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Special Report

EU nuclear decommissioning assistance programmes in Lithuania, Bulgaria and Slovakia: some progress made since 2011, but critical challenges ahead

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EU nuclear decommissioning assistance programmes in Lithuania, Bulgaria and Slovakia: some progress made since 2011, but critical challenges ahead

(pursuant to Article 287(4), second subparagraph, TFEU)

Audit team

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The ECA's special reports set out the results of its performance and compliance audits of specific budgetary areas or management topics. The ECA selects and designs these audit tasks to be of maximum impact by considering the risks to performance or compliance, the level of income or spending involved, forthcoming developments and political and public interest.

This performance audit was produced by Audit Chamber II – headed by ECA Member Henri Grethen – which specialised in structural policies, transport and energy spending areas. The audit was led by the Reporting Member Phil Wynn Owen, supported by an audit team of Chamber II.

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Activation: The process whereby neutron irradiation causes an unintended induction of radioactivity in moderators, coolants and structural and shielding materials.

Brownfield site: Although this term has no standard international definition, for the purpose of this report it should be understood to be an end state for a decommissioned nuclear power plant site which falls short of greenfield status. A brownfield site remains under regulatory control, and the land's reuse and redevelopment is subject to certain restrictions.

Contamination: The unintended, unwanted presence of a radioactive substance on surfaces or within solids, or the process giving rise to its presence in such locations.

Contingent liability: In accounting, this is a present obligation of which payment is not probable or the amount cannot be measured reliably, or a possible obligation which depends on whether some uncertain future event occurs.

Controlled area: A controlled-access area subject to special rules for the purpose of protecting against ionising radiation and preventing the spread of radioactive contamination.

Decommissioning measures: Projects designed to help relieve some of the financial burden placed on the Member States as they decommission the plants.

Deep geological repository: A final disposal facility is located underground in a stable geological formation so as to provide the long-term containment (for thousands of years or longer) of long-lived radioactive waste and isolation of the waste from the accessible biosphere. Disposal means that there is no intention to retrieve the waste, although such a possibility is not ruled out. Geological disposal is a method for disposing of, in particular, high-level radioactive waste.

Dry storage of spent nuclear fuel: The spent nuclear fuel is enclosed in casks in a dedicated facility. This is one of the two possibilities for the interim storage of spent fuel, the other option being 'wet storage'.

***Ex ante* conditionalities**: These are conditions for the effective and efficient use of EU support. The *ex ante* conditionalities for the nuclear decommissioning assistance programmes are laid down in Council Regulations (Euratom) No 1368/2013[1] and No 1369/2013[2]. Lithuania, Bulgaria and Slovakia had to have taken appropriate measures to meet these conditions by the time the Commission adopted its financing decision on the 2014 annual work programme.

Final decommissioning plan: A document drawn up by the nuclear power plant operator when a facility is shut down and submitted as part of the decommissioning licence application. It sets out all the necessary activities, as well as their scheduling and estimated costs, and includes a financing plan. The document may be amended as the decommissioning proceeds.

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1 Council Regulation (Euratom) No 1368/2013 of 13 December 2013 on Union support for the nuclear decommissioning assistance programmes in Bulgaria and Slovakia, and repealing Regulations (Euratom) No 549/2007 and (Euratom) No 647/2010 (OJ L 346, 20.12.2013, p. 1).

2 Council Regulation (Euratom) No 1369/2013 of 13 December 2013 on Union support for the nuclear decommissioning assistance programme in Lithuania, and repealing Regulation (EC) No 1990/2006 (OJ L 346, 20.12.2013, p. 7).

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Final disposal: The last step in the radioactive waste management process. There are various options available, including disposal in a deep geological repository for high-level radioactive waste.

Greenfield site: Although this term has no standard international definition, for the purpose of this report it should be understood to be an end state for a decommissioned nuclear power plant site which allows the land to be released from regulatory control.

Indirect management: One of three different ways to implement the EU budget. In this management mode, the Commission has overall responsibility for the budget but entrusts implementing tasks to one or more partner countries, international organisations, Member State agencies or other bodies.

International Decommissioning Support Funds: The EBRD-managed funds supporting the decommissioning process in Lithuania through the Ignalina International Decommissioning Support Fund (IIDSF), in Bulgaria through the Kozloduy International Decommissioning Support Fund (KIDSF) and in Slovakia through the Bohunice International Decommissioning Support Fund (BIDSF).

Liability: In accounting, this is a present obligation resulting from past events.

Licences: All activities performed over the life cycle of a nuclear power plant, including decommissioning, are regulated and require a licence from a national authority. A change from operational licence to a decommissioning licence is required to work in the controlled area.

Mitigation measures: Projects designed to help mitigate some of the effects of lost national energy production capacity due to early closure.

Multiannual financial framework (MFF): The MFF establishes the spending priorities and maximum amounts that the EU may spend in particular areas over a fixed period of several years. The expenditure ceilings in the MFF regulation are not equivalent to those in the EU budget, which are always lower. The MFF also includes income sources for the EU budget and correction mechanisms for the period in question (currently 2014-2020).

Nuclear decommissioning: The process whereby a nuclear power plant is dismantled and the site is cleaned up to a predetermined end point.

Nuclear decommissioning assistance programmes: EU programmes launched to provide financial assistance to Lithuania, Bulgaria and Slovakia as they shut down and decommission Soviet-designed nuclear reactors that could not be economically upgraded to Western safety standards at the sites of Ignalina, Kozloduy and Bohunice respectively, in line with the relevant conditions laid down in their accession treaties.

Nuclear power plant: A power plant using fissionable nuclear material as fuel.

Nuclear reactor: Found on the site of a nuclear power plant, this is a system that contains and controls sustained nuclear chain reactions.

Polluter pays principle: A commonly accepted environmental policy practice which dictates that those responsible for causing pollution should bear the costs of managing it.

Provision: In accounting, this is a liability of uncertain timing or amount recorded in the balance sheet.

Glossary

07

Radioactive waste: Material resulting from the plant operation and decommissioning processes which is affected by radioactive contamination or activation. This category can be further subdivided according to the level of the waste's radioactivity (exempt, very short-lived, very low, low, intermediate or high).

Reactor building: This houses the reactor and other main components and constitutes part of the controlled area.

Spent nuclear fuel: Nuclear fuel that has been irradiated in a reactor and reached the end of its useful life.

Technical decommissioning: In this report, this shall be understood to cover the methodology, technology and works relating to the decontamination, dismantling and fragmentation of radiologically activated/contaminated structures and systems and their adequate management.

Wet storage of spent nuclear fuel: The spent nuclear fuel is stored in pools. This is one of the two possibilities for the interim storage of spent fuel, the other option being 'dry storage'.

Abbreviations

08

AWP: Annual work programme

BNPP: Bohunice nuclear power plant in Slovakia

CPMA: Central Project Management Agency in Lithuania

EBRD: European Bank for Reconstruction and Development

IAEA: International Atomic Energy Agency

IAS: Internal Audit Service of the European Commission

INPP: Ignalina nuclear power plant in Lithuania

JAVYS a.s.: Slovak state enterprise responsible for decommissioning and radioactive waste management

KNPP: Kozloduy nuclear power plant in Bulgaria

KPI: Key performance indicator

NDAP: Nuclear decommissioning assistance programmes

RBMK-1500: High-power channel-type reactor (as in Lithuania)

SERAW: Bulgarian state enterprise for radioactive waste management

VVER 440/230: Water-water energetic reactor (as in Bulgaria and Slovakia)

Executive summary

I

When Lithuania, Bulgaria and Slovakia were candidate countries to join the European Union (EU), the closure and subsequent decommissioning of eight Soviet-designed, first generation nuclear reactors at three nuclear power plant sites was made a condition for their accession.

II

The shutdown and subsequent decommissioning of these nuclear reactors before the end of their design lifetimes represented a significant financial and economic burden for the three Member States concerned. The EU therefore agreed to provide financial support, starting in 1999. By 2020, EU support will have totalled 3.8 billion euro, with Lithuania receiving the biggest share, followed by Bulgaria and then Slovakia.

III

The aim of this audit was to determine whether progress has been made in the implementation of the EU's nuclear decommissioning assistance programmes for Lithuania, Bulgaria and Slovakia since 2011, when our previous report on the subject was published.

IV

The dedicated EU funding programmes for nuclear decommissioning have not created the right incentives for timely and cost-effective decommissioning.

V

Since 2011, some progress has been made in decommissioning the nuclear power plants of Ignalina in Lithuania, Kozloduy in Bulgaria and Bohunice in Slovakia. Key components in the plants' non-controlled areas have been dismantled, but the critical challenges involved in working in the controlled areas, including the reactor buildings, still lie ahead for all three Member States. Although Member State authorities claim that the plants have been irreversibly closed, not all of the expected outputs used by the Commission to assess progress towards irreversible closure have been fully met.

VI

The three Member States have made some progress in putting in place waste management infrastructure, but many key infrastructure projects experienced delays in the 2011-2015 period. The longest delays have been in Lithuania, where the decommissioning end date has, since 2011, been postponed by a further 9 years to 2038. Challenges remain in each of the three Member States, such as a reliance on external experts and dealing with first-in-kind technical solutions.

Recommendation 1: the three Member States concerned should:

(a) further improve their project management practices in order to have the necessary waste and spent fuel management infrastructure in place when planned;

(b) take steps to build up their own technical capacity, so as to achieve a better balance between in-house and external expertise;

(c) find better ways to exchange best practices and technical knowledge, both among themselves and with the wider nuclear decommissioning community in the EU and beyond — the Commission should facilitate this in a cost-effective way.

VII

Talks in the three Member States regarding potential final disposal solutions for high-level waste and spent nuclear fuel, which may be national, regional or other EU-based solutions, are still only at a conceptual stage, despite such solutions taking several decades to implement.

Recommendation 2:

(a) The Commission should, together with all relevant EU Member States, explore options for the disposal of spent fuel and high-level waste, including any regional and other EU-based solutions, duly considering safety, security and the cost-effectiveness of the alternatives. The Commission should include a review of this matter in its first report to the European Parliament and the Council on the implementation of the radioactive waste directive.

(b) The three Member States should, in parallel, progress with their plans for final disposal, in order to establish more complete cost estimates and financing plans for the disposal of spent fuel and radioactive waste, as required by the radioactive waste directive.

VIII

The estimated cost of decommissioning at the three plants will be at least 5.7 billion euro in total, and double that if the cost of final disposal is included. The decommissioning financing gap in Lithuania has increased since our last audit and costs now exceed financing by 1.6 billion euro. The financing gaps estimated by Bulgaria and Slovakia are now at 28 million euro and 92 million euro respectively. Although the three Member States are ultimately responsible for ensuring that adequate financial resources are available for both decommissioning and final disposal, their co-financing of the EU's decommissioning programmes remains very limited. The Commission has not issued clear guidance on co-financing requirements. Staff levels have declined at all three plants since they were fully operational, but some EU funds are being used to cover the cost of staff working on safe plant maintenance. In 2011 the Commission indicated that it does 'not foresee any further extension of financial EU support' beyond 2020.

Recommendation 3: the three Member States should recognise their own role in ensuring that the polluter pays principle is respected, and be prepared to use national funds to cover decommissioning costs, as well as the cost of final disposal, both in the current financing period and thereafter.

Recommendation 4: the Commission should seek increases in national co-financing during the 2014-2020 financing period. It should define clearly, for example, in a Commission decision, the 'well-founded exceptional' conditions under which projects can be fully financed by the EU under the nuclear decommissioning assistance programmes.

Recommendation 5: dedicated funding programmes for nuclear decommissioning in Lithuania, Bulgaria and Slovakia should be discontinued after 2020. If a clear need for the use of EU funds beyond 2020 is established, in one or more of the three Member States, any future EU funding proposed by the Commission and agreed by the legislator should include the right incentives to pursue decommissioning, including by being time limited and by being based on appropriate levels of Member State co-financing. One way to do this would be to consider widening access to the European Structural and Investment Funds to allow nuclear decommissioning activities to be covered, fulfilling these conditions.

Recommendation 6: the Commission should allow EU financing under the nuclear decommissioning assistance programmes to be used to finance only the cost of staff working fully on decommissioning activities.

IX

The Commission's assessment as to whether the financing and decommissioning plans fulfil the *ex ante* conditionalities has been inadequate.

Recommendation 7: the Commission should complete its assessment of the *ex ante* conditionalities.

X

Future costs are not always recognised as provisions and/or included in the notes to the accounts. This limits transparency and hampers the relevant authorities' ability to plan adequately how the future costs of decommissioning and the disposal of spent nuclear fuel are to be met.

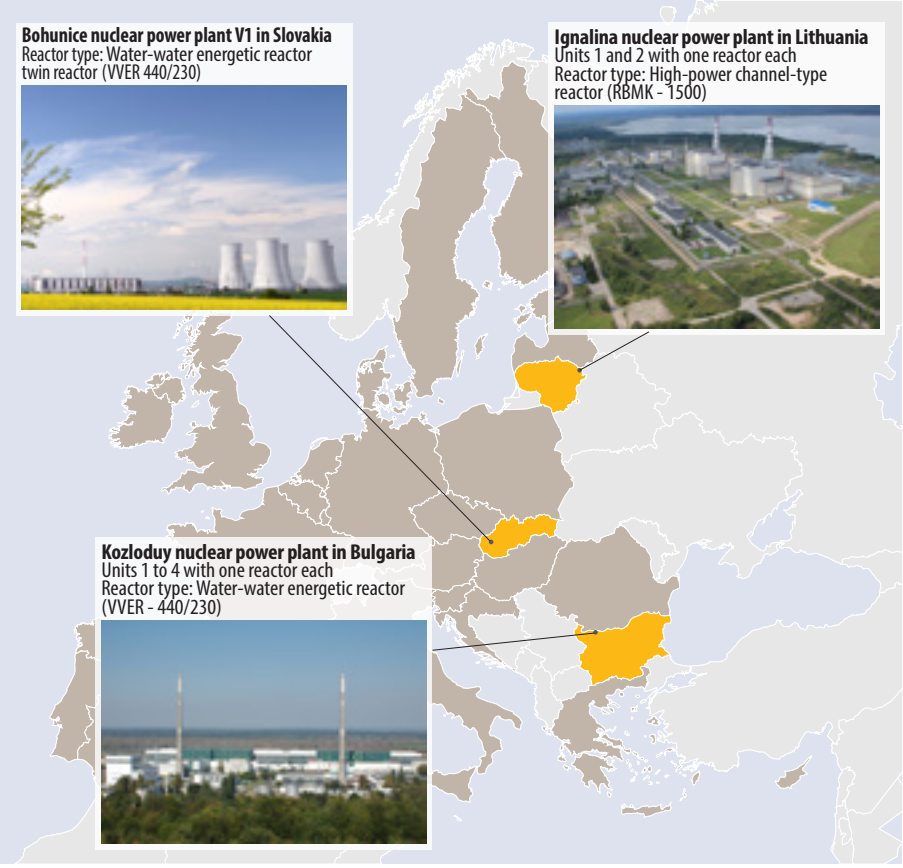
Recommendation 8: the Commission should work together with all relevant Member States so that all future costs associated with nuclear decommissioning and the final disposal of spent fuel are accounted for properly, in a transparent manner, consistent with relevant accounting standards.

01

When **Lithuania**, **Bulgaria** and **Slovakia** were candidate countries to join the European Union (EU), the closure and subsequent decommissioning of eight Soviet-designed, first generation nuclear reactors at three nuclear power plant sites[3] was made a condition for their accession (see ***Figure 1*** and ***Annex I***). Since an upgrade to Western safety standards was deemed to be uneconomical, it was agreed during accession negotiations that these reactors would be shut down before the end of their design lives[4]. The three sites are operated by state enterprises.

Figure 1

The nuclear power plants in Lithuania, Bulgaria and Slovakia covered by the EU's nuclear decommissioning assistance programmes



Source: ECA, based on information provided by the nuclear power plants. Photos © Bohunice nuclear power plant (BNPP), Kozloduy nuclear power plant (KNPP), Ignalina nuclear power plant (INPP).

3 The Kozloduy plant in Bulgaria and the Bohunice plant in Slovakia have reactors under operation adjacent to those being decommissioned. In this report, the word 'plant' is used to refer only to the reactors being decommissioned.

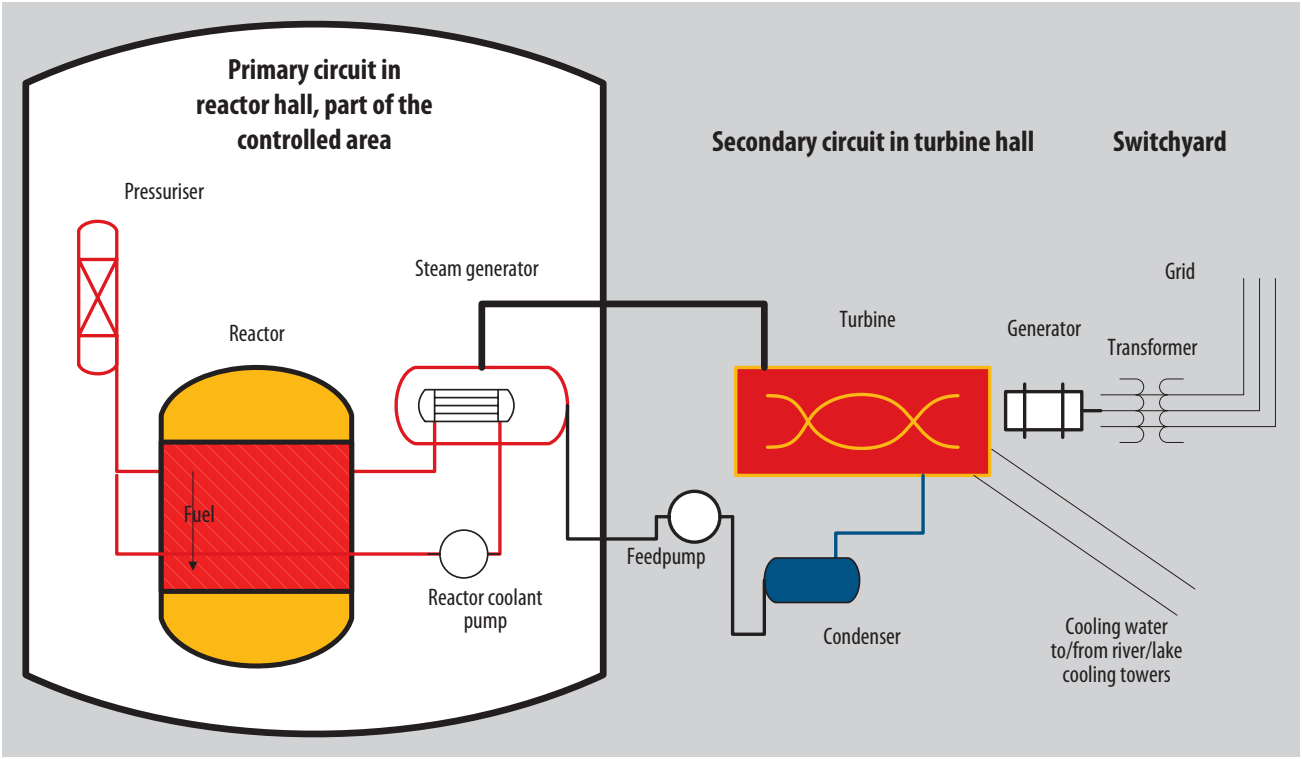
4 DOC/97/8, Strasbourg/ Brussels, 15 July 1997, Agenda 2000 — Summary and conclusions of the opinions of Commission concerning the applications for membership to the European Union presented by the candidates countries; Western European Nuclear Regulators Association (WENRA), *Nuclear safety in EU candidate countries*, October 2000.

02

The Bohunice nuclear power plant V1 in Slovakia and the Kozloduy nuclear power plant in Bulgaria both have water-water energetic reactors (VVER), a sub-category of pressurised water reactors (see ***Figure 2***). This type of reactor has previously been decommissioned elsewhere in Europe.

Figure 2

Illustration of a pressurised water reactor nuclear power plant (VVER-440/230)



The reactor and primary cooling circuit components in the reactor building form the activated and contaminated primary circuit. The turbine and condenser form the secondary circuit. Bohunice V1 and Kozloduy units 1-4 lack a massive steel and concrete containment structure as the final barrier against the mass release of radiation in an accident in the reactor and primary circuit components.

Source: ECA.

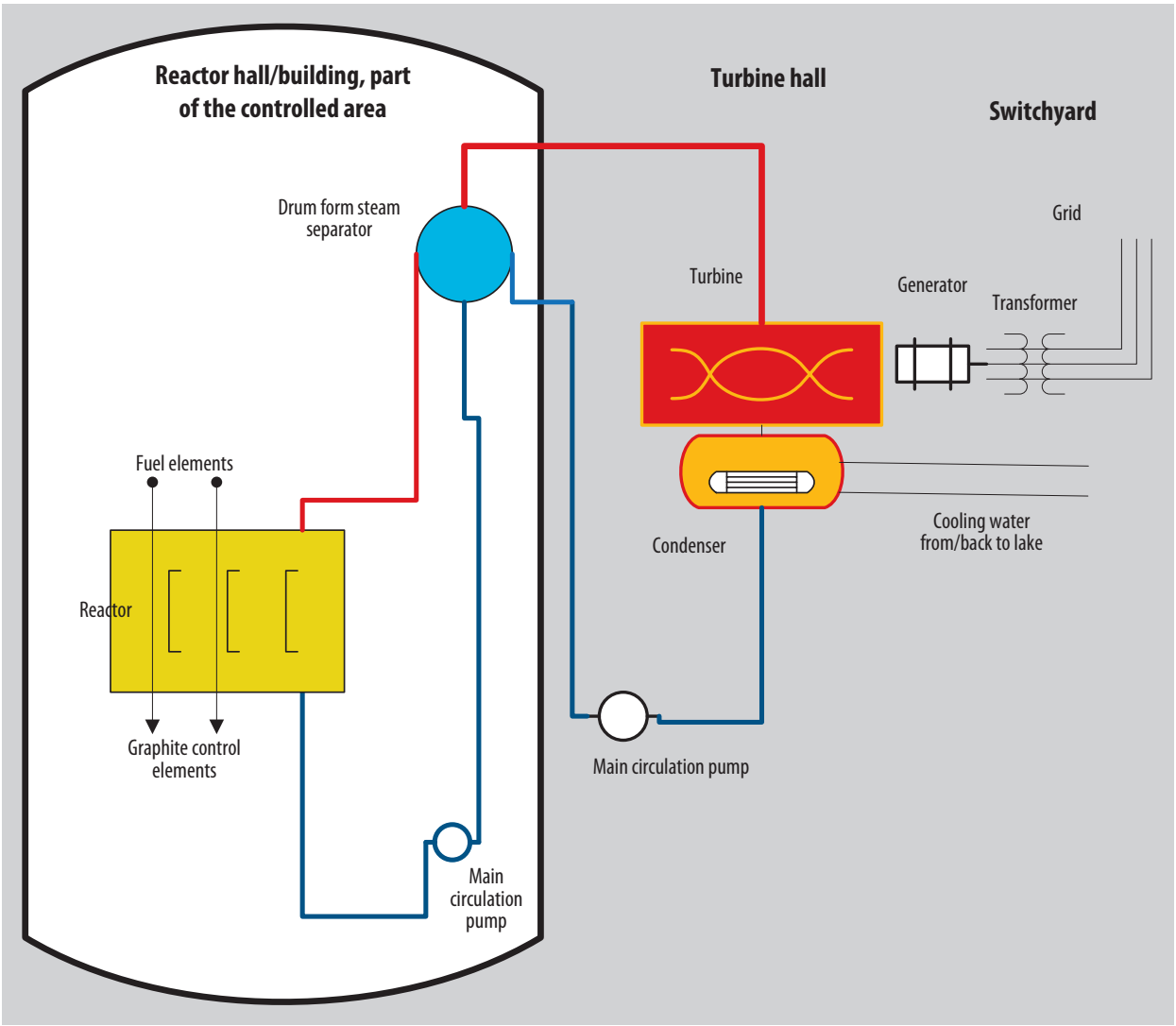
03

The reactor at the Ignalina plant in Lithuania is a graphite-moderated (RBMK-1500) reactor, a sub-category of boiling water reactors, also commonly referred to as a Chernobyl-type reactor (see ***Figure 3***). This is the first time that such a graphite-moderated reactor is being decommissioned[5].

5 Though closed, the reactor units at Chernobyl have not been decommissioned. Following the accident in 1986, reactor unit 4 was encased in a 'sarcophagus'.

Figure 3

Illustration of a graphite-moderated reactor nuclear power plant (RBMK-1500)



The reactor and the main cooling circuit components in the reactor building form the activated and contaminated circuit, which is directly connected to the turbine and condenser in the turbine hall. Ignalina units 1 and 2 lack a massive steel and concrete containment structure as the final barrier against the mass release of radiation in an accident in the reactor and in main cooling circuit components.

Source: ECA.

The EU's nuclear decommissioning assistance programmes

04

The shutdown and subsequent decommissioning of these nuclear power plants before the end of their design lifetime represented a significant financial and economic burden for the three Member States concerned, all the more so since they had not accumulated national funds to cover the full cost of decommissioning and lacked the necessary waste management infrastructure[6].

05

The EU agreed to provide financial support from 1999. This began under the PHARE programme, which was a pre-accession instrument designed to channel financial and technical assistance to the candidate countries in central and eastern Europe. Once the three countries joined the EU, support continued under the nuclear decommissioning assistance programmes (NDAPs) on the basis of the provisions in the individual accession treaties and in Council regulations (see ***Annex II*** for an overview)[7]. A separate, dedicated support programme was put in place for each country.

06

Between the beginning of the support programmes in 1999 and up until 2013, these programmes involved:

- decommissioning measures to help relieve some of the financial burden placed on these Member States as they begin to decommission the plants;
- measures to help mitigate some of the effects of lost national energy production capacity due to early closure.

07

In the current 2014-2020 period, only decommissioning measures[8] are now eligible for funding under the EU's nuclear decommissioning assistance programmes, which pursue the specific objectives outlined in ***Table 1.***

6 Commission staff working paper, 'Nuclear decommissioning assistance programme data' (SEC(2011) 914 final).

7 In addition to EU support, Lithuania and Bulgaria have also received separate grants from nuclear safety accounts managed by the European Bank for Reconstruction and Development (EBRD) for operational nuclear safety.

8 Mitigation measures, including energy efficiency and renewable energy, are eligible for funding under the European Structural and Investment Funds, from which all three Member States benefit.

Table 1

Specific objectives of the EU's nuclear decommissioning assistance programmes for 2014-2020

Programme	Specific objectives
Ignalina, Lithuania	Defuelling the reactor core of unit 2 and the reactor fuel ponds of units 1 and 2 into the dry spent fuel storage facility.
	Safely maintaining the reactor units.
	Dismantling operations in the turbine hall and other auxiliary buildings.
	Safely managing the decommissioning waste in accordance with a detailed waste management plan.
Kozloduy, Bulgaria	Dismantling operations in the turbine halls of units 1 to 4 and in auxiliary buildings.
	Dismantling large components and equipment in the reactor buildings of units 1 to 4.
	Safely managing the decommissioning waste in accordance with a detailed waste management plan.
Bohunice, Slovakia	Dismantling operations in the turbine hall and auxiliary buildings of reactor V1.
	Dismantling large components and equipment in the V1 reactor buildings.
	Safely managing the decommissioning waste in accordance with a detailed waste management plan.
All	Possible measures to maintain a high level of safety at the units under decommissioning, including support for the nuclear power plants' personnel.

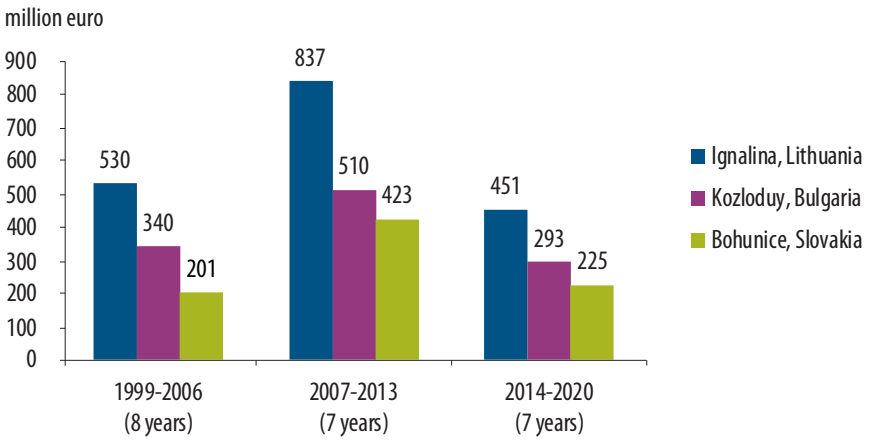
Source: ECA, based on Council Regulations (Euratom) No 1368/2013 and No 1369/2013.

08

By 2020, EU support will have totalled 3.8 billion euro (see ***Figure 4***).

Figure 4

The EU's nuclear decommissioning assistance for Lithuania, Bulgaria and Slovakia from 1999 to 2020



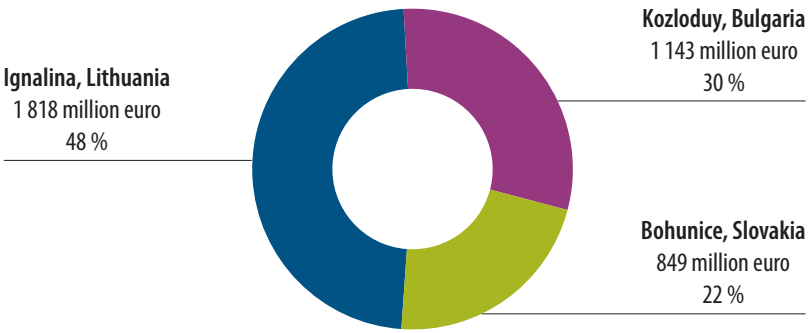
Source: ECA, based on data from the European Commission.

09

The biggest share has gone to Lithuania, followed by Bulgaria and then Slovakia (see ***Figure 5***)[9].

Figure 5

Share per Member State of overall EU decommissioning assistance from 1999 to 2020



Source: ECA, based on data from the European Commission.

10

In its impact assessment prepared for the 2014-2020 financial period, the Commission stated that it did 'not foresee any further extension of financial EU support' beyond 2020[10].

What is nuclear decommissioning?

11

Nuclear decommissioning is the final step in the life cycle of a nuclear power plant. Across Europe, a growing number of nuclear power plants are already being decommissioned or will be in the short/mid term. At the end of 2015 there were 129 nuclear reactors in operation in the EU, and a further 91 that had been shut down, of which three had been completely decommissioned (see ***Annex III***). It is estimated that more than 50 of the 129 reactors in operation will be shut down by 2025[11].

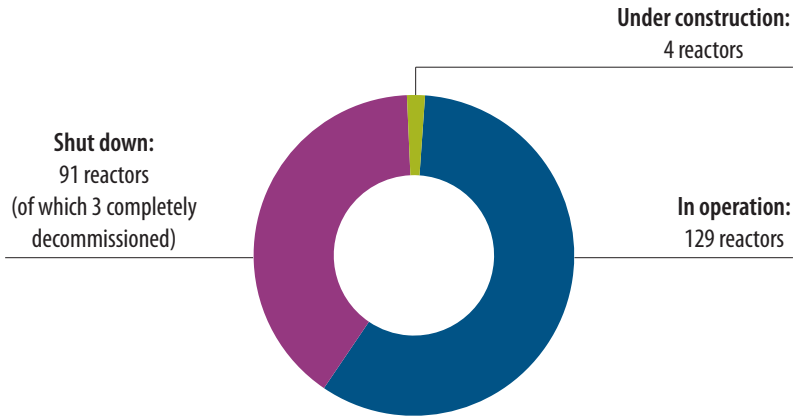
9 Throughout this report, the Member States are listed in the order of the size of their respective programmes as follows: Lithuania, Bulgaria and Slovakia.

10 SEC(2011) 1387 final, Commission staff working paper, 'Impact assessment'.

11 COM(2016) 177 final of 4 April 2016, p. 7, 'Nuclear illustrative programme presented under Article 40 of the Euratom Treaty for the opinion of the European Economic and Social Committee', in the following referred to as the Commission's 2016 nuclear illustrative programme.

Figure 6

Status of nuclear power reactors in the EU as at 31 December 2015



Source: ECA, based on data from the European Commission and the IAEA's Power Reactor Information System (PRIS).

12
Nuclear decommissioning involves a range of specific processes, some of which run in parallel. The process is complete once the site has been cleaned up to the point where the land can be reused or redeveloped, either without any restrictions ('greenfield' status) or subject to certain restrictions ('brownfield' status), according to national legislation. All three sites in Lithuania, Bulgaria and Slovakia are to be decommissioned to 'brownfield' status.

13
All three Member States opted for the 'immediate dismantling' decommissioning strategy, rather than the 'deferred dismantling' or 'long-term safe enclosure' strategy. With immediate dismantling, decommissioning begins shortly after the permanent shutdown of operation. With the alternative deferred dismantling strategy, once the nuclear fuel has been removed, all or part of a facility containing radioactive material is either processed or maintained in a safe storage state until it is subsequently decontaminated and/or dismantled[12].

14
Decommissioning entails both conventional industrial decommissioning work, such as the demolition of the turbine hall, and highly specialised activities dealing with the radioactive material on site. Planning the correct sequence of activities and identifying the procedures and methodologies to be followed is key.

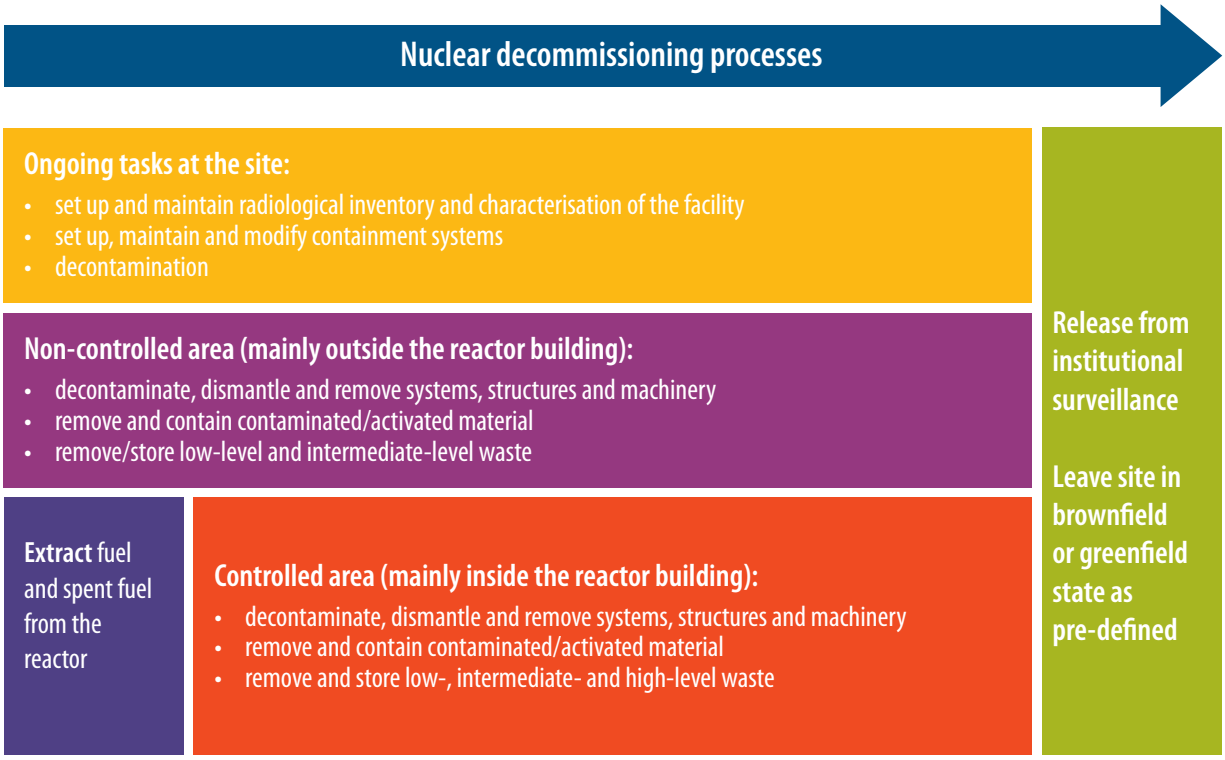
12 IAEA Safety Standards, *Decommissioning of facilities — General safety requirements No. GSR part 6*, 2014.

15

Figure 7 shows the main processes involved in decommissioning a nuclear power plant.

Figure 7

Main processes involved in decommissioning a nuclear power plant



Source: ECA.

16

Nuclear facility operators must prepare and update a **final decommissioning plan** that contains a financing plan and sets out all the necessary activities, as well as their scheduling and estimated costs[13]. The EU support has to be implemented in accordance with these plans, whilst, at all times, maintaining the highest level of safety[14].

17

All activities performed over the life cycle of a nuclear power plant, including decommissioning, are regulated and require a licence from a national authority.

13 IAEA Safety Standards, *General safety requirements part 6*, pp. 15-16.

14 Article 2(1) of Council Regulations (Euratom) No 1368/2013 and No 1369/2013.

Radioactive waste management

18

All stages of the nuclear fuel cycle generate radioactive waste. The International Atomic Energy Agency's (IAEA) classification scheme defines six classes of radioactive waste, depending on the level of radioactivity, as shown in ***Table 2***.

Table 2

Classes of radioactive waste and their management and disposal

Class	Description	Management and disposal (underground depths indicative only)	
Exempt	Waste that contains such small concentrations of radionuclides that it does not require provisions for radiation protection and can be cleared from regulatory control.	ground level	free release, waste dump
Very short-lived	Waste that contains only radionuclides of a very short half-life with activity concentrations above clearance levels.	ground level	decay storage
Very low-level	Waste that does not necessarily meet the criteria for exempt waste, but that does not need a high level of containment and isolation.	ground level	landfill
Low-level	Waste with limited amounts of long-lived radionuclides. Such waste requires robust isolation and containment for periods of up to a few hundred years.	underground	near surface (< 30 metres)
Intermediate-level	Waste that, because of its content, particularly of long-lived radionuclides, requires a greater degree of containment but no, or only limited, provision for heat dissipation.	underground	intermediate depth (30-100 metres)
High-level	Waste with levels of activity concentration high enough to generate significant quantities of heat or with large amounts of long-lived radionuclides. Spent nuclear fuel falls under this category.	underground	geological disposal (> 400 metres)

Source: ECA, based on IAEA Safety Standards, *Classification of radioactive waste — General safety guide No. GSG-1*, 2009.

19

Each class requires different technologies and methods for its safe containment and management. At the lowest end of the spectrum, exempt waste can simply be disposed of along with domestic refuse. At the other extreme, high-level waste, such as spent nuclear fuel, is so highly radioactive that it requires the greatest degree of containment and isolation to ensure long-term security and safety. Disposal in a deep geological repository, excavated several hundred metres below ground, is generally recognised as the preferred option for the final disposal of high-level waste[15]. According to the IAEA Safety Standards, waste management is still not complete when the nuclear decommissioning process ends, since the high-level waste has not yet been disposed of in a final disposal facility[16].

'Polluter pays' as an EU and international principle

20

The management of spent fuel and radioactive waste in the European Union is governed by the radioactive waste directive[17]. Its requirements are based on a 1997 IAEA convention to which Lithuania, Bulgaria and Slovakia are signatories[18]. This convention obliges its contracting parties to apply the 'polluter pays' principle, meaning that the producers of waste should bear the costs of managing it to prevent damage to human health and the environment[19]. A further principle underpinning the convention is that the burden of nuclear waste management not be unduly imposed on future generations. This is reflected in the radioactive waste directive, which states that 'it should be an ethical obligation of each Member State to avoid any undue burden on future generations in respect of spent fuel and radioactive waste including any radioactive waste expected from decommissioning of existing nuclear installations'[20].

The roles and responsibilities of actors under the EU's nuclear decommissioning assistance programmes

21

As permitted under the relevant legal provisions, the **European Commission** has opted to manage the nuclear decommissioning assistance programmes via indirect management[21]. In this management mode, the Commission entrusts budget implementation tasks to implementing bodies (see ***Annex IV***), but retains overall responsibility and accountability for EU budget implementation. The Commission therefore has to ensure that the implementing bodies have adequate control and monitoring structures in place. The **European Bank for Reconstruction and Development** (EBRD) acts as an implementing body for all three of these programmes.

15 IAEA Safety Standards, *General safety guide No. GSG-1 — Classification of radioactive waste*, 2009, p. 6.

16 IAEA Safety Standards, *General safety guide No. GSG-1 — Classification of radioactive waste*, 2009, p. 3.

17 Council Directive 2011/70/Euratom of 19 July 2011 establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste (OJ L 199, 2.8.2011, p. 48).

18 IAEA, Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management.

19 Article 21 of the IAEA Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management reads: 'Each Contracting Party shall ensure that prime responsibility for the safety of spent fuel or radioactive waste management rests with the holder of the relevant licence and shall take the appropriate steps to ensure that each such licence holder meets its responsibility.'

20 Recital 24 of Council Directive 2011/70/Euratom.

21 Article 58(c) of Regulation (EU, Euratom) No 966/2012 of the European Parliament and of the Council of 25 October 2012 on the financial rules applicable to the general budget of the Union and repealing Council Regulation (EC, Euratom) No 1605/2002 (OJ L 298, 26.10.2012, p. 1), last amended by Regulation (EU, Euratom) No 2015/1929 of 28 October 2015.

22
In addition, in Lithuania the **Central Project Management Agency**, a national public-sector body, acts as a second implementing body, and performs the same functions as the EBRD for the projects placed under its management[22]. At the time of the audit, all new projects were channelled through the Central Project Management Agency. The EBRD will remain in charge of the projects that were previously placed under its responsibility.

23
The three **Member States** are obliged to establish appropriate national structures for programme implementation and to take all the necessary steps to remove any legal or administrative obstacles to the proper functioning of their respective decommissioning programmes[23]. The Member States designate a programme coordinator, from the ministry responsible for energy policy, who assumes overall responsibility for the planning, coordination and monitoring of the respective decommissioning programmes at national level.

24
Lithuania has also appointed the Ministry of Finance to act as the financial coordinator responsible for the financial oversight of the Central Project Management Agency.

25
The programmes' **main beneficiaries** are the nuclear power plant operators and/or the decommissioning licence holders, which are state enterprises. They are responsible for executing projects once proposals have been approved.

26
Each year the Member States propose an annual work programme outlining the envisaged use of funding. The Commission then approves the financing decisions, after consulting the Nuclear Decommissioning Assistance Programme Committee, composed of representatives from the 28 EU Member States. It also approves the documentation on the individual projects to be financed using EU assistance, as selected by the implementing body. Following coordination at national level, new project proposals are submitted by the programme coordinator for approval to the EBRD and, in Lithuania, to the Central Project Management Agency. After verification, the project proposals are submitted by the implementing bodies to the Commission.

22 Slovakia has formally proposed setting up a second, national implementation channel, with the Slovak Innovation and Energy Agency operating alongside the EBRD.

23 Article 4 of the Commission Implementing Decision of 7.8.2014 on the rules of application for the nuclear decommissioning assistance programmes for Bulgaria, Lithuania and Slovakia for the period 2014-2020, C(2014) 5449 final.

27
The Commission then transfers the relevant funds to the EBRD, as well as, for Lithuania, to the Central Project Management Agency, according to contractual arrangements. These bodies then monitor project implementation.

Previous ECA special report on nuclear decommissioning

28
In a 2011 special report, the European Court of Auditors previously examined the EU's financial assistance for the decommissioning of nuclear plants in Bulgaria, Lithuania and Slovakia[24].

24 Special Report No 16/2011, E'U financial assistance for the decommissioning of nuclear plants in Bulgaria, Lithuania and Slovakia: achievements and future challenges' (http://eca.europa.eu).

Audit scope and approach

29
This audit sought to determine whether progress has been made in the implementation of the EU's nuclear decommissioning assistance programmes for Lithuania, Bulgaria and Slovakia since 2011, when we published our previous report[25].

30
In particular, we examined whether the programmes had made progress in terms of:

— dismantling the plants, obtaining the necessary licences and putting in place spent fuel and waste management infrastructure;

— establishing a reliable assessment of costs and securing the necessary funds to complete decommissioning.

31
In each of the three Member States we visited the sites concerned, analysed programme and project documentation and interviewed Member State officials, nuclear power plant operators, national radioactive waste management licence holders, regulatory authorities, and officials from the implementing bodies and the European Commission.

32
To assess progress at project level, we selected 17 EU-funded infrastructure and non-infrastructure nuclear decommissioning projects across the three Member States (see ***Annex V***). We selected projects where we had made the most critical findings in our previous report and other projects which are crucial for decommissioning. We also gathered data on the delays and cost overruns affecting 18 ongoing key infrastructure projects (***Annex VI***).

33
We also identified, where possible, examples of emerging practice improvement in the three Member States and general forward thinking. To this end, we included a visit to the construction site of the world's first deep geological repository in Finland (see ***Annex VII***).

25 Special Report No 16/2011.

Audit scope and approach

34
The audit work was carried out from April 2015 to April 2016.

35
Our audit did not cover the compliance of project expenditure with fund-specific rules. Nor did it cover public procurement procedures. We did not assess the radioactive security or the safety of installations, since this is the responsibility of the relevant national authorities. We in no way sought to make a case for or against nuclear energy, nor to draw conclusions on the energy supply mix in the EU; such matters are not discussed in this report.

Observations

Some decommissioning progress made since 2011, but critical challenges ahead

36
This section sets out our findings regarding progress made since 2011 in the decommissioning process supported by the EU's assistance programmes, highlighting any delays affecting key infrastructure projects.

Progress made in non-controlled areas, but decommissioning of reactor buildings yet to begin and radioactive waste management infrastructure only partially complete

37
For each of the three nuclear power plants, we examined:

— the extent to which the closure of the nuclear power plants is irreversible;

— the progress made in dismantling activities in the non-controlled and controlled areas;

— the availability of the spent fuel and waste management infrastructure required for decommissioning and dismantling activities.

National authorities state that closure of the plants is now irreversible but Commission expected outputs have not yet been achieved

38
In 2011 the Commission identified four expected outputs which had to be met before the closure of a nuclear power plant could be deemed irreversible[26]. ***Table 3*** shows our assessment of the extent to which these expected outputs have been achieved in Lithuania, Bulgaria and Slovakia.

39
The authorities in Lithuania, Bulgaria and Slovakia claim that the progress achieved means that closure is now effectively irreversible, since it would no longer be technically viable or cost-effective to resume operations[27].

26 SEC(2011) 1387 final of 24 November 2011, 'Commission staff working paper — Impact assessment — Accompanying document to the proposal for a Council regulation on Union support for the nuclear decommissioning assistance programmes in Bulgaria, Lithuania and Slovakia'.

27 According to information provided by the Ignalina nuclear power plant, unit 1 achieved irreversible status in 2007, when its operational licence was changed and the conditions for implementation of its decommissioning were approved. On 16 June 2014 a law was rescinded which prohibited the irreversible termination of operations at unit 1 until the financing for all works pertaining to the stage or decommissioning of the facility had been assured. Unit 2's licence was changed in 2012 and 2014. The Bulgarian Minister of Energy said during a plenary session of the Bulgarian Parliament held on 6 February 2015 that the decommissioning of the four units concerned was irreversible. The Slovakian authorities regard the change to the decommissioning licence as achievement of the irreversible state.

Table 3

The ECA's assessment of achievement of expected outputs indicating irreversible closure of the three nuclear power plants as at 31 December 2015

Expected outputs	Ignalina, Lithuania	Kozloduy, Bulgaria	Bohunice, Slovakia
1. The nuclear power plant is safely maintained in post-shutdown mode until complete defuelling	**Partially achieved** Safe maintenance ongoing. Reactor 1 is defuelled. Reactor 2 not yet defuelled.	**Achieved** Reactors and fuel ponds defuelled.	**Achieved** Reactors and fuel ponds defuelled.
2. Decommissioning licence is in place	**Not achieved** Licence not yet issued.	**Partially achieved** Licence issued for units 1-2, expected for units 3-4 in 2016.	**Achieved** Licence issued in 2015.
3. The design for the dismantling of the reactor core/ primary circuit is complete	**Partially achieved** Design of the dismantling process not yet completed, study under way (see *Annex V*, Project 6)	**Partially achieved** Project to design dismantling process in the procurement phase.	**Partially achieved** Project to design dismantling process still in progress (see *Annex V*, Project 16)
4. Dismantling in the reactor building has started	**Partially achieved** Only minor works in the reactor building to date.	**Partially achieved** Only minor works in the reactor building to date.	**Partially achieved** Only minor works in the reactor building to date.

Source: ECA, based on information from national authorities.

40

However, one expected output for assessing whether the nuclear decommissioning process has reached an irreversible state is the existence of a decommissioning licence, which is required before work can begin in the controlled area. Since 2011, while both Bulgaria and Slovakia have progressed from an operational to a decommissioning licence for the plants concerned, Lithuania has not.

— Ignalina, **Lithuania**, has yet to obtain its decommissioning licence and is now not scheduled to do so until 2022, 10 years later than originally planned and 18 years after unit 1 stopped producing electricity.

— Kozloduy, **Bulgaria**, obtained a 10-year decommissioning licence for its first two units on 27 November 2014, and is expecting its decommissioning licence for units 3 and 4 in 2016. However, additional permits might still be required to perform any major work dismantling the critical reactor systems or the reactor itself.

— Bohunice, **Slovakia**, received its current decommissioning licence on 23 December 2014, which gives it the green light to begin the dismantling process in the reactor building. The decommissioning plan did not schedule the start of major dismantling work until the end of 2015. Major dismantling work has not started yet.

Progress made in dismantling activities in the non-controlled area

41

As shown in ***Table 3***, none of the three plants has yet completed the designs for the dismantling of the reactor cores/primary circuits or performed any more than minor works in the reactor building. This means that the critical challenges involved in working in the controlled area, including the reactor building, still lie ahead for all three Member States.

42

Progress has, however, been made with the dismantling activities in the non-controlled area. Since our previous report, at all three locations, the dismantling of certain key components, like the turbine halls in the non-controlled area, has advanced (see example in ***Figures 8 and 9***). In Lithuania, dismantling started later than planned, but has been progressing since 2014.

Figures 8 and 9

Photos showing progress in the dismantling of key components in the turbine hall at Bohunice V1 nuclear power plant, Slovakia

Figure 8 — Before dismantling

2011: Turbine hall with turbines

Figure 9 — After dismantling

2015: Turbine hall without turbines

Some progress in waste management infrastructure but final disposal facilities for spent fuel only at conceptual phase

43

A licence to advance in the decommissioning process will only be issued if, inter alia, adequate waste management solutions and infrastructure are in place. Since the various waste types generated are handled differently (see ***Table 2***), a sufficiently complete radiological inventory and characterisation of the facility and radioactive waste is necessary in order to determine accurately the methodologies and technologies needed to decontaminate, dismantle and fragment systems and structures, as well as to select the most appropriate waste management solutions. All three Member States have made some progress in this regard since our last audit. However, although generally on track according to the decommissioning plans, the radiological characterisation of the reactor buildings is not yet comprehensive at any of the three plants.

44

Regarding **very low- to intermediate-level waste** (see ***Table 4***), all three Member States have made some progress in constructing the main required waste management infrastructure. The infrastructure in place meets current needs at this stage of the decommissioning process. As a result, there is no imminent risk at any of the three plants of decommissioning needing to be suspended due to insufficient waste management infrastructure capacity. However, several projects for handling waste of higher radioactivity levels or future increased volumes are facing delays and some remain in the design phase (see ***Table 4*** and paragraphs 60 to 71).

45

High-level waste principally takes one of two forms: spent nuclear fuel for disposal, or the waste materials which remain once spent nuclear fuel has been reprocessed. In general, spent nuclear fuel accounts for 95 % of the high-level waste volume and holds between 95 % and 99 % of the nuclear power plant's overall radioactivity. Once the spent nuclear fuel elements have been removed from the reactor (see ***Figure 10***) they are either reprocessed or placed in interim storage for around 50 years.

Table 4

Progress in constructing infrastructure for managing very low- to intermediate-level waste, 2011 and 2015

	2011	2015
Ignalina, Lithuania	Work on the 'buffer storage' for the landfill facility for very low-level waste ongoing.	Buffer storage completed and filled to 80 % of its current capacity.
	Construction of the above-surface facility not yet started.	Construction of the above-surface facility not yet started since tendering is delayed due to changes in the technical design.
	Near-surface repository for low- and medium-level, short-lived, waste in design phase.	Near-surface repository is still in the design phase and delayed by 1 year.
	Solid waste management and storage facility for long-lived medium-level waste delayed by 3.5 years.	Solid waste management and storage facility is delayed by 9 years. Operational acceptance planned for 2018. No facility available for storage of reactor dismantling waste, although a related project has begun.
Kozloduy, Bulgaria	Use of existing storage and treatment facilities on site, but additional storage and treatment capacity needed for future decommissioning.	According to an assessment made by the decommissioning licence holder State Enterprise Radioactive Waste Management (SERAW), the capacity of the existing radioactive waste storage facilities should suffice until 2022.
	National disposal facility for low- and intermediate-level radioactive waste to be constructed by the end of 2015.	The national disposal facility for low- and intermediate-level radioactive waste, the main missing element, is delayed by 6 years. Expected completion 2021 (see paragraph 56).
Bohunice, Slovakia	Use of existing storage and treatment facilities on site. Additional storage and treatment capacity needed for future decommissioning.	Ongoing project to increase the capacity of the national radioactive waste repository for very low-level waste to be finished in 2018.

Source: ECA, based on information from national authorities.

Figure 10

Storage basket for VVER440/230 spent nuclear fuel elements

© Javys.

46

While defuelling is complete in **Bulgaria** and **Slovakia**, in **Lithuania** unit 2 is still partially fuelled and the storage pools in unit 1 are still filled with spent nuclear fuel. In **Bulgaria** and **Slovakia**, the spent nuclear fuel elements are still classified as material for potential future use, although some of this material will unavoidably require permanent disposal. ***Table 5*** provides an overview of the classification of spent nuclear fuel, its current storage location and means and the status of the interim spent nuclear fuel management infrastructure.

Table 5

Overview of storage and classification of spent nuclear fuel

		Reactor core defuelled?	Reactor and storage ponds defuelled?	Classification of the spent nuclear fuel	Current location of spent nuclear fuel	Final repository for spent nuclear fuel disposal available?
Ignalina, Lithuania	**Unit 1**	Yes	No	High-level waste	In reactor ponds in unit 1 and in interim spent fuel dry storage on site	No
	Unit 2	No	No	High-level waste	In unit 2 reactor core and in unit 2 reactor ponds	No
Kozloduy, Bulgaria		Yes	Yes	Material for potential future use	Interim spent fuel wet and dry storage facility on site, partial shipment to Russia	No
Bohunice V1, Slovakia		Yes	Yes	Material for potential future use	Interim spent fuel wet storage facility on site	No

Source: ECA, based on information from national authorities.

47

Table 6 provides an overview of the progress made with **infrastructure for the interim storage of spent nuclear fuel** since 2011. In particular, progress in Lithuania has been held back by delays in the construction of the interim spent fuel storage facility.

Table 6

Progress in infrastructure for the interim storage of spent nuclear fuel, 2011 and 2015

	2011	2015
Ignalina, Lithuania	Units could not be defuelled until the interim storage facility for spent fuel was operational, but this project was 4 years behind schedule.	Construction of the interim spent fuel storage facility has been delayed by a further 6 years, putting it 10 years behind schedule compared with the 2005 final decommissioning plan. Its completion is a precondition to obtaining a decommissioning licence.
Kozloduy, Bulgaria	Significant delays and budget overruns affecting the design and construction of an interim spent fuel dry storage facility for storing spent fuel assemblies in casks.	Takeover certificate was obtained in March 2013 and, by 2015, six loaded casks had been stored out of the 34 planned. A 10-year licence to operate the storage facility was obtained on 29 January 2016.
Bohunice, Slovakia	Interim spent fuel wet storage facility available.	Spent fuel from the V1 nuclear power plant is stored in the interim spent fuel storage facility on site. Its storage capacity will suffice until 2024 when including spent nuclear fuel from other plants. Pending a decision on final disposal, there are plans to build an interim spent fuel dry storage facility.

Source: ECA, based on information from national authorities.

48

The interim storage of spent nuclear fuel is a temporary solution prior to final disposal. **Final disposal in a deep geological repository**, usually several hundred metres or more below ground, is generally recognised as the preferred option for the disposal of high-level waste (see ***Annex VII*** for an example). In principle, each country with a nuclear programme should devise a programme for constructing an adequate repository[28]. However, some countries may generate low radioactive waste volumes, have limited financial resources or lack appropriate geological conditions[29]. As shown in ***Table 5***, not one of the three Member States concerned currently has access to such a repository for final disposal. Other EU Member States face the same challenges.

49

Access to a final disposal site could be ensured through multinational cooperation. With a 'multinational repository', waste originating from more than one country is disposed of in a common repository. If all the participating countries are in the same neighbourhood, the repository is often referred to as a 'regional repository'[30].

28 IAEA, 'Developing multinational radioactive waste repositories: Infrastructural framework and scenarios for cooperation', October 2004. IAEA Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management.

29 IAEA, 'Developing multinational radioactive waste repositories: Infrastructural framework and scenarios for cooperation', October 2004. IAEA Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management.

30 IAEA, 'Developing multinational radioactive waste repositories: Infrastructural framework and scenarios for cooperation', October 2004, p. 5.

50

The EU's radioactive waste directive leaves room for regional cooperation in this area and expressly acknowledges that 'some Member States consider that the sharing of facilities for spent fuel and radioactive waste management, including disposal facilities, is a potentially beneficial, safe and cost-effective option'[31]. However, some EU Member States restrict the import of nuclear waste in their national legislation. For example:

— **Lithuania** prohibits the import of radioactive waste and spent nuclear fuel, except for (a) the transit of radioactive waste and spent nuclear fuel through Lithuania and (b) the reimport of radioactive waste and spent fuel processed abroad[32];

— **Bulgaria** prohibits the import of radioactive waste, except (a) upon reimport of used sealed sources of ionising radiation manufactured in Bulgaria and (b) radioactive waste reprocessed as a service for Bulgaria[33];

— **Slovakia** prohibits the import of radioactive waste, except for (a) transport through the country and (b) imports of radioactive waste for reprocessing and treatment[34].

51

Throughout the EU, only one deep geological repository is currently under construction, in Finland (see ***Annex VII***). From the adoption of the Finnish government's first decision on the implementation timetable and the beginning of site screening in 1983, nearly 40 years will have passed before disposal can begin (***Figure 11*** shows the project timeline). Disposal of spent fuel is planned to start in the early 2020s.

31 See recital 33 of Council Directive 2011/70/Euratom. On the conditions for import and export, see Article 4(4) of the radioactive waste directive and Council Directive 2006/117/Euratom of 20 November 2006 on the supervision and control of shipments of radioactive waste and spent fuel (OJ L 337, 5.12.2006, p. 21).

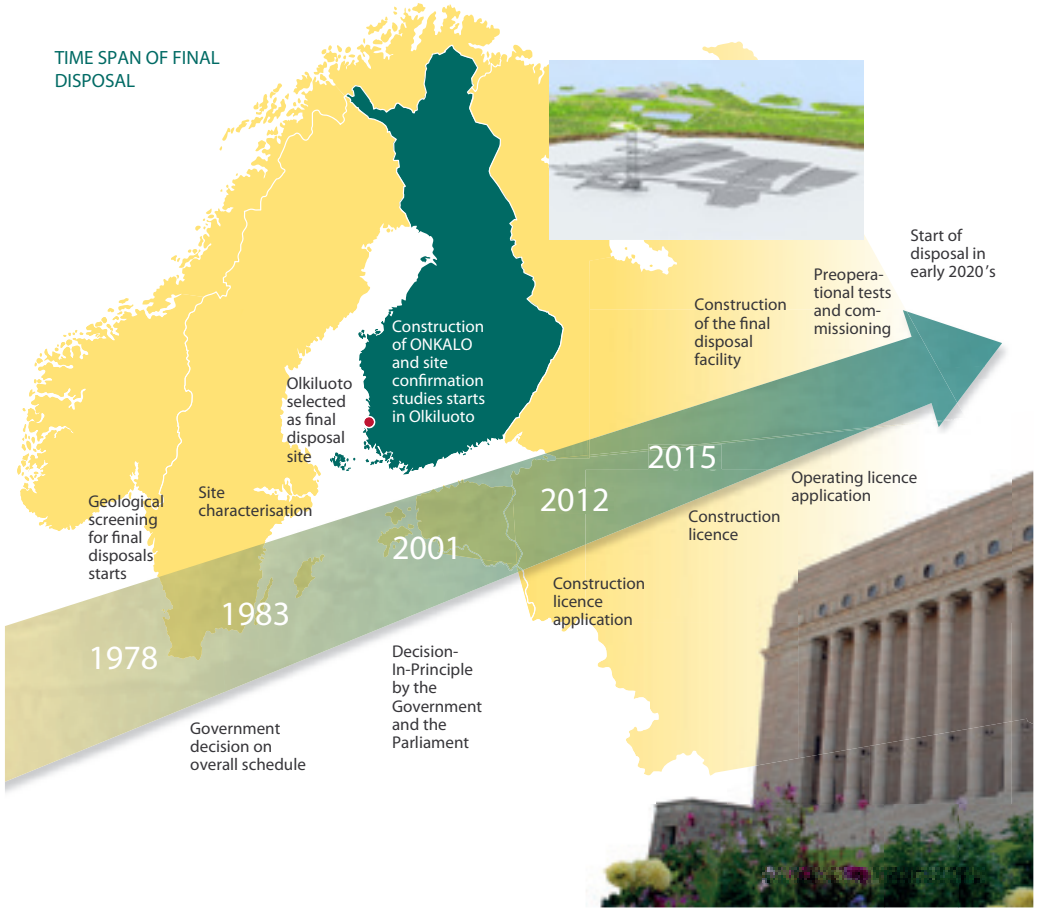
32 See Article 24 of Lithuanian Law No VIII-1190 of 20 May 1999 on radioactive waste management.

33 See Article 17 of the Bulgarian Act on the Safe Use of Nuclear Energy (last amended on 28 November 2014).

34 See the Slovak Act 541/2004 Coll, the peaceful use of nuclear energy and its Article 21 on 'imports of radioactive waste'.

Figure 11

Timeline of the Finnish deep geological repository



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52

Other Member States are also currently working on preparations for a deep geological repository, and are at different stages along the timeline.

— In **Sweden**, an application for the construction of a deep geological repository at the chosen site of Forsmark is under review by the Swedish Radiation Safety Authority. Construction and commissioning are scheduled for completion by 2028[35].

— In **France**, an application for construction could be submitted in 2017/2018. The pilot operation phase is scheduled between 2025 and 2035, with commercial exploitation starting after 2035[36].

35 SWD(2016) 102 final of 4 April 2016, 'Commission staff working document, accompanying the document "Communication from the Commission — Nuclear illustrative programme presented under Article 40 of the Euratom Treaty for the opinion of the European Economic and Social Committee"', p. 30.

36 http://www.developpement-durable.gouv.fr/Calendrier-du-projet.html-+.

— In **Germany**, the Commission for the Storage of High-level Radioactive Waste has been tasked with drafting a report by the end of 2016 as preparation for the process of selecting a site. Under national law, a decision on site selection should be taken by 2031. At the earliest disposal could start 2045/2050[37].

53

Under the EU's 2011 radioactive waste directive, Member States had to prepare their national programme by August 2015, including their plans for final disposals. The Commission is obliged to report to the Parliament and the Council on the implementation of this directive, but has not yet done so[38].

54

We analysed the respective national programmes of the three Member States and concluded that Lithuania, Bulgaria and Slovakia have only just begun discussing potential final disposal solutions, so talks are at a conceptual stage.

55

In **Bulgaria,** the national programme lists three options for dealing with its high-level waste including spent fuel, as follows.

— Reprocessing in other countries.

— Participating in regional or international final disposal solutions, without jeopardising the implementation of the national programme.

— Disposing of the high-level waste in Bulgaria.

Bulgarian authorities interviewed during the audit expressed a preference for the second, regional option, owing to concerns regarding the country's small nuclear capacity, its geological and climatic conditions, legislation, public opinion, financial capabilities and the volume of the high-activity radioactive waste. A final decision on which option to choose is scheduled to be reached by 2030. As a temporary solution, the national programme envisages the construction of a pre-disposal storage facility.

37 *Prozesswege zu einer sicheren Lagerung hoch radioaktiver Abfälle unter Aspekten der Rückholbarkeit/Bergbarkeit/ Reversibilität, Papier der Vorsitzenden unter Einbeziehung von Kommentaren weiterer Mitglieder der AG 3*, online: http://www.endlagerbericht.de, accessed on 11 April 2016, p. 4.

38 Article 14(1) of Council Directive 2011/70/Euratom.

56
In **Lithuania**, the national programme adopted in December 2015 envisages the construction of a final repository in Lithuania. Nevertheless, the interviewed Lithuanian authorities echoed the concerns cited by the Bulgarian authorities, as well as their preference for a regional scheme.

57
In **Slovakia**, the national programme lists two options:

— disposal in a deep geological repository in Slovakia, for which a cost estimate is included in the programme;

— monitoring and support for building an international repository.

58
None of the three Member States indicated which region or countries might be involved in a potential regional or other EU-based solution.

Nearly all the key decommissioning infrastructure projects have experienced delays

59
To determine the decommissioning progress achieved since 2011, we gathered data on a sample of 18 key decommissioning infrastructure projects and supporting projects in each of the three Member States, financed by the EU assistance programmes (see ***Annex VI***)[39].

60
Nearly all the sampled key decommissioning infrastructure projects experienced delays between 2011 and 2015. As can be seen from ***Annex VI***, from the beginning of their implementation until the end of 2015, they had accumulated delays of up to around 10 years. These delays are among the main reasons for Lithuania having postponed the final decommissioning end date by a further 9 years since our previous report in 2011. The decommissioning end date in Lithuania is now 2038.

39 These 18 projects account for 587 million euro of the EU contribution to decommissioning activities, or around 37 % of contracted EU financing (excluding mitigation measures) since 2001.

61
Our 2011 report noted that in **Lithuania**, implementation of the **interim spent fuel storage facility** project (see ***Figure 12***) had fallen behind by over 4 years, as stated in ***Table 6***. Since then, a further 6-year delay has built up. Project progress was particularly slow between 2011 and 2014. It was only at the beginning of 2013 that decisions were taken to start to turn the project around. Delays to this project have held up reactor defuelling (see Project 1 in ***Annex V***).

Figure 12

Interim spent fuel storage facility at the Ignalina nuclear power plant, Lithuania

© INPP.

© INPP.

62
Another key project in Lithuania, **the solid waste retrieval treatment and storage facility**, has fallen behind by a further 5 years since our last audit, resulting in a total delay of 9 years. The related commercial disputes have been settled with the contractor and the EU assistance programme has paid 55 million euro in compensation; a further 17.9 million euro has been set aside for anticipated risks.

63
The main reasons for the delays in Lithuania included contractual disputes, poor information on how the plant was actually built, incomplete data on the facility and on spent fuel and insufficient coordination and supervision of sub-contractors' work.

64

While there have also been project delays in Bulgaria and Slovakia, these have not led to a postponement of the planned decommissioning end date. In Slovakia, the end date has remained at 2025. In Bulgaria, this date has even been brought forward by 5 years, from 2035 to 2030, although this is attributable to the 2011 national strategy for spent fuel and radioactive waste management formally resolving upon a brownfield end state, thus eliminating the greenfield option, which would require more time.

65

In **Bulgaria**, examples of project delays include the following.

— The construction of a key radioactive waste management facility, **the national disposal facility for low- and intermediate-level radioactive waste**, was planned for completion in 2015 (See ***Table 4*** and ***Figure 13***). However, the process has fallen behind by 6 years, mainly due to the rejection of the Environment Impact Assessment, which had to be restarted and is still ongoing. The deadline for completing this facility is now 2021 (see Project 11 in ***Annex V***).

Figure 13

Site awaiting the national disposal facility for low- and intermediate-level radioactive waste in Bulgaria

© SERAW.

— The construction of the **plasma melting facility**, a facility for treating and conditioning solid waste with a high-volume reduction factor, is almost 5 years behind schedule. This has occurred because of challenges in determining first-in-kind technological solutions, changes in the regulatory framework leading to three revisions to the facility's design and the appeal of the environmental impact assessment. A construction permit was issued on 14 May 2015 and completion is now expected in June 2017 (see ***Figure 14*** and Project 11 in ***Annex V***).

Figure 14

Preparatory works for the installation of the plasma melting facility

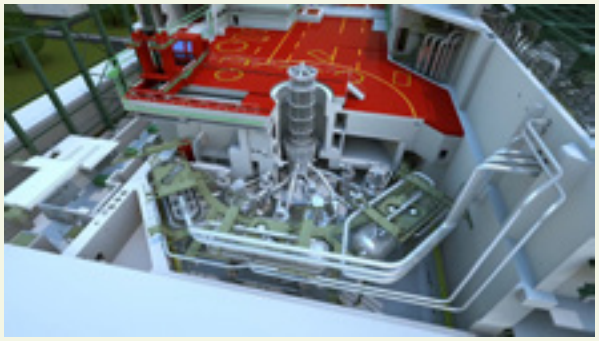
© SERAW.

66

In **Slovakia**, the project **decontaminating the primary circuit** (see ***Figure 15***), which needs to be completed before the heart of the reactor building can be dismantled, was originally scheduled for completion in 2014. Since several technical challenges remain unresolved, the project's ultimate completion date was still unknown at the end of January 2016, as was the impact this delay would have on costs and the overall decommissioning schedule (see Project 16 in ***Annex V***).

Figure 15

A VVER440/230-type reactor and the main components in the primary cooling circuit



© Javys.

67

The examples above illustrate that there have been various reasons for the delays encountered in the three Member States, including:

— challenges in determining and implementing first-in-kind technological solutions;

— incomplete historical operational data and poor information on how the plant was actually built;

— incomplete inventory and/or characterisation of waste, particularly for the reactor buildings.

68

In some instances, project progress was hampered by the need to substantially modify plans, or even terminate projects completely, despite proposals having already gone through several rounds of scrutiny. This suggests that there were difficulties in selecting and designing projects. It also points to the challenges that the ministries, national authorities and final beneficiaries are facing as the decommissioning advances to the critical stage of tackling the reactor buildings, where specific knowledge and experience is required to dismantle, move and store structures and components from the controlled area.

69

At the same time, there has been a reliance, particularly among the decommissioning licence holders, on external experts such as consultants, engineers and lawyers (see ***Table 7*** for external expert costs). Although the use of external experts is required under EBRD rules and was indispensable in the planning and early implementation stages, the use of experts should decrease over the years, as knowledge is transferred to local staff.

Table 7

External expert costs in 2001-2015 and their proportion of the EU support allocated to decommissioning

Ignalina, Lithuania 2001-2016		Kozloduy, Bulgaria 2001-2015[1]		Bohunice, Slovakia 2003-2016	
Million euro	% of EU support	Million euro	% of EU support	Million euro	% of EU support
75	9	99	20	45	9

1 Figures in Bulgaria include one contract for the project management unit which runs from 2016-2019.

Source: ECA, based on project data provided by the implementing bodies and nuclear decommissioning project monitoring reports.

70

In addition, the EU-wide shortage of qualified, experienced engineers poses a risk. This is especially the case in Lithuania, which is facing a lack of international experience in dismantling its RBMK-type reactor, which is the first of its kind to be decommissioned (see paragraph 2)[40].

71

The three Member States are seeking to build up their technical capacity and enhance knowledge-sharing. For example:

— In **Bulgaria**, in April 2013, the two different project management units, responsible for decommissioning and the construction of the national disposal facility for low- and intermediate-level radioactive waste, were merged and embedded within SERAW, which is the decommissioning licence holder. The external consultant assisting this integrated project management unit is embedded within SERAW's organisational structure. The external consultant's staff located on site work in pairs with their local counterparts for each project. Ultimate decision-making power rests with the head of the project management unit, who is a local SERAW employee. This has led to increased responsibility and ownership.

— In **Slovakia**, JAVYS a.s., the Slovak state enterprise responsible for decommissioning and radioactive waste management, organised a 2-day knowledge-sharing seminar in March 2015 with representatives from the Ignalina, Bohunice and Kozloduy nuclear power plants, the EBRD, the European Commission and the Slovak Ministry of the Economy.

40 The shortage of qualified engineering resources has been noted in a European Commission report entitled *Putting into perspective the supply of and demand for nuclear experts by 2020 within the EU-27 nuclear energy sector*, 2012.

Estimated cost of decommissioning will be at least 5.7 billion euro and double this if the cost of final disposal is included

72

Our previous report observed that all three national decommissioning plans and their cost estimates were incomplete. Significant financing gaps were found. This audit analysed how decommissioning costs and the level of available financing have evolved, at both EU and national levels. We also sought to estimate the full cost, including final disposal, which the three Member States will face and analysed the ways in which liabilities for future costs are accounted for.

Total estimated decommissioning cost has increased by 40 % to 5.7 billion euro since 2010

73

Our previous report recommended a comprehensive assessment of the costs arising from nuclear decommissioning. In 2014 the Member States updated the nuclear decommissioning cost estimates set out in the final decommissioning plans which they had previously submitted to the Commission. Slovakia made further minor changes in 2015. These updates, intended to provide a fuller picture, saw cost estimates increase by 40 %, from 4.1 billion euro in 2010 to 5.7 billion euro in 2015. The increase was most pronounced between 2010 and 2011 (see ***Figure 16***). There were significant differences between the three Member States. Lithuania accounted for most of the estimated cost increase, with a 67 % rise between 2010 and 2015. In the same period, the cost estimate for Bohunice, Slovakia, has also risen, by 30 %. The cost estimate for Kozloduy, Bulgaria, has remained largely unchanged. After an initial increase in 2011, the cost estimate made after the decision to move the deadline forward saw costs decrease by 136 million euro (see paragraph 64).

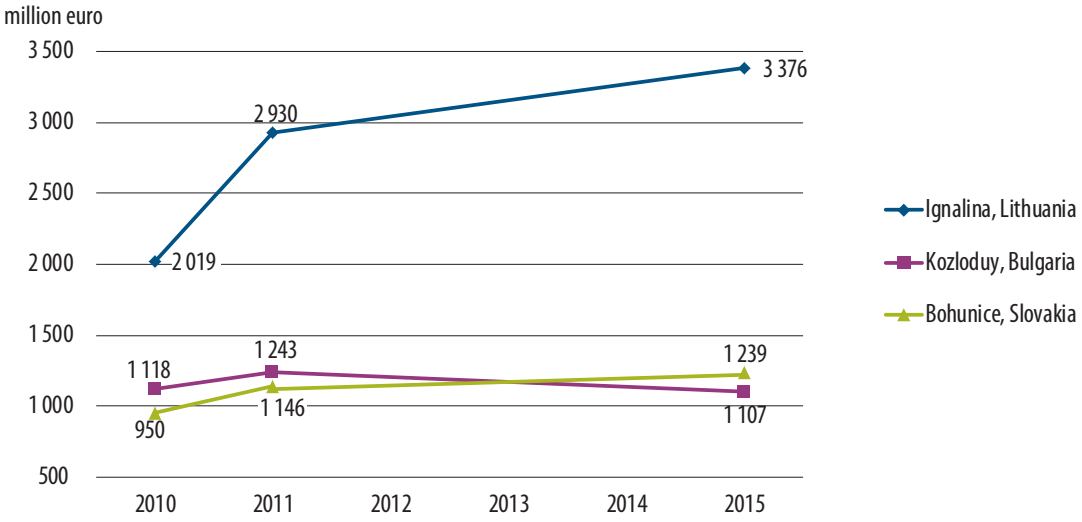
74

Since 2011 all three Member States have improved their approach to estimating the cost of nuclear decommissioning activities in their final decommissioning plans. They now use the latest methodology known as the International Structure for Decommissioning Costing of Nuclear Installations[41]. However, uncertainty continues to surround the full list of activities and the associated costs involved in dismantling the respective reactor buildings, in particular, since a comprehensive inventory and radiological characterisation of the controlled area has still not been completed at any of the sites (see paragraph 32).

41 Developed jointly by the European Commission, the IAEA and the Organisation for Economic Cooperation and Development, with a view to creating greater harmonisation in costing nuclear decommissioning activities.

Figure 16

Estimated decommissioning costs from 2010 to 2015



Source: 2010 figures: final decommissioning plans; 2011 figures: updated estimates presented to the Nuclear Decommissioning Assistance Programme Committee meeting in March 2011; 2015 figures: updated final decommissioning plans, 2015 annual work programmes and, for Slovakia due to update, draft 2016 annual work programme.

The Member States, and in particular Lithuania, face financial challenges

75

For all three Member States, we compared the cost estimates and available funding found during our last audit with the latest figures available at the time of this audit. Currently, EU financing for decommissioning activities is provided for up until 2020. However, the available national and EU financing of 4.0 billion euro falls short of covering the estimated total cost of 5.7 billion euro, excluding the cost of final disposal (see ***Table 8*** and ***Figure 17***). This leaves a financing gap of 1.7 billion euro until the completion of decommissioning. Lithuania accounts for 93 % of this financing gap.

Table 8

Estimated overall decommissioning costs and financing gap, 2011 and 2015

(million euro)

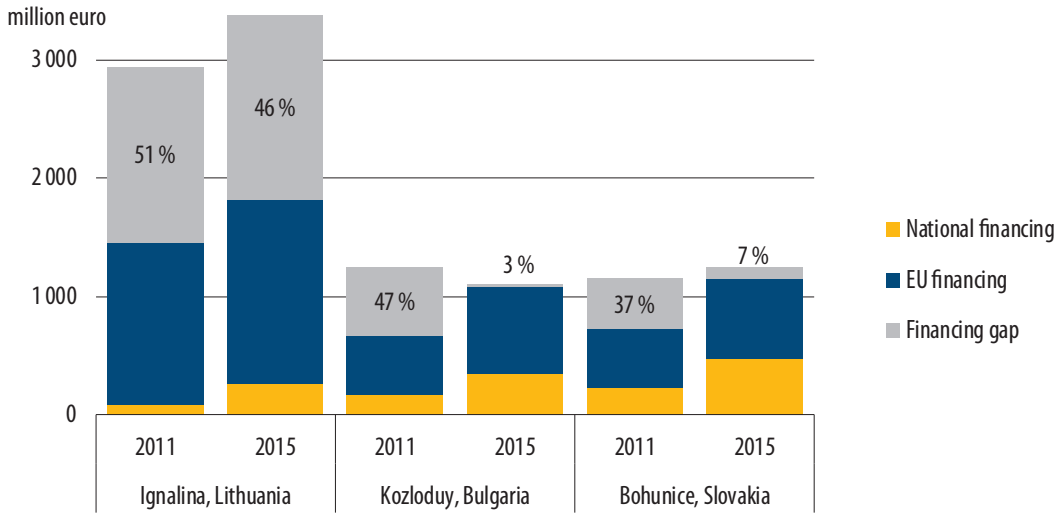
	Ignalina, Lithuania		Kozloduy, Bulgaria		Bohunice, Slovakia		Total	
	2011	2015	2011	2015	2011	2015	2011	2015
Estimated costs	2 930	3 376	1 243	1 107	1 146	1 239	5 319	5 722
National financing, allocated[1]	83	262	171	348	231	476	485	1 086
EU financing, allocated	1 367	1 553	493	731	489	671	2 349	2 955
Financing gap	1 480	1 561	579	28	426	92	2 485	1 681

1 Allocated national financing may be made up of dedicated funds set up for decommissioning, committed public expenditure or other national sources.

Source: 2011: updated estimates presented to the Nuclear Decommissioning Assistance Programme Committee meeting in March 2011; 2015: Member State authorities, updated final decommissioning plans and 2015 annual work programmes, and, for Slovakia due to update, the draft 2016 annual work programme.

Figure 17

Illustration of the 2011 and 2015 financing gaps in each of the three Member States



Source: Based on ***Table 8***.

Cost increases and financing gap in Lithuania are substantial

76

Lithuania's 2015 estimates of the overall decommissioning cost increased by 15 % compared with 2011, but by 67 % compared with 2010, amounting to 3.4 billion euro. The Lithuanian authorities attributed these increases to labour costs, the postponement of the decommissioning end date and cost overruns in major decommissioning infrastructure projects. The inflation cost category accounted for 26 % of the remaining decommissioning cost until 2038, or 695 million euro. This had been calculated on the basis of a 3 % annual estimate; however, at the time of the Member State's calculation, the Central Bank of the Republic of Lithuania put the average inflation rate estimate for 2015, which takes into account 2013 and 2014, at 1.5 %.

77

We also consider the extent of the cost increase to be indicative of poor initial planning. For example, the 2014 update to the final decommissioning plan included 15 previously unconsidered decommissioning activities, estimated to cost 318 million euro in total.

78

Our analysis of key infrastructure projects in Lithuania, from the start of their implementation to the end of 2015, confirmed major cost increases in such projects (see ***Annex VI***). Some of these additional costs were caused by project delays. For example, the delay in implementing the interim spent fuel storage facility project had repercussions on reactor-defuelling progress and, by the end of 2014, had triggered additional maintenance costs exceeding 61.3 million euro (see paragraph 61), as well as contributing to the postponement of the decommissioning end date.

79

Generally speaking, staff numbers at a plant undergoing decommissioning are likely to be held close to operating plant levels until the fuel has been removed from the reactor. Staff levels should then progressively decline as the plant transitions from an operational status.

80

Staff levels have declined at all plants (see ***Table 9***). However, at Ignalina in Lithuania, where only one of the two reactor cores has been defuelled and which is still under an operational licence, staff levels, and hence costs financed by the EU, remain high. A third of staff continue to work on safe plant maintenance. In both Bulgaria and Slovakia, alternative employment elsewhere on the nuclear reactors still in full operation at the same site has been possible. In Lithuania, which no longer produces nuclear energy, this has not been possible.

Table 9

Staffing at the time of reactor closure and in 2015

	Number of staff		EU support granted (million euro)[3]
	during full operation[1]	in 2015	
Ignalina, Lithuania (two reactor units)	3 517	2 127[2]	171
Kozloduy, Bulgaria (four reactor units)	1 400	650	130
Bohunice, Slovakia (two reactor units)	1 060	239	45
Total	**5 977**	**3 016**	**346**

1 Full operation figure as at 31.12.2004 for Ignalina, as at 31.12.2002 for Kozloduy and as at 1.4.2006 for Bohunice.

2 Of the staff at Ignalina, 1 377 were working on nuclear decommissioning and 701 on safe maintenance.

3 Figures for Ignalina cover EU support from first unit closure in 2005 until 2016; for Kozloduy, from first unit closure in 2003 until 2017; for Bohunice, from first unit closure in 2008 until 2016.

Source: ECA, based on figures provided by Member State authorities.

81

Since our previous report, workforce management at Ignalina has improved. For example, the management at the Ignalina nuclear power plant has introduced an outsourcing strategy. This involves analysing several activities, such as equipment maintenance and the decontamination of unrestricted-access buildings, and deciding whether it would be more cost-effective to procure the related services or to staff them internally.

82

However, whether the current level of staffing is appropriate has not been validated externally, and there is still no detailed staffing plan covering the entire decommissioning process. Given the lack of co-financing and the local economic and social challenges involved in decommissioning at Ignalina, Lithuania, there is a risk of staffing exceeding the needs of the decommissioning programme, and of EU dedicated decommissioning financing being used to support such employment.

83

As noted in ***Table 8*** and paragraph 76, Lithuania's financing gap has increased significantly since our last report. During interviews with Lithuanian representatives, reference was made to Protocol No 4, annexed to the country's accession treaty to the EU, and to the Lithuanian interpretation that cost increases in the decommissioning project will continue to be financed by the EU[42]. The Commission's 2011 impact assessment argued that, based on their needs, support should be provided for the 2014-2020 period to all three Member States, but that, beyond 2020, the Commission did 'not foresee any further extension of financial EU support' (see paragraph 10)[43].

A small financing gap remains in Bulgaria and Slovakia although estimates have varied considerably over time

84

With the allocation of EU financing for the 2014-2020 period, the financing gaps noted in our previous report have decreased significantly in Bulgaria and Slovakia, to 28 million euro and 92 million euro respectively. However, cost and financing gap estimates have varied dramatically.

— The **Bulgarian** authorities' estimate for the financing gap fell significantly from 230 million euro in September 2014 to 28 million euro at the end of 2015, mainly due to the inclusion of costs borne by the Kozloduy nuclear power plant for preparatory decommissioning activities not taken into account in previous calculations. Contrary to this, Commission data at the end of 2015 showed a gap of 150 million euro.

— In **Slovakia**, the financing gap at the end of June 2015 was 193 million euro according to Commission data, while the draft 2016 annual work programme put it at 92 million euro.

42 Article 3, Protocol No 4 on the Ignalina nuclear power plant in Lithuania (OJ L 236, 23.9.2003) states that 'the decommissioning of the Ignalina Nuclear Power Plant … is of a long-term nature and represents for Lithuania an exceptional financial burden not commensurate with the size and economic strength of the country', and 'that Union shall, in solidarity with Lithuania, provide adequate additional Community assistance to the decommissioning effort beyond 2006'. The Protocol also states that 'for the period of the next Financial Perspectives, the overall average appropriations under the extended Ignalina Programme shall be appropriate'.

43 SEC(2011) 1387 final of 24 November 2011, 'Commission staff working paper — Impact assessment — Accompanying document to the Proposal for a Council Regulation on Union support for the nuclear decommissioning assistance programmes in Bulgaria, Lithuania and Slovakia'.

85

Such variations between the national and Commission figures raise questions regarding the reliability and robustness of the calculation methodologies used. Furthermore, the significant revisions made to figures indicate that the estimates presented in the final decommissioning plans had, at the time of our audit, not yet been scrutinised thoroughly by either the national stakeholders or the Commission.

The Commission's assessment of financing and decommissioning plans was inadequate

86

Partly in response to the recommendations in our previous report, the legislative framework for the 2014-2020 financing period introduced three *'ex ante* conditionalities'[44] (see ***Box 1***). These are prerequisites for the disbursement of any new financing for decommissioning under the current multiannual financial framework, intended to ensure the effective and efficient use of EU funds.

44 See COM(2011) 783 final, Council Regulations (Euratom) No 1368/2013 and No 1369/2013 and Commission Implementing Decision C(2014) 5449.

Box 1

Ex ante conditionalities

By 1 January 2014, the three Member States shall take the appropriate measures to fulfil the following *ex ante* conditionalities:

1. comply with the Euratom Treaty's *acquis* in the area of nuclear safety, in particular regarding the transposition into national law of Directive 2009/71/Euratom and Directive 2011/70/Euratom;

2. establish, in a national framework, a financing plan identifying the full costs and the envisaged funding sources required for the safe completion of decommissioning of the nuclear reactor units, including management of spent fuel and radioactive waste;

3. submit to the Commission a revised detailed decommissioning plan, broken down to detail the level of decommissioning activities, including a schedule and corresponding costs structure based on internationally recognised standards for the estimation of decommissioning costs.

Source: Articles 4 of Council Regulations (Euratom) No 1368/2013 and No 1369/2013.

87

By the time the Commission took its financing decision on the 2014 annual work programme in October 2014, it should have assessed whether the Member States had taken appropriate measures to fulfil these conditions[45]. However, we found the Commission's assessment of the respective financing plans and detailed decommissioning plans, i.e. of the second and third *ex ante* conditionalities respectively, to be inadequate. A September 2015 report from the Commission's Internal Audit Service corroborated our assessment. For example, we found that there were considerable revisions to total cost estimates and financing figures (see paragraph 84) and, in some instances, no detailed plans for certain costs or activities (see, for example, paragraph 79 on staff costs). A reservation related to the adequacy of the Directorate-General for Energy's assessment in 2014 of the *ex ante* conditionalities is included in its *2015 annual activity report*[46].

88

The Commission's Directorate-General for Energy devised an action plan targeting the weaknesses identified by the Commission's Internal Audit Service, setting the end of October 2016 as the deadline for completing the assessment of the *ex ante* conditionalities. It is crucial that the Commission complete this assessment and analyse thoroughly both the financing and decommissioning plans for each Member State, since these documents form the basis for future funding.

The EU budget finances the vast majority of costs in all three Member States

89

All three Member States have set up dedicated national funds to finance their national policies for the safe management and disposal of radioactive waste and for the decommissioning of nuclear installations. However, resources in these funds remain limited, particularly in Lithuania.

— In **Lithuania** the Lithuanian National Decommissioning Support Fund, first established in 1995, received revenue contributions from the operation of the nuclear power plant until the plant was shut down at the end of 2009. It now depends on revenue from the sale of redundant assets, and on external funds and the interest generated thereon. In the past it was also used to fund non-decommissioning activities such as preferential electricity and heating tariffs, or additional social guarantees for ex-employees. According to an estimate provided by the Ministry of Energy, the fund held 4 million euro on 1 January 2016[47].

45 See Article 4 of Council Regulations (Euratom) No 1368/2013 and 1369/2013.

46 Directorate-General for Energy, *2015 annual activity report*, ref. Ares(2016)1667891, 8.4.2016.

47 SWD(2016) 102 final, p. 38, does not mention this fund but gives a figure of 0.5 billion euro as the total available funds. It is not clear what this figure refers to.

— In 1999, **Bulgaria** set up a national radioactive waste fund and a decommissioning of nuclear facilities fund. Both funds concern all nuclear facilities in Bulgaria. The first fund is funded mainly through contributions from radioactive waste producers, the main contributor, at a rate of 92 %, being the Kozloduy nuclear power plant. The fund had spent 34.8 million euro on units 1-4 as radioactive waste management facilities and held 61 million euro at the end of 2015. The second fund is financed with contributions from nuclear facility operators. Cumulated funds for the Kozloduy units 1-4 were 156 million euro at the end of 2015.

— In 2010, **Slovakia** introduced a levy on end-user electricity consumption to compensate for the 'historical deficit' and the fact that the mandatory contributions from nuclear power plant operators since 1995 had raised insufficient funds to cover nuclear decommissioning and the final disposal of spent fuel. The amount earmarked in the national decommissioning fund for decommissioning the Bohunice V 1 nuclear power plant was 290 million euro at the end of 2014.

90

The total available national resources, made up of the dedicated funds and other national sources, will not cover the full decommissioning costs (see paragraph 67 and ***Table 8***). National resources would cover just 31 % of estimated costs in Bulgaria and 38 % in Slovakia, while the national funds in the EU's nuclear decommissioning programme in Lithuania would cover less than 8 % of the total decommissioning cost. To date, the EU budget has financed the shortfall through the nuclear decommissioning assistance programmes.

91

There is currently no legal requirement for Member States to co-finance the decommissioning assistance, whether at programme or individual project level. In contrast, the European Structural and Investment Funds[48] oblige Member States to contribute — from their own resources — a set percentage of the funding for co-financed programmes or projects. Our previous report recommended that the Commission, if proposing funding for the 2014-2020 financial framework, take into account other EU funds, such as the Structural Funds, and the conditions for fund disbursement. The Commission followed up this recommendation by continuing support for mitigation measures under the European Structural and Investment Funds (ESIF) but decided to keep dedicated decommissioning support separate, with no access to the ESIF for actual decommissioning.

48 The European Structural and Investment Funds include, inter alia, the European Regional Development Fund, the Cohesion Fund and the European Social Fund. Before 2014, these were referred to as the 'Structural Funds'.

92
The obligation to provide co-financing is important because it gives the recipients of EU funding more of a financial incentive to seek value for money in managing a project and to make progress with programmes. The relevant Council regulations for these nuclear decommissioning assistance programmes do acknowledge the importance of co-financing and state that full EU financing of projects should only be authorised in 'well-founded exceptional cases'[49]. However, the Commission has not yet laid down clear guidelines on what would constitute such a case. This is corroborated by the Commission's September 2015 Internal Audit Service report. The Commission has thereby so far missed out on the opportunity to incentivise and maximise co financing.

The total estimated cost would double if the cost of final disposal of high-level waste is included

93
None of the financing gap estimates given in the final decommissioning plans gives the full picture of the costs involved once a plant is closed, since they each fail to include the cost of the final disposal of spent fuel.

94
According to the internationally recognised 'polluter pays' principle, it is the responsibility of the Member State to ensure that the operator fulfils its obligations as the polluter and sets aside sufficient financial resources to cover the full cost of decommissioning, including the final disposal of spent fuel (see paragraph 20).

95
The 2011 radioactive waste directive reflects this principle. The directive requires Member States to ensure that all radioactive waste and spent nuclear fuel management activities, including final disposal, are identified and fully costed, and that adequate financial resources will be available when required[50].

96
Furthermore, one of the preconditions for financing under the nuclear decommissioning assistance programmes (see paragraphs 86 to 88) is that Member States 'establish, in a national framework, a financing plan identifying the full costs and the envisaged funding resources required for the safe completion of the decommissioning of the nuclear reactor units, including management of the spent fuel and radioactive waste'[51].

49 Recital 17 of Council Regulation (Euratom) No 1368/2013 and Recital 15 of Council Regulation (Euratom) No 1369/2013.

50 See, in particular, Article 12 of Council Directive 2011/70/Euratom.

51 See Articles 4 of Council Regulations (Euratom) No 1368/2013 and 1369/2013.

97
We calculated an estimate for the cost of final disposal to provide a fuller picture of the costs involved in decommissioning the respective plants.

98
As shown in ***Table 10***, we calculated that if the costs associated with final disposal are taken into account, the estimated total cost of decommissioning could double, amounting to 11.4 billion euro in total for all three Member States.

Table 10

Decommissioning cost estimation including high-level waste and spent nuclear fuel disposal

(million euro)

	Ignalina, Lithuania	Kozloduy, Bulgaria	Bohunice, Slovakia	Total
2015 cost estimate, excluding high-level waste and spent nuclear fuel disposal	3 376	1 107	1 239	5 722
Cost estimate for final disposal of high-level waste and spent nuclear fuel from these eight reactors[1]	2 610	1 590	1 466	5 666
Cost estimate, including high-level waste and spent nuclear fuel disposal	**5 986**	**2 697**	**2 705**	**11 388**
National financing	262	348	476	1 086
EU financing	1 553	731	671	2 955
Financing gap	4 171	1 618	1 558	7 347

1 Note on estimates of final disposal costs

For **Ignalina, Lithuania,** our estimate of 2 610 million euro is based on the figure provided in the national programme and quoted in the Commission's 2016 nuclear illustrative programme.

For **Kozloduy, Bulgaria**, the Bulgarian national programme does not provide a figure. Our estimate of 1.59 billion euro is based on the 3 billion euro estimate of the total cost of a national disposal facility, based on discussions with the Bulgarian national authorities regarding the Finnish case during the audit. We divided the 3 billion euro in half to reflect the share of units 1-4 and the other operating units 5 and 6. We did not take into account any plans for future units or plants, since these were not yet concrete.

For **Bohunice, Slovakia**, our estimate of 1.46 billion euro is based on the Slovak authorities' 4.4 billion euro estimate of national final disposal costs, using the more conservative scenario in which the remaining nuclear power plants in Slovakia have an operational life of 60 years. We divided 4.4 billion euro by three, to split the cost equally between the two units under decommissioning and the four currently operating units. Contrary to the Slovak national programme, we did not take into account the two units planned in Mohovce, due to the delays in their construction. Had we done so, the units under decommissioning would have accounted for a 16.3 % share of the 4.4 billion euro, equal to 717 million euro. The Commission's 2016 nuclear illustrative programme quotes a figure of 3.7 billion euro, which appears to refer to the less conservative scenario regarding the operational plant life of 40 years.

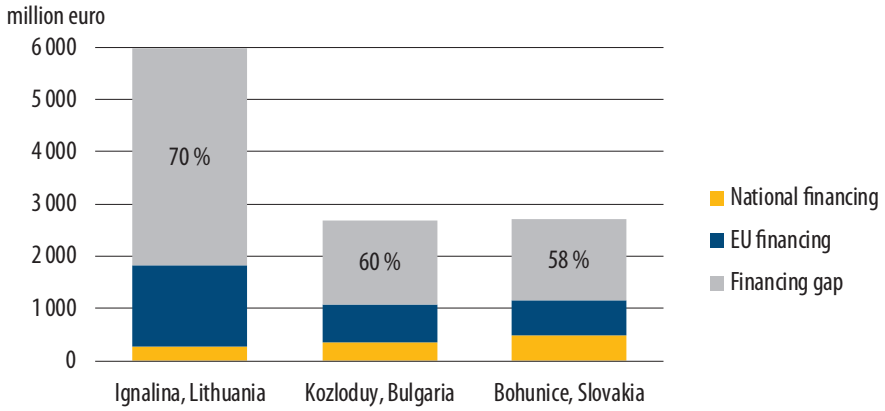
Source: ECA, based on Commission, AWPs 2015 and 2016, national stakeholders.

99

When taking into account both decommissioning and final disposal, Lithuania accounts for the largest share of the overall shortfall of 7.4 billion euro. However, sizeable shortfalls would also emerge for Bulgaria and Slovakia (see ***Figure 18***).

Figure 18

Financing gaps when taking into account both decommissioning and final disposal



Source: ECA, based on ***Table 10.***

Liabilities for future costs are not properly accounted for in the three Member States

100

In accordance with international accounting standards[52], liabilities that are expected to arise in the future should be identified as provisions and recognised on the balance sheet of the organisation which has the obligation to pay them if:

— a present legal or constructive obligation has arisen as a result of a past event[53];

— payment is probable, i.e. more likely than not;

— the amount can be estimated reliably[54].

52 IAS 37, 'Provisions, contingent liabilities and contingent assets' and IPSAS 19. There is no specific international accounting standard concerning nuclear decommissioning. There is a standard on how statistical information on decommissioning costs is calculated within the European System of Accounts (ESA) and this does not require liabilities to be recorded for future costs.

53 According to IAS 37.10, an obligating event is an event which creates a legal or constructive obligation (e.g. construction of nuclear power plant, creating an obligation for nuclear decommissioning) and which, therefore, results in an entity having no realistic alternative but to settle that obligation.

54 According to IAS 37.40, provisions for one-off events (restructuring, environmental clean-up, settlement of a lawsuit) are measured at the most likely amount.

101
If these three conditions are not met, the liabilities are termed 'contingent liabilities' and disclosed off balance sheet, for example in the notes to the accounts, unless payment is considered remote, in which case no disclosure is necessary[55].

102
Accordingly, nuclear decommissioning costs and the costs for the final disposal of spent fuel should therefore, when such payment is probable and the amount can be estimated reliably, be recognised as liabilities by the organisation which has the obligation to pay them. Cost estimates might, for example, be based on a nuclear decommissioning plan. The precise accounting treatment depends on the legal situation as regards liability for payment and on the accounting practices adopted by the Member State or organisation[56].

103
We asked the relevant authorities in the Member States to provide information on how the liabilities for costs associated with decommissioning and the final disposal of spent nuclear fuel are accounted for.

104
As shown in ***Table 11***, the accounting treatment varies among the three Member States and depending on whether the costs are associated with nuclear decommissioning or final disposal. Nuclear decommissioning costs are not recognised as provisions on any balance sheet in Lithuania and only minor contingent liabilities are disclosed. Decommissioning costs are not recognised in the accounts of the Kozloduy nuclear power plant, Bulgaria, and are only partially recognised in the Bohunice nuclear power plant, Slovakia.

105
Regarding the costs of final disposal, the relevant organisations in Lithuania and Bulgaria have neither recognised provisions for such costs on balance sheet nor disclosed any information in the notes to account. Only in Slovakia have relevant organisations recognised a provision in respect of the costs of final disposal, in a national nuclear fund sub-account.

55 Under IAS 37, disclosure is not obligatory if payment is remote.

56 Some organisations are required to use International Accounting Standards, whereas other organisations may use accounting standards at national level.

Table 11

Accounting treatment of liabilities relating to nuclear decommissioning and final disposal of spent fuel

	Nuclear power plant accounts (excluding final disposal of spent nuclear fuel)	Fund/ministry/government accounts (including final disposal of spent nuclear fuel)
Ignalina, Lithuania	No recognised provisions. Explanatory note explains that no reliable estimate is available for dismantling. Therefore, no contingent liabilities disclosed.	No recognised provisions. Minor contingent liabilities related to nuclear decommissioning are disclosed off balance sheet (13 million euro), concerning additional social guarantees for former NPP employees.
Kozloduy, Bulgaria	No recognition of either provisions for decommissioning, or of spent fuel storage and management costs. The 2014 accounts were therefore qualified by an independent auditor.	Revenues and expenditure of the national decommissioning and radioactive waste funds are included in the Ministry of Energy's annual budget accounts. Any unused portions of the accrued financial resources, including resources from previous years, are disclosed off balance sheet.
Bohunice, Slovakia	Partially recognised, but not earmarked for Bohunice V1.	Preliminary information regarding final disposal included in a national nuclear fund sub-account.

Source: ECA, based on information from the national authorities.

106

The fact that future costs are not systematically recognised as provisions and/or included in the notes to the accounts limits transparency and hampers the relevant authorities' ability to plan adequately how to meet future decommissioning and disposal costs.

Conclusions and recommendations

107

The dedicated EU funding programmes for nuclear decommissioning have not created the right incentives for timely and cost-effective decommissioning. Since we published our previous report in 2011, some progress has been made in decommissioning the nuclear power plants of Ignalina in Lithuania, Kozloduy in Bulgaria and Bohunice in Slovakia. Key components in the plants' non-controlled areas have been dismantled. However, nearly all the key decommissioning infrastructure projects have experienced delays, and the critical challenges involved in working in the controlled areas still lie ahead for all three Member States. Member State authorities claim that the plants have been irreversibly closed; however, not all of the expected outputs used by the Commission to assess progress towards irreversible closure have been fully met. The financing gap in Lithuania has increased since our last audit and now stands at 1.6 billion euro. The estimated cost of decommissioning at the three plants will be at least 5.7 billion euro in total, and 11.4 billion if the cost of final disposal is included.

Some decommissioning progress made since 2011 but critical challenges ahead

108

Since 2011, the three Member States have dismantled certain key components in the non-controlled area and, except in the case of Lithuania, advanced in obtaining the relevant licences for starting work in the controlled area. Lithuania has yet to obtain such a licence, the granting of which is now scheduled for 2022, 10 years later than originally planned (see paragraphs 40 and 42).

109

According to all of the national authorities, the progress achieved means that closure is now effectively irreversible. However, the expected outputs by which the Commission assesses progress towards irreversible closure have not yet been fully met at any of the three plants. The designs for the dismantling of the reactor cores/primary circuits are not yet complete and only minor works in the reactor building have been carried out to date. This means that the critical challenges involved in working in the controlled areas, including the reactor buildings, still lie ahead for all three Member States (see paragraphs 38 to 42).

110

There has been some progress in putting in place waste management infrastructure, but many key infrastructure projects in the three Member States experienced delays in the 2011-2015 period (see paragraphs 43 and 59 to 71). The longest delays have been in Lithuania, where the decommissioning end date has, since 2011, been postponed by a further 9 years to 2038 (see paragraphs 59 to 63).

111

Challenges remain in each of the three Member States, such as a reliance on external experts (see paragraph 69) and dealing with first-in-kind technical solutions (see paragraphs 67 to 68). The EU-wide shortage of qualified, experienced engineers poses a risk, particularly in Lithuania (see paragraph 70).

Recommendation 1 — Ensure progress in decommissioning

The three Member States concerned should:

(a) further improve their project management practices in order to have the necessary waste and spent fuel management infrastructure in place when planned;

(b) take steps to build up their own technical capacity, so as to achieve a better balance between in-house and external expertise;

(c) find better ways to exchange best practices and technical knowledge, both among themselves and with the wider nuclear decommissioning community in the EU and beyond. **The Commission** should facilitate this in a cost-effective way.

Target implementation date: By end 2017.

112

The projects funded under the EU's nuclear decommissioning assistance programmes do not relate to final disposal, but only to the interim storage of spent nuclear fuel. It can take several decades and high levels of financial commitment to develop a final disposal site for spent nuclear fuel. Doing so might be difficult for some countries which generate low volumes of radioactive waste, have limited financial resources or lack appropriate geological conditions. Talks in the three Member States regarding potential final disposal solutions for high-level waste and spent nuclear fuel, which may be national or regional solutions, are still only at a conceptual stage (see paragraphs 48 to 58). The Commission is required to report on Member States' plans in this area, but has not yet done so (see paragraph 53).

Recommendation 2 — Solutions for the final disposal of spent nuclear fuel

(a) **The Commission** should, together with all relevant EU Member States, explore options for the disposal of spent fuel and high-level waste, including any regional and other EU-based solutions, duly considering safety, security and the cost-effectiveness of the alternatives. The Commission should include a review of this matter in its first report to the European Parliament and the Council on the implementation of the radioactive waste directive.

Target implementation date: to start immediately; publication of report by mid 2017 at the latest.

(b) **The three Member States** should, in parallel, progress with their plans for final disposal, in order to establish more complete cost estimates and financing plans for the disposal of spent fuel and radioactive waste, as required by the radioactive waste directive.

Target implementation date: by mid 2017.

Estimated cost of decommissioning will be at least 5.7 billion euro and double that if the cost of final disposal is included

113

Estimates of the total cost of decommissioning across the three programmes increased by 40 % between 2010 and 2015, from 4.1 billion euro to 5.7 billion euro (see paragraphs 73 to 74). If costs associated with the final disposal of spent nuclear fuel are included, the full cost could double, reaching 11.4 billion euro (see paragraphs 93 to 99).

114

The currently available national and EU financing of 4.0 billion euro falls short of covering the estimated total cost of 5.7 billion euro, not including the cost of final disposal. There is, therefore, a financing gap of 1.7 billion euro until the completion of decommissioning. Lithuania accounts for 93 % of this overall financing gap, with a shortfall of 1.6 billion (see paragraphs 73 to 85). The financing gaps estimated by Bulgaria and Slovakia now amount to 28 and 92 million euro respectively (see paragraph 84).

115

According to the internationally recognised 'polluter pays' principle, it is the responsibility of the Member State to ensure that nuclear power plant operators fulfil their obligations as the polluter, and set aside sufficient financial resources to cover the full cost of decommissioning and final disposal (see paragraphs 20 and 93). The three sites are operated by state enterprises. All three Member States have set up dedicated national funds to finance their national policies for the safe management and disposal of radioactive waste and for the decommissioning of nuclear installations. However, to date, little use has been made of national funds in the three nuclear decommissioning programmes, and resources in these funds remain limited, particularly in Lithuania (see paragraphs 89 to 92).

116

As a result, the co-financing of projects with national funds has been the rare exception rather than the norm. Although, in contrast to other EU funds, there is no legal requirement in these programmes to co-finance projects, the legal base recognises that full EU financing of projects should only be authorised in 'well-founded exceptional cases'[57]. However, the Commission has not yet laid down clear guidelines on what would constitute such a case. Had it done so, it could have been more effective in creating the right incentives for higher levels of national co-financing to be invested in decommissioning (see paragraph 92).

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The three Member States are ultimately responsible for ensuring that adequate financial resources are available for both decommissioning and final disposal (see paragraphs 20 and 95). In its 2011 impact assessment, the Commission concluded, based on an assessment of the Member States' needs, that EU financial support should not be extended beyond 2020 (see paragraph 10). In this regard, Lithuanian representatives drew our attention, in particular, to their accession treaty protocols (see paragraph 83 and footnote 43).

Recommendation 3 — Respecting the polluter pays principle by increasing national financing for 2014-2020 and beyond

The three Member States should recognise their own role in ensuring that the polluter pays principle is respected, and be prepared to use national funds to cover decommissioning costs, as well as the cost of final disposal, both in the current financing period and thereafter.

Target implementation date: starting with an increase in national co-financing from the 2017 annual work programmes.

57 Recital 17 of Council Regulation (Euratom) No 1368/2013 and recital 15 of Council Regulation (Euratom) No 1369/2013.

Recommendation 4 — Increase in national co-financing in the 2014-2020 financing period

The Commission should seek increases in national co-financing during the 2014-2020 financing period. It should define clearly, for example in a Commission decision, the 'well-founded exceptional' conditions under which projects can be fully financed by the EU under the nuclear decommissioning assistance programmes.

Target implementation date: by the end of December 2017.

Recommendation 5 — Discontinue dedicated funding programmes for nuclear decommissioning in Lithuania, Bulgaria and Slovakia after 2020

Dedicated funding programmes for nuclear decommissioning in Lithuania, Bulgaria and Slovakia should be discontinued after 2020. If a clear need for the use of EU funds beyond 2020 is established, in one or more of these three Member States, any future EU funding proposed by the Commission and agreed by the legislator should include the right incentives to pursue decommissioning, including by being time limited and by being based on appropriate levels of Member State co-financing. One way to do this would be to consider widening access to the European Structural and Investment Funds to allow nuclear decommissioning activities to be covered, fulfilling these conditions.

Target implementation date: by the end of 2018, if necessary.

118

Staff levels have declined at all three plants. However, at Ignalina in Lithuania, where only one of the two reactor cores has been defuelled, and which still operates under an operational licence, staff levels, and hence costs funded by the EU, remain high. A third of the staff continues to work on safe plant maintenance. Given the lack of co-financing and the local economic and social challenges involved in decommissioning at Ignalina, Lithuania, there is a risk of staffing exceeding the needs of the decommissioning programme, and of EU dedicated decommissioning financing being used to support such employment (see paragraphs 80 to 81).

Recommendation 6 — EU funding only for cost of decommissioning

The Commission should allow EU financing under the nuclear decommissioning assistance programmes to be used to finance only the costs of staff working fully on decommissioning activities.

Target implementation date: from the 2017 annual work programmes and beyond.

119

The Commission's assessment as to whether the financing and decommissioning plans fulfil the *ex ante* conditionalities has been inadequate (see paragraphs 86 to 88).

Recommendation 7 — Improving Commission oversight

The Commission should complete its assessment of the *ex ante* conditionalities.

Target implementation date: by the end of October 2016.

120

The accounting treatment of liabilities and contingent liabilities for future costs associated with nuclear decommissioning and the final disposal of spent nuclear fuel varies among the three Member States. The fact that future costs are not always recognised as provisions and/or included in the notes to the accounts limits transparency and hampers the relevant authorities' ability to plan adequately how to meet future decommissioning and disposal costs (see paragraphs 100 to 103).

Recommendation 8 — Accounting treatment

The Commission should work together with all relevant Member States so that all future costs associated with nuclear decommissioning and the final disposal of spent fuel are accounted for properly, in a transparent manner, consistent with relevant accounting standards.

Target implementation date: by the end of December 2017.

This Report was adopted by Chamber II, headed by Mr Henri GRETHEN, Member of the Court of Auditors, in Luxembourg at its meeting of 14 July 2016.

For the Court of Auditors

Vítor Manuel da SILVA CALDEIRA
President

Annex I

The nuclear reactors being decommissioned under the EU's nuclear decommissioning assistance programme

		TWh	Commercial operation				Planned decommissioning completion date	
			Start	Shutdown	Years	As % of 30-year life	Per ECA 2011 report	As at Dec. 2015
Lithuania	Ignalina 1	86	May 1985	Dec 2004	20	65	2029	2038
	Ignalina 2	155	Dec 1987	Dec 2009	22	73		
Bulgaria	Kozloduy 1	61	Oct 1974	Dec 2002	28	94	2035	2030
	Kozloduy 2	63	Nov 1975	Dec 2002	27	90		
	Kozloduy 3	63	Jan 1981	Dec 2006	26	86		
	Kozloduy 4	61	Jun 1982	Dec 2006	25	82		
Slovakia	Bohunice-V1, reactor 1	72	Apr 1980	Dec 2006	27	89	2025	2025
	Bohunice-V1, reactor 2	77	Jan 1981	Dec 2008	28	93		

Source: IAEA, Pris Database.

Annex II

Overview of the legal bases for the nuclear decommissioning assistance programmes

	Ignalina, Lithuania	Kozloduy, Bulgaria	Bohunice, Slovakia
Pre-accession	Council Regulation (EEC) No 3906/1989 of 18 December 1989	Council Regulation (EC) No 1266/1999 of 21 June 1999 (PHARE programme)	
Accession treaties	Protocol No 4 on the Ignalina Nuclear Power Plant in Lithuania, attached to the Act concerning the conditions of accession of the Republic of Lithuania and the adjustments to the Treaties on which the European Union is founded (OJ L 236, 23.9.2003, p.944-945	Act concerning the conditions of accession of the Republic of Bulgaria and Romania (OJ L 157, 21.6.2005, p. 203)	Protocol No 9 of the Act concerning the conditions of accession of the Slovak Republic and the adjustments to the Treaties on which the European Union is founded. (Bohunice V1 NPP) (OJ L 236, 23.9.2003, p.954)
Post-accession	Council Regulation (EC) No 1990/2006 of 21 December 2006 on the implementation of Protocol No 4 on the Ignalina NPP	Council Regulation (Euratom) No 647/2010 of 13 July 2010	Council Regulation (Euratom) No 549/2007 of 14 May 2007 on the implementation of Protocol No 9 on Unit 1 and Unit 2 of the Bohunice V1 nuclear power plant in Slovakia to the Act concerning the conditions of accession to the European Union of the Czech Republic, Estonia, Cyprus, Latvia, Lithuania, Hungary, Malta, Poland, Slovenia and Slovakia
	Council Regulation (Euratom) No 1369/2013 of 13 December 2013 on Union support for the nuclear decommissioning assistance programme in Lithuania, and repealing Regulation (EC) No 1990/2006	Council Regulation (Euratom) No 1368/2013 of 13 December 2013 on Union support for the nuclear decommissioning assistance programmes in Bulgaria and Slovakia and repealing Regulation (Euratom) No 549/2007 and (Euratom) No 647/2010	

Annex III

Nuclear power reactors in the Member States and their status as at 31 December 2015

United Kingdom	
Shut down	30
Operational	15
Under construction	-
Total	**45**

Netherlands	
Shut down	1
Operational	1
Under construction	-
Total	**2**

Belgium	
Shut down	1
Operational	7
Under construction	-
Total	**8**

Germany	
Shut down	28
Operational	8
Under construction	-
Total	**36**

France	
Shut down	12
Operational	58
Under construction	1
Total	**71**

Spain	
Shut down	3
Operational	7
Under construction	-
Total	**10**

Italy	
Shut down	4
Operational	-
Under construction	-
Total	**4**

Status	
Shut down	91
Operational	129
Under construction	4
Total	**224**

Slovenia (shared with Croatia)	
Shut down	-
Operational	1
Under construction	-
Total	**1**

Hungary	
Shut down	-
Operational	4
Under construction	-
Total	**4**

Finland	
Shut down	-
Operational	4
Under construction	1
Total	**5**

Sweden	
Shut down	3
Operational	10
Under construction	-
Total	**13**

Lithuania	
Shut down	2
Operational	-
Under construction	-
Total	**2**

Czech Republic	
Shut down	-
Operational	6
Under construction	-
Total	**6**

Slovakia	
Shut down	3
Operational	4
Under construction	2
Total	**9**

Romania	
Shut down	-
Operational	2
Under construction	-
Total	**2**

Bulgaria	
Shut down	4
Operational	2
Under construction	-
Total	**6**

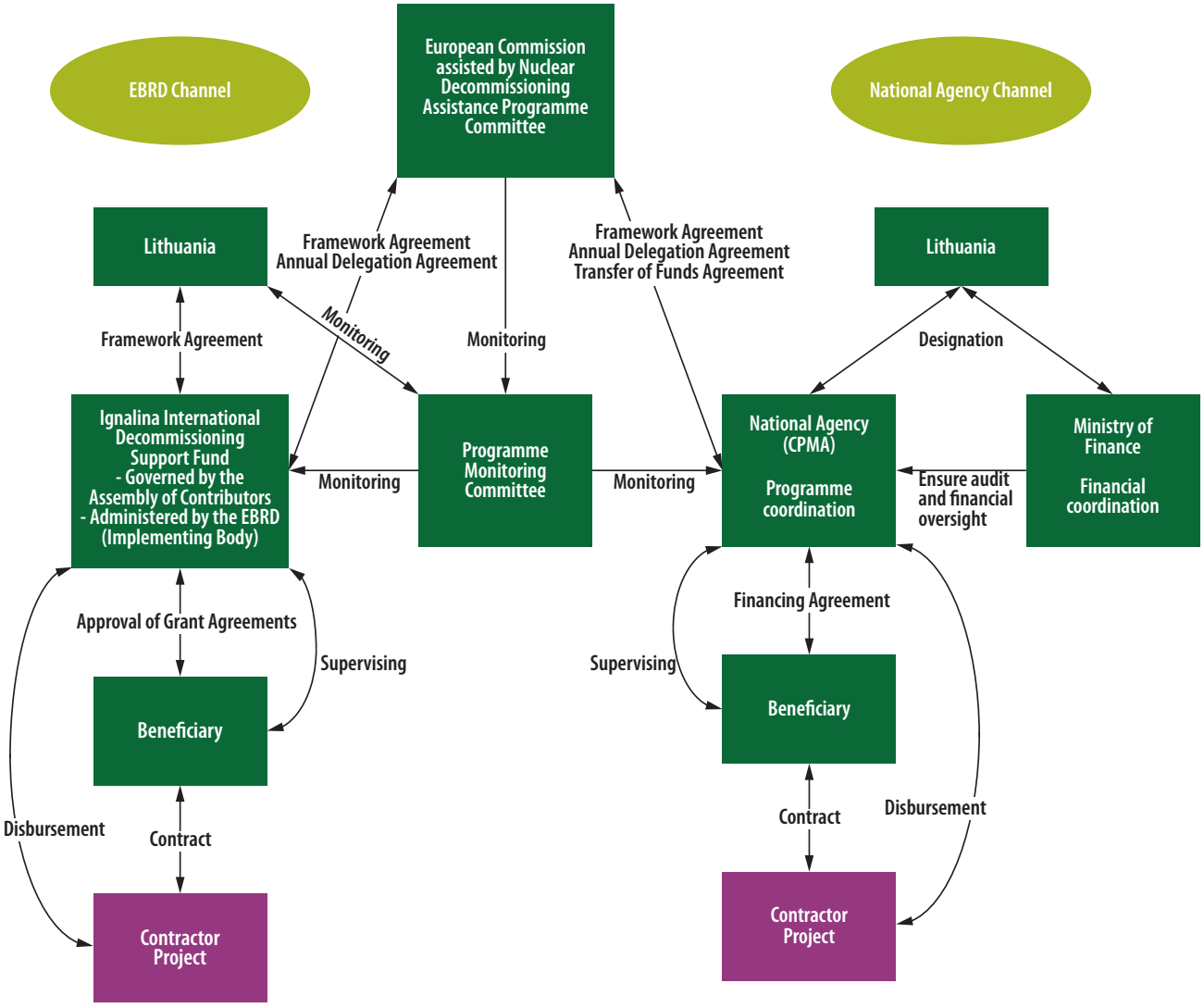
Note: The two reactor units in Ignalina, Lithuania, are still under operational licence (see paragraph 40).

Source: ECA, based on data from the European Commission and the IAEA's Power Reactor Information System (PRIS).

Annex IV

Overview of the nuclear decommissioning assistance programme actors

Nuclear decommissioning assistance programme, two implementing bodies in Lithuania

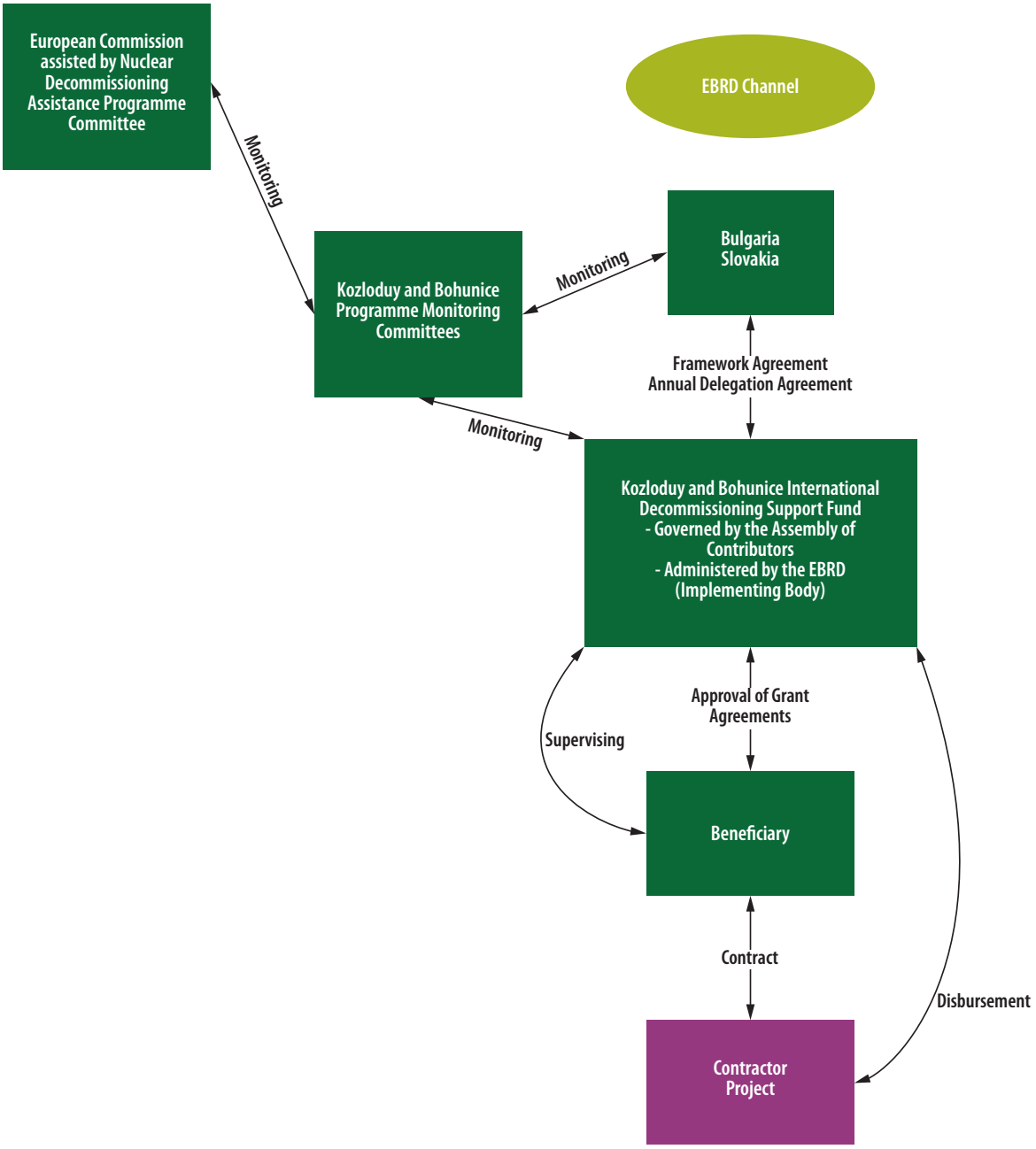


In 2015 the EBRD was responsible for the following ongoing decommissioning projects:	EU financing (million euro)
Interim storage for INPP's spend fuel	205.97
Solid waste management and storage facilities	184.02
Project Management Unit - Phases 1-5 (2001-2015)	51.81
Near-surface repository for low- and intermediate-level short-lived radioactive waste (design)	10.63
Total for 2015	452.43
Total completed and ongoing EBRD decommissioning projects from 1999 to end 2015	522.91

In 2015 the CPMA was responsible for the following ongoing decommissioning projects:	EU financing (million euro)
Annual Decommissioning Activities of INPP with associated Costs in 2015	50.50
Construction of Landfill Facility for Very Low Level Radioactive Waste (Landfill Facility Phase 3)	8.42
Technical Assistance to VATESI (Phase 6)	1.80
Waste cement containers	1.00
RMTF Establishment	0.96
Total for 2015	62.68
Total completed and ongoing CPMA decommissioningpro-jects from 1999 to end 2015	465.97

Annex IV

Nuclear decommissioning assistance programmes, with one implementing body in Bulgaria and Slovakia



Annex V

EU-financed projects examined for the audit

Ignalina, Lithuania		
Project	**ECA assessment**	
1. Interim storage for spent fuel assemblies Initial budget: 165 million euro Latest budget: 206 million euro Initial deadline: Aug. 2008 Latest deadline: Oct. 2017	**ECA 2011 report**	Significant delays will have a major impact on nuclear safety until all the spent fuel elements have been put into casks, as well as on the plant's operational costs.
	As at Dec. 2015	Construction of the storage facility has been delayed by a further 6 years, meaning that it is 10 years behind schedule compared to the 2005 final decommissioning plan. The facility's additional maintenance costs relating to the B1 project exceeded 61 million euro.
2. Solid waste management and storage facility Initial budget: 120 million euro Latest budget: 184 million euro Initial deadline: Nov. 2009 Latest deadline: Nov. 2018	**ECA 2011 report**	Significant project delays which are critical because waste management routes are needed for progress in dismantling and decontamination projects. Additional IIDSF funding is likely to be required.
	As at Dec. 2015	The project is delayed by 9 years, 5 years of which were built up in the 2011-2014 period. The INPP and the Lithuanian Ministry of Energy settled related commercial disputes with the contractor by paying 55 million euro in compensation, and have set aside a further 17.9 million euro for anticipated risks.
3. Engineering, planning and licensing of dismantling and decontamination activities Initial project budget 8 million euro No budget or schedule currently set for the project.	**ECA 2011 report**	The decision to outsource project activities was not based on an adequate assessment of either the on-site availability of the required technical resources or the cost-effectiveness of this option.
	As at Dec. 2015	Document preparation has been delayed by 30 months due to overestimation of contractor resources and to the time required for document approval by the plant and regulating institutions. Three years of delay due to transfer of tool procurement projects from IIDSF channel to CPMA channel.
4. Management and engineering support to the Project Management Unit (PMU) Initial budget: 45 million euro Latest budget: 54 million euro	**ECA 2011 report**	PMU consultant has significantly contributed to progress, but management and administrative costs are high and there has been insufficient development of the organisational structure at the plant.
	As at Dec. 2015	PMU consultant staff decreased since 2010. They are more involved in decommissioning activities, managed major infrastructure projects and supported staff development at the plant. However, much of the consultant's activities still focus on general project management and procurement activities, rather than on nuclear decommissioning tasks.
5. Projects related to direct support of the INPP workforce activities, external supplies Budget: 198 million euro Deadline: ongoing annual project	**ECA 2011 report**	Not examined.
	As at Dec. 2015	Problems with the workforce included difficulties in justifying staffing levels, unclear management accounting and attributing staff costs to tasks. The INPP introduced a new calculation model for INPP staff, developed a cost structure for works and introduced earned value management. However, there was limited progress in justifying staffing levels and in implementing an outsourcing strategy.
6. Reactor dismantling study Initial budget: 5 million euro (feasibility study only) Latest budget: 70 million euro (design and technical engineering)	**ECA 2011 report**	Not examined.
	As at Dec. 2015	A feasibility study for reactor dismantling started under the IIDSF in 2009, but was cancelled and transferred to the CPMA in 2010. A new CPMA-led project has since experienced delays. There is a lack of experience in dismantling this type of reactor, which may further hamper progress. There remains, therefore, uncertainty about whether the 2038 deadline for dismantling the reactor is feasible.

Annex V

Kozloduy, Bulgaria		
Project	**ECA assessment**	
7. Project Management Unit Consultancy Services — general **Period 2006-2013** Initial budget: 8 million euro Latest budget:45 million euro Initial deadline: Dec. 2006 Latest deadline: Jul. 2013 **Period 2014-2016** Initial budget: 14 million euro Latest budget: 32 million euro Initial deadline: Jan. 2016 Latest deadline: Jan. 2019	**ECA 2011 report**	The consultant helped modify the decommissioning strategy, but there were problems with project delays, cost estimates, identification of necessary decommissioning works and waste inventories. The consultant focused more on management than on decommissioning.
	As at Dec. 2015	In 2013, the PMU became the sole entity responsible for the management of both the decommissioning and the construction of the national disposal facility. The consultant is now embedded in the organisational structure, which places decision-making power with SERAW. Consultants' involvement in the work has been increasing, and there is no indication of their involvement being phased out.
8. Design and construction of a spent fuel dry storage facility Initial budget: 49 million euro Latest budget: 73 million euro Initial deadline: Dec. 2008 Latest deadline: Mar. 2013	**ECA 2011 report**	The completion of the facility is delayed by 2.5 years. Revisions to the initial requirements resulted in cost increases and an amended price basis for the contract, leading to a 19 % budget overrun.
	As at Dec. 2015	The project was divided into two stages: the construction of the facility and storage of fuel assemblies in 34 casks; and the extension of the facility for up to 72 casks. Not all of the planned storage capacity will be used for spent nuclear fuel from units 1-4. The use of the facility to store other material would require approval by the regulator.
9. Plasma melting facility for the treatment and conditioning of solid waste Initial budget: 21 million euro Latest budget: 21 million euro Initial deadline: Mar. 2013 Latest deadline: Jun. 2017	**ECA 2011 report**	Novel technology was selected without proper demonstration of its effectiveness and due consideration of costs. There is a risk of cost overrun.
	As at Dec. 2015	Regulatory changes required revisions to the design. Construction of the facility is behind schedule mainly due to an appeal relating to the environmental impact assessment and a number of commercial and administrative issues, including the lack of a nuclear indemnity agreement. The facility has not been tested, so system operation has not yet been demonstrated. Completion now scheduled for June 2017.
10. Promotion of the efficient use of human resources **Period to 2009** Initial budget: 20 million euro Latest budget: 84 million euro Initial deadline: Sep. 2009 Latest deadline: Mar. 2014 **Period to 2015** Initial budget: 35 million euro Latest budget: 46 million euro Initial deadline: Dec. 2015 Latest deadline: Dec. 2017	**ECA 2011 report**	Organisational changes allowing for a clear demarcation of staff working on the transition from an operational organisation to a decommissioning organisation have not taken place. Adequate monitoring of the pre-decommissioning activities has been lacking.
	As at Dec. 2015	Reliance on the KIDSF to finance personnel involved in decommissioning activities has continued. In a positive development since 2011, all the 650 staff employed by SERAW are working exclusively on decommissioning activities.
11. Construction of the national disposal facility for low- and intermediate-level radioactive waste Initial budget: 66 million euro Initial deadline: Dec. 2015 Latest deadline: Jan. 2021	**ECA 2011 report**	Not examined.
	As at Dec. 2015	The construction of the facility was originally scheduled for completion by 2015. However, the process has fallen 6 years behind, mainly due to the environmental impact assessment being rejected and having to be restarted. The current deadline is 2021.

Annex V

Bohunice, Slovakia		
Project	**ECA assessment**	
12. Project Management Unit Consultancy Services — project implementation **Period 2003-2007** Initial budget: 11 million euro **Period 2015-2016** Latest budget: 45 million euro	**ECA 2011 report**	The consultant helped modify the decommissioning strategy, but insufficient progress was achieved in formulating and implementing the decommissioning strategy.
	As at Dec. 2015	Although consultants have been used extensively, there have been project delays which in turn have caused cost overruns. Since 2015, the scope of work of the new consultant has decreased.
13. Design and erection of new disposal facilities for very low-level and low-level waste from V1 NPP at NRR Mochovce Budget: 22 million euro Deadline: Jun. 2018	**ECA 2011 report**	There was a delay in the feasibility study because the NPP did not provide necessary information.
	As at Dec. 2015	The repository is under construction, co-financed by national funds. A third double row will be added, fully financed by BIDSF. The allocation of costs between disposal of waste from the V1 NPP and disposal of waste from other facilities is not clear.
14. Implementation of the decommissioning programme using human resources available Budget for Phase 1: 1.5 million euro Budget for Phase 9: 50 million euro	**ECA 2011 report**	Organisational changes allowing for a clear demarcation of staff working on the transition from an operational organisation to a decommissioning organisation have not taken place. Adequate monitoring of the pre-decommissioning activities has been lacking.
	As at Dec. 2015	The project finances 246 full-time equivalent JAVYS staff working on decommissioning. JAVYS has evolved from an operational to a decommissioning organisation.
15. Interim storage of radioactive waste at the Bohunice site Budget: 11 million euro Initial deadline: Mar. 2016 Latest deadline: Aug. 2017	**ECA 2011 report**	Not examined.
	As at Dec. 2015	This project was originally scheduled for implementation from March 2013 to March 2016. Construction works began in 2015. The expected completion date is now August 2017. A new environment impact assessment and an amendment to the grant agreement were required following a decision to change the location. Delays to this project will no longer lead to delays in dismantling projects because the latter will be managed such that intermediate-level waste will be produced only after the interim storage facility is complete.
16. Decontamination of the primary circuit Initial budget: 6 million euro Latest budget: 5 million euro Initial deadline: Sep. 2014 Latest deadline: Sep. 2016 (radioactive waste management share transferred to JAVYS)	**ECA 2011 report**	Not examined.
	As at Dec. 2015	Works were planned to start in 2013 and to be completed by the end of 2014. Delays and unresolved technical challenges have led to the project being put on hold. The contract with the current supplier has been terminated. This project needs to be finished before dismantling in the controlled area can start, and therefore delays in this project may have an impact on the decommissioning end date.
17. Decommissioning database, including inventory and radiological characterisation Initial budget: 2.48 million euro Latest budget: 3.5 million euro Initial deadline: May 2012 Latest deadline: Dec. 2012	**ECA 2011 report**	Not examined.
	As at Dec. 2015	Although the project was finalised in 2012, the characterisation and inventory still needs to be regularly updated. Several sub-projects were delayed and experienced cost overruns due to incomplete information about the inventory and/or characterisation of waste.

Annex VI

Delays and cost overruns affecting a sample of 18 key decommissioning infrastructure and supporting projects financed by the EU assistance programmes since 2001

	Project	Project cost (million euro)	Contracted financing		Total delay to date (years)	Cost increase to date (%)
			EU (million euro)	National (million euro)		
Ignalina, Lithuania	Interim storage for spent fuel assemblies (see Annex IV, Project 1)	211	206	5	9.2	25 %
	Solid waste management and storage facilities (See Annex IV, Project 2)	184	184		9.0	53 %
	Landfill facility for very low radioactive waste (Phase 1 buffer storage)	7	6	1	2.8	0 %
	Construction of landfill facility for very low-level radioactive waste (Phase 3)	8	8		1.0	12 %
	Near-surface repository of low- and intermediate-level short-lived radioactive waste (design)	11	11		1.0	3 %
	Total for these five projects	**421**	**415**	**6**		
	Total contracted EU financing for decommissioning 2001-2014/2015		**989**			
Kozluduy, Bulgaria	Supply, installation and commissioning of retrieval and conditioning equipment for ion-exchange resins (initial scope extended)	6	5	1	10.9	132 %
	Design and construction of a spent fuel dry storage facility (see Annex IV, Project 8)	73	73		4.3	50 %
	Facility for the retrieval and processing of the solidified phase from evaporator concentrate tanks (Phase 1 completed, Phase 2 terminated)	10	10		4.6	none
	Plasma melting facility (see Annex IV, Project 9)	30	21	9	4.2	0 %
	Size reduction and decontamination workshops	19	19		2.8	0 %
	Evaluation of the radiological inventory	1	1		1.3	none
	Total for these six projects	**139**	**129**	**9**		
	Total contracted EU financing for decommissioning 2001-2014		**360**			

Annex VI

	Project	Project cost (million euro)	Contracted financing		Total delay to date (years)	Cost increase to date (%)
			EU (million euro)	National (million euro)		
Bohunice, Slovakia	Treatment of historical waste-sludges and sorbents (completed)	11	11		3.0	38 %
	Decontamination of the primary circuit (see Annex IV, Project 16) (suspended)	4	4		2.0	0 %
	Modification of the JAVYS power supply scheme after V1 final shutdown	11	11		1.5	21 %
	Increasing capacity of existing fragmentation and decontamination facilities	2	2		1.2	13 %
	Treatment of historical waste	6	4	2	0.4	7 %
	Dismantling of technical equipment in V1 turbine hall	8	8		-	6 %
	Free release of decommissioning materials	3	3		-	20 %
	Total for these seven projects	**45**	**43**	**2**		
	Total contracted EU financing for decommissioning 2001-2014		**228**			
Total	**Total for these 18 projects**	**605**	**587**	**17**		
	Total contracted EU financing for decommissioning 2001-2014		**1 577**			

Source: Commission, draft AWPs 2016, draft monitoring reports 2016. Data provided by the EBRD and Central Project Management Agency.

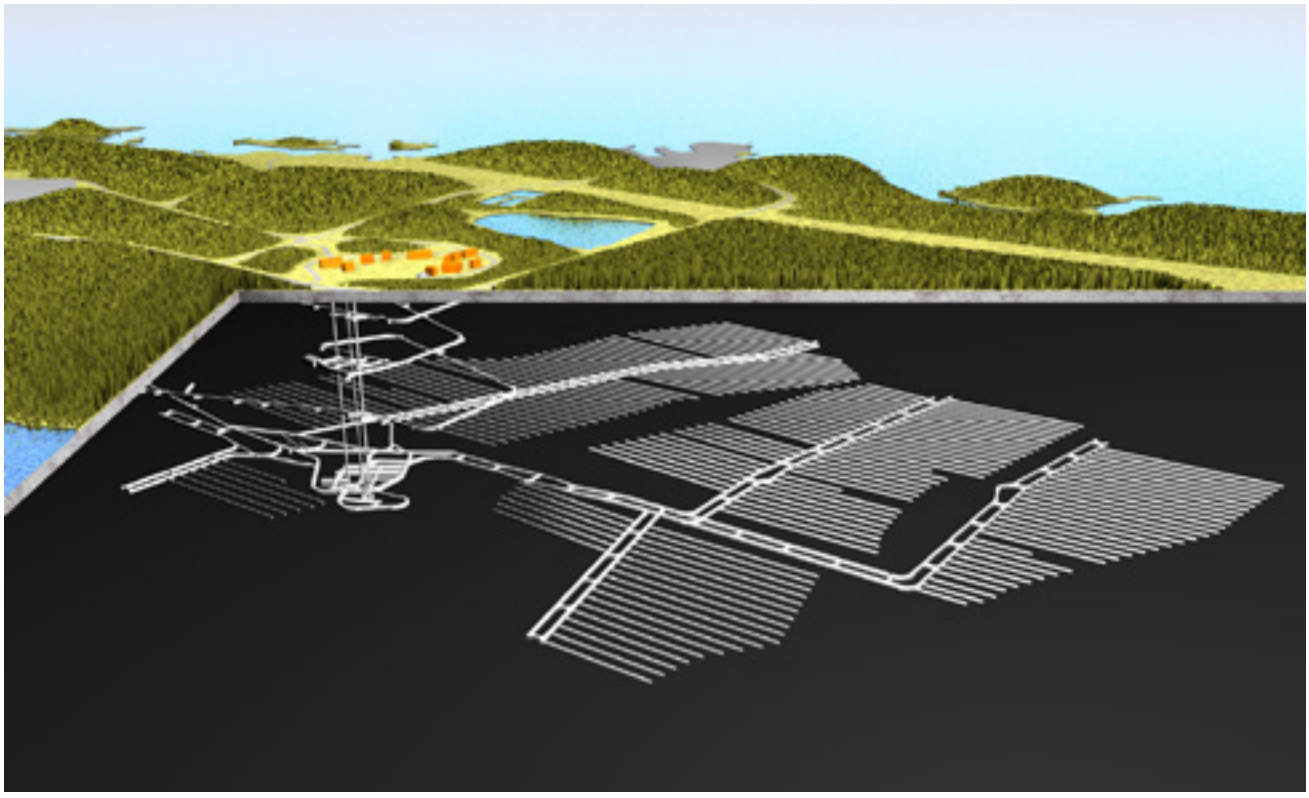
Annex VII

Construction of the deep geological repository for the final disposal of spent nuclear fuel in Olkiluoto, Finland

Olkiluoto, on the west coast of Finland, near an existing nuclear power plant, is to be the site of the world's first deep geological repository for the final disposal of spent nuclear fuel following civil utilisation. It is designed to accommodate waste from the two Finnish nuclear power plants.

Its development process illustrates the long timescales involved in such an undertaking. In 1983, the Finnish government took a decision in principle on the overall schedule and strategy for nuclear waste management, and the geological screening process searching for potential sites began. The Olkiluoto site was selected as the site of final disposal in 2000. Intense excavation and research work followed to enable the disposal of spent nuclear fuel at a depth of 400-450 metres down in the bedrock. Around 150 million euro was spent on this work. Disposal of spent fuel is planned to start in the early 2020s.

Total expenditure will be approximately 3.5 billion euro, of which around 1 billion euro during the construction phase and around 2.5 billion euro on operation over a period of 100 around years. Funds are being accumulated in the State Nuclear Waste Management Fund from charges on generated electricity.



Reply of the Commission 74

Executive summary

I
In the context of the negotiations for accession to the European Union, Bulgaria, Lithuania and Slovakia undertook to close and subsequently decommission eight Soviet-designed, first-generation nuclear reactors which could not be economically upgraded to Western safety standards.

II
The EU had committed itself to assisting those countries in addressing the exceptional financial burden imposed by the decommissioning process.

IV
The Commission considers that the EU financial support has effectively mitigated the economic consequences of the early closure and the decommissioning process is well engaged. However, it notes that decommissioning is a complex and lengthy process going beyond the 7-year multiannual financial framework (MFF) — in most cases exceeding two decades.

The updated decommissioning plans and associated cost estimates approved under the 2014-2020 MFF are the basis for programming in the three Member States. Under these arrangements, the Commission is closely monitoring progress towards the decommissioning end state whilst maintaining the highest level of safety.

V
Decommissioning is generally composed of two major phases: (i) post-closure (i.e. still under operational licence due to the presence of spent fuel) and (ii) decommissioning/ dismantling.

Slovakia and Bulgaria are in the second phase while Lithuania, due to the presence of spent fuel in one of the reactors, is still in the post-closure phase.

The Commission considers, in line with the Member States, that no plants subject to the NDAP can be economically restarted. It acknowledges that, as observed in other comparable decommissioning activities, the critical technical challenges of dismantling the reactors lie ahead.

VI
In the three Member States, the decommissioning programmes are at different level of advancement and maturity.

The Bohunice (SK) and Kozloduy (BG) programmes are the most advanced and scheduled for completion in 2025 and 2030 respectively. The latter programme was shortened by 5 years when it was revised in 2011.

In Ignalina (LT), the decommissioning of the Chernobyl-type reactors is a first-of-a-kind process which actually entails the greatest challenges.

Notwithstanding the progress already achieved, the Commission recognises the need for continuous improvement in the decommissioning programmes.

Recommendation 1

The Commission notes that recommendations 1(a) and 1(b) are addressed to the Member States.

The Commission accepts recommendation 1(c), insofar as it is concerned by it. It supports the idea of an improved exchange of best practices and technical knowledge, and will encourage the three Member States to do so.

(a) The Commission has already introduced improvements in the current MFF, establishing a comprehensive framework for programming, project management and monitoring under which the Member States operate.

(b) It sees the need to continuously build up know-how and competences but notes that the use of external experts is beneficial in certain specialist areas.

(c) The Commission has already taken action to promote an open and transparent environment, facilitate the exchange of best practices and knowledge and foster standardisation processes with the aim, inter alia, of increasing competitiveness and enhancing safety.

VII

The Commission recognises the importance of the responsible and safe management of spent fuel and radioactive waste. The Commission will provide opinions on the national programmes and report during 2016 to the Parliament and the Council on the implementation of Directive 2011/70.

The Commission furthermore notes that the issues related to the final disposal of high-level waste and spent fuel management go beyond the scope of the nuclear decommissioning assistance programme.

Recommendation 2

(a) The Commission accepts the recommendation. The Commission will already set the direction in the opinions that it will issue during 2016/2017 on the national programmes under Directive 2011/70. This will launch the debate that will take place in 2017 on options for disposal, including regional and other EU-based solutions. Following on from this, the Commission will be in a better position to formulate policy options and a roadmap by 2018.

(b) The Commission notes that this recommendation is addressed to Member States and is already being addressed through the assessment of the national programmes and the opinion the Commission will address to the Member States.

VIII

The Commission acknowledges that co-financing is not systematically achieved at individual project level. It notes that the current legal base does not provide a clear definition of co-financing, or a minimum percentage to be achieved. The Commission notes, as reported by the Court, that the total contribution of Lithuania, Bulgaria and Slovakia to their respective decommissioning programmes amounts to 1.09 billion euro.

Recommendation 3

The Commission notes that this recommendation is addressed to Member States. It will support the action recommended by the Court through its effort to introduce a well-defined level of co-financing in the context of the nuclear decommissioning assistance programme, thus supporting the polluter pays principle. In this respect, it will lead discussions with the Member States and examine critically the level of co-financing proposed by the Member States in the 2017 annual work programmes.

Reply of the Commission

Recommendation 4
The Commission accepts the recommendation.

It recognises that co-financing contributes to the efficient and effective implementation of the programme and increases ownership by Member States. It will undertake actions to clarify the meaning of the 'well-founded exceptional circumstances' that are currently referred to in the regulations and critically examine the level of co-financing proposed by the Member States in the 2017 annual work programmes

Recommendation 5
The Commission partially accepts the recommendation. The Commission will carry out an impact assessment in line with the requirements of the financial regulation and better regulation agenda with regard to proposals of new initiatives. This impact assessment will explore whether funding should be continued and if so the most suitable financing mechanisms. Should this assessment conclude that funding need to be continued for the next, post-2020, MFF, the Commission will take into account the Court's recommendation and ensure that the funding mechanism includes incentives to pursue decommissioning, including by being time limited and based on appropriate levels of Member States' co-financing.

Recommendation 6
The Commission partially accepts the recommendation.

The Commission is in the process of identifying non-decommissioning-related costs. This process will be finalised in the mid-term evaluation and possible actions will be proposed for the phasing out of such costs in 2018.

However, the Commission considers that some essential functions, such as safety, should not be excluded from EU funding.

Recommendation 7
The Commission accepts the recommendation and notes that action has already been taken. The assessment is ongoing and will be completed by October 2016.

Recommendation 8
The Commission accepts the recommendation. The Commission acknowledges the importance of this issue.

It has started addressing this recommendation through the implementation of the waste directive. The Commission is currently reviewing the national programmes submitted under the waste directive and has scheduled a number of studies in order to collect information and further engage in the validation.

Reply of the Commission

Introduction

20
The EU nuclear landscape has undergone significant changes in the last decade with the adoption of landmark legislation at European level on nuclear safety, radioactive waste and spent fuel management and radiation protection. In addition, the Commission has adopted a new PINC in 2016, which for the first time covers the financing needs related to the decommissioning of nuclear power plants and to the management of radioactive waste and spent fuel, including for the financing of long-term solutions such as the construction of deep geological disposal facilities.

The radioactive waste directive (Council Directive 2011/70/Euratom) establishes a Community framework for ensuring responsible and safe management of spent fuel and radioactive waste to avoid imposing undue burdens on future generations. The directive goes further than the joint convention in that Member States must have a national programme for the implementation of spent fuel and radioactive waste management policy.

The Commission through the PINC and the waste directive aims to compile for the first time a comprehensive picture of the full costs linked to decommissioning and waste management and how Member States ensure that these are financed according to the polluter pays principle.

Observations

Common Commission reply to paragraphs 38-40
The Commission considers, in line with the Member States, that no plants subject to the NDAP can be economically restarted.

40 First indent
While the Commission acknowledges that the licence-related expected output has not been met for the Ignalina plant, due to the presence of spent fuel in the installation, it also notes that the dismantling of the turbine hall in INPP effectively ensures the irreversibility of the process.

40 Second indent
Regarding the Kozloduy (BG) plant, the Commission notes that the additional permits that might still be required are related to works that would occur past the point of reversibility.

40 Third indent
Regarding the Bohunice (SK) plant, the current status is in line with the decommissioning plan and the scheduled end date of 2025.

Common Commission reply to paragraphs 41-42
Whereas the Commission acknowledges that the main challenges still lie ahead, it also notes that the state of play illustrated by Table 3 is in line with the decommissioning plans and the scheduled end dates for all three Member States. The key dismantling operations in the reactor building are only possible towards the end of the decommissioning process.

Common Commission reply to paragraphs 43-46

The NDAP covers the decommissioning process and waste management infrastructure including the safe long-term storage of waste and disposal of low-level waste. Low-level waste typically comprises over 90 % of the waste volume and mature solutions for disposal are available. Disposal of spent fuel and high-level waste is part of the Member States' responsibility under the radioactive waste directive, and covers all such waste produced in the Member State.

48

Under Directive 2011/70/Euratom, each Member State shall ensure the implementation of its national programme for the management of spent fuel and radioactive waste, covering all types of spent fuel and radioactive waste under its jurisdiction and all stages of spent fuel and radioactive waste management from generation to disposal.

The Commission, for the first time, is compiling a comprehensive picture of the Member States' plans with regard to disposal and associated costs.

Common Commission reply to paragraphs 49-52

The Commission will investigate the economic, legal and social impacts of shared repositories, considering that the sharing of facilities for spent fuel and radioactive waste management, including disposal facilities, may be a potentially beneficial, safe and cost-effective option.

53

Member States shall, for the first time, notify the Commission of the content of their national programme no later than August 2015. Within 6 months of the date of notification, the Commission may request clarification and/or express its opinion on whether the content of the national programme is in accordance with the directive. Member States shall provide the requested clarification and/or inform the Commission of any revision of the national programmes within 6 months of the Commission's request.

Member States shall also submit a report to the Commission on the implementation of this directive for the first time by August 2015, and every 3 years thereafter.

On the basis of the Member States' reports, the Commission shall submit to the European Parliament and the Council the following:

(a) a report on progress made with the implementation of this directive;

(b) an inventory of radioactive waste and spent fuel present in the Community's territory and the future prospects.

This exercise is the first of its kind and the Commission intends to draw lessons from this process to try to improve and harmonise future reporting. For this particular exercise the Commission had to take into account the national programmes of all 28 Member States, as well as the national reports. In view of this, and in order to have a complete picture, the Commission took into account the assessment process of the national programmes in its timetable for the report to the Parliament and the Council. The report is expected in quarter 4 of 2016.

Reply of the Commission

Common Commission reply to paragraphs 60-68

The Commission acknowledges that a number of decommissioning projects experienced delays particularly in the previous MFF. The Commission has introduced increased planning, monitoring and reporting requirements for 2014-2020 and closely follows project implementation through desk and on-the-spot reviews.

It should be noted that the delays experienced in Bulgaria and Slovakia do not currently impact the end date.

69

The Commission considers that it is of utmost importance that nuclear operators/licence holders for decommissioning build up know-how and competences, especially in project management. However, the use of external experts is beneficial in certain specialist areas.

Common Commission reply to paragraphs 73-74

During the last decade, the outlook in terms of nuclear decommissioning has evolved considerably. The Commission has contributed to the improvement of cost estimation for decommissioning programmes and participated in the drawing up of the International Structure for Decommissioning Costing of Nuclear Installations (ISDC) in 2012 together with OECD/NEA. Further developments of decommissioning cost estimation are still necessary; this is an issue of high interest worldwide, as the OECD/NEA and IAEA are still quite active in addressing cost estimation and uncertainties. The Commission fully supports these activities.

The Commission notes that the main costs increased by 2011 as also demonstrated in Figure 16. The change of momentum reflects the improvements made in the programme management resulting from the previous audit, in particular in the Bulgarian and Slovak programmes.

75

No financial gap is expected for the 2014-2020 period while the Commission has increased its monitoring and scrutiny of the programmes. The Commission has also started an in-depth assessment of the robustness of the financing plans, which is expected to be finalised at the end of October 2016.

Furthermore, the Commission has used the QUEST model for macroeconomic policy analysis and research (which is used by the Commission for its forecasting) to run different scenarios for the programmes post-2020. The main result was that even in the worst case scenario the Member States can finance the decommissioning programmes with negligible or little impact on their macroeconomics parameters.

When considering the post-2020 financial framework, the Commission will carry out an impact assessment in line with the requirements of the financial regulation and better regulation agenda with regard to proposals for new initiatives, while making no commitment to any post-2020 funding at this point in time. This impact assessment will explore whether funding should be continued and, if so, the most suitable financing mechanisms. See the Commission's reply to recommendation 5.

77

In addition, the Commission has strengthened programming under the 2014-2020 MFF, introducing as a prerequisite the submission of decommissioning and financing plans. The completeness and robustness of these plans is currently being assessed by an external independent expert.

Reply of the Commission

80
The Commission has requested a thorough analysis of the staffing at Ignalina power plant, bearing in mind the need not to endanger the safety of the site given the presence of spent fuel in the reactor and the relatively greater hazard currently remaining.

82
The Commission recognises the risk that insufficient incentives to keep the staffing level to the level strictly necessary might result in increased cost. For several years various measures are have been taken to mitigate this risk, including a systematic assessment of the advantages of outsourcing activities and a yearly quantitative staffing plan based on the planned activities. Discussions are ongoing on practical ways to further use co-financing schemes to align the interests of local stakeholders with those of the Commission.

84
The Commission notes that the funding gaps are closing for both BG and SK. The Commission assessments are based on the decommissioning plan and the available resources. They will be reassessed following the results of the mid-term evaluation.

85
The Commission is aware that further work is needed in relation to decommissioning cost estimation. This is also acknowledged by other international organisations such as OECD/NEA and IAEA. The Commission closely follows developments in this area and has an expert group on decommissioning funding through which it will focus its efforts in this area.

With regard to the programmes in question, the Commission uses a more conservative, prudent approach than the Member States. However, in the case of Bulgaria and Slovakia the general trend being observed for the financing gap is downwards.

See also the Commission's replies to paragraph 75 and recommendation 5.

87
The Commission's Internal Audit Service had already identified these weaknesses in the management and control system. Consequently an action plan has been in place since 2015 and is currently being implemented. The key actions addressing the issue underlined by the Court will be completed by the end of October 2016 and a further set of agreed actions is due by end of the year.

Common reply to paragraphs 89-90
Taking into account that these plants faced premature closure due to a political decision, it is logical that the funds cannot cover the entire costs of decommissioning. One of the triggers for EU financial support was to mitigate the resulting financial burden to the given Member States.

Reply of the Commission

91
The legal basis does not set any level of national co-financing. It only refers to the need to continue the previously established co-financing practice. Although not generally achieved at the individual project level, there will be co-financing at the overall programme level.

The total contribution of Lithuania, Bulgaria and Slovakia to their respective decommissioning programmes amounts to 1.09 billion euro.

92
The Commission considers the objective of strengthening national co-financing important. However, at this stage the Commission is not in the position to make a firm commitment on the Court's recommendation to increase co-financing by Member States by end of 2016. The possible options will be examined during the mid-term evaluation of the programme to be carried out in 2017.

93
The decommissioning plans and cost estimates approved under the 2014-2020 MFF are the basis for programming in the three Member States. Disposal of spent fuel and high-level waste is part of the Member States responsibility under the radioactive waste directive and for this reason it was not included in the NDAP.

94
Directive 2011/70/Euratom states that the costs for the management of spent fuel and radioactive waste shall be borne by those who generated those materials (Article 4(3)(e)), as well as the clear allocation of responsibilities to the bodies involved in the different steps of spent fuel and radioactive waste management (Article 5(1)(f)), and that Member States shall ensure that the national framework require that adequate financial resources be available when needed, especially for the management of spent fuel and radioactive waste, taking due account of the responsibility of spent fuel and radioactive waste generators (Article 9).

95
The implementation of the waste directive by the Member States is a priority for the Commission. Currently the review of the Member States national programmes is ongoing and it will address all these issues.

96
The decommissioning plans include the cost of the management of the spent fuel and radioactive waste, as required by the NDAP regulations. They do not include the cost of disposal projects to be started in the long term. They do include the cost of the storage facilities needed to bridge this gap.

Reply of the Commission

Conclusions and recommendations

107

Since the 2011 audit, the Commission has introduced a number of important improvements in programming and project management. The 2014-2020 legal basis has introduced specific objectives measured by key performance indicators and a new monitoring and reporting framework.

The Commission considers that, as a result, the EU financial support has effectively mitigated the economic consequences of the early closure and the decommissioning process is well engaged. However, it notes that decommissioning is a complex and lengthy process going beyond the 7-year MFF — in most cases exceeding two decades.

The updated decommissioning plans and associated cost estimates approved under the 2014-2020 MFF are the basis for programming in the three Member States. Under these arrangements, the Commission is closely monitoring progress towards the decommissioning end state whilst maintaining the highest level of safety.

Common Commission reply to paragraphs 108-111

The Commission monitors in a proactive manner implementation towards the achievement of the objectives set out in the Council regulations and reports annually to the Parliament and the Council.

Decommissioning is generally composed of two major phases: (i) post-closure (i.e. still under operational licence due to the presence of spent fuel) and (ii) decommissioning/ dismantling.

Slovakia and Bulgaria are in the second phase while Lithuania, due to the presence of spent fuel in one of the reactors, is still under the post-closure phase.

The Commission considers, in line with the Member States, that no plants subject to the NDAP can be economically restarted. It acknowledges that, as observed in other comparable decommissioning activities, the critical technical challenges of dismantling the reactors lie ahead.

Recommendation 1 — Ensure progress in decommissioning

The Commission notes that recommendations 1(a) and 1(b) are addressed to the Member States.

The Commission accepts recommendation 1(c), insofar as it is concerned by it. It supports the idea of an improved exchange of best practices and technical knowledge, and will encourage the three Member States to do so.

(a) Under the current MFF the Commission has prioritised the establishment of an overall framework for programming, project management and monitoring for the Member States to work within. In addition, the Commission has introduced an earned value management (EVM) system to measure project performance and progress in an objective manner. The full impact of these changes is expected in the coming years.

(b) The Commission considers that it is of utmost importance that nuclear operators/licence holders for decommissioning build up know-how and competences, especially in project management, and identify the areas where outsourcing of services adds value. Use of external experts is beneficial in certain specialist areas.

(c) The Commission tries to promote an open and transparent environment, facilitate exchange of best practices and knowledge and foster standardisation processes with the aim, inter alia, of increasing competitiveness and enhancing safety.

To support this aim, the Commission has reactivated in 2015 the Decommissioning Funding Group that consists of national experts that provide up-to-date knowledge on decommissioning costs and the management of funding.

In addition, the Commission will use its participation in international fora and working groups to share the experience gained through the management of the decommissioning programmes. In particular, the activities in collaboration with IAEA and OCED/NEA will be pursued.

112

Regarding the report on Member State plans, see the Commission's reply to paragraph 53.

The Commission is currently assessing the national programmes of all 28 Member States. This exercise is the first of its kind and the Commission intends to draw lessons from this process to try to improve and harmonise future reporting. For this particular exercise the Commission had to take into account the national programmes of all 28 Member States as well as the national reports. In view of this, and in order to have a complete picture, the Commission took into account the assessment process of the national programmes in its timetable for the report to the Parliament and the Council. The report is expected in quarter 4 of 2016.

Recommendation 2 — Solutions for the final disposal of spent nuclear fuel

(a) The Commission accepts the recommendation. The Commission attaches significant importance to the safe and responsible management of spent fuel and radioactive waste to avoid imposing undue burdens on future generations. In this regard, the Commission will already set the direction in the opinions that it will issue during 2016/2017 on the national programmes under Directive 2011/70. This will launch the debate that will take place in 2017 on options for disposal, including the possibility of regional and other EU-based solutions. Following on from this, the Commission will be in a better position to formulate policy options and a roadmap by 2018.

(b) The Commission notes that this recommendation is addressed to Member States. It also notes that this is already being addressed through the assessment of the national programmes and the opinion the Commission will address to the Member States. The Commission intends to launch a study in 2017 in order to assess the Member States' waste management cost estimates.

113

The decommissioning plans approved under the 2014-2020 MFF are the basis for programming in the three Member States. The cost of final disposal of spent fuel and high-level waste is not considered eligible under the NDAP and it is not part of the baseline. Disposal of spent fuel and high-level waste is part of the Member States' responsibility under the radioactive waste directive. The NDAP should ensure complementarity and consistency of relevant Union intervention, to respect the principle of proportionality.

114

The Commission stresses that, under the 2014-2020 MFF, there is no shortfall in the funding of the agreed objectives.

Recommendation 3 — Respecting the polluter pays principle by increasing national financing for 2014-2020 and beyond

The Commission notes that this recommendation is addressed to Member States.

Reply of the Commission

84

The Commission will support the action recommended by the Court through its effort to introduce a well-defined level of co-financing, thus supporting the polluter pays principle. In this respect, it will lead discussion with the Member States and examine critically the level of co-financing proposed by the Member States in the 2017 annual work programmes.

Recommendation 4 — Increase in national co-financing in the 2014-2020 financing period

The Commission accepts the recommendation.

The Commission recognises that co-financing contributes to the efficient and effective implementation of the programmes and increases ownership by the Member State. However, the current legal base does not set a specific level for such co-financing. The Commission will therefore, as a first step, undertake actions to clarify the meaning of the 'well-founded exceptional circumstances' that are currently referred to in the regulations and critically examine the level of co-financing proposed by the Member States in the 2017 annual work programmes.

Recommendation 5 — Discontinue dedicated funding programmes for nuclear decommissioning in Lithuania, Bulgaria and Slovakia after 2020

The Commission partially accepts the recommendation. The Commission will carry out an impact assessment in line with the requirements of the financial regulation and better regulation agenda with regard to proposals of new initiatives. This impact assessment will explore whether funding should be continued and, if so, the most suitable financing mechanisms. Should this assessment conclude that funding needs to be continued for the next post-2020 MFF, the Commission will take into account the Court's recommendation and ensure that the funding mechanism includes incentives to pursue decommissioning, including by being time limited and based on appropriate levels of Member States' co-financing.

118

The Commission has requested a thorough analysis of the staffing at the Ignalina power plant, bearing in mind the need not to endanger the safety of the site, given the presence of the remaining spent fuel in the reactor buildings, the associated hazards and the resulting need to maintain essential safety functions.

Recommendation 6 — EU funding only for cost of decommissioning

The Commission partially accepts the recommendation.

The Commission is in the process of identifying non-decommissioning related costs. This process will be finalised in the mid-term evaluation and possible actions will be proposed for the phasing out of such costs in 2018.

However, the Commission considers that some essential functions, such as safety, should not be excluded from EU funding.

Recommendation 7 — Improving Commission oversight

The Commission accepts the recommendation and action has already been taken. The assessment of the *ex ante* conditionalities will be completed by October 2016.

Recommendation 8 — Accounting treatment

The Commission accepts the recommendation. The Commission acknowledges the importance of this issue.

It has started addressing this recommendation through the implementation of the waste directive. The Commission is currently reviewing the national programmes submitted under the waste directive and has scheduled a number of studies in order to collect information and further engage in the validation.

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Event	Date
Adoption of the audit planning memorandum/start of audit	25.3.2015
Official sending of draft report to Commission (or other auditee)	2.5.2016
Adoption of the final report after the adversarial procedure	14.7.2016
Commission's (or other auditee's) official replies received in all languages	15.7.2016

The decommissioning of eight Soviet-designed nuclear reactors in Lithuania, Bulgaria and Slovakia was a condition for the countries' EU accession. We found that the EU funding programmes set up to assist with meeting this requirement have not created the right incentives for timely and cost-effective decommissioning. While some progress has been made, key infrastructure projects have experienced delays, and the critical challenges involved in working in the controlled areas still lie ahead. By 2020, EU support should have reached 3.8 billion euro. The estimated total cost of decommissioning will be at least 5.7 billion euro. If the cost of final disposal of high-level waste is included, this total could double.