LITHUANIA

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1. GENERAL INFORMATION

1.1. General Overview

The Republic of Lithuania is situated on the eastern coast of the Baltic sea, in central Europe. Lithuania is bordered by Latvia in the north, Belarus in the east, Poland in the south, Kaliningrad Region of the Russian Federation in the southwest and the Baltic sea in the west.

Lithuania is situated in a temperate climate zone. The average annual air temperature in Lithuania is 5.5°C, with 17.8°C in June and -6.5°C in January. The absolute maximum-recorded temperature is 36°C and the absolute minimum -40°C. There are noticeable east-west weather variations. The western part, mostly influenced by the Baltic Sea, is characterized by the smallest temperature variations. The eastern part, where the Ignalina nuclear power plant is situated, has colder and longer winters and warmer but shorter summers. Western and southwestern winds predominate.

The average annual amount of precipitation is 638 mm. About 70% of the precipitation takes place during the warm period of the year (April - October). The minimum relative humidity (53-63%) is in June and the maximum (exceeding 90%) in January.

The steady growth of the population (about 0.9% a year) in the period 1970 to 1990, primarily caused by influx of people from other Soviet republics, was abruptly stopped in 1991 and a period of slow decrease, caused mostly by the outflow, followed. The population slightly exceeded 3.7 million in the period from 1990 to 2000. In the 2001 the number of population dropped to 3.5 million. (Table 1).

TABLE 1. POPULATION INFORMATION

									Growth rate (%)
	1960	1970	1980	1990	1998	1999	2000	2001	1980 to 2000
Population (millions)	2.7	3.1	3.4	3.7	3.7	3.7	3.7	3.5	0.4
Population density (inhabitants/km²)	41	47.8	52.2	56.8	56.7	56.8	56.7	53.7	0.4
Urban population as percent of total	38	49.9	60	68.1	68.2	68	68	67	-
Area (1000 km²) 65.2									

Source: IAEA Energy and Economic Database; Country Information.

1.2. Economic Indicators

Lithuanian Gross Domestic Product (GDP) increased on average by 4.6% per year from 1980 to 1989. However, because of Lithuania's export to east oriented economy and the shortage of domestic mineral and energy resources, Lithuania suffered from a very steep decline in production during the transition to a market economy. A slow decrease of 5% in GDP in 1990 was followed by a much more serious recession during the period 1991 to 1993. The situation gradually stabilized in 1994 with preliminary data on GDP of the same level as in 1993. Steady growth during 1995-1997 was followed by slowdown in 1998 because of the influence of the financial crisis in Russia. The Lithuanian market stabilized in 1999- 2001 and is growing steadily. The historical GDP data are shown in Table 2.

1.3. Energy Situation

Lithuania's primary energy sources are not substantial and have not been thoroughly explored. The country has limited oil reserves. There is no information about resources of uranium. There is a

potential of about 400 MW(e) of hydro power, of which 100 MW(e) has been developed.

TABLE 2. GROSS DOMESTIC PRODUCT

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001*	Growth rate (%) 1990 to 1998
GDP [a]	0.034	0.104	0.851	2.897	4.226	6.026	7.892	9.585	10.692	10.664	11.233	11.992	105.21
GDP [b] per capita	0.009	0.028	0.227	0.775	1.135	1.621	2.126	2.586	2.887	2.774	2.866	3.444	105.72
GDP by sector (%):													
-Agriculture	26.4	16.4	13.8	14.2	10.7	11.8	12.3	11.7	9.9	8.4	7.6	7	-11.54
-Industry	20.3	44.4	37.5	34.2	27.0	26.1	25.8	25.2	23.7	22.9	26.2	24	1.95
-Services	43.6	33.8	44.8	46.5	55.1	55.0	54.8	55.4	58.5	57.5	56.8	62.9	3.74
-Construction and Utilities	9.7	5.4	3.9	5.1	7.2	7.1	7.1	7.7	7.9	11.2	9.4	6.1	-2.53

[a] Millions of current US$.
[b] Current US$ per capita.
* Preliminary data
Source: IAEA Energy and Economic Data Base; Country Information.

Table 3 shows the historical energy statistics, Fig. 1 shows the share of the primary energy sources in the corresponding energy consumption and Fig. 2 the share of the various sectors in final energy demand. Table 4 shows the historical energy balance and Fig. 3 the share of the primary energy sources in the 2001 energy production.

TABLE 3. BASIC ENERGY SITUATION

Exajoule

	1970	1980	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	Average annual growth rate (%) 1970 to 1980	Average annual growth rate (%) 1980 to 1998
Energy consumption																
- Total [1]	0.32	0.52	0.69	0.77	0.50	0.39	0.34	0.38	0.41	0.38	0.41	0.34	0.30	0.35	5.0	-1.3
- Solids [2]	0.09	0.06	0.05	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0..03	-4.0	-3.8
- Liquids	0.17	0.34	0.26	0.34	0.19	0.16	0.15	0.13	0.14	0.14	0.16	0.12	0.09	0.11	7.2	-4.1
- Gases	0.05	0.11	0.2	0.20	0.12	0.06	0.07	0.09	0.09	0.08	0.07	0.08	0.09	0.10	8.2	-2.5
- Primary electricity [3]	0.00	0.00	0.19	0.19	0.16	0.14	0.09	0.13	0.15	0.13	0.15	0.11	0.09	0.11	-	-
Energy production																
- Total	0.04	0.02	0.2	0.20	0.17	0.16	0.11	0.16	0.18	0.16	0.18	0.14	0.12	0.17	-6.7	13.0
- Solids	0.04	0.02	0.01	0.02	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	-6.7	0.00
- Liquids	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.02	-	-
- Gases	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	-
- Primary electricity[3]	0.00	0.00	0.19	0.19	0.16	0.14	0.09	0.13	0.15	0.13	0.15	0.11	0.09	0.13	0.00	0.00
Net import (import - export)																
- Total	0.27	0.49	0.49	0.57	0.32	0.23	0.23	0.22	0.23	0.22	0.23	0.20	0.18	0.18	6.1	-4.1
- Solids	0.05	0.04	0.04	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-2.2	-7.4
- Liquids	0.17	0.34	0.25	0.34	0.19	0.16	0.15	0.12	0.13	0.13	0.15	0.11	0.08	0.08	7.2	-4.4
- Gases	0.05	0.11	0.2	0.20	0.12	0.06	0.07	0.09	0.09	0.08	0.07	0.08	0.09	0.09	8.2	-2.5

[1] Energy consumption = Primary energy consumption + Net import (Import - Export) of secondary energy.
[2] Solid fuels include coal, lignite and commercial wood.
[3] Primary electricity = Hydro + Geothermal + Nuclear + Wind.
Source: IAEA Energy and Economic Database; Country Information.

1.4. Energy Policy

The highest body of state power in the Republic of Lithuania is the Seimas (Parliament). Parliament has a number of standing committees on most sectors such as science, culture and education, but there is no specific committee for energy. According to the Energy Law of the Republic of Lithuania (Lietuvos Respublikos energetikos istatymas) adopted by Parliament in July 2002 , the Ministry of Economy is responsible for preparing the National Energy Strategy covering a period of not less than 20 years, and updating it every five years. The Strategy is approved by Parliament. Parliament is also entitled to approve the list of State energy sector enterprises.

The Government is responsible for establishment of rules for the use of energy and energy resources. It is also responsible for establishing procedures for new state or privately owned enterprises, joint ventures and foreign owned companies in the power sector.

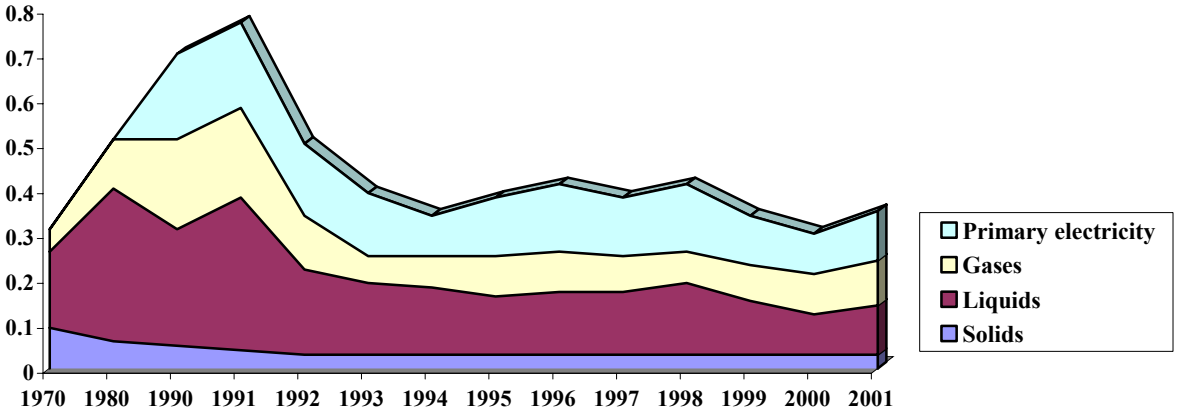

FIG. 1. Energy consumption (EJ)

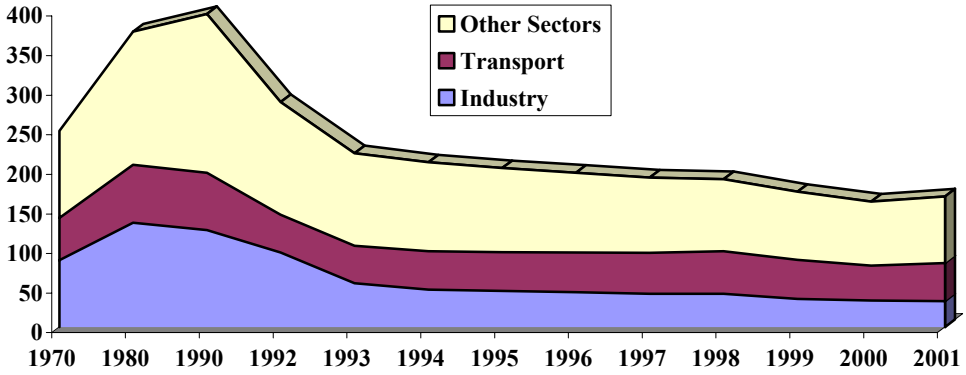

FIG. 2. Final Energy Demand (PJ)

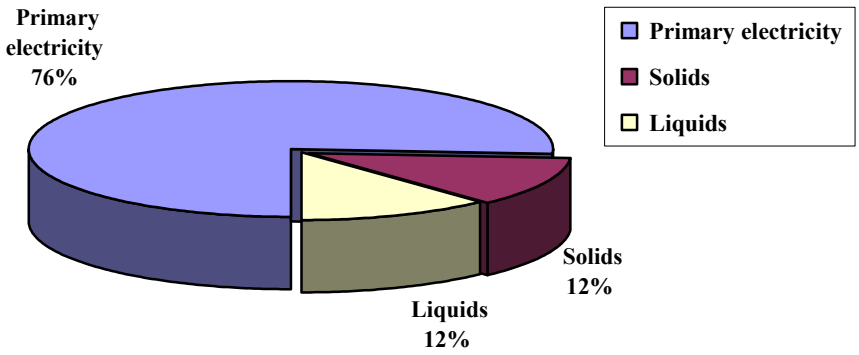

FIG. 3. Energy production in 2001

TABLE 4. ENERGY BALANCE

PJ

	1970	1980	1990	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Indigenous Production	42.6	21.9	202.9	177.9	154.3	110.1	157.1	182.8	163.6	185.8	145.8	133.7	172.0
Import (+)	281.6	495.2	628.5	320.3	295.6	317.3	317.6	333.7	352.4	396.3	283.3	307.4	400.9
Export (-)	12.9	0.4	166.0	42.2	71.3	95.2	83.1	118.2	150.7	194.8	107.5	151.4	227.2
Stock Changes (±)	4.1	1.6	20.9	15.5	3.6	14.6	-22.2	-4.0	3.0	1.1	7.3	8.6	8.8
Primary Energy Supply	315.3	515.1	686.4	471.5	382.3	346.8	369.4	394.3	368.3	388.4	328.9	298.3	350.0
Net Transformation Input	48.2	79.8	200.0	131.5	100.7	84.9	107.3	129.3	107.9	124.5	92.4	77.8	79.0
Energy Sector Own Use	1.8	14.0	38.1	23.7	37.5	18.5	15.6	17.2	19.9	23.4	17.1	18.3	26.7
Energy Losses	5.2	11.2	13.5	13.0	15.6	20.3	23.9	27.8	27.2	26.5	21.7	16.2	17.4
Non-Energy Use	12.4	36.7	39.5	19.3	9.0	15.2	22.0	25.2	24.5	27.5	27.0	27.5	38.1
Final Energy Demand	247.7	373.5	395.4	284.1	219.5	207.9	200.6	194.9	188.8	186.5	170.7	158.5	164.8
Industry	84.4	131.7	122.2	93.9	55.3	47.0	45.5	44.1	41.8	41.7	35.4	33.4	32.7
Transport	53.5	73.3	72.7	48.0	47.1	48.5	49.0	50.0	51.7	54.0	49.3	44.0	48.2
Other Sectors	109.7	168.0	200.4	142.2	117.1	112.4	106.1	100.8	95.3	90.8	86.0	81.1	83.9
Primary Energy Supply	100	138	184	125	102	93	99	106	99	105	89	81	
Final Energy Use	79	109	106	76	58	56	54	53	51	50	46	43	170*

Source: Country Information.
* Final Energy Consumption

TABLE 5. ESTIMATED ENERGY RESERVES

Exajoule

	Solid	Liquid	Gas	Uranium [1]	Hydro [2]	Total
Total amount in place	0.00	0.08	0.00	0.00	0.48	0.57

[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 - 1996) by a factor of 10.
Source: IAEA Energy and Economic Data Base; Country Information.

In accordance with the Law on Energy, the National Energy Strategy was updated and approved by the Parliament on 10 October 2002. The following objectives of the National Energy Strategy have been formulated with the assessment of principal factors that determine the energy policy:

- Reliable and safe energy supply with least costs;
- Increase of energy efficiency;
- Improvement of the energy sector management and implementation of market principles in the energy sector;
- Reduction of the negative impact upon environment; assurance of nuclear safety requirements;

- Integration of the Lithuanian energy sector into energy systems of the EU;
- Regional co-operation and collaboration.

Limited indigenous energy resources available and, the in-efficient use and conservation of energy resources are the basic conditions for the National Energy Strategy. Improvement of energy efficiency is therefore of utmost importance. The main directions for implementation of the National Energy Efficiency Programme, which is constantly up-dated, are the following:

- improvement of legal and normative basis;
- introduction of modern technologies and energy conservation measures;
- introduction of a pricing system stimulating energy conservation;
- creation of favourable conditions for investments into the energy conservation field;
- development of scientific, informational and educational activities.

2. ELECTRICITY SECTOR

2.1. Structure of the Electricity Sector

Generation of electric power in Lithuania is provided by the Joint Stock Company "Lietuvos Elektrinė", Joint Stock Company "Mažeikių Elektrinė", CHP plants belonging to municipalities and the Ignalina Nuclear Power Plant. All power generated at Ignalina NPP can be sold to Joint Stock Companies "Rytų skirstomieji tinklai" and "Vakarų skirstomieji tinklai" or Joint Stock Company "Lietuvos Energija" (LE). LE is a specific Joint Stock with responsibility for managing and supervision of transmission grids, it sells power to two regional network utilities: Joint Stock Companies "Rytų skirstomieji tinklai" and "Vakarų skirstomieji tinklai" who, in turn, distributes and sells it to the end users. Earlier responsibility of LE for supplying heat was transferred to municipalities, responsibility of generation of electric power - to Joint Stock Companies "Lietuvos Elektrinė" and "Mažeikių Elektrinė".

The national transmission system in Lithuania comprises 330 kV and 110 kV grids, which connect all power stations to the load centres throughout Lithuania. Electricity export interconnections already exist with Latvia, Belarus and Kaliningrad.

Lithuania is continuing talks with Poland on possible transmission line across Poland connecting Lithuania's with other western countries into common market. Lithuania is considering building additional transmission lines from the Kruonis hydro pumped storage unit, through Alytus, to the border with Poland.

2.2. Policy and Decision Making Process

Tariffs and other activities in the power sector are examined and controlled by the National Control Commission for Prices and Energy. This Commission is proposed by the Government and approved by the President for a period of five years.

The regulatory bodies of the energy sector are the ministries and the municipalities. The main body is the Ministry of Economy (State Power Inspection was established in January 1995 subject to the Ministry of Economy) although several other ministries, such as Ministry of Finance and Ministry of Environment, are involved to some degree in the regulation of energy supply and consumption.

The electricity market of Lithuania is expected to change over the forthcoming years, which will have major implications on the conditions for operation of Ignalina NPP. Free connection to the national electricity grid of the new independent electricity producers provided by the Energy Law together with the establishment of free electricity market as a result of the anticipated future integration with EU energy market will inevitably lead to the appearance of a new decentralized generating capacities, especially for the combined heat and power generation.

With closure of the first unit at the Ignalina NPP, the existing capacities would meet the national demand by 2020 in all forecasted scenarios of internal energy demand growth only when the Lithuanian Thermal Power Plant (TPP) is maintained and upgraded. In this case, the balance of generation and demand in 2020 would be positive, ensuring an export potential of 3-5 TWh. Possible modernization of available thermal power plants and construction of new one would further increase this potential.

In addition to the Ignalina NPP, Vilnius CHP-3, Kaunas CHP (combined cycle operation) and the existing hydro power plants would be operated. With only one unit of the Ignalina NPP in operation, and with limited profitable export available the Lithuanian TPP will serve only as a reserve capacity and for the meeting demands of maneuver capacity. It is also expedient to keep the Kruonis HPSP besides the day regulation in a regime of weekly regulation. However, its role in the Lithuanian power sector will depend on the course of implementation of other international projects (the Baltic Ring, electricity transmission line to Poland, etc.) and the volume of electricity export.

Performed technical-economic analysis shows that if new capacities should be required, CCGT CHP, small CHP with gas turbines and a new combined cycle gas turbine (CCGT) would be the second most attractive sources of electricity generation after the refurbishment of available thermal power plants. Depending on the situation in fossil fuel market the construction of the eventual cascade of hydro power plants on the Neris river and on the middle track of the Nemunas could be justified. However, environmental, land ownership, monument protection and other requirements will restrict the possibility of constructing these power plants. In addition to that, the total capacity of these hydro power plants is only 170 MW, therefore, their impact on the power balance is not significant.

The Lithuanian TPP is designed to burn various kinds of fuel (gas, heavy fuel oil and partially orimulsion, which is a bitumen-in-water emulsion), and it does not depend on any single source. Consequently, the Lithuanian TPP in the nearest 10 years will serve as a reliable source of half-peak energy, capacity reserve and in the future as a source of basic energy too. The final choice for replacement for the first unit of Ignalina NPP will depend on further least cost analysis and feasibility studies, including other economic, financial and environmental aspects.

Integration of Lithuania into the EU, a closer co-operation with other Baltic, Western and Northern European states require changes in the structure of the national electricity grid, especially in developing systems of dispatch monitoring and modern departmental communications. It will be relevant to prepare for common efforts of the three Baltic States in a new scheme of the high voltage grid and to provide a sequence of actions and financing sources.

2.3. Main Indicators

Tables 6, 7, 8 and 9 show the historical statistics of the electricity balance, installed capacities and energy related ratios respectively.

The two 1 500 MW(e) RBMK units of Ignalina, downrated to about 1 250 MW(e) for safety reasons, are supplying about 70% of the electricity consumption of Lithuania and allow export of electricity to Latvia and Belarus. In fact, the thermal capacity of the Ignalina units is downrated from 4 800 MW(th) to 4 200 MW(th), so the maximum electrical output depends on the cooling conditions.

2.4. Impact of Open Electricity Market in the Nuclear Sector

The Electricity Law came into force in January 2002, and calls for a partial opening of the market from 2002 and a full opening by 2010. International agreements with Latvia and Estonia have called for the opening of the Baltic Electricity Market in 2002, but this is somewhat delayed.

The main impact so far of the market on Ignalina NPP is to clarify the real cost of generation in

comparison with other plants in the country, since generation costs are now unbundled and ownership separated in the previously vertically integrated State power company. New pricing mechanisms are applied, with two part capacity and energy prices.

Since INPP generates more than 25% of the domestic demand, the Electricity Regulator has the right according to the Electricity Law, to regulate prices, and currently sets a price for generating capacity and for reserve capacity as well as for kwh, as opposed to the previous simple kwh price. Since only one Unit of INPP is needed to meet domestic electricity demand, the rates set by the Regulator do not fully cover the fixed costs of operating the second Unit, and so additional income for electricity exports is necessary to cover the costs for two units. The Transmission System Operator, who also functions as Single Buyer at the moment, has so far been relatively successful in finding export markets at a price sufficient to cover costs. Otherwise, the Second Unit would need to be considered a stranded asset.

However, exports will not be possible after 2005, when Unit One closes, and so INPP must make efforts to reduce its fixed costs to a level appropriate for single unit operation. Restructuring needed to do this is going slowly.

Another requirement from the Electricity Market has been to change the legal status of INPP from a State Enterprise to a limited liability company, owned by the State. This is necessary to comply with EU legislation on competition and state aid. The change in legal status required an Amendment of the Nuclear Energy Law, to allow entities other than State Enterprises to operate nuclear facilities. The Parliament took the opportunity to include provision in the Law for privately owned nuclear power generators, in anticipation of a future nuclear replacement for INPP, privately financed.

The change in legal status, which still requires further legal acts to finalise, is expected to make the restructuring of INPP easier.

TABLE 6. ELECTRICITY PRODUCTION AND INSTALLED CAPACITY

	1960	1970	1980	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Electricity production (TW·h)															
- Total[(1)]	1.12	7.36	11.7	28.4	29.4	18.7	14.1	10.0	13.9	16.8	14.9	17.6	13.5	11.4	14.7
- Thermal	0.75	6.93	11.2	11.0	12.1	3.6	1.2	1.6	1.3	2.0	2.1	3.2	2.8	2.4	2.7
- Hydro	0.37	0.43	0.47	0.4	0.3	0.5	0.6	0.7	0.8	0.9	0.8	0.9	0.9	0.6	0.7
- Nuclear	0.00	0.00	0.00	17.0	17.0	14.6	12.3	7.7	11.8	13.9	12.0	13.5	9.8	8.4	11.4
Capacity of electrical plants (GW(e))															
- Total	0.4	1.4	2.4	5.7	5.7	6.1	6.1	6.3	6.3	6.3	6.3	6.5	6.5	6.5	6.6
- Thermal	0.3	1.3	2.3	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
- Hydro	0.1	0.1	0.1	0.1	0.1	0.5	0.5	0.5	0.7	0.7	0.7	0.9	0.9	0.9	0.9
- Nuclear	0.00	0.00	0.00	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0

[(1)] Electricity losses are not deducted.
Source: IAEA Energy and Economic Database; Country Information.

TABLE 7. ELECTRICITY BALANCE

TW·h

	1960	1970	1980	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Gross Production	1.12	7.36	11.67	28.41	29.36	18.71	14.11	10.02	13.90	16.79	14.86	17.63	13.54	11.42	14.74
Import - Export (±)	0.01	-2.18	-0.11	-11.97	-12.75	-5.30	-2.73	1.10	-2.68	-5.16	-3.53	-6.08	-2.68	-1.34	3.96
Gross Consumption	1.13	5.18	11.56	16.44	16.61	13.41	11.38	11.12	11.22	11.63	11.34	11.55	10.85	10.09	10.78
Own Use of Power Plants	0.01	0.43	0.66	2.11	2.22	1.75	1.55	1.56	1.52	1.67	1.55	1.68	1.59	1.38	1.52
Hydro Pumped Storage	0.00	0.00	0.00	0.00	0.00	0.24	0.28	0.39	0.54	0.77	0.66	0.65	0.62	0.43	0.52
Net Production	1.10	6.93	11.01	26.30	27.15	16.72	12.28	8.47	12.38	15.12	13.31	15.95	11.95	10.04	13.22
Losses in Network	0.11	0.64	1.37	1.55	1.71	1.69	1.91	1.98	2.01	1.78	1.59	1.52	1.33	1.28	1.42
Net Consumption	1.01	4.11	9.53	12.78	12.69	9.73	7.64	7.19	7.15	7.41	7.54	7.69	7.32	7.00	7.29
Electricity per capita, kWh/cap															
Gross Production	403	2337	3402	7637	7850	4976	3765	2693	3742	4526	4010	4762	3660	3086	3354
Gross Consumption	406	1644	3370	4419	4441	3566	3033	2988	3020	3135	3060	3120	2932	2727	3080
Net Consumption	363	1308	2778	3435	3393	2588	2037	1932	1925	1997	2035	2077	1978	1892	2083

Source: Country Information

TABLE 8. INSTALLED CAPACITY OF THE POWER PLANTS

MW(e)

	1960	1970	1980	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Thermal Power Plants	308	1375	2293	2655	2633	2633	2633	2628	2628	2628	2628	2628	2628	2653	2652
Electricity only Plant	0.00	1200	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Combined Heat and Power Plants	308	175	493	855	833	833	833	828	828	828	828	828	828	853	852
Nuclear Power Plant	0.00	0.00	0.00	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
Hydro Power Plants	104	98	107	106	106	106	106	107	107	107	108	109	110	112	116
Hydro Pumped Storage	0.00	0.00	0.00	0.00	0.00	400	400	600	600	600	600	800	800	800	800
TOTAL	412	1473	2400	5761	5739	6139	6139	6335	6335	6335	6336	6537	6538	6565	6568

Source: Country Information

TABLE 9. ENERGY RELATED RATIOS

	1960	1970	1980	1990	1996	1997	1998	1999	2000	2001
Energy consumption per capita (GJ/capita)	63	100	138	184	111	103	111	92	82	101
Electricity per capita (MW·h/capita)	403	2.337	3.402	7.637	4.526	4.010	4.762	3.660	3.086	4.211
Electricity production/Energy production (%)	18	158	468	139	92	90	94	89	82	
Nuclear/Total electricity (%)	0	0	0	60	83	81	77	73	74	77
Ratio of external dependency (%)[(1)]	50	86	96	71	54	56	52	57	56	51
Load factor of electricity plants										
- Total (%)	94	95	96	85	30	N/A	N/A	N/A	N/A	N/A
- Thermal	94	95	96	83	11	N/A	N/A	N/A	N/A	N/A
- Hydro	75	86	94	82	14	N/A	N/A	N/A	N/A	N/A
- Nuclear	-	-	-	87	67	65	70	58	50	67

[(1)] Net import / Total energy consumption
Source: IAEA Energy and Economic Database; Country Information.

3. NUCLEAR POWER SITUATION

3.1. Historical Development

The decision to build a nuclear power plant in the Baltic region for electricity supply to the Baltic States, Belarus and Kaliningrad was made by the former government of the Soviet Union at the beginning of the seventies. After the formal agreement of the Lithuanian Government, the site on the shore of Druksiai lake near the borders of Lithuania, Latvia and Belarus was selected. Construction of the first unit of the Ignalina Nuclear Power Plant (INPP) commenced in April 1978, the second unit followed in April 1980, and the third unit in 1985. The town of Visaginas (formerly named Snieckus) was built for the workers of the INPP. The first unit was commissioned in December 1983 and the second in August 1987. In August 1988, the former USSR Council of Ministers suspended the construction of the third unit. In November 1993, after Western experts expressed the opinion that Unit 3 was not suitable for installation of a safer nuclear reactor, the Lithuanian Government decided to abandon the construction of Unit 3 and dismantle the existing structure.

3.2. Status and Trends of Nuclear Power

Table 10 shows the status of the nuclear power reactors. Both units of Ignalina Nuclear Power Plant were operating steadily during the last few years. Nevertheless, the plant did not have good performance indicators because of the decreased demand for electricity (Table 11). Even though the share of electricity produced by nuclear means was constantly growing due to the high prices of organic fuel, the units were shut down for four weeks in the summer of 1994, when Russia proposed to repay its debts back by electricity. During 1995– 2001 production of electricity did depend strongly on the volume of export. Table 12 and Figure 4 show the contribution of nuclear power to the total electricity generation.

On 10 October 2002, the Parliament of Lithuania updated and approved the National Energy Strategy, which states that unit 1 of the Ignalina NPP should be closed before the year 2005.

3.3. Current Policy Issues

Apart from the short period of regaining independence, when the slogan "down with all Soviet time monsters" was popular, there have been no strong antinuclear movements in Lithuania. The current sentiment of the public can be explained not by lack of awareness of the risks involved by the utilization of nuclear energy, but, in the face of the difficult economic conditions, by the considerably lower price of "nuclear electricity" which outweighs its possible risks.

Until December 1994, Ignalina Nuclear Power Plant had a status of State Enterprise for Special Purpose with some restrictions on privatization issues, after which it was excluded from the list of

Special Purpose enterprises. On July 2, 2002 Law on Nuclear Energy was changed forming/presenting the possibility for private capital to participate in the nuclear power sector.

TABLE 10. STATUS OF NUCLEAR POWER PLANTS

Station	Type	Capacity	Operator	Status	Reactor Supplier
IGNALINA-1	LWGR	1185	INPP	Operational	MAEP
IGNALINA-2	LWGR	1185	INPP	Operational	MAEP

Station	Construction Date	Criticality Date	Grid Date	Commercial Date	Shutdown Date
IGNALINA-1	01-May-77	04-Oct-83	31-Dec-83	01-May-84	
IGNALINA-2	01-Jan-78	01-Dec-86	20-Aug-87	20-Aug-87	

Source: IAEA Power Reactor Information System as of 31-Dec-2001.

TABLE 11. ENERGY AVAILABILITY FACTOR

	Year 1993		Year 1994		Year 1995		Year 1996		Year 1997		Year 1998	
	# 1	# 2	# 1	# 2	# 1	# 2	# 1	# 2	# 1	# 2	# 1	# 2
Energy availability factor (%)	35.19	38.22	33.34	30.51	48.42	54.05	55.36	66.65	42.38	62.17	39.62	78.75

Source: IAEA Power Reactor Information System

TABLE 12. NUCLEAR POWER AND TOTAL ELECTRICITY GENERATION

TWh

Year	1985	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Nuclear	9.48	16.65	17.03	17.0	14.64	12.27	7.71	11.8	12.7	12.0	13.6	9.86	8.42	11.36
Total	20.96	29.16	28.40	29.39	18.72	14.10	10.02	13.9	15.2	14.9	17.6	13.5	11.4	14.7
Nuclear (%)	45.2	57.1	60.0	57.8	78.2	87.0	77.0	84.9	83.4	80.9	76.9	72.9	73.7	77.3

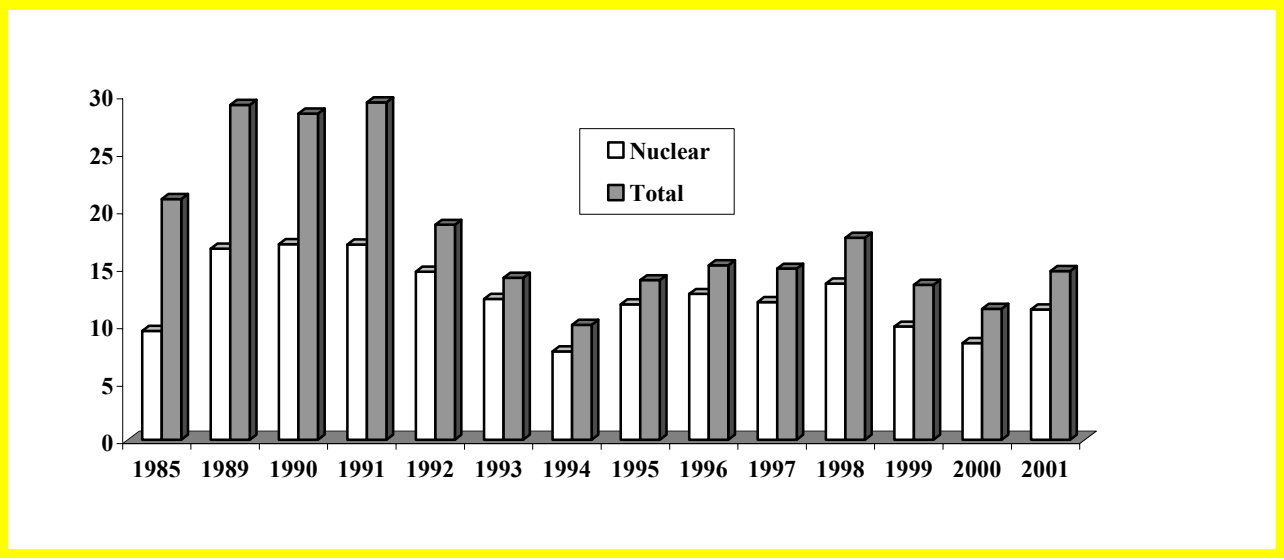

FIG. 4. Nuclear Power and Total Electricity Generation

The safety level of the Ignalina Nuclear Power Plant during the times of very limited financial resources was one of the main concerns of the Lithuanian Government. In 1993, after numerous consultations with Western, Russian and Lithuanian experts, the Ignalina Safety Enhancement Programme was developed. Main safety issues were ranked in order of importance. A Grant Agreement between the European Bank for Reconstruction and Development and the Government of Lithuania, signed in February 1994, was very helpful in the resolution of most urgent safety issues. In the frame of this agreement, during 1995-1996 the first comprehensive Safety Analysis Report (SAR) for RBMK type reactors was prepared for Units 1 and 2 of INPP. Several generic safety issues for RBMKs were also defined. The SAR-2 for Unit 2 is under preparation and will be compleated in

2003. On the basis of SAR conclusions Ignalina NPP started new Safety Improvement Programme (SIP)–2 in April, 1997. SIP–2 consisted of almost 160 positions and most of them are completed. Every year SIP-2 is revised and additional positions are added. Now for the period of 1997-2005 SIP-2 consists of 199 measures. . One of the biggest and most important items is "Second Independent Diverse Shut-Down System", which is planned to be installed and commissioned by the end of 2004. Actively seeking Western assistance in the form of bilateral assistance programmes, Lithuania took an equivalent effort to take part in multilateral efforts where experts from the East were actively involved. Possibly because of this policy of transparency, Ignalina Unit 2, together with Unit 3 of Smolensk NPP, was selected as representative models of second and third generation RBMKs for analysis of the generic safety issues and specific safety features in the framework of the IAEA Extrabudgetary Programme.

Lithuania will completely fulfil all recommendations of the earlier developed Safety Analysis Report, its Independent Review and international Ignalina Safety Panel. Ignalina NPP has already implemented these recommendations and in July 1999 the VATESI issued a license corresponding with international requirements, which allows operating Unit 1 until July 2004. Licensing process for Unit 2 of Ignalina NPP is under development now. Government of Lithuania is committed to continue operating and safety upgrading Ignalina NPP according to Western European tradition and guidelines.

Cost of electricity generated at the Ignalina NPP is presently lower than at the other existing plants (except of hydro power plants) as well as potential new power plants that could be built in Lithuania. Uncertainties on the future investments needed for safety upgrade of Ignalina NPP, a predicted relatively slow growth rate of national energy demand and limited opportunities for profitable power-export, however, complicate an efficient use of the full capacity of Ignalina NPP in the future.

Based on comprehensive assessment of technical, economical and political influencing parameters, Parliament has set an agreement to close the Unit 1 of the Ignalina NPP before the year 2005, taking into consideration long-term substantial financial assistance from countries of European Union, G7 group, other countries and international financial institutions.

On 12 July 2001, the Law on Decommissioning Fund for Ignalina NPP was adopted by the Parliament. This Law determines the structure of the fund, the principles of its administration and defines the methods for provision and collection of the resources to cover the historical costs, related to radioactive waste generated earlier, as well as to cover the cost of spent nuclear fuel in process of dismantling Unit 1 of Ignalina NPP. On 19 February 2001 Government adopted the Decommissioning programme for Unit 1. As for its implementation, on 25 April 2001, the Ministry of Economy adopted the list of technical-environmental and social-economic implementation measures, laid down relevant timetable as well as indicated the responsible organizations and financing sources. The list of measures is an integral part of National Energy Strategy Action Plan, which was adopted by the Government on 25 May 2001.

The conditions and date of the closure of Unit 2 of Ignalina NPP will depend in a large degree on the experience with the preparation for decommissioning of Unit 1 and amount of assistance provided. Lithuanian Seimas on October 10, 2002 approved the revised energy strategy calling for the Unit 2 of Ignalina NPP to be closed in 2009, while stressing the need for Lithunia to remain a 'nuclear state'.

To determine the conditions for further operation of the second unit of the Ignalina NPP, it will be necessary:

- to prepare a new safety investment programme;
- to carry out new safety analysis;
- to issue new license for operation according to Western European tradition;
- to update based on development of the national and international energy marked, as well as operation and decommissioning costs of the second Unit;

- to develop infrastructure (administrative, supervision, scientific-technical support, staff training) for safe and economic operation of the Ignalina NPP.

During preparation of this strategy a preliminary analysis of Ignalina NPP closure and decommissioning costs, the cost of replacing Ignalina NPP in the power supply and macroeconomics impact was evaluated.

The impact of the final closure of Unit 1 and management of all waste are evaluated at approximately 10.4 billion Lt. The costs of management, storage and disposal of waste and spent fuel accumulated by 1999 (about 8 billion Lt.) should be proposed to be covered by the international grants and the costs from 2000 to be covered by increasing electricity tariffs and improving efficiency of the whole power sector.

Investments into modernization of the power sector related to closure of Unit 1 up to 2020 amount to approximately 2.8 billion Lt. Financing of this should be investigated through international loans and discharged from the revenues from energy.

Financing for spent fuel and radioactive waste storage and funding for decommissioning of Nuclear Power Plant is partially resolved. State Enterprise Ignalina NPP Decommissioning Fund was approved in 1995 from income received for sold power. The price of sold power includes the expenses of spent fuel and radioactive waste management. An interim storage for spent fuel in CASTOR and CONSTOR type containers was built and commissioned in 1999 on the site of INPP. However, there are plans to build a spent nuclear fuel storage facility. The project is in a preparatory stage and will be financed from the International Decommissioning Fund.

3.4. Organizational Chart

See Fig. 5 of interaction between governmental and regulatory bodies and Ignalina Nuclear Power Plant.

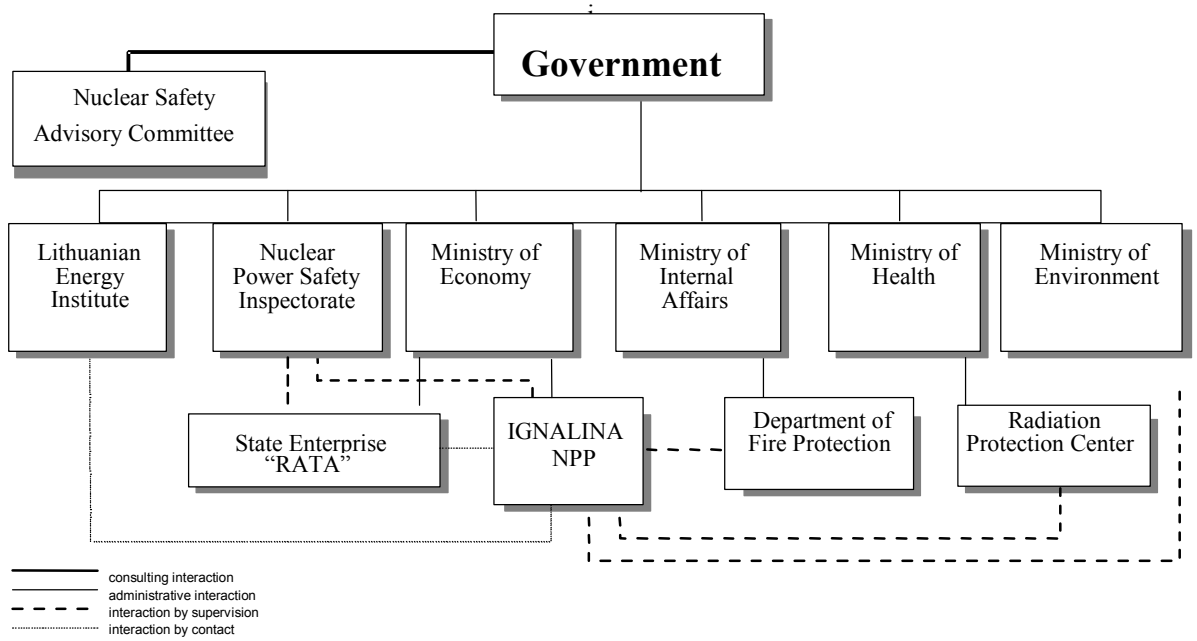

FIG.5. Organizational Chart of Nuclear Power

4. NUCLEAR POWER INDUSTRY

4.1. Supply of Nuclear Power Plants

Both units of the Ignalina Nuclear Power Plant are of the RBMK type reactors, designed and constructed by the former USSR's Ministry for Nuclear Power Industry. Only these two units of the new design RBMK-1500 were built, representing the most powerful nuclear units in the territory of the former USSR. An overview of the various institutions responsible for the design and construction of the RBMK type reactors is shown in Figure 6.

The All-Union Research and Development Institute for Energy Technology (NIKIET) of Moscow, Russia, as the main designer, carried out the development of the Ignalina Nuclear Power Plant project. The institute originated the design of the reactor internals and other primary system components. The Accident Confinement System was designed by the Institute's Sverdlovsk branch in Ekaterinburg, Russia. Metal structures of the main building were designed by the Main Design Office "Leningrad Steel Design" ("Leningradstalkonstrukcija") of St. Petersburg, Russia. The turbine hall, the open distributive system, and auxiliary facilities were developed by the Kiev branch of the Atomic Energy Design Institute ("Atomenergoproekt") of Kiev, Ukraine.

The scientific supervisor of the RBMK-1500 project was the Kurchatov Atomic Energy Institute (often referred to as the Russian Research Centre "Kurchatov Institute") in Moscow, Russia. The main designer of the nuclear steam supply system was the Research and Development Institute of Power Engineering (NIKIET) in Moscow, Russia. Russia is also the main supplier of spare parts to the Ignalina Nuclear Power Plant.

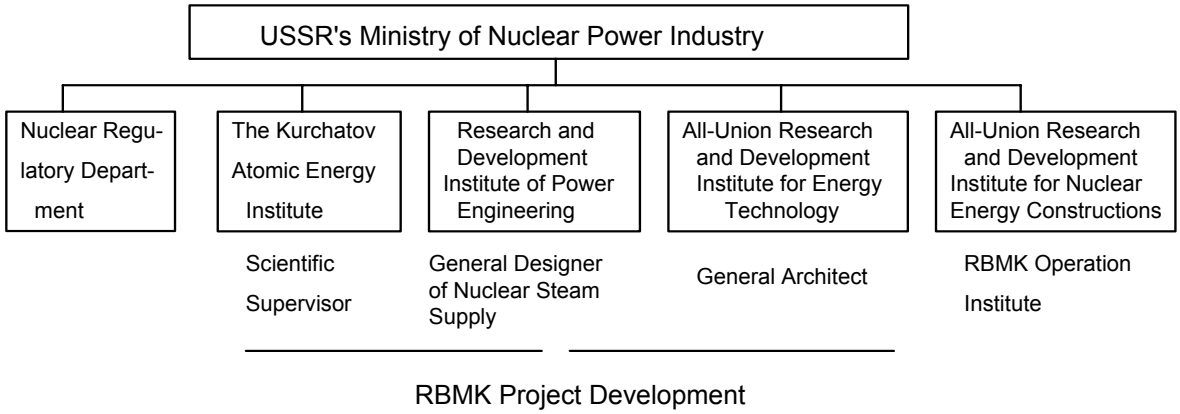

FIG. 6. Scope of responsibility for the RBMK-type reactor projects

4.2. Operation of Nuclear Power Plants

The Ignalina Nuclear Power Plant is owned by the Republic of Lithuania through the Ministry of Economy. At the present time, INPP entitles the rights as operator of a nuclear installation. For other purposes, such as liability to foreign countries, the State is assumed to be the operator. The Ignalina nuclear power plant management was substantially reorganized during 1995-1997.

The electricity produced by Ignalina Nuclear Power Plant can be sold to Joint Stock Companies “Rytų skirstomieji tinklai” and “Vakarų skirstomieji tinklai” or Joint Stock Company “Lietuvos Energija” (LE).

4.3. Fuel Cycle and Waste Management Service Supply

Lithuania has no fuel cycle industry. All the nuclear fuel is supplied by Russia till now. Originally, spent nuclear fuel from Ignalina was to be managed by central Soviet agencies for reprocessing and final disposal of the radioactive waste.. However, with the disintegration of the Soviet Union, Lithuania was obliged to find other solutions. Operational radioactive waste from INPP is managed by INPP itself now. There are facilities for processing and storage of liquid and solid waste. As an interim measure, in November 1993, Lithuanian Government approved temporary storage of spent fuel in containers for forty to fifty years until more permanent solutions for final conditioning and disposal are found. Interim storage for spent fuel was built in 1999 on the site of INPP. Containers for storage were produced by GNB, Germany. The project to build a spent nuclear fuel storage facility is in a preparatory stage and will be financed from the International Decommissioning Fund.

State enterprise Radioactive Waste Management Agency (RATA) was established on 20 July 2001. RATA drafted and in February 2002 the Government approved the radioactive waste management strategy and the three-year programme of RATA. According to this programme RATA should took ownership of Maišiagala repository for institutional radioactive waste and became operator of this facility as well to prepare a plan for the construction of new repository for low and intermediate level short lived radioactive waste in Lithuania.

4.4. Research and Development Activities

Apart from the Lithuanian Energy Institute (LEI) in Kaunas (including Nuclear Installation Safety Laboratory) and the Institute of Physics in Vilnius, there are some independent groups of persons in the research and educational institutions, who are acting as technical support organizations. As the first step to develop better technical support, the Centre for Non-Destructive Testing at Kaunas University of Technology and the Laboratory of Welding and Material Analysis at Vilnius Technical

University were created. With the aid of the European Commission, these facilities were equipped with modern instrumentation.

4.5. International Co-operation in the Field of Nuclear Power Development and Implementation

Lithuania has or had multilateral and bilateral projects, mostly concerning safety of nuclear power plants, with several highly developed Western countries, including Sweden, Germany, the USA, the UK, France, Belgium, Italy, Switzerland, Denmark, Canada, Finland and Japan.

The main multilateral projects were the TACIS founded International RBMK Safety Review Consortium, Lord Marshall's Users Group for Soviet Designed Reactors and the IAEA extra budgetary programme on RBMK reactors. One of the most important projects for Lithuania was the international project "Safety of Design Solutions and Operation of NPP's with RBMK Reactors" covering a broad range of safety related topics with Unit 2 of the Ignalina NPP used as a reference plant.

In December 1994 an agreement was signed between European Bank for Reconstruction and Development (EBRD) and the Republic of Lithuania for safety improvement at Ignalina NPP. Nuclear Safety Project for Ignalina Units 1 and 2 (RBMK 1500) was dedicated to reduce the seriousness of operational and design deficiencies. First comprehensive Safety Analysis Report (SAR) – investigation and analysis of factors that could limit a safe operation of the plant - was prepared as a part of a Grant Agreement. Based on the recommendations of the SAR Ignalina NPP has developed extensive Safety Improvement Programme.

On 5 April 2001, a Framework Agreement was signed between the Republic of Lithuania and the European Bank for Reconstruction and Development relating to the activities of the Ignalina international decommissioning Support Fund in Lithuania for the decommissioning of Unit 1 of INPP. In December 2001 Ignalina NPP have signed Agreement for Decommissioning Project Management Unit (DPMU). The DPMU experts are responsible for preparation and management the projects necessary for implementation of a spent nuclear fuel storage facility, reliable heating source in the Ignalina NPP and Visaginas town and modernization of the technical documentation archive as well as the modernization of the Management and the Storage of Short and Long-Lived Low and Intermediate Level Waste. The European Commission (EC) supported the project "Assistance in the enhancement of Lithuanian Technical Safety Organizations Capability to Support Nuclear Safety Regulatory Authority", which enables future development of the Metal Control Laboratory.

International Atomic Energy Agency (IAEA) offers a lot of courses for nuclear specialists' training. One of the most important national Technical Co-operation projects - Systematic approach to training (SAT) for NPP personnel, completed in 2000, helped to strengthen safety and reliability of the Ignalina NPP.

Sweden is a very active partner of Lithuania. Three phases of the joint Lithuanian-Swedish-Russian project "Barselina", level 1 and 2 probabilistic safety analysis of the Ignalina Unit 2, have been completed. This project provides a unified basis for the assessment of severe accident risks for RBMK type reactors and the preparation of remedial measures. Some of the improvements highlighted by PSA have already been implemented at the Ignalina Nuclear Power Plant. Another project of the Lithuanian-Swedish bilateral programme is the application of modern non-destructive testing (NDT) systems for in-service inspection of the pressure boundary system. One other project is the preparation of an "Overall Plan for Radioactive Waste Management" in Lithuania by Swedish Nuclear Fuel and Waste Management Co., SKB. Project "Fire and flooding protection" helped to improve the whole fire protection system at Ignalina NPP.

There have been implemented a number of projects with the USA financed by the Department of Energy and USAID framework of Nuclear Safety Assistance Programme for Lithuania. The Ignalina Source Book was prepared and printed in 1994 in close co-operation with the University of Maryland. Brookhaven National Laboratory (BNL) and Science Application International Corporation (SAIC) from the USA together with Nuclear Installation Safety Laboratory have

developed the RELAP5 model for the Ignalina Nuclear Power Plant. BNL also assisted with the development of the Ignalina Nuclear Plant Analyser, and the University of Maryland is conducting an assessment of the Accident Confinement System using the software code CONTAIN. Other project with USA will help to develop western style Configuration Management programme for INPP and will provide plant staff technical support. New Project will provide Ignalina NPP with DC Power Supply System consisting of safety class batteries, battery racks and switch board. One of projects, "Symptom-Based Emergency Operating Instructions (SBEOI) Support", in Nuclear Safety Assistance Programme with US is very useful for bringing safety level of INPP to internationally approved standards.

Co-operation in nuclear safety improvement at the Ignalina NPP with Japan specialists started in 1944. In the frame of the Agreement of Co-operation for Safety Improvement at the Ignalina NPP signed in 1996, Science and Technology Agency of Japan started two big projects: "Co-operation on plant operation management" and "Co-operation on fuel channel integrity". In November 1998 Japanese experts installed at INPP a data server system as result of the first project. The second project includes problems of inspection equipment for oxidized layer thickness of fuel channel and investigation of corrosion of fuel channel.

GRS (Germany) and Nuclear Installation Safety Laboratory are involved in the co-operative project of Analysis of Safety Aspects of Ignalina NPP, including the studies of neutron dynamics and thermal hydraulics. A compact simulator for operator training of normal and accident scenarios was developed by CORYS (France) and TRACTEBEL (Belgium). Canada mainly provides educational and training courses in the formation of organizations, safety design, waste management, maintenance and inspection of NPP's. The Lithuanian-Italian co-operative project of seismic evaluation of the Ignalina Nuclear Power Plant is in progress. A seismic network is to be placed in and 30 km around the plant. The British authority AEA has launched two Ignalina specific programs: checking the reliability of the Ignalina ultrasonic inspection devices on British mock-ups during the plant operation and a leak before break analysis, including the use of a code treating a transition weld. A Swiss consortium of independent engineers evaluated the design concepts for interim storage of spent fuel elements. Finland, in association with Sweden, is working on radiation control at the Ignalina Nuclear Power Plant.

5. REGULATORY FRAMEWORK

5.1. Safety Authority and the licensing Procedures

In 1991, just after Lithuania regained independence, the national regulatory authority - State Nuclear Power Safety Inspectorate (VATESI) - was created and in October 1992, the Government approved the statute of VATESI. The new statute of VATESI was approved on July 1 2002.

Most of the existing Soviet laws and rules, as well as earlier decisions, were accepted as valid in Lithuania. So until 1994 VATESI was not directly involved in the licensing of nuclear power plants. In autumn of 1994, VATESI, aided by Swedish experts, started the first licensing activity - licensing of spent fuel storage at the Ignalina Nuclear Power Plant site**.** Later, in 1999 using close co-operation with the experts of international Licensing Assistance Project VATESI issued the license for the operation of Ignalina NPP Unit 1 for 5 years. Licensing process for Unit 2 of Ignalina NPP is under development now.

According to the Nuclear Energy Law, VATESI is responsible for licensing: design, construction, reconstruction and operation of nuclear power plants, storage and disposal of radioactive waste, and purchase and transportation of nuclear materials. Currently VATESI has a new task – to control and supervise the safe decommissioning of INPP unit 1 and to assess the safety of the projects. In connection with that a new Department was established - Decommissioning and Radiation Protection Department. In 2002 VATESI increased number of employees till 53.

The Ministry of Health is responsible for licensing of purchases and transportation of

radioactive materials, and the Ministry of Economy for export, import and transportation of nuclear and radioactive materials and equipment. In June 1995, the Nuclear Safety Advisory Committee consisting of Lithuanian and foreign specialists proposed the creation of a Board of Governors to control the activities of VATESI. Such Board was created by the Government of the Republic of Lithuania on 4 July, 1997. The new VATESI Board was set up in 2001.

5.2. Main National Laws and Regulations

- Law on Nuclear Energy, adopted by Parliament on 14 November 1996.
- Law on the Enforcement of Application of the Vienna Convention on Civil Liability for Nuclear Damage of 21 May 1963 and the Joint Protocol Relating to the Application of the Vienna Convention and the Paris Convention of 21 September 1988, adopted by Seimas 30 November 1993. The Law gives the main articles of Vienna Convention and Joint Protocol the validity of the law with direct applicability before the courts.
- Decree of Lithuanian Government No. 1403 of November 2, 1995 defines regulation rules of Ignalina NPP decommissioning fund. Decree No. 964 of July 31, 1998 provides for deduction of 6% of internal electricity cost for that fund.
- Law on the amendments and supplements to the Law on taxes on profit of legal persons, adopted by Seimas on April 11, 1995. Item 10, allowing the inclusion of other expenses associated to the Ignalina NPP, provided by Government decrees, is added to the earlier Law. Corresponding Government decrees on the deductions for the management of radioactive waste and increasing the rate of deductions for decommissioning fund were adopted by Government in 1995.
- Law Concerning Control of Import, Transit and Export of Strategic Goods and Technologies, adopted by Seimas on 05 July 1995.
- Civil Protection Law, adopted by Seimas on 15 December 1998.
- Law on Radiation Protection, adopted by Seimas on 12 January 1999.
- Law on Management of Radioactive Waste, adopted by Seimas on 20 May 1999.
- Resolution on State Accounting and Control of Nuclear Material, adopted by Seimas on 08 September 1997.
- Regulation on Licensing of Nuclear Power Related Activities, adopted by Seimas on 27 January 1998.
- Law on the Decommissioning of Unit 1 at the State Enterprise of Ignalina NPP, adopted by Seimas on 2 May 2000.
- Law on Electricity, adopted by Seimas on 20 July 2000.
- Law on the State Enterprise Ignalina Nuclear Power Plant Decommissioning Fund, adopted by Seimas on 12 July 2001.
- Radioactive Waste Management Strategy, approved by Government on 6 February 2002.
- Energy Law of Republic of Lithuania, adopted by Seimas on 01 July 2002.
- National Energy Strategy, approved by Seimas on 10 October 2002.

5.3. International, Multilateral and Bilateral Agreements

AGREEMENTS WITH THE IAEA

• Membership in IAEA		18 November 1993
• NPT related agreement INFCIRC/413	Entry into force:	15 October 1992
• Additional Protocol	Entry into force:	5 July 2000
• Improved procedures for designation		Accepted

of safeguards inspectors

- Supplementary agreement on provision of technical assistance by the IAEA — Entry into force: 22 February1995
- Agreement on privileges and immunities — Entry into force: 28 February 2001

OTHER RELEVANT INTERNATIONAL TREATIES

- NPT — Entry into force: 23 September 1991
- Convention on the physical protection of nuclear material — Entry into force: 6 January 1994
- Convention on early notification of a nuclear accident — Entry into force: 17 December 1994
- Convention on assistance in the case of a nuclear accident or radiological emergency — Entry into force: 22 October 2000
- Agreement for the application of Safeguards in connection with the Treaty on the Non-proliferation of Nuclear Weapons — Entry into force: 15 October 1992
- Vienna convention on civil liability for nuclear damage — Entry into force: 15 December 1992
- Joint protocol relating to the application of the Vienna convention and the Paris convention — Entry into force: 20 December 1993
- Protocol to amend the Vienna convention on civil liability for nuclear damage. — Signature: 30 September 1997
- Convention on supplementary compensation for nuclear damage — Signature: 30 September 1997
- 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 — Signature: 30 September 1997
- ZANGGER Committee — Non-Member
- Nuclear Export Guidelines — Not Adopted
- Acceptance of NUSS Codes — Accepted

BILATERAL AGREEMENTS

- Agreement between the Government of the Kingdom of Denmark — 16 March 1993

and the Government of the Republic of Lithuania concerning information exchange and co-operation in the fields of nuclear safety and radiation protection

- Agreement between the Government of Republic of Lithuania and the Government of Canada for the co-operation in the peaceful uses of nuclear energy — 17 November 1994
- Agreement between Commissariat a l'Énergie Atomique de France and Ministry of Energy of Lithuania on the co-operation in the peaceful use of nuclear energy — 26 April 1994
- Agreement between the Government of the Republic of Lithuania and the Government of the Kingdom of Norway on early notification of nuclear accidents and on the exchange of information on nuclear facilities — 13 February 1995
- Agreement between the Government of the Republic of Lithuania and the Government of the Republic Poland on early notification of a nuclear accidents, and on co-operation in the field of nuclear safety and radiation protection — 2 June 1995

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[3] Republic of Lithuania. National Energy Strategy. October 1999.

[4] Almenas, A. Kaliatka, E. Uspuras. Ignalina RBMK - 1500. A Source Book. Ignalina Safety Analysis Group, Lithuanian Energy Institute, 1994.

[5] Ignalina Safety Analysis Report. Final Edition, 12 December 1996, Vattenfall Nuclear, Project AB for Ignalina Nuclear Power Plant.

[6] Lithuanian Ministry of Economy. Least Cost Power Sector Strategy for Lithuania. Draft Report. COWI, EBE, MIF, Elkraft, June 1999.

[7] IAEA Energy and Economic Data Base (EEBD).

[8] IAEA Power Reactor Information System (PRIS).

Appendix

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

NATIONAL ATOMIC ENERGY AUTHORITY

Ministry of Economy Gedimino pr. 38/2, 2600 Vilnius	Tel. 370 5 261 88 96 Fax. 370 5 262 39 74 http://www.ekm.lt/
Ministry of Environment 4/9 A.Jaksto, 2694 Vilnius	Tel. 370 5 261 05 58 Fax. 370 5 222 08 47 http://www.gamta.lt

NATIONAL REGULATORY AUTHORITY

State Nuclear Power Safety Inspectorate VATESI 3 Sermuksniu, 2600 Vilnius	Tel. 370 5 266 16 20 Fax. 370 5 261 44 87 http://www.vatesi.lt

MAIN POWER UTILITY

State Enterprise Ignalina Nuclear Power Plant Visaginas 4761 Ignalina	Tel. 370 (386) 28 350 Fax. 370 (386) 29 350 http://www.iae.lt/

OTHER ORGANIZATIONS

Lithuanian Energy Institute 3 Breslaujos, 3035 Kaunas	Tel. 370 37 35 14 03 Fax. 370 37 35 12 71 http://www.lei.lt
Joint-Stock Company “Lietuvos Energija” 14 Zveju, 2748 Vilnius	Tel. 370 5 275 07 93 Fax. 370 5 222 67 36 http://www.lpc.lt
Radiation Protection Centre 153 Kalvariju, 2042 Vilnius	Tel. 370 5 276 36 33 Fax. 370 5 275 46 92 http://www.rsc.lt
Kaunas University of Technology	http://www.ktu.lt/lt/
Lithuanian University of Agriculture	http://www.lzua.lt/
Vilnius Gediminas Technical University	http://www.vgtu.lt/
Vilnius University	http://www.vu.lt/
Vytautas Magnus University	http://www.vdu.lt/