrease in exploitation to current 42 per cent compared to the state in 1989. In case of the ”Trebonsko” reserve, the gravel materials present a major source of spar for the domestic ceramics industry with ties to export of its products.

The persisting conflicts with environmental protection issues include namely the following: previously declared mining claims that interfere with natural monuments, first zones of natural reserves and the infrastructure of municipalities, exploitations that produce irrevocable changes of landscape, decrease of aesthetic value of landscape, and, in the case of grinded stone lead, removal of solitary landscape dominants. The environment is negatively influenced by the changes of landscape caused, for example, by the creation of numerous water surfaces, changes in the water cycle as result of hollowing of deep quarries, lowering of underground water levels leading to drying out of forest growths, large consumption of quality farming or forest land, destruction of alluvial wolds, opening of another deposit while the previous has not yet been depleted, unsatisfactory recovery and landscaping plans including failures to observe deadlines and conditions, and encumbrance with noise and dustiness of country, residences and often even the first zones of natural reserves as the result of exploitation and transportation of raw materials. Specific problems of exploitation in some natural reserves include ineffective utilisation of reserved deposits by technologically unfit exploitation and insufficient processing of the mineral raw material.

Imports of Polish coal

Poland has been exporting cheap hard coal to the Czech Republic (2.3 million tons in 1997, under import quota of 2 million, the quota remained unchanged for the year 1998, it had been lowered for 1999 to 1.2 million tons). All the while, the geological conditions in the Upper-Silesian basin (in both Polish and Czech Republics) are comparable. This export is supported in Poland by governmental subsidies to counterweight the costs of exploitation of the exported coal. It would be a mistake to conclude that the current low Polish prices would remain even after termination of exploitation of hard coal in the Czech Republic. Just the contrary, without the threat of the domestic competition the prices would level with the European prices. A situation hard to foresee will occur after accession of both countries to the European Union, when both will be forced to oblige European standards for mutual trading. The Czech Republic will oppose any subsidised imports of coal. In the future, the issue of Australian coal that has the lowest costs of production cannot be left unanswered. This coal has not threatened the central European markets due to high transportation costs from the European ports of Antwerp and Rotterdam:

Transoceanic coal	Price at port	Price at the Czech border	Price in Ostrava
for coke	$59/t	$84/t	$97/t
for energy	$43/t	$68/t	$81/t

Note: The distribution price of the coke coal of the domestic mining company OKD for domestic consumers is about CZK 1,700/t. The average distribution price of classified coal is about CZK 1,500/t. contractual prices for energy coal are significantly lower. Contractual prices of the imported Polish coal are around CZK 1,300/t

The issue of exploration of gold deposits

Gold is not currently exploited in the Czech Republic. The former Ministry of Economy awarded between the years 1993-95 numbers of exploration areas to eight mining companies intending to conduct prospecting of gold deposits in the territory of the Czech Republic in accordance with the provisions of the Geological Act. The interest in exploration of gold deposits has faced strong opposition from the concerned municipalities and public caused by worries of subsequent exploitation and technologies of mining of gold naturally dispersed in rock. In response to the above described situation the Cabinet in its declaration No. 516, dated May 25, 1999, to the issue of exploration and exploitation of gold in the Czech Republic stated *that due to the domestic demand for gold, the situation on the world gold markets, and with respect to the negative impacts of exploitation and refining of gold on the environment, any exploitation of gold on the territory of the Czech Republic is not desired, at least until approval of the Raw material policy, and the government is therefore not interested in authorisation of geological works in prospecting and exploration of gold.* The government has furthermore passed the update of act on geological works, elaborated by the Ministry of Environment that enforces stricter criteria for all reserved minerals and awards concerned municipalities the position of participant in administration proceedings to declare exploration area. The Ministry of Environment that had assumed the responsibility from the former Ministry of Economy has therefore aborted all awarding of exploration authorisations.

3. Domestic raw material base, its lifetime and perspectives of development

The Czech Republic has its specific conditions resulting from its geographical position and composition of the territory. There is sufficient resource base for several industrial branches, including branches with export capacities (glassworks, ceramics, pargeting materials). Important branches of the economy (namely metallurgy, engineering, chemical industry, energy industry, transportation) are completely or to a great extent dependent on acquisition of raw materials from abroad – these include ores, some fundamental chemical materials (e.g. fluorite, barite, salts, phosphates, sulphur), crude oil, natural gas and under certain circumstances coal as well. Negative phenomenon is the low level of utilisation of secondary materials and the pace of development in this field that is incomparable to the situation in EU countries.

The raw material base of the Czech Republic can be divided as follows:

- fuels;
- ores;
- industrial and building materials;
- secondary materials.

3.1 Fuels

The raw material policy in the field of fuels is to a certain extent reflection of the energy policy, which specifies the basic parameters of securing of energy requirements of the society. Under the chosen energy system and in accordance with the energy policy the raw material policy provides idea of the scenario of utilisation of domestic resources with respect to the capabilities of the domestic fuels base. The energy policy has been elaborated by the MIT. The draft was negotiated by the Cabinet on June 23, 1999. The declaration of the Cabinet No. 632 charged the Ministry to complete the draft with comments of the Cabinet, submit it for environmental impacts assessment and present to the Cabinet for final review by December 31, 1999.

In contemplation of available options of orientation of the energy sector the only equal option to full consumption of the domestic resources of energy coal is the expansion of nuclear energy. Raw material policy based on the principles of sustainable development therefore requires application of further energy savings and support for optimum use of alternative energy sources as the requisite condition of the requisite orientation to the domestic resources of hard coal and brown coal and lignite and introduction of the nuclear plant Temelin into operation. That should efficiently and sensitively utilise the potential of domestic energy resources and extend their lifetime.

The domestic primary energy sources are to certain extent limited. Highly energyally demanding structure of the domestic economy and the doctrine of self-sufficiency have in the past lead to incomparable development of exploitation and extensive consumption of reserves of fuel resources. The share of solid fuels in primary energy sources has been gradually decreasing.

The domestic resources of **uranium** had been extensively exploited as the material for the nuclear energy of the Comecon. Uranium had been obtained at the price of direct subsidies or hidden subventions in the form of purchasing of surplus of uranium concentrate to state material reserves that had been going on until the year 1993.

Since 1989 the production of uranium concentrate has decreased to about one quarter. Out of 16 registered deposits of uranium ores, some of which may represent some reserve for the future, only two (Straz, Rozna) with total production of 608 tons of uranium were utilised under the inhibition programme in 1998. In 1995, the last deep mine (Hamr I, in the Straz locality) was closed down. This traditional deep mining had in the past supplemented the chemical extraction that became undesirable after the year 1989 and the political changes. Recovery of the deep mine Rozna will be initiated by January 1, 2002, at the latest. Termination of exploitation of uranium in the Czech Republic has been founded by appropriate decisions of the government approved by the Cabinet in its meeting on July 21, 1999 (Cabinet decision No. 750).

The exploited raw material is chemically treated into the form of a concentrate whose only consumer is the energy company CEZ, a.s. The present consumption of uranium amounts to 350 tons annually for the nuclear plant Dukovany. The rest of the uranium concentrate production has been partly purchased by the company CEZ, a.s., in order to provide material stock for the nuclear plant Temelin and partly remains in the store of its only producer in the Czech Republic (Diamo, s.p.) and in state material reserves. In case of operation of both blocks of the nuclear plant Temelin the annual demand for uranium will reach 690 tons.

Satisfaction of demand is in accordance with the decree No. 560/1991 of the Collection, in the wording of the decree No. 300/1993 of the Collection, on conditions of awarding of official authorisation for import and export of goods and services, so far satisfied until the year 2001 from domestic resources. In compliance with the entered agreement with the EU on liberalisation of uranium market, the domestic chemical production of uranium will be subjected to competition of concentrate from abroad after the year 2001. In the future, the State Administration of Material Reserves (SAMR) will commence to release the retained uranium concentrate on the market. The release of the state material reserves of concentrate that is likely to take place in the environment of liberal prices has not been decided upon yet.

The domestic exploitation of **natural gas and crude oil** is rather negligible in comparison to the requirements of the Czech economy. In 1998, about 172 thousand tons of crude oil was exploited while the needs of consumers amounted to approximately 7 million tons; in case of natural gas the exploitation produced 137 million m^3 and the demand reached to the amount of 9.6

billion m^3. In general, it is an interesting supplementary source with favourable environmental parameters. Therefore, it is desirable to seek tools to enable its efficient exploration and greater utilisation.

The off-exploited deposits of natural gas and crude oil can be used as underground storage of gas in the future, under suitable geological conditions. Such storage space is scarce in the Czech Republic. The current applicable storage capacity of the domestic gas storage is about 1.8 billion m^3. It is even necessary to rent storage space abroad, Lab (Slovakia) and Rehden (Germany) in the total volume of 1 billion m^3, in order to satisfy the needs of the national economy. To satisfy the requirements of provision of gas for Prague and the surrounding area a unique cavernous storage of volume 55 million m^3 in the vicinity Haje near Pribram has been built. The storage has been operational since 1998.

Security of deliveries of strategic mineral raw materials from abroad, such as crude oil and natural gas (17.5 per cent and 14 per cent of energy needs respectively) is assured by diversification of sources and creation of storage. The SAMR has been maintaining stock of crude oil and oil products in the quantity covering average 60-day domestic consumption with the intention to increase the stock to 90-day supply by the year 2005, in compliance with the EU standard. (Oil security shall be further strengthened by the membership of the Czech Republic in the international energy agency OECD that is expected in the near future). The so far exclusive source of oil supply from the Russian Federation has been supplemented through construction of new pipeline from Germany, whose capacity is capable of replacing the supplies of the Russian pipeline. Diversification of the intended oil supply in 1999 is described by the ratio between the pipelines "Druzhba" and IKL 82:18. Supply of natural gas from the Russian Federation has been supplemented by Norwegian gas delivered by German shippers since 1997. During the first decade after the year 2000 approximately 3 billion m^3 of gas annually shall be delivered this way.

The chances of revelation of other reserves of natural gas and crude oil are quite limited by the high degree of prospecting conducted in the past. Not even in the case of optimistic scenarios, any significant change in the share of the domestic resources in the energy supplies cannot be expected. In addition, search for methane, tied to deposits of coal (coal-bed methane) in the Upper-Silesian basin, financed in participation of the national budget, has not revealed positive results. Even in the case of utilisation of these methane sources, only local energy resources would be provided. Almost 100% of crude oil and natural gas will be imported provided that in the year 2010 no more than 65 per cent of supplies shall be provided by a single supplier. The ratio of imports in the nearest future will depend on the pace of amortisation of the costs of construction of the IKL pipeline, in the long-term it will be conditioned by the quality of crude oil and its price on the world markets.

There are deposits of **hard coal** on the territory that is used in both energys and coke production. Exploitation has been going on namely in the Upper-Silesian basin. Ineffective hard coalfields with high costs of production are inhibited or being inhibited at the price of registered stock losses. The overall drop in demand for coal and the ongoing inhibition of coal mining resulted in decrease in the exploited volume from 30.7 million tons in the year 1990 to 19.5 million tons in the year 1998. In relation to the future exploitation of the coalfields in the active mines of the Karvina area of the Ostrava-Karvina coal basin future supplies for the Czech energy sector and industry will have to be attended to in the long-term perspective. The future orientation of the domestic energy sector and industry and the related demand for hard coal will serve as deciding factors whether to re-evaluate the degree of utilisation of reserves of coal. Higher exploitability of the deposits of hard coal in the Ostrava-Karvina coal basin would on one hand require state intervention yet on the other would probably result in more sensitive utilisation of these limited energy resources and extension of lifetime of the whole coalfield.

Other significant still not utilised domestic sources are characteristic from the viewpoint of exploitation with unfavourable geological and technical conditions such as the depth of the deposits, gas leaks etc. Explorated reserves of hard coal are found in the area of Frenstat pod Radhostem in the depth of approximately 1 km. Their opportune initiation is restricted by the natural reserve "Beskydy", unclear economic conditions of its implementation and the financial possibilities of the mining company OKD as the potential investor. The draft of the energy policy in accordance with the result of its negotiation by the Cabinet on June 23, 1999, (Cabinet declaration No. 632) does not include utilisation of these reserves. Effective utilisation of coal deposits in the Slany and Melnik basins would probably cause inextricable conflicts namely with water management and environmental interests. In case of the Slany basin, there appear also complicated mining and technical circumstances that caused termination of mines near Slany in 1992. Utilisation of yet unopened deposits of hard coal depends on general agreement in the region and approval of the ME.

The free trade economy is likely to incline to imports of cheaper hard coal from abroad. That will bring pressure on the import side of the foreign trade and may speed up the closure of domestic mines even in the case of effective defence of the state against subsidised imports.

Brown coal and lignite still remain the main input for energy production although further development as well as scope of exploitation has been limited by the state. In 1990, 78.4 million tons of brown coal and lignite was exploited in the country, while in 1998 the amount was 51.3 million tons. The level of further exploitation will depend on the approved energy policy. If only the resources that are authorised for exploitation are used and the energy consumption will continue to grow, the deficit will grow and expiration of the deposits must be expected by the year 2030. The basic issue of the energy policy remains whether the Czech Republic will utilise mainly brown coal and lignite to produce electric power after the year 2015-2020 (the issue of release of brown coal and lignite deposits restricted by environmental limits in northern Bohemia) or whether the energys will be oriented towards other energy sources (e.g. nuclear). So far, no great progress has been made in the enforcement of the priority requirement of savings in energy consumption, optimal utilisation of sustainable resources and thus extension of the lifetime of the limited resources of energy coal. According to the assessment of the Ministry of Environment the overall potential of the renewable resources represents in the long run as much as 30 per cent of the current energy consumption. Its full utilisation would expect investments in the amount of CZK 1,250 billion. What can be rather expected is that the share of utilisation of renewable resources in the overall consumption of primary resources from present 1.5 per cent to approximately 3 to 6 per cent by the year 2010 and between 4 to 8 per cent by the year 2020. This increase of the share of renewable resources by the year 2010 to the level of 6 per cent would cost about CZK 242 billion in investments and CZK 42.5 billion form other sources (according to the calculation of the CEA, evolved from the so far implemented projects).

The contemplated construction of new energy blocks based on brown coal and lignite that would replace the outdated and aging equipment is rather questionable since sufficient resource base has not been secured. Further exploitation would exceed the environmental land limitations of exploitation. Their prospective utilisation is impossible without previous re-evaluation of former decision of the government on these limits. In the other case, imports of brown coal and lignite must be taken into account. The above stated facts put significant doubts on the suitability of construction of new brown coal and lignite-based blocks. Exploitation of brown coal and lignite deposits located under inhabited or otherwise urbanised areas cannot be contemplated. Brown coal and lignite resources that cannot be utilised by the energy sector shall be preserved for future possible energo-chemical utilisation by future generations.

The prepared energy policy expects maintenance of levels of output of brown coal and lignite in the future that would in the long term secure resources for approximately 50% of energy production. This assumption clashes with the lifetime of brown coal and lignite deposits whose exploitation is currently authorised see table No. 5). At the moment, there is 1.25 billion tons of exploitable raw material that under diminishing output would secure resources until the year 2035 at the most. Besides these reserves, there are another 0.97 billion tons blocked by the environmental limits declared by the declaration of the Cabinet of the Czech Republic No. 391, 444 and 490/1991, that would in case of their utilisation prolong in a corresponding manner the lifetime of this energy source. The condition of any opportune alteration of the declarations is mutual agreement of all parties concerned, i.e. the mining entity, the municipalities and public administration bodies, as well as awarding of approval by the ME. If the opportune correction is not decided upon in the next two years the deposits beyond the environmental limits will be either lost or such mining conditions will occur that will hamper the economy of any future mining that will forbid any future economic utilisation of the resources. The draft of the energy policy in accordance with the result of its discussing by the Cabinet on June 23, 1999, (Cabinet declaration No. 632) does not intend to correct the land limits.

Table No. 5

Lifetime of brown coal deposits

Nature of deposits	Quantity in mil. tons	Lifetime of deposits in years
geological	9,742	190
of that –industrial	2,028	38
of that –in active mines	1,058	21
tied by land limits	970	18

Note:
The lifetime is calculated as ratio of the volume of deposits to the decrease by exploitation in 1998.

Goals	Tools	Institutional Backing
· restructuralisation of mining industry	· conclusion of privatisation of mining companies that can be privatised	· MIT, Ministry of Finance (MF), mining companies
· termination of uranium exploitation and securing of protection of deposits for opportune future utilisation	· Cabinet declaration, energy policy, Mining Act, land development planning	· MIT, MF, ME, Ministry for Local Development (MLD), Czech Mining Office (CMO), Diamo, s.p.
· securing of recovery of long-term consequences of uranium exploitation	· governmental policy on environment, recovery plans	· MIT, MF,ME, CMO, Diamo, s.p.
· securing of 90-day supply of crude oil and oil products	· Act on emergency stock of crude oil, investments	· SAMR, MF
· diversification of crude oil and natural gas supplies from abroad	· Cabinet declaration	· Ceska rafinerska a.s., Paramo, a.s., Transgas
· conversion of exploited deposits of crude oil and natural gas into storage	· investments	· Transgas, Moravian Oil Mines

space for natural gas		
· re-evaluation of the degree of exploitability of open deposits in the Ostrava-Karvina coal-fields	· energy policy, review of current course of inhibition of coal mining and requirement of coke production	· MIT, MF, ME, CMO, coal and metallurgic companies
· securing of protection of hard coal deposits near Frenstat as reserve for future generations	· energy policy, Mining Act, land development planning	· MIT, ME, MLD, CMO, municipalities
· securing of protection of brown coal deposits beyond land limits as reserve for opportune utilisation by future generations	· energy policy, Mining Act, land development planning	· MIT, ME, MLD, CMO, municipalities
· programmes of energy savings and increased energy efficiency	· economic stimulation, price deregulation, creation of space for utilisation of alternative energy sources	· CEA, ME, MIT, MF
· support for introduction of new technologies (Clean Coal Technologies)	· programmes of research and development	· MIT, ME

3.2 Ores

In the field of ore materials (ferrous and non-ferrous metals), there are and will not be any perspectives of effective exploitation of materials from domestic deposits. Exploitation of poor domestic resources (Fe, Cu, Pb, Zn, Sn, W, Au, Ag) that had been possible only with governmental subventions was terminated to January 1, 1994. The territory of the Czech Republic is comparatively well explorated for any occurrence of ore deposits. Discovery of small ore deposits in the future cannot be excluded yet lack of investment demanding processing capacities as well as conflicts with environmental protection interests are likely to prove as limiting factors.

The total consumption of ferrous and non-ferrous ores in the Czech Republic is covered by imports. Demand for metals or their concentrates in the future will depend on the changes in the structure of the metallurgic and machinery-building industries. A preposition for economic acquisition of metals in the time horizon of 15 to 20 years is support to activities leading to **utilisation of mineral resources from the seabed** (polymetallic nodules with increased contents of Mn, Ni, Co, Zn, Cu) and maintenance of position of the Czech Republic in this perspective field on the level comparable to EU countries. The fundamental preposition of it is membership of the country in the joint organisation Interoceanmetal (IOM) and the International Seabed Authority (Authority). The aim is to prepare strong position for the domestic entrepreneurs for industrial utilisation of polymetallic nodules. The basic right of the Czech Republic as member of the IOM is the access to mineral raw materials at the reserved pioneer area of the Pacific Ocean. The pioneer area was declared by the Authority for the IOM in 1992. As of August 1999, the Authority comprises of 131 members, which only documents the enormous interest in exploitation of mineral

Goals	Tools	Institutional Backing
· elimination of consequences of exploitation of domestic	· governmental environmental policy, inhibition and	· MIT, MF, ME

ore deposits	recovery programmes	
· decrease of demand for ore raw materials as result of structure changes in the metallurgic and machine-building industries	· structural changes, privatisation, industrial policy	· MIT, MF, metallurgic and machine-building companies
· securing of satisfaction of demands of the metallurgic industry by supplies from abroad	· foreign trade	· trading companies
· higher utilisation of secondary materials in the fields of ferrous and non-ferrous metals	· business support programmes	· ME, MIT, Czech-Moravian Commodity Exchange (CMCE), Union of secondary materials industry – Aporeko
· utilisation of mineral raw materials from seabed	· membership of the Czech Republic in the IOM and Authority	· MIT, Ministry of Foreign Affairs (MFA), IOM
· privatisation of the Czech share in the IOM	· privatisation project	· MIT, MF, metallurgic and machine-building companies, other strong companies
· securing of protection of gold deposits and their preserve for opportune environmentally sensitive utilisation by future generations	· Mining Act, land development planning	· MIT, ME, MLD, CMO, municipalities

resources of seabed. The Authority manages exploration and exploitation activities related to utilisation of mineral resources from seabed. Rules for prospecting, exploration and exploitation of polymetallic nodules from seabed, as specified in the United Nations Convention on the Law of the Sea (Convention) shall be passed by the Authority in 2000. As a party to the Convention the Czech Republic is obliged to enforce an internal standard obeying the international legal principles of utilisation of mineral resources obtained from seabed. The one-fifth share of the Czech Republic in the IOM shall be privatised shortly. This step has been contemplated and prepared also by the other member states of the IOM. The share in the organisation depends on the annual contribution that in the case of the Czech Republic has amounted since the founding of the organisation to CZK 136 million. To that the value of the know-how acquired during expeditions to the pioneer area must be added. This value has not been specified yet. The government shall cease to contribute to the operation of the IOM after privatisation of the share yet it shall retain the right to direct the activities of the private entities in accordance with the international law.

In the area of utilisation of precious metals deposits only **gold** can be seriously contemplated, whose deposits present a reserve suitable for opportune future utilisation. This utilisation will depend on meeting of all legal, and especially environmental, conditions including other requirements in extent comparable to the conditions in countries of the European Union. All the while the fact must be taken into account that some gold deposits are located in environmentally sensitive areas (natural reserves or vicinity of water sources). From the viewpoint of raw material policy, gold does not present any exceptional commodity to demand enforcement of a different system of authorisation of exploration and exploitation, and assessment of impacts of these activities on the environment from the systems used in cases of other raw materials.

3.3 Industrial and building materials

If we omit the scarce industrial materials utilised by the chemical industry (sulphur, phosphates, apatite, barite, fluorite) and some other materials for special use (e.g. asbestos, large-flake graphite, precious stones with the exception of Czech garnet and vltavin gem), deposits of other industrial materials are the only mineral resources abundant in the Czech Republic.

Factors influencing exploitation of industrial and building materials:

- domestic and foreign demand;
- competition of imported materials and ready products;
- interests of environmental and landscape protection *(A significant portion of the limestone deposits and certain part of gravel reserves, spar and grinded stone are located in natural reserves. Utilisation of these resources will become more difficult. The reserves of industrial and building materials, whose utilisation can be contemplated, are much lower than the amounts of geological reserves registered in the state balance as state material reserve.)*;
- difficult conflicts of interest between miners and land-owners;
- requirements for quality of production and the level of mining technological ethics in exploitation of building materials and production thereof;
- utilisation of secondary materials decreasing the demands for natural resources.

The positive influence of the economic transformation and privatisation on industrial branches based on industrial materials has been undoubtedly aided by the well-verified material foundation with sufficient lifetime. There is suitable base in the Czech Republic namely for the development of traditional industries – glassworks (glass sands), ceramics and porcelain manufacture (wide variety of ceramic clays, spar materials, kaolin) and paper manufacture (paper kaolin) that has been adequately utilised. Import provides only special enamel spar and energyally economic materials (wollastonite, staurolite, etc.) for the ceramics and porcelain manufacture. Also building materials production has a sufficient material base, especially parget, whitewash, cement and plaster, stone industry and brick manufacture.

In the **ceramics industry**, the manufacturing technology has been overhauled (implementation of electromagnetic separation of kaolin, new drum kilns, implementation of single firing, manufacture of non-glazed tiles, transition of large facing materials, automation of classification and packing of final products). The demand for energyally economic materials, especially flux materials, has increased. Therefore, since 1994 the output of spar and spar replacements – fonolites that are also exported, has been increasing.

The volume of investments into the parget industry amounted in 1989 to approximately CZK 12 billion. Thus the level of technical development in manufacture of cement, whitewash and plaster in the Czech Republic is comparable to the levels of production in the developed countries of western Europe and northern America, in many cases even from the viewpoint of impacts on the environment. For example, the fundamental product of this industrial field – cement – has been manufactured and labelled in accordance with the European standard EN-197 and the quality has been checked by foreign test laboratories, which results in possibilities of export to Germany and Austria. The manufacture of dry **parget mixtures** has been significantly extended – about five times – since 1989.

Output of building materials recorded a sharp fall after the year 1989 mainly as result of drop in domestic demand in the period 1991-1995 when the civil engineering had been inhibited. This fact was not much influenced even by the increased export of some building materials and ready products (**parget sands, exploited and grinded stone**), which only soothed the consequences of the domestic demand decrease and prevented deterioration of the building material industry. In the nearest future, due to the enforced measures, any substantial growth of civil engineering output and therefore related increased exploitation of building material cannot be expected. Exploitation and manufacturing capacities have sufficient material reserves even for cases of natural disasters, such as the floods in July 1997. The industry of building materials has sufficient reserves in the medium and long-term view to satisfy increased demand as result of aging of former construction without the need to expand exploitation. All the while, the importance of non-reserved building mineral raw materials deposits will increase as opposed to reserved deposits of building stone, gravel and brick clays owned by the state. Exploitation of these materials has already reached about a one third share in today's output of building materials and therefore must be duly taken into account in implementation of raw material policy in separate regions. The lifetime of the geological and industrial deposits of these materials (see table No. 4, page 14) appears to be sufficient. A problem is presented by the much shorter lifetime of the reserves presently authorised for exploitation (building stone approximately 13 years, gravel approximately 9 years, brick materials approximately 22 years) if the present output persists. Authorisation of other industrial and geological reserves may in the future face strong opposition and fierce conflicts of interests. Attention shall be paid to recycling of building materials and the issue of replacement of gravel with grinded stone with respect to the limited usability of most deposits due to preservation of agricultural land resources.

Exploitation of **stone for raw and fine masonry** (dimension stone) has been slightly increasing since 1994 despite high competition of imported final products (facing plates and pavements) in situation when most workshops are equipped with aging technologies (up-to-date technology is available to about 10 per cent of manufacturers). The volume of exploitation is not likely to change even in the long-term view due to comparably high costs of exploitation in the Czech Republic. Increase of both export and import can be expected due to the tendency of increasing the variety on the market.

Brick manufacturing industry has expanded its assortment of masonry materials and fired roofing along with increase of manufacturing output and quality of production. Manufacture of hollow brick blocks with high heat resistance represents a new generation of products of the industry. Brick manufacturers in the border areas present equal competition to foreign products with the quality and prices of their exported products. The view in all time horizons expects higher concentration of production, decrease of energy demands of production and increased consumption of brick products in the mid-term horizon. The irregular spread of deposits of input materials in the country will remain as problem.

Decrease of energy consuming industrial production has resulted in decrease in demand for inside lining of blast furnaces and foundry industry, which influenced the exploitation of **quartz materials** for production of dinas and **foundry bentonites** that has been inhibited. In the long-term view, stabilisation of the current consumption or slight decrease of consumption of these materials is expected.

Goals	Tools	Institutional Backing
· specification of the possibly exploitable reserves of	· supplementation of information system	· MIT, MF, CMO, Geofond Czech Republic

industrial resources		
· securing of protection of raw material resources	· legislature (Mining Act), land development planning documentation	· ME, MLD
· supplying of processing industry and civil engineering with material resources	· verification of the possibility of creation of reserve for geological works or other type of support as per the situation in the EU	· ME, MIT, MF
· complex utilisation of raw materials including utilisable associated resources	· research and development programmes, business support programmes	· MIT
· implementation of exploitation methods securing maximum possible utilisation of mineral resources	· authorisation of mining activities	· CMO
· regulation of utilisation of mineral resources in the country	· land development planning documentation	· land development authorities, environmental authorities, municipalities

3.4 Secondary materials

The fundamental problem of evaluation of secondary materials and their participation in the foreign and domestic trade of the country is the absence of interpretation of this term in the enforced legislative regulations in the Czech Republic. Utilisation of waste materials as activity leading to acquisition of secondary materials and recycling of waste is a relation of "waste - secondary material", as specified in the **Act No. 125/1997 of the Collection, on waste**.

The primary mineral raw materials resource base does not, with few exceptions, cover the demands of the domestic processing industry. Namely, it does not provide the required resources for production of ferrous and non-ferrous metals, chemical and petrochemical industry. It is traditionally supplemented by domestic or foreign secondary materials in the total amount of 15 to 20 per cent of the financial value of the material inputs. In some inputs, the share of consumption of secondary materials exceeds 60 per cent (e.g. some non-ferrous metals). Especially important is **recycling of ferrous and non-ferrous metals** on which the Czech metallic industry is to certain extent dependent. Export and import of the most important commodity from the list of secondary materials, i.e. scrape metal, fluctuates in dependence on the demand and supply of the metallurgic companies. The overall amount of the scrape metal processed by the domestic companies decreases with the reduction of industrial output. Higher degree of scrap metal processing is hindered by insufficient payment ethics of the metallurgic companies when the suppliers of the secondary material receive delayed payments and judicial action to enforce payments take too much time and are not always effective.

Basic data on the field of processing of secondary materials are indicated in the table No. 6. As result of the overall output in the recent period also the total amount of produced waste decreases. Only a portion of this amount is returned back to manufacture process in the total annual amount exceeding CZK 10 billion and enables decrease of consumption of primary raw materials from domestic as well as foreign resources.

Table No. 6

Processing of secondary materials

product code (as per SKP)	name	unit	1994	1995	1996	1997	1998
3710100001	processing of secondary metallic materials (scrap metal and waste)	kt	1,503.7	1,419.3	1,311.3	1,573.7	1,450.8
3720100001	processing of other secondary non-metallic materials	kt	135.8	182.2	276.1	384.6	515.0

Source: Czech Statistic Office

Note: The indicated quantities do not include waste of own production, recycled construction materials statistically not observed, materials of recycling of electronic products, plastic, and others.

Effective utilisation of secondary materials increases the overall efficiency of industrial production and if properly applied it associates with energy savings in comparison to production from primary sources. Significant energy savings (see Table No. 7) and their positive environmental outcome are in developed countries reasons for increasing of the share of utilisation of domestic secondary materials as well as support of purchase of secondary materials abroad.

Modern technological processes, economic in use of industrial and building materials as well as energy used in their exploitation and processing, are not yet sufficiently implemented, neither is classification of household refuse applied properly. Utilisation of secondary materials, in this case namely **recycling of building materials**, has great possibilities of improvement in the Czech Republic in order to reach the level comparable to the conditions in EU countries. Of the total assessed quantity of building waste (between 8 and 10 million tons) approximately 10 per cent are recycled in the Czech Republic, which number does nor reach even half of reserves commonly recycled in EU countries. The difference rests in the low price for storage of waste in comparison to the costs of recycling. So far legislative measures have not been passed and enforced to redeem the present situation. In the field of recycling of building material, the greatest recycled volume is that of the railway ballast. Various programmes, such as the TECHNOS, implement number of projects related to recycling technologies of building materials, railway ballast, materials used in electronics, plastic and rubber. Their gradual implementation into practical utilisation shall create conditions for higher degree of utilisation of secondary materials. New is the **manufacture of plaster** from waste products (energo-limestone) from desulphurisation of heat power plants. In the field of minimisation of waste from utilisation of primary mineral resources, the constitutional principle of sensitive utilisation of mineral resources, enforced by the fact of their limitedness and fixed location, shall be fulfilled by the most thorough utilisation of masses of mineral raw materials. That can be secured both in the phase of exploitation and in processing of exploited minerals. In the stage of exploitation, the thoroughness of utilisation of raw material can be influenced by the selection of the exploitation method, in the stage of processing use for all, of possible, components of the exploited raw material should be sought in order to minimise the reserves of waste, coupled with selection of best fitting processing methods. Miners can be expected to seek and employ the greatest profit bearing methods of utilisation of exploited materials. Implementation of support to investments to processing technologies effectively associated with environmental policy should be considered as the most effective approach.

Table No. 7

Savings of energy through utilisation of secondary materials

material	electric power consumption in kWh/t for manufacture from		savings in %
	primary materials	secondary materials	

steel	4,270	1,666	61
aluminium	65,000	2,000	97
zinc	10,000	500	95
paper	5,700	4,200	26
glass	5,000	2,860	43
rubber	13,310	2,770	79
plastic	11,900	700	94

Note: Individual data may differ from the published average values.

Source: Materials Recycling, The Financial Times Management Reports, London, 1995

The Czech-Moravian Commodity Exchange Kladno (Exchange) was founded in 1995 based on governmental license for purposes of exchange trading with mostly industrial commodities. Currently, the exchange deals in 11 commodity sections, including e.g. sections **"Mineral raw materials including processed ores, industrial and building materials and fuels"** or **"Waste and secondary materials"**. In relation to utilisation of waste as secondary material, a private mediator is available at the Exchange – Environmental Centre with the CMCE ("*Ekologicke centrum pri CMKB Kladno s.r.o.*") – can be employed. The Exchange creates, within legal limitations, free and open space for trading waste and secondary materials. The Exchange is an important tool supporting the market of waste and secondary materials and at the same time supporting liberalisation of circulation of secondary materials in international trade. The state can use the Exchange to enforce its both raw materials and environmental policies and to regulate handling of secondary materials without overstepping the principles of market economy. The Exchange has in accordance with its position and implemented system of trading with secondary materials good perspectives of gradual meeting of the appropriate standards and guidelines of the European Union. The value of trading in 1998 reached CZK 80 million. Trading with scrap steel and pure metals amounted to most of that value.

The international legal regulations valid in the EU and the OECD respect the requirements of extensive international market with secondary materials and adjust regulation regimes to that as well. The implemented regimes are binding for the Czech Republic as member country of the OECD and adequately as associated country of the EU. Regulation of higher utilisation of secondary materials is subject to EU regulations that are applied in unification of legal systems. The legal regulation of the mandatory acceptance of a selected group of products and packing materials was implemented in the legal system of the Czech Republic in accordance with harmonisation requirements of the EU through the new Waste Act, effective of January 1998. For purposes of achievement of desired results it is supplemented with a set of economic tools, in some cases characteristic for this area. Similar shift in use of legal and economic tools shall be prepared and enforced in the Czech Republic as well.

The financial volume of international trade of the Czech Republic in the secondary materials section annually reaches the value of several billion CZK. Selected data on the Czech foreign trade with secondary materials are indicated in the table No. 8.

Table No. 8

Selected data on foreign trade with secondary materials

Weight and financial reserves of import

classification (abbreviated) as per HS-6		1994		1995		1996		1997		1998	
		thous. tons	mil.CZK	thous. tons	mil.CZK	thous. tons	mil.CZK	thous. tons	mil.CZK	thous. tons	mil.CZK
7001	broken glass	45,56	64,2	58,21	61,2	65,06	63,3	77,21	78,4	75,70	82,7
7112	precious metals waste and scrap /*	4,11	17,7	8,60	57,8	2,70	12,9	2,20	6,0	4,00	74,6
7204	melted refuse /scrap iron	158,79	383,7	110,99	299,3	82,37	214,8	39,94	97,5	114,10	312,9
7404	copper scrap	4,16	108,0	7,40	251,4	2,02	45,3	2,73	69,1	2,83	89,4
7503	nickel scrap	1,60	3,6	4,29	1,2	0,25	2,2	0,33	2,8	0,03	0,5
7602	aluminium scrap	10,40	288,9	19,44	736,4	12,90	401,9	25,52	974,9	34,20	1 165,4
7802	lead scrap	3,79	17,3	5,06	25,1	0,83	5,1	0,69	3,6	0,00	0,0

7902	zinc scrap	0,10	1,2	0,06	0,2	0,00	N	0,01	0,3	0,00	0,0
8002	tin scrap	0,00	0,0	0,00	0,0	0,00	0,0	0,00	0,0	0,00	0,0

Source: Czech Statistic Office

classification (abbreviated) as per HS-6		1994		1995		1996		1997		1998	
		thous. tons	mil.CZK	thous. tons	mil.CZK	thous. tons	mil.CZK	thous. tons	mil.CZK	thous. tons	mil.CZK
7001	broken glass	10,92	27,6	13,49	21,6	20,26	27,7	10,26	34,6	21,10	51,5
7112	precious metals waste and scrap /*	14,14	66,9	14,03	340,5	10,77	210,3	10,39	257,7	14,00	321,6
7204	melted refuse /scrap iron	993,46	3 656,5	827,80	2 548,7	906,23	2 621,8	976,49	3 063,0	873,41	2 763,2
7404	copper scrap	25,68	1 021,3	29,23	1 349,3	26,56	1 096,0	26,55	1 092,3	28,06	1 066,0
7503	nickel scrap	3,70	118,5	3,14	71,3	4,44	90,6	5,36	79,1	0,75	20,6
7602	aluminium scrap	13,05	253,0	13,64	368,8	11,89	236,3	15,12	369,9	21,23	548,1
7802	lead scrap	0,01	0,2	0,00	0,1	0,12	1,7	1,58	11,7	3,00	24,3
7902	zinc scrap	4,04	69,7	4,07	71,6	3,73	68,5	4,79	111,7	2,51	50,6
8002	tin scrap	0,06	1,9	0,04	2,9	0,04	2,7	0,00	0,3	0,00	0,0

Source: Czech Statistic Office

N/A – data not available
*/ - data for item 7112 are indicated in tons
Data for 19994 are indicated in accordance with the 1994 methodology, data for years 1995-1998 and further in accordance with 1997 or 1998 methodology respectively.

The processing and gradual updating of the Czech Republic raw material policy together with application of its tools in the field of secondary materials promisses in particular to render favourable impacts on energy saving sphere, reduction of environmental burden, contributions in foreign trade, using of raw materials instead of primary resources facilating thus their economical utilization or lowering the need for their import. A higher degree of secondary raw materials utilization represents at the same time topical perspective for effective business activity connected with desirable extension of job opportunities. The 1999 new statistic recognition of data about waste production and its utilisation as a secondary material become the basement for formulation of effective measures watching the development of this promissing sphere.

Goals	Tools	Institutional Backing
• decrease of primary mineral raw materials as a result of higher utilisation of secondary materials	• modification of legislature on waste, research and development programmes, business support programmes	• ME, MIT
• industrial and separated community waste utilization	• economic stimulation research and development pro-grammes, business support programmes	• MIT, communities, Aporeko, Union of Metallurgical and other scrapping companies
• attaining EU countries level in building materials recycling	• research and investigation programmes, business support programmes	• MIT, Building Material Recycling Assotiation.
• support to secondary raw material business	• stock-exchange statute	• stock-exchange, MIT, ME
• increasing of solvency of metallurgical companies	• legislation for adherence of contract´s commitment	• courts, MIT, Fund of National Property

4. General goals of the raw material policy of the Czech Republic in the field of mineral raw materials and their resources

In the context of the Czech Republic as a state interested in the EU membership, the only raw material having a strategical significance is represented by crude oil. Because of own resources available are neglectable with respect to its consumption volume, it is necessary to put emphasis on diversification of import capacities as well as to complete the construction of necesssary reserve

storage deposits. Of principal importance are some domestic raw materials resources facilitating to support economic growth and infrastructure development. It primarily concerns coal and some industrial and building raw materials resources, in particular those which enabled to give rise to the traditional glass industry, porcelain industry and ceramics production in the Czech Republic. From other raw materials it concerns those safeguarding highway and railway engineering and big building industry. By means of tools applied, the pursued raw material policy will strive to create operatively such a space, with respect to all time horizons, which would be necessary in particular for utilization of restricted raw materíal resources being of economic importance. Similarly, the same policy is supposed to be applied for delimitation of mineral raw materials resources destined to cover the needs of regions and their development. The support policy to regional resources will be declared according to specific needs of territory development and possibilities following from geological situation of the given area. In conformity with the mentioned rules, as a tool applied for conservation with mineral resources in the individual regions there will be used a territorial plan; the final goal lies in creating optimal direction of territory development in conformity with possibilities of raw material potential available on its territory. With deficiency mineral raw materials necessary imports must be envisaged (besides cruid oil even natural gas, metals, some ores). A prerequsite for sustainable development of the society is an optimal utilisation of reserves, in particular savings, introduction of advanced technologies and a higher degree of secondary materials utilisation.

4.1 Long-term goals

The long-term goals are fully subjected to the conditions of membership of the Czech Republic in the European Union when full legislative, institutional and economic compatibility is expected to have been established. The material and energy demands of production in this period will correspond with the comparative advantages of the Czech economy within unified European market when all fundamental issues of its restructuralisation will have been solved. The economy will be adjusted to European standards from the viewpoint of environmental impacts, energy and raw materials demands with smooth access to raw material resources all around Europe. Establishment of market economy shall bring increased pursuit by entrepreneurs of decreasing their energy consumption, better utilisation of raw materials and implementation of progressive technologies. On the other hand, this process alone is not all-curing. A certain degree of influence of the state is necessary to achieve level comparable to the European Union in the long-term and to enforcement of principles of sustainable development as well as respecting of land limits as defining factor for exploitation of primary resources. Even payment balance and avoiding prevention of increasing indebtedness of the state are among the main long-term goals as well as decreased raw material and energy demands of the industrial production, achievement of optimum degree and higher utilisation of secondary materials.

The kind, scope and quality and availability of resources required in the future will change compared to the parameters of resources exploited today. It is likely that in the future even resources that are currently considered unavailable for economic or technological reasons will be utilisable. Just the same, materials overlooked today may in the future be used as inputs for production. To the contrary, some currently exploited resources may lose their economic value and become unused part of the Earth crust. This aspect of alteration of mineral resources value in time requires permanent expert evaluation and assessment of the territory of the Czech Republic and preservation of prospected primary resources of mineral raw materials for future utilisation.

The availability of mineral resources will be assessed especially with respect to the principle of sustainable development that meets the requirements of the current generation and at the same time does not limit the future generations in their requirements. The State Geological Survey will

expand the cognisance of the geological composition of the territory of the Czech Republic and specify prognoses of occurrence of mineral resources. In the interest of sustainable development of the raw material base, prospecting of new sources of mineral raw materials shall be supported as well as their protection and sensitive utilisation, and support to securing of replacement resources. Complex assessment of availability of mineral resources will take into account the strategic, regional, local, economic, technological, social, environmental and ownership aspects with respect to preservation of natural, cultural and landscape values, heeding the influence of the time factor. This complex assessment will enable responsible decision making for example on utilisation of hard coal and gold deposits.

Further assessment of raw material resources of the state is based on evaluation of the current conditions and definition of the goals of the raw material policy in the field of renewable resources of raw material. This step is fully compatible with corresponding intentions within the frame of EU.

4.2 Medium-term goals

The horizon of the medium-term goals of the raw material policy is the accession of the Czech Republic with the European Union. Provisional year of the accession is 2003. By this time it is desirable to propose, elaborate and approve all measures directed to implementation of long-term goals.

The main mid-term goals are:

- implementation of measures implemented by EU countries in prospecting, exploration and utilisation of their mineral resources and in trading mineral materials, especially for securing of **sustainable development** and **relation** of the raw material policy with **land development planning,**
  tools – approximation of the appropriate legal regulations, informatics, land development planning,

In the authorisation proceedings miners must prove that the economic potential of the deposit intended to be exploited is sufficient and guarantees acquisition of required resources especially for elimination of negative impacts on the environment, subsequent recovery of landscape and after inclusion of all conceivable circumstances profit for the company as well. Exploitation of deposits in the threshold of economic value or deference of some costs to future is not possible in the conditions of EU membership. In such cases only mineral raw materials savings, recycling and purchase within the European Union and other foreign markets are the options. Countries of the EU apply similar proceedings in impartial evolution and decision making on utilisation of mineral resources as the Czech land development planning for large areas. Planned utilisation of mineral potential of the country can be efficiently improved by cooperation of all concerned state administration authorities. The regional raw material policy shall not be based on direct management of the raw material market through specification of exploitation limits but rather use of land development plans for definition of planned exploitation works with specification of space limits and time schedules of exploitation of raw materials. In practice, this will mean for example that in a specified time horizon just two of ten known deposits shall be opened and exploited. Authorisation to open another deposits shall be issued at the time of termination of exploitation of the preceding deposits and execution of recovery measures. This way the overall impacts on the area and pressure to open numerous new deposits at an area shall be significantly decreased.

- greater attention to **directing of demand** for raw materials from primary resources,
  tools – state environmental policy,

Besides limitation of production, directing of demand is less common yet in the view of coming years ever more contemplated way of application of principles of sustainable development on the raw material policy and ways of satisfying the demands for mineral raw materials. The policy of management of demand is a term generally used for policy directed at decrease of demand for mineral raw materials, especially in relation to building materials. In planning and designing of civil engineering products the demand can be decreased through supporting such forms of development and technical specifications that are less demanding of primary mineral resources.

- conclusion of the process of **accommodation of prices** for energy as systematic measure that shall provide a strong signal for energy saving as well as lower consumption of domestic reserves of fuels and energy materials,
  tools – energy policy, decision on accommodation of prices for electric power and natural gas for households,

- maintenance of acceptable level of energy self-sufficiency of the Czech Republic even in the conditions of EU membership that requires **securing of resources** with regards to short lifetime of the coal deposits,
  tools – energy policy, state environmental policy, concept of land development,

- **internalisation of externalities** in all cases, where this measure appears to be really workable
  tools – state environmental policy, environmental tax,

One of the ways is the alteration of the philosophy of remuneration for mining claim (see subchapter 5.3 Economic tools, page 43) that is currently applied as flat payment of CZK 10 thousand per year per square kilometre of mining claim. It is recommended to differentiate the value in accordance with the value of the area, impacts on the environment and the nature of the work conducted (industrial areas vs. natural reserves; within the mining claim: reserve areas for future exploitation vs. exploited areas vs. recovered areas; surface exploitation vs. deep mining vs. exploitation of oil and natural gas through deep wells).

- dealing with the **issue** of utilisation of mineral resources in **large, especially preserved natural reserves**,
  tools – state environmental policy, environmental protection strategy, environmental supervision of exploitations, review of raw material potential of such areas, legislative measures,

Solution to this problem rests namely in analyses of conflicts, review of prognoses and re-assessment of reserves (depreciation of reserves, alterations of mining claims), specification of fixed limits of exploitation and preservation of important portions of solitary dominant landscape elements. Exploitation shall be directed into areas with less exposure applied to landscape, away from solitary dominants and areas protected by special legal regimes, especially areas with concentration of fundamental water sources and curing resources. Recovery plans shall be reviewed with intention of better inclusion of artificial landscape into country. It is necessary to secure continuous recovery of abandoned parts of deposits e.g. as a condition of continuance of exploitation and in cases of formerly opened deposits relate the authorised activities of miners to recovery of the areas. It is always desirable to evaluate each mining claim separately and independently. (In some cases recovery and landscaping may not be advisable for reasons of environmental protection. The fact that recovery works had been often omitted in the past has

resulted in occurrence of several unique habitats that have been declared and are registered as distinct landscape elements.) Rights awarded to miners shall be balanced with threat of sanction up to removal of these rights if conditions specified in the authorisation of exploitation are neglected. The basic limiting factor of exploitation exceptionally authorised in the second zone of natural reserves shall be the proof of domestic demand, not export interests. Exploitation shall be directed at gradual inhibition of utilisation of sources located in the second zones of natural reserves.

- optimum **utilisation of renewable energy sources**, e.g. geothermal, solar, wind,
  tools – programmes of research and development, programmes of fuels and energy savings of the Czech Energy Agency, programme of support of energy savings and utilisation of renewable resources,

- **development of production** with high added value **low in energy consumption**,
  tools – programmes of business development support, programmes of research and development,

- implementation of **advanced technologies of processing** of mineral raw materials that will provide for their economic use and higher level of utilisation,
  tools –programmes of research and development,

- implementation of **low-waste processing technologies** in utilisation of mineral raw materials,
  tools –programmes of business development support, programmes of research and development,

Implementation of technologies and programmes of minimisation of waste in utilisation of mineral raw materials will result in their economic and sensitive use. The raw material policy will be efficiently related to the environmental policy lessening the enviromental burden.

- implementation and certification of **environmental management systems** (further referred to as EMS) in accordance with standards of the file CSN EN ISO 14000 in enterprises dealing in exploitation and processing of mineral raw materials,
  tools – availability of interest-free loans for implementation of the system, one of the alternatives is the State Environmental Fund,

The fundaments of implementation of the EMS rest in systematic providing of solutions to various environmental issues and continuous improvement of the environmental management of business enterprises with due approach and obedience of environmental regulations. Implementation of EMS shall result in qualified specification of priorities in avoidance of negative impacts of activities on the environment, prevention of pollution and accidents, in decrease of demands for energy inputs to production as well as more efficient use of mineral resources. At the same time, holders of EMS certificates will have easier position to defend themselves when accused of dumping strategy in export. Finally yet importantly, the EMS shall also provide "green image" on developed markets as well as lay foundation for accurate relationship with the public.

- verification whether it is desirable to allow **creation of reserve for geological works** to entrepreneurs from their costs account, based on the analysis of subsidies and supports for deposits exploration, as applied in the EU. The aim is to verify in time the quality of mineral raw material deposits with heeding the sustainable development of the raw material resource base and its future utilisation,
  tools – analysis, legislative measures,

Miners would, to the contrary of current practice, acquire the possibility to create required resources for these financially demanding geologic operations, necessary in order to secure sufficient mineral resource base. The decrease in the tax yield would be balanced by decrease of national budget expenditures spent on deposits prospecting. The mechanism of creation and use of such a reserve would be compliant with the taxation laws and accounting regulations. The basic precondition for implementation of this tool is the analysis of the issue of support to prospecting of deposits of mineral resources in the taxation systems of EU countries.

- **exploration and exploitation of mineral resources beyond the territory of the Czech Republic** for the use in the country as well as from the viewpoint of export of investment units,
  tools – implementation of exploration projects and projects of exploitation of mineral raw materials abroad, membership of the Czech Republic in the Authority,

In accordance with the principles of foreign policy, the state is active in abroad operations such as provision of development assistance (in 1998 $11.8 million or 0.02 per cent of the GDP) and membership in international organisations. Support is awarded to such projects of exploration and exploitation abroad that provide good chances of their efficiency even in the form of subsequent supplies of Czech investment units or advantageous trade switches with the concerned country, including acquisition of scarce mineral raw materials. The precondition of acquisition of mineral resources from seabed (polymetallic nodules) by Czech enterprises is the membership of the Czech Republic in the Authority. The Czech share in the Interoceanmetal after its privatisation shall also provide easier access to mineral resources for Czech businesses.

4.3 Short-term goals

Short-term goals of the raw material policy are such measures whose implementation can be proposed instantly:

- through **higher degree of utilisation of secondary materials** assume the direction to employment of domestic mineral resources, lowering of demand for imported mineral raw materials and achievement of energy savings. Enforcement of legislative measures supporting greater utilisation of secondary materials,
  tools – programmes of business support, research and development programmes, economic inducements, Waste Act and related decrees,

- **increasing of flexibility of taxes from extracted reserved minerals** that shall be increased in comparison to current state for some minerals (brown coal and lignite, gold), extension of taxes for utilisation of deposits of non-reserved minerals at state-owned reserved deposits,
  tools – update of the Mining Act and subsequently of the decree No. 617/1992 of the Collection, on details of mining claim and extracted reserved minerals tax payment,

- evaluation of **efficiency of prospecting and exploration** of deposits of mineral raw materials, paid from the national budget, since 1990 as groundwork for decision making on further participation of the national budget in their financing and specification of **programme** of any further assignments,
  Tools – analysis and synthesis, declaration of the Cabinet,

- evolution of current course of the **inhibition of coal and ores mining** from the viewpoint of utilisation of limited natural resources as well as results of energy and raw material policies, specification of further proceeding after the year 2000 in accordance with the Cabinet decisions No. 691/1992, 558/1995, 814/1998, 912/1999,

tools – restructuralisation, privatisation, participation of the national budget in enterprises listed in the appendices these declarations,

- supplementation of the current **information system for mineral raw materials** in order to provide not only tabular overview of their reserves in reserved deposits and their movement, as provided by the statistic record so far, but also information on handling of the exploited reserves in the mining claims including preparedness of reserves for exploitation in separate parts of mining claims authorised for mining,
  tools – annual statistic record for acquisition of accurate on lifetime of reserves of individual kinds of mineral resources,

- implementation of statistic observation of quantity and movement of selected **secondary materials** in order to provide tabular overview of their assortment composition, quantity occurrence and foreign trade, with the aim to elaborate register of secondary materials and their use in the Czech Republic,
  tools – annual statistic record,

- raw materials policy of the state assists securing of **material reserves** in the field of mineral resources and in sustained cases proposes measures to create or dissolve state reserves of a specific mineral material. Material reserves of selected mineral raw materials and intermediate products of mineral origin necessary for securing of defence capability of the state, redemption of disaster situations of the economy and for securing of vital interests of the state, should in the future be created through similar procedures as in the countries of the European Union. As affiliated country of the EU the Czech Republic shall namely commence to create 90-day supply of crude oil and oil products,
  tools – Act No. 97/1993 of the Collection, on the authority of the State Administration of Material Reserves, Act No. 189/1999 of the Collection, on emergency reserve of oil,

In accordance with the recently passed Law No. 189/1999 of the Collection, on emergency reserve of oil, the quantity of emergency supply must, as of November 1, 2005, reach the level of average 90-day consumption of selected oil products in the Czech Republic in the previous calendar year, yet not less than the quantity of 90-day average net imports of oil and oil products in the Czech Republic. The selected oil products and possibilities of their prospective replacement are defined by the above stated act.

- strategy of utilisation of shared mineral deposits in **border areas**,
  tools – valid international treaties.

5. Tools of raw material policy for achievement of defined goals

5.1 Information system

Enforcement of raw material policy requires collection of information on mineral raw materials and their sources including secondary and easy access to such information. Collection of information is the assignment of the organisation **Geofond Czech Republic**. The raw materials policy as integral part of the economic policy is carried out in compliance with industrial, commercial and energy policies and the state environmental policy. Superior definition and enforcement of the raw material policy requires qualified approach of executors of the other policies as well as adjustment of the present information system for mineral raw materials. The inflow of

information from abroad, especially from EU countries with similar mineral resource base shall be used as a source for the raw material policy. Continuous assessment of current conditions, evaluation of market development and utilisation of mineral resources are necessary preconditions of definition of the core courses of the raw material policy. For this purpose, there is a sufficient information base respectful of the economic, industrial, trade, energy and environmental interests of the state. Information is extracted from drafts of separate policies, reports issued by the Czech Statistic Office and Geofond Czech Republic. Their analysis allows identification or foreseeing of negative influences and assumption of preventive or corrective measures in due time. The information bundle also contains reporting of authorisations for geological and mining activities. The information system describes not only the domestic conditions but abroad as well. The scope of necessary information includes data on utilisation of secondary material sources. The level of information on secondary materials has not yet reached the quality of the information compared to the primary materials.

5.2 Legislative tools

The rules of exploitation of mineral raw materials deposits are set in appropriate legislative regulations whose observance in supervised by the state. The basic legislative tool of an effective raw material policy is the **Mining Act, law No. 44/1988 of the Collection, on mineral wealth protection and its utilisation**, in the valid wording, that defines the conditions and manners of mining activity and activities carried out as mining. Furthermore, the act defines the principles of protection of reserved deposits owned by the state as well as conditions of their utilisation. The technical and administrative issues of processes in utilisation of reserved deposits are governed by the **Czech National Council Act No. 61/1988 of the Collection, on mining operations, explosives and state mining administration**, in valid wording. This act partially defines the utilisation of other mineral resources that are included in given limits. State possession of the industrially significant mineral resources provides room for necessary governmental influence and enforcement of public interests as well as for application of other, especially economic, tools of the raw material policy. The present manner of acquiring of rights to exploit and authorisation for mining activities correspond with the principles of decentralised democratic society where people decide on their matters themselves through community and regional representatives. The above-specified legal regulations are supplemented with a number of executing regulations, namely decrees and proceeds of the Czech Mining Office. Minimisation of the impacts of exploitation of primary mineral sources on the environment is secured through the process of EIA included in the process of review of mining project as well as environmental supervision of exploitation works. The field of geological exploration of mineral deposits in the conditions of market economy is governed by **the Czech National Council Act No. 62/1988 of the Collection, on geological works**, in valid wording (Geological Act). The above-mentioned acts form the Czech mining law suite.

There is no uniform legislative environment in the countries of the European Union in the field of mining law. The mining law of individual countries differ from one another yet all provide environment for existence of uniform market. The issues of work safety and health protection during mining work, safety in operation of technical and electric equipment, oil and natural gas boring, and work safety in environment with risk of explosion are governed by guidelines uniform throughout the EU. The Czech standards are fully compatible with these EU guidelines. Adoption of a new mining act in the Czech Republic is not the top priority of current approximation of the legal environment to the European standards.

The Czech mining law does not contradict the EU law. It allows for sensitive utilisation of natural mineral resources, bestows their protection and the most complete possible exploitation with

least losses. Exploitation oriented only at the rich parts of deposits (ransacking) is not allowed. The law allows exploitation works and at the same time sufficiently protects the rights and rightful interests of the landowners. After updates of the legal acts between 1991-1992, the legal environment in the field of mining approached the standards applied in the EU. Yet upon analysis of the current mining law impediments have been found that cast doubts on the actual application of the regulations in practice. Immediate action shall be taken to amend the geologic works act. In 1997, the Cabinet prepared the factual layout of the update to the existing Geological Act and subsequently the Ministry of Environment elaborated a draft of articulated law. The geological exploration of mineral deposits shall be divided into non-destructive prospecting and geological exploration using works with impact on the land where more stringent administration proceeding for authorisation is proposed. More profound novelisation of the Mining Act shall relate to the amendments of the appropriate definitions in the Civil Code, Trade Act, Civil Engineering Act and others. The most needed adjustments in the Mining Act are presented along with the new Geological Act.

As well as in many EU countries, in the Czech Republic the heritage of authorisations issued before application of stricter regulations in the area of environmental protection persist. This issue shall be attended to in concurrence with the authorities of land development planning and the state mining administration within valid legislative regulations, or its current amendments. The problems with authorisations issued before enforcement of present regulations are closely related to the validity terms of the authorisations. Solution of the issue is therefore based on issuing of short-term, e.g. two-year, authorisations for exploitation of minerals. After expiration of this period, the exploitation plan must be reviewed by the Regional Mining Office and possibly updated and adjusted. The above-specified procedure should be capable of securing compliance of issued authorisations with valid legal regulations of environmental protection. Application of temporary measures or conditions corresponding with the present situation is an option. On the other hand, the issue of compensations is important.

The requirement of the European Union for creation of 90-day supply of state-controlled reserve of crude oil and oil products is enforced by the **Act No. 189/1999 of the Collection, on emergency reserve of crude oil**.

Utilisation of mineral raw materials from seabed shall be defined by the legal standard based on international legal regulations, namely the United Nations Convention on the Law of the Sea and international rules for utilisation of mineral resources from seabed.

Import and export of mineral resources from primary as well as secondary sources is governed, in accordance with the Association Agreement and other international treaties (e.g. CEFTA) by the **decree No. 560/1991 of the Collection, on conditions of awarding of official authorisation for import and export of goods and services**, in valid wording.

Handling of secondary materials is governed by the **Act No. 125/1997 of the Collection, on waste,** that has come into force on January 1, 1998.

One of the forms of trading mineral and secondary materials is their circulation through commodity exchanges. Exchange trading is governed by the provisions of the **Act No. 229/1992 of the Collection, on commodity exchanges**, in valid wording. The draft of an update to this act, whose intention is to introduce new mechanisms designed to spur the trading in the Czech commodity exchanges, was approved by the Cabinet in February 1999.

Functional utilisation of land including mineral resources, in accordance with the principles of environmental protection, is specified in acts **No. 17/1992 of the Collection, on the**

environment, and **No. 50/1976 of the Collection, on land development planning and civil engineering order (Civil Engineering Act)**, in valid wording. Anyone, who utilises land and/or natural resources, designs or removes buildings must execute such activities only after assessment of their impact on the environment and burdening of the area, in scope defined by specified acts, namely the **Czech National Council Act No. 244/1992 of the Collection, on the environment impact assesment.**

The Ministry of Environment is, besides others, the central body of state administration for **execution of state geological survey, protection of mineral environment including protection of mineral resources and underground water, and environmental supervision of exploitation**. Protection of mineral resources is secured through establishment of protected natural reserves, possibly protective zones as well, based on the mining act and the civil engineering act. The environmental supervision of exploitation is one of the tools of preservation of mineral environment that requires elaboration of groundwork for qualified definition of conditions for specification of mining claims, authorisation of mining activities, definition of land limits from the viewpoint of exploitation capacity of areas, and assessment of mineral resource potential of land. Neither the protection of the mineral environment nor the environmental supervision has been legally enforced yet. The environmental supervision of exploitation shall be implemented in the legal system as important tool of effective protection of mineral environment not only at the level of central administration, but mainly at the level of district offices or higher self-administration units. Exercise of the State Geological Survey (SGS) is the assignment of the Czech Geological Survey and the Geofond Czech Republic. One of the main tasks of the SGS is to provide information on geological composition of the territory of the country and general information on sources of mineral raw materials. It is desirable to contemplate establishment of one common institution of the SGS, similarly to the situation in EU countries.

5.3 Economic tools

In order to achieve the goals of the raw material policy the state can also employ economic tools through which financial resources can be obtained. These tools are purposefully used by the state as well as municipalities and miners. *Functioning economic tools are:*

- **prices of mineral raw materials** should not be regulated in the market economy environment (in the case of price for energy, due to the existence of regional monopoly, regulation cannot be completely removed). Mineral raw materials, as industrial products sell for market prices that are defined by the costs incurred by the manufacturer and the demand. Costs of exploitation of mineral raw materials that are usually more risky and fluctuating compared to regular production, are defined by the mining and geological conditions of mines or quarries after internalisation of externalities, including environmental. Part of the profit of mining entrepreneur is the **mining allowance**. The mining allowance (including the portion that is the return of higher than limiting technical and technological level of the miner) should be, besides regular business taxation and tax from extracted minerals (in case of state-owned deposits), left in the possession of the miner. Achievement of the allowance is the main stimulus of development of this highly demanding and unsafe field that mining is;

- **tax from extracted minerals** in accordance with the Mining Act and the appropriate decree does not exceed 10 per cent of the price of the mineral. The taxes present an economic tool of the state as the owner of deposits. Of the received amount 50 per cent are income of budget of the local community in whose vicinity the mining claim is, and the other 50 per cent become part of the national budget where the resources are used to finance recovery of environmental damages, caused by exploitation of reserved deposits. The mineral shall be implemented

through increased flexibility of specification of the compensation tariffs. Amounts of taxes from extracted minerals during the period 1993-1996 are indicated in the table No. 9;

Table No. 9

Taxes from extracted minerals (in millions of CZK)

Materials class /Year	1993	1994	1995	1996	1997	1998
Ores	N	N	0	0	0	0
Fuels	N	N	381	388	404	385
Industrial and building materials	N	N	56	60	60	58
T o t a l reserved minerals	468	441	437	448	464	443

N – not observed Source: Czech Mining Office

- **tax from mining claim** of CZK 10 thousand per year per each square kilometre or its part delimited on the surface (in case of small mining claims of less then two hectares of total area the annual fee is CZK 2,000) is not a mineral policy tool. So far it has been rather a fee. The compensation is the income of communities in whose vicinity the mining claim is located. The fees for mining claims in 1998 amounted to CZK 23 million. In the future, it is desirable to turn it into an economic tool of environmental and landscape protection;

- **financial reserve** in the costs account to **settle mining damages and recovery of land**;

- **depreciation of 10 per cent of the accounting price of material assets**, enabled in cases of purchase of large investment units for exploitation and processing of mineral raw materials, in accordance with the depreciation class 2 of the Czech National Council Act No. 586/1992 of the Collection, on income taxes, in valid wording;

In order to increase the efficiency of utilisation of mineral resources in the medium-term period implementation of new economic tools can be contemplated:

- **environmental tax** that should be introduced in the case of its application in the EU and under similar circumstances. The purpose of the eventual implementation of such environmental tax in the relation to utilisation of mineral resources is not the increase of the total tax burden. For example the proposal of energy and fuel tax in EU countries dated March 1997 expects full balancing of the increase by lowering of other taxes. Based on the declaration of the Cabinet No. 480/1998, on the draft of the State programme for support of energy savings and utilisation of sustainable energy sources, an analysis of the possibilities of introduction of neutral energy and fuel taxes shall be elaborated by the end of the year 1999 (in relation to adjustments in the taxation system in the Czech Republic as part of the EU accession procedure). In the case of exploitation of mineral raw materials it is desirable that the environmental tax, if introduced, replaces the current tax from mining claims and through differentiated application enables inclusion of environmental external conditions in separate locations according to local circumstances (zones of natural reserves, industrially exceptionally burdened areas). The environmental tax should not be mistaken for tax from extracted reserved minerals, it should be applied generally for all industries, possibly services as well;

- **reserve for prospecting and exploration of mineral raw materials deposits** on the costs account. Eventual introduction of this tool requires analysis of the need for application of such a tool and of the issue of subventions to prospecting and exploration of mineral raw materials in the EU countries;

- preference of implementation of technologies enabling **minimisation of waste production in utilisation of mineral raw materials**, e.g. by expansion of current research and development programmes support;

- **preference of higher utilisation of secondary materials** through support to entities efficiently utilising secondary materials in the interest of sensitive use of primary resources, e.g. by extension of current business support programmes or increase of fees for dumping and removal and improvement of flexibility of their definition.

5.4 Land development planning

Land development plan for a large area as a tool of purposeful securing of needs of the region in terms of mineral resources creates conditions for utilisation of mineral raw materials in the region in the long-term view. Management of mineral resources will, just as in the European Union, have two poles: state raw material policy, enforced and applied through legislative and economic tools, and **regional raw material policy**, employing land development planning, governed by the civil engineering act.

The principles of implementation of the mineral raw materials policy in territory include specification of area limits as well as time limitations for exploitation of mineral raw materials in land development plans for large areas **heeding the capacity of the area**. The plans shall determine for specified periods of time the mineral deposits to be opened, to what extent and in which order exploitation shall commence and proceed, termination of exploitation, recovery and landscaping activities in the vicinity of exploitation. Hence the total immediate load on the territory shall decrease and pressure to open number of deposits at the same time in areas with concentrated occurrence of mineral raw materials shall be prevented. At the same time legal securities shall be provided for development of communities as well as other activities using capacities of the territory.

Conclusion

The Raw Material Policy of the Czech Republic in the Field of Mineral raw materials and Their Resources is a basic conceptual document. It originates from the requirements of the society and ways of solution of the matter namely in countries of the European Union. It attempts to present and sustain optimum scope of activities through which the government shall direct utilisation of domestic mineral resources and balancing of the deficit in case of some materials. The aims of the raw material policy originate from the analysis of the domestic raw material base and prognosis of the demands for mineral raw materials in the future. In order to achieve the individual goals separate tools and institutional background are specified.

main goals of the raw material policy

tools	*institutional background*
create condition for securing of requirements of the domestic economy while heeding the principles of sustainable development and environmental exploitation limits	
industrial policy, energy policy, state environmental policy, legislative regulations, informatics, land development planning documentation	MID, ME, MLD, MF, CMO, SAMR, SGS, district offices, communities, professional associations, civic associations, entrepreneurs
achieve conditions common in countries of the European Union in the area of utilisation of domestic mineral resources and assessment of their availability, as well as in the area of trade with mineral raw materials including secondary materials	

legislative regulations, informatics, land development planning documentation, principles of sustainable development	ME, MIT, MLD, CMO, SGS, commodity exchanges, professional associations, civic associations, entrepreneurs
further decrease the consumption of mineral resources as result of structural changes of the economy and technological advancement	
restructuralisation, privatisation, industrial policy, research and development support programmes	MIT, MF, Academy of Sciences of the Czech Republic, universities, professional associations, entrepreneurs
reach the level of EU countries in lower consumption of limited sources of mineral raw materials by their profound utilisation and higher degree of utilisation of secondary materials and recycling, with respect to the initial conditions of the mineral raw material base at after period of extensive exploitation	
economic incentives, principles of sustainable development, research and development support programmes, business support programmes, Waste Act	MIT, ME, MF, communities, professional associations, entrepreneurs
specify raw material policy in detail in particular conditions of regions and areas for purposes of decision making in the areas	
legislative regulations, land development documentation, land utilisation limits	MLD, MIT, ME, CMO, SGS, district offices, professional associations, civic associations, entrepreneurs, citizens

continued

maintain the required energy self-sufficiency of the Czech Republic in the circumstances of EU membership. Achieve optimum extent of energy savings and higher degree of utilisation of renewable energy sources, with respect to low lifetime of domestic deposits of brown coal and lignite, and hence extend the lifetime of domestic non-renewable energy sources of fuels and energy raw materials	
energy policy, state environmental policy, principles of sustainable development, land development concepts, economic stimuli for energy savings, price deregulation, support programmes (energy saving and utilisation of renewable resources support programmes)	MIT, ME, MLD, MF, CMO, Czech Energy Agency, SGS, communities, professional associations, civic associations, entrepreneurs, citizens
create emergency reserve of oil and oil products in the amount of average 90-day supply of selected energy oil products consumed in the Czech Republic	
Oil Reserve Act	SAMR
supplement information system in order to provide accurate image of the lifetime of reserves of individual kinds of mineral raw materials and introduce statistical observation of individual materials	
statistic records	Czech Statistic Office, MIT, ME, CMO, SGS
resolve the issue of utilisation of mineral resources in large protected natural reserves, gradually reduce exploitation of mineral raw material in natural reserves	
state environmental policy, state policy of environmental and landscape protection, legislative regulations, review of raw material potential of individual natural reserves	ME, MIT, SGS, natural reserves administrations, CMO, civic associations, entrepreneurs

evaluate the efficiency of current prospecting of domestic mineral resources, financed by the state budget. Define concept of further geological works in prospecting and exploration of mineral raw materials	
analyses and syntheses, Cabinet declarations	ME, MIT, MF, SGS, professional associations