

BELGIUM

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1. ENERGY, ECONOMIC AND ELECTRICITY INFORMATION

1.1. General Overview

Belgium is a country of 30,514 square kilometres with 10.3 million inhabitants (2002). It has a high population density of 337 persons per square kilometre (over 95 per cent of the population is classified as urban) and high electricity consumption per capita. Belgium's natural population increase during the 1980s was only about 0.1%. By the end of the decade the birth rate increased so that the population grew from 9.98 million in 1991 to the present 10.3 million (Table 1).

Belgium is situated in the heart of Western Europe, bounded on the north by the Netherlands and the North Sea, on the east by Germany and Luxembourg and on the south and southwest by France. The climate is temperate.

TABLE 1. POPULATION INFORMATION

	1970	1980	1990	2000	2001	2002	Average annual Growth rate (%) 1990 To 2002
Population (millions)	9.7	9.9	10.0	10.3	10.3	10.3	0.3
Population density (inhabitants/km ²)	316.4	322.9	326.1	335.9	336.7	337.4	

Predicted population growth rate (%) 2002 to 2010	0.0
Area (1000 km ²)	30.5
Urban population in 2002 as percent of total	97.5

Source: IAEA Energy and Economic Database.

The historical Gross Domestic Product (GDP) statistics are shown in Table 2.

TABLE 2. GROSS DOMESTIC PRODUCT (GDP)

	1980	1990	2000	2001	2002	Average annual Growth rate (%) 1990 To 2002
GDP (millions of current US\$)	121,560	197,350	228,798	231,292	233,860	1.4
GDP (millions of constant 1990 US\$)	161,345	197,350	244,971	246,931	249,153	2
GDP per capita (current US\$/capita)	12,339	19,833	22,320	22,515	22,714	1.1

Source: IAEA Energy and Economic Database.

The country has no gas, no uranium, no oil and very limited hydraulic resources. The mining of coal ended in 1978 in the south of the country and in the early 1990s in the north. Coal mining was no longer economically viable. (proven reserves of bituminous coal in 1993 were 715 million Mt., see Table 3). Hydraulic resources are estimated to be 2,873 TJ. In the early 1980s, nuclear power replaced coal as the main indigenous energy source.

In 2001, the total primary energy consumed in Belgium amounted to 58,270 ktons of oil

equivalent (2.4 EJ). Nuclear power provided 20.7% of this total compared with only 7% in 1980. Over the same period (1980-2001), the share of oil declined from 50% to 41.0%, while coal fell from 25% to 13.2%. Gas increased during the same period from 20% to 22.7%. 0.9% of the total primary energy consumed in Belgium in 2001 was produced from renewable energy sources. Missing 1.4% relates mainly to import/export differences (Table 4).

In 2001, per capita gross primary energy consumption in Belgium was 5.66 toe, or 237 GJ.

TABLE 3. ESTIMATED ENERGY RESERVES

	Estimated energy reserves in (Exajoule)					
	Solid	Liquid	Gas	Uranium (1)	Hydro (2)	Total
Total amount in place					0.10	0.10

(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 STATISTICS(*)

	1970	1980	1990	2000	2001	2002	Average annual growth rate (%)	
							1970 To 1990	1990 To 2002
Energy consumption								
- Total (1)	1.69	1.98	1.93	2.38	2.41	2.44	0.65	1.97
- Solids (2)	0.55	0.51	0.46	0.35	0.35	0.34	-0.84	-2.42
- Liquids	0.98	0.96	0.72	0.91	0.93	0.93	-1.51	2.13
- Gases	0.16	0.41	0.38	0.62	0.64	0.66	4.44	4.77
- Primary electricity (3)	0.01	0.10	0.36	0.50	0.48	0.49	22.22	2.63
Energy production								
- Total	0.31	0.34	0.46	0.47	0.46	0.46	2.02	-0.06
- Solids	0.31	0.22	0.07	0.02	0.01	0.01	-7.38	-12.87
- Liquids								
- Gases							-6.90	2.17
- Primary electricity (3)		0.12	0.40	0.45	0.44	0.45	27.86	1.00
Net import (Import - Export)								
- Total	1.51	1.79	1.71	2.14	2.16	2.18	0.64	2.05
- Solids	0.23	0.29	0.40	0.32	0.31	0.30	2.89	-2.57
- Liquids	1.12	1.09	0.92	1.21	1.22	1.22	-0.96	2.33
- Gases	0.16	0.41	0.38	0.62	0.64	0.67	4.52	4.77

(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.

(*) Energy values are in Exajoule except where indicated.

Source: IAEA Energy and Economic Database.

1.2. Energy Policy

Belgium is highly dependent on foreign countries for its energy supply and, therefore, it has to integrate its energy policy into a larger framework on the international level. Working towards this goal implies finding a dependable energy supply on viable economic conditions that also sustains environmental quality (balancing of the three E's - energy, economy and environment).

Coal, the main energy source in the 1950's, was replaced by oil, which today (2001) represents about 41% of the total primary energy consumption. Gas, nuclear energy and coal each represent approximately 22.7%, 20.7% and 13.2% of the total primary energy. Keeping this in mind, special attention is now given to the rational use of energy both on the demand and supply side.

1.3. The Electricity System

1.3.1. Structure of the Electricity Sector

Before the federal law of 29th April 1999 transposing the EU Directive 96/92 on the liberalisation of electricity markets into Belgian law, the legal and administrative context of the distribution of electrical power in Belgium was determined by the law of March 10, 1925, which stipulates:

- i) that the distribution of electricity is the exclusive right of the local municipalities for all supplies that do not exceed 1000 kWe (increased to 10,000 kWe in one region); and,
- ii) that for larger customers, there is no monopoly right for the municipality and the power can be supplied either by the local municipality or by any private or public electric utility.

There was no law governing production and transmission of electricity and as a consequence these activities could be considered to be free, although in the course of time these activities have been subject to subsequent conventions.

This context has led to a situation where a large number of power generation companies developed across the country. In 1955, 47 generating companies existed in Belgium, most of them private. From then onwards, a long chain of mergers reduced private suppliers to three companies EBES, INTERCOM and UNERG by 1980. In 1979, public utilities regrouped into one public utility SPE. Finally, in 1990, the three private utilities merged to create ELECTRABEL.

Pursuant to the Convention reached in 1994 between ELECTRABEL and SPE, both companies have pooled in 1995 their electricity generating and transmission resources by transferring them to the co-operative company CPTE (Company for Co-ordination of Generation and Transmission of Electrical Energy). This company is the result of the merger of the limited liability company of the same name, which owned the national dispatching centre, and the co-operative company GECOLI that owned the national 380, 220 and 150 kV electricity grids. CPTE sold the power produced by the pooled plants to ELECTRABEL and SPE, which in turn supply it to their own customers, trading under their own names. Both ELECTRABEL and SPE took over responsibility for operating CPTE's power stations, and ELECTRABEL for electricity transmission, under management contracts. The part of SPE in the total electricity production capacity in CPTE was 8.5% in 2002.

After the publication of the federal law of 29th April 1999, transposing the EU Directive 96/92 on the liberalisation of electricity markets into Belgian law, in the Official Bulletin on 11th May 1999, ELECTRABEL and SPE founded, in June 2001, ELIA, an independent public limited company, to operate independently the high-voltage network, as required under the unbundling rule of the EU Directive 96/92. The Belgian federal government officially appointed, by Ministerial Order of 13th September 2002 (Official Bulletin of 17th September 2002), ELIA as Transmission System Operator (TSO). The technical legislation regulating the access to the transmission network was published by royal decree of 19th December 2002 (Official Bulletin of 28th December 2002).

ELIA's former shareholders (ELECTRABEL and SPE) reached an agreement with the Belgian federal government on the future shareholder structure of ELIA. PUBLI-T, a cooperative company representing the Belgian municipalities, took a 30% stake. ELECTRABEL and SPE will further

reduce their participation from 70% to 30%, as 40% of the shares will, in principle, be listed on the stock exchange. ELIA has a license as TSO at the federal level, as well as licenses as distribution system operator in Flanders and local/regional transmission system operator in the Walloon and Brussels Regions.

The electricity production activity is totally “liberalised” in Belgium. Nevertheless, the law of 29th April 1999 sets out an authorisation procedure for new units. Electricity production, by means of co-generation and renewables, is a beneficiary of substantial privileges, such as tariff measures and priority access to the transmission and distribution networks.

In Belgium following three categories of electricity producers are distinguished:

- Electricity companies: they currently (2002) cover 97.9% of the domestic production. The most important producers are the private company ELECTRABEL and the public company SPE. Some smaller units (mainly co-generation and renewables) are owned by “distributors” or newly founded companies;
- Auto-producers: they generate electricity themselves to cover their own needs. They are mainly active in the chemistry and metallurgy sector and represent 1.5 % of the total production;
- Autonomous producers: they are mainly active in the service sector and produce electricity as a complementary activity (e.g. in the framework of waste incineration) for resale to a third party. They are mainly active in the service sector and represent only 0.6% of the total production.

In 2002, the electricity companies account for 95.8% of the total net electricity production capacity of 15,546 MWe in Belgium. The auto-producers and autonomous producers account for respectively 2.6% and 1.6%.

ELECTRABEL and SPE agreed on 28 February 2003 to split their joint venture CPTE. Public operator SPE will now be able to independently operate some 1,500 MWe of small hydro and conventional power plants in Belgium. SPE will also have a 100 MWe stake in Chooz B nuclear power plant in France. The stakes in Doel and Tihange nuclear power plants remain unchanged and the two operators are still tied in them. The split agreed is retroactive to 1 January 2003. This was agreed by the Belgian federal government on 25 April 2003 and by Belgium’s competition authorities on 13 June 2003. Approval by the general assemblies of both companies was finally obtained on 4 July 2003.

On the distribution side, only a few municipalities have exercised their right to create “régies” (public, autonomous bodies). In the beginning of the 20th century many “régies” granted concessions or franchises to private companies, and later on regrouped to form inter-municipalities or groups of municipalities. Inter-municipalities are either “pure” (public), i.e., without collaboration of private partners; or “mixed”, i.e., associated with the private company ELECTRABEL. Today, most Belgian distribution companies are mixed.

1.3.2. Decision Making Process

Federal and Regional Responsibilities

The Belgian institutional system, which had been set up by 1970, considers two different kinds of federal entities: three Communities (Dutch, French and German-speaking) which are responsible for cultural, social and educational matters and three Regions (Flanders, Wallonia and Brussels-Capital) governing matters concerning economic and regional development, environmental protection, public transport, housing and some energy issues.

According to the special act of institutional reform of 8 August 1980, reviewed by the act of 8 August 1988 and the special act of 16 July 1993, the Federal State and the Regions share competences on energy issues. In fact, the regional authorities have major responsibilities for designing and implementing energy policies, while the Federal Government is responsible for nuclear power, off-shore wind parks, production infrastructure and tariffs (e.g. for using the transmission and distribution networks). Transmission of electricity at a voltage level above 70 kV is a federal responsibility, while distribution and local transmission of electricity over networks with a voltage less than or equal to 70 kV is a regional responsibility. In addition, the 1993 special act empowered the Regions with residual competences, which means that all issues that are not formally attributed to the federal authorities fall under the competence of the Regions in case of conflict.

New administrations have been progressively set up in the Regions to deal with the newly transferred energy competences: ANDRE (Afdeling Natuurlijke Rijkdommen en Energie) in Flanders and DGTRE (Direction Générale des Technologies de la Recherche et de l'Énergie) in Wallonia.

Under article 92bis of the special act of 1980 (enacted by the act of 8 August 1988), the federal government and the three regional governments may conclude cooperation agreements on shared energy issues. An organ of cooperation CONCERE/ENOVER was created in 1991 and became operational in 1992. It is only a consultative and advisory body, where consensus is built between different governmental authorities on sensitive and multi-level energy issues.

Role of the Controlling Committee and the Management Committee (till July 2003)

In 1955, the electricity sector's activities became under the concerted control of labour organizations, the confederation of Belgian enterprises (employers' federation), and various Government bodies. The established system of regulation and control was quite unique to Europe. It was based on a strictly contractual regime between the actors of the sector. The Controlling Committee was constituted of so-called "controlling organisations" (trade unions and employers' federation), which had voting rights, and on the other side of the table were the so-called "controlled organisations", the electricity companies, represented by the Management Committee. The public authorities were also represented but without voting rights.

The Management Committee co-ordinated at management level the sector, particularly regarding investment choices in the development of the generating resources and in electricity pricing matters.

The government supervised Controlling Committee made recommendations to the controlled organisations regarding electricity costs, prices, depreciation and investment policies and the operation of the inter-municipal distribution companies. It collected information, reports, and studies concerning the controlled organisations, audited their accounts, and appealed to external experts.

In 1964, when the above agreement of 1955 expired, a new agreement was signed for another ten years, and again renewed in 1974. The new agreement extended the Controlling Committee to include the gas sector. A "Common Chamber" was added to the Management Committee to study the sector's development plans regarding generation, interconnection and transmission facilities. The municipal directors of the mixed (i.e., private/public) inter-municipalities, and the inter-municipalities in charge of electricity distribution within their territory, were represented in the Controlling Committee. Intermixt represents the mixed inter-municipalities and Inter-Régies the public inter-municipalities.

The National Committee for Energy was created in 1975 in order to give advice to the Energy Minister on the energy policy options and on the national energy investment plans ("National Equipment Plans") proposed by the electricity companies. It was composed with a parity representation of the main actors of the electricity sector and public authority representatives, similar

to the Controlling Committee. Unlike the Controlling Committee, that was based on a contractual regime, it had a legal basis.

In 1980, by the law of 8 August, the Controlling Committee became a public establishment, overseen by the federal Minister for Economic Affairs, and the same law imposed that the National Equipment Plan has to be approved by the Minister, based on recommendations by the Controlling Committee and the National Committee for Energy.

Under the above described legal framework, investment decisions of the electricity sector, particularly those regarding the construction of nuclear units, are proposed by the Management Committee with the collaboration of the public electricity sector and under the supervision of the Belgian confederation of industry, labour organizations, municipal authorities and the Government (see Figure1).

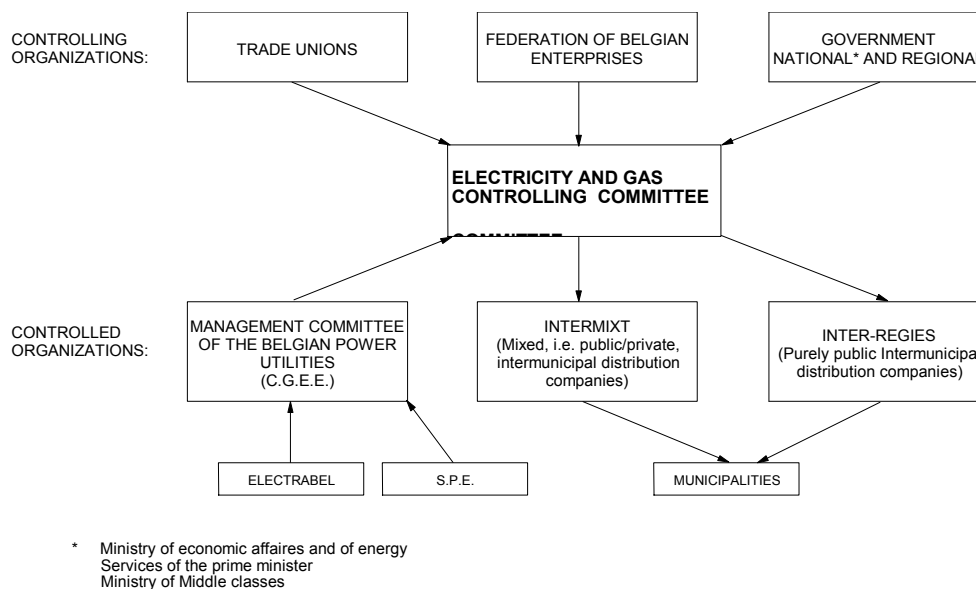


FIG. 1. Controlling Committee (till July 2003)

Regulatory organisation after the liberalisation (federal act of 29th April 1999)

The liberalisation and the re-regulation of the electricity sector due to the federal act of 29th April 1999 generated several changes within the Belgian public authorities, both at federal and regional levels.

The main change is the institutionalisation of new public regulators, replacing the Controlling Committee. In Belgium, four regulators were created: the CREG (Commission of Regulation of Electricity and Gas) at the federal level, the VREG (Flemisch Regulatory Body for the Electricity and Gas Markets) in Flanders, the CWAPE (Walloon Commission on Energy) in Wallonia, and IBGE-BIM (Brussels Environmental Institute) in the Brussels Capital Region. Their missions vary slightly, but all exert an advisory role for the public policies of the sector, a role of responsible body for the implementation of the rules (approval of the network access pricing, nomination for the network operators, etc.), of controllers of the sector, and of administrative jurisdiction in case of illegal behaviour on the market (for instance concerning the indiscriminate access to the network). The regulators have a legal status and benefit from a significant autonomy. Nevertheless, the independence of the regional regulators is weaker than that of the CREG, because of a supervision control of their activities via government representatives.

The CREG has a twofold mission. On the one hand it acts in an advisory capacity to the public authorities on the organisation and operation of the electricity and gas markets, and on the other hand it is also responsible of supervising the application of the laws and their concomitant regulations.

The CREG has two governing bodies with different roles and mode of operation: the Management Board, which began operating on 10 January 2003, and the Council-General, which began operating on 13 February 2001. The Management Board is a permanent structure that is responsible for the operational management of the CREG. The Council-General meets at least three times a year and supervises the Management Board's activities. It is composed of all stakeholders, including representatives from government, labour units, employer's federations, producers, consumers, NGOs, etc.

In the transition period, the Controlling Committee remained in charge of the non-eligible consumers while the new regulators took care of the eligible part of the market. But with the full liberalisation of the Flemish market in July 2003, the Controlling Committee disappeared. All its prerogatives were transferred either to the CREG (for federal competences like tariffs) or to the regional regulators (for regional competences). The competences of the National Committee for Energy were also transferred to the CREG. The Managing Committee was already dissolved in June 2003. The regulation model based on auto-regulation by the sector through consensual decisions therefore came to an end with the institutionalisation of the four new public regulators.

According to the new regulatory framework, electricity production is subject to an authorisation by the competent Federal Minister. Nevertheless, it is only required for the new installations and not for the existing ones. The CREG elaborates an "Indicative Program" of the production means that follows the major options of the energy policy and sets the investment priorities. This program is adopted for a ten year period, but is adapted every three years. However, it is only an indicative program and not a constraining investment plan, unlike the "National Equipment Plans" established by the abolished Managing Committee.

According to the Royal Decree of 2 April 2003 (published in the Belgian Official Bulletin on 22 April 2003) a license is required for trading electricity and supplying it to end users connected to the transmission grid with a voltage higher than 70 kV. The application must be submitted by the CREG and is granted for a period of five years. This decree also sets out the rules of conduct which apply to the traders and suppliers, who are active on the Belgian (federal) electricity market. A license is also required to supply electricity to end users connected to distribution networks. These licenses are delivered by the regional regulators

1.3.3. Main Indicators

Since the 1980's nuclear overtake of coal, nuclear power in 2001 provided 58.2% of Belgium's gross electricity production, third only to France and Lithuania in relative importance. Of the total gross electricity produced, thermal energy sources accounted for 37.9%, hydro, including pumping facilities, for 2.0%, and renewable energy sources (biomass, wind, etc.) for 1.9%.

Total net installed capacity of electricity generating plants in 2001 was 15,528 MW(e), of which thermal accounted for 8,353 MW(e), nuclear for 5,738 MW(e), hydro for 1,412 MW(e), and renewables (mostly wind) for 25 MW(e).

In 2001, total gross electricity consumption in Belgium amounted to 83.6 TW·h with a per capita gross consumption of 8,186 kWh. Table 5 lists the historical gross electricity production and net installed capacity and Table 6 gives the main indicators.

TABLE 5. ELECTRICITY PRODUCTION AND INSTALLED CAPACITY

	1970	1980	1990	2000	2001	2002	Average annual growth rate (%)	
							1970 To 1990	1990 To 2002
Electricity production (TW.h)								
- Total (1)	30.52	53.13	70.85	81.14	81.80	83.32	4.30	1.36
- Thermal	30.22	40.26	29.54	34.03	35.94	36.80	-0.11	1.85
- Hydro	0.25	0.32	0.90	1.70	1.75	1.76	6.68	5.80
- Nuclear	0.06	12.55	40.40	45.40	44.10	44.74	38.84	0.85
- Geothermal								
Capacity of electrical plants (GWe)								
- Total	6.26	11.01	14.14	15.73	15.83	16.07	4.16	1.07
- Thermal	6.18	8.21	7.02	8.56	8.65	8.89	0.64	1.99
- Hydro	0.06	1.13	1.40	1.41	1.41	1.41	16.87	0.03
- Nuclear	0.01	1.67	5.71	5.76	5.76	5.76	36.70	0.07
- Geothermal								
- Wind				0.01	0.01	0.01		11.40

(1) Electricity losses are not deducted.

(*) Energy values are in Exajoule except where indicated.

Source: IAEA Energy and Economic Database.

TABLE 6. ENERGY RELATED RATIOS

	1970	1980	1990	2000	2001	2002
Energy consumption per capita (GJ/capita)	175	201	194	233	234	237
Electricity per capita (kW.h/capita)	3,038	4,859	6,375	7,974	7,811	8,050
Electricity production/Energy production (%)	94	149	147	166	173	174
Nuclear/Total electricity (%)		24	57	56	54	54
Ratio of external dependency (%) (1)	89	91	89	90	90	90
Load factor of electricity plants						
- Total (%)	56	55	57	59	59	59
- Thermal	56	56	48	45	47	47
- Hydro	45	3	7	14	14	14
- Nuclear	59	86	81	90	87	89

(1) Net import / Total energy consumption.

Source: IAEA Energy and Economic Database.

2. NUCLEAR POWER SITUATION

2.1. Historical Development and current nuclear power organizational structure

2.1.1. Overview

First nuclear power development began during World War II, when Belgium started uranium production in its mines in Africa and signed a nuclear technical co-operation agreement with the US. Nuclear power development was accelerated after the 1970's oil crisis. The main milestones are:

1949 Government of Belgium grants purchasing priority of the uranium resources in Congo to the governments of the UK and the US.

- 1957 Belgian engineers took part in the commissioning of the first commercial nuclear plant in the United States.
- 1960 Franco-Belgian convention and creation of SENA (Société Nucléaire franco-belge des Ardennes): the principle was that everything from funding to studies and energy production should be shared equally.
- 1962 Commissioning of the BR3 PWR prototype plant (11 MW) in Mol. This reactor was the first imported from the United States.
- 1965 Creation of SYNATOM (Syndicate for the design of large capacity nuclear power plants).
- 1966 Commissioning of the Franco-Belgian (Chooz A) Nuclear Power Plant (NPP) (305 MW).
- 1966 Decision to build Doel 1 and 2 NPPs (ordered in 1968) and Tihange 1 NPP (ordered in 1969)
- 1973 Oil crisis and decision to build Doel 3 NPP, Doel 4 NPP, Tihange 2 NPP and Tihange 3 NPP (ordered in 1974).
- 1974 Commissioning of Doel 1 NPP
- 1975 Commissioning of Doel 2 and Tihange 1 NPPs.
- 1977 SYNATOM becomes a nuclear fuel management company (Belgian company for nuclear fuel).
- 1980 Creation of the National Organization for Radioactive Waste and Fissile Materials (ONDRAF/NIRAS).
- 1982 Commissioning of Doel 3 and Tihange 2 NPPs.
- 1985 Commissioning of Doel 4 and Tihange 3 NPPs.
- 1985 Exhaustive backfitting process for Doel 1, 2 and Tihange 1 NPPs.
- 1986 Architect-engineering companies ELECTROBEL and TRACTIONEL merge to create TRACTEBEL.
- 1988 The construction of an 8th unit (N8) of 1400 MW (50 per cent ELECTRABEL - 50 per cent EDF) is indefinitely postponed by the Government.
- 1990 Private electricity producers INTERCOM, EBES and UNERG merge to create ELECTRABEL.
- 1991 Decommissioning of Chooz A NPP.
- 1993 First steam generator replacement in Belgium at Doel 3 NPP.
- 1993 The first Belgian Parliament's debate on reprocessing and use of MOX fuel led to the suspension of the reprocessing contract signed between SYNATOM and COGEMA in 1991. The active reprocessing contract signed in 1978 could be further carried out, but no new reprocessing contracts could be signed. From 1993, both options for the back-end of the fuel cycle are to be considered on an equal basis and must be assessed in detail during the next five years. The authorization to use MOX in Belgian NPPs is granted in order to consume plutonium obtained from past and active reprocessing contracts for Belgian spent fuel.
- 1994 Royal Decree authorizing the loading of MOX fuel in Doel 3 and Tihange 2 NPPs.
- 1994 Promulgation of the law with respect to the Federal Agency for Nuclear Control (FANC).
- 1995 First loading of MOX fuel in Tihange 2 (March) and Doel 3 (June) NPPs.
- 1995 Commissioning of the dry interim spent fuel storage facility on the Doel NPP's site.

- 1995 Creation of the co-operative company CPTE (Company for co-ordination and Transmission of Electrical Energy) by ELECTRABEL (91.5%) and SPE (8.5%).
- 1997 Commissioning of the wet interim spent fuel storage facility on the Tihange NPP's site.
- 1997 In April, NIRAS/ONDRAF presents the various options for the final disposal of low level and short-lived waste to the authorities.
- 1997 A new law of December 12 defines a new mission for NIRAS/ONDRAF to establish the inventory of all nuclear facilities and sites containing radioactive waste and its financing.
- 1998 The Belgian Government decides on a new approach for the search of disposal sites for low level and short-lived radioactive waste; it limits the research to existing nuclear zones or areas where the municipalities have shown interest.
- 1998 In December, the Belgian government ordered the cancellation of the reprocessing contract signed in 1991 between SYNATOM and COGEMA and which was suspended in 1993. It postponed the debate about spent fuel management for a year pending the results of ongoing technical and economic studies. The government's decision doesn't ban further reprocessing of Belgian spent fuel, but forbids SYNATOM to conclude a new contract without its formal approval. In addition, an expert commission will be set up to assess the country's future electricity supply options.
- 1999 Installation in February of the government-appointed commission AMPERE (Commission d'Analyse des Modes de Production d'Électricité et de Redéploiement des Énergies). The commission has been given eighteen months to assess the electricity demand and the options for the future of power generation in Belgium in the 21st century.
- 1999 In July, the new government announces the closure of all Belgian nuclear power plants when they reach their 40-years lifetime and introduces a moratorium on reprocessing.
- 2000 In December, the joint-venture EURIDICE (European Underground Research Infrastructure for Disposal of Nuclear Waste in Clay Environment) between ONDRAF/NIRAS and SCK•CEN was created. The joint venture is now responsible for the management and operation of the underground research laboratory HADES and the realisation of the PRACLAY project.
- 2000 In April, the first 28 containers with vitrified high-level radwaste, resulting from the reprocessing of Belgian spent fuel in La Hague (France), returned to Belgium. The second repatriation took place in November.
- 2000 In December, the Commission AMPERE published its report¹, containing more than 1000 pages. Among its key messages, we mention its recommendations to keep the nuclear option open and to take other measures therefore. The report will be evaluated by a group of five international experts selected by the Government.
- 2001 In February, repatriation of the third batch of containers with vitrified high-level radwaste resulting from the reprocessing of Belgian spent fuel in La Hague (France).
- 2001 In May, the group of five international experts published the conclusions of their evaluation of the report of the Commission AMPERE². The experts corroborate the standpoints of the Commission AMPERE on a large number of points, in particular the preservation of the national know-how regarding nuclear energy.
- 2001 During the outage of Tihange 2, that started on 9 June and ended on 11 August, the three steam generators were successfully replaced. The steam generators replacement itself was executed in the new time record of 17.5 days.
- 2001 In September, the Federal Agency for Nuclear Control (FANC), established by the

¹ Available at http://mineco.fgov.be/energy/ampere_commission/home_fr.htm
² http://mineco.fgov.be/energy/ampere_commission/Revision_ampere_commission_report_en.pdf

- federal act of 15 April 1994, became operational.
- 2001 In December, an agreement was obtained between the Belgian government and the electricity sector on financing the dismantling of old nuclear installations at the Mol and Dessel sites, and on the management of the provisions for spent fuel disposal and dismantling of the Belgian nuclear power stations.
 - 2002 In February and September, repatriation of the fourth and fifth batches of containers with vitrified high-level radwaste, resulting from the reprocessing of Belgian spent fuel in La Hague (France).
 - 2002 In July, the SAFIR 2 Report (SAFIR = Safety Assessment and Feasibility Interim Report) on high level radwaste disposal in Belgium was presented by ONDRAF/NIRAS to the competent federal authorities. The report confirms the Boom clay as a potential host formation, as well as the technical feasibility of the construction of an underground repository in this clay. The report was peer-reviewed by the OECD/NEA³.
 - 2003 In January, the Belgian Senate approved the legislation on phasing out Belgian nuclear power plants no later than 40 years from the date on which operations started (federal act of 31 January 2003).
 - 2003 In the same month, ONDRAF/NIRAS submitted to the Government the first inventory report of all nuclear sites or facilities containing radioactive substances on the Belgian territory.
 - 2003 In July, the federal act of 11 April 2003, regulating the provisions for decommissioning of Belgian nuclear power plants and for the management of spent fuel from those nuclear power plants, was published.
 - 2003 In the same month, the general assemblies of ELECTRABEL and SPE agreed to split their joint venture CPTe with retro-active effect to 1 January 2003.
 - 2003 In September, repatriation of the sixth batch of containers with vitrified high-level radwaste, resulting from the reprocessing of Belgian spent fuel in La Hague (France).

2.1.2. Current Organizational Chart(s)

Figure 2 shows the nuclear energy sector organization and its shareholdings among the main companies, research centres and the Belgian state

ELECTRABEL is operator of all Belgian nuclear power plants. Its reference-shareholder is SUEZ-TRACTEBEL (41.4 % of the shares at the end of 2000). SUEZ-TRACTEBEL, the energy arm of Suez, is a Belgian industrial group with international scope provides public utility services; community services; engineering and industrial construction and services. It is organized into five operating units including the "Electricity and Gas Europe" (EGE) unit (ELECTRABEL and DISTRIGAS), the "Electricity and Gas International" (EGI) unit and the "Engineering" unit (TRACTEBEL ENGINEERING).

³

www.nea.fr/html/rwm/reports/2003/nea4431-safir2.pdf

The Belgian NPPs require yearly over 350,000 man-hours of nuclear engineering services. Nuclear engineering services are provided by the engineering division of SUEZ-TRACTEBEL (TRACTEBEL ENGINEERING) for the Belgian NPPs and by the engineering division of BELGONUCLEAIRE for the fabrication of MOX fuel. The nuclear technical know-how of both SUEZ-TRACTEBEL and BELGONUCLEAIRE is commercialized for all other customers in Belgium and abroad by BELGATOM, a joint subsidiary.

Fuel fabrication plants are at Mol-Dessel. The uranium-plutonium mixed-oxide fuel (MOX) factory is owned and operated by BELGONUCLEAIRE (35 tHM/yr), the uranium fuel factory by FBFC International (400 tU/yr). BELGONUCLEAIRE is currently the only MOX-producer that manufactures MOX-fuel for BWRs. In the period 1996-98, FBFC commissioned new workshops for assembling MOX-fuel elements and gadolinium containing fuel elements. In 1996 it has been to manufacture BWR MOX- fuel assemblies for the Japanese market.

SYNATOM, a joint subsidiary of ELECTRABEL and SUEZ-TRACTEBEL, is responsible for the enriched uranium procurement and spent fuel management for all Belgian nuclear power plants and is entrusted by law with the management of the provisions for dismantling the Belgian nuclear power plants and the management of their spent fuel.

ONDRAF/NIRAS (National Agency for Radioactive Wastes and Fissile Materials Management) is entrusted by law with the safe transportation, treatment, conditioning, storage and disposal of all radioactive waste produced in the country and with some aspects of decommissioning. BELGOPROCESS, a subsidiary of ONDRAF/NIRAS, operates the radwaste treatment, conditioning and storage facilities of the Mol-Dessel site and manages the former EUROCHEMIC site.

Belgian companies supplied about 80% of the systems and equipment for the country's nuclear facilities. The nuclear steam supply systems (NSSS) were provided by WESTINGHOUSE and FRAMATOME (now FRAMATOME-ANP), associated with ALSTOM ACEC ENERGIE and COCKERILL MECHANICAL INDUSTRY (CMI).

The reactor vessels, reactor internals, primary pumps, steam generators, pressurizers, piping, and instrumentation and control (I&C) systems were made in Belgium. The manufacturers and contractors participate in servicing the operating Belgian nuclear power.

ASSOCIATION VINÇOTTE NUCLEAR (AVN), a non-profit organization, is an authorised inspection organisation that is authorised by the FANC to perform safety assessments and inspections of the nuclear facilities in Belgium.

2.2. Nuclear Power Plants: Status and Operations

Belgium has seven operating nuclear power plants; see Table 7 for details about their status. During the year 2002, the seven Belgian nuclear power stations supplied the high voltage network with 45.0 TWh or 57.6% of total net electricity generated (78.1 TWh). In the record year 1999, these figures were respectively 46.7 TWh and 57.8%. The average load factor of the Belgian nuclear power plants reached 89.8% in 2002 against 93.3% for the record year 1999. These results confirm the reliability of the Belgian nuclear power stations, which belong to the best performers in the world.

The steam generators of the Tihange 2 plant were replaced in 2001 during the maintenance and refuelling outage, as planned. These operations are part of a replacement programme of the steam generators that started in 1993 in Doel 3 and continued during the years in the different Belgian nuclear power stations. The Japanese company Mitsubishi manufactured the new steam generators for Tihange 2. In 2002 the decision was taken to replace the steam generators of Doel 2. The replacement is scheduled for 2004.

TABLE 7. STATUS OF NUCLEAR POWER PLANTS

Station	Type	Capacity	Operator	Status	Reactor Supplier
BR-3	PWR	11	CEN/SCK	Decommissioned	WESTINGHOUSE
DOEL-1	PWR	392.5	ELECTRABEL	Operational	ACECOWEN ^a
DOEL-2	PWR	392.5	ELECTRABEL	Operational	ACECOWEN
DOEL-3	PWR	1,006	ELECTRABEL	Operational	FRAMACECO ^b
DOEL-4	PWR	985	ELECTRABEL	Operational	ACECOWEN
TIHANGE-1	PWR	962	ELECTRABEL	Operational	ACECOWEN
TIHANGE-2	PWR	1,008	ELECTRABEL	Operational	FRAMACECO
TIHANGE-3	PWR	1,015	ELECTRABEL	Operational	ACECOWEN

^a ACECOWEN: ACEC-COCKERILL-WESTINGHOUSE; ^b FRAMACECO: FRAMATOME-ACEC-COCKERILL

Station	Construction Date	Criticality Date	Grid Date	Commercial Date	Shutdown Date
BR-3	01-Nov-57	29-Aug-62	10-Oct-62	10-Oct-62	30-Jun 87
DOEL-1	01-Jul-69	18-Jul-74	28-Aug-74	15-Feb-75	
DOEL-2	01-Sep-71	04-Aug-75	21-Aug-75	01-Dec-75	
DOEL-3	01-Jan-75	14-Jun-82	23-Jun-82	11-Oct-82	
DOEL-4	01-Dec-78	31-Mar-85	08-Apr-85	01-Jul-85	
TIHANGE-1	01-Jun-70	21-Feb-75	07-Mar-75	01-Oct-75	
TIHANGE-2	01-Apr-76	05-Oct-82	13-Oct-82	06-Jun-83	
TIHANGE-3	01-Nov-78	05-Jun-85	15-Jun-85	01-Sep-85	

Source: IAEA Power Reactor Information System, as of 31 December 2002.

Although the government decision of December 1988 brought a moratorium on the construction of new NPPs, ELECTRABEL is allowed to upgrade the capacity of its NPPs. The upgrades have increased the total Belgian nuclear generation capacity with 319 MW(e) (+5.8%) from 1994 until 2002. 48 MWe is due to the steam generator replacement at Tihange 2 in 2001. Moreover, Belgian utilities have a 25% share in the output of the two 1,400 MW(e) PWR French units at Chooz. The new Belgian law, imposing a limited 40-years lifetime for nuclear power plants, will lead to a decrease in nuclear electricity generation while the share of fossil fuelled power plants, especially through the commissioning of new combined-cycle gas turbine units, is estimated to increase.

Figure 3 shows the location of the nuclear sites in Belgium.

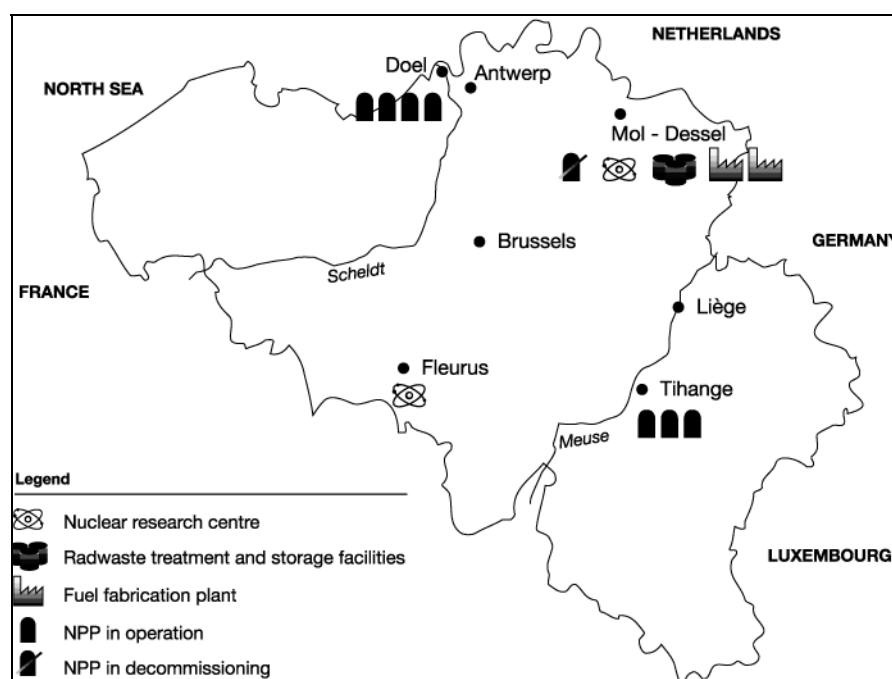


FIG. 3. Locations of nuclear sites in Belgium

2.3. Supply of NPPs

There are no Belgian companies supplying Nuclear Steam Supply Systems (NSSS). Architect engineering and consulting services for nuclear power plants and facilities are performed by three companies:

- TRACTEBEL ENGINEERING (among the leading design firms in the world) provides contractor and architect-engineer services (pre-project studies, site selection and qualification, feasibility and optimization studies, basic and detailed engineering, construction, supervision and start-up), and full Engineering, Procurement and Construction (EPC) solutions. Power systems engineering, under the responsibility of TRACTEBEL ENGINEERING, represents about 50% of the activities, half of which accounts for nuclear engineering services for NPPs, including turnkey projects.
- BELGONUCLEAIRE, a subsidiary of SUEZ-TRACTEBEL (16%), ELECTRABEL (34%) and SCK•CEN (50%) has engineering expertise in uranium-plutonium mixed-oxide fuel (MOX) utilization, manufacturing and manufacturing plant design, and radwaste treatment, storage and disposal facilities.
- BELGATOM, jointly owned by SUEZ-TRACTEBEL (80%) and BELGONUCLEAIRE (20%), provides worldwide nuclear engineering services to the international market. The contracts signed by BELGATOM are performed by the engineering division of SUEZ-TRACTEBEL (TRACTEBEL ENGINEERING) and by the engineering division of BELGONUCLEAIRE. BELGATOM has a close and continuous relationship with the key players in the Belgian nuclear energy sector, including ELECTRABEL, SCK•CEN, LABORELEC, SYNATOM, ONDRAF/NIRAS and BELGOPROCESS.

Most of the companies involved in nuclear component manufacturing or supply are grouped in AGORIA, a professional federation covering 100 industrial companies in metal working, mechanical engineering, electrical engineering and electronics, transport equipment and plastic conversion. The main nuclear component suppliers, contractors and civil engineering companies are listed below:

ABB	Mechanical and electrical systems
ALSTOM ACEC ENERGIE*	Generators, primary pumps
ALSTOM BELGIUM	Pumps, valves, turbines
AMEC SPIE*	Electrical and instrumentation systems
ASCOM	Mechanical engineering
ATELIERS DE LA MEUSE*	Mechanical construction, fuel containers
CEGELEC	Instrumentation for site security systems
CEGELEC SOLUTIONS & SERVICES*	Specific instrumentation and control systems (reactor protection, rod position indication and control, thermodynamics instrumentation, neutron flux instrumentation)
CMI	Main mechanical NSSS components (such as steam and diesel generators)
ENI	Electrical components
FABRICOM*	Piping, electrical equipment, ventilation
G.C.C.N. ¹	Structural systems
IMOP	Piping, electrical, insulation
KABELWERK EUPEN*	Electrical cables
LEPAGE EURONUCLEAIRE	Mechanical equipment
LEMMENS SERVICES*	Decontamination, radioprotection, mechanical works
M.P.E. ²	Precision machined and mechanically welded assemblies
PAUWELS	Transformers
SIEMENS*	Mechanical and electrical supply systems
SOBELCO	Thermal engineering and construction
STORK MEC	Piping
TCM ³	Piping
WESTINGHOUSE	Mechanical and electrical supply systems

*: Member of AGORIA Group B6

¹ Groupe Genie Civil des Centrales Nucléaires

² Mecanique de Précision pour Equipements

³ Tuyauteries & Constructions Mosanes

2.4. Operation of Nuclear Power Plants

Electricity supply (nuclear and non-nuclear) in Belgium is mainly carried out by ELECTRABEL that provided in 2002 about 89% of the electricity supply to end users. ELECTRABEL operates the Tihange and Doel nuclear power plants with a total net capacity of 5,761 MW(e) (4.7% of the European Union's net nuclear installed capacity as of end 2002). As a nuclear operator, ELECTRABEL ranks 13th worldwide in installed nuclear capacity. It owns Doel 1 and Doel 2, 50% of Tihange 1 (the other 50% is owned by EDF, France) and 96% of Doel 3, Doel 4, Tihange 2 and Tihange 3. The other 4% of Doel 3, Doel 4, Tihange 2 and Tihange 3 is owned by the Belgian utility SPE.

Engineering support to operation is provided by TRACTEBEL ENGINEERING, a division of SUEZ-TRACTEBEL, which takes part in important plant modifications, such as steam generator replacement, upgrading and backfitting, fuel fabrication procurement, core management and fuel handling and inspection services, Quality Assurance, in-service inspection, A/E services, project management, and technical assistance.

Maintenance service suppliers: Most of the component suppliers and contractors listed under paragraph 4.1 provide also maintenance services. The list below is not exhaustive, as Belgium is an open market and most contracts are concluded after competitive tender procedures.

ALSTOM ACEC ENERGIE	Maintenance of generators, quality control and training in the field of primary components (reactor vessels, internals, primary pumps) and fuel handling equipment and systems
ALSTOM BELGIUM	Maintenance of valves, pumps, fans
CEGELEC SOLUTIONS & SERVICES	Instrumentation and control systems
FRAMATOME ANP	Design, training, quality control, maintenance, inspection and repair work of primary components (reactor vessel and internals, steam generators), steam generator replacement, fuel supply, control rod, fuel handling equipment and systems
MITSUBISHI HEAVY INDUSTRIES	Replacement steam generators
TECNUBEL	Maintenance and cleaning, decontamination, radio monitoring
WESTINGHOUSE ELECTRIC EUROPE	Design, training, quality control, maintenance, inspection and repair work of primary components (reactor vessel and internals, steam generators), steam generator replacement, fuel supply (EFG, Westinghouse Atom), control rod, fuel handling equipment and systems

2.5. Fuel Cycle and Waste Management

Interfaces regarding the nuclear fuel cycle are shown in Figure 4.

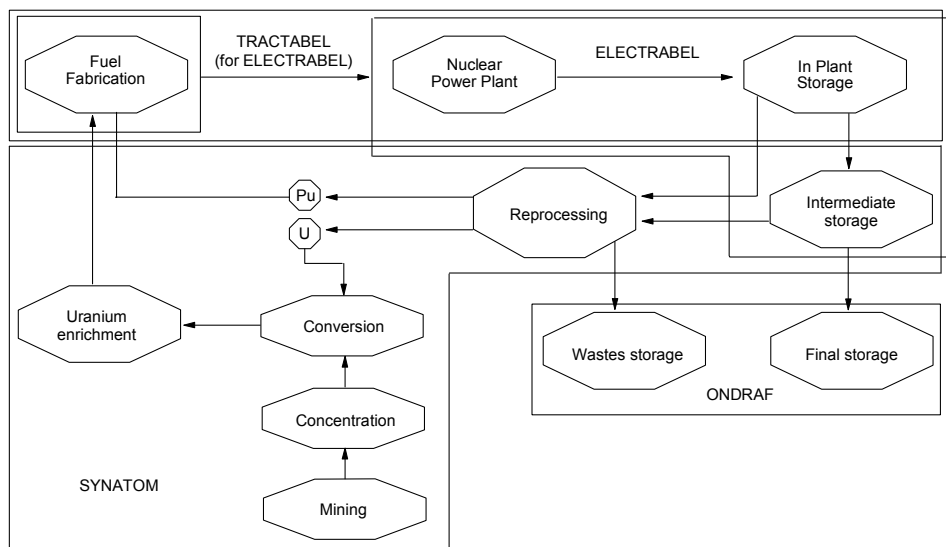


FIG. 4. Organizations covering the nuclear fuel cycle: Interfaces

Fuel cycle and waste management engineering services are provided by TRACTEBEL ENGINEERING, BELGONUCLEAIRE and their subsidiary BELGATOM.

Two fuel fabrication plants are located at Mol-Dessel. The MOX fuel facility is owned and operated by BELGONUCLEAIRE and the uranium fuel facility is owned and operated by FBFC INTERNATIONAL, a subsidiary of FRAMATOME-ANP. FBFC INTERNATIONAL manufactures uranium fuel assemblies and pressurized water reactor control rods and provides the final assembly of MOX fuel (all BWR and PWR types).

SYNATOM, a joint subsidiary of ELECTRABEL and SUEZ-TRACTEBEL, is responsible for the enriched uranium procurement and the spent fuel management for all Belgian nuclear power

plants. It maintains ownership of the nuclear materials, at all times, prior, during and after use in nuclear reactors until final disposal. The Belgian State holds a “golden share” in SYNATOM, which entitles it with special rights.

Transportation services are provided by:

TRANSNUBEL	Fresh and spent fuel (uranium and MOX) transportation; design of handling systems for fuel containers.
TRANSRAD	Radioactive waste transportation ; uranium transportation

ONDRAF/NIRAS, National Agency for Radioactive Waste and Fissile Materials Management is entrusted by the law with the safe management of all radioactive wastes produced in the country, including their transport, treatment, conditioning, storage and disposal.

BELGOPROCESS, a subsidiary of ONDRAF/NIRAS, operates the radwaste treatment plant, conditioning and storage facilities of the Mol-Dessel site, as well as managing the EUROCHEMIC site.

Engineering services to ONDRAF/NIRAS and BELGOPROCESS are supplied by TRACTEBEL ENGINEERING and BELGONUCLEAIRE via their joint subsidiary BELGATOM.

2.6. Research & Development Activities

Nuclear research and development in Belgium is co-ordinated by the Federal Public Service (FPS) Economy, Small and Medium Enterprises (SMEs), Self-employed and Energy (formerly the Ministry of Economic Affairs of the Federal Government) and carried out mostly by the SCK•CEN (Belgian Nuclear Research Centre) at Mol. Nuclear research done by SCK•CEN is mainly confined to reactor safety experiments, reactor fuel and reactor materials examinations, radioactive waste disposal, decommissioning, radiation protection and health physics.

In April 1997, the BR2-high flux nuclear research reactor has been restarted after two years of refurbishing. This research reactor is specialising in irradiation and post-irradiation research for new fuels and structural materials. The reactor is also used for the production of medical and industrial isotopes and doping silicon. These productions are integrated in an international co-operation with other research reactors, in order to provide the isotopes in a continuous way, as demanded by the medical sector.

MYRRHA, or the study on an accelerator driven multi purpose neutron source (ADS), is a most challenging research subject. The preliminary research, executed at SCK•CEN, is related to the scientific and technical feasibility and is performed in the framework of a coherent European ADS-policy. The ADOPT-network has selected the SCK•CEN-project as the most probable ADS-system for an European co-operation.

The know how of the SCK•CEN on radiation damage in cells is a base for a research programme in the ESA/MELISSA project. The SCK•CEN studies the stability of the genetic codes of the bacteria to be involved in the production of food and oxygen from human waste during space flights.

Research and development for the support of both nuclear and non-nuclear power plant operations is carried out by LABORELEC, a central research laboratory of the utilities, ELECTRABEL and SPE, and by TRACTEBEL ENGINEERING.

2.7. International Co-operation and Initiatives

Belgium is active in a number of international nuclear organizations including the International Atomic Energy Agency (IAEA), Nuclear Energy Agency (NEA) of the Organization for Economic Co-operation and Development (OECD) as well as other bilateral and multilateral organizations such as WANO.

Belgium is also involved in a number of European organizations set up to improve safety of nuclear power plants in countries of the former Soviet Union and Eastern Europe:

- RAMG (Regulatory Assistance Management Group) is formed of Western Safety Authorities to assist for setting up of Eastern Safety Authorities. [AVN]
- TSOG (Technical Safety Organisation Group) is an association of technical support organisations in EU member countries to advise the Eastern European Safety Authorities. [AVN]
- CASSIOPEE (Consortium d'Assistance Operationnelle aux Pays d'Europe de l'Est) is an EEIG of the EU agencies responsible for radioactive waste management and storage. [ONDRAF/NIRAS]

Belgium participates in programmes and projects for developing and promoting new advanced NPP technology:

- EUR (European Utility Requirements) common requirements for building future LWRs in Europe, written by European electricity producers [TRACTEBEL ENGINEERING]
- EPRI programme for ALWR Certification in the US [TRACTEBEL ENGINEERING]
- EPP (European Passive Plant) programme for developing Westinghouse type passive nuclear plants in Europe. [TRACTEBEL ENGINEERING]
- EFET (European Fusion Engineering and Technology) – industrial consortium for the engineering of fusion reactors [BELGATOM]

Belgium participates in several international R&D programmes:

- Pressure vessel steel projects (materials behaviour in the frame of plant lifetime extension) with IAEA, “Kurchatov Institute” of Russia, and VTT of Finland [TRACTEBEL ENGINEERING]
- Halden reactor project (Norway) project runs under the auspices of OECD/NEA. [SCK•CEN, BELGONUCLEAIRE, TRACTEBEL ENGINEERING, AVN]
- Benchmarking of the RELAP (thermohydraulic) code in the frame of the international user's group (member of the Code Assessment and Maintenance Programme - CAMP).
- VIP (Venus International Programme) - with TRACTEBEL ENGINEERING participation - to assess neutronics codes for MOX fuel by performing experimental tests in the VENUS reactor with UK and Japan as scientific partners. VENUS is operated by the Belgian nuclear research center SCK•CEN. [SCK•CEN, BELGONUCLEAIRE]
- RASPLAV project to study melt core cooling inside the reactor vessel, a joint research programme with the Federation of Russia and 14 other countries. RASPLAV is sponsored by the Nuclear Energy Agency (NEA) of the OECD. [TRACTEBEL ENGINEERING]
- FIGARO: Irradiation and examination of two high burnup MOX fuel rods for fission gas release analysis. [BELGONUCLEAIRE, TRACTEBEL ENGINEERING]
- ARIANE: Evolution of isotopic composition of MOX fuel during irradiation. [BELGONUCLEAIRE, TRACTEBEL ENGINEERING]

2.8. Human Resources Development

The Belgian nuclear research centre coordinates a project within the 5th Framework Programme of the European Commission for preparing the coordinating and harmonising the training of nuclear engineers: the European Nuclear Engineering Network (ENEN⁴). The underlying objective of the work is safeguarding of nuclear knowledge and expertise through the preservation of higher nuclear engineering education. Through co-operation between universities and research centres, better use will be made of dwindling teaching capacity, scientific equipment and research infrastructure. In the 6th Framework, this initiative will result in a coherent European Network, coping with the dwindling nuclear know-how at university level.

On the Belgian level the SCK•CEN has, in co-operation with five Belgian universities, realised this course. The interuniversity programme in Nuclear Engineering organised within the Framework of the Belgian Nuclear Higher Education Network (BNEN⁵) leads to the post-graduate degree of “Master of Science in Nuclear Engineering”. The universities involved are the University of Leuven (KUL), the University of Louvain (UCL), the University of Gent (RUG), Liège University (ULg) and the University of Brussel (VUB). The nuclear engineering programme is a one-year programme: from October to mid-July. In many cases, but subject to special request and approval, the programme can be spread over two academic years. Applicants must hold a Belgian university degree or equivalent. The language of teaching is English.

The programme consists of a set of general courses followed by some elective advanced courses, an on-the-job-training and a master’s thesis work. The schedule of the programme will stimulate the students’ mobility in the preparation of their master’s thesis work: on-the-job-training in industry, in research centres or in universities within Belgium or Europe. The lectures are taught at the premises of the Belgian nuclear research centre SCK•CEN. The laboratory exercises make use of the nuclear facilities of SCK•CEN. Various technical visits are organised to research and industrial nuclear facilities.

3. NATIONAL LAWS AND REGULATIONS

3.1. Safety Authority and the Licensing Process

Licensing takes place under the authority of the Minister of Labour and the Minister of Interior (Royal decree of August 7, 1995), which have the guardianship over the Federal Agency for Nuclear Control (FANC). This Minister and the Agency are responsible for promulgating and enforcing regulations designed to protect the employees of the nuclear plants and the population against the hazards of ionising radiations. The Agency is assisted in technical matters by a Scientific Council of experts and representatives from various authorities responsible for nuclear safety. They have only an advisory role. The Commission gives recommendations by absolute majority. State approved agencies, such as the ASSOCIATION VINÇOTTE NUCLEAR (AVN), carry out official acceptance procedures for installations prior to commissioning and exercise supervision over installations during operation. Final authorization for nuclear plant commissioning rests with the King.

The main steps in the Belgian licensing procedure are described below:

- Filing of an application: the request for the licence is first sent to the Director General of the FANC, together with the relevant information (characteristics of the installation, planned safety measures, an Environmental Impact Assessment, and a study of the premises and the

⁴ <http://www3.sckcen.be/enen>

⁵ <http://www3.sckcen.be/bnen>

demographic, geological, meteorological, etc. characteristics of the area of the installation). The request has to contain a preliminary safety report and a report describing the incidences of the environment;

- The Scientific Council is consulted a first time. After the Council has given its preliminary advice, it is sent to the applicant. Then the European Commission is also consulted (if necessary) according to article 37 of the Euratom Treaty, as well as all the municipalities in a radius of 5 km around the installation (who inform their population) and the Province involved. After the advice of the municipalities, of the Province and of the European Commission have been received, the file is submitted to the Scientific Council once more, which then gives its definitive advice;
- The Minister of Labour and the Minister of Interior then decide by submitting a Royal Decree to the King. This Royal Decree gives the construction and operation licence. It contains the conditions to be respected. These stipulate, among other things, the content of the safety report;
- After the construction of the installation, and before the start of the operation, the Agency or the state approved agency designated by her, proceeds with the acceptance of the installation. This acceptance must establish the conformity of the installation with the general regulation, the stipulations of the construction and operation licence and the safety report. If the acceptance is favourable, the Minister of Interior proposes to the King to confirm the construction and operation licence, which are granted for an unlimited period.

3.2. Main National Laws and Regulations in Nuclear Power

Act of March 10, 1925:

Electricity generation is not regulated. Each individual or corporation is free to generate electricity.

Act of March 29, 1958 and Royal Decree of February 28, 1963 [GRR-1963]:

General Regulations for the protection of the population and workers against the hazards of ionizing radiation. Nuclear installations are divided into four classes, in descending order of hazards involved. Class I includes nuclear reactors and large nuclear installations (criticality hazard). Installations in Classes II, III and IV are divided according to the quantity of radioactive materials they may handle. Installations in Classes I, II and III require prior licensing, whereas those in Class IV do not. (Replaced since September 1, 2001 by the Act of April 15, 1994 and the Royal Decree of July 20, 2001)

Royal Decree of October 15, 1979:

Founding of the Inter-ministerial Commission for Nuclear Safety and State Security in the nuclear field against hazards arising from the use of radioactive substances.

Act of August 8, 1980:

Founding of ONDRAF/NIRAS for the treatment, the conditioning, the storage and the disposal of radioactive waste and for the handling of some aspects of fissile materials and decommissioning (replaced by the Act of January 11, 1991).

Act of February 9, 1981 and Royal Decrees of May 12, 1989 and July 16, 1993:

Regulations for the exportation of nuclear materials, nuclear equipment and nuclear technological data.

Act of July 22, 1985:

Defining third party liability pertaining to nuclear energy generation as outlined in the Paris Convention of 29 July 1960, and the additional Convention of Brussels of 30 January 1963:

- Liability of the power plant operator in the event of a nuclear accident: victims are not required to supply proof of the nuclear power plant operator's fault in order to be compensated for damages arising from a nuclear accident.
- Three-tiered compensation system (1 EUR is 40.3399 BEF):
 - by the power plant operator up to a maximum amount of BEF 4 billion. Under Belgian law, the nuclear plant operator must supply proof of an insurance policy or have adequate security deposits to cover potential civil liability suits before the operating license is granted;
 - by the Belgian State for the amount between BEF 4 billion and BEF 9 billion;
 - by the signatories of the Paris and Brussels Conventions for the amount between BEF 9 billion and BEF 15 billion.

Royal Decree of May 16, 1986:

Determines the financial security certificate for the transport of nuclear substances.

Act of January 11, 1991

Mission of ONDRAF/NIRAS (replaces the Act of August 8, 1980).

Royal Decree of September 17, 1991

Establishes the Nuclear and Radiological Emergency Plan for the Belgian territory (replaced by the Royal Decree of October 17, 2003).

Act of April 15, 1994 and Royal Decree of July 20, 2001 [GRR-2001]:

General Regulations for the protection of the population, workers and environment against the hazards of ionizing radiation and founding of the Federal Agency for Nuclear Regulation (FANC) (replaces, starting from September 1, 2001, the Act of March 29, 1958 and the Royal Decree of February 28, 1963)

Act of December 12, 1997

Defines the missions for the organization concerning the inventory of all nuclear facilities and sites containing radioactive waste and its financing.

Act of April 29, 1999 and Royal Decree of May 3, 1999:

Organizes the electricity market in Belgium (implementation of the European Electricity Directive 96/92 of December 19, 1996).

Royal Decree of November 18, 2002:

Describes the provisions on the qualification of storage, processing and conditioning installations for radioactive waste.

Act of January 31, 2003 (published in the Official Bulletin of February 28, 2003):

Regulates the phase-out of nuclear energy in Belgium by stipulating that all 7 Belgian nuclear power plants must be shut down no later than 40 years from the date on which they entered operation.

Act of April 11, 2003 (published in the Official Bulletin of July 15, 2003):

Regulates the provisions for decommissioning of Belgian nuclear power plants and for the management of spent nuclear fuel from those nuclear power plants.

Royal Decree of October 17, 2003 (published in the Official Bulletin of November 20, 2003):

Establishes the Nuclear and Radiological Emergency Plan for the Belgian territory (replaces the Royal Decree of September 27, 1991).

Agreements concluded between the Belgian State and the electric utilities:

- The decommissioning agreement with the State in 1985 regulates the constitution of provisions to cover the dismantling costs of nuclear installations and the decontamination costs of the nuclear sites to be implemented within 30-years. In the agreement it is foreseen to re-evaluate the situation every five years at the request of the Control Committee. This agreement has been replaced by the federal act of April 11, 2003.
- The agreement in 1990 with the Belgian State defines the contribution of each party of the agreement in the financing of the decommissioning and the cleanup cost of the state owned nuclear facilities at the Mol-Dessel site up to 2000. Parties to the agreement are the State of Belgium, ONDRAF/NIRAS, SYNATOM and ELECTRABEL and SPE. Based on an agreement in principle at the end of 2001, a new agreement was accepted in 2003, regulating the contributions for the period after 2000.

4. CURRENT ISSUES AND DEVELOPMENTS ON NUCLEAR POWER

4.1. National Nuclear Energy Policy

By means of the federal act of 31 January 2003, the political authorities have decided to abandon the use of fissile nuclear energy for industrial electricity production. This was done by prohibiting the building of new nuclear power plants and by limiting the operational period of the existing nuclear power plants to 40 years. The act does not affect the operation of research facilities, and does not rule out fusion as a future technology. The phase-out can only be overridden by new legislation or by a Government decision based on a recommendation from the regulator (CREG) if Belgium's security of supply would be threatened by closing the plants.

Power upgrades of the existing nuclear power plants, e.g. through steam generator replacement, turbine refurbishments, etc. are authorised after approval of licence adaptation application.

The use of MOX-fuel in Belgian nuclear power plants is authorised, however limited to the quantity obtained from the reprocessed spent fuel from Belgian nuclear power plants at La Hague (France).

The return of the vitrified high-level waste of reprocessed Belgian spent fuel from the reprocessing plant of COGEMA in La Hague, France to Belgium is authorised. At the end of 2003, six (of total 15) shipments of each 28 containers have taken place. The first repatriation was in April 2000.

On September 1, 2001, the Federal Nuclear Control Agency (FANC), responsible for the surveillance of nuclear activities, became operational. As a result of the operational start up of the FANC, the regulations concerning nuclear safety and radiation protection have been modified thoroughly. Up to this date, the regulations were governed by the act of 29 March 1958, and the accompanying Royal Decree of 28 February 1963, known as the General Radioprotection Regulation for the Protection of the Workers, the population and the Environment (GRR-1963). These regulatory texts have been abolished since 1 September 2001 and respectively been replaced by the act of 15 April 1994 and the Royal Decree of 20 July 2001 (GRR-2001).

In the second half of the year 2001 negotiations took place between the Belgian Government and the electricity sector about the further financing of the dismantling of the old nuclear facilities in the Mol/Dessel site on the one hand and the management of the provisions for the spent fuel and the dismantling of the nuclear power plants on the other hand. An agreement in principle has been reached at the end of 2001, which can be summarized as follows:

- The Belgian State will continue to finance the dismantling of the old EUROCHEMIC-plant.
- The electricity producers will continue to finance the dismantling of the old waste department of the SCK•CEN and they will intervene for 25% in the dismantling of the old BR3-reactor of SCK•CEN. The corresponding amounts have been introduced at the European commission as stranded costs in the frame of the liberalization of the electricity market.
- The provisions for the spent fuel and the dismantling of the nuclear power plants have to be concentrated at SYNATOM, of which the Belgian State possesses a golden share, which permits it to block any decision of the governing board of the firm with respect to energy policy. The provisions will have to be supervised by a special committee, composed of financial and economic experts. The committee will have to report annually to the Government and the Parliament.

The financing of the contribution of the Belgian State for the dismantling of the old nuclear facilities has been completely changed in 2002 by the Government. A law has been promulgated which stipulates that, from 2003 onwards, the restoration of the old EUROCHEMIC-plant, the

dismantling of the BR-3 reactor and the old waste department of SCK•CEN has to be covered by an extra charge on the electricity consumed in Belgium.

The new regulation for the management of the provisions for the dismantling of the nuclear power plants and for the management of the spent fuel is the object of the federal act of 11 April 2003, published in the Official Bulletin of 15 July 2003. The provisions are centralised at SYNATOM, which will be transformed into a 100% subsidiary of ELECTRABEL. The Belgian State will keep its golden share. SYNATOM can lend maximum 75% of the provisions set up to ELECTRABEL on normal conditions and at the rate applied for industrial credits, as far as the consolidated group ELECTRABEL remains solvent. SYNATOM will report to a Committee composed of governmental representatives on the forecasting for the setting up of provisions, on the investment of the provisions and on the agreements with ELECTRABEL for the attention of the Parliament.

4.2. Surveillance of nuclear activities after September 1, 2001

The surveillance of the nuclear activities in Belgium is structured in three consecutive levels: the operator, an independent control organisation recognised by the FANC and, finally, the FANC itself.

The criteria and obligations that have to be observed by the control organisations in order to obtain and keep their qualifications, are mentioned in art.74 of the GRR-2001. Furthermore, the inspections in nuclear installations have to be entrusted by the control organisations to experts having obtained an individual qualification from the FANC, on the basis of Art.73 of the GRR-2001. The control organisation recognised by the FANC with regard to the performing of inspections in nuclear reactors or in waste processing installations, is AVN.

The FANC is an autonomous government institution with legal personality. The Agency is governed by the Board of Directors. Its members are appointed by the Federal Government on the basis of their particular scientific or professional qualities. In order to guarantee the independence of these directors, their mandate is incompatible with certain other responsibilities within the nuclear sector and within the public sector/ The Agency is supervised by the Federal Minister of Internal Affairs via a government Commissioner who attends the meetings of the Board of Directors.

In order to perform its tasks, the Agency is assisted by a Scientific Council. The composition and the competence of this Council are determined by Royal Decree. The Council consists of experts within the field of nuclear energy and of certain safety disciplines.

The Agency exercises its authority with regard to the nuclear operator through one-sided administrative legal acts (the consent of the persons involved is not required) such as the delivery, refusal, modification, suspension and withdrawal of licence, authorisations, recognitions or approvals. It organises inspections to verify the observance of the conditions stipulated in these licences, recognitions and approvals. The Agency can claim all of these documents in whatever form, from the facilities and companies under its supervision. Infractions with regard to the decisions of the Agency can be sanctioned.

The operation of the Agency is entirely financed by the companies, organisations or persons it renders services to. In practice this is done through non-recurrent or annual retributions at the expense of the holders or applicants of licences, recognitions or approvals; the tariffs are determined by Royal Decree.

The above mentioned statute attributes to the Agency the indispensable independence to enable it to impartially exercise its responsibilities as a regulator of the nuclear activities.

4.3. Nuclear waste management issues

The current major developments in radioactive waste management in Belgium are mainly related to the return of vitrified high-level waste, the selection of final radwaste disposal sites and R&D on disposal of various waste categories.

A. Return of Vitrified High-Level Radwaste

In view of the return of the vitrified high-level waste resulting from the reprocessing in France of Belgian spent fuel, the preliminary test and transfer programme with an empty transport container was successfully completed on 24 February 2000.

Following the authorization for three return shipments granted by the Minister of the Interior, the first 28 canisters with vitrified high-level waste returned to Belgium on 5 April 2000. Transport by railway, transfer on and transport by lorry to BELGOPROCESS and the ultimate reception, after adequate control, in the interim storage building on the site of BELGOPROCESS in Dessel all went smoothly. A second return transport took place on 17 November 2000. Control at the reception in the interim storage building confirmed that the containers complied with the norms and characteristics that are imposed by the authorities. The communication actions with regard to these transports were jointly taken care of by ONDRAF/NIRAS, SYNATOM and the Minister of the Interior, the latter acting as competent authority in this matter. Web-cameras in the storage building on the site of BELGOPROCESS allowed following through internet all the operations dealing with the reception and manipulation of the containers.

By the end of 2003 six transports of vitrified high level radwaste took place, resulting in the interim storage of 168 containers on the BELGOPROCESS site in Dessel. In total, fifteen transports are planned over a period of ten years to return the vitrified high level radwaste from the reprocessing at La Hague of 630 tU from Belgian nuclear power plants.

At the request of the federal government, who wants the vitrified waste canisters' quality to be guaranteed and to comply with the safety requirements of long-term radioactive waste management, an additional scientific programme requiring both destructive analyses of a glass sample and non destructive analyses of a vitrified waste canister will have to be carried out in close cooperation between ONDRAF/NIRAS, SCK•CEN and COGEMA. Because of the complexity of the programme, results are not expected before 2006.

B. Selection of Radioactive Waste Disposal Sites

As far as low-level and short-lived waste is concerned, ONDRAF/NIRAS continued to concentrate its activities on the existing nuclear zones in Belgium, following the decision of the Belgian federal government of 16 January 1998. Among these zones, those of Dessel (where BELGOPROCESS is located) and Mol (SCK•CEN) witnessed considerable progress with the establishment of local partnerships. The aim of these local partnerships is to involve the various local actors (political, social, cultural, etc.) in the development of activities that may result in a disposal project proposal that can be integrated in a more global project with a positive impact for the zone concerned and that can be accepted by the local population and authorities.

After the creation of a partnership in Dessel in September 1999 (called STOLA), a second partnership was established in Mol in February 2000 (called MONA). Both partnerships reached their cruising speed and created several working groups to study various aspects an integrated disposal project might involve (location, social-economical impact on the region, local development compensations, environment, safety, etc.). They also developed their own websites to inform the local

public.

In Fleurus/Farciennes, a local information committee was first created to follow and assess the results of a preliminary geological survey on the nuclear site of the IRE that was carried out at the request of the local authorities. In 2002, the site investigations have concluded positively of a near surface disposal, after which the decision to create a local partnership was taken by both communities. It was established in October 2002 under the name PaLoFF (Partenariat Local Fleurus/Farciennes). The authorities of the nuclear zones of Tihange and Doel have not changed the opinion they already formulated in 1999 (no participation in a local partnership).

C. Research and Development on Radioactive Waste Disposal

Research on deep geological disposal in clay layers of high-level waste was performed according to the 1998-2003 research and development programme that was signed in 1998 by the various parties involved. Significant progress was made with regard to the PRACLAY demonstration experiment, particularly with the “Ophélie” mock-up and the excavation of the 80m long connecting gallery from the second access shaft to the existing HADES (High Activity Disposal Experimental Site) Underground Research Laboratory (URL), finalised in March 2002. In a future experimental gallery perpendicular to this gallery, the feasibility of the underground disposal concept for high level radwaste will be demonstrated. The disposal concept to be tested is under thorough review.

Since January 2001, the Economic Interest Grouping “EIG PRACLAY” is in charge of the management of both the HADES underground research laboratory and the PRACLAY project implying a joint operation of all the underground and aboveground research facilities. Consequently, the articles of association and the name of the EIG were changed on 21 November 2000 into “European Underground Research Infrastructure for Disposal of Nuclear Waste in Clay Environment”, in short EURIDICE.

The results of the research conducted on the feasibility of geological disposal of vitrified high-level waste in the Boom clay layer during the period 1990-1999 are described in the report SAFIR 2 (SAFIR = Safety Assessment and Feasibility Interim Report) that was submitted to the government in July 2002. It was peer-reviewed by the OECD/NEA.

HADES URL

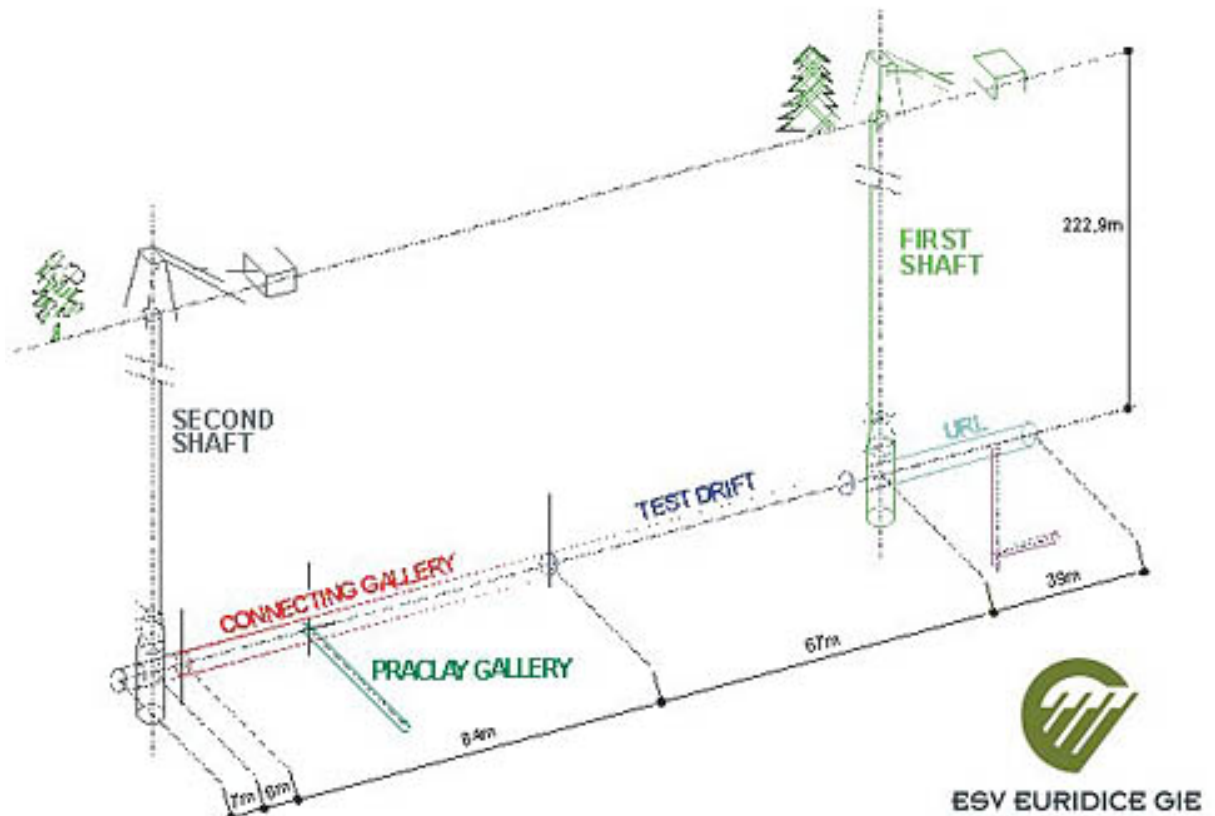


FIG. 5. HADES Underground Research Laboratory (URL) at SCK•CEN

4.4. Nuclear energy and climate change

The current (2003) government focuses its energy policy on the reduction of greenhouse gases in order to reach the reduction quota foreseen by the Kyoto Protocol (for Belgium a reduction of 7.5% from the level of 1990). Therefore, the government will take different measures, for example reduce taxes on 'clean' energy, take measures for energy saving in industry, transport and households, as well as promote the construction of large wind farms offshore with a capacity of nearly 6 to 10% of the national electricity generation

It can be expected that in spite of all planned measures and goodwill, it will be very difficult for Belgium to achieve the Kyoto goals : Belgium has to decrease its greenhouse gases emissions by about 15% (7,5% as the Kyoto goal plus +/- 7,5% corresponding to the increase of the greenhouse gases emissions between 1990 and 2002). The nuclear phase-out will not help meeting this target, even when taking into account that the nuclear phase-out in Belgium will only start in 2015, after the first Kyoto commitment period.

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Appendix 1

INTERNATIONAL, MULTILATERAL AND BILATERAL AGREEMENTS

AGREEMENTS WITH THE IAEA

- Improved procedures for designation of safeguards inspectors
Rejected by EURATOM.
Offered alternative solutions.
Letter of: 16 February 1989
- NPT related safeguards agreement INFCIRC No. 193
Entry into force: 21 February 1977
- Additional protocol to the NPT safeguards agreement
Signature: 22 September 1998
- Agreement on privileges and immunities
Entry into force: 26 October 1965

OTHER RELEVANT INTERNATIONAL TREATIES

- NPT
Entry into force: 2 May 1975
- EURATOM
Member
- Convention on physical protection of nuclear material
Entry into force: 6 October 1991
- Convention on early notification of a nuclear accident
Entry into force: 4 February 1999
Ratification: 4 January 1999
- Convention on assistance in the case of a nuclear accident or radiological emergency
Entry into force: 4 February 1999
Ratification: 4 January 1999
- Vienna convention on civil liability for nuclear damage
Non-party
- Paris convention on civil liability for nuclear damage
Entry into force: 3 August 1966
- Joint protocol
Signature: 21 September 1988
- Protocol to amend the Vienna convention on civil liability for nuclear damage
Not signed
- Convention on nuclear safety
Entry into force: 13 April 1997
- Convention on supplementary compensation for nuclear damage
Not signed

- Joint convention on the safety of spent fuel management and on the safety of radioactive waste management

Entry into force:	4 December 2002
Signature:	8 December 1997
- ZANNGER Committee

Member	
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- Nuclear export guidelines

Adopted	
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- Acceptance of NUSS Codes

Summary: codes can be used as guidelines when formulating national regulations. Belgium often goes beyond code requirements.	
Letter of:	8 November 1988
- Nuclear Suppliers Group

Member	
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BILATERAL AGREEMENTS

- Belgium has nuclear bilateral agreements with Luxembourg (1970), Romania (1974), USA-USNRC (1978), Korea (1981), France (1981 and 1984), Egypt (1984), The Netherlands (1984 and 1990) and China (1985).
- Belgium (or the Belgian-Luxembourgisch economic union) has scientific, industrial and technological agreements with France (1950), USA (1950, 1951), Kuwait (1974), Democratic Republic of Germany (1974), Poland (1974), Bulgaria (1975), Czechoslovakia (1975), Hungary (1975 and 1986), Romania (1976), Cuba (1976), Egypt (1979), China (1979), Algeria (1982 and 1983), Tunisia (1983), Germany (1980), United Arab Republics (1984); USSR (1984), Mexico (1984), Brazil (1985), Kenya (1985), Venezuela (1986), and India (1990).

Appendix 2

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

NATIONAL ATOMIC ENERGY AUTHORITIES

The Federal Public Service Economy, SMEs,
Self-Employed and Energy
Energy Administration
Division 4 - Nuclear Applications
North Gate III
Boulevard du Roi Albert II, 16
B-1000 Bruxelles, Belgique

Tel.: +32-2-206 42 58
Fax: +32-2-206 57 11
<http://mineco.fgov.be/>

Services Fédéraux des Affaires Scientifiques,
Techniques et Culturelles (SSTC)
Rue de la Science, 8
B-1000 Bruxelles, Belgique

Tel.: +32-2-238 34 11
Fax: +32-2-230 59 12

The Federal Public Service Health, Food Chain
Safety and Environment
Services fédéraux pour les Affaires-
Environnementales
Service de Protection Contre les
Radiations Ionisantes
Rue Ravenstein, 36
B-1000 Bruxelles, Belgique

Tel.: +32-2-289 21 01
<http://www.health.fgov.be>
<http://www.environment.fgov.be>

The Federal Public Service Foreign Affairs,
Foreign Trade and Development
Cooperation
Service Scientifique
Rue des Petits Carmes, 15
B-1000 Bruxelles, Belgique

Tel.: +32-2-238 25 11
Fax: +32-2-230 02 80
<http://diplobel.fgov.be>

The Federal Public Service Employment
Labour and Social Dialogue
Administration de la Sécurité du Travail
Service de la Sécurité Technique
des Installations Nucléaires
Rue Belliard, 51
B-1040 Bruxelles, Belgique

Tel.: +32-2-233 41 11
Fax: +32-2-233 42 31
<http://meta.fgov.be>

The Federal Public Service Justice
Service de la Sécurité Nucléaire
North Gate I
Boulevard du Roi Albert II, 6
B-1000 Bruxelles, Belgique

Tel.: +32-2-205 62 38
Fax: +32-2-205 62 37
<http://just.fgov.be>

BELGIAN NUCLEAR INDUSTRY SECTOR

Forum Nucléaire Belge
Avenue Ariane, 7
1200 Brussels

Tel.: +32-2-773 84 96
Fax: +32-2-773 98 20

Agoria (Group B6)
Diamant Building
Bd. A. Reyers, 80
1030 Brussels

Tel.: +32-2-706 80 10
Fax: +32-2-706 80 18
www.agoria.be

AV Nuclear (Authorised Inspection Agency)
Rue Walcourt, 48
1070 Brussels

Tel.: +32-2-528 01 11
Fax: +32-2-528 01 01
www.avn.be

Belgatom (Architect-Engineer)
Avenue Ariane, 7
1200 Brussels

Tel.: +32-2-773 84 96
Fax: +32-2-773 98 20
www.belgatom.com

Belgonucleaire, S.A. (MOX Manufacturer and
Architect-Engineer)
Avenue Ariane, 4
1200 Brussels

Tel.: +32-2-774 05 11
Fax: +32-2-774 05 47
www.belgonucleaire.be

Belgoprocess (Waste Treatment)
Gravenstraat, 73
2480 Dessel

Tel.: +32-14-33 41 11
Fax: +32-14-31 30 12
www.belgoprocess.be

Electrabel (Utility)
Boulevard du Régent, 8
1000 Brussels

Tel.: +32-2-518 61 11
Fax: +32-2-511 65 64
www.electrabel.be

FBFC International, S.A. (Fuel Manufacturer)
Europalaan, 12
2480 Dessel

Tel.: +32-14-33 12 11
Fax: +32-14-31 58 45

FEX – Nuclear Fuel Experts (consulting)
Avenue de l'Observatoire, 96
1180 Brussels

Tel.: +32-14 31 25 33
Fax: +32- 14 32 09 52

IRE (Production of Radio-Isotopes)
Avenue de l'Espérance 1
6220 Fleurus

Tel.: +32-71-82 92 92
Fax: +32-71-81 38 12

Laborelec (Utility's Laboratory)
Rue de Rhode, 125
1630 Linkebeek

Tel.: +32-2-382 04 97
Fax: +32-2-382 06 46
www.laborelec.be

M.P.E. - Mécanique de Précision pour Equipements
(Mechanical Equipment Supplier)
Avenue de Tyras, 51
1120 Brussels

Tel.: +32 2 262 1010
Fax: +32-2-262 0241
www.mpe.be

ONDRAF/NIRAS (Waste Management) Avenue des Arts, 14 1210 Brussels	Tel.: +32-2-212 10 11 Fax: +32 2 218 51 65 www.nirond.be
SCK•CEN (Nuclear Research Centre) Boeretang, 200 2400 Mol	Tel.: +32-14-33 21 11 Fax: +32-14-31 50 21 www.sckcen.be
SPE-Société Coopérative de Production d'Électricité (Utility) Rue Royale, 55 (BTE 14) 1000 Brussels	Tel.: +32-2-217 10 30 Fax: +32-2-218 61 34 www.spe.be
Synatom, S.A. (Nuclear Fuel Procurement) Bastion Tower Place du Champ de Mars, 5 1050 Brussels	Tel.: +32-2-505 07 11 Fax: +32-2-505 07 90
Suez-Tractebel S.A. (Energy and Services) Place du Trône 1 B-1000 Brussels	Tel. : 32 (0)2 510 71 11 Fax : 32 (0)2 510 73 88 www.tractebel.com
Tractebel Engineering (Architect-Engineer and Contractor) Avenue Ariane, 7 1200 Brussels	Tel.: +32 2 773 8111 Fax: +32 2 773 9900 http://nuclear.engineering.tractebel.com http://eis.engineering.tractebel.com www.engineering.tractebel.com
Tecnubel S.A. (Decontamination) Avenue Ariane, 4 1200 Brussels	Tel.: +32-14-34 69 11 Fax: +32-14-32 00 90 www.tecnubel.be
Transnubel, S.A. (Fuel Transportation) Gravenstraat, 73 2480 Dessel	Tel.: +32-14-33 11 11 Fax: +32-14-31 89 48 www.transnubel.be
Transrad, S.A. (Waste Transportation) Zoning Industriel – site IRE 6220 Fleurus	Tel.: +32-71-82 97 59 Fax: +32-71-82 97 68 www.transrad.be
Westinghouse Electric Europe, sprl (NSSS Supplier) Rue de l'Industrie, 43 1400 Nivelles	Tel.: +32-67-28 78 11 Fax: +32-67-28 78 21 www.westinghouse.com

BELGIAN NUCLEAR RELATED COMPANIES MEMBER OF AGORIA GROUP B6

AIB-Vinçotte Group (Safety Services) A. Drouart avenue 27 1160 Brussels, Belgium	Tel.: 0032.2.674.57.11 Fax.: 0032.2.674.59.59 www.aib-vincotte.com
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Amec Spie (Contractor)
Rue de Genève 4, BTE 30
1140 Brussels
Tel.: +32-2-729 61 18
Fax: +32-2-729 62 53
www.amecspie.com

Alstom Acec Energie (Generator Supplier)
Rue Chapelle Beaussart, 80
6030 Marchienne-au-Pont (Charleroi)
Tel.: +32-71-44 31 31
Fax.: +32-71-36 46 00
www.alstom.com

Ateliers de la Meuse (Mechanical Equipment)
Rue Ernest Solvay, 107
4000 Sclessin (Liège)
Tel.: +32-4-252 00 30
Fax: +32-4-252 00 35
www.alm.be/english

Cegelec Solutions & Services SA (I & C Systems)
rue Santos Dumont, 3
6041 Gosselies (Charleroi)
Tel.: +32 71 60 65 11
Fax: +32 71 60 65 15
www.cegelec.com

Fabricom (Electrical and Mechanical Contractor)
Rue Gatti de Gamond, 254
1180 Brussels
Tel.: +32-2-370 31 11
Fax: +32-2-332 24 55
www.fabricom.be

Ion Beam Applications (IBA) Groupe
Chemin du Cyclotron, 3
1348 Louvain-La-Neuve
Tel. : +32-10-47 58 11
Fax : +32-10-47 58 10
www.iba.be
www.iba-sni.com

Kabelwerk Eupen AG (Cable Supplier)
Malmedyerstrasse, 9
4700 Eupen
Tel.: +32-87-59 70 00
Fax: +32-87-59 71 00
www.eupen.com

Lemmens Services NV (Decontamination)
Brant Industrial Services Group
Nieuwe Weg 1/3
2070 Zwijndrecht
Tel.: +32-3-210 97 05
Fax: +32-3-210 97 76
www.bisg.be

Siemens S.A. (Electrical Contractor)
Chaussée de Charleroi, 116
1060 Brussels
Tel.: +32-2-536 21 11
Fax: +32-2-536 24 92

OTHER BELGIAN NUCLEAR ORGANISATIONS

Belgian Association for Radioprotection
Wetenschappelijk Instituut Volksgezondheid
Louis Pasteur
Juliette Wytsmanstraat 13
1050 Brussels
www.bvsabr.be

Belgian Nuclear Society
Ravenstein Street, 3
1000 Brussels
Tel.: +32-14-33 24 30
Fax: +32-14-33 05 13
www.bns-org.be

Institut Interuniversitaire des Sciences Nucléaires
Rue d'Egmont, 5
1000 Brussels
Tel.: +32-2-504 92 11
Fax: +32-2-504 92 92

MISCELLANEOUS

International Organizations located in Belgium

Euratom Supply Agency at the European Commission (ESA)	http://europa.eu.int/comm/euratom/index_en.html
European Atomic Forum (FORATOM)	http://foratom.org/
European Commission (Brussels, Belgium):	http://europa.eu.int/comm/index_en.htm
European Energy Foundation (EEF) ⁶	http://www.f-e-e.org/
European Union law (including nuclear energy):	http://europa.eu.int/eur-lex/en/index.html
International Nuclear Law Association	http://www.aidn-inla.be
Joint Research Centre of the European Commission (JRC) Institute for Reference Materials and Measurements (IRMM)	http://www.jrc.cec.eu.int/
Union of the Electricity Industry (EURELECTRIC) ⁷	http://unipede.eurelectric.org/

Prognostic and Statistical Energy Data

Belgian Federation of Electricity Producers and Distributors	http://www.bfe-fpe.be
The Federal Public Service Economy, SMEs, Self-Employed and Energy Administration	http://mineco.fgov.be/energy/
National Institute for Statistics	http://www.statbel.fgov.be/home_en.htm

National Regulatory Organisations

Federal Agency for Nuclear Control	http://www.fanc.fgov.be
Commission for Electricity and Gas Regulation	http://www.creg.be

⁶ EEF is an informal and neutral forum where topical energy related subjects linked to the European Union political dialogue are presented.

⁷ EURELECTRIC was formed as a result of a merger in December 1999 of the twin Electricity Industry Associations, UNIPEDE and EURELECTRIC.