

CZECH REPUBLIC

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1. ENERGY, ECONOMIC AND ELECTRICITY INFORMATION

1.1. General Overview

The Czech Republic (CR) is together with Slovakia successor country of former Czechoslovakia, which was divided by January 1, 1993. The country is situated in the centre of Europe and has a mild climate. The country's topography is quite varied from plains, hills to highlands and mountains, and regions in the range from 200 to 500 m above sea level make up about 74% of the country. It borders with Austria, Germany, Poland and Slovakia (see Figure 1). It has almost no gas or oil and very limited hydro resources.



Figure 1. Map of the Czech Republic

The CR is a relatively small country of 78 864 square kilometres (land area is 77 276 sq. km) with a population of 10.2 million inhabitants at the end of 2002 (see Table 1). Three quarters of the population live in urban areas. The population density is 129 inhabitants per sq. km. The population is slightly declining, the natural change in population in the Czech Republic was -1.7 persons (in 2001) per 1,000 inhabitants.

TABLE 1. POPULATION INFORMATION

	1970	1980	1990	2000	2001	2002	Average annual growth rate (%) 1990 To 2002
Population (millions)				10.3	10.3	10.2	
Population density (inhabitants/km ²)				130.2	130.1	129.9	

Predicted population growth rate (%) 2002 to 2010	-1.1
Area (1000 km ²)	78.9
Urban population in 2002 as percent of total	74.6

Source: IAEA Energy and Economic Database.

The development of the Czech economy since the year 1989 is characterized particularly by the process of the economic reform. In the year 1991, the main processes of the reform were started, such as liberalization of prices, de-monopolization of the foreign trade, introduction of the internal convertibility of the Czech crown and the beginning of privatization of small enterprises (e.g. shops, restaurants and workshops). This was completed during 1992 and 1993 and privatization of large enterprises commenced. At present, privatization is continuing.

The years 1990-93 are characterized by a substantial drop of economy caused, partially, by external influences (loss of market in former Soviet block, recession in Western Europe) and internal changes (restructuring of the production and loosening of property rights). The economic growth was restored in the year 1994. In the same year, the exigencies of primary energy sources (PES) consumption needed for Gross Domestic Product (GDP) dropped significantly for the first time and continued dropping in subsequent years. The economic growth slowed down in 1997 and was almost zero until 1999 because of still ongoing privatization accompanied by weakness of governing structures and cyclic course of economic activity. At present, the economic growth is slowly increasing (see Table 2).

The energy intensity increased during the decrease of economic activity due to a significant share of inevitable energy consumption in industry (e.g. heating of buildings, hot water preparation and lighting) and the increase in consumption of electricity in households. For the whole time period concerned, the dynamics of reduction in final energy consumption did not reach the level of economy performance decrease. The energy intensity for electricity is almost constant because of increase in consumption of households, which were under-equipped.

TABLE 2. GROSS DOMESTIC PRODUCT (GDP)

	1980	1990	2000	2001	2002	Growth rate (%) 1990 To 2002
GDP (millions of current US\$)			50,766	49,257	48,435	
GDP (millions of constant 1990 US\$)			34,848	34,900	35,031	
GDP per capita (current US\$/capita)			4,944	4,802	4,727	

Source: IAEA Energy and Economic Database.

Table 3 presents the Czech energy resources and Table 4 its energy balance. Both primary and final energy consumption have decreased in 2001 in comparison to 1990. It is a good signal, which

demonstrates the increasing efficiency of the economy. The decrease in the final energy consumption is larger than for the primary energy.

The structure of the consumption has changed even more substantially. (Brown) coal remained the main source of the energy. It still covers more than 50% of the primary energy sources. Regardless of the continuing trend of a decreasing rate, coal will remain significantly important in the future too; based on the present forecast, coal will cover about 40% by the year 2005. In 2001, the structure of primary energy consumption was: 53.8% of coal, 18.9% of crude oil and 20.1% of natural gas. Nuclear energy covers 7.2% including contribution of commercial renewables and hydro which is almost negligible (see Table 4). Coal is partially exported and almost all crude oil and natural gas have to be imported.

Significant changes are taking place in the coal mining industry, mainly the restructuring process connected with the final stage of the privatization process. The main obstacle in closing down of ineffective mines is social (unemployment).

Coal is still the main energy source in final energy consumption. Petroleum products due to road transport increase cover about 19%. The share of natural gas is almost the same, thanks to its use for households and heat production is required mainly by environmental legislation.

The energy sources for electricity production are quite stable for several years since the nuclear power plant (NPP) Dukovany is in full operation and the main hydro potential, which can not be further increased, was utilized. In 2001, the structure of total electricity generation was: fossil fuel (mostly coal) power plants provided 76.9% of total electricity generation, the only Dukovany NPP 19.8% and hydro power plants only 3.3%. After the Temelin NPP is commissioned, nuclear power will cover approximately 40-45% of electricity production in the Czech Republic.

TABLE 3. ESTIMATED ENERGY RESERVES

	Estimated energy reserves in (Exajoule)					
	Solid	Liquid	Gas	Uranium (1)	Hydro (2)	Total
Total amount in place	106.21	0.46	0.14	3.82	1.16	111.80

(1) This total represents essentially recoverable reserves.

(2) For comparison purposes a rough attempt is made to convert hydro capacity to energy by multiplying the gross theoretical annual capability (World Energy Council - 2002) by a factor of 10.

Source: IAEA Energy and Economic Database.

TABLE 4. ENERGY BALANCE

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Indicator	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001 ⁽¹⁾
Indigenous natural resources	1 731	1 627	1 511	1 481	1 380	1 410	1 403	1 347	1 284	1 156	1 246	1 247
Solid fuel	1 572	1 471	1 360	1 324	1 218	1 254	1 241	1 189	1 119	985	1 078	1 077
Liquid fuel	2	3	3	5	5	6	6	7	7	8	7	8
Gaseous fuel	8	12	8	8	8	8	8	7	7	7	7	5
Primary heat and electricity	148	141	140	144	148	142	148	143	150	156	153	157
Imports	592	613	579	605	661	726	803	779	780	744	728	787
Solid fuel	45	81	47	45	45	63	81	62	45	41	45	47
Liquid fuel	317	266	335	318	365	351	369	361	384	355	334	377
Gaseous fuel	210	258	197	239	245	270	321	323	321	316	318	330
Exports	159	153	331	342	349	397	389	376	366	363	339	357
Solid fuel	105	133	300	303	296	341	313	292	271	266	230	234
Liquid fuel	22	15	16	28	46	34	42	45	55	51	40	53
Gaseous fuel	24	0	0	0	0	0	2	2	1	1	2	2
Gross consumption of primary energy resources	2 076	1 938	1 789	1 749	1 668	1 750	1 823	1 745	1 659	1 621	1 656	1 695
Solid fuel	1 348	1 251	1 121	1 057	985	1 006	1 016	977	883	825	906	912
Liquid fuel	356	300	318	306	312	322	342	305	313	326	315	320
Gaseous fuel	226	252	221	250	244	279	318	324	322	327	318	341
Primary heat and electricity	146	132	129	137	147	143	148	139	141	144	117	122
Final consumption, total	1 303	1 217	1 096	1 092	1 054	1 091	1 152	1 099	1 047	1 052	1 018	1051
Non-energy materials	60	44	81	57	60	67	66	41	31	7	14	33

⁽¹⁾ preliminary data

Source: Czech Statistical Office

1.2. Energy Policy (an excerpt from an official document Energy Policy, January 2000)

The energy policy of the CR has been prepared by the Ministry of Industry and Trade as a official draft open document with a horizon of 15 to 20 years and approved by the Czech government in January 2000. Compliance with the energy policy of the State is evaluated by the same Ministry within intervals not longer than two years; the Ministry informs the government on the evaluation results and proposes eventual modifications.

The key strategic targets of the energy policy include the determination of the basic conception of long-term development of the energy sector and determination of the essential legislative and economic environment, which would encourage electricity generators and distributors to prefer environment-friendly behaviour. On the consumption side, the long-term strategic targets of the energy policy include a gradual reduction of the volumes of energy and raw materials needed by the economy to the level of advanced industrial countries. This target should be achieved, in particular, by a support to new production technologies with minimum need for energy and raw materials and with maximum utilization of the energy and raw materials through national work. In the tertiary sphere, the need for energy should be reduced mainly through support to programmes leading to energy savings and to greater utilization of alternative energy and raw material sources in supplying the population with energy.

The main open issues of the energy sector, including the proposed solutions are:

- Adjustment of the prices of energy commodities and services and the tariff structure relating thereto (future development of the prices of electricity, natural gas and centralized heating).

Issue addressed	Solution proposed	Note
Still existing (cross) subsidies to the prices of electricity and natural gas for the households; impact of subsidized prices on the prices for other users and for the utilities; absence of suitable tariff systems for the central supply of heat, gas and electricity.	Year-on-year growth of energy prices respecting the cost analyses performed according to the decision of the government 1250/1999 on further progress in adjusting prices of electricity and natural gas (removing the subsidies to energy prices for the households before the year 2002). Definitive settlement of the issue of energy prices and tariff structure in respect of the households by the end of 2002; a new tariff system for electricity and gas which will enter into force gradually after 1.1. 2000 (for households during 2000).	Adjustment of prices will take place in a socially bearable manner.

- Procedure of the privatization of the state ownership interests in the key energy companies while maintaining a reasonable state influence.

Issue addressed	Solution proposed	Note
Completing the privatization of the electricity and gas distribution companies.	To prepare conditions for privatization in accordance with the branch consolidation.	Concrete time and material plan of privatization will be prepared before 2/2000 and in accordance with the other decision of the government. The task will be fulfilled by the Ministry of Finance in co-operation with the National Property Fund and the Ministry of Industry and Trade.
Maintaining the influence of the State in the transmission grid and in the system of electricity central control (dispatching).	Separation of the transmission system - creating of a company independent on electricity generation and distribution.	Need to decide on how to secure the State's ownership interest in such a new company.
Privatization of the CEZ, a.s.	Privatization of CEZ a.s. will take place in 2002 after adaptation of the electric power sector to the conditions of the new legislation.	Concrete time and material plan of privatization will be prepared before 2/2000 and in accordance with the other decision of the government. The task will be fulfilled by the Ministry of Finance in co-operation with the National Property Fund and the Ministry of Industry and Trade.
S.p. Transgas (as operator of the gas lines of the transit system, the backbone high-pressure gas lines and underground gas storage facilities).	S.P. Transgas will be transformed into a corporation owned by the State and its position in the gas market will be strengthened.	The task will be fulfilled by the Ministry of Finance in co-operation with the National Property Fund and the Ministry of Industry and Trade.
Privatization of companies in the refinery industry: Cepro, a.s. MERO CR, a.s. Unipetrol, a.s.	To leave 100 % state share. To leave 100 % state share. A proposal for the company's holding privatization will be submitted. Completion of the privatization of the holding's subsidiaries is expected to be performed as the first step.	Cepro, a.s. and MERO CR, a.s. are companies of strategic importance (also with implications for national defence of the state), engaged in distribution of liquid media and their storing and protecting.

- Establishing an independent regulator and defining its relationship to businesses (regulation framework).

Issue addressed	Solution proposed	Note
Provide regulation in the electricity, gas and heat supply sectors; specification of the obligations imposed on the grounds of public (general economic) interest, regulation of the business activities of natural monopolies (transmission, distribution, system services); protection of transparent and non-discriminating market competition.	Requirements will be specified in the framework of the preparation of the new energy act concerning the regulator's activities and tasks of the economic regulation, including the regulated businesses' duty to provide contributions to the activities of the regulator. Before the new energy act enters into force, the current regulation regime will apply.	Need to secure the legal aspects of: <ul style="list-style-type: none"> • regulatory framework • independence and objective attitudes of the regulator • financial resources for the regulator.

- Laying down the rules for the development of the internal electricity and gas market (on the basis of EU Directives).

Issue addressed	Solution proposed	Note
Securing the function of independent regulator which function must be performed by the State through such a created body.	Functioning of the independent regulatory body in compliance with the government's policy statement for the period up to 2001-2002.	Need for prior formation of a regulatory framework (see previous point).
Introduction of the rules for the electricity and gas market.	Successive opening of the market. The target solution is reg. TPA in the electricity area and negotiated TPA in the gas area for s.p. Transgas and reg. TPA for distribution companies.	Improved competitiveness of the economy and well secured standard of living of the population, including solution of the employment issue.

- Creating a well-functioning, non-discriminatory, transparent and motivating system of support to possible energy savings, use of renewable resources and electricity and heat co-generation units.

Issue addressed	Solution proposed	Note
Creating a well-functioning, system of support to possible energy savings, use of renewable resources and electricity and heat co-generation units.	To implement the State Programme of energy saving and use of renewable sources according to Government resolution No. 480/1998. To realize the National programme in this sphere based on the act on energy economy, including the systems ensuring financial means. To ensure programme's efficiency and control so that energy and environmental benefits are adequate to the resources invested, while maintaining a long-term feasibility to the national budget as well as opportunities of further financial sources.	The functioning system must be fair and transparent, must encourage the recipient to increase effectiveness and must not deform competition in the energy market. The support systems will be compatible with the procedures used in EU countries and will be suitable to the actual conditions prevailing in the Czech Republic.

- Nuclear power.

Issue addressed	Solution proposed	Note
Further development of the nuclear power sector.	Further development of the nuclear power sector will be evaluated within the context of economically and environmentally optimum exploitation of the coal deposits with respect to projections of demand for the end usage of energy and, within that framework, demand for electricity.	The nuclear power sector can significantly contribute to the fulfilment of the UN Framework Convention on the reduction of the emissions of greenhouse gases. Further development of the nuclear power sector is one of the possible ways of meeting the need for electricity after the year 2015.

The legislative framework of the key targets of the energy policy includes:

- a new Energy Act (responsibility of the Ministry of Industry and Trade and Ministry of Environment);
- the Energy Management Act (responsibility of the Ministry of Industry and Trade and Ministry of Environment);
- the Act 189/1999/Coll. on emergency oil reserves, solutions to the states of emergency need for oil and amendments to certain related laws (the act on emergency oil reserves entered into force by November 1, 1999).

This complete set of laws must enter into force in 2000-2001, with respect to the "pre-entry" negotiations, in order to be able to prepare the Czech energy sector for the conditions of the internal EU market sufficient time in advance. However, the specific purpose of the Energy Act as well as Act on Energy Management had to be ready by the end of 1999 as a basic prerequisite for the application of EC legislation.

Environmental protection in the energy area has been mostly focused on the removal of environmental damage, especially the damage caused by extremely high emissions of pollutants discharged into the air. Successive implementation, in the coal-fired power plants, of de-sulphuring and de-nitrifying projects, as well as installation of equipment to separate dust, have substantially reduced the exhalations, particularly those of sulphur dioxide and dust. In 1998, compared with 1990, the exhalations of sulphur dioxide were reduced by 60% and dust by 80%. These results are very good. Currently our power-generation sources meet the limits defined in Act 309/1991 (the Clean Air Act).

Within the context of the efforts to alleviate the changes in the global climate, the UN Framework Convention on the Change of Climate was adopted in 1992; the Czech Republic acceded to it in 1993. In December 1997 a Protocol on the Convention was adopted, by which the Czech Republic joined the countries which would reduce the emissions of greenhouse gases by 8% before 2008-2012, compared with the level of the year 1990. This reduction applies to all greenhouse gases expressed in the form of the so-called aggregated carbon dioxide emissions balances.

The framework scenario of the development of energy sector in the Czech Republic is based on the following premises:

- Continued operation of the Dukovany nuclear power plant without limitation over the whole time horizon. Both units of the Temelin nuclear power plant will be set in operation: the first unit will be put in test operation in 2001 and the second unit in 2002. Taking into account the successive commissioning of both units, the utilisation of their rated capacity will be lower during the first years of operation;
- Heating plant units in which heat generation is combined with electricity generation are planned to be successively commissioned. Besides these, a number of smaller co-generating units are being built within both the public utilities and private industrial companies. As of the year 2000, up to 100 MW of rated capacity will be added in this way. Another slight increase in the rated capacity in the facilities held by independent producers and by industrial companies is expected after 2000. The declining availability of energy sources will be made up for by new sources, some of which will have already been built to use imported fuels (depending, of course, on the trade balance of the State); nevertheless, available domestic sources will continue being used at the maximum possible rate;
- All the existing and newly built power plants and power and heating plants are, or will be, equipped with facilities for the protection of environment, as required by the laws in force. No new large hydro power stations are planned to be built because the potential of water energy is already utilized at a high rate;
- Greater usage of renewable energy sources will be stimulated by the State Programme of Energy Savings and Usage of Renewable Sources. The spectrum of such sources includes

both the traditional ones - mainly the small hydro power plants - and a wide range of their sources (biomass, wind energy, heat pumps and also geothermal energy and solar energy. Energy saving programmes will be strongly supported;

- The general electricity generation system will rely on nuclear energy, on the exhaustion of the remaining reserves of coal, on the use of gas in co-generating units, on the current level of electricity generation in hydro power stations and on support to more intensive usage of renewable resources;
- The limited domestic availability of coal will not enable the existing coal-fired power plants to continue operating once their de-sulphuring units past their useful life. In the period of 2008-2020, it will be possible to retrofit only part of the existing capacity of the traditional coal-fired power plants, extending their useful life by another 15 years or so (until 2030 to 2035);
- The scenario does not reckon with the possibility of releasing part of the coal reserves to which the environmental limits apply, hence, no new large power generating units which would use domestically extracted coal are planned to be built;
- It follows from the above that any new power plants which will be built after 2015 (2020) will have to use primary sources other than Czech coal. These may include, for example, nuclear units with flexibly regulated power output; however, such units must pay off and must be acceptable to the general public. The nuclear units will work at a basic level of load, serving as a stabilizing element of the electricity system.

1.3. The Electricity System

All major energy companies were converted to share-holding companies and major portion of shares is held by state, a part of the rest was given to municipalities. In last years, many municipalities sold their owner rights mostly to foreign energy companies. Governmental Resolution No. 967/2000 sets the procedure of privatization of the resting state share in electricity sector. In a long-term perspective, the state influence in the energy sector is anticipated, only, in a form of indirect measures (legislation, pricing, tax) and regulating natural monopolies in particular industries.

The Act No. 406/2000 Coll. (Energy Management Act) on Energy Management stipulates the rights and obligations of natural and legal persons in the management of energy, in particular electricity and heat, as well as gas and other fuels. It shall contribute to the economical use of natural resources and protection of the environment, as well as to more efficient use of energy, enhanced competitiveness, more reliable energy supplies, and to the sustainable development of society.

The Act No. 458/2000 Coll. (Energy Act) on Business Conditions and Public Administration in the Energy Sectors establishing a new regulatory regime regulates the business in the electrical power sector. According the Energy Act, the electricity generation, distribution, transmission and electricity trading is subject of licensing. The Energy Act introduces the market environment, opens the electricity and gas markets and defines relevant institutions such as the Energy Regulatory Office (ERO) and the Electricity Market Operator (EMO).

The ERO defined in the Energy Act is a separate state organisation under the responsibility of the Prime Minister and is established as the administrator Office to exercise regulation in the energy sector. Its operating costs are covered by the state budget approved every year by the Parliament. The general mission of the ERO is to support economic competition and protect consumers' interests in energy sector, aiming to meet all reasonable requirements for energy supply, i.e. electricity, gas and heat supplies. The EMO is a state-owned stock company. The key role of the EMO is to organise the electricity market and flow of information between the market players.

For comparison of the Czech Industry Structure and Regulation see Table 5.

TABLE 5. COMPARISON OF THE CZECH ELECTRICITY INDUSTRY STRUCTURE AND REGULATION: IMPACT OF 2000 ENERGY ACT

Area	Old	New
Generation	<p>a) CEZ, 67% state owned company produces 71% of the electricity production</p> <p>b) IPP supply remaining 29% must sell direct to respective local distributor based on CEZ price (some sell to CEZ)</p>	<p>a) Free entry for generators (authorisation procedure).</p> <p>b) Licensed generators free to contract with eligible customers and third parties.</p>
Transmission	<p>a) Transmission owned by a CEZ subsidiary CEPS (since 1999).</p> <p>b) No access to HV transmission allowed for either IPP or distributors</p> <p>c) System (ancillary) services charged to distributors based on the amount of power purchased from CEZ</p>	<p>a) CEPS becomes the Transmission System Operator (TSO). To be spun off as separate company from CEZ.</p> <p>b) Regulated Third Party Access regulated by network regulator through license.</p> <p>c) Postage stamp pricing will be adopted.</p> <p>d) Ancillary services charges are based on total power consumed. Tender process for services proposed.</p>
Dispatch/Market Operator	<p>a) Dispatch managed by the Central Dispatch Centre (UED).</p>	<p>a) UED will be replaced by Electricity Market Operator overseen by a multi stakeholder board.</p>
Distribution	<p>a) Distribution and supply bundled in 8 distributors created in 1990 as joint stock companies. Approximately 50% state owned.</p> <p>b) Distributors are obliged to purchase IPP generation at prices comparable to prices from CEZ.</p> <p>c) Wholesale and retail prices are the same for all distributors despite the cost differences.</p>	<p>a) Distribution services managed by independent distribution services operator</p> <p>b) Regulated non-discriminatory Third Party Access</p> <p>c) Distributors will be able to contract with any generator.</p> <p>d) Distribution tariffs are expected to reflect differences in costs.</p> <p>e) Distributors will be obligated to purchase CHP and renewable electricity generation.</p>
Supply and End User Choice	<p>a) Distributors are also suppliers.</p> <p>b) A small number of wholesale electricity traders.</p> <p>c) Retail tariffs are regulated.</p>	<p>a) Phased implementation of end user choice according to annual demand: > 40 GW·h in 2002, > 9 GW·h in 2003, ≥ 0.1 GW·h in 2005, all customers in 2006.</p> <p>b) Distributors licensed to act as exclusive, regulated suppliers for captive customers.</p> <p>c) Prices for eligible customers unregulated.</p> <p>d) Tariffs for captive customer expected to reflect cost differences among distribution companies.</p>
Regulator	<p>a) The Energy Regulatory Administration sets prices that are approved by Ministry of Finance.</p>	<p>a) New sector regulator Energy Regulatory Office (ERO) sets tariffs for access and use of the networks, market operator and for captive customers.</p>
International Trade	<p>a) HV grid trade limited to CEZ</p> <p>b) Limited MV (110 kV) direct import by distributors</p>	<p>a) Open access to export electricity.</p> <p>b) Imports open but subject to reciprocity conditions.</p> <p>c) Temporary limit on imports to protect domestic companies/consumers against adverse financial impact.</p>
Public Service Obligations	<p>Distributors are obligated to serve consumers.</p>	<p>Distributors are obligated to serve captive customers and to provide access for eligible customers.</p> <p>Distributors who have to supply beyond scope of their license to may receive compensated through government fund.</p>
Renewables	<p>Distributors have an obligation to purchase renewable electricity (price not specified) as well as CHP electricity.</p>	<p>Distributors have an obligation to purchase renewable electricity (price not specified) as well as CHP electricity.</p>

Approximately 70% of the electricity production is concentrated in CEZ, a.s., (Czech Power Company), the joint-stock company: ten coal power plants, the Dukovany and Temelin NPPs, eleven large hydro power plants and two pumped-storage hydro power plants, three wind power plants and one solar power station. The remaining 30% of the electrical power production is provided by plants owned largely by independent producers (e.g. Elektrárna Opatovice a.s., Elektrárna Kolín a.s.) or by

auto producers in industry and local heat producers (co-generation) and by eight regional utilities (0.5%). CEPS, a.s., a daughter company of CEZ, a.s. owns the backbone high voltage power transmission system (400 kV and 220 kV lines) and dispatching center. It is a licenced Czech transmission system operator. At present, CEPS, a.s. is owned partly by the Czech state (66%).

The electricity distribution is provided by eight electrical power distribution companies (utilities). They have a regional monopoly except for large consumers connected directly to high voltage grid. Utilities can buy electricity from small hydro and wind plants.

Table 6 shows the electricity production and installed capacity and Table 7 the energy related ratios.

TABLE 6. ELECTRICITY PRODUCTION AND INSTALLED CAPACITY

Indicator	Unit	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001 ⁽¹⁾
Electricity production, total	GW·h	60 527	59 293	58 882	58 705	60 847	64 257	64 598	65 112	64 692	73 466	74 647
Steam power plants	GW·h	47 138	45 398	44 652	43 949	46 326	48 208	48 903	48 762	49 106	57 550	57 421
Hydroelectric power plants	GW·h	1 257	1 638	1 596	1 776	2 274	2 403	2 080	1 884	2 215	2 313	2 467
Nuclear power plants	GW·h	12 132	12 250	12 627	12 977	12 230	12 850	12 494	13 178	13 357	13 590	14 749
Internal combustion engines and gas turbines	GW·h	-	7	7	3	17	796	1 121	1 288	14	13	10
Nuclear share	%	20.0	20.7	21.4	22.1	20.1	20.0	19.3	20.2	20.6	18.5	19.8
Installed capacity, total	MW	14 957	14 499	14 227	13 851	13 803	14 974	15 103	15 513	15 216	15 324	15 443
Steam power plants	MW	11 626	11 277	11 028	10 652	10 594	10 896	10 954	11 112	11 270	11 431	11 511
Hydroelectric power plants	MW	1 360	1 400	1 402	1 396	1 399	2 014	2 050	2 033	2 153	2 097	2 145
Nuclear power plants	MW	1 760	1 760	1 760	1 760	1 760	1 760	1 760	1 760	1 760	1 760	1 760
Internal combustion engines and gas turbines	MW	211	62	37	43	50	304	339	608	33	36	27
Nuclear share	%	11.8	12.1	12.4	12.7	12.8	11.8	11.7	11.3	11.6	11.5	11.4

⁽¹⁾ preliminary data

Source Czech Statistical Office.

TABLE 7. ENERGY RELATED RATIOS

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Energy consumption per capita (GJ/capita)	188	173	169	161	169	177	169	161	157	161	165
Electricity per capita (MW·h/capita)	5.87	5.75	5.70	5.68	5.89	6.23	6.27	6.32	6.28	7.13	7.25
Nuclear/Total electricity (%)	20.0	20.7	21.4	22.1	20.1	20.0	19.3	20.2	20.6	18.5	19.8
Ratio of external dependency (%) ⁽¹⁾	16	14	15	19	19	23	23	25	24	23	25
Load factor of electricity plants (%)											
- Total	46	47	47	48	50	49	49	48	49	55	55
- Thermal	46	46	46	47	50	51	51	50	50	57	57
- Hydro	11	13	13	15	19	14	12	11	12	13	13
- Nuclear	79	79	82	84	79	83	81	85	87	88	96

⁽¹⁾ Net import / Total energy consumption

Source Czech Statistical Office

2. NUCLEAR POWER SITUATION

2.1. Historical Development and current nuclear power organizational structure

2.1.1. Overview

The nuclear power era in the former CSFR has started off in the 50s because of the lack of oil resources. A heavy water gas-cooled reactor was built and operated in Jaslovské Bohunice (now Slovakia). The further development of nuclear power in the Czech Republic was determined by the influence of former Soviet Union in Eastern Europe.

In the 70s, WWERs 440 of Soviet design were built and the Czech industry was involved in the production of NSSS components and partly in primary circuit - e.g. vessel, control rod drive mechanism. The Czech industry became the supplier of these parts in other Eastern European countries (e.g. 20 reactor vessels were made by Skoda). In the 80s, construction of the WWERs 1000 started. In 1993, a resolution was adopted to change the reactor control system (I&C) to meet the state-of-art criteria of unit control.

2.1.2. Current Organizational Chart(s)

The organizational chart (structure) of the State Office for Nuclear Safety (SÚJB) is presented on the following Figure 2.

Figure 3 shows the main governmental bodies involved in energy policy-making. The Ministry of Industry and Trade has the principal responsibility for overall energy policy. It is supported by the Czech Energy Agency (CEA) for energy efficiency and renewable energy, and the State Energy Inspection Board for the supervision of energy facilities in the public sector and state-owned companies. Since January 2001, the ERO has performed the main regulatory functions.

Through the National Property Fund, the Ministry of Finance acts as government shareholder in state-owned energy companies, except Transgas which is owned by the Ministry of Industry and Trade. The Ministry of Finance also manages state aid to the coal sector and the fund created for managing nuclear wastes. The Ministry of the Environment portfolio includes regulation, air pollution and climate change policy. On behalf of the Ministry of the Environment, the State Environmental Fund provides financial support for the installation of equipment to prevent air pollution, for the extension of the natural gas network and for the use of renewable energy.

The Administration of State Material Reserves has responsibility for oil stockholding and emergency preparedness. The Czech Statistical Office produces most energy statistics, and the Ministry of Industry and Trade has a large role in supply statistics.

ORGANIZATIONAL CHART OF THE STATE OFFICE FOR NUCLEAR SAFETY

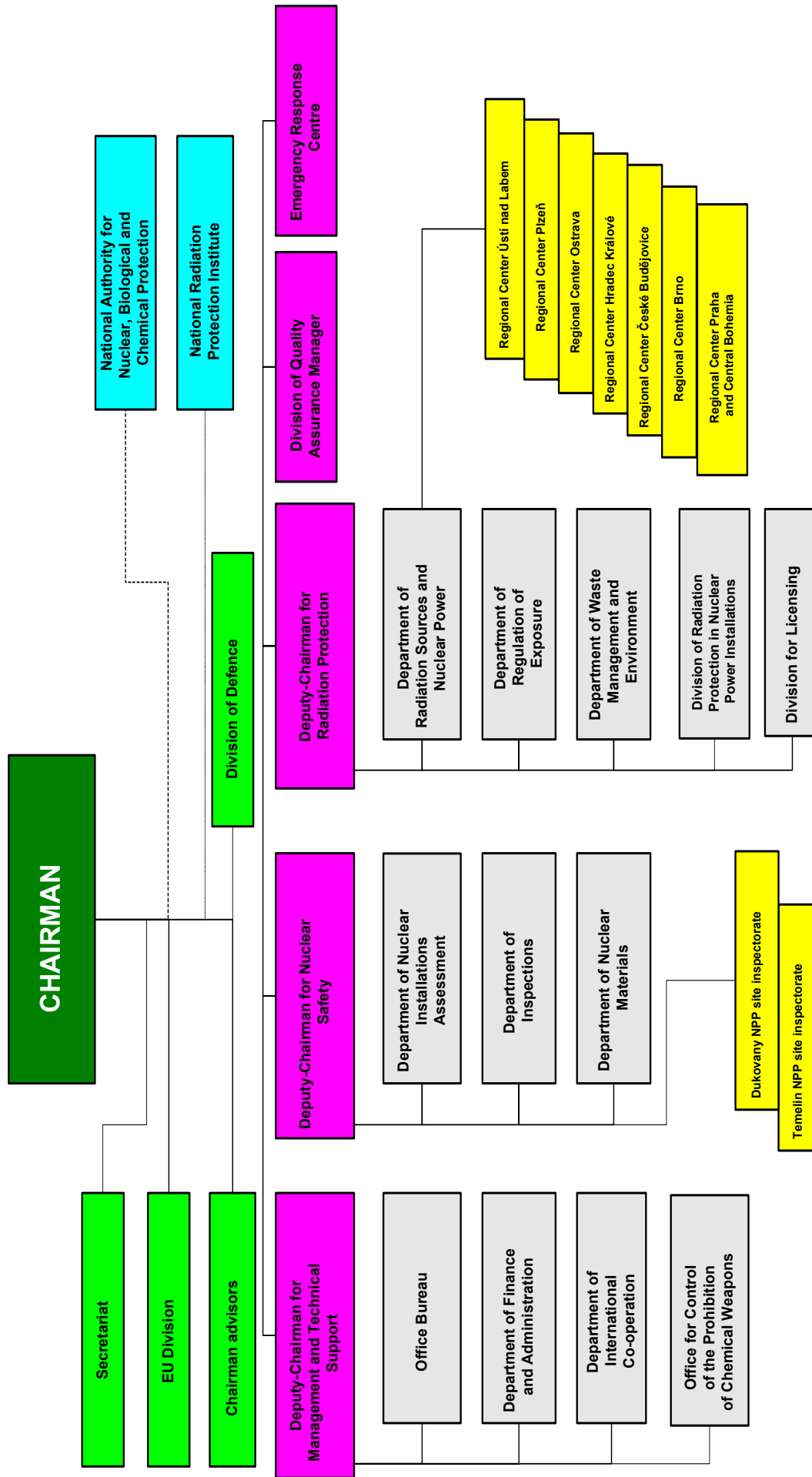
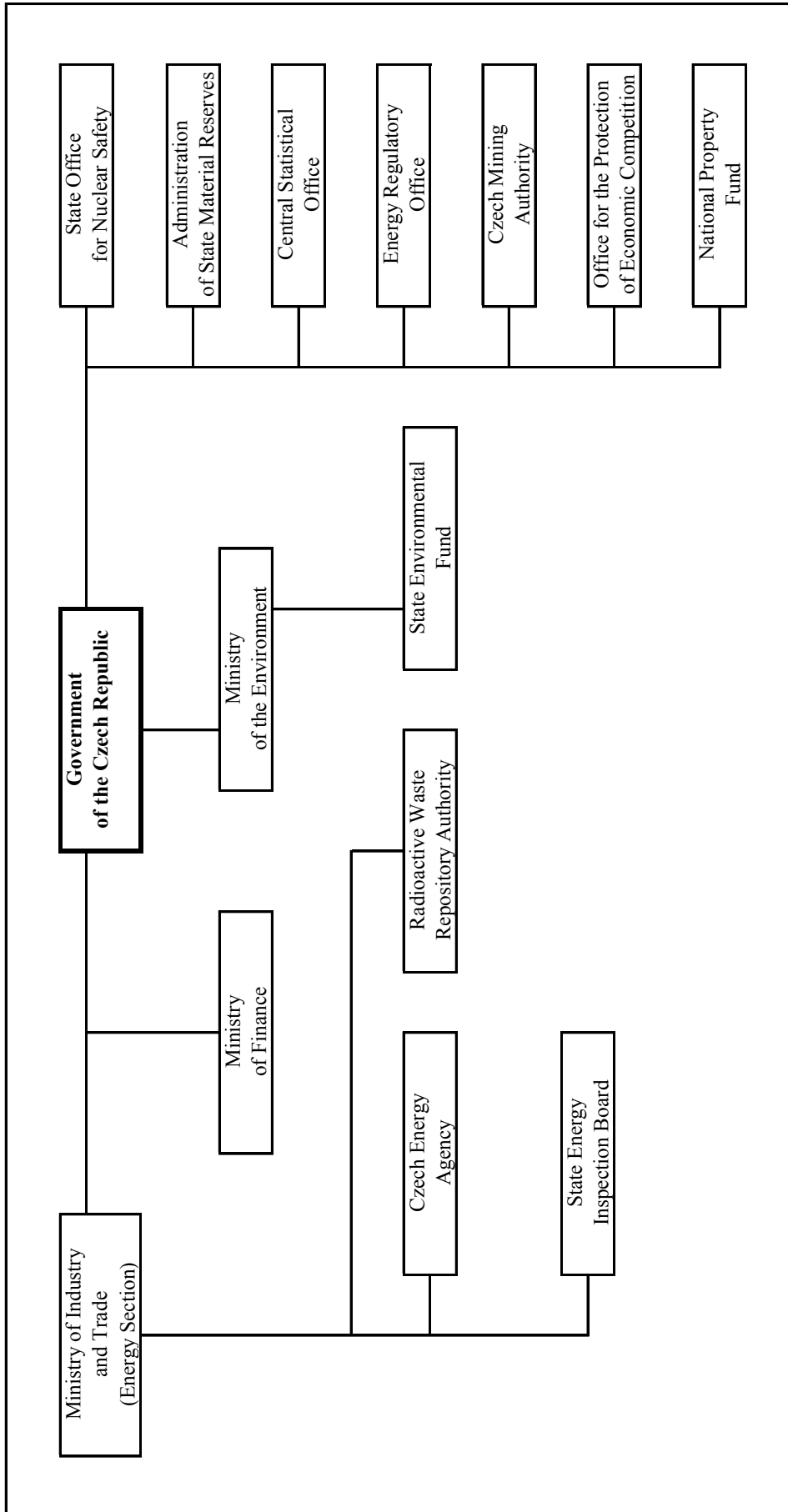


Figure 2. Organizational Structure of the SÚJB.

Government Institutions Involved in Energy Policy-Making



Sources: Ministry of Industry and Trade; OECD/IEA.

Figure 3. Government Structure for Energy Policy

2.2. Nuclear Power Plants: Status and Operations

2.2.1. Status of nuclear power plants

In the Czech Republic, there are four units operating at the Dukovany (EDU-Elektrárna Dukovany) NPP. The units are Russian WWER 440/V213 type PWRs with the total installed power of 1760 MW(e). The production of the plant represents currently about 20% (24.5% in 2002) of the total electricity production in the Czech Republic.

The construction of the Temelin NPP (two units with WWER 1000/V320 type with the total installed power of 2000 MW(e)) has been completed. The Unit 1 and Unit 2 were completed and now they are in test operation. Table 8 shows the current status of the Czech NPPs.

The CEZ, a.s. finances directly the completion of the Temelin NPP, the planned upgrading of Dukovany station and the construction of a spent fuel storage facility. The CEZ, a.s. is using its own resources and credits, without, however, any direct financial participation of the state. The exception is a guarantee of the state for World Bank loan. As soon as the Temelin NPP commences full operation, the proportion of nuclear electricity produced in the Czech Republic will approximately double and it will exceed 40%. The construction of another nuclear power plant is, however, very unlikely in the forthcoming years (see Energy Policy).

TABLE 8. STATUS OF NUCLEAR POWER PLANTS

Station	Type	Net Capacity (MW)	Operator	Status	Reactor Supplier
DUKOVANY-1	WWER	411	CEZ - EDU	Operational	SKODA
DUKOVANY-2	WWER	411	CEZ - EDU	Operational	SKODA
DUKOVANY-3	WWER	411	CEZ - EDU	Operational	SKODA
DUKOVANY-4	WWER	411	CEZ - EDU	Operational	SKODA
TEMLIN-1	WWER	912	CEZ - ETE	Operational	SKODA
TEMLIN-2	WWER	912	CEZ - ETE	Operational	SKODA

Station	Construction Date	Criticality Date	Grid Date	Commercial Date	Shutdown Date
DUKOVANY-1	01-Jan-79	12-Feb-85	24-Feb-85	03-May-85	N/A
DUKOVANY-2	01-Jan-79	23-Jan-86	30-Jan-86	21-Mar-86	N/A
DUKOVANY-3	01-Mar-79	28-Oct-86	14-Nov-86	20-Dec-86	N/A
DUKOVANY-4	01-Mar-79	01-Jun-87	11-Jun-87	19-Jul-87	N/A
TEMLIN-1	01-Feb-87	11-Oct-2000	21-Dec-2000	10-Jun-2002	N/A
TEMLIN-2	01-Feb-87	31-May-2002	29-Dec-2002	1-May-2003	N/A

Source: IAEA Power Reactor Information System; CEZ, a.s.

The National Property Fund (NPF), i.e. the state owns 67.6% of the CEZ, a.s. shares, privatized in the year 1992. The fund delegated the shareholding rights to the Ministry of Industry and Trade. The remaining CEZ, a.s. shares are traded on the Stock Exchange. They are owned, at present, by companies and corporations (28.5%) and individuals (3.9%).

The UJV-Rez, a.s. (the Nuclear Research Institute Rez) was privatized in the year 1992. At present, about 52.4% of the shares is owned by the CEZ, a.s., (Czech Power Company). The SE, a.s., (Slovak Power Company) holds 27.8%, the Škoda JS, a.s. 17.4% and about 2.4% is owned by the local municipality.

The Škoda - Jaderné strojírenství (JS), s.r.o. is 100% owned by Škoda, a.s., where a group of private owners (including major banks) hold a major share, since 1992.

2.2.2. Performance of NPPs

Basic data on performance of the Czech NPPs are shown in Table 8 (see net capacity). Nuclear share in both total electricity generation and total installed capacity it is possible to find in Tables 6 and 7.

2.2.3. Plant upgrading and plant life management

The extensive modernisation long term “Upgrading Program of NPP Dukovany Equipment” (including modernisation of the Dukovany NPP) has started in 1995 and its completion is scheduled in 2010. Partial projects and separate actions relating to the renewal of NPP equipment are organised and coordinated in programme called MORAVA (**MO**dernisation – **RE**construction – **AN**alysis – **VA**lidation).

In the year 2002 was finalized altogether 40 modifications of equipment in total investment of 850 millions CZK, hereof 12 actions increasing the nuclear safety. One of the most important actions of programme MORAVA is “Renewal of supervision and control system equipment”. The realisation works started in 2002 at reactor Unit 3 and are going to continue in sequence at the Units 1, 2 and 4 in the years 2004-2010.

A part of upgrading programme is IAEA safety issues implementation. In the year 2002 70% of recommendations have been solved, 27% of recommendations are prepared for the period 2003-2006, and 3% of recommendations, connected with renewal of supervision and control system equipment, will be realized in the terms according to the time schedule of this action.

Complex upgrading programme MORAVA implementation creates good precautions for the Dukovany NPP safety operation at least till the year 2025. After full implementation of the modernisation programme it is expected that the Dukovany NPP will achieve a safety level comparable to that of NPPs of the same vintage operating in Western Europe.

The Temelin NPP safety enhancement started, with the IAEA assistance, during the construction period, when replacement of I&C system and nuclear fuel was initiated. The combination of eastern and western technology was successfully completed and verified by the commissioning process. The IAEA missions have so far confirmed that most of the safety issues have been resolved and works on the few remaining issues are in an advanced stage and are not precluding safe operation of the Temelin NPP.

2.2.4. Nuclear power development projections and plans

The current energy policy of the Czech Republic does not exclude the construction of new nuclear units in addition to the Temelin NPP, if they are needed. However, in light of the country’s large excess of baseload electricity generation capacity, an additional nuclear power plant is very unlikely to be built in the foreseeable future.

2.2.5. Decommissioning information and plans

According to the Atomic Act (at present, the Act No. 18/1997 Coll. has been amended with Act No. 13/2002 Coll. and Act No. 310/2002 Coll.), the CEZ, a.s. should, under the state control, prepare both financial and technical means for decommissioning of its nuclear facilities and it should provide payments to the Czech National Bank (the State Bank of the Czech Republic) to accumulate means necessary for a preparation and construction of a spent fuel repository.

At present, the costs of future decommissioning of an nuclear power plant and disposal (deposit) of spent fuel are not directly reflected in the electricity prices and the nuclear power plant utility creates provisions based on its consideration, from the net profit to its reserve fund, under the state control.

2.3. Supply of NPPs

Most of the equipment and all construction parts of both NPPs were produced inside of the country or in Slovakia (second part of former Czechoslovakia). Fuel, I&C system and main circulation pumps are main exceptions. The original design of both NPPs is Russian but during construction of the Temelin NPP it was substantially changed (I&C system, fuel). Also at the Dukovany NPP a substantial improvement has been done. A standard Western practice was used to combine Eastern and Western technologies for the Temelin NPP. The Temelin NPP will achieve a safety level that is comparable to that of operating Western NPPs.

The CEZ, a.s., has built up the Temelin NPP in the co-operation with the many Czech and foreign contractors. The main Czech contractors are: Škoda Praha, a.s., Energoprojekt Praha, a.s., Škoda Jaderné strojírenství, s.r.o., Škoda Energo, a.s., Vítkovice, a.s., První brněnská ABB, a.s., Sigma, a.s., ZVVZ Milevsko, a.s., EZ Praha, a.s., Královopolská strojírna, a.s., Vodní stavby Bohemia, a.s., Modřanská potrubní, a.s., Orgrez SC (OSC), a.s., Regula Praha, a.s. The most important foreign suppliers are: Hungary (GANZ Budapest), Austria (PKE Philips, Nalco Chemical, ELIN), France (Alcatel Cable Lyon, SGN, Fragma), Italy (Ansaldo), Germany (AEG AG, Sempel), Switzerland (ABB, Cerberus, Sulzer), Great Britain (Cadcentre Ltd.), USA (Westinghouse, Data Systems & Solutions, Sorrento Electronics).

The Czech industry is capable to produce almost all of the main components of WWER design, including RPV's, primary piping, steam generators, pumps, etc.

The first research reactor was delivered to UJV Rez from former Soviet Union but after two reconstructions it is almost entirely produced in the Czech Republic (the fuel is again an exception). The two other small research reactors were designed in the country using some parts and experience of Russian technology.

2.4. Operation of NPPs

The CEZ, a.s., owns and operates both Dukovany and Temelin NPPs and ensures its personnel training. Maintenance services are supplied both by the CEZ, a.s. itself and by many other Czech companies from which the most important are listed in Appendix.

The state supervision and licensing activities are carried out by the State Office for Nuclear Safety (SÚJB) based on the Act No. 18/1997 Coll. (Atomic Act) on Peaceful Utilization of Nuclear Energy and Ionizing Radiation.

2.5. Fuel Cycle and Waste Management

The uranium for the fuel of the Dukovany NPP is supplied by a domestic producer, with the exception of one-year consumption of the Russian uranium for nuclear fuel, purchased a few years ago. Both conversion and enrichment services, together with fuel fabrication, for the Dukovany NPP are purchased in Russia.

For the Temelin NPP, the fuel for the initial loading was already supplied and contracts for a few reloadings are signed. The uranium for the initial fuel load was supplied by Russia, conversion and enrichment were provided by Russia and the United Kingdom and fuel fabrication took place in the USA. For the fuel reloads of the Temelin NPP, Czech uranium is ensured. Conversion will be done in France and Canada and enrichment and fuel fabrication in the USA (Westinhouse).

The fuel for the Czech research reactors, including the uranium, comes from the Russian Federation.

Uranium mining in the Czech Republic is according to Government Resolution No. 750/1999 declining. State owned company Diamo s.p. is the only operator of uranium mining and milling facilities in the Czech Republic. In January 2003 only one underground mine at Rozna site remains in operation and the milling facility produced 350 t uranium in the year 2002 in the form of ammonium diuranate after chemical lixiviation of uranium ore. The uranium is processed into a form of a chemical concentrate (yellow cake). The production will decline to 50-150 t/year during the next one or two decades after terminating the underground mining in the year 2004. All other mines are already closed and remediation works are carried out. Therefore about 110 t uranium/a is produced as the by-product of technologies used by the remediation of chemical mining sites near the city of Straz pod Ralskem as well. There are no other uranium processing plants in the Czech Republic.

The storage of spent fuel is ensured by its originators, i.e. CEZ, a.s. with regard of spent fuel from the nuclear power plants, and UJV-Rez, a.s. with regard of spent fuel from the research reactors. The spent fuel storage capacity in the reactor pools is sufficient for 6 years of operation of each nuclear power plant unit. At the Dukovany NPP, an interim dry cask-type (CASTOR) spent fuel storage facility with capacity of 600 tonnes of uranium was put in operation, in 1995. Currently, another interim storage facility for spent fuel from the Dukovany NPP is being prepared, with a projected operation start-up in 2006.

High-level waste and spent nuclear fuel classed as waste are unsuitable for disposal in existing repositories. The construction of a deep geological repository is proposed in the "Concept of Radioactive Waste and Spent Nuclear Fuel Management in the Czech Republic", prepared by RAWRA (the Radioactive Waste Repository Authority) in co-operation with a number of other organizations. The Concept was completed by the Ministry of Industry and Trade for government discussion. Based on a preliminary timetable, approval for the final disposal facility site is expected in 2015, construction start of the repository approximately in 2030. The commissioning of the repository is scheduled for roughly 2065.

The issue of reprocessing spent fuel remains open. The decision whether spent fuel is to be reprocessed is, in principle, left to its owner. At present, the CEZ, a.s. does not consider the reprocessing as economical. Due to the fact that the preparation of a final repository of radioactive waste is the responsibility of the state, the procedure of both the CEZ, a.s. and the state, regarding the reprocessing issue must be co-ordinated in the long-term. A decision to reprocess or directly dispose spent fuel (after its conditioning) as a waste is suspended for the time of its storage in the interim storage facility, envisaged for the time of 40 to 50 years.

In UJV-Rez, a.s. a new spent fuel interim storage facility was put into operation in 1996, with sufficient capacity for the entire life of the operating research reactors.

A shallow land repository of radioactive waste is operated by CEZ a.s. within the Dukovany NPP complex. It is designed to accommodate all future low and intermediate radioactive waste from both the Dukovany and Temelin NPPs.

A repository for low and intermediate radioactive waste is located in abandoned mine "Richard" near Litomerice on the north of the Czech Republic.

More detail information is possible to find in "Country Nuclear Fuel Cycle Profiles", Technical Reports Series No. xxx (in preparation).

2.6. Research and Development

2.6.1. R&D Organizations and Institutes

The responsibility for the research state policy in the area of nuclear energy is divided between the Ministry of Industry and Trade of the Czech Republic and the State Office for Nuclear Safety.

Most activities in the area of nuclear energy research and development are carried out by UJV Rez, a.s., (the Nuclear Research Institute Rez) founded in 1955 and the Czech Technical University in Prague. The Nuclear Fuel Institute owned by Skoda a.s. performs specialized research of fuel element cladding. Several institutes of the Czech Academy of Sciences and other universities such as West Bohemia University in Plzen are marginally included in the nuclear power research.

At present, three research nuclear reactors are operated in the Czech Republic. Two experimental reactors are located in vicinity of Prague at the Nuclear Research Institute in Rez – LVR-15 and LR-0 – and one training reactor VR-1 is operated by the Faculty of Nuclear Sciences and Physical Engineering in Prague.

2.6.2. Development of advanced and new generation nuclear reactor systems

Czech organisations (and especially Nuclear Research Institute Rez plc) are already engaged in some topics related to the „Development of Advanced and New Generation Reactor Systems”. Czech research institutions and universities are also involved in the activities covered by EURATOM 5th Framework Programme addressing severe accidents, plant life management and other topics significant for current and advanced reactors (including molten salts reactors). UJV Rez has become a member of High Temperature Reactor Technology Network (HTR-TN), consequently – it is active in the preparation of 6th Framework Programme projects on HTR. It is expected that within 6th FP – EURATOM Priority Programme “Management of Radioactive Waste” the Czech Republic will take part in the projects focused on reactor concepts with better use of fissile material and less waste generation.

Czech Republic has an observer status in the IAEA INPRO project, and UJV Rez representative is a member of this project Steering Committee (continued participation in the follow-up phase 1B is expected).

Medium-term prospects formulated in the State Energy Concept include an option of new nuclear power source of an advanced type. The required infrastructure has been developed during 1999 – 2003 within the Czech Ministry of Industry and Trade project “Criteria for Decision-making and Selection of an Alternative Nuclear Power Source” (leading organisation – UJV Rez, participants: Czech industry and universities) that had two main targets:

- Establishing criteria for decision-making and selection of nuclear source as an alternative to fossil and renewable;
- Optimising procedures applied for incorporating an alternative nuclear source into the Czech grid.

The Czech Republic makes every effort to get involved in GENERATION IV programme being aware of its importance.

2.7. International Co-operation and Initiatives

The Czech Republic has had very active international co-operation with a number of foreign nuclear – oriented organizations and is a member of a number of international nuclear organizations including the International Atomic Energy Agency (IAEA), the Nuclear Energy Agency (NEA) as

well as other bilateral and multilateral organizations such as the World Association of Nuclear Operators (WANO) and the Western European Nuclear Regulators' Association (WENRA).

It takes part in international research activities organized by international organizations like NEA, ISOE, INEX, IRS and programmes of CERN, Dubna, etc.

The relatively large volume of the nuclear safety related technical support continued to come from the IAEA and European Union. The Czech Republic participates in the IAEA Programme of technical co-operation and in the PHARE Programme, especially Regional PHARE Nuclear Safety programme, from the European Union.

Nuclear power-related activities, especially nuclear safety, have been a principal major focus for the IAEA national technical co-operation programme with the Czech Republic. It has focused on many specific technical issues of WWER-type reactors, such as integrity of primary circuit, in-service inspection, plant operation and maintenance, Systematic Approach to Training (SAT), comprehensive safety assessment methodology and analysis and implementation of operational feed-back. A safety improvement programme for Dukovany NPP implemented over the years resulted in upgradings of the plant in accordance with international practice and standards. Safety assessment of the Temelin NPP was subject to technical co-operation through site safety mission, design review missions (1990, 1996, 2001), operational safety missions – OSART (1990, 2001) and various topical missions (QA, LBB, PSA, fire safety), which were focused on safety issues generally identified for WWER 1000 units. Many missions at the Dukovany NPP (8) and particularly at Temelin NPP (19) have taken place since 1990. Furthermore, the full scope IRRM mission was also conducted at SÚJB in June 2001 to review the effectiveness of the regulatory body of the Czech Republic. Participating in regional projects related to safety assessment was one of the most important areas and continued under several national projects. The Nuclear Research Institute Rez was one of the main beneficiaries.

In the past decade the radioactive waste management policy was subject to several TC projects focusing on assessment of risks and elaboration of a waste management policy in the Czech Republic.

The IAEA technical co-operation (TC) programme approved for the Czech Republic for the current cycle 2003-2004 comprises of four TC projects. The on-going TC programme for the current cycle includes the following areas:

- Strengthening the Analytical Laboratory at the National Physics Institute (CZR2003);
- Evaluation of Radiation Damage Attenuation in WWER Reactor Pressure Vessel and Core Internals (CZR4009);
- Automatic Data Acquisition and Evaluation System for Research Reactor (CZR4010);
- Enhancing Regulatory Body Assessment Capabilities (CZR9015).

In addition to these projects, another project was implemented by the IAEA in 2002 as support to the Nuclear Research Institute Rez, the Nuclear Physics Institute of the Czech Academy of Sciences and the FJFI CVUT for replacement of equipment irreparably damaged by floods in summer 2002 which is an example of prompt TC assistance to unexpected situations:

- Equipment Replacement at the Nuclear Research Institute (CZR9014).

Several safety missions to the Temelin and Dukovany NPPs and UJV Rez are included in the TC programme for 2003-2004.

The Czech Republic is also actively participating in the Europe regional TC programme dealing, with primary circuit integrity, management of radioactive wastes, safety of research reactors, harmonization of PSA practices, strengthening of safety assessment capabilities and emergency preparedness.

Of particular importance was the so-called IAEA Extra-budgetary Programme, aimed at enhancing nuclear safety of WWER reactors. For some of the activities, SÚJB, CEZ, a.s. and other

Czech organizations were involved in this programme. Within this framework, with active participation of other WWER operating countries, lists of design shortcomings established in the individual types of WWER reactors were prepared. These shortcomings were step-by-step analysed and subsequently repaired or removed.

Apart from receiving support, the Czech Republic has also been providing support by financing (via the IAEA) technical assistance projects in Armenia, Bulgaria and Georgia in 2001, and Armenia, Georgia and Ukraine in 2002. In 2003, the Czech Republic considered to make technical and financial assistance to Armenia for strengthening safety of the Medzamor NPP, Moldova for support of the radiation protection with emphasis on medical exposures, Ukraine for enhancing of safety of the Ukrainian Zaporozhe NPP and Uzbekistan for enhancing operational reliability and safety of research reactor in Tashkent.

In co-operation with the EC administration for Phare programme control in nuclear safety various Phare projects have been an important part of activities related to safety upgrading.

The Czech Republic is a member of the 5th Framework Programme of the EU. In 2002, strengthening of a scientific and research co-operation with the EU countries was realized through participation in the EU 5th Framework Programme, covering research and technological development and was significant feature of the international co-operation. The UJV Řež took part in 45 projects, especially in “Nuclear Fission” EURATOM key activity, which implementation well progressed in 2002. The UJV Rez has been intensively preparing for the EU 6th Framework Programme and submitted proposals for participation in various Integrated Projects (IP) or Network of Excellence (NoE) in nuclear and other areas (aircrafts). The co-operation with the leading European nuclear research centers reached a new, qualitatively and quantitatively higher level recognizing the Institute as the competent partner.

Co-operation of the Czech Republic with the OECD Nuclear Energy Agency (NEA) started in 1992 when the UJV first joined the Halden Reactor Project and developed significantly since 1996 when the Czech Republic was accepted into the OECD/NEA. Since then, Czech specialists take part in the Committee for Safety of Nuclear Installations (CSNI) and in all permanent Working Groups and Special Expert Groups in various specialist meetings and also in majority of the Joint Research and Database projects. Through that co-operation, the Czech Republic shares the key know-how with the most developed countries in all important areas of nuclear sector, keep the relevant national infrastructure on sufficient level, stimulate young people for work in the field and make financial expenses more effective.

Bilateral relations continued with the countries of major programmes for peaceful utilization of nuclear energy and ionizing radiation, e.g. France (CEA, IRSN), USA (NRC, DOE), Germany (BMU, GRS) and Russian Federation (Kurchatov Institute, NPPs).

For the Czech Republic is also significant co-operation with the neighboring states – Germany (participation of German experts in experts seminars and meetings, co-operation with the Temelin NPP and UJV Rez), Slovakia (exchange of information, co-operation during multilateral projects organized under IAEA and the EU programme Phare), Austria (co-operation of experts and seminars for safety questions, Melk process) and Poland (co-operation based on the submission of information related to nuclear safety, radiation protection and the Temelin NPP start-up), as well as with other states, such as France (participation of French experts in expert seminars, implementation of Phare projects), the United States of America (thermohydraulic codes) and Japan (participation of the Czech experts in expert seminars and training courses focused on nuclear safety, radiation protection, NPP operation, radioactive waste treatment and seismic resistance of NPPs) including Hungary (during bilateral meeting in Prague in 2002, chairmen of national regulators signed an agreement on co-operation and information exchange) and Slovenia (bilateral meeting, technical visit to the Dukovany NPP).

With respect to technical and industrial co-operation, there are many activities based on bilateral contracts that are not subject to any centralized review.

The Czech Republic succeeded into the Agreement between the government of the Czechoslovak Socialist Republic and the International Atomic Energy Agency (IAEA) concerning a number of agreements indicated at appendix 1.

2.8. Human Resources Development

In the Czech Republic the Ministry of Education, Youth and Sports is the central authority in education responsible for overall strategy, educational policy, upper secondary and special schools, distribution of the financial resources from the State budget and introduction of the general scientific research and development policy.

The government of the Czech Republic approved “The National Programme of Development of Education” (Gov. resolution No. 113 of 2001-02-07), published under the title “The White Book”. The programme is a part of the strategy of further social and economic development of the Czech Republic, which highlights the education and human resource development as one of the governmental priorities. The White Book provides basic guidelines for the development of the whole education system in the mid-term time horizon of 2005, with some parts up to the year 2010. The education sector is user of radiation sources including the school research reactor at the Technical University in Prague.

The Czech Republic, a country with developed nuclear energy, dedicates systematic care to educating and training human resources and specialists to ensure provision of reliable operation and manufacturing of various nuclear devices, and carrying out research and developmental activities. Utilization of the existing research reactor facilities for production of radioisotopes, material testing (LVR-15), reactor physics (LR-0) and training (VR-1) is considered another mid term country priority. Reliable operation of research reactor facilities, improvement their safety and safety assessment in line with updated technologies will be constantly addressed. Of great importance is also constant human resources development and training, in particular in health physics (diagnostic radiology, nuclear medicine and radiotherapy), radiation physics QA/QC (preparation of guides, protocols and procedures), isotope production and radiation accidents. Most of this programme will be financed through national resources. However, the Czech Republic will strongly support a regional co-operation for education and training.

3. NATIONAL LAWS AND REGULATIONS

3.1. Safety Authority and the Licensing Process

The State Office for Nuclear Safety (SÚJB), as Czech Republic’s national regulatory authority in nuclear safety and radiation protection field was established as of 1st January 1993 by the Act No. 21/1992 Coll. It is a follow-up organization of the former Czechoslovak Atomic Energy Commission. The SÚJB is carrying out state supervision and licensing activities. The legal framework of the SÚJB is given by Act No. 18/1997 Coll., on the Peaceful Utilization of Nuclear Energy and Ionizing Radiation (Atomic Act). The other legal documents specifying powers of SÚJB are listed in the paragraph Main National Laws and Regulations in Nuclear Power.

The SÚJB is an independent central body of the state administration with its own budget. It is headed by a Chairman appointed by the Czech Government (as a body) and the Chairman can, on request, be present at the government meeting. Regulatory decisions of the SÚJB (except of fines)

cannot be changed by any other governmental body. Deputy Chairmen, Directors of Departments and Heads of Divisions are appointed by the Chairman of the SÚJB.

The Chairman acts at the same time as the Nuclear Safety Inspector General. He appoints the SÚJB nuclear safety and radiation protection inspectors. The inspectors' authorities, to perform their function, are stipulated in the provisions of Act No. 18/1997 Coll.

The SÚJB has 203 employees (August 2003) and two institutes are subordinated financially and as a technical support. The organizational chart of the SÚJB is presented in Figure 2.

3.2. Main National Laws and Regulations in Nuclear Power

The Czech Republic's legislative framework is based particularly on the Atomic Act. At present, the Czech legislation in the sphere of nuclear energy and ionizing radiation consists mainly of the following national laws and appropriate decrees of the SÚJB and the Government:

- Act No. 18/1997 Coll. (Atomic Act) on the Peaceful Utilization of Nuclear Energy and Ionizing Radiation regarding especially the state supervision over the nuclear safety of nuclear installations and licensing activities. The act corresponds, in a sufficient extent, with the reciprocal legislation of the European Union member countries. Now, the Act is amended with Act No. 13/2002 Coll. and Act No. 310/2002 Coll.
- Act No. 458/2000 Coll. (Energy Act) on Business Conditions and Public Administration in the Energy Industry Sectors and on Amendment to Other Laws.
- Decree of the SÚJB No. 144/1997 Coll., on Physical Protection of Nuclear Materials and Nuclear Facilities and their Classification.
- Decree of the SÚJB No. 145/1997 Coll., on Accounting for and Control of Nuclear Materials and their Detailed Specification. Now the Decree is amended in the wording of Decree of the SÚJB No. 316/2002 Coll.
- Decree of the SÚJB No. 146/1997 Coll., Specifying Activities Directly Affecting Nuclear Safety and Activities Especially Important from Radiation Protection Viewpoint, Requirements on Qualification and Professional Training, on Method to be Used for Verification of Special Professional Competency and for Issue Authorizations to Selected Personnel, and the Form of Documentation to be Approved for Licensing of Expert Training of Selected Personnel. Now the Decree is amended in the wording of Decree of the SÚJB No. 315/2002 Coll.
- Decree of the SÚJB No. 214/1997 Coll., on Quality Assurance in Activities Related to the Utilization of Nuclear Energy and in Radiation Activities, and Laying Down Criteria for the Assignment and Categorization of Classified Equipment into Safety Classes.
- Decree of the SÚJB No. 215/1997 Coll., on Criteria for Siting Nuclear Facilities and Very Significant Ionizing Radiation Sources.
- Decree of the SÚJB No. 106/1998 Coll., on Nuclear Safety and Radiation Protection Assurance during Commissioning and Operation of Nuclear Facilities.
- Decree of the SÚJB No. 195/1999 Coll., on Basic Design Criteria for Nuclear Installations with Respect to Nuclear Safety Radiation Protection and Emergency Preparedness.
- Decree of the SÚJB No. 196/1999 Coll., on Decommissioning of Nuclear Installations and Working Places with Important and Very Important Sources of Ionizing Radiation.

- Decree of the SÚJB No. 324/1999 Coll., on Limits of Concentration and Amount of Nuclear Material for which Nuclear Liability Requirements does not apply.
- Decree of the SÚJB No. 179/2002 Coll., Laying Down a List of Selected Items and Dual Use Items in Nuclear Sector.
- Decree of the SÚJB No. 307/2002 Coll., on Radiation Protection Requirements.
- Decree of the SÚJB No. 317/2002 Coll., on Type-Approval of Packaging Assemblies for Transport, Storage, and Disposal of Radionuclide Sources and Nuclear Materials, on Type-Approval of Ionizing Radiation Sources, and on Transportation and Shipment of Specified Nuclear Materials and Specified Radionuclide Sources (on Type-Approval and Transportation).
- Decree of the SÚJB No. 318/2002 Coll., on Details of Emergency Preparedness of Nuclear Facilities and Workplaces with Ionizing Radiation Sources, and on Requirements on the Content of On-Site Emergency Plans and Emergency Rules.
- Decree of the SÚJB No. 319/2002 Coll., on Function and Organization of National Radiation Monitoring Network.
- Decree of the SÚJB No. 419/2002 Coll., on Personal Radiation ID Cards.
- Decree of the SÚJB No. 185/2003 Coll., on Putting Nuclear Equipment or Workplace of III. or IV. Category out of Service.
- Unregistered regulation issued by Ministry of Trade and Industry - Statut No. MPO 9/97 on the Radioactive Waste Repository Authority.
- Decree of the Government No. 11/1999 Coll., on Emergency Planning Zone.
- Decree of the Government No. 416/2002 Coll., on Payments of Radioactive Waste Producers to the Nuclear Account and Annual Amount of Contribution to Municipalities and Rules for its Provision.

4. CURRENT ISSUES AND DEVELOPMENTS ON NUCLEAR POWER

4.1. Energy Policy

Both Czech nuclear power plants, i.e. the Dukovany and Temelin NPPs, are built, operated and owned by the CEZ, a.s. The nuclear research reactors at Rez are operated and owned by the Nuclear Research Institute (UJV-Rez, a.s.). The university nuclear research reactor, in Prague, is operated and owned by Technical University CVUT.

Investment projects of CEZ, a.s. are based on its business plan and they are financed from CEZ, a.s., own resources. The only state budget obligation is represented by the Czech government guarantee provided to the US Eximbank, regarding the loan from the Citibank, for Westinghouse supplies to Temelin nuclear power plant.

Nuclear safety and radiation protection in the Czech Republic are supervised by the national regulatory authority - the State Office for Nuclear Safety (SÚJB) established on 1st January 1993 as a follow-up organization of the former Czechoslovak Atomic Energy Commission. The responsibilities

of the SÚJB concerning nuclear safety, the licensing of nuclear facilities, including fuel and waste treatment facilities, and nuclear safeguards are given by the Act No. 18/1997 Coll.

An environmental impact assessment of a nuclear installation project, as well as, of another civil construction including other significant sources of ionizing radiation, is determined, especially, in the following three laws:

- The Act No. 50/1976 Coll. (the Civil Construction Act) determines procedures of the Civil Construction Office - an administrative body making decisions in regard to the siting, construction and operation. Licence concerning nuclear installation needs approval of the SÚJB. The Act has been amended and the last changes are included in the Act No. 59/2001 Coll;
- The Act No. 244/1992 Coll. (Environmental Impact Assessment, EIA) determines that, prior to an administrative decision, the environmental control bodies, including the Ministry for the Environment, issue an official attitude to the environmental impact assessment (even if the attitude is not binding for the final decision of an administrative body). Within the EIA process, a public hearing is required. A formally established group of citizens may become a participant of the procedure according, also, to the above mentioned Act. The Act has been amended with the Act No. 100/2001 Coll. and the changes have entered into force in 2002;
- The Act No. 18/1997 Coll. (at present, the Atomic Act has been amended with Act No. 13/2002 Coll. and Act No. 310/2002 Coll. for the purpose of harmonization with the EU legislation), concerning the state supervision on the nuclear safety, together with associated regulations, determines, apart from others, procedures of the SÚJB when issuing the approval according to the Civil Construction Act. Prior to an issue of the approval, the SÚJB considers safety analysis including a proof that the construction impact on the population and environment will not exceed limits determined by this Office;

The Energy Policy (see 1.2. Energy Policy) is a basic document indicating the targets in the area of energy management according to the needs of economic and social development, including environmental protection. The long-term strategic targets of energy policy include a gradual reduction of the volumes of energy and raw materials needed by the Czech economy to meet the level of advanced industrial countries. The new sub-objectives up to 2020 on the demand side are to remove price subsidies and distortions, to create competitive markets for electricity and gas, to achieve freedom of choice for consumers, and to ensure energy efficiency enhancement.

At present the government energy policy is focusing on harmonizing the Czech energy sector standards with those in the EU. The main changes and priorities of the current Energy Policy in the Czech Republic are:

- Increasing energy efficiency of energy use
- Protection of environment
- Respect of the principles of sustainable development
- Reliable and safe ensurance of energy
- Economic competitiveness
- Rational introduction of new energy resources and identification of role of domestic resources
- Finalization of energy sector restructuring and privatization
- Energy policy based on identical goals as the energy policy of the European Union

From 2002 the largest customers of energy, accounting for roughly two-thirds of total consumption, have a free choice of the electricity supplier and by the end of year 2006, the schedule will eventually cover all energy customers.

The energy policy includes the renewable energy sources (solar, wind, biomass etc.), however, with limited possibilities: small hydro power stations for local use, wind power stations where wind exceeds 5 m per second on average, limited scale of solar systems, some geothermal using heat pumps. The renewable sources shall contribute to the total consumption of primary energy sources from a current level of about 1.5 % to about 3-6 % by 2010 and about 4-8 % as of 2020.

The State Programme to Support Energy Savings and Use of Renewable Sources of Energy is a one year programme set up by the Ministry of Industry and Trade which has been announced each year since 1991. It includes energy saving measures in the sphere of production, distribution and consumption of energy, wider use of renewable and secondary sources of energy and development of co-generation of heat and power, counselling, implementation of new low energy consuming technologies, education, public education and promotion leading to more economic use of energy. To carry out the State Programme, the Ministry of Industry and Trade has established the CEA.

The CEA is a publicly funded organisation carrying out the work of the former Energy Agency. The CEA main mission is to encourage and carry out activities aimed at energy savings and mitigate negative environmental impacts caused by the consumption and conversion of all kinds of energy. The CEA is in charge of implementing the above-mentioned State Programme. The CEA implements programmes which:

- Save energy in industry, agriculture and transport
- Optimise energy supplies of residential areas
- Implement co-generation in small and medium-sized heat production sources
- Reduce energy consumption in public and residential buildings, as well as education and healthcare sector buildings
- Increase the use of renewable and alternative energy sources

At present, the State Energy Concept Update has been prepared by the Ministry of Industry and Trade based on the Energy Management Act and the Energy Policy (2000) as a official draft open document with horizon up to 2030 for Government discussion. In compliance with the energy policy of the State and the Energy Management Act the document will be periodically evaluated and eventually modified by the same Ministry within intervals not longer than two years.

4.2. Privatisation and deregulation

The 1994 Energy Act, which previously regulated energy sector, was replaced in January 2001 by the new Energy Act. The construction of new heating plants above 30 MWt capacity has to be approved by the Ministry of Industry and Trade and units below this limit by regional authorities. Criteria for approval in both cases include the use of domestic and local energy sources, energy efficiency and conditions of solvability of the investing company.

According to current legislation, there is no compulsory buy-back tariff between heat generators and heat distributors; prices are fixed by contract. As electricity sales make up an important part of the district heating revenues (up to 80%), liberalisation of the electricity market is likely to lower electricity prices and reduce the revenue of co-generation of heat and power operators. To offset this, the new Energy Act includes an obligation of purchase to transmission and distribution networks for the electricity generated by co-generation of heat and power. However, the buy-back tariff is not set by the new Energy Act so co-generators and buyers (distribution company or national grid) will have to negotiate the prices. Along the same lines, the new Energy Act also contains an obligation of purchase for heat generated from co-generation of heat and power, industrial process, renewable energy and environmentally clean incineration. However, there are exemptions from the obligation where the end-consumer will not accept a higher tariff or for non-compliance with technical parameters.

The Ministry of Finance regulates the household tariff for each network on a cost-plus fees analysis method. Since 1994, regulation on prices for industrial heat users has been lifted.

As 50% of households have individual meters and flow regulation, household tariffs for the remaining consumers do not reflect actual consumption of heat but are based on the size of the apartment and/or the number of persons per apartment. This tariff structure appears complicated and inaccurate in evaluating effective heat consumption and providing effective energy-saving incentives. Heat subsidies were abolished in 1996 but the VAT rate remained at 5%. With the new Energy Act which came in force in January 2001, the ERO is in charge of pricing and licensing.

4.3. Role of the government in the nuclear R& D

The Research and Development Council, pursuant to the provisions of Act No. 130/2002 Coll., on State-Funded Research and Development Support and on the Amendment of Some Related Acts, such as the Act on the Support of Research and Development, is a professional and advisory body of the Government of the Czech Republic in the area of research and development (R&D) and fulfils the tasks following from this act, in particular:

- a) clarifies long-term principle trends and proportions of the progress of research and development in the Czech Republic through its advisory bodies, which are professional commissions for individual areas of research and development;
- b) carries out regular annual analyses and assessments of the existing state of research and development and the comparison with the situation abroad and presents it to the Government;
- c) performs the function of an administrator and operator of a research information system pursuant to the Act and approves the operational rules of the research and development information system;
- d) assembles the various viewpoints regarding materials presented to the Government in the area of research and development;
- e) deals with advisory bodies for research and development of the European Communities and with the research and development councils of individual member states of the European Communities and other countries;
- f) fulfils other tasks and duties stipulated by law, specific legal regulations or assigned by the Government;
- g) proposes a medium-term perspective of research and development support;
- h) proposes the amount of total costs on research and development from individual budget chapters and recommends their distribution pursuant to the Act.

The "National Research and Development Policy of the Czech Republic" was approved by the Government of the Czech Republic in January 2000. This document was formulated by the Ministry of Education, Youth and Sport and the Research and Development Council of the Czech Republic in co-operation with representatives of the state administrative bodies, Academy of Sciences of the Czech Republic, Grant Agency of the Czech Republic, Council of Czech Universities, Czech Rectors' Conference, Association of Research Organisations and Confederation of Industry of the Czech Republic. This National Policy should be compatible with the respective policies of developed countries and should include primarily the following:

- the specification of priorities of industrial R&D, oriented on the most efficient disciplines supporting the export of goods, technologies and services and also on such fields which form a base for the long-term economic evolution with respect to ecological problems;
- the financial support of disciplines having international standards, mostly at the universities. Such policy will cultivate the culture, health and security of a nation together with other basic needs;
- the support of a transference of scientific and technological knowledge,

- the harmonisation of a system and legislation of a state R&D support with those of the European Union by formulation and implementation of a new R&D Act and creation of respective conditions for its functioning.

Together with the approval of R&D National Policy the Government also accepted a proposal of respective measures for its realisation.

4.4. Nuclear Energy and Climate Change

Utilization of nuclear energy is playing very significant role in electricity production and reduction of emissions in the Czech Republic. If the total electricity output of the Dukovany and Temelin NPPs was replaced by the same output of traditional coal-fired power plants, then the volume of carbon dioxide emissions would increase by 17% in the Czech Republic. The purpose is to change future approaches to the environmental issues to support further minimisation of the impacts of the energy sector on the environment.

Coal-fired power plants planned to remain in use for a long-term were desulphurized and denitrified before the end of 1998. Their operation currently meets the strict emission limits of the Act No. 309/1991 Coll. – the Clean Air Act currently replaced by the Act No. 86/2002 Coll.

The Czech Republic acceded to the UN Framework Convention on Climate Change (UN FCCC) in 1993 on the basis of the Government of the Czech Republic Resolution No. 323/1993. In 1998, the Czech Republic signed the Kyoto Protocol. During the 2008-2012 commitment period, the country is committed to reducing total emissions by 8% compared to the 1990 level. At present, total GHG (greenhouse gases) from fuel combustion are 20% below the 1990 baseline.

In June 2002 the Act No. 86/2002 Coll. (new Clean Air Act) came into force. The main reason for restructuring the current air protection legislation in the Czech Republic lies in harmonisation and transposition of the relevant legislation of the European Union in relation to the preparation for accession of the country to the European Union. The new Act is comprehensive and includes protection against pollutants, protection of the ozone layer and of the climate system of the earth in the sense of the UN FCCC and of the Kyoto Protocol. The new Clean Air Act also provides legislative basis for the National Programme to Mitigate Changes in the Climate of the Earth, approved by the government of the Czech Republic. The Act will set up reduction targets for substances influencing the climate system and deadlines for achieving them.

4.5. Safety and waste management issues

In the Czech Republic all uranium-related activities are carried out by the state-owned company Diamo s.p. The uranium produced is used entirely for fuelling operating nuclear units. The Czech Republic has no domestic industry for producing nuclear fuel or providing other fuel-cycle services such as conversion and enrichment, and there are restrictions on uranium imports. The fuel for the Dukovany NPP is imported from Russia where it is manufactured with Czech uranium. CEZ, a.s. has signed a contract with Westinghouse to buy five years' worth of fuel from its U.S. plants to supply the Temelin NPP.

In conjunction with the reduction of uranium production, a major programme of Diamo s.p. focuses on the decommissioning and restoration of closed mining and milling sites. It aims to mitigate the heavy damage done to the environment by past uranium production activities. The programme covers some 20 sites and is expected to last until 2040.

The construction of a deep geological repository for high-level waste and spent nuclear fuel is proposed in the "Concept of Radioactive Waste and Spent Nuclear Fuel Management in the Czech

Republic”, prepared by RAWRA (the Radioactive Waste Repository Authority) in co-operation with a number of other organizations and the Ministry of Industry and Trade:

- 2005 and ongoing, construction of a spent nuclear fuel storage facility;
- 2015, selection of sites with proper geological conditions taking into account local developments at proposed sites. After evaluation of relevant results include two sites into land use plans (main and reserve one) for deep geological repository;
- 2025, confirmation of the suitability of one site for a geological repository on the basis of geological work performed and complex data analysis;
- 2030, preparation of the necessary documentation for construction of an underground research laboratory and performance of long term experiments for confirmation of safety of deep geological repository;
- 2065, operation of deep geological repository.

4.6. Other issues

The Government of the Czech Republic considers nuclear power as an important component of the energy balance in the country. It intends to follow the strategic documents of the European Union, the Green Paper – Towards the European Strategy for the Security of Energy Supply and the Accession Partnership Agreement of the European Union. In doing so, the Czech Republic will comply with the relevant international agreements in the nuclear energy field, including the Nuclear Safety Convention. It recognizes the necessity of continuous upgrading and modernization of the nuclear power sector in the country, as well as strengthening the national safety authority.

Nuclear power will remain one of the important main sources of electric energy in the Czech Republic for the foreseeable future. Czech Power Company (CEZ, a.s.) will therefore continue to focus on operational reliability and safety issues of operating units in full compliance with international safety standards and practices. This national programme will be designed, financed and implemented entirely by CEZ, a.s.

Participation of the Czech Republic in the IAEA TC regional programme is very important. High-level of plant performance and nuclear safety, sound management practices and appropriate level of maintenance resources and R&D require continued focus and exchange of experience in order to continuously and sustainably comply with international best practices and standards. To this end, the Czech Republic considers regional activities as highly beneficial and a very high priority and shall continue its active involvement in NPP-related regional activities of Europe Section. Issues of particular interest include:

- Evaluation of safety issues which are of importance for the strengthening nuclear safety of WWER reactors;
- Implementation of plant safety improvements;
- Enhancement of operational safety through development of in-service inspections techniques;
- Progress in comprehensive waste management and decommissioning preparation programmes;
- Concept of radioactive waste and spent fuel management and final disposal;
- Reconstruction of design basis of NPPs with WWER-440 and WWER-1000;
- Plant ageing management programme.

Mechanisms of the IAEA safety review missions shall be used as a tool of independent international verification in this area for the medium term. In comparison with last 10 years, it is expected that the high frequency of the IAEA missions will be substantially lower (5-10 years).

The assistance expected for the period 2003-2004 will include:

- OSART follow-up missions of the Temelin NPP and the Dukovany NPP;
- INSARR mission at LVR 15 reactor at the NRI Řež ;
- IPSART mission at the Temelin NPP;
- Safety Issues mission at the Dukovany NPP.

REFERENCES

- [1] IAEA Energy and Economic Data Base (EEDB)
- [2] IAEA Power Reactor Information System (PRIS)
- [3] Czech Statistical Office
- [4] Ministry of Industry and Trade
- [5] OECD/IEA

Appendix 1
INTERNATIONAL, MULTILATERAL AND BILATERAL AGREEMENTS

AGREEMENTS WITH THE IAEA

- Nuclear Proliferation Treaty related safeguards agreement INFCIRC N° 541 Entry into force: 11 September 1997
- Additional Protocol Entry into force: 1 July 2002
- Improved procedures for safeguards inspectors Accepted designation of
- Supplementary agreement on provision of technical assistance by the IAEA Succeeded: 1 January 1993
(Notification of succession was received on 1 July 1998)
- Agreement on privileges and immunities Succeeded: 27 September 1993

OTHER RELEVANT INTERNATIONAL TREATIES etc.

- Nuclear Proliferation Treaty Succeeded: 1 January 1993
- EURATOM Non-member
- Treaty for prohibition of nuclear and other mass-destruction weapons located on sea and ocean bottoms and underground
- Convention on physical protection of nuclear material Entry into force: 1 January 1993
- Convention on early notification of a nuclear accident Entry into force: 1 January 1993
- Convention on assistance in the case of a nuclear accident or a radiological emergency Entry into force: 1 January 1993
- Vienna convention on civil liability for nuclear damage Entry into force: 24 June 1994
- Joint protocol Entry into force: 24 June 1994
- Protocol to amend the Vienna convention on civil liability for nuclear damage Signature: 18 June 1998
- Convention on supplementary compensation for nuclear damage Signature: 18 June 1998
- Convention on nuclear safety Entry into force: 24 October 1996

- | | | |
|---|-------------------------|--------------|
| • Joint convention on the safety of spent fuel management and on the safety of radioactive waste management | Entry into force: | 18 June 2001 |
| • ZANGGER Committee | Member | |
| • Nuclear export guidelines | Adopted by former CSFR | |
| • Acceptance of NUSS codes | Accepted by former CSFR | |
| • Nuclear Suppliers Group | Member | |

BILATERAL AGREEMENTS

- The Agreement between the Government of the CSSR and the Government of Austria on the Issues of Common Interest Related to Nuclear Safety and Radiation Protection
- The Agreement between the Government of the CSFR and the Government of Germany on the Issues of Common Interest Related to Nuclear Safety and Radiation Protection
- The Agreement between the Government of the CSFR and the Government of Hungary on the Issues of Common Interest Related to Nuclear Safety and Radiation Protection
- The Agreement between the Government of the CSFR and the Government of USA on Co-operation in Peaceful Uses of Nuclear Energy
- The Agreement between the Government of the CR and the Government of the Russian Federation on Co-operation in the Nuclear Energy Field
- The Agreement between the Government of the CR and the Government of Canada on Co-operation in the Peaceful Uses of Nuclear Energy
- The Agreement between the Government of the CR and the Government of the Slovak Republic on Co-operation in the State Regulation of Nuclear Safety and Nuclear Materials
- The Agreement between the Government of the CR and the Government of Ukraine on Co-operation in the Nuclear Energy and Nuclear Industry
- The Agreement between the Government of the CR and the Government of Ukraine on Co-operation in the Transport of Nuclear Materials between CR and Russian Federation over the territory of Ukraine
- The Agreement between the Government of the CR and the IAEA on Safeguards
- The Agreement between the Nuclear Installations Safety Directorate (France) and the State Office for Nuclear Safety (Czech Republic) for the Exchange of Information and Co-operation in the Regulation of Nuclear Safety
- The Agreement between the United States Nuclear Regulatory Commission and the Czech Republic State Office for Nuclear Safety on Exchange of Technical Information and Co-operation in Nuclear Safety
- The Agreement between the United States Nuclear Regulatory Commission and the Czech Republic State Office for Nuclear Safety on Application of Thermohydraulic Codes (CAMP)
- The Agreement between the United States Nuclear Regulatory Commission and the Czech Republic State Office for Nuclear Safety on Co-operation in the Framework of Program of Severe Accident Research
- Statement of Intent concluded between Minister of Science and Technology of the Republic of Korea on one side and Deputy Minister of Industry and Trade of the CR and the Chairman of the State Office for Nuclear Safety of the CR on the other side
- The Agreement between the Health & Safety Executive of the United Kingdom of Great Britain and Northern Ireland and the Czech Republic State Office for Nuclear Safety on Exchange of Information
- The Agreement on Co-operation in the Area of State Supervision of Nuclear Safety and Peaceful Utilisation of Atomic Energy between the Federal Regulatory Authority of the Russian Federation (Gosatomnadzor) and the Czech Republic State Office for Nuclear Safety

- The Agreement between the Federal Ministry for Environment, Nature Conservation and Nuclear Safety of the Federal Republic of Germany and the State Office for Nuclear Safety of the Czech Republic on Exchange of Information
- The Agreement between the CIEMAT (Spain) and the Czech Republic State Office for Nuclear Safety on Evaluation of Computer Technology Used for Measuring and Control Systems in Nuclear Safety of Nuclear Power Plants for the Purpose of Licensing Process
- The Arrangement between the State Office for Nuclear Safety of the Czech Republic and the Slovenian Nuclear Safety Administration for the Exchange of Information.
- The Arrangement between the State Office for Nuclear Safety of the Czech Republic (SÚJB) and the United States Nuclear Regulatory Commission (USNRC) for the Exchange of Technical Information and Cooperation in Nuclear Safety Matters
- The Arrangement between the State Office for Nuclear Safety of the Czech Republic and the State Commission for Nuclear Supervision of Ukraine on Cooperation in the Area of State Administration and Supervision of Nuclear and Radiation Safety in Uses of Nuclear Energy

Appendix 2

DIRECTORY OF THE MAIN ORGANIZATIONS, INSTITUTIONS AND COMPANIES INVOLVED IN NUCLEAR POWER RELATED ACTIVITIES

NATIONAL ATOMIC ENERGY AUTHORITY

Ministry of Industry and Trade
Energy Division
Na Františku 32
110 15 Praha 1 – Staré Město

Tel: (+420) 224 851 111
Fax: (+420) 224 811 089
<http://www.mpo.cz/>

State Office for Nuclear Safety
(Státní úřad pro jadernou bezpečnost - SÚJB)
Senovážné náměstí 9
110 00 Praha 1
Czech Republic

Tel: (+420) 221 624 111
Fax: (+420) 221 624 704
<http://www.sujb.cz/>

Ministry of Environment
Vršovická 65
100 10 Praha 10

Tel.: (+420) 267 121 111
Fax: (+420) 267 310 308
<http://www.env.cz/>

Czech Society for Radiation Protection
c/o State Office for Nuclear Safety

Tel: (+420) 224 172 738

Radioactive Waste Repository Authority (RAWRA)
(Správa úložišť radioaktivních odpadů – SÚRAO)
Dlážděná 6
110 00 Praha 1

Tel: (+420) 221 421 511
Fax: (+420) 221 421 544
<http://www.surao.cz>

Energy Regulatory Office (ERO)
Masarykovo nám. 5
586 01 Jihlava

Tel: (+420) 567 580 111
Fax: (+420) 567 580 640
<http://www.ero.cz>

Czech Energy Agency (CEA)
U Sovových mlýnů 9
118 00 Praha 1

Tel: (+420) 257 099 011
Fax: (+420) 257 530 478
<http://www.ceacr.cz>

POWER UTILITIES

Czech Power Board
Praha

Power Company ČEZ, a.s.
Jungmannova 29
111 48 Praha 1

Tel: (+420) 224 081 111
Fax: (+420) 224 082 440
<http://www.cez.cz/>

Dukovany Nuclear Power Plant

<http://www.cez.cz/>

Temelín Nuclear Power Plant

<http://www.cez.cz/>

ČEPS, a.s.
Elektrárenská 774/2
101 52 Praha 10

Tel. (+420) 267 104 111
Fax: (+420) 267 104 568
<http://www.ceps.cz>

Electricity Market Operator, a.s. (EMO)
Sokolovská 192/79
186 00 Praha 8 – Karlín

Tel: (+420) 296 579 160
Fax: (+420) 296 579 180
<http://www.ote-cr.cz>

NUCLEAR RESEARCH INSTITUTES

Nuclear Research Institute Řež plc
250 68 Řež u Prahy

Fax: (+420) 220 940 840
Tel: (+420)220 940 885, 220 940 179,
220 940 351, or 266 171 111
<http://www.nri.cz/>

National Radiation Protection Institute
Šrobárova 48
100 00 Praha 10

Tel: (+420) 267 311 239
Fax: (+420) 267 311 410
<http://www.suro.cz/cz/index.html>

National Institute for Nuclear, Biological
and Chemical Protection (SÚJCHBO)
Příbram – Kamenná
262 31 Milín

Tel: (+420) 318 621 187, 318 600 200
Fax: (+420) 318 626 055
<http://www.sujchbo.cz>

Research Institute of Fuel and Energy Complex
VUPEK
Praha

Energoprojekt Praha, a.s.
Vyskočilova 3
140 21 Praha 4

Tel: (+420) 241 006 111
Fax: (+420) 241 006 739
<http://www.egp.cz>

Škoda – UJP Praha, a.s.
Nad Kaminkou 1345
156 10 Praha – Zbraslav

Tel: (+420) 257 920 273
Fax: (+420) 257 921 760
<http://www.skoda-ujp.cz>

Nuclear Physics Institute
Academy of Sciences of the Czech Republic
258 68 Řež u Prahy

Tel: (+420) 220 940 149
Fax: (+420) 220 941 130, 940 220
<http://hp.ujf.cas.cz/>

Institute of Plasma Physics
Academy of Sciences of the Czech Republic
P.O.Box 17, Za Slovankou 3
182 21 Praha 8

Tel: (+420) 266 052 052, 286 890 450
Fax: (+420) 286 586 389
<http://www.ipp.cas.cz/>

MANUFACTURERS AND SERVICES

Škoda Praha, a.s.
M. Horákové 109/116
160 00 Praha 6

Tel: (+420) 224 396 111
Fax: (+420) 224 396 447
<http://www.skodapraha.cz/>

Škoda Jaderné strojírenství (JS), s.r.o.
Orlík 266
316 06 Plzeň

Tel: (+420) 377 042 410

EZ Praha, a.s.
Na Poříčí 1076/5
P.O.Box 889
111 74 Praha 1

Tel: (+420) 233 026 111
Fax: (+420) 224 810 495
<http://www.ezpraha.cz/>

Královopolská strojírna, a.s.
Křižíkova 68a
660 90 Brno

Tel: (+420) 532 045 400
<http://www.kralovopolska-strojirna.cz/>

Vodní stavby Bohemia, a.s.
(now Hochtief VSB, a.s.)
Primátorská 36/323
180 00 Praha 8 - Libeň

Tel: (+420) 283 841 851
Fax: (+420) 283 840 642
<http://www.hochtief-vsbs.cz/>

Modřanská potrubní, a.s.
Komořanská 326/63
143 14 Praha 12 - Modřany

Tel: (+420) 296 781 400
Fax: (+420) 296 781 403
<http://www.modrany.cz/>

Diamo s.p.
Máchova 201
471 27 Stráž pod Ralskem

Tel: (+420) 487 851 338
Fax: (+420) 487 851 456
<http://www.diamo.cz>

OTHER ORGANIZATIONS

Academy of Sciences of the Czech Republic (ASCR)
Národní 3
117 20 Praha 1

Tel: (+420) 221 403 111
Fax: (+420) 224 240 512
<http://www.cas.cz/>

Czech Nuclear Forum
Hoffmanova 3
147 00 Praha 4 – Podolí

<http://www.nuclear-forum.cz/>

Czech Nuclear Society
(Česká Nukleární Společnost)

<http://www.csvts.cz/cns/>

Czech Society of Nuclear Medicine
(Česká společnost nukleární medicíny)

<http://www.csnm.cz/>

UNIVERSITIES

Czech Technical University in Prague
Headquarters
Zikova 4
166 36 Praha 6 – Dejvice

Tel: (+420) 224 351 111
<http://www.cvut.cz/en/>

Czech Technical University in Prague
Faculty of Nuclear Sciences and Physical Engineering
Břehová 7
115 19 Praha 1 — Staré Město

Tel: (+420) 224 351 111
Fax: (+420) 222 320 861
<http://www.fjfi.cvut.cz/>

Charles University
Faculty of Mathematics and Physics
Ke Karlovu 3/5
121 16 Praha 2

Tel: (+420) 221 911 111
Fax: (+420) 221 911 292
<http://www.mff.cuni.cz>

West Bohemia University
Univerzitní 8
306 14 Plzeň

Tel: (+420) 377 631 111
Fax: (+420) 377 631 112
<http://www.zcu.cz/index-en.html>
<http://www.fst.zcu.cz/>
<http://www.kke.zcu.cz/>