



EUROPEAN COMMISSION

DG ENER

Support to the mid-term evaluation of the Nuclear
Decommissioning Assistance Programmes

FINAL REPORT - ANNEXES



Building a better
working world

Report submission date: 22 June 2018
Version: final
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Luxembourg: Publications Office of the European Union, 2019

ISBN: 978-92-76-08789-2

doi: 10.2833/189189

MJ-02-19-508-EN-N

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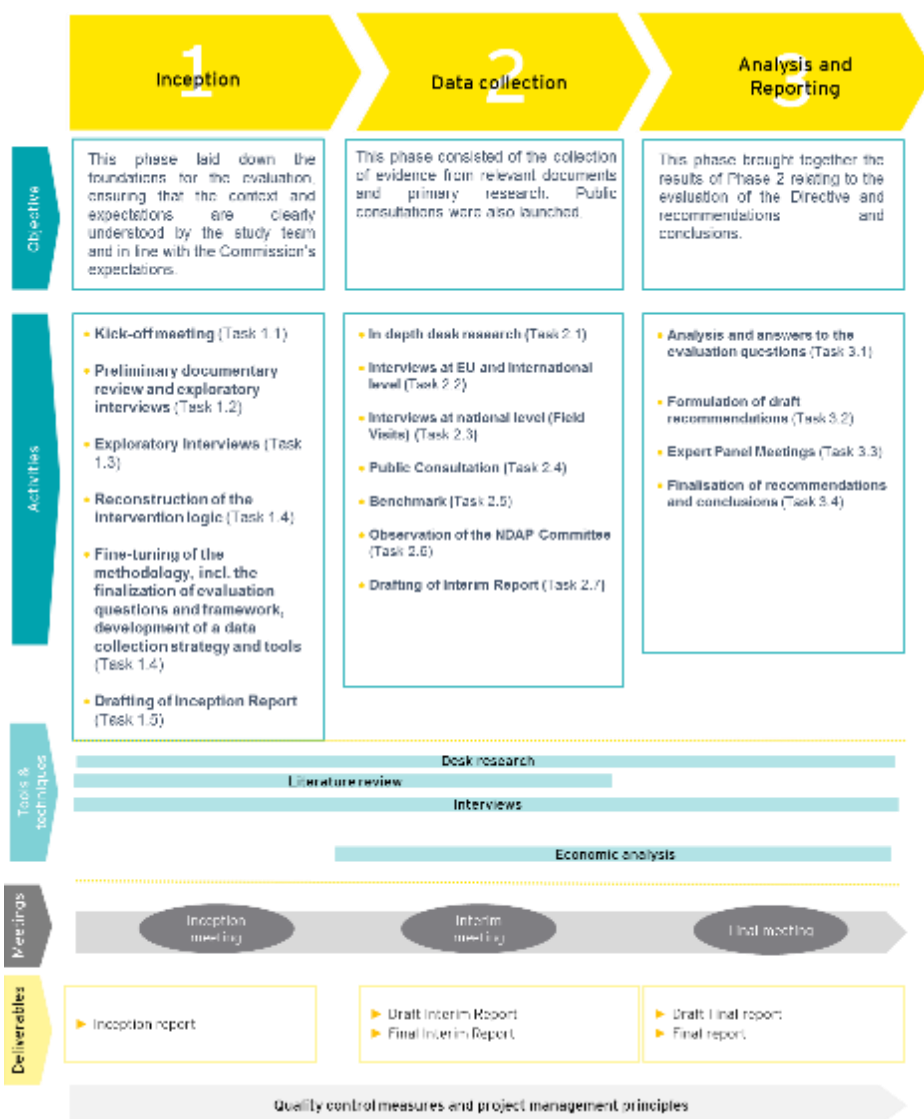
1. Annex 1: Presentation of the methodology

The Evaluation was executed under three main phases, organised as follows:

- **Phase 1: Inception Phase.** The aim of this Phase was to ensure the complete structuring of the Evaluation, including the evaluation framework presented in Annex 2: Evaluation Framework.
- **Phase 2: Data collection Phase.** The data collection phase allowed to focus on both primary and secondary data research.
- **Phase 3: Analysis and reporting phase.** This phase allowed the Evaluation Team to analyse the collected data in order to formulate answers to the Evaluation questions,

The Figure below presents a comprehensive overview of the steps that were followed, how these steps link to each phase of the assignment, and the key deliverables that was produced for each step.

Figure 1 Proposed approach



The tools developed for the data collection phase are listed below.

1.1. In-depth desk research

Following the submission of the Inception Report, in-depth desk research was undertaken by the Study Team. An overview of documentation consulted is provided in **Error! Reference source not found..**

1.2. Interviews with targeted stakeholders

Consultation was undertaken with stakeholders whom are directly involved in the NDAP programmes.

Interviews were therefore undertaken with the following groups of stakeholders:

- ▶ Stakeholders at **national level**
- ▶ Stakeholders at **EU level**
- ▶ Stakeholders at **international level**

The list of interviewed stakeholders is available in Annex 4: List of Interviews.

1.3. Field Visits

Onsite field visits were undertaken to the following sites:

- ▶ London – United Kingdom, 12 – 14 June 2017 (Observation of the Assembly meetings and a workshop hosted by the EBRD, interviews with key stakeholders of the EBRD)
- ▶ Vilnius and Visaginas – Lithuania, 18 – 23 June 2017 (24 interviews with INPP, CPMA, national authorities and regulatory authorities)
- ▶ Bratislava and Bohunice – Slovak Republic, 26 - 30 June 2017 (14 interviews with SIEA, JAVYS, the Nuclear Regulatory Authority of the Slovak Republic (NRA) and the Ministry of Economy of Slovakia)
- ▶ Sofia and Kozloduy – Bulgaria, 27 - 30 June 2017 (12 interviews with the Ministry of Energy, SE RAW and the Bulgarian Nuclear Regulatory Authority)

1.4. Public Consultation

The public consultation consisted of both a general public consultation launched by the Commission in line with the Better Regulation Guidelines and a targeted consultation launched by EY through the use of the EY Online survey tool. Both are described in further detail below.

General Public Consultation

In line with the Commission's Better Regulation Guidelines, a public consultation of 12 weeks duration shall was launched between July and September. The aim of this consultation was to provide an opportunity for all interested members of the public to provide their input to the Evaluation.

Targeted Consultation

In addition to the public consultation, EY launched an online survey through the use of the EY Online Survey Tool which targeted small and medium sized enterprises, regional/local/municipal authorities and national organisations representing not for profit interests.

1.5. Benchmark

Following the data collected through interviews and on-site visits, a benchmark exercise was undertaken in order to respond to questions relating to the governance structure and financial management of the NDAP, as well as prospective questions on potential simplification. This benchmarking exercise consisted of undertaking a comparative analysis of other comparable instruments / programmes managed by the EU. In particular, analysis focused on the governance and management structures, as well as financial management modalities.

The benchmarking exercise was conducted on the following programmes.

Programme	Short description	Rationale under the selection of this programme in the benchmark
Connecting Europe Facility	Facility for the delivery of large infrastructure (energy, transport & ITC) projects across Europe (direct management)	As NDAP projects, CEF also finance large size infrastructure projects with large European budget (including in energy sector). Moreover some of these projects are very specific actions and include the development of innovative technologies. They are also implemented by with large number of contractors with very specific skills and various areas of expertise.
Budget support aid delivery modality	Instrument primarily used for delivering aid and capacity building support to third countries (direct management)	The budget support instrument has a number of potential benefits that make it an interesting comparative case study. While budget support has little precedent for being used in the 'domestic' Union context, it is increasingly being considered for wider, including internal, use.
Structural Funds for major projects	Mechanism for approving and implementing large projects (>5M) (shared management)	Major projects are large scale complex projects with some commonalities with NDAP projects such as the part of innovation, the involvement of specific knowledge, the work with contractors,... Some of them are therefore in energy and infrastructure sectors. The management of project implementation is however very different as the NDAP projects.

1.6. Expert Panel

The Expert Panel was organized in EY Office in Paris on 22 September 2017. The objective was to discuss main findings and recommendations before the submission of the final report. The following experts attended to this meeting:

- ▶ Przemyslaw Zydek (Executive director / Nuclear expert, EY Poland)
- ▶ Georgij Krivosein (Senior manager / Nuclear expert, EY Ukraine)
- ▶ Andrzej Strupczewski (Chairman of the Nuclear Safety Commission NCBJ / Nuclear Safety expert)

Birute Bobrovaite-Jurkone (Nuclear Engineer, EY Lithuania) also contributed to the final discussions on the report although she could not attend the meeting.

2. Annex 2: Evaluation Framework

This Annex presents the Evaluation Frameworks for the assignment for the five evaluation criteria.

RELEVANCE | EQ1. To what extent are the general and specific objectives of the NDAP still appropriate in relation to the existing needs? Do these objectives need to evolve to take into account present and future needs?

Our understanding and approach:

The aim of this question is to measure the extent to which the NDAP is still in line with the needs existing in relation to decommissioning. To this end, evaluators will examine the extent to which the needs, at a general and specific level, have evolved since 2014. If necessary, the evaluation may propose specific amendments to objectives (e.g. to the Rules of Application) in order to take into account the evolution of needs observed.

As stated in the Impact Assessment prepared by the Commission, the root need on which the NDAP's general objective was based was that of addressing the safety risk to the general population posed by the first generation, Soviet-designed reactors. From this arose the need to mitigate the economic consequences of the early closure of the Lithuanian, Bulgarian and Slovakian units negotiated with the European Commission. Due to early closure of the units before the expiration of their full design lifetime and other historical factors¹, the countries had not amassed adequate resources to finance decommissioning activities. This was particularly the case of Lithuania, due to specific historical factors. Indeed, the Commission Impact Assessment noted that this funding shortfall *'would be a major risk for the safe maintenance of the shutdown reactors... [and] also jeopardize the seamless continuation of safe decommissioning because of the risk that further decommissioning steps would be postponed to an undefined date, awaiting the availability of funds and transferring this liability and responsibility to future generations.*

On the level of specific objectives, the underlying needs dictating the NDAP programme objectives relate to the concrete decommissioning activities – e.g. the on-going decommissioning plans that predate the current generation NDAP. For Slovakia and Bulgaria, these needs are similar and relate primarily to dismantling of contaminated and activated equipment and systems. For Lithuania, the primary needs included the defueling of spent nuclear fuel from the reactor / fuel pond and safe maintenance of the reactor units, in addition to dismantling activities. For all programmes, there was an identified need to ensure the highest levels of safety during decommissioning activities.

In order to collect the evidence necessary to draw judgments for this question, evaluators will rely primarily on extensive documentary review complemented by interviews with stakeholders at the national and EU level. In particular, evaluators will assess on a general level to what extent the rationale for supporting decommissioning activities is still valid (TOR1). On a more specific level, evaluators will examine the advancement made since 2014 and other contextual factors in order to assess whether the specific objectives remain relevant (TOR2).

Sub-questions	Judgment criteria	Indicators / Descriptors	Data sources
NA	<ul style="list-style-type: none"> Member States remain under a financial burden with respect to providing adequate resources for safe decommissioning activities. An absence of EU financial assistance would continue to constitute as safety risk for the general population. The NDAP has put in place the necessary support to effectively assist the decommissioning of nuclear power plants. 	<ul style="list-style-type: none"> Current estimates of financing gap in BG, LT & SK Risks associated with a lack of financial assistance Adequacy of financial assistance provided Alignment of NDAP support with specific needs identified in 	<p>Documentary review</p> <ul style="list-style-type: none"> Impact Assessment Decommissioning Plans Progress Reports Various studies (Deloitte report, ECA report, etc.) <p>Interviews</p> <ul style="list-style-type: none"> Commission

¹ The power plants were built under different political and economic regimes, not necessitating the accumulation of funding

RELEVANCE | EQ1. To what extent are the general and specific objectives of the NDAP still appropriate in relation to the existing needs? Do these objectives need to evolve to take into account present and future needs?

	<ul style="list-style-type: none"> ■ None of the specific objectives have yet been accomplished (and are therefore no longer relevant) ■ No difficulties have arisen with programme implementation that would constitute changes in the specific objectives. ■ No other contextual changes have arisen that would constitute changes in the specific objectives. 	<ul style="list-style-type: none"> ■ the IA / decommissioning plans ■ Level of completion of the specific objectives ■ Identification of relevant technical or contextual factors having an influence on needs (ex. reduced threat, economic development) ■ Feasibility of current milestones ■ Stakeholder perception 	<ul style="list-style-type: none"> ■ EP, Council ■ NDAP Committee ■ IAEA <p>Field visits</p> <ul style="list-style-type: none"> ■ Programme Coordinator <p>Expert panel</p>
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COHERENCE | EQ2. To what extent is the NDAP coherent with relevant EU acquis?

Our understanding and approach:

The aim of this question is to assess the extent to which the NDAP intervention is coherent with relevant policy EU policies. To respond to this evaluation question, the evaluation has proposed two sub-questions:

- ▶ **EQ2.1** Is the NDAP coherent with the Euratom Treaty's acquis in the area of nuclear safety and responsible management of spent fuel and radioactive waste?
- ▶ **EQ2.2** Is the NDAP coherent with the EU acquis in other relevant areas, in particular the environment?

In the area of nuclear safety, the principal EU level legislation is Council Directive 2009/71/Euratom of 25 June 2009 establishing a Community framework for the nuclear safety of nuclear installations, amended by Council Directive 2014/87/Euratom. In the area of radioactive waste management, the principal legislation that will be considered is 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. Finally, the EU has legislated extensively in the area of radiation protection. The EU acquis on radiation protection cover a number of relevant environmental issues.

It is important to note that the objective of this question will not be to assess the extent to which these have been transposed into national regulatory frameworks. Rather, this question will focus primarily on assessing the extent to which the NDAP Regulations are themselves coherent with EU acquis and the extent to which these have been implemented in practice. The response to this evaluation question will be based primarily on documentary review.

Sub-questions	Judgment criteria	Indicators / Descriptors	Data sources
EQ2.1 Is the NDAP coherent with the Euratom Treaty's acquis in the area of nuclear safety and responsible management of spent fuel and radioactive waste? (TOR3)	<ul style="list-style-type: none"> ■ The NDAP Regulations makes specific reference to relevant EU acquis. ■ The EU acquis are actually implemented in practice 	<ul style="list-style-type: none"> ■ Specific mention of relevant EU acquis in Regulations ■ Evidence of conformity with EU acquis 	Documentary review <ul style="list-style-type: none"> ■ NDAP Regulations ■ Relevant EU legislation Interviews <ul style="list-style-type: none"> ■ Commission Field visit <ul style="list-style-type: none"> ■ Regulatory authorities
EQ2.2 Is the NDAP coherent with the EU acquis in other relevant areas, in particular the environment? (TOR5)	<ul style="list-style-type: none"> ■ The NDAP Regulations makes specific reference to relevant EU acquis. ■ The EU acquis are actually implemented in practice. 	<ul style="list-style-type: none"> ■ Specific mention of relevant EU acquis in Regulations ■ Evidence of conformity with EU acquis 	Documentary review <ul style="list-style-type: none"> ■ NDAP Regulations ■ Relevant EU legislation Interviews <ul style="list-style-type: none"> ■ Commission Field visit <ul style="list-style-type: none"> ■ Regulatory authorities

EFFECTIVENESS | EQ3 To what extent have the (general, specific & detailed) objectives of the NDAP been achieved for each of the three programmes.

Our understanding and approach:

The aim of this question is to measure the extent to which the NDAP's objectives, general, specific and detailed, have been achieved. This evaluation question will be addressed through five separate evaluation sub-questions:

- ▶ **EQ3.1** Overall, what level of progress has been made towards the objectives of each national programme? Is the progress in line with the decommissioning baseline adopted by the Commission? If not, what is the risk that objectives will not be achieved?
- ▶ **EQ3.2** To what extent are control systems in place to measure the progress of the decommissioning programmes by the beneficiaries?
- ▶ **EQ3.3** What external and internal factors influenced (positively and negatively) the progress of the decommissioning programmes?
- ▶ **EQ3.4** To what extent has the level of risk at each nuclear site been improved thanks to the NDAP support?
- ▶ **EQ3.5** Are the communication actions addressed to the stakeholders and the public effective, adequate and accurate?

EQ3.1 will assess the progress made to date towards the objectives of each national programme and assess the extent to which this is in line with the baseline adopted by the Commission – e.g. where the programmes should be. To do this, it is necessary to identify the expected outputs, results and impacts of the NDAP since its revision (2014) and assess the extent to which actual observed outputs, results and impacts are aligned with what was expected. Our understanding of the objectives of the NDAP has been presented in the form of the intervention logic and relies on the following documents:

- ▶ NDAP Regulations identify the general and specific objectives for each programme;
- ▶ The detailed objectives for each programme have been identified in Annex 1 to the Commission Implementing Decision; and
- ▶ The specific actions to be implemented on a yearly basis are set out in the Annual Work Programmes and Commission Financing Decisions.

Since this project is undertaking a mid-term evaluation, it is of course evident that not all objectives of the NDAP shall be achieved fully to date. It will therefore be necessary to map the progress which has been made to date, notably relying on monitoring reports and site field visits. This will be compared with the detailed baseline adopted by the Commission in 2014 for each programme (taking into account amendments where applicable). Evaluators will also make a reasoned assessment of what is currently expected to be completed in order to identify the risk that exists that the general, specific and/or detailed objectives of the NDAP will not be achieved with the resources dedicated to the programme by the EU and the concerned MS and secondly the risk that the objectives will not be achieved on time, that is in accordance with the baseline schedule adopted with the NDAP Rules of Application.

The response to this sub-question will be based mainly on documentary review, but also complemented by (and triangulated with) interviews and observation conducted during field visits. This will also allow evaluators to assess (by comparison) to what extent the control system in place (at national and EU level) is able to effectively measure the progress of decommissioning programmes (EQ3.2)

Beyond a simple observation of the progress made and, where applicable, the gaps with expected progress, evaluators will also attempt to identify all factors which have positively or negatively impacted progress. Some issues may be identified from documentary review (e.g. project documentation); however, this will be a particular focus of the interviews conducted during field visits on site with Implementing Bodies and beneficiaries.

Beyond the decommissioning measures, the NDAP seeks fundamentally to reduce the level of risk posed by the concerned nuclear installations, as well as to ensure that decommissioning activities are carried out whilst maintaining the highest level of safety. EQ3.4 will seek to understand to what extent the national programmes have contributed to reducing the risk posed by the concerned nuclear installations and how national programmes have incorporated safety aspects into their programmes and achieved measurable impacts in terms of safety for workers, population and environment (TOR16, TOR27). This will be achieved through documentary review, as well as interviews with stakeholders directly implicated in the programme, notably the relevant regulatory authorities. Outside perception may also be sought through the e-survey / public consultation. This specific sub-question will adopt a longer-term perspective, looking at the evolution of the level of risk since the final days of operation of the concerned nuclear installations, shutdown and decommissioning.

EFFECTIVENESS | EQ3 To what extent have the (general, specific & detailed) objectives of the NDAP been achieved for each of the three programmes.

Finally, EQ3.5 will take stock of communication actions that have been implemented as part of the NDAP and assess to what extent they have been adequate (and accurate). Stock-taking will be based on documentary review and interviews with programme stakeholders. Perceptive data on adequacy and accuracy will also be sought from outside stakeholders through the e-survey / public consultation.

Sub-questions	Judgment criteria	Indicators / Descriptors	Data sources
EQ3.1 Overall, to what level of progress has been made towards the objectives of each national programme? (TOR11) Is the progress in line with the baseline adopted by the Commission? If not, what is the risk that objectives will not be achieved?	<ul style="list-style-type: none"> The NDAP has made progress towards the general objective in the three national programmes. The NDAP has achieved progress against the specific objectives set out for each of the three programmes. The NDAP has made progress against the detailed objectives set out for each programme. (TOR12) There is no gap between what has currently been accomplished and what was expected. (TOR17 & 26) There are no risks present that would preclude the NDAP from accomplishing objectives fixed for 2020. 	<ul style="list-style-type: none"> Stock-taking of high level progress Stock-taking of progress against specific objectives Measurement of performance indicators against detailed objectives Milestones accomplished up to Q2 2017 % accomplishment for milestones falling after Q2 2017 Identification of risk factors 	<p>Documentary review</p> <ul style="list-style-type: none"> NDAP Regulations Implementing Decision Annual Work Plans Monitoring reports <p>Interviews</p> <ul style="list-style-type: none"> Commission NDAP Committee <p>Field visits</p> <ul style="list-style-type: none"> Programme Coordinator Implementing Bodies Beneficiaries <p>Expert panel</p>
EQ3.2 To what extent are control systems in place to measure the progress of the decommissioning programmes by the beneficiaries? (TOR13)	<ul style="list-style-type: none"> The control system produced information adequate to monitor progress. Processes are in place to ensure all relevant information is aggregated and reported. There are no inconsistencies observed between monitoring reports and work actually accomplished. 	<ul style="list-style-type: none"> Evaluator assessment of monitoring reports Robustness of control system processes Stakeholder perception of the quality of reports and other information Gaps between monitoring reports and observed progress 	<p>Documentary review</p> <ul style="list-style-type: none"> Monitoring reports <p>Interviews</p> <ul style="list-style-type: none"> Commission EBRD NDAP Committee <p>Field visits</p> <ul style="list-style-type: none"> Programme Coordinator Implementing Bodies Beneficiaries
EQ3.3 What factors influenced (positively and negatively) the progress of the	<ul style="list-style-type: none"> Specific factors contributed to the success of the NDAP programme. 	<ul style="list-style-type: none"> Identification of specific factors having a positive or negative 	<p>Documentary review</p> <ul style="list-style-type: none"> Monitoring

EFFECTIVENESS | EQ3 To what extent have the (general, specific & detailed) objectives of the NDAP been achieved for each of the three programmes.

decommissioning programmes? (TOR14)	<ul style="list-style-type: none"> Specific factors had a negative impact on progress achieved to date 	<p>effect (e.g. best practices, bottlenecks, external constraints, etc.)</p> <ul style="list-style-type: none"> Identification of specific examples from project documentation Quantification (where possible) of impacts (e.g. delays, savings, additional costs, etc.) 	<p>reports</p> <ul style="list-style-type: none"> Project documentation Delegation Agreements National legislation <p>Interviews</p> <ul style="list-style-type: none"> Commission EBRD NDAP Committee <p>Field visits</p> <ul style="list-style-type: none"> Programme Coordinator Implementing Bodies Beneficiaries
EQ3.4 To what extent has the safety of each of the nuclear sites been improved? (TOR16 & 28)	<ul style="list-style-type: none"> There is a quantified measure of the safety level; it is measured/monitored; it shows an increased safety. Decommissioning programmes have used EU assistance to finance measures to improve the safety of decommissioning sites / activities. Decommissioning programmes comply with international safety standards for decommissioning. 	<ul style="list-style-type: none"> Amounts of radioactive material stored safely vs still to be dismantled Evolution of level of risk identified by regulator / operator (e.g. for licensing purposes) Amount of resources used for safety enhancement measures Types of safety enhancement measures taken Number / type / evolution of safety incidents registered at the decommissioning sites Existence of national adequate national regulatory framework Existence of regulatory body overseeing 	<p>Documentary review</p> <ul style="list-style-type: none"> Decommissioning plans Annual Work Programmes Monitoring reports Project documentation IAEA standards / <p>Interviews</p> <ul style="list-style-type: none"> Commission NDAP Committee <p>Field visits</p> <ul style="list-style-type: none"> Regulatory authorities Programme Coordinator Implementing Bodies Beneficiaries <p>Expert panel</p>

EFFECTIVENESS | EQ3 To what extent have the (general, specific & detailed) objectives of the NDAP been achieved for each of the three programmes.

		decommissioning activities <ul style="list-style-type: none"> ■ Respect of international safety standards (e.g. IAEA), e.g.: <ul style="list-style-type: none"> - Application of dose limits - Application of a graded approach - Existence of safety assessment 	
EQ3.5 Are the communication actions addressed to the stakeholders and the public effective, adequate and accurate? (TOR43)	<ul style="list-style-type: none"> ■ The decommissioning programmes implemented communication actions. ■ The communication actions were adequate and accurate. 	<ul style="list-style-type: none"> ■ Amount of resources dedicated to communication ■ Number and type of communication actions ■ Perception of the adequacy and accuracy of communication actions ■ Outcomes of public hearings 	Documentary review <ul style="list-style-type: none"> ■ Project documentation Interviews <ul style="list-style-type: none"> ■ Commission Field visits <ul style="list-style-type: none"> ■ Programme Coordinator ■ Civil society E-survey / public consultation

EFFECTIVENESS | EQ4 Aside from the financial assistance provided, what other types of results and impacts can be attributed to the NDAP (e.g. (economic, environmental, social impacts)?

Our understanding and approach:

Going beyond the effectiveness of the NDAP in terms of making progress against the decommissioning plans, this evaluation questions seeks to measure other types of positive effects and impacts that have been generated by the NDAP in each country. For example, the financial support and expertise provided to the national programmes may have had the by-product of strengthening the national nuclear regulatory framework and organizational capacity for nuclear decommissioning and linked waste management activities and more generally progress in the back-end of nuclear fuel cycle (TOR 31 & 32). Beyond this, the Commission also noted a number of economic and social impacts in its Impact Assessment. Concerning potential social impacts, the Impact Assessment noted that 3 715 staff worked at the three nuclear power plants in question. The NDAP may thus provide EU added value through the mitigation of the socio-economic consequences of decommissioning (TOR35 & 36). Concerning potential economic impacts, the Commission noted the positive impact in terms of the development of skills and know-how decommissioning operators and other companies involved in decommissioning activities, both in the three Member States in question and at Union level (TOR33 & 34).

Sub-questions	Judgment criteria	Indicators / Descriptors	Data sources
NA	<ul style="list-style-type: none"> ■ The intervention has caused permanent changes / 	<ul style="list-style-type: none"> ■ Evolutions in the national regulatory 	Documentary review <ul style="list-style-type: none"> ■ 2016 ECA Report

EFFECTIVENESS | EQ4 Aside from the financial assistance provided, what other types of results and impacts can be attributed to the NDAP (e.g. (economic, environmental, social impacts)?

	<p>improvements in the national management systems related to nuclear safety and safe and responsible management of spent fuel and radioactive waste. (TOR31)</p> <ul style="list-style-type: none"> ■ The intervention has fostered general progress in the back-end of nuclear fuel cycle. (TOR32) <p>■ The intervention has generated and made available knowledge / know how for the benefit of the Union in view of the economic, technological and environmental aspects of decommissioning and radioactive waste management. (TOR33)</p> <p>■ The NDAP has fostered development of SMEs either locally or at Union level. (TOR34)</p> <p>■ The NDAP has supported employment and economic activity locally and helped mitigate the social consequences of decommissioning. (TOR35 & 36)</p>	<p>framework</p> <ul style="list-style-type: none"> ■ Capacity at the ministerial / regulator level ■ Demonstrated capacity of decommissioning / waste management operators ■ Number & types of investments made in skills (e.g. people trained) ■ Perception of stakeholders ■ Perception of beneficiaries ■ Identification of examples (potential) reapplication of knowledge / technology ■ Number and amount of contracts going to SMEs ■ Identification of examples of positive impacts for SMEs ■ Number of staff supported by NDAP funds ■ Evolution of socio-economic indicators for surrounding area 	<ul style="list-style-type: none"> ■ Deloitte report ■ State budget ■ National reporting to Commission / IAEA on regulatory framework ■ Activity reports of decommissioning operators <p>Interviews</p> <ul style="list-style-type: none"> ■ Commission ■ NDAP Committee ■ EBRD <p>Field visits</p> <ul style="list-style-type: none"> ■ National regulator ■ Programme Coordinator ■ Implementing bodies ■ Beneficiaries ■ Local stakeholders (public authorities, civil society) <p>E-survey / Public consultation</p> <p>Expert panel</p>
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EFFECTIVENESS | EQ5 How effective is the governance and project management framework at EU and national levels?

Our understanding and approach:

This second effectiveness question goes beyond the expected outputs and results of the programmes themselves to assess the governance and project management framework that has been put in place at the EU and national levels. This question is addressed through two evaluation sub-questions looking at first the EU then the national levels. Although they are assessed separately, the evaluation will also examine the interaction between the two and the effectiveness of the system as a whole:

- ▶ **EQ5.1** Is the Commission supervisory role well defined and effective in terms of:
 - Exercising its role and responsibility as part of the planning process
 - Exercising its role and responsibility as part of the implementation and monitoring phase
 - Fulfilling its reporting obligations
 - Protection of the Union's financial interests
- ▶ **EQ5.2** At national level, how well are the roles of the Programme Manager and Implementing Bodies defined and effective in terms of:
 - Exercising its role and responsibility as part of the planning process
 - Exercising its role and responsibility as part of the implementation and monitoring phase
 - Fulfilling its reporting obligations
 - Protection of the Union's financial interests
- ▶ **EQ5.3** How effective is the governance and project management system of the decommissioning programmes? In particular does it allow to effectively:
 - Develop a robust and coherent work programme reflecting stakeholder needs and contributing to the decommissioning plan
 - Ensure adequate supervision of the Implementing Body and supervisory authority
 - Ensure adequate coordination with other funding sources and instruments supporting decommissioning
 - Ensure adequate communication between stakeholders, as well as with the Commission
 - Ensure adequate arrangements for project management
 - Ensure adequate arrangements for monitoring of programme implementation
 - Take corrective action when necessary

The first evaluation sub-question is focused on the roles and responsibility of the Commission as defined in Article 3 of the Commission Implementing Decision, whereas the second focuses on the roles and responsibilities of actors on the national level, in particular the roles and responsibilities of Member States (Article 4), the Programme / Financial Coordinator (Articles 5 & 8), as well as the implementing bodies (Articles 6 & 7). Beyond the statutory tasks and responsibility, evaluators will also assess NDAP governance & project management effectiveness against basic principles of sound governance & management (e.g. division of roles, prioritisation, risk mitigation, etc.) in the third sub-question. The sub-questions will look at both the extent to which the actors individually are fulfilling their responsibilities, as well as the extent to which the system is functioning effectively as a whole. For example, evaluators will examine closely the annual programming, implementation and monitoring cycle from a holistic perspective and examine the roles of each actor there within. Finally, the evaluation will also assess the clarity and adequacy of the roles and responsibilities set out by the NDAP Regulations and the Rules of Application to assess to what extent they may need to be modified in order to improve the effectiveness of the system – feeding in to TOR37 d, e & f.

This evaluation question will focus primarily on issues of effectiveness. A separate question has been included in this evaluation to analyse the efficiency of the governance and project management system. However, these two areas will naturally have many overlaps. For example, inadequate prioritisation and risk management can lead to inflated project costs and delays. Whilst looking at this issue through two evaluation questions, evaluators will ensure that the links between the two aspects are well identified.

Data collection for these evaluation questions will rely primarily on interviews with stakeholders. This includes telephone interviews with EU-level stakeholders, in particular within the scope of EQ5.1, but the majority of data collected will take place through the field visits. This will also be complemented through thorough documentary review in order to understand the roles and responsibilities of different actors and document the governance and project management structures established on Member State level.

EFFECTIVENESS | EQ5 How effective is the governance and project management framework at EU and national levels?

Sub-questions	Judgment criteria	Indicators / Descriptors	Data sources
EQ5.1 Is the Commission supervisory role well defined and effective in terms of: i) planning, ii) monitoring, and iii) reporting? (TOR9)	<ul style="list-style-type: none"> The Commission has adequate resources and competencies to assess the Annual Work Programmes. The Commission has adequate resources and competencies to exercise adequate monitoring of programme implementation. The Commission participates and plays an active role in the programme Monitoring Committees. The Commission has set up and adequately supported the NDAP Committee. The NDAP Committee provides a relevant forum with adequate competencies to provide value added opinions to the Commission. The roles and responsibilities of the Commission, as they are currently defined, contribute to overall programme effectiveness. The governance structure put in place at EU level corresponds with basic principles of sound governance. The Commission is taking adequate steps to protect the EU's financial interests 	<ul style="list-style-type: none"> Level of resources provided to Commission programme management unit Technical competencies of programme managers Time to assess and approve AWP / project documentation Time to assess and approve Monitoring Reports Participation of Programme Managers in Monitoring Committees Type of support provided to NDAP Committee Perception of NDAP Committee members Perception of the added value of the NDAP Committee Types of opinions issued by the NDAP Committee (e.g. types of feedback – positive & negative) Identification of issues detracting from effectiveness Clarity of accountability framework Clarity & coherence of separation of roles & responsibility Evidence of capacity & competencies of 	Documentary review <ul style="list-style-type: none"> NDAP Regulations Implementing Decision Rules of Procedure of (NDAP, Monitoring Committee) National documentation from implementing bodies Minutes, opinions... (NDAP Committee, Monitoring Committee, Commission) Interviews <ul style="list-style-type: none"> Commission NDAP Committee EBRD Field visits <ul style="list-style-type: none"> Programme Coordinator Implementing bodies Beneficiaries Expert panel

EFFECTIVENESS | EQ5 How effective is the governance and project management framework at EU and national levels?

		<p>actors</p> <ul style="list-style-type: none"> ■ Evidence of management of Conflict of Interest ■ Transparency of processes ■ Evidence of good faith in discharge of responsibilities ■ Etc. ■ Adequacy of the PIF 	
<p>EQ5.2 At national level, how well are the roles of the Programme Manager and Implementing Bodies defined and effective in terms of:</p>	<ul style="list-style-type: none"> ■ Member States have fulfilled their responsibilities under the NDAP Regulations. ■ Programme Coordinators are effectively fulfilling their statutory obligations. (TOR42) ■ The implementing bodies are fulfilling their roles in an effective manner. ■ The roles and responsibilities at the level of national programmes, as they are currently defined, contribute to overall programme effectiveness. (TOR10) 	<ul style="list-style-type: none"> ■ Timely appointment / replacement of Programme / Financial Coordinators ■ Level of resources provided to Programme Coordinators ■ Creation of adequate programme support structures (e.g. FTEs, resources, etc.) ■ Capacity & competencies of PC role ■ Timely production of AWP ■ Quality of AWP (stakeholder perception, number of modifications requested, etc.) ■ Evidence of effective coordination with other sources of financing (TOR 40 & 41) ■ Quality and fluidity of communication with relevant actors ■ Respect of statutory obligations with regards to project documentation ■ Quality of project 	<p>Documentary review</p> <ul style="list-style-type: none"> ■ NDAP Regulations ■ Implementing Decision ■ Rules of Procedure of (NDAP, Monitoring Committee...) ■ National documentation from implementing bodies ■ Minutes, opinions... (NDAP Committee, Monitoring Committee, Commission) <p>Interviews</p> <ul style="list-style-type: none"> ■ Commission ■ NDAP Committee ■ EBRD <p>Field visits</p> <ul style="list-style-type: none"> ■ Programme Coordinator ■ Implementing bodies ■ Beneficiaries <p>Expert panel</p>

EFFECTIVENESS | EQ5 How effective is the governance and project management framework at EU and national levels?

		<p>design (e.g. number of delays, cost overruns...)</p> <ul style="list-style-type: none"> Quality of monitoring reports Identification of issues detracting from effectiveness Clarity of accountability framework 	
EQ5.3 How effective is the governance and project management system of the decommissioning programmes? (TOR10)	<ul style="list-style-type: none"> The governance structure put in place corresponds with basic principles of sound governance. The management structures put in place corresponds with basic principles of sound project management. 	<ul style="list-style-type: none"> Clarity of accountability framework Clarity & coherence of separation of roles & responsibility Evidence of capacity & competencies of actors Evidence of management of Conflict of Interest Transparency of processes Evidence of good faith in discharge of responsibilities Use of recognised project management methodologies (e.g. PRINCE2, Agile, Critical Chain, COBIT...) Adequacy of definition or project objectives and scope (clearly defined, realistic, identification of needs...) Adequacy of risk identification and mitigation Adequate identification of dependencies / 	<p>Documentary review</p> <ul style="list-style-type: none"> NDAP Regulations Implementing Decision Rules of Procedure (NDAP, Monitoring Committee...) National documentation from implementing bodies Minutes, opinions... (NDAP Committee, Monitoring Committee, Commission) <p>Interviews</p> <ul style="list-style-type: none"> Commission NDAP Committee EBRD <p>Field visits</p> <ul style="list-style-type: none"> Programme Coordinator Implementing bodies Beneficiaries <p>Expert panel</p>

EFFECTIVENESS | EQ5 How effective is the governance and project management framework at EU and national levels?

		<p>interfaces</p> <ul style="list-style-type: none"> ■ Clear operationalisation of projects (e.g. work streams, activities, tasks...) ■ Identification of clear roles / ownership ■ Establishment of adequate monitoring framework ■ Presence of relevant policies (procurement, make or buy, etc.) ■ Etc. 	
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EFFICIENCY | EQ6 To what extent is the management of the decommissioning programmes cost effective and efficient?

Our understanding and approach:

The objective of this question is to measure the extent to which the desired effects of the NDAP are achieved at a reasonable cost. Efficiency will therefore measure how the resources/inputs are converted to results and how the systems in place, including the monitoring and reporting systems and governance, assist in efficiency. This question is addressed through three evaluation sub-questions:

- ▶ **EQ6.1** To what extent has the NDAP been cost effective when considering each cost category compared against performance indicators? Are there adequate indicators for measuring efficiency?
- ▶ **EQ6.2** What are the major factors impacting the efficiency of the assistance programmes? What are the root causes of these factors?
- ▶ **EQ6.3** What factors can explain differences in costs (and possibly benefits) arising between Member States?

EQ5.1 will take stock of the overall costs of the programme and compare them with the results achieved (e.g. the performance indicators identified for each programme). The evaluators will also consider, to the greatest extent possible, other efficiency indicators, such as the level of administrative expenses borne at different levels. To a large degree, evaluators will rely on the indicators available in the monitoring documents. Evaluators will also critically assess the extent to which the indicators allow for a monitoring of efficiency. Where weaknesses are identified, evaluators will attempt to identify additional data to measure the efficiency of the programmes. This assessment will largely be made on the basis of documentary sources, but may also draw on interviews to collect additional data.

At a minimum, the evaluation should measure and analyse the program's costs in broad categories (for example following the ISDC level categories and a separate category for administrative costs) and categorize and list the program's activities, outputs, outcomes, and other benefits, even if these cannot be valued in monetary terms. Evaluators should, to the extent possible, address the following broad questions:

- Has the program cost more or less than planned? How did it measure up against its own costing schedule?
- How do actual costs compare with benchmarks from similar programs or activities? Are there obvious cases of inefficiency or wasted resources?
- What is the least-cost way of getting the expected results?
- Were the program's outputs and outcomes achieved in the most cost-effective way?

After quantitatively observing the cost effectiveness and efficiency of the programmes, EQ5.2 will take a more qualitative approach and attempt to take stock of the different factors that have influenced the efficiency of the programme (both from a positive and negative perspective). The quantitative assessment conducted as part EQ5.1 will provide indications of areas to explore; however, the response to this sub-question will rely mainly on in depth qualitative interviews conducted at EU level and during the field visits. Going beyond the quantitative symptoms, evaluators will attempt to identify the underlying root causes. This sub-question will also draw strongly on the evaluation questions dealing with governance (EQ4 & EQ6).

The final sub-question will look at differences in efficiency observed between Member States and attempt to isolate the causal factors. It will draw equally on EQ5.1 to observe the variations in efficiency and cost effectiveness, as well as EQ5.2 to dig into the underlying causes and identify variations between Member States that can provide explanation for the differences at a quantitative level.

Sub-questions	Judgment criteria	Indicators / Descriptors	Data sources
EQ6.1 To what extent has the NDAP been cost effective when considering each cost category compared against performance indicators? Are there adequate indicators for measuring efficiency? (TOR21)	<ul style="list-style-type: none"> ■ The costs are in line with the budget established in the DDP ■ The results of the decommissioning programmes individually and collectively were achieved at a reasonable cost. ■ The large majority of funds are being spent on direct 	<ul style="list-style-type: none"> ■ Earned value analysis ■ Identification of examples of cost overruns ■ Amount and 1? of funds going to non-decommissioning activities 	Documentary review <ul style="list-style-type: none"> ■ Annual work plans ■ Commission Financing Decision ■ Monitoring Reports

EFFICIENCY | EQ6 To what extent is the management of the decommissioning programmes cost effective and efficient?

	<p>decommissioning activities. (TOR4)</p> <ul style="list-style-type: none"> Costs associated with decommissioning activities are clearly identified. (TOR8) The absolute level of resources spent on administrative / management (compared with operational tasks) tasks is reasonable. The available indicators allow for a robust monitoring of efficiency. (TOR23) 	<ul style="list-style-type: none"> % of administrative and management expenses in total NDAP expenditure (EU / national level / by actor) Quality of costing methodology Number of non-operational FTE % staff cost in overall programme expenditure Number and type of efficiency indicators Stakeholder perception of indicator quality Time lag in reporting 	<ul style="list-style-type: none"> Budget expenditure data <p>Interviews</p> <ul style="list-style-type: none"> Commission EBRD <p>Field visits</p> <ul style="list-style-type: none"> Programme Coordinator Implementing Bodies Beneficiaries
<p>EQ6.2 What are the major factors impacting the efficiency of the assistance programmes? What are the root causes of these factors? (TOR24)</p>	<ul style="list-style-type: none"> Governance structures contributed to overall programme efficiency. (TOR19) Programme management structures contributed to overall programme efficiency. (TOR19) Programme implementing rules / EU financial regulations contributed to overall programme efficiency. (TOR19) The proper incentive structures are in place to incentivize actors to be cost-effective – e.g. co-financing / sharing of financial risks (TOR22 & 28) National legislation / regulatory frameworks contributed to overall programme efficiency. No technical challenges detracted from programme cost effectiveness No other external factors detracted from programme cost effectiveness. 	<ul style="list-style-type: none"> Identification of issues contributing positively or negatively to efficiency / cost-effectiveness Quantification (where possible) of efficiency impacts 	<p>Documentary review</p> <ul style="list-style-type: none"> Commission Implementing Decision Relevant EU Financial Regulations Monitoring Reports Project documentation <p>Interviews</p> <ul style="list-style-type: none"> Commission EBRD NDAP Committee <p>Field visits</p> <ul style="list-style-type: none"> Programme Coordinator Implementing Bodies Beneficiaries
<p>EQ6.3 What factors can explain differences in costs (and possibly</p>	<ul style="list-style-type: none"> Issues can be identified contributing to differences in 	<ul style="list-style-type: none"> Identification of issues contributing positively 	<p>Interviews</p>

EFFICIENCY | EQ6 To what extent is the management of the decommissioning programmes cost effective and efficient?

benefits) arising between Member States? (TOR25)	efficiency and / or cost-effectiveness between Member States.	<p>or negatively to efficiency / cost-effectiveness</p> <ul style="list-style-type: none"> Quantification (where possible) of efficiency impacts Identification of possible best practices 	<ul style="list-style-type: none"> Commission EBRD NDAP Committee <p>Field visits</p> <ul style="list-style-type: none"> Programme Coordinator Implementing Bodies Beneficiaries
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EFFICIENCY | EQ7 How does the governance and management system of the NDAP compare to other programmes managed by the Commission (or other actors)? Do these comparators provide any best practices in terms of governance or management?

Our understanding and approach:

The purpose of this evaluation is to provide an analytical framework for the benchmarking exercise that will be undertaken as part of this evaluation (see step 2.5 of the methodology presented in the Main Report). The of this exercise is to develop comparative case studies providing: an overview of the comparator programme, a detailed comparison of the governance and finance structures, conclusions identifying possible beneficial organisational and governance solutions which could be applicable for the NDAP (TOR18 & 20). Whilst this question has been placed under efficiency, it will not be restricted to this thematic heading. The case studies will look equally at approaches and practices that could enhance the effectiveness and efficiency of the governance and management of the NDAP. However, it should be noted that these case studies will not constitute evaluations in themselves. Rather, evaluators will examine the advantages and disadvantages presented by each comparator.

Sub-questions	Judgment criteria	Indicators / Descriptors	Data sources
NA	<ul style="list-style-type: none"> The comparator programmes have put in place an effective and efficient governance system. The comparator programmes have developed robust project management practices (e.g. programming, project implementation, monitoring, etc.) 	<ul style="list-style-type: none"> Clarity of accountability framework Clarity & coherence of separation of roles & responsibility Evidence of capacity & competencies of actors Evidence of management of Conflict of Interest Transparency of processes Evidence of good faith in discharge of responsibilities Etc. Use of recognised project management methodologies (e.g. PRINCE2, Agile, Critical Chain, COBIT...) Adequacy of definition or project objectives and scope (clearly defined, realistic, identification of needs...) Adequacy of risk identification and mitigation Adequate 	<p>Documentary review</p> <ul style="list-style-type: none"> Legal basis of comparator programmes Detailed programme rules Applicable financial regulations Other relevant programme documentation <p>Interviews</p> <ul style="list-style-type: none"> Programme stakeholders

EFFICIENCY | EQ7 How does the governance and management system of the NDAP compare to other programmes managed by the Commission (or other actors)? Do these comparators provide any best practices in terms of governance or management?

	<ul style="list-style-type: none"> ■ The comparator organisations present examples of good practice relevant to the NDAP. 	<ul style="list-style-type: none"> ■ identification of dependencies / interfaces ■ Clear operationalisation of projects (e.g. work streams, activities, tasks...) ■ Identification of clear roles / ownership ■ Establishment of adequate monitoring framework ■ Etc. ■ Identification of good practices ■ Feasibility of applicability to NDAP 	
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EU ADDED VALUE | EQ8 What would be the likely result of ending the NDAP in the three Member States concerned?

Our understanding and approach:

This transversal question seeks to measure the EU added value of the NDAP. EU added value is additional to the value created by actions of individual Member States, which may result from different factors, such as coordination gains, legal certainty, greater effectiveness or complementarities, economies of scale, promotion of best practice, benchmarking, etc.

The expected EU added value of the NDAP from its beginning has been cast in terms of financial mitigation and nuclear safety. Lithuania, Slovakia and Bulgaria agreed with the Commission to close unsafe nuclear reactors before the end of the design lifetime, creating a significant financial burden for which the Member States had not had adequate opportunity to prepare. In the case of Lithuania, the country found itself after independence in possession of a nuclear power plant that had been built and operated by a foreign state and had primarily provided energy to the Belorussian market since its construction. Given this context, the counterfactual appears clear: no dismantling or even continued operation of unsafe nuclear reactors. The Commission Impact Assessment for the NDAP Regulation noted that the EU added value *lies in the support of measures dedicated to achieving... progress in dismantling in order to reach a safe and irreversible state..., which is of paramount importance for nuclear safety*. The main focus of this mid-term review will thus be to assess the extent to which this central aspect of EU added value remains present today for the different national programmes. It draw in particular on data collected within the framework of EQ1.

The answer to this question will draw on virtually all of the data collection methods used in the study as a key transversal theme, most notably qualitative interviews with

Sub-questions	Judgment criteria	Indicators / Descriptors	Data sources
NA	<ul style="list-style-type: none"> Member States possess adequate financial resources to continue the decommissioning programme without Union assistance. Member States in a state to manage the decommissioning programmes on their own. 	<ul style="list-style-type: none"> Current estimated national budget gap for decommissioning activities National capacity to close the budget gap (e.g. percentage of annual State budget) Availability of other outside financial resources Strength of national regulatory framework (e.g. compliance with EU & international standards) Demonstrated capacity of decommissioning operators 	<p>Documentary review</p> <ul style="list-style-type: none"> 2016 ECA Report Deloitte report State budget National reporting to Commission / IAEA on regulatory framework Activity reports of decommissioning operators <p>Interviews</p> <ul style="list-style-type: none"> Commission NDAP Committee EBRD <p>Field visits</p> <ul style="list-style-type: none"> National regulator Programme Coordinator Implementing bodies Beneficiaries <p>Expert panel</p>

3. Annex 3: List of Documentation

The following documentation was identified to date.

Decommissioning Plans

Member State	Name of the document
Lithuania	Ignalina nuclear power plant final – Decommission Plan
Slovakia	Detailný plán vyradovania je V1
Bulgaria	KNPP DecommPlan-U3&4 (Bulgarian version)
Bulgaria	KNPP DecommPlan-U3&4 (English translation)
Bulgaria	KNPP PlanDecomm_31 July 2014 KNPP 1-2 (Bulgarian version)
BG/SK	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
BG/SK	Corrigendum to 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
Lithuania	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
Lithuania	Corrigendum to 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
Slovakia and Lithuania	Official Journal of the European Union L236 Volume 46
Bulgaria	Official Journal of the European Union L157 Volume 48
All	European Parliament legislative resolution of 19 November 2013 on the proposal for a Council regulation on Union support for the nuclear decommissioning assistance programmes in Bulgaria, Lithuania and Slovakia
All	Proposal for a COUNCIL REGULATION on Union support for the nuclear decommissioning assistance programmes in Bulgaria, Lithuania and Slovakia.
All	DG ENER - Impact assessment on a Euratom Council Regulation on Union support for the nuclear decommissioning assistance programmes in Bulgaria, Lithuania, and Slovakia.
All	Proposal for a Council Regulation on Union support for the nuclear decommissioning assistance programmes in Bulgaria, Lithuania and Slovakia.
All	Proposal for a Council Regulation on Union support for the nuclear decommissioning assistance programmes in Bulgaria, Lithuania and Slovakia.
All	Nuclear Illustrative Programme
All	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
Bulgaria	Regulation (euratom) no 647/2010 of the council of 13 July 2010 on financial assistance of the Union with respect to the decommissioning of Units 1 to 4 of the Kozloduy Nuclear Power Plant in Bulgaria (Kozloduy Programme)

Member State	Name of the document
Lithuania	Règlement (CE) n° 1990/2006 du Conseil du 21 décembre 2006 relatif à la mise en œuvre du protocole n° 4 à l'acte d'adhésion de la République tchèque, de l'Estonie, de Chypre, de la Lettonie, de la Lituanie, de la Hongrie, de Malte, de la Pologne, de la Slovénie et de la Slovaquie, concernant la centrale nucléaire d'Ignalina en Lituanie «Programme Ignalina»
Slovakia	Regulations 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
All	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
All	Detailed objectives and general information for the implementation of decommissioning programmes
Lithuania	Detailed baseline decommissioning plan as referred in Article 4(1)(c) of Regulation (EU) No 1369/2013 – Lithuania
Slovakia	Detailed baseline decommissioning plan as referred in Article 4(1)(c) of Regulation (Euratom) No 1368/2013 – Slovakia
Bulgaria	Detailed baseline decommissioning plan as referred in Article 4(1)(c) of Regulation (Euratom) No 1368/2013 - Bulgaria
All	Template for the annual work programme
All	VI - Project documentation guidelines
All	Template for Monitoring Report
All	Framework administrative agreement on actions by the EBRD and funded or co-funded by the European Union.
All	Commission decision of 18/05/2015 approving the framework agreement.
All	European union delegation agreement
All	General Conditions for PA Grant or Delegation Agreements
All	Commission decision of 18.5.2015 on the adoption of the model Pillar Assessed Grant or Delegation Agreement (pagoda)
All	Rules of the Ignalina / Kozloduy / Bohunice international decommissioning support fund
All	Commission staff working paper "Nuclear Decommissioning Assistance Programme data"
All	Proposal for a Council Regulation on Union support for the nuclear decommissioning assistance programmes in Bulgaria, Lithuania and Slovakia.
All	Nuclear Decommissioning Assistance Programme (NDAP) – Assessment of the robustness of the financing plans considering the economic-financial-budgetary situation in each concerned Member State and of the relevance and feasibility of the detailed decommissioning plans
All	EU financial assistance for the decommissioning of nuclear plants in Bulgaria, Lithuania and Slovakia: achievements and future challenges
All	Nuclear decommissioning : management of costs and risks
All	Decommissioning assistance programmes in Lithuania, Bulgaria and Slovakia: some progress made since 2011, but critical challenges ahead

Member State	Name of the document
All	Communication from the Commission to the European Parliament and the council Report on the use of financial resources earmarked for the decommissioning of nuclear power plants
All	Commission Staff working paper Report on the use of financial resources earmarked for the decommissioning of nuclear power plants
All	Communication from the Commission to the European Parliament and the council Second Report on the use of financial resources earmarked for the decommissioning of nuclear installations, spent fuel and radioactive waste
All	Communication from the Commission to the European Parliament and the council Second Report on the use of financial resources earmarked for the decommissioning of nuclear installations, spent fuel and radioactive waste - Second report
All	Communication from the Commission to the European Parliament and the council Second Report on the use of financial resources earmarked for the decommissioning of nuclear installations, spent fuel and radioactive waste
All	Annex to the report from the Commission to the European Parliament and the council on the implementation of the work under the nuclear decommissioning assistance programme to Bulgaria, Lithuania and Slovakia in the period 2010-2014
All	Report from the Commission to the European Parliament and the council on the implementation of the work under the nuclear decommissioning assistance programme to Bulgaria, Lithuania and Slovakia in the period 2010-2014
All	Annex to the report from the Commission to the European Parliament and the council on the implementation of the work under the nuclear decommissioning assistance programme to Bulgaria, Lithuania and Slovakia in 2015 and previous years
All	Report from the Commission to the European Parliament and the council on the implementation of the work under the nuclear decommissioning assistance programme to Bulgaria, Lithuania and Slovakia in 2015 and previous years
Slovakia	Commission - National Agency Agreement for the implementation of the Bohunice Programme
Slovakia	System of implementation for the Bohunice programme
Lithuania	EC-CPMA Delegation Agreement for the Ignalina Programme
Slovakia and Lithuania	European Commission, DG TREN Mid-term evaluation of the decommissioning assistance to Lithuania and Slovakia provided under the protocols to the Treaty of Accession
All	Analysis of the Factors Influencing the Selection of Strategies for Decommissioning of Nuclear Installations
All	Comparison among different decommissioning funds methodologies for nuclear installations
Bulgaria	Kozloduy Programme Monitoring Report 2014 H1
Bulgaria	Kozloduy Programme Monitoring Report 2014 H2
Bulgaria	Kozloduy Programme Monitoring Report 2015 H1
Bulgaria	Kozloduy Programme Monitoring Report 2015 H2
Bulgaria	Kozloduy Programme Monitoring Report 2016 H1
Bulgaria	Kozloduy Programme Monitoring Report 2016 H2
Lithuania	Ignalina Programme Monitoring Report 2014 H1

Member State	Name of the document
Lithuania	Ignalina Programme Monitoring Report 2014 H2
Lithuania	Ignalina Programme Monitoring Report 2015 H1
Lithuania	Ignalina Programme Monitoring Report 2015 H2
Lithuania	Ignalina Programme Monitoring Report 2016 H1
Lithuania	Ignalina Programme Monitoring Report 2016 H2
Slovakia	Bohunice Programme Monitoring Report 2014 H1
Slovakia	Bohunice Programme Monitoring Report 2014 H2
Slovakia	Bohunice Programme Monitoring Report 2015 H1
Slovakia	Bohunice Programme Monitoring Report 2015 H2
Slovakia	Bohunice Programme Monitoring Report 2016 H1
Slovakia	Bohunice Programme Monitoring Report 2016 H2
Lithuania	Ignalina International Decommissioning Support Fund - 32nd Work Programme
Lithuania	Ignalina International Decommissioning Support Fund – 31st Work Programme
Lithuania	Ignalina International Decommissioning Support Fund – 30th Work Programme
Lithuania	Ignalina International Decommissioning Support Fund – 29th Work Programme
Lithuania	Ignalina International Decommissioning Support Fund – 28th Work Programme
Lithuania	Ignalina International Decommissioning Support Fund – 27th Work Programme
Slovakia	Bohunice International Decommissioning Support Fund - 32nd Work Programme
Slovakia	Bohunice International Decommissioning Support Fund – 31st Work Programme
Slovakia	Bohunice International Decommissioning Support Fund – 30th Work Programme
Slovakia	Bohunice International Decommissioning Support Fund – 29th Work Programme
Slovakia	Bohunice International Decommissioning Support Fund – 28th Work Programme
Slovakia	Bohunice International Decommissioning Support Fund – 27th Work Programme
Bulgaria	KIDSF – Grant Agreement - 17A
Bulgaria	KIDSF – Grant Agreement - 18
Bulgaria	KIDSF – Grant Agreement - 031C
Bulgaria	KIDSF – Grant Agreement - 035C
Bulgaria	KIDSF – Grant Agreement - 038C
Bulgaria	KIDSF – Grant Agreement - 46
Bulgaria	KIDSF – Grant Agreement - 48B
Bulgaria	KIDSF – Grant Agreement - 50A
Bulgaria	KIDSF – Grant Agreement - 51A
Bulgaria	KIDSF – Grant Agreement - 52A
Lithuania	IIDSF – Grant Agreement - 1
Lithuania	IIDSF – Grant Agreement - 002D

Member State	Name of the document
Lithuania	IIDSF – Grant Agreement - 003B
Lithuania	IIDSF – Grant Agreement - 6
Lithuania	IIDSF – Grant Agreement - 007E
Lithuania	IIDSF – Grant Agreement - 8
Lithuania	IIDSF – Grant Agreement - 9
Lithuania	IIDSF – Grant Agreement - 10
Lithuania	IIDSF – Grant Agreement - 12
Lithuania	IIDSF – Grant Agreement - 13
Lithuania	IIDSF – Grant Agreement - 14
Lithuania	IIDSF – Grant Agreement - 15D
Slovakia	BIDSF – Grant Agreement - 1
Slovakia	BIDSF – Grant Agreement - 3
Slovakia	BIDSF – Grant Agreement - 004A
Slovakia	BIDSF – Grant Agreement - 5
Slovakia	BIDSF – Grant Agreement - 6
Slovakia	BIDSF – Grant Agreement - 007A
Slovakia	BIDSF – Grant Agreement - 008A
Slovakia	BIDSF – Grant Agreement - 009D
Slovakia	BIDSF – Grant Agreement - 010B
Slovakia	BIDSF – Grant Agreement - 012A
Slovakia	BIDSF – Grant Agreement - 013D
Slovakia	BIDSF – Grant Agreement - 16E
Slovakia	BIDSF – Grant Agreement - 17D
Slovakia	BIDSF – Grant Agreement - 18F
Slovakia	BIDSF – Grant Agreement - 019I
Slovakia	BIDSF – Grant Agreement - 021D
Slovakia	BIDSF – Grant Agreement - 22A
Slovakia	BIDSF – Grant Agreement - 23A
Slovakia	PowerPoint Presentation prepared by JAVYsS for the mid-term review
Slovakia	PowerPoint Presentation prepared by the NRA for the mid-term review
Lithuania	PowerPoint Presentation prepared by the CPMA for the mid-term review

4. Annex 4: List of Interviews

In accordance with the methodology, a number of exploratory interviews were undertaken for the assignment. The table below presents an overview of the interviews undertaken.

Interviews

Name	Institution	Position
Exploratory interviews		
Massimo GARRIBA	COM - DG ENER	Director
Jean-Philippe GUISET	COM - DG ENER	Programme manager
Gianfranco BRUNETTI	COM - DG ENER	Head of Sector
Robert KUNDE	COM - DG ENER	Programme manager of the Bohunice Programme (Slovakia)
Simon MURPHY	COM - DG ENV	Programme manager Kozloduy Programme (BG)
Vince NOVAK	EBRD	Director of the Nuclear Safety Department
Peter HARRISON	CPMA	Coordinator of the Ignalina Programme Division
Simonas ŠATŪNAS	Ministry of Energy (Lithuania)	Vice-Minister of Energy (Lithuania)
Zakova ALENA ²	Ministry of Economy (Slovak Republic)	Director, Department of International Relations in Energy, Section of Energy, General State Advisor
Vojtech FERENCZ	Ministry of Economy (Slovak Republic)	1st State Secretary of the Ministry of Economy Member of the Supervisory Board of the National Nuclear Fund; Programme Coordinator
Katerina KOSTADINOVA	Ministry of Economy and Energy (Bulgaria)	Head of Nuclear Safety and Security Unit, Security of Energy Supplies Directorate
EU Institutions		
Thomas KIRCHNER	COM - DG OIL	Former Head of Sector – D2
Jolita KORZUNIENE	ECA	Auditor
Pekka ULANDER	ECA	Senior Auditor
NDAP Committee members		
Antoine CARON /	French ministry of environment, energy and sea	Head of External Affairs Office
Adrien BEGUIN	French ministry of environment, energy and sea	Project Officer
Simon Carroll	Swedish Radiation Safety Authority	International Relations department
Karl Raymond Mudra	German representative	Retired, independent consultant
Emilio Garcia Neri	ENRESA	International Relations Department
Andreas Molin	BMLFUW	Director
Robert Muner	BMLFUW	Officer
Industry actors		
Péter Kádár	Mecsekérc Zrt	Project Manager
Michael Köbl	GNS	Head of Communications

² Ms Zakova replied for Mr Ferencz by mail.

Eberhard Thurow	EWN	Head of International Projects
International Organisations		
Patrick O'SULLIVAN	IAEA	Waste Technology Section
Inge WEBER	NEA	Nuclear Decommissioning Specialist
Gloria KWONG	NEA	Deputy Head of Division Radioactive Waste Management

Field visits

Name	Institution	Position
London – EBRD		
Vince NOVAK	EBRD	Director, Nuclear Safety Dept.
Balthasar LINDAUER	EBRD	Deputy Director, Nuclear Safety Dept.
Gunter GRABIA	EBRD	Associate Director (IIDSF)
Kees KETELAAR	EBRD	Associate Director (BIDSF)
Valentine SEIDER	EBRD	Associate Director (KIDSF)
Lithuania		
Darius JANULEVICIUS	INPP	Director General
Sergej KRUTOVCOV	INPP	Head of Decommissioning Department
Glen MUNRO	INPP	Head of PMU
Audrius KAMIENAS	INPP	Head of Planning & Finance Dept.
Saulius URBONAVICIUS	INPP	Head of Planning Department
Tomas LIUKAITIS	INPP	Head of Corporate Affairs
Danielius KOLISOVAS	INPP	Chief Risk Officer
Daiva ARELYTE	INPP	Deputy Director for Decommissioning
Jurij SHAPOVAL	INPP	Project Management Division
Vladimir DRANIK	INPP	Trade Union Rep.
Loreta MASKALIOVIENE	Ministry of Finance	Vice-Minister
Darius TRAKELIS	Ministry of Finance	Director, EU and International Affairs Department
Donatas SKARA	Ministry of Finance	National Fund Department
Simonas ŠATŪNAS	Ministry of Energy	Vice Minister for Energy
Asta ZALNIERIUTE	Ministry of Energy	Head of Decommissioning Dept.
Patricija CEIKO	Ministry of Energy	Decommissioning Dept.
Dalia Štraupaitė	Municipality of Visaginas	Mayor
Peter HARRISON	CPMA	Direction, INPP Programme Division
Giedrius PAŠKEVIČIUS	CPMA	Nuclear Specialist
Elžbieta RYNKEVIČIŪTĖ	CPMA	Legal Specialist
Michail DEMČENKO	VATESI	Director
Saulius STRAVINSKAS	VATESI	Head of Division, Decommissioning
Albinas MASTAUSKAS	RPC	Director
Ineta JANUŠYTĖ	RATA	Acting Director
Bulgaria		
Dilyan PETROV	SE RAW	Executive Director
Margarita KORKINOVA	SE RAW	Deputy Director, Finance, Administration and Security
Boris PEKOV	SE RAW	Deputy Executive Director
Ira STEFANOVA	SE RAW	Chief Engineer of NDF
Georgi GIOSHEV	SE RAW	Director Decommissioning
Galia SIMEONOVA	SE RAW	Head of International Projects Division
Jesus SANCHEZ	SE RAW	Head of the PMU

Name	Institution	Position
Kevin CORRIGAN	SE RAW	Commercial manager PMU
Plamen PETKOV	SE RAW	Chief Engineer of Specialised Division Decommissioning
Georgi HASHALOV	SE RAW	Head of Operations Department at Specialised Division RAW Management
Bratan BRATANOV	SE RAW	Head of Engineering Services Department
Krasimir PARVANOV	Ministry of Energy	Deputy Minister of Energy
Ivan YORDANOV	Ministry of Energy	Expert
Slovakia		
Artur BOBOVNICKY	SIEA	Director, Division of Innovation and International Cooperation
Peter KOVAR	SIEA	Head of Programme Bohunice
Cecilia GALLOVA	SIEA	Programme Bohunice
Thomas KLEIN	JAVYS	Director of V1 Decommissioning and PMU Division
Andrea ORESANSKA	JAVYS	Head of V1 Decommissioning Planning and Technical Engineering Section
Jozef HARING	JAVYS	Head of Planning, Preparation and Technical Engineering Department
Lenka VIDLICKOVA	JAVYS	Project Engineer, Planning, Preparation and Technical Engineering Department
Tibor KUKAN	JAVYS	Specialist (Planning, Preparation and Technical Engineering Department)
Alena ZAKOVA	Ministry of Economy	Director of International Relations Energy Department
Jan PETROVIC	Ministry of Economy	General Director of Energy Section
Martin URMINSKY	Ministry of Economy	International Relations Energy Department
Mikulas TURNER	NRA	General Manager of Department
Martin POSPISIL	NRA	Director of the division of Legislation and Legal Affairs
Peter VALCUHA	NRA	NA
Bernard LIPAR	NRA	NA
Peter PAVLOVIC	NRA	Director of the division of International Relations and European Affairs

5. Annex 5: Public consultation results

5.1. General Public Consultation

The section below is describing the results of the open public consultation launched by the European Commission regarding the NDAP. The survey was available online on DG ENER's website and "Your Voice in Europe" website between July and September 2017.

Identification of the respondents

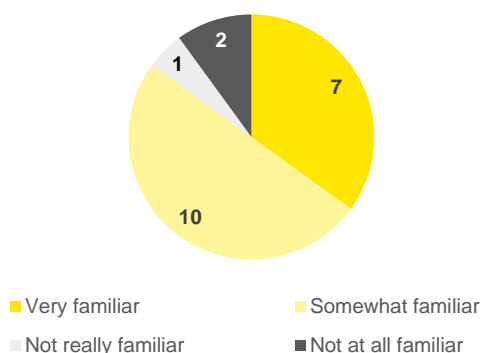
20 contributions to the open public consultation have been registered. The respondents mainly answer in their personal capacity (13) rather than in their professional capacity or on behalf of an organisation (7). Most of the answers came from Lithuanian (11). Regarding the other two Member States which directly benefit from the EU support, only one answer was registered from Bulgaria and no answer from Slovakia. Some other Member States also participated in the survey: Germany (3), Spain (1), Italy (1), Austria (1), France (1) and Finland (1). Among all respondents, 5 indicated that they were involved in public authorities, 2 in Member States authority, 2 in private organisations, 1 in NGO and 4 as Citizens.

Overall the participation to the consultation can be considered as very low which can be explain by two main factors:

- ▶ A large part of programme stakeholders have directly been consulted during the study through interviews;
- ▶ There are no strong supporters or opponents to the programme.

The respondents are generally familiar with the NDAP (17) and only three respondents indicated that they are not familiar with the programme. However, few respondents are directly involved in the programme (3 respondents) but eight respondents learn about NDAP because they are working in the nuclear sector or interested out of professional interest. Among them two respondents indicated that they are also concerned because they have a link with the concerned geographical area. Finally four respondents indicated that they only learn from NDAP out of personal interest.

Figure 2 - What is your level of awareness regarding the Nuclear Decommissioning Assistance programme and the nature of assistance it is providing?

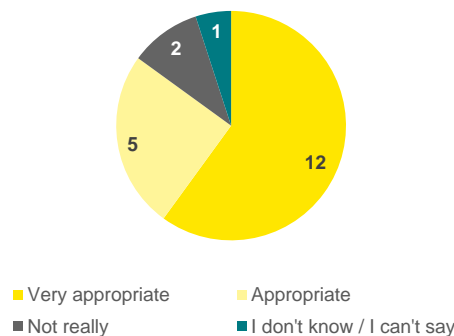


Main findings of

the consultation

17 respondents considered that the general objective of the NDAP is still appropriate to the current needs. These needs have been identified by the respondents as the removal of the safety threat posed by the concerned reactors until their final safe decommissioning stage (18 answers) and the sharing of the financial burden of the decommissioning of the nuclear power plants (11 answers).

Figure 3 - To what extent is the general objective of the Nuclear Decommissioning Assistance Programme still appropriate in relation to the current needs?



13 respondents considered that the NDAP is fully coherent with the Euratom acquis rather than 5 respondents did not provide answer to this question.

The respondents have overall a good opinion on the effectiveness of the NDAP (17 respondents) and most of them considered that the level of safety of the EU citizens have been improved as a consequence of the NDAP (14 respondents).

Regarding the impacts of the NDAP, the large majority of respondents considered that the NDAP had a positive impact on the local economy and brought a rather or very positive change for local people and society. Other types of impacts at local or national level were acknowledged by the respondents including two position opinions (Implementation of dialogues and kind of responsibility towards European citizens regarding nuclear power, Positive development for decommissioning service providers and consultants) and 2 negative opinions. The respondents also considered that the NDAP generated impacts that could not been achieved otherwise, according to the additional information provided by some respondents this is mainly due to the fact that the Member States concerned would not been able to financially support the decommissioning of the nuclear power plant and so ensure the safety of the nuclear sites concerned.

Diverging views

Diverging views are very limited in the consultation answers and are not consistent with one another. The main points underlined by the respondents in the responses to the open questions are related to the following statements:

- ▶ The main risk in the nuclear power plants was related to the spent nuclear fuel and the NDAP should only cover this aspect;
- ▶ The NDAP conducted to reinforce a sad image of the nuclear energy rather than encourage competitiveness of nuclear sector;
- ▶ More national responsibility and ownership have to be taken;
- ▶ An increase in the supervision and monitoring of the European Commission and a higher implication of the Member States in the decisions are needed to ensure higher efficiency of the programme and limit the cost increase.

5.2. Targeted Consultation

The section below is describing the results of the targeted consultation launched by EY regarding the NDAP. Invitation was sent by mail to approximately 90 members of targeted organisations. The survey was available online between 4 July and 15 September

Identification of the respondents

17 answers were registered to the online survey including 4 from Lithuania, 1 from Bulgaria and 12 from Slovakia. 10 respondents indicated that they were familiar with the programme but 3 indicated not to be really familiar with the NDAP and 4 not familiar at all. Above them three respondents only answered to the

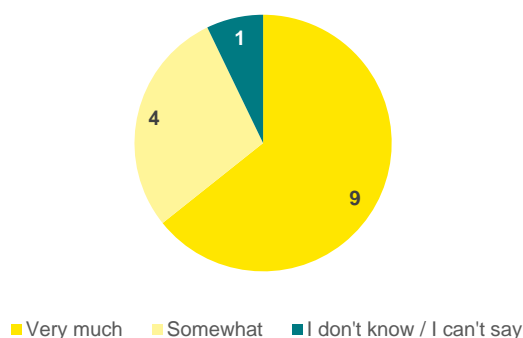
identification questions and did not provide answers to the main part of the survey. These answers are not included in the following analysis.

Relevance

Most of the respondents considered that the programme remains relevant to the needs of each Member State considering that:

- EU has to continue supporting the decommissioning of the plants because it required their closure (9 answers),
- National authorities do not have adequate capacities to manage the decommissioning safely and effectively without EU assistance (9 answers),
- Adequate national funding is not available to ensure the timely decommissioning of the reactors (8 answers) and the safe decommissioning of the reactors (6 answers) creating a risk for the general public.

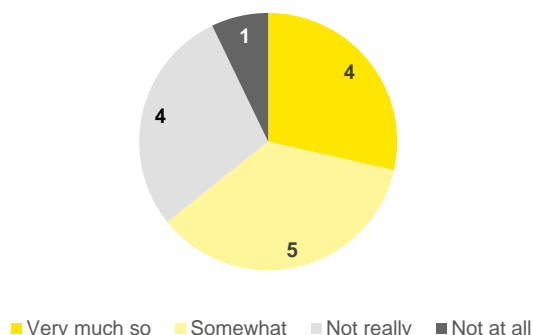
Figure 4 - To what extent do you believe that the programme remains relevant to the needs of Lithuania/Bulgaria/Slovakia today?



Effectiveness

The respondents are divided regarding the fact that authorities are on the right track to achieve expected results in line with decommissioning plans.

Figure 5 - Considering the achievements since 2014, do you believe that authorities are on the right track to achieve expected results in line with the decommissioning plans?



However all the respondents considered that nuclear safety has been adequately taken into account in the implementation of the NDAP in the three Member States.

Efficiency

9 respondents out of 14 considered that the efficiency of programme implementation have been a primary concern of national authorities rather than 3 assessed that the programme implementation was not really efficient and 1 that the programme was not at all efficient. The respondents identified the nuclear

power plant owner/operator (7 answers), the implementing bodies (5 answers), the national ministries (5 answers) and the European Commission (2 answers) as organisations assuming primary responsibility for the implementation of decommissioning activities.

Impacts

The respondents considered that the NDAP implementation had a positive impact on the development of knowledge and expertise, the capacity of national authorities and operators to manage decommissioning of spent fuel and radioactive waste. However the respondents are more divided regarding the economic impacts at local and national level.

Five respondents considered that the NDAP also led to unintended negative impacts but were not able to precisely describe them.

Added Value

All respondents considered that the NDAP has provided added value to the Member States. However only one respondent described the types of added value provided, he underlined the experience and knowledge gain for the EU companies and positive impact on safety of people and environment.

6. Annex 6: Technical Annexes

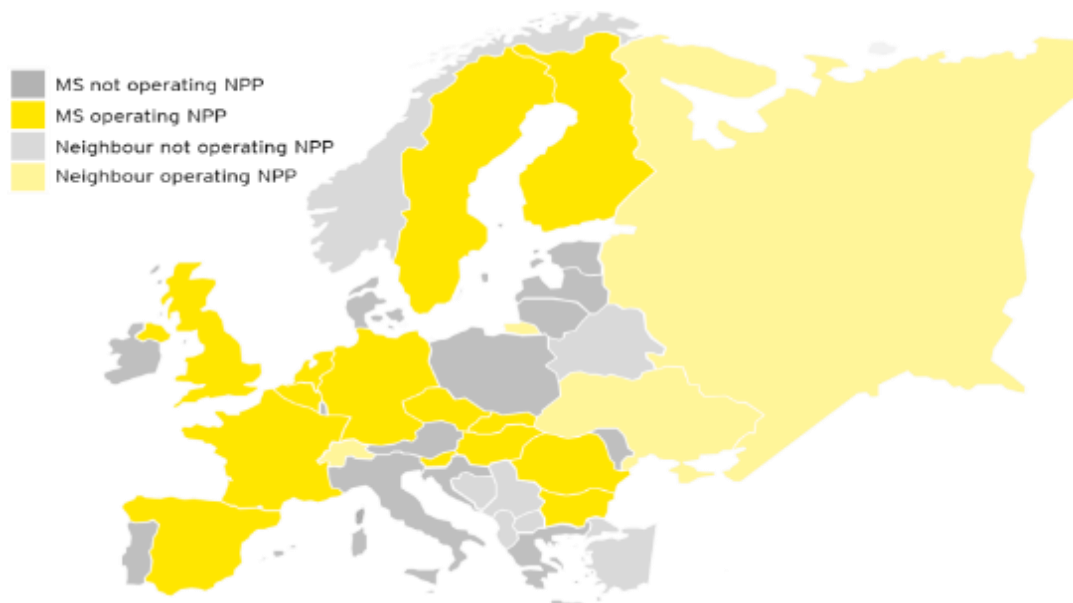
6.1. Nuclear and decommissioning in the European Union

Nuclear in the European Union

Nuclear energy is a crucial element of the EU power generation portfolio. There are currently 129 nuclear power reactors (119 GWe) operating in 14 of the 28 EU Member States.³ Together, they account for approximately 30% of the electricity generated in the whole of the EU.⁴ The EU's nuclear fleet represents a base-load source of energy with relatively low carbon levels (comparable to many renewable energy sources)⁵ and stable costs, which makes it attractive from the point of view of supply security and meeting ambitious emissions targets taken on the EU level.

In addition to current plans for lifetime extension and capacity upgrades to the existing nuclear fleet and the construction of new units in Member States already operating nuclear reactors, two Member States not currently hosting nuclear reactors (Poland and Lithuania) will potentially begin construction of nuclear power plants (NPPs) in the coming years. On Europe's borders, 53 reactors are currently operating in three non-EU countries (Russia, Ukraine and Switzerland) and plans for constructing nuclear power stations are under way in Belarus and Turkey.⁶

Figure 6: Nuclear Energy in the EU and neighbouring countries⁷



The large majority of nuclear reactors operating in the EU are Generation II light-water reactors (LWR). Most of the expansion in the coming decades is expected to come from Generation III LWRs. Two Generation III+ reactors (the European Pressurised Reactor designed by AREVA-Siemens) are currently under construction in the EU in Finland (Olkiluoto NPP) and France (Flamanville NPP) and construction has recently begun in the United Kingdom on the Hinkley Point C power station.

³ [IAEA Power Reactor Information System](#)

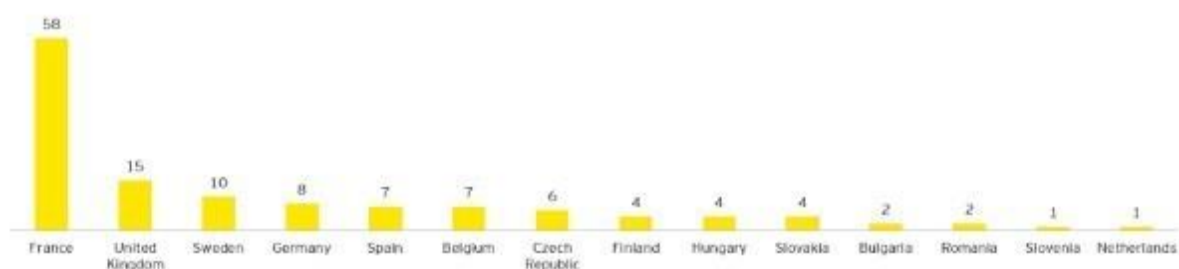
⁴ Eurostat [nrg_109a] accessed October 2016

⁵ Various sources compiled by the [Nuclear Energy Institute](#)

⁶ [Nuclear Power in the European Union – World Nuclear Association](#)

⁷ [IAEA Power Reactor Information System](#)

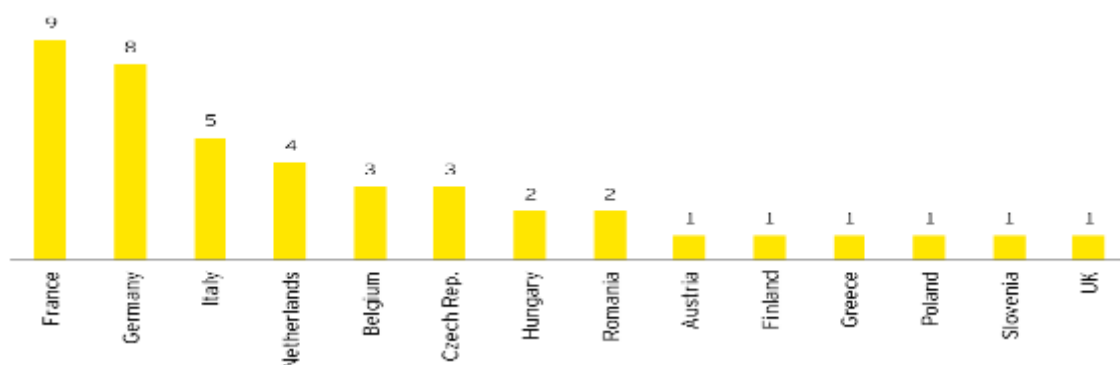
Figure 7: Number of operational nuclear reactors by Member State⁸



In line with the EU treaties, it is up to each Member State to decide whether or not to pursue the option of nuclear power and, more generally speaking, set their energy policy. For this reason the policies of Member States vary considerably. The current EU reactor fleet is highly concentrated in a small number of Western and Northern European Member States. Out of the 130 nuclear reactors operating in 14 Member States, the French reactor fleet (58 reactors) comprises approximately 45% of the total EU nuclear fleet. The reactor fleets of the five most nuclearized Member States in terms of the installed nuclear capacity represent 76% of the entire EU reactor fleet. However, the historic nuclear leaders are generally moving towards a declining share of nuclear power in their national energy mix. It is in Eastern Europe, where Member States are keen to reduce reliance on Russian gas imports and coal, that the most ambitious plans for new build exist.

Nuclear fission is a highly technical subject, requiring important amounts of research and development. Reflecting this, there are 42 research reactors in the EU currently planned, under construction or currently being operated, as well as six in temporary shutdown.⁹

Figure 8: Research reactors, planned, under construction or operating¹⁰



Nuclear decommissioning

NPPs, as with any sort of power plant, have a finite life beyond which it is not economically feasible to operate them safely. According to the World Nuclear Association¹¹, early NPPs were designed for a life of about 30 years; though with refurbishment, some have proven capable of continuing well beyond this. Newer NPPs are designed for a 40 to 60 year operating life. At the end of the life of an NPP, it needs to be decommissioned, cleaned up and demolished so that the site can be made available for other uses.

The number of nuclear installations in the EU, such as NPPs, research reactors and other nuclear fuel cycle installations, that are definitively closed and undergoing decommissioning is steadily increasing as the reactor fleet ages. In 2017, over 105 commercial power reactors, 48 experimental or prototype reactors and over 250 research reactors and a number of fuel cycle facilities have been shut down and retired from operation in the whole world, including 90 in the European Union – 36% of the world total. Some of them

⁸ [IAEA Power Reactor Information System](#)

⁹ [IAEA research reactor database](#)

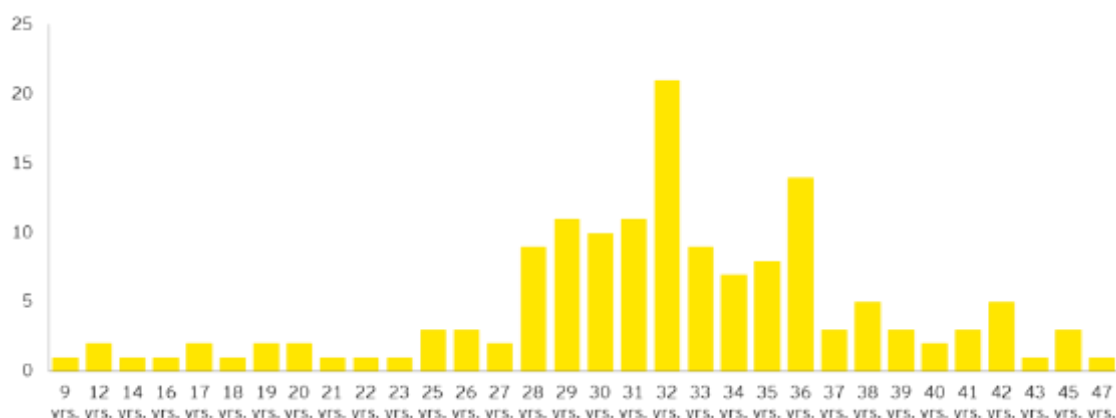
¹⁰ *Idem*

¹¹ [World Nuclear Association – Decommissioning Nuclear Facilities](#)

have already been fully dismantled, but the rest will need to be decommissioned in coming years. According to the European Commission, only three reactors have been completely decommissioned - all based in Germany – amongst the 90 shut down in Europe.¹²

The large majority of commercial nuclear reactors operating in the EU are Generation II LWRs built in the 1970s and 1980s. The construction of reactors has slowed down in the last 30 years, meaning the average age of the nuclear fleet has been continually growing and reached 32 years in 2016. The country with the oldest reactor fleet is the Netherlands (43 years), followed by Switzerland (41,4 years), Finland (37,8 years), Sweden (37,7 years), Belgium (36,4 years), Slovenia (35 years) and the United Kingdom (32,6 years). The average age of the reactor fleets in other EU Member States was equal to or less than the overall average.

Figure 9: Distribution of the age of the EU commercial reactor fleet ¹³



Nuclear decommissioning is the final step in the lifecycle of nuclear installation covering all activities from shutdown and removal of fissile material to environmental restoration of the site. According to the IAEA, the term ‘decommissioning’ refers to the administrative and technical actions taken to allow the removal of some or all of the regulatory controls from a facility (except for the part of a disposal facility in which the radioactive waste is emplaced, for which the term ‘closure’ instead of ‘decommissioning’ is used).¹⁴

Three decommissioning options exist, according to the International Atomic Energy Agency:

- ▶ **Immediate Dismantling**, allowing for the facility to be removed from regulatory control soon after shutdown. The final dismantling or decontamination activities can begin within a few months or years, depending on the facility. The site is then available for re-use.
- ▶ **Safe Enclosure**, which projects final dismantling 40 to 60 years after the shutdown or termination of regulated activities. The facility is placed into a safe storage configuration until the beginning of the decommissioning process.
- ▶ **Entombment**, that consists in putting the facility into a condition that will allow it to be maintained on-site, with the radioactive material also on-site. The facility is then encased in a long-term structure, such as concrete, in order to last for a period of time after which the remaining radioactivity will no longer pose a threat.

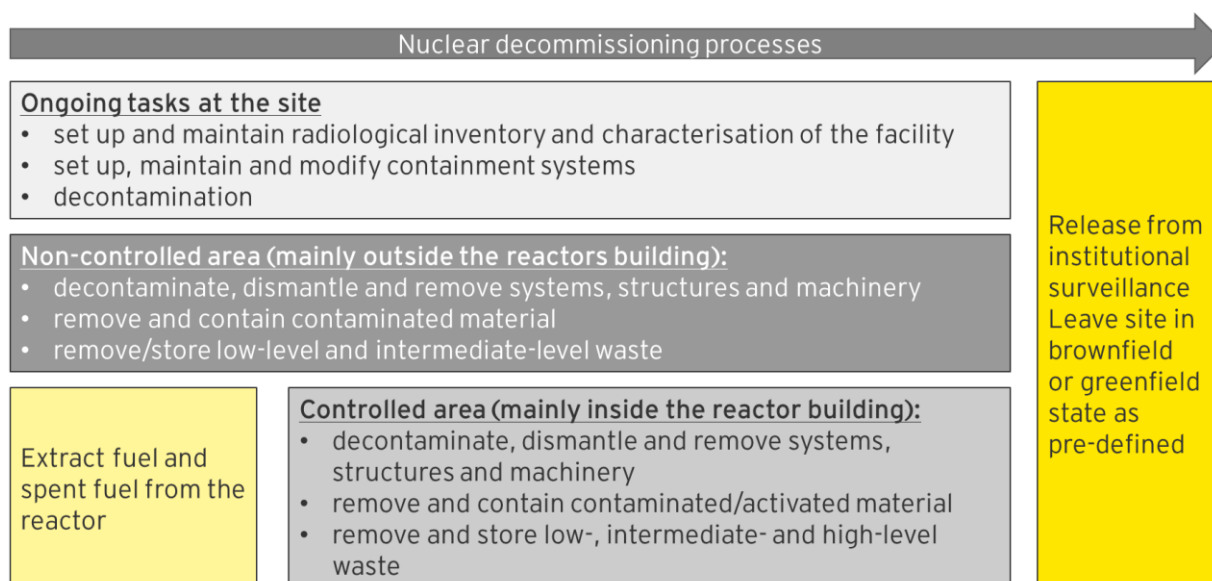
Immediate dismantling is the most common approach to nuclear decommissioning and the approach chosen by the three Member States concerned by the NDAP. A generic presentation of the decommissioning is presented below:

¹² [EU Court of Auditors: EU nuclear decommissioning assistance programmes \(2016\)](#)

¹³ [IAEA Power Reactor Information System](#)

¹⁴ [IAEA Safety Standards: Decommissioning of Facilities](#)

Figure 10: Main processes involved in decommissioning a nuclear power plant



Source: European Court of Auditors, 2016

EU action in the area of decommissioning

In view of the challenges that decommissioning represents for national authorities and NPP operators, as well as the inherent public health and safety concerns associated with the back-end of the nuclear cycle, the European Union has developed a number of areas of action in third domain.

- ▶ In 2006, the European Commission adopted a recommendation¹⁵ on the efficient use of nuclear decommissioning funds, measures to ensure adequate and properly managed financial resources for all decommissioning activities of nuclear installations as well as for the safe management of spent fuel and radioactive waste.
- ▶ In order to facilitate common reflection and discussion of decommissioning funding issues, the Commission introduced, in 2006, the Decommissioning Funding Group (DFG), following on the abovementioned recommendation. The DFG is an expert group with nominated representatives from all EU Member States, created to assist the EC in the development of its decommissioning policy. It is tasked with providing up-to-date knowledge on decommissioning costs and the management of funding and exploring ways to further co-operation and harmonisation of nuclear decommissioning at European level.
- ▶ In 2011, the European Union adopted a Directive on the responsible and safe management of spent fuel and radioactive waste¹⁶, which supplemented existing national legislation and international conventions. It aims at ensuring a high level of safety, avoiding undue burdens on future generations and enhancing transparency. This Directive reaffirms the ultimate responsibility of Member States for management of the spent fuel and radioactive waste generated in them, including to establish and maintain national policies and frameworks, and to assure the needed resources and transparency. Member States were obliged to notify to the Commission their national programmes by August 2015 and any subsequent significant changes / progress towards implementation.
- ▶ In addition to the abovementioned legislation, the European Union has also adopted a wide range of legislation on radiation protection covering basic safety standards, information and emergency

¹⁵ Commission Recommendation of 24 October 2006 (2006/851/Euratom) on the management of financial resources for the decommissioning of nuclear installations, spent fuel and radioactive waste

¹⁶ 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

preparedness and contamination of drinking water and foodstuffs.¹⁷ This legislation has direct and indirect implications for decommissioning activities specifically.

- ▶ The European Union has also provided direct support to the decommissioning of nuclear reactors due to specific considerations. Following the Chernobyl disaster in 1986, the EU decided that so-called High Power Channel Type Reactors (RBMK) and first-generation Soviet-designed nuclear reactors would need to be shut down as the cost of the necessary safety enhancements no longer made it feasible to economically operate the reactors. At the time of their accession to the EU, Bulgaria, Lithuania and Slovakia agreed to shut down reactors at the sites of Kozloduy, Ignalina and Bohunice respectively. The EU launched the Nuclear Decommissioning Assistance Programmes to assist them.

¹⁷ [Overview of EU radiation protection legislation](#)

6.2. The Nuclear Decommissioning Assistance Programme (NDAP)

Overview

The 1986 Chernobyl disaster and its cross-border impact generated broad concern in Europe and beyond with regard to the operation of some first generation nuclear reactor types. At the watershed 1992 Munich summit, the G-7 heads of state and government committed to supporting the countries of Central and Eastern Europe with Soviet-designed nuclear power plants requiring safety upgrades. As part of these efforts and alongside other multilateral institutions such as the EBRD, the EU began providing financial and technical assistance during this period to partner countries in Central and Eastern Europe, as well as Central Asia, through the TACIS and PHARE programmes. A number of countries benefited from this assistance, including Bulgaria, Czech Republic, Hungary, Lithuania, Romania, Slovakia, Slovenia, Armenia, Kazakhstan, Russia and Ukraine.

In the framework of their EU accession negotiations, Bulgaria, Lithuania and Slovakia made a formal commitment to close eight Units located on their territories. These were: Kozloduy Units 1 to 4 in Bulgaria, Ignalina Units 1 and 2 in Lithuania and Bohunice VI Units 1 and 2 in Slovakia. The reactors were shutdown, as per the timescales set out in the Accession Treaties, the last one in 2009.

Table 1: Nuclear reactors subject to early closure and support through the NDAP

Member State	Reactor unit / type	Envisaged operational lifetime	Closure date	Decommissioning timescale*
Bulgaria Kozloduy NPP Units 1 – 4	Unit 1: VVER- 440/230	1974 - 2004	2002	2030 (24 years)
	Unit 2: VVER- 440/230	1975 - 2005	2002	
	Unit 3: VVER- 440/230	1980 - 2011	2006	
	Unit 4: VVER- 440/230	1982 - 2011	2006	
Lithuania Ignalina NPP Units 1 & 2	Unit 1: RBMK 1500	1984 - 2013	2004	2038 (29 years)
	Unit 2: RBMK 1500	1987 - 2017	2009	
Slovak Rep. Bohunice V1 Units 1 & 2	Unit 1: VVER- 440/230	1980 - 2008	2006	2025 (17 years)
	Unit 2: VVER- 440/230	1981 - 2010	2008	

**Pre-decommissioning activities began for all programmes before final shutdown of reactors. The timescales indicated above provide the end date and the duration following the shutdown of the final unit.*

Recognising the exceptional circumstances of their closure, the EU committed to provide assistance to these three Member States, to support decommissioning as well as mitigation measures to address the consequences of early closure. Historically, this assistance, provided through the Nuclear Decommissioning Assistance Programmes (NDAP), can be divided into four distinct periods beginning during the pre-accession period and stretching to the current Multi-Annual Financial Framework (MFF):

- ▶ During the pre-accession period (up to 2004 for Slovakia and Lithuania and 2007 for Bulgaria), the three countries received funding through the instruments targeted at candidate and partner countries (PHARE and later the Instrument for Pre-accession Assistance).
- ▶ Financial assistance over the second period (2004 - 2006 for Slovakia and Lithuania and 2007 – 2009 for Bulgaria) was provided under the protocols to the countries' accession acts.

- ▶ Since 2007 for Slovakia and Lithuania and 2009 for Bulgaria, Council regulations have ensured the continuation of assistance for decommissioning assistance programmes.
- ▶ The fourth and current period began in 2014 with the new MFF and will run until 2020. In December 2013, two new Council Regulations were adopted providing financial assistance for the MFF 2014-2020:
 - 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
 - Council Regulation (EC) 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

The European Court of Auditors estimates that by 2020, some EUR 3,8 billion of EU financial assistance will have been committed within the framework of the NDAPs since 1999, providing financial assistance for decommissioning, dismantling and waste management projects, but also energy-sector projects aimed at mitigating the consequences of reactor shutdowns. The overall resources available to the three programmes for the 2014 – 2020 period amounts to EUR 989 million as summarised in the table below. This overall budget is reduced to EUR 2,9 billion of EU financial assistance once the energy-sector projects are excluded.

Table 2: NDAP financial allocation 1999 – 2020

Programme	1999 – 2020 (M€) (% of total)	2014 – 2020 (M€) (% of total)	1999 – 2013 (M€) (% of total)
Kozloduy (BG)	1 143 (30%)	293 (30%)	850 (30%)
Ignalina (LT)	1 818 (48%)	451 (47%)	1 367 (48%)
Bohunice (SK)	849 (22%)	225 (23%)	624 (22%)
Total	3 810	969	2 841

Besides the NDAP, other sources of financial support to the three Member States' decommissioning programmes exist. International donor contributions were made in addition to EU support to the three International Decommissioning Support Funds (Ignalina IDSF, Kozloduy IDSF, Bohunice IDSF) managed by the ERBD. Such blended EU- and non-EU financial assistance was provided to elements of the national decommissioning programmes up to 2013 when remaining resources were expended. In addition, Member States have also provided national funding, which is complemented by the EU support. This has gone directly to support decommissioning measures, but also to other essential tasks for supporting decommissioning, such as assuring the physical security of nuclear sites.

The NDAP Regulations covering the current MFF define the general objective (article 2.1) and the specific objectives (article 2.2) for each programme. The general objective is to *assist Member States in implementing the steady process towards the decommissioning end state of the reactors in question in accordance with their respective decommissioning plans, whilst maintaining the highest level of safety*. It should be noted that unlike previous programming periods, the NDAP during the current programming period (2014 – 2020) does not propose further support from the EU to mitigate the consequences of the early closure of the nuclear power plants. The specific objectives for each programme are summarised in the table below.

Table 3: Specific objectives of NDAP

MS	Specific Objectives (as per Article 2.2 of the NDAP Regulations)
Kozloduy (BG)	<ul style="list-style-type: none"> ▶ 1. Performing dismantling in the turbine halls of units 1 to 4 and in auxiliary buildings; ▶ 2. Dismantling of large components and equipment in the reactor buildings of units 1 to 4; and ▶ 3. Safely managing the decommissioning waste in accordance with a detailed waste management plan.
Ignalina (LT)	<ul style="list-style-type: none"> ▶ 1. Defueling of the reactor core of unit 2 and the reactor fuel ponds of units 1 and 2 into the dry spent fuel storage facility; ▶ 2. Safely maintaining the reactor units; and ▶ 3. Performing dismantling in the turbine hall and other auxiliary buildings and safely managing the decommissioning waste in accordance with a detailed waste management plan.
Bohunice (SK)	<ul style="list-style-type: none"> ▶ 1. Performing dismantling in the turbine hall and auxiliary buildings of reactor V1, to be measured by the number and type of systems dismantled; ▶ 2. Dismantling of large components and equipment in the V1 reactor buildings, to be measured by the number and type of systems and equipment dismantled; and ▶ 3. Safely managing the decommissioning waste in accordance with a detailed waste management plan, to be measured by the quantity and type of safely conditioned waste.

Additionally, detailed objectives, targets, milestones and performance indicators have been defined for each programme and each specific objective in Annex 1 of the Rules of Application of the NDAP set out in Commission Implementing Decision C(2014) 5449 final.

Governance & management of the NDAP

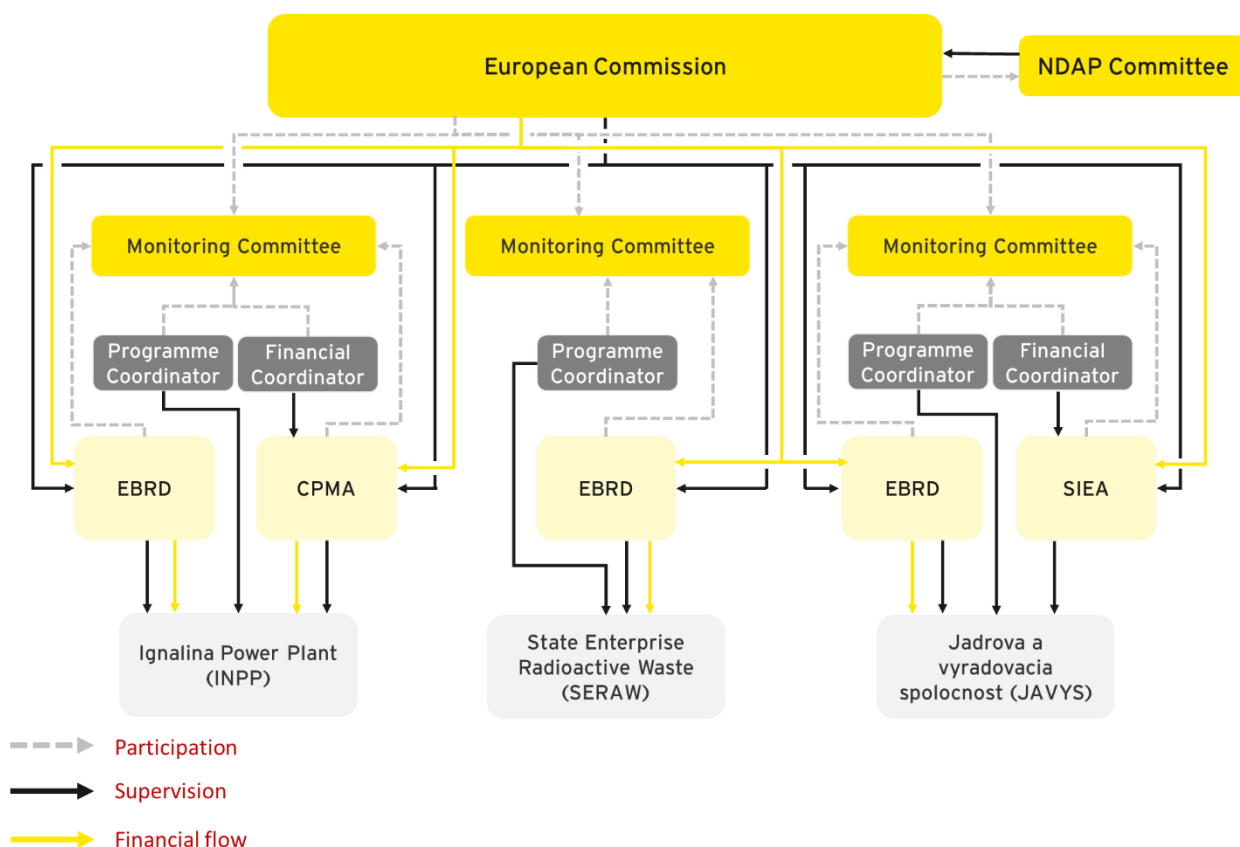
The Nuclear energy, Nuclear Waste and Decommissioning Unit (D2) under the Nuclear Energy, Safety and ITER Directorate of the Directorate-General for Energy of the European Commission (DG ENER) is the *chef de file* of the NDAP supervision on behalf of the Commission. The management mode is indirect management, whereby the Commission entrusts budget implementation tasks to implementing bodies, but retains overall responsibility and accountability for EU budget implementation.

There are three Implementing Bodies:

- ▶ Since 2001, the European Bank for Reconstruction and Development (EBRD) acts as an implementing body for all three of these programmes. It continues to act as the sole implementing authority in Bulgaria; however, the EBRD is now only managing past on-going projects in Lithuania and Slovakia.
- ▶ Since 2003, an increasing portion of the tasks have been entrusted to a national Central Project Management Agency (CPMA). At present, all new projects are being channelled through the Central Project Management Agency. As noted, the EBRD remains in charge of the projects that were previously placed under its responsibility.
- ▶ In 2015, upon request of the Slovak Republic, the Commission services assessed the national Slovak Innovation and Energy Agency (SIEA) with the aim of establishing a new implementation channel for the Bohunice programme. The Delegation Agreement was signed in August 2016 and new projects are now being implemented through the SIEA. As noted, the EBRD remains in charge of the projects that were previously placed under its responsibility.

The figure below presents the governance structure for programme administration for the NDAP in Lithuania, Slovak Republic and Bulgaria.

Figure 11: Governance structure for NDAP administration



The roles of the respective actors at EU and national level are presented below:

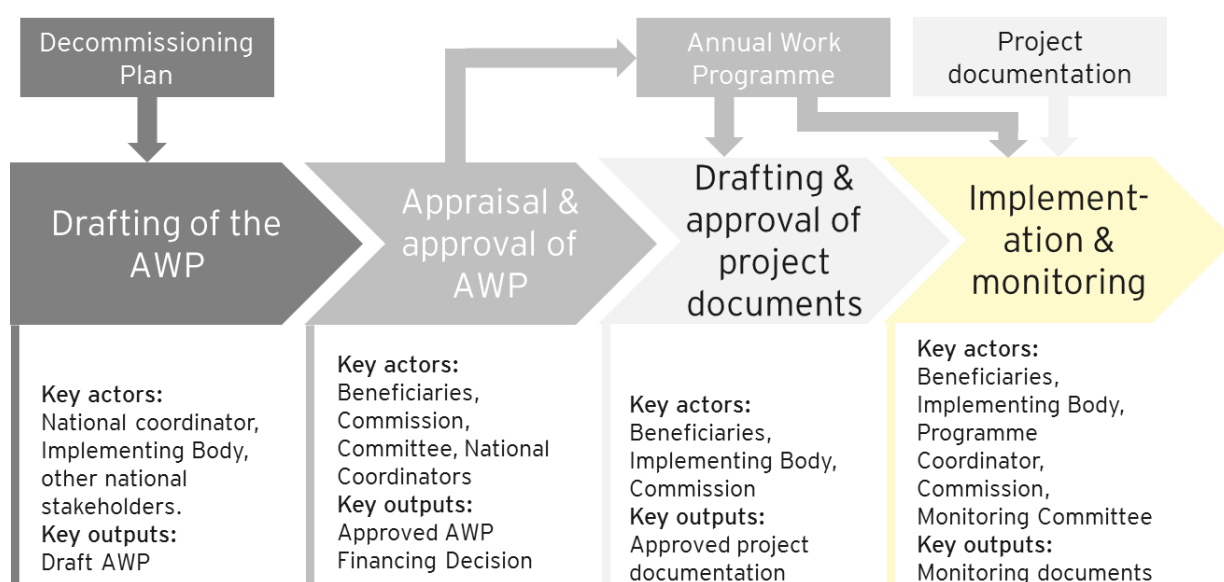
- ▶ As noted, under indirect management mode the **Commission** retains overall final responsibility for the general budget execution. More specifically, the Rules of Application of the NDAP (Article 4 of the Commission Implementing Decision) set out the roles and responsibilities in the management of the programme. Overall, the Commission is responsible for ensuring the effective and efficient implementation of Union actions provided for in the decommissioning programmes. It approves the decommissioning plans (baselines) in annex to the Implementing Decision and has the authority to review and approve, in consultation with the NDAP Committee, the Annual Work Programmes (and any revision thereof). On this basis, it adopts annual financing decisions and provides funding to the respective Implementing Bodies. Beyond this, the Commission also has the authority, in informal consultation with the Committee, to decide on the eligibility of individual projects (and any amendment thereof). It also participates in monitoring of the implementation of the decommissioning programmes (e.g. through the Monitoring Committees) and periodically conducts on-the-spot monitoring of progress against the annual work programmes at the facilities under decommissioning.
- ▶ The **NDAP Committee** is set up by the Commission to assist it in its task. The Committee is composed of the representatives of the Member States and chaired by the Commission. The Committee delivers an opinion with regards to the draft financing decision with attached annual work programmes and any draft revision of the approved financing decision with attached annual work programmes. The Commission also informs the Committee prior to deciding on the eligibility of individual projects.
- ▶ The **Member States** are responsible for designating the Programme Coordinator, and where a National Agency has been established in the Member State concerned, the Financial Coordinator. They establish national structures for the coordinated management of the implementation of measures and ensure the efficient management of the programme at national level (e.g. adopt all measures to remove legal and administrative obstacles to the proper functioning).
- ▶ The **Programme Coordinator** has overall responsibility for the leading the annual programming exercise, in cooperation with other national stakeholders and the Commission. They should also

identify coordinate the NDAP with other Union programmes and financial instruments operating in the Member State and identify potential synergies and overlaps. They serve as the primary point of contact with the Commission. Finally, the Programme Coordinator ensures arrangements for monitoring at national level, notably the establishment of the Monitoring Committee.

- ▶ Where a National Agency has been established, the **Financial Coordinator** is responsible for ensuring the appropriate audit and financial overseeing of the national agency and provide on behalf of the Member State concerned the adequate financial guarantees
- ▶ The **Monitoring Committee** is set up by the Member States for the purpose of overseeing the implementation of the respective decommissioning programmes with EC cooperation. The Monitoring Committee is composed of the Programme Coordinator, the Financial Coordinator (the case being), the authorised representatives of the Implementing Bodies and a representative of the Commission. Representatives of the beneficiaries and other competent national authorities as well as external experts concerned with the implementation of the respective decommissioning programme may also attend. It reviews progress made against the objectives of the decommissioning programme and individual projects. It may also advise the Programme Coordinator on necessary corrective actions.
- ▶ The **Implementing Body** is a national agency (Lithuania & Slovakia since 2003 and 2016 respectively) or the European Bank for Reconstruction and Development (Bulgaria for all projects, Lithuania & Slovakia some or all past projects). This entity is responsible for implementation tasks under the respective decommissioning programme on the basis of a delegation agreement concluded with the Commission. The Implementing Body must notably ensure the submission of project documentation (and amendments) to the Commission and participate in the monitoring of the programme.

Annual programming and monitoring process

Figure 12: Overview of the annual programming and monitoring process



The Annual Work Programme (AWP) is drawn up by the competent authorities of the Member States, in close cooperation with Implementing Bodies and other public authorities and other national entities concerned with aspects of the respective decommissioning. This document includes:

- ▶ an updated decommissioning schedule highlighting the main activities, programme of work expected results, milestones, and target dates;
- ▶ a summary of the main achievements and problematic issues arising in the preceding calendar year;

- ▶ changes with respect to the baseline decommissioning schedules adopted as part of the Implementing Decision; and
- ▶ the relationship with other national financial instruments including where applicable information on national co-financing of objectives by the Member State.

It is submitted to the Commission for approval by the Programme Coordinator. Should the Commission consider that the draft work programme does not comply with the rules laid out in the Implementing Decision, it can require the Programme Coordinator to make appropriate revisions. Following Commission assessment of the AWP and consultation with the Committee, the AWP is formally validated by the Commission. On the basis of the approved AWP, the Commission adopts annually financing decisions providing the amount of the appropriations allocated to the decommissioning programmes and allocating funds for the execution of projects defined within the framework of the AWP.

Once the AWP is approved and the Commission adopts the annual financing decision, project documentation is prepared describing and justifying the measures planned in order to implement the objectives of the decommissioning programme in line with the AWP. This documentation is drafted by the beneficiaries, in close cooperation with the Implementing Body. The Implementing Body submits the project documentation to the Commission, which conducts an appraisal and may request additional supporting information or clarifications.

The Implementing Decision adopted for the NDAP provides for the possibility of amending the AWP or project documentation. In cooperation with the Implementing Body, the Programme Coordinator is responsible for initiating a modification of the AWP. Project documentation is updated by beneficiaries and the Implementing Body whenever there are significant changes. Where it is necessary or advisable to deviate from the provisions of the project documentation approved by the Commission, the project documentation is amended and submitted to the Implementing Body for approval.

During the course of project implementation, progress is regularly monitored. The Monitoring Committee is tasked with ensuring the effectiveness and quality of the implementation of measures and financial assistance. In cooperation with the beneficiaries, the Implementing Body prepares regular monitoring reports for the Programme Coordinator, the representative of the Commission (and Financial Coordinator where applicable). The draft monitoring reports are reviewed by the Commission before being distributed to the Monitoring Committee ahead of its biannual meetings.

The introduction of Earned Value Management (EVM) methodology in the three decommissioning programmes enables project management at local level and further enhances the effectiveness of the Commission monitoring and reporting. The comparability of progress in implementation and effectiveness of Commission monitoring were improved thanks to the EVM.

6.3. Description of key on-going projects

This section provides an overview of relevant information concerning key ongoing projects. It is intended primarily to complement analysis in the main report.

6.3.1. Kozloduy programme

Project: Design and construction of the National Disposal Facility	Reference: R-Project
Short description of the project: <p>National Disposal Facility (NDF) is envisaged for disposal of low and intermediate level short lived radioactive waste, category 2a according to the Bulgarian Regulation for Safe Management of Radioactive Waste. According to the Updated Decommissioning Strategy construction and commissioning of the National Disposal Facility is obligatory for the implementation of the decommissioning activities of Kozloduy Nuclear Power Plant Units 1-4. The acceleration of the decommissioning process, approved by the Council of Ministers on 5 January 2011 in the Bulgarian Strategy on management of spent fuel and radioactive waste until 2030, explicitly requires the availability of disposal modules for decommissioning radioactive waste in 2015. The Bulgarian Government assigned the task on establishment of the NDF to SERAW with Council of Ministers Decision No. 683 of 25 July 2005.</p>	
Implementation during the period under evaluation: <p>The beginning of construction (sub-project R-10) has been delayed by a variety of factors, including delays in the development of the Technical Design (TD) and Interim Safety Analysis Report (ISAR), legal challenges to the EIA and delays in contracting with the consortium for construction. In a major milestone, the BNRA approved the National Disposal Facility TD in March 2017 and the construction permit was issued shortly thereafter.</p>	
Project: Facility for extraction and processing of spent ion exchange resins	Reference: 5a
Short description of the project: <p>Ion exchange resins (IERs) from the operation of Units 1 to 4 are stored in tanks designed specifically for this purpose and situated in SPB-1 and SPB-2 (300m³). The initial design of the Units does not include equipment for the extraction and processing of IERs. It is therefore necessary to supply IER extracting and processing equipment. The equipment must enable the extraction of all IERs from the tanks and the conditioning of the resin extracted to a form appropriate for further processing and/or storage. The project has found that the IERs must be fully characterised before a conditioning procedure can be developed so that the conditioned product is compliant with the technical specification of the project and with the requirements of the final recipient of the conditioned product.</p>	
Implementation during the period under evaluation: <p>The project has met numerous difficulties in the previous and financing period due to technical difficulties experienced by the contractor. Factory Acceptance Tests (FATs) of sampling equipment were successfully conducted in September 2015, and the equipment was delivered to the Kozloduy in October 2015. However, the Contractor subsequently had to conduct additional design work and FATs were rescheduled to March 2017. The Contractor's additional delay in the design, manufacture, installation and commissioning of the Articulated and Telescopic Sampling Equipment caused delays in the sampling, analysis and characterisation of the ILW tanks. SERAW mitigated delays by monitoring project progress on a weekly basis via teleconferences and by offering the Contractor technical support through its engineering department and D-R PMU Consultant home-office resources. Continued delays in the design and manufacture of Articulated and Telescopic Sampling Equipment have led to a suspension of the sampling, analysis and characterisation of the IER content of ILW tanks. Continued poor performance on the part of the Suppliers finally resulted in reduction in the Contract's scope and price. A decision was taken to combine the remaining work under this contract and the subsequent</p>	

retrieval and processing of the resins with Project 9b (retrieval and processing of the evaporator concentrates) and Project 28 (retrieval and processing of residual sludge from a number of locations in Units 1-4).	
Project: Facility for the treatment and conditioning of solid radioactive waste with high coefficient of volume reduction (Plasma Melting Facility)	Reference: 5b
Short description of the project: <p>The existing facility for conditioning and intermediate storage of compressed low-level solid radioactive waste is dimensioned to the RAW amounts generated by the operation six KNPP units. The decommissioning of Units 1 to 4 will generate additional amounts of this type of waste. Implementation of the project for the supply of a Facility for the treatment and conditioning of solid radioactive waste with high coefficient of volume reduction will provide for the efficient processing of all waste generated by operational and decommissioning activities, and for the storage of the derived waste in the existing storage facility of SERAW</p>	
Implementation during the period under evaluation: <p>The Plasma Melting Facility (Project 5b) has been a contentious project suffering from a number of difficulties and delays – mostly artificial in nature. Development of the project and tendering were delayed by protracted negotiations over co-financing. Following market response, more delay accumulated in negotiation before deciding to move forward with the proposed technology. Significant delays were also accrued during the development of the TD and SAR, handover between KNPP and SE RAW, legal challenges to the EIA and commercial disputes with the contractor. The Nuclear Indemnity Agreement was not ratified until 2017, leaving a significant and unnecessary risk hanging over the project for nearly two years. 72-hour cold trials finally began in May 2017 and a contract amendment was signed in March 2017 to conclude all accumulated commercial issues with the contractor. Hot tests were completed by the end of 2017.</p>	
Project: Facility for Retrieval and Processing of The Solidified Phase from Evaporator Concentrate Tanks	Reference: 9b
Short description of the project: <p>Evaporator concentrates are currently stored in 10 tanks on the KNPP site. There are 5 tanks in Auxiliary Building 1 (AB 1) and 5 tanks in Auxiliary Building 2 (AB 2) filled with concentrates from Units 1-4. Some of these concentrates have been stored in the tanks since 1970 and have precipitated out to form a solid crystalline phase and a liquid phase in the tanks. The removal of the solid crystalline phase is necessary work in order to empty and clean the tanks and allow dismantling work to start. 5000m3 of evaporator concentrate have been generated and temporarily stored in KNPP AB-1 and AB-2. The design solutions in the 1960's did not envisage evaporator concentrate processing technology. They only foresaw their storage. The evaporator concentrates form a significant problem for KNPP in the site decommissioning work.</p>	
Implementation during the period under evaluation: <p>Following significant delays developing the proposed technical solution, the testing of Evaporator Concentrate Tanks' (ECT) waste retrieval and processing equipment was performed in June 2015. The main conclusion of the analysis of the results is that the applied technology cannot achieve the objectives of the project. SERAW and the contractor have agreed that Phase 2 (waste retrieval and processing) of the contract would not be executed. Following a detailed analysis of available options and alternatives, SERAW chose the option of issuing a new tender to complete retrieval and conditioning of the contents of the ECT. The scope of the new project may include retrieval and treatment of other liquid historical wastes such as sludges (Project 28) and ion exchange resins.</p> <p>In October 2016 the EBRD received for its review the draft of first stage tender documents. Tender Documents were issued late due to a protracted process of review between SERAW and the Consultant and addressing of EBRD and EC comments on the tender documentation. The two-stage tender was launched in February 2017. Successful tendering, award and execution of this significant contract (over</p>	

EUR 70 million) now set the critical path for dismantling in Auxiliary Buildings 1 & 2. Dismantling of equipment in Auxiliary Building 1 was originally foreseen for 2016.

Project: Treatment of Wet Solid Radioactive Wastes	Reference: 9b-2
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Short description of the project:

Under the initial Project 9b, detailed characterization of radioactive concentrate in all 10 storage tanks (ECT) was performed.

Project 9b-2 is a turnkey project with an experienced Contractor required to design, build, install, commission, operate and decommission the plant and equipment required to process the wastes. Remuneration is based on the quantity of wastes processed and meeting the Waste Acceptance Criteria for the downstream facilities.

The project scope covers retrieval and processing of:

- Concentrates from ECT (characterized within the completed Project 9b, Phase 1);
- Resins (characterized within the completed Project 5a);
- Sludges and other sediments (characterized within the completed Project 11c).

The retrieval and processing is based on proven technologies.

Implementation during the period under evaluation:

The 9b-2 Project Information Sheet was elaborated in May 2016 and presented for information and approval. The Technical Specification was completed in January 2017.

Two-stage Tender Process is being applied. The Invitation for First Stage Tender Process was issued on 3 February 2017. The Pre-Tender Meeting was held on 28 February 2017.

Site visit was held on 14 March 2017.

Sampling and initial characterisation of resins, sludges and sediments was completed in May 2017.

First Stage Proposals from Tenderers were submitted to SERAW on 25 May 2017.

Clarification meetings with all Tenderers were held in October 2017. Questions from the Evaluation Committee were answered by the Tenderers in October 2017 as well. Final First Stage Proposal Evaluation Report and Invitation for Second Stage Tender non-objected by the Bank on 29th November 2017.

Invitations for Second Stage Tender Process were submitted to three selected Potential Tenderers on 30 November 2017 based on the non-objected Second Stage Tender documents. The deadline for submission of the 2nd stage tenders was extended by 23 February 2018 as individually requested by the three potential contractors.

Project: Supply of Size Reduction and Decontamination Workshops	Reference: 12a
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Short description of the project:

The objectives of this project are to provide the necessary equipment and facilities for size reduction and decontamination of lightly contaminated equipment and materials in the Turbine Halls, and where appropriate, from Auxiliary Buildings and the Reactor Buildings. This will be a permanent building to be constructed using Containment Modules to prevent the spread of radioactive material into the environment, located within the decommissioning area of the four units. The workshop will be serving all four units under decommissioning, and will be equipped with all necessary fragmentation and decontamination tools and devices.

Implementation during the period under evaluation:

The Construction Permit was issued by the Ministry of Regional Development in October 2014. BNRA's plant modification permission was granted in October 2014. The same month, the EBRD also issued its non-objection to Contract Amendment 3 for EUR 14 276. The amendment covers the time extension for

completion, the revised schedule of payments, and the resolution of all outstanding claims and variations. The Contractor started construction in November 2014 and after the winter break resumed in March 2015. In July the Bank issued its non-objection to Contract Amendment No. 5 incorporating variations for repair of sewage connection and additional scope for SRDW power supply integration with KNPP Site infrastructure. As a result, the contract price is increased by EUR 2 915 to the total of EUR 19 147 192. 72 hour integrated hot tests were completed in December 2017. These tests had been delayed since November 2016.

Project: Decay storage at the Kozloduy Site for transitional radioactive waste	Reference: 19
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Short description of the project:

This project comprises the design, construction, testing, licensing and commissioning of sites for safe temporary storage of radioactive materials (RAM) and non-radioactive materials (scrap) from the decommissioning of KNPP Units 1 to 4. Projects 19 and 21 are combined in Project 19.

Implementation during the period under evaluation:

The expectation that construction would start in June 2015 did not materialised due to delays in the transfer of construction rights from KNPP to SERAW. The transfer was finalised in October 2015, causing a 7-month delay against the original plan. The delay in completion of Project 19-4 had a negative impact on the performance of dismantling works. The delays also created the need to resolve the contractor's request for extension of time and settle the associated claim. The outstanding claim prevented the contractor from completing the facilities, which in turn further affected the pace of dismantling works. The construction permit was issued in October 2015 and construction commenced in November. SERAW reached an agreement with the Contractor on resolution of its request for extension of time and the associated claim. A contract amendment for EUR 1,1 million was signed on in December 2015, allowing the contractor to proceed with the construction works at full speed.

The project reach important milestone with the construction dismantling waste storage sites, which has allowed for a backlog of dismantled equipment to be moved from the turbine halls in order to increase the pace of work. 3 000 tonnes of dismantled material were subsequently moved to these sites. This allowed for the increased pace of dismantling in the turbine halls.

Project: Detailed design for dismantling of equipment in the controlled areas of Kozloduy NPP Units 1-4	Reference: 44
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Short description of the project:

This projects is for the procurement of a detailed design for dismantling of equipment in the controlled areas of Kozloduy NPP Units 1-4. Design development is envisaged in two steps, first the conceptual design, analysing at least two options for the dismantling of the primary circuit and subsequently the management of the waste. Second, technical and detailed designs of the selected option for the dismantling of the primary circuit and its components. Dismantling design will be conclude with a safety analysis report justifying safety of selected option.

The dismantling design shall consider the ALARA principle, ensure safe execution of the dismantling activities and shall be based on modern tools for dismantling of contaminated and activated components. The design shall propose management patterns both for contaminated and activated systems and components, considering available facilities for treatment and storage of decommissioning RAM/RAW and if needed, new facilities shall be proposed.

Implementation during the period under evaluation:

The Invitation for Expressions of Interest was published on in May 2015 to submit applications by June 2015. A three-month delay was caused in the tendering process due the late submission of radiological inventory data for Units 1-4 from Project 11c. SERAW received three proposals from the shortlisted consultants on 1 February 2016. The prices of all three proposals exceed the original cost estimate and the available funds under Grant Agreement No. 052. This is due to the additional scope, which was not foreseen in the original Project Identification Sheet for Project 44. During development of the detailed

terms of reference, the analysis of available data to support the assignment concluded that sufficient data of adequate quality was not available to SERAW. Therefore a gamma scanning survey and Uniform Information Model Database and 3D Model, were chosen to address this issue. On 8 July 2016, the Bank gave its non-objection to the negotiated contract with Consortium “Decommissioning Kozloduy” comprising NUKEM Technologies GmbH, Germany (leader), Energiewerke Nord GmbH, Germany and NEOLANT JSC, Russia for €7,194,935.00.

The project is currently planned to be finalized in 2019, with the first deliverable (gamma scanning) recently being delivered. This project is driving the critical path of major dismantling works in the Controlled Area and any delay in execution will directly affect the overall decommissioning schedule by preventing the start of major decommissioning activities in the controlled areas of Units 1-4.

6.3.2. Ignalina programme

Project: Interim storage for RBMK spent fuel assemblies from Ignalina NPP Units 1 and 2	Reference: B1
Short description of the project: <p>Defueling of Ignalina NPP Units has a direct and critical impact on the overall timeline and cost of the decommissioning process. The Interim Spent Fuel Storage Facility (ISFSF, project B1) formed part of the initial decommissioning support investment package supported by the NDAP (Grant Agreement 002). This key infrastructure project was initiated due to the fact that Ignalina NPP did not have sufficient capacity to interim store its spent fuel. During operation, spent fuel assemblies were loaded from the spent fuel ponds into storage casks and transferred to an existing interim storage facility at an adjacent site. However, the interim storage facility could not contain all of the spent fuel that accumulated in the reactor cores and spent fuel ponds prior to and at shutdown of Ignalina.</p>	
Implementation during the period under evaluation: <p>Project B1 accumulated significant and unacceptable delays in previous programming periods due to a variety of different factors that eventually led to a suspension of disbursements in January 2013. These delays had a direct impact and contributed significantly to the extension of the overall duration of the decommissioning programme (5 years) in the latest version of the DDP.</p> <p>Since late 2014, INPP under new management, has worked quickly to resolve outstanding issues with the contractor which were highlighted by the EBRD. Significantly, the parties to the B1 contract signed contract amendment No. 10 in November 2015, which resolved pending commercial issues with no increase in the contract price. This progress culminated in the start of ISFSF hot trial operations in September 2016, which were completed in May 2017 five months earlier than planned. Subsequently, INPP received VATESI's permission for continued industrial operation.</p> <p>The completion of the B1 project has enabled for the critical process of defueling to begin in 2016. This, combined with ongoing efforts to optimize the defueling process and expedition of the delivery of remaining casks, is currently expected to enable complete defueling of Units 1 & 2 spent fuel ponds earlier than November 2021. This would enable other activities to begin earlier, if ready, and theoretically shorten the duration and cost of the overall decommissioning programme.</p>	
Project: Design and Construction of new Solid Waste Retrieval, Treatment & Storage Facility	Reference: B2/B3/B4
Short description of the project: <p>Radioactive wastes are produced during normal operation and decommissioning at Ignalina NPP Units 1 and 2. A safety assessment of the existing radioactive waste storage buildings on Ignalina NPP site has shown that their structures were not designed and constructed for long-term storage of radioactive wastes. The objective is to provide the new SWMSF for modernisation of the waste management and storage system for existing and future operational solid waste and solid waste from decommissioning of Ignalina NPP. The new SWMSF shall provide technologies and equipment for the safe retrieval,</p>	

sorting, repackaging and storage of the operational waste currently being stored on Ignalina NPP site. It should also accommodate processing of the operational solid waste that will be generated until final closure of Unit 1 before 2005 and Unit 2 in 2009 and decommissioning waste as included in the table above.

Implementation during the period under evaluation:

Just prior to the current MFF, the contract price for the project increased significantly by EUR 55 million from EUR 124 million to EUR 179 million. The project was subsequently rebaselined in cooperation with the contractor. By May 2015, the main construction works for the new B2 and B3/4 solid waste management facilities were completed and installation works were well advanced. Cold trials in new B2/3/4 solid waste management facilities started in August 2015. While work advanced generally in a satisfactory manner, the contractor's progress was slowed down due to delayed provision of funds from the contractor's owner Atomstroyexport to enable the contractor to pay subcontractors' invoices promptly. In November 2016, the contractor and INPP agreed on an updated Programme of Performance and related joint Action Plan. Completion of all pre-commissioning (cold trial) works was been rescheduled for April 2017 and the start of commissioning (hot trial) for June 2017. Cold trials were successfully completed in April 2017 and hot trial activities were underway at the time of evaluation.

Project: Engineering on Dismantling of Unit1 and Unit 2 Reactor Structures and Components from the Reactor Shafts

Reference: UP01

Short description of the project:

Project UP01 concerns the development of the dismantling technologies for structures and equipment from INPP Unit 1 reactor shafts. Three main areas for dismantling in the reactor shaft which are referred to as "working areas R1, R2 and R3".

Implementation during the period under evaluation:

Preparation of the technical and safety documentation for reactor zones R1&2 has lagged behind due to a lack of qualified personnel and overall rethinking of the general approach. In 2015 INPP's new management recognized the lack of qualified INPP personnel to develop D&D documentation for the reactors R3 zone and decided to involve an external professional contractor. Technical Specifications for the procurement of technical support to complete this work is currently underway over five years after the procurement for the original project (B9/4) was cancelled. The development of Technical Specifications has fallen behind schedule due to delays with measurement of nuclide vectors and disagreements between INPP and CPMA staff on the strategy to adopt for tendering. The target date for the preparation of the Technical Specification for the procurement of design services for R3 zone is September 2017.

Project: Design and construction of a Landfill facility for Short-lived Very Low Level Waste

Reference: B19/2

Short description of the project:

The Landfill Facility is intended for the disposal of Very Low Level short lived waste complying with Landfill disposal criteria (A class waste). It is operated in conjunction with the Landfill Facility Buffer Storage (B19/1). This installation is used for carrying out radiological characterization of all types of the waste packages. When radiological characterization is complete, all received packages approved as adequate for the disposal are stored in the facility storage, from where they will be transferred to the Landfill Repository (Project B19/2).

Implementation during the period under evaluation:

The landfill facility for short-lived very low level waste was delayed in the tendering process. This was launched in December 2015 and the first round of tendering was completed in May 2016. In June 2016, however, the District Court ordered the second stage of tendering to be suspended due to issues raised by one rejected tenderer. The decision of Court of Appeal was obtained in September 2016 and required the re-inclusion of the rejected tender and continuation of the procedure. At the time of the field visit (June 2017), approval for contract signature was expected imminently.

While slippage in project schedules can be noted, INPP management and other stakeholders agree that delays in B19/2 do not risk creating significant bottlenecks in waste streams at this point. The delay in B19/2 will result in a shortage of buffer storage capacity (Class A waste) in the Landfill Buffer Storage Facility (B19-1). To avoid any bottlenecks in waste streams, dismantled areas of the turbine hall have been adapted for temporary buffer storage

Project: Design and implementation of upgrades to the existing bituminized waste storage facility located at INPP site in view of providing for final disposal of such waste.	Reference: B20
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Short description of the project:

The bituminised waste storage facility, which stores conditioned liquid radioactive waste generated during operation / post-operation, is expected to be transformed into a waste repository once bituminization processing ceases in 2022 (project B20). This is due to the fact that no proven technology has been identified to recover the bituminized waste for reprocessing and/or packaging for alternative disposal.

Implementation during the period under evaluation:

The project identification fiche for the preparatory activities was approved by the European Commission on 15 September 2016. Discussions are underway between VATESI and INPP to agree the detailed specification for the form and content of the regulatory documents to meet VATESI's requirements for approval. However, the ultimate solution is dependent on a number of unknown variables due to close proximity with other facilities and upgrade works will not begin before 2026; it appears unlikely that the envisaged milestone will be met.

Project: Design & Construction of Near Surface Repository for Low and Intermediate Level Short-lived Radioactive Waste	Reference: B25/1 – B25/2
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Short description of the project:

According to the national strategy on radioactive waste treatment, a repository for disposal of short-lived low and intermediate level radioactive waste should be designed and constructed in Lithuania. Construction of 36 reinforced concrete vaults is foreseen intended for a final disposal of 100 000 m3 of processed, packed in concrete containers and cemented radioactive waste. The repository, its protective areas and auxiliary structures required for operation will occupy the area of about 45 hectares. Since waste will be disposed for a long time (about 20 years), the repository will be divided into three groups of vaults (12 vaults per group) in order not to build all vaults at the same time. First of all, only one group of vaults will be constructed and the license for its construction and operation will be received, and then - two other groups. Simultaneously in the repository there will be the vaults both under construction and operation, as well as already closed ones.

Implementation during the period under evaluation:

The schedule for the near surface repository for low & intermediate level short-lived waste (B25/2) has slipped due to delays incurred during the design phase (B25/1). The main reason for slippage was the lack of progress in the procurement of the CPMA-funded B25-2 contract for detailed design and construction of the near surface repository. Extra time was used by the B25-1 contractor and INPP for further optimization of the B25-1 Technical Design. This will enable a further significant reduction in the time and cost of construction of the NSR as well as increased efficiency of the operation of the B3 (new Solid Waste Treatment Facility) and NSR facilities whilst maintaining strict compliance with all safety requirements. Following an 18-month process, the TD and Preliminary Safety Analysis Review were approved by all nine competent regulatory authorities in April 2017. The CPMA submitted the Project Identification Fiche for construction of the NSR to the EC approval in August 2016 and was waiting for approval at the time of the field visit (June 2017). According to the CPMA, the protracted approval process is due to negotiations on the co-financing rate. Officially, the start of operations for the first part of the facility is scheduled for the third quarter of 2020. However, stakeholders recognised that this

target date would in all likelihood not be met due to foreseen challenges. A start date in 2022 may thus be more realistic.

While slippage in project schedules can be noted, INPP management and other stakeholders agree that delays in B25 do not risk creating significant bottlenecks in waste streams at this point. According to INPP management, the critical start date for B25 can be conservatively estimated to be 2024, INPP's estimated 2024 date for the start of operation of the NSR is primarily linked to the speed of INPP's dismantling and decontamination activities and the related waste flow directly to the NSR or via the new B3/4 Solid Waste Treatment and Interim Storage Facilities. INPP's dismantling and decontamination activities are running late due to a decision by the Ministry in 2010 (at an advanced stage of starting the actual procurement) to transfer from the IIDSF to CPMA the funding of the tools and equipment for the performance of the dismantling and decontamination works. If the start of operation of the NSR will be delayed beyond a critical date, then the capacity of the B4 Solid Waste Interim Storage Facilities would have to be extended by adding further storage modules. This would increase the cost of INPP's overall decommissioning programme.

6.3.3. Bohunice programme

Project: Dismantling and demolition of the V1 NPP cooling towers	Reference: D3.1B
Short description of the project: <p>The project aims to demolish the 4 cooling towers, inlet steel pipeline, cables, trenches and drainage pit by means of mechanical demolition techniques including the installation & erection of the demolition facilities and the management of the waste.</p>	
Implementation during the period under evaluation: <p>The project is under implementation, demolition equipment is installed on site and asbestos dismantling has started. The project has been delayed (partly because of the larger quantity of asbestos in the cooling towers than planned), but it is not expected to affect the end-date of the decommissioning programme in 2025. However, the delay also enabled to contractor to reduce the overall cost of the project. Currently the initial documentation has been finalized by the contractor and approved by JAVYS and the Permission for Dismantling and Demolition delivered by the NRA. The project is planned to be completed in January 2019.</p>	
Project: Dismantling of insulation in controlled area	Reference: D4.3A
Short description of the project: <p>Thermal insulation of the technological equipment and piping systems located in the Controlled area of V1 NPP (the Reactor building and the Auxiliary building) was dismantled. Dismantled insulation was sorted out, processed, disposed of and metal shielding decontaminated.</p>	
Implementation during the period under evaluation: <p>The project was completed in 2016.</p>	
Project: Decontamination of the Primary Circuit	Reference: D2 / D2-A
Short description of the project: <p>The project consists in V1 NPP primary circuits chemical pre-dismantling decontamination (started within the project D2). The aim is to reduce dose rates of primary circuit components to such levels that they can be dismantled in more efficient way by using hands-on techniques and disposed of as lower waste disposal classes.</p>	
Implementation during the period under evaluation: <p>After several months of implementation of the project D2 including the establishment of the decontamination circuit technology on the reactor vessel, the original contractor faced several technical</p>	

difficulties and was unable to finalise the project. The contract was terminated in 2013. The decision was taken to continue with the decontamination of the primary circuit and the project D2-A (Decontamination of the Primary Circuit – II) was built on the use of the DfD (Decontamination for Decommissioning) facilities installed during the project D2. JAVYS has selected a new contractor through direct tendering to implement the project. The decontamination process is scheduled to restart in 2017. The project is planned to be completed by the end of 2017.

Project: Reactor Coolant System Large Components Dismantling	Reference: D4.2A
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Short description of the project:

The project consists of the dismantling and waste management of the large components that are part of the reactor coolant system and dismantling of other components located in the hermetic zone and in the reactor hall, including the spent fuel pools, of both NPP V1 units.

Implementation during the period under evaluation:

The expected completion date for this project has been pushed back to 2022 (compared with 2020 in the baseline schedule) due to issues with primary circuit decontamination (project D2/D2.A). Following the dismantling, fragmentation, decontamination and transport of components, 99,99% of the radioactive waste will be removed from the site which is related with a very low remaining risk in the NPP.

Project: Reactor Coolant System Large Components Dismantling	Reference: C9.4
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Short description of the project:

The projects aims to design, licence, erect and commission:

- ▶ the facility for disposal of Low Level Waste (LLW). The system is based on the existing disposal system (double-rows of reinforced concrete vaults) at the NRR Mochovce.; and
- ▶ the facility for disposal of Very Low Level Waste (VLLW) originated from NPP V1 decommissioning at NRR Mochovce. The facility will be based on the engineered multi-barrier shallow landfill concept preventing radionuclides from migrating into the environment. The environment protection shall be guaranteed by means of waterproof sheet layers and artificial geological barriers.

Implementation during the period under evaluation:

Both part of the project are under implementation. Regarding the LLW storage, the earthworks were executed and works on base floor reinforcement are ongoing. The VLLW repository is also under implementation with the construction of the manipulation building and the construction of clay sealing layer.

Project: Reactor Coolant System Large Components Dismantling	Reference: C8
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Short description of the project:

The projects aims to erect a storage facility for storing RAW originated from decommissioning of Bohunice V1 NPP. It includes the relocation of the underground ducts and site preparation, design, supply and erection of a large storage facility for storing RAW originated from systems dismantling and buildings demolitions.

Implementation during the period under evaluation:

After some delays due to the relocation of the erection site, which led to launch a second environmental assessment, the building was erected and pre-commissioning and commissioning tests executed. Safety documentation for commissioning and operation of the nuclear facility was sent to the Nuclear Regulatory Authority and JAVYS is currently waiting for their approval. The Interim storage is planned to be operational by mid-august 2017. The implementation of this project is currently on the programme

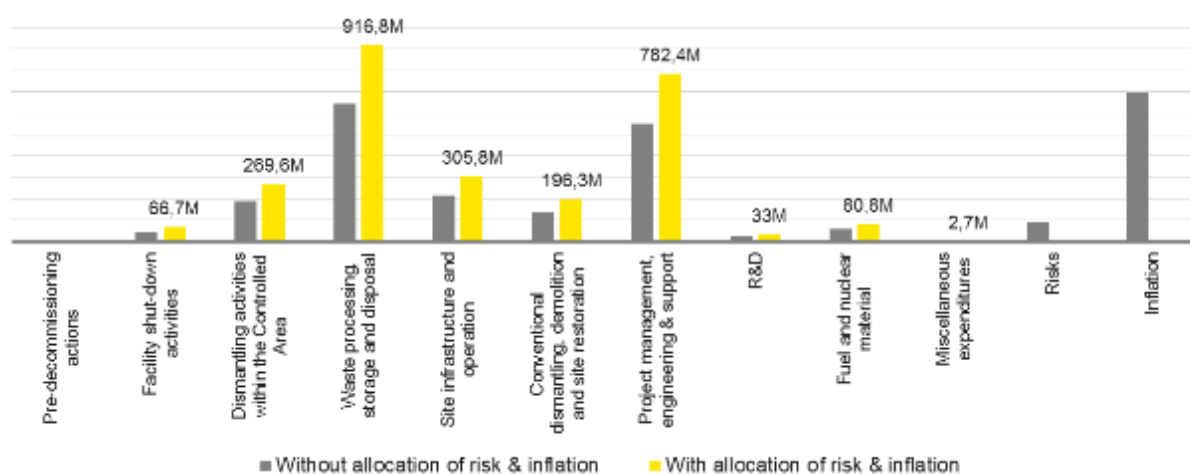
critical-path as facility must be operational to store the waste produced during the dismantling of the controlled area.

6.4. Detailed analysis of cost-effectiveness by activity area

Ignalina programme

Presentation of programme cost breakdown

According to the most recent cost estimation adopted in 2014, the total estimated cost for the Ignalina programme is EUR 3 376 million. This includes the risk contingency and inflation, which are presented separately. For the sake of presentation, these have also been presented below allocated proportionally to the different activity costs. It should be noted that the revised cost estimate covers only 2014 – 2038 as a new cost structure was adopted. Resources already engaged up to 2014 were not allocated according to the new cost structure in order to provide a picture of the overall decommissioning budget on a detailed level. The detailed breakdown is thus only available for costs from 2014 onwards. This breakdown is presented below according to the main ISDC activities.



As can be observed, the largest activity costs, representing over half the budget, concern waste processing, storage and disposal (EUR 916,8 million) and project management, engineering and support (EUR 782,4 million). Other large cost categories include site infrastructure and operation, dismantling activities in the Controlled Area and conventional dismantling, demolition and site restoration. The cost estimate is also presented according to the main programme headings in the work breakdown structure (figure to left). From this perspective, dismantling, demolition and site restoration activities represent the largest programme component by cost at 32% of the total.

The cost estimate includes a breakdown by cost category. Contracted works/services, procurement of material and technical resources (EUR 818,8 million – not including inflation) are all presented within a single category. The second largest cost category is labour costs of the enterprise personnel, which represents EUR 812,3 million (not including inflation). The other cost categories are energy resources (242,2 million) and taxes (EUR 1,9 million).

Facility shut-down activities & post-operation

While not an issue of cost effectiveness per se, the overall cost of facility shut-down & post-operation activities has been significantly impacted by delays in the defueling and obtaining of the Decommissioning Licenses. The Lithuania programme continues to maintain a large contingent of personnel and associated budget appropriations for the safe maintenance of reactors in shutdown mode awaiting defueling of the Unit 2 reactor core and adjacent spent fuel ponds in Units 1 & 2. Post operation

remains the highest consumer of man-hours at INPP, accounting for 31,94% of all time worked at INPP in 2016 (equivalent to 664 FTE).

The presence of fuel in the reactor core and fuel ponds thus has a significant 'hoteling cost'. Any delays in the defueling process will contribute directly to increasing these costs. Under current projections, these elevated costs will continue to be borne until 2021 when the defueling process is scheduled to be completed. It can be noted that defueling activities are currently being implemented in an efficient manner following the commissioning of the B1 facility and may even be finished ahead of schedule. This would contribute to reducing the post-operation costs.

The actual cost effectiveness of post-operation activities has been negatively impacted by a sub-optimal organisational structure. Responsible departments were largely remnants of the original organisational structure, while departments responsible for decommissioning activities have largely been developed in the final years of operation and post shutdown. In 2016, INPP undertook a reform of its maintenance department resulting in the planned reduction of approximately 100 staff. While this can be commended, it is indicative of the reforms that have been necessary since well before 2016. The percentage of overall workload for post operation activities has decreased from 34,05% in the first half of 2015 to 31,94% during the second half of 2016.

Site maintenance activities

The cost-effectiveness of some site maintenance activities may be further enhanced through externalisation. Due to the availability of local staff on site, externalisation has generally not been widespread practice in Lithuania and may thus point to the possibility for some cost savings, in particular for site maintenance staff that can easily be implemented by private contractors. The ongoing implementation of the make-or-buy review in Lithuania provides indication of the scope for some cost savings. The decision was recently taken, for example, to outsource cleaning services.

The strong time-dependent nature of these costs also means that the increased duration of the Ignalina programme has inevitably extended the temporal scope of these activities and increased costs. Due to the fact that the level of outputs will ostensibly increase proportionally, this is not an issue of cost-effectiveness per se, but does have a notable impact on the overall cost of the programme. However, the longer duration also significantly increases the potential scope of cost-savings that can be achieved through greater externalisation.

Project management and technical support activities

Project management, engineering and support is the second largest cost category for the Ignalina programme (2014 – 2038) when considering the allocation of costs by ISDC category – EUR 782,4 million. Using INPPs current work breakdown structure, it is difficult to pinpoint the number of staff devoted to this activity. Approximately 24% man hours were devoted to 'enterprise activity organising' in the second half of 2016, which covers much of the planning and administrative support functions. Other engineering and technical support functions for the preparation of dismantling activities are covered under the dismantling / demolition heading (19% of man / hours). Expenditure on the PMU, which provides important project management and technical support on EBRD-financed projects, has amounted to approximately EUR 56,9 million since the beginning of the programme. During the current MFF, however, this cost has been a small portion of EU assistance. The PMU has been progressively reduced in size as EBRD-financed projects have wound down. Additional consultancy and engineering support has been provided through other contracts beyond the PMU.

The cost-effectiveness of these activities has been positively influenced by the decision to in-source much of the preparatory technical activities for dismantling. Following pilot projects early on contracted out to external consultancies for the development of technical design and safety documentation for dismantling, the majority of this work is being conducted in house. This notably includes the development of technical design documentation for the Reactor Buildings and reactor cores, which was developed with extensive external support at Kozloduy and Bohunice. Internal personnel costs at INPP are significantly cheaper than consultancy fees. This decision reflects in part the first-in-kind nature of the Ignalina programme and the lack of experience in the market.

However, there is indication that INPP has been too ambitious in insourcing certain tasks, which has impacted cost effectiveness. Following attempts to develop the technical design for Reactor Zone R3 (the core of the reactor) in house, a new tender (originally cancelled in 2009) is being launched to solicit external support. However, it can be noted that the scope of the cancelled B9-4 tender is not the same as that of the planned Zone R3 only contract. Delays have also been accrued in the preparation of technical documentation for the Reactor Building (outside the reactor installation) due in part to lack of internal capacity.

Dismantling & decontamination

D&D work in the Turbine Halls has been proceeding in a cost-effective manner. Some bottlenecks have arisen since the beginning of works, but these have largely been successfully addressed by management in cooperation with the CPMA. Former plant staff have been largely utilised for D&D activities to date. This is considered as being more cost effective than going to the market.

As noted, preparatory D&D activities in the Reactor Building have faced some delays due to challenges developing the technical documentation for D&D in these areas. Limited physical dismantling work has taken place in the Reactor Building to date, with major physical works not expected to begin until the next programming period. With D&D work in the Reactor Building entailing higher dose rates and, in turn, limiting the amount of time that personnel can spend in these zones, INPP expects to adapt the staffing mix for D&D works in the years ahead. The number of staff working on D&D activities will increase appreciably, but management expects to use external contractors for much of the additional capacity necessary due to working constraints.

Waste processing, storage and disposal activities

Waste processing, storage and disposal is the largest activity cost for the Ignalina programme at EUR 916,8 million. As discussed in section 2.6.3, this reflects in part the large level of infrastructure investment necessary due to the limited availability of pre-existing waste management infrastructure. During the period covered by the evaluation, the main projects of concern include the completion of the ISFSF, the SWTSF, the Landfill Facility for Short-Lived Very Low Level Waste and the New Near Surface Repository.

Improved contract management has ensured the cost-effectiveness of major infrastructure projects that had in the previous MFFs led to significant delays and cost overruns. Since late 2014, INPP has worked quickly to resolve outstanding issues with the ISFSF contractor. Significantly, pending commercial issues were resolved with no increase in the contract price. INPP effectively managed the SWTSF contract to make progress despite delays caused by the contractor's delayed internal provision of funds to pay sub-contractors.

Other ongoing large infrastructure projects have been impacted by difficulties during initial phases of implementation, but not resulting in cost overruns to date.

Use of decommissioning operator personnel

Personnel costs are a significant portion of the Ignalina programme budget, representing approximately 43%. EU assistance financed the large majority of personnel costs. The current staffing level stands at 2 080, which is significantly higher than the other two programmes.

INPP has made the decision to largely utilise former plant staff during the decommissioning process. The overall number of staff has been decreased by 40% since shut down and approximately 15% of current staff are new hires since shut-down. A very large contingency of former plant staff have thus remained in the context of decommissioning. The use of former plant staff can generally be seen as a cost effective practice, in particular in older plants for which the decommissioning process is hindered by a lack of historical operational data and knowledge. It can also contribute to lowering administrative overheads for human resources management.

As noted, staffing levels at Ignalina are significantly higher than the other two programmes.¹⁸ A large part of this difference can be attributed to the characteristics of the power plant (its significantly larger size) and the fact that defueling remains in progress, requiring a higher level of post-operational staff to maintain and operate safety systems. Moreover, it can be noted that the Ignalina programme has had less recourse to PMU support (especially relative to the size of the programme) and has generally chosen to internalise some technical support tasks that have been externalised in other programmes.

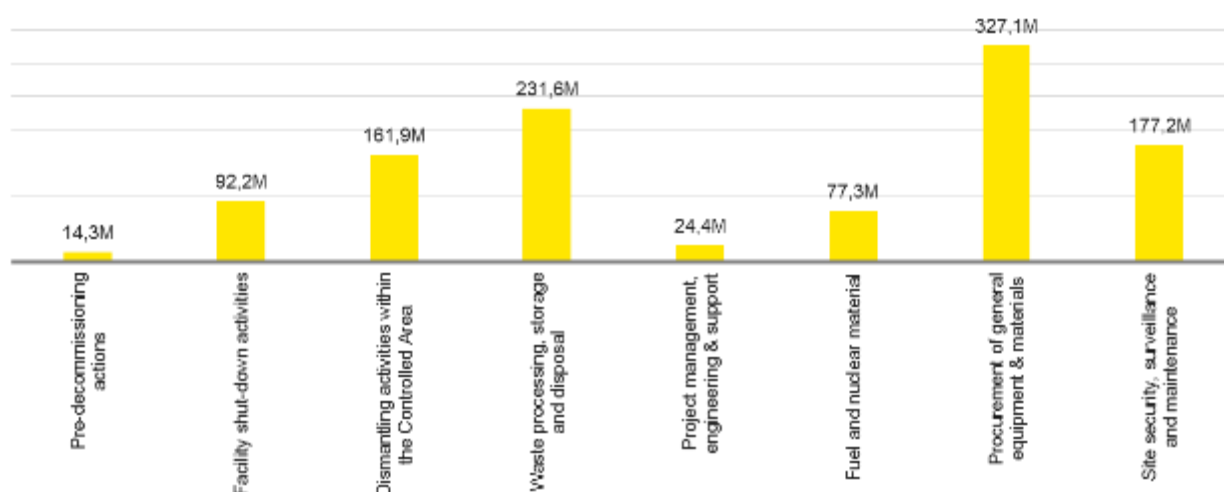
However, evidence suggests that the programme has carried excess human resources. The relative organisational continuity that can be observed in the Ignalina programme along with the lack of alternative opportunities for many staff have created strong political pressures internally and at national level to minimise redundancies. Recent optimisations to staffing levels at INPP point to **excess levels of human resources have been maintained in the past** and that there may be scope for further reduction. INPP is implementing a series of business case analyses as part of a systematic make-or-buy review. Some activities formerly implemented by INPP staff have since been externalised, notably for cleaning services, and more may follow. Organisational restructuring, for example of the Maintenance Department, has also enabled consequential reductions in staff levels (approximately 100).

Analysis of the use of human resources also finds that only a relatively small portion of staff are directly engaged in core decommissioning tasks. While certain maintenance and safety positions are required in any decommissioning programme, the Ignalina programme presents a large administrative and technical support overheads. In Lithuania, only 35% of the decommissioning operator's personnel are focused on core decommissioning activities (i.e. dismantling, waste & fuel management)¹⁹. Administrative and technical support staff accounted respectively for 33%²⁰.

Kozloduy programme

Presentation of programme cost breakdown

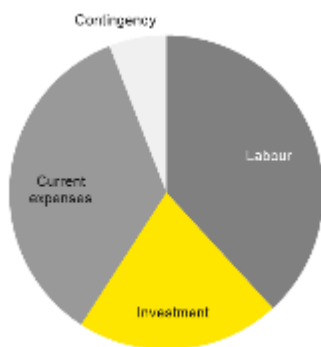
According to the most recent cost estimation adopted in 2014, the total estimated cost for the Kozloduy programme is EUR 1 106 million. It can be noted that this estimate is currently under revision by Bulgarian authorities and may evolve. This breakdown is presented below according to categories used by Bulgarian authorities, which are partly aligned with the ISDC methodology.



¹⁸ Comparatively, staff levels at Kozloduy have fallen by 54% since reactor shut down and by over 77% at Bohunice.

¹⁹ In activity typology used by INPP, this includes: P.2 Objects dismantling / demolition; P.3 Spent nuclear fuel handling; and P.4 Waste handling

²⁰ In the activity typology used by INPP, this includes: P.0 Enterprise Activity Organizing; and P.1 Preparation for decommissioning



The largest activity cost for the Kozloduy programme is procurement of general equipment and materials (non-standard ISDC activity), representing EUR 327 million. The other three principal activity costs include waste processing, storage and disposal (EUR 231,6 million), site security, surveillance and maintenance (EUR 177,2 million) and dismantling activities within the Controlled Area (EUR 161,9 million). The Kozloduy cost estimate is also presented using the standard ISDC cost categories (figure to left). Labour costs make up the largest category at EUR 423,5 million (38%), followed by current expenses (35%), investment (21%) and contingency (6%).

Facility shut-down activities

The Kozloduy programme budgeted EUR 92,2 million for facility shut down activities. These activities have largely been finalised with the delivery of the Decommissioning License and cannot be considered within the scope of the present review.

Site maintenance activities

The cost-effectiveness of some site maintenance activities may be enhanced through externalisation. This has generally not been widespread practice at Kozloduy. It can be noted that the Ignalina programme is currently undertaking a make-or-buy review in order to identify services for which it may be economically advantageous to go to the market.

Project management and technical support activities

The Kozloduy programme has budgeted EUR 25 million for project management, engineering & support. However, it is not clear what has been included or excluded from this category; the programme has benefited from EUR 20,7 million in EU assistance for expenditure on PMU services, in addition to other consultancy and engineering contracts, since the outset of the programme.

The level of support compared with the identified lack of planning and project management capacity in some programmes (see section 2.6.3), can raise some questions with regards to the cost-effectiveness of project management and technical support activities. In particular, the important amount of funds going into consultancy and engineering contracts may merit a more careful weighing of costs and benefits in the future to ensure an adequate return on investment. SERAW stakeholders noted that the quality of the current contractor is not considered an issue for them.

Dismantling work

The Kozloduy programme has budgeted a total of EUR 161,9 million for dismantling in the Controlled Area. There is no budget line for conventional dismantling, demolition and site restoration (ISDC activity 7). At present, it is not foreseen to demolish all buildings outside the Controlled Area (notably the Turbine Hall), but it is not clear under which budget line dismantling activities outside the Controlled Area have been budgeted.

D&D work has generally been undertaken in a cost-effective manner, but some issues can be raised. Some bottlenecks have arisen during D&D activities in the Turbine Hall; however, these have largely been addressed in a pragmatic and efficient manner. Work in the Controlled Area in Bulgaria has been slowed by bottlenecks in waste streams. This delay is expected to be made up once the necessary waste management infrastructure comes on line. However it will require the use of costly shift work.

Wider delays in D&D work in the Controlled Area also raise questions as to the full utilisation of human resources foreseen to be mobilised on physical works at present. The programme is currently two years behind overall in work in the Controlled Area and staffing levels remain higher than originally foreseen

Waste processing, storage and disposal activities

The Kozloduy programme has budgeted EUR 231,6 million for waste processing, storage and disposal. However, the cost estimate also includes a separate budget line for procurement of general equipment & materials (EUR 327,1 million). Part of the costs for waste management infrastructure likely fall under this category, making it difficult to provide an overall amount budgeted. The main projects of relevance during the period under evaluation include the National Disposal Facility, the Plasma Melting Facility, the Size Reduction and Decontamination Workshop, sites for management of materials from the decommissioning and projects for the treatment and conditioning of the wet radioactive wastes.

As described in the following section 2.6.3, the cost effectiveness of these large infrastructure projects has been significantly impacted by difficulties during implementation, leading to cost increases. While technical difficulties have contributed, in particular concerning projects for the treatment of wet radioactive waste, the primary culprit for delays and cost overruns accrued has been poor planning, weak contract management and delays in the regulatory approval process, as well as other largely administrative difficulties. This has led to significant delays, cost overruns and increases in cost estimates for major projects, such as the Plasma Melting Facility.

Use of decommissioning operator personnel

The Kozloduy programme has budgeted EUR 423 million for staff costs over the entirety of the programme. EU support for staff costs has amounted to EUR 125 million since the beginning of the programme. For the period 2014 – 2017, the Grant Agreement covering staff costs amounts to EUR 46 million, or approximately EUR 11,5 million per year. Additionally, national resources finance costs such as pension, insurance, indemnities, transport and meals amongst others. The current staffing level stands at 650.

In order to take advantage of the deep knowledge of existing staff at the three power plants, the Kozloduy programme made the decision to redeploy some of the former plant staff in the decommissioning context. A portion of the staff from the power plants were transferred to the decommissioning operator when ownership was assumed for the units under decommissioning, and redundant staff were transferred to operational units at the same sites. The use of former plant staff can generally be seen as a cost effective practice, in particular in older plants for which the decommissioning process is hindered by a lack of historical operational data and knowledge. It can also contribute to lowering administrative overheads for human resources management.

The progressive decrease has not been in line with projections under the 2014 decommissioning plan. By 2016, staff levels were planned to be reduced to 570. According to SERAW management, the maintaining of staffing levels at 650 in 2016 and 2017 can be ascribed in part to the failure of initial planning to take into account positions necessary to operate RAW management infrastructure. However, this would appear to be in contradiction with SERAW's own reporting. While 2014 projections fixed the number of RAW management positions at 71 for 2016, the 2017 Kozloduy AWP indicated that the number of positions allocated to this task in 2016 was in fact 71. Compared with 2014 projections, reporting documents suggest that Kozloduy is carrying excess staff in the areas of facility shutdown activities (double the 2014 estimate in 2016) and project management and engineering support (186% of the projected number of positions in 2016).

Analysis of the use of human resources also finds that only a relatively small portion of staff are directly engaged in core decommissioning tasks. While certain maintenance and safety positions are required in any decommissioning programme, the Kozloduy programme presents a large administrative and technical support overheads. At Kozloduy, 43%²¹ of the decommissioning operator's personnel are focused on core decommissioning activities (i.e. dismantling, waste & fuel management)²². Administrative

²¹ In the activity typology used by Kozloduy, this includes: 04. Dismantling activities; and 05. Treatment of RAM and RAW and delivery for disposal

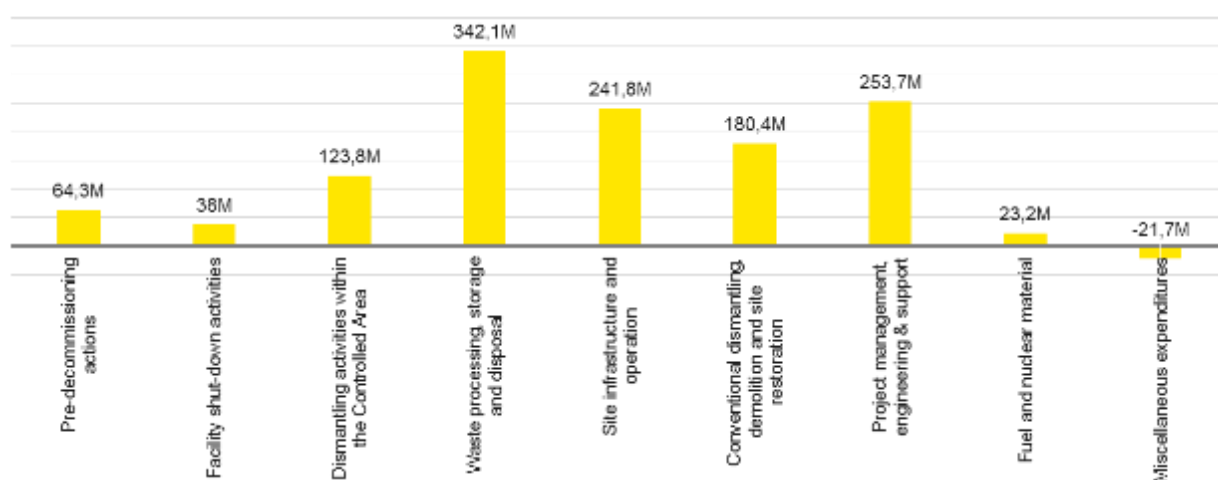
²² In activity typology used by INPP, this includes: P.2 Objects dismantling / demolition; P.3 Spent nuclear fuel handling; and P.4 Waste handling

and technical support staff accounted respectively for 33%²³. Administrative and technical support staff accounted respectively for 28%²⁴. Concerning the Kozloduy programme, relatively lower administrative and technical support overheads should also be considered in the context of higher funding for the PMU activities (over EUR 20 million). This level of overhead appears somewhat high considering the deficiencies noted with regards to planning and programme management described in the following section.

Bohunice programme

Presentation of programme cost breakdown

According to the most recent cost estimation adopted in 2014 (and subsequently updated in 2015), the total estimated cost for the Bohunice programme is EUR 1 239 million. The breakdown is presented below according to the main ISDC activities.



The largest activity cost for the Bohunice programme is waste processing, storage and disposal, representing EUR 342,1M. The other main cost categories include project management, engineering & support (EUR 253,7 million), site infrastructure and operation (EUR 241,8M) and Conventional dismantling, demolition and site restoration (EUR 180,4 million). The Bohunice cost estimate is also presented using the standard ISDC cost categories (figure to left). Labour costs make up the largest category at EUR 562,9 million (45%), followed by current expenses (40%).

Facility shut-down activities

The Bohunice programme budgeted EUR 38 million for facility shut down activities. These activities have largely been finalised with the delivery of the Decommissioning Licenses (Stage 1 & II) and cannot be considered within the scope of the present review.

Site maintenance activities

²³ In the activity typology used by INPP, this includes: P.0 Enterprise Activity Organizing; and P.1 Preparation for decommissioning

²⁴ In the activity typology used by Kozloduy, this includes: 03. Procurement of equipment; 06. Site management and support; and 07. Project management and engineering. Parts of activity category 06 were excluded as pertaining to site upkeep and maintenance. This estimation was made through cross-referencing the more detailed activity breakdown in the EBRD Grant Agreement 48B

The Bohunice programme budgeted EUR 241,8 million for site maintenance activities. The cost-effectiveness of some site maintenance activities may be enhanced through externalisation. It can be noted that the Ignalina programme is currently undertaking a make-or-buy review in order to identify services for which it may be economically advantageous to go to the market.

Project management and technical support activities

The Bohunice programme has budgeted EUR 253,7 million for project management and technical support activities. The Bohunice programme notably benefited from EUR 37 million to fund the PMU for EBRD financed projects. The amount allocated to the PMU is lower compared to other programmes, although it can be noted that an additional EUR 6,8 million was allocated to consultancy contracts for the development of decommissioning documentation and support to the licensing process, a task supported directly by the PMUs in other programmes. In Slovakia, PMU consultant support had been progressively reduced from the beginning of the programme to date (from with 7 external consultants to 2) as skills and competencies were integrated in-house.

The Bohunice programme has generally demonstrated relatively strong project management. It can be noted that it is the only decommissioning operator that had managed another decommissioning programme prior (and since in parallel) to the NDAP. No major cost-effectiveness issues can be identified.

Dismantling & decontamination

D&D work outside of the Controlled Area is currently winding down. The last project remaining under implementation is the dismantling and demolition of the V1 NPP cooling towers. The project has been postponed by the operator JAVYS, but it has been **contracted for a substantially lower price than budgeted**. In this respect, a delay in project implementation was able to secure a significant price decrease.

The cost effectiveness of D&D work in the Controlled Area / Reactor Buildings has been somewhat impacted by technical difficulties faced. In particular, the work on the decontamination of the primary circuit has been slowed due to poor contractor performance. However, efforts by the decommissioning operator have allowed to minimise the financial impact to mainly lost time and the relaunching of the administrative procedure.

The project for dismantling of large components of the Reactor Coolant System rose significantly from an original estimate of EUR 60 million to EUR 120 million at the time of signature of the contract in 2017. This was due to the significant underestimation of market analysis and review of the cost estimate conducted originally in 2013. Slovak authorities have agreed to absorb any extra costs that cannot be secured through savings elsewhere in the programme.

Waste processing, storage and disposal activities

The Bohunice programme has budgeted EUR 342,1 million for waste processing, storage and disposal. Due to the pre-existing level of waste management infrastructure, the necessity for implementing large, complex infrastructure projects, which have often been met with challenges in other programmes, has been avoided in the Bohunice programme. Two final waste management infrastructure projects are currently under implementation. **No findings were identified relative to the cost effectiveness of these projects.**

The pace of waste treatment has been slowed due to delays in the D&D work. It can be noted that financing for waste treatment has generally been based on specific contracts with JAVYS for the treatment of a set amount of waste rather than subsidising the salaries of the personnel of the decommissioning operator. **This arrangement has allowed to avoid cost effectiveness issues for EU financing arising from idle waste management capacity.**

Use of decommissioning operator personnel

The Bohunice programme has budgeted EUR 572 million for staff costs over the entirety of the programme. EU support for staff costs has amounted to EUR 51 million since the beginning of the programme. The relatively lower level of EU assistance for staff costs in the Bohunice programme can be

explained by the smaller size of the plant and larger recourse to external contractors for core decommissioning tasks. The current staffing level stands at 247 FTE.

The local knowledge and know-how have been reused by the transfer of former nuclear power plant workers to the decommissioning activities. Moreover JAVYS had a strong knowledge of waste management with the operation of the Bohunice Radioactive Waste Treatment Centre, bituminization and vitrification facilities for radioactive waste treatment, a fragmentation facility for metallic radioactive waste and the National RAW Repository in Mochovce during the operation and current decommissioning of the NPP.

The lower levels of staffing in the Bohunice programme can be attributed in large part to the decision to use external contractors to implement significant parts of decommissioning tasks.

While this approach may have some drawbacks, such as higher transaction costs and even higher unit staff costs in the absolute, it appears to **provide greater flexibility** to the decommissioning operator. If plans are changed or delays experienced, the decommissioning operator does not have to 'carry' underutilised human resources. This of course is dependent on delays being anticipated before contract signature with the external contractor, after which such delays can result in additional claims by the contractor. In addition the simultaneous decommissioning of the A1 reactor in Bohunice nuclear power plant gives more flexibility in the allocation of human resources.

7. Annex 7: Benchmark

Three programmes have been selected in compliance with the European Commission to be submitted to a comparative analysis regarding NDAP: Connecting Europe Facility, Budget support aid delivery mechanism and Major projects under ESIF.

In addition to a deep desk review of the three comparable programmes, some interviews were undertaken to deepen analysis regarding good practices that may be applicable to the NDAP.

Name	Institution	Position
Connecting Europe Facility		
Catharina SIKOW-MAGNY	COM – DG ENER	Team leader of the CEF
Andreas BOSCHEN	INEA	Head of Department – Connecting Europe Facility
Michal ŽILIAK	INEA	Project manager
Budget Support aid delivery mechanism		
Peter KOVACS	COM-DEVCO	Policy Officer
Terhi KARVINEN	COM-NEAR	Policy Officer
Stéphanie GANTZER-HOUZEL	COM-REGI	Policy Officer
Major projects under ESIF		
Camelia-Mihaela KOVACS	COM-REGIO	Project Officer – Major Projects

An overview of the main findings of the benchmarking exercise is provided in section 2.7 of the main final report. This annex provided a detailed overview and the main findings for each of the three comparable programmes.

7.1. Connecting Europe Facility

Introduction
Presentation of the comparator instrument

According to the Commission, the estimated investment requirement for trans-European networks in the transport, telecommunications and energy sectors for the period up to 2020 is EUR 970 billion. While the bulk of the investment needed in these infrastructure sectors can be delivered by the market, EU financing is needed for specific projects with wider regional and European benefits, which are unable to attract market-based financing. In this context, the Connecting Europe Facility (CEF) has been created a key EU funding instrument to promote growth, jobs and competitiveness through targeted infrastructure investment at European level.

According to Article 3 of Regulation (EU) No. 1316/2013, the general objective of the CEF is to enable projects of common interest (PCIs) to be prepared and implemented within the framework of the trans-European networks policy in the sectors of transport, telecommunications and energy. The rationale for a common funding instrument covering these three domains was to enable synergies between the three sectors to be harnessed to the full, thus enhancing the effectiveness of EU action and enabling implementing costs to be optimised.

These projects of common interests have to meet specific objectives for each of the three domains, enumerated in the Regulation (EU) No. 1316/2013 and fully described in:

- Regulation (EU) No 1315/2013 on Union guidelines for the development of the trans-European

transport network (TEN-T)

- ▶ Regulation (EU) No 347/2013 on Union guidelines for trans-European energy infrastructure (TEN-E) identifying 4 priority electricity corridors, 4 Priority gas corridors, 1 priority oil corridor and 3 priority thematic areas (smart grids, electricity highways and carbon dioxide transportation). This regulation also established twelve Regional Groups in charge of the identification of the CPIs.
- ▶ Regulation (EU) No 283/2014 on Union guidelines for trans-European networks in the area of telecommunications infrastructure (e-TEN) identifying criteria for projects to be eligible.

The original financial envelope for the 2014 - 2020 period was EUR 33 242 259 000. This includes an amount of 11 305 500 000 transferred from the Cohesion Fund to finance transport projects on the transport core network or transport projects relating to horizontal priorities in the Member States eligible for financing from the Cohesion Fund under the CEF. The CEF's original budget was subsequently reduced by 8% with the establishment of the European Fund for Strategic Investments (EFSI) under President Juncker's Investment Plan for Europe in June 2015. The Regulation allocated this overall amount amongst the three areas as follows:

- ▶ CEF Transport: EUR 24.1 billion, including EUR 11.3 billion exclusively for support to projects of common interest in Member States eligible for the Cohesion Fund.
- ▶ CEF Energy: EUR 5.35 billion
- ▶ CEF Telecom: EUR 1,04 billion

Rationale for the case study

The CEF was first chosen as a comparative instrument because some common features have been identified with the NDAP. They are both financing large sized infrastructure projects (especially for transport and energy projects). Moreover some of these projects are very specific actions and include the development of innovative technologies. A part of the programme is under the responsibility of the DG ENER as the NDAP.

The CEF also contrasts with the NDAP in some important ways, such as the direct management by the European Commission and the use of financial instruments which can be interesting points of comparison with the current NDAP operation.

Management of the CEF

Governance

Issues of strategic governance under the CEF are limited in scope due to the fact that the legal base is largely prescriptive in terms of the projects that the CEF shall finance. As mentioned, the PCIs are the only project eligible under the CEF. However, the list is more or less detailed depending on the sector concerned. For example, the list of PCIs related to energy sector is very detailed and describe each project which can be supported. It is updated every two years based on the proposition and assessment of regional groups in order to integrate new vital projects and remove those that have become obsolete. The second list of project was published in 2016 and will be revised in 2018. Regarding the transport sector, a list of prior corridors have been defined since the beginning of the implementation of the CEF to identify the scope of the projects to be funded. However this list is less detailed than those in energy sector. The projects included in these lists may be eligible to the CEF funding. However they have to be selected and validated by the European Commission to be funded through grants or financial instruments.

The governance of the CEF involved mainly the European Commission and DGs responsible of the sectoral policies concerned by the CEF: DG Mobility & Transport (MOVE), DG Energy (ENER), and DG Communications Networks Content and Technology (CNECT). The Commission adopts, by means of implementing acts, multiannual programmes for each of the transport, telecommunications and energy sectors. These multi-annual programmes can be completed by the adoption of annual programmes for smaller projects or specific activities (Transport sector). They are updated each year and defined priorities that have to be implemented for the coming year and related budget.

Like with the NDAP, the Commission is assisted by the CEF Coordination Committee (CCC), which includes the representatives of each Member States. However, this committee has a stronger

strategic role than the NDAP Committee. It ensures a horizontal overview of the work programmes to ensure that they are consistent and that synergies are identified, exploited and assessed between the transport, telecommunications and energy sectors. It also seeks to coordinate work programmes with a view to allowing multi-sectoral calls for proposals. The CCC can be organised in several configurations: Energy, Transport, Telecommunications or in a common form for all sectors. The CCC is consulted at different steps of the implementation of the CEF and gives a positive opinion on the multiannual and annual work programmes and projects selected through grants before the final validation of the European Commission.

Programme management

The management of the large part of the programme is under the responsibility of the Innovation & Networks Executive Agency (INEA). The agency is the successor organisation of the Trans-European Transport Network Executive Agency (TEN-T EA), which was created by the European Commission in 2006 to manage the technical and financial implementation of its TEN-T programme. INEA officially started its activities in January 2014, also responsible for managing part of other EU programmes (e.g. H2020). This contrasts with the mode of implementation chosen for the NDAP. While the implementation is delegated by the Commission, in the case of the NDAP this is to third party institutions. In both cases, this decision was motivated by economic incentives (more efficient for specialised parties to implement programmes) and a lack of technical capacity in the Commission to manage directly. Delegation to an Executive Agency has the advantage of reducing transaction costs because they share the same business and financial processes.

Four European Commission's Directorates-General oversee INEA's activities: DG MOVE, DG ENER, DG CNECT and DG Research & Innovation (RTD). In addition of the work programmes defined for each CEF sectors, a work programme for the INEA is annually defined and validated by the European Commission. It defines the budget, and annual output objectives (number of grant agreements signed, execution of payments, number of proposals received, etc.). It also includes target values for human resources indicators, internal control and risk management, information management, external and internal communications. During the year, steering committees between the INEA and the four parent DGs are organised to report on the implementation of the annual programme. In parallel, a more regular reporting is developed between the INEA and the sectoral DGs through budget reporting, publication of projects selected via calls for proposal and reports on project implementation. The INEA formally reporting its activities through annual activity reports which are approved by the Commission.

The CEF operates following a classic open competition model, compared to the NDAP, which operates following a mono-attribution model with no calls for proposals. Calls for proposals are published by the INEA after the validation of the parent DGs. The INEA also ensures the preliminary check of the proposals received: (admissibility check and eligibility check). However, the technical evaluation is ensured by external independent experts. Each proposal is first independently reviewed by three experts who then come to a consensus meeting to draft a consensus form for each proposal. On the basis of these conclusions, the European Commission develops an internal evaluation in which it: considers the results of the technical evaluation, performs budgetary adjustments, checks complementarity of Actions, considers EU Added value of Actions, identifies potential synergies and takes into account budgetary constraints

On this basis, the European Commission established a draft list of proposals recommended for funding. This list is thereafter submitted to the consultation of the CCC which give its positive opinion and transmitted to the European Parliament for information. The INEA is in charge of the signature of grant agreements with legal autonomy following the templates developed by the European Commission for each sectors of the CEF.

Project management

Recital 20 of the CEF Regulation notes that institutional and administrative capacity are essential prerequisites for effective delivery of the objectives of the CEF. The Commission should, as far as possible, offer appropriate means of support to permit the design and implementation of projects in the Member States concerned. During project implementation, the INEA closely monitors execution and supports beneficiaries.

The INEA relies on a pool of Project Managers with relevant technical experience in order to

monitor and support project implementation after grant signature. The Project Managers are affected to four geographic and thematic units, with each responsible for a portfolio of 10 – 15 projects. The INEA is primarily focused on implementation of the grant. In principle, they are not playing a role in management decisions on the ground. However, Project Managers typically have relevant experience and can provide support to beneficiaries when appropriate. However, the INEA is closely verifying that the EU legislation is taken into account. The Agency performs detailed checks on how different rules are being applied. In this respect, the INEA assumes a role similar to that of the Implementing Bodies under the CPMA. However, the evaluation found that Implementing Bodies are generally more implicated in day-to-day project management and can on occasion play a stronger role in management decisions.

The project management procedures are spelled out in a Project Management Manual ensuring uniformed adherence across the agency. This contrasts with the NDAP, which relies on the heterogeneous project management procedures of Implementing Bodies. Following the Project Management Manual, a clear project monitoring process is followed. This begins with a kick-off meeting after signing of the grant agreement, and continues annually through the submission of annual implementation reports by beneficiaries and periodic on-site visits. The grant agreements lays out the performance indicators that beneficiaries report against on an annual basis. Annual Status Reports are submitted by beneficiaries via an easy-to-use online portal. The project performance indicators are aggregated and feed into programme level performance indicators following a framework established by the legal base.

When problems arise during implementation, Project Managers work closely with beneficiaries to resolve them. When no other solution is possible, a modification of the scope, budget or timeline of the project may be studied and approved by the Agency. This is similar to the NDAP in that project documentation must be approved by the Commission and any amendment thereof by the Implementing Body.

Projects are generally multi-annual, with the grant agreement setting out the schedule for the project and expected milestones. There is no annual programming process. This is in contrast to the NDAP, which has an overall baseline schedule covering the entire period, but which is complemented by annual programming.

For many projects, the Member State is the beneficiary. For those where this is not the case, the project is implemented in close cooperation with the relevant national authorities to ensure effective project implementation. For example, Member States must approve implementation reports before they are submitted to the INEA.

Financial management

The CEF provides financial support in two forms: Grants (app. 90% of the budget) provided through calls for proposals, Financial instruments (app. 9%): developed together with entrusted financial institutions such as the European Investment Bank (EIB). These financial instruments build on the experience with previous such instruments, such as the Marguerite Fund, the Loan Guarantee for TEN Transport (LGTT), or the Project Bond Initiative. The NDAP provides assistance through grants, generally financing 100% of expenses. However, EU assistance is complemented at programme level by national resources and at project level, to varying extents, for co-financed projects.

The CEF funding is based on Commission Implementing Decisions establishing Multi-Annual and Annual Work Programmes which set out inter alia the budget, the objectives and funding priorities, the funding instrument etc. For Grants, funds are transferred to beneficiaries upon submission of payment requests and the necessary evidence to document eligible expenditure.

The CEF offers a clear co-financing framework and any agreed change in budget would entail also an increase in the cost to the beneficiary. Moreover, major delays or underperformance put projects at risk of decommitment, which creates a strong incentive to beneficiaries. This is in contrast to the NDAP, which does not have a clear framework for cofinancing. The national contributions are complementary to EU financed projects and negotiated with the Commission.

Actions supported by means of financial instruments are selected on the basis of maturity and seek sectoral diversification as well as geographical balance across the Member States. Two financial instruments have been launched to date:

- ▶ The **CEF Debt Instrument** was launched in 2015 jointly by the European Commission and the EIB, and is currently implemented by the EIB. The goal of the CEF Debt Instrument is to offer an alternative to traditional grant funding by offering competitive financial products for priority investments in transport, energy and telecommunications. The Instrument provides an extension of the credit enhancement of project bonds provided under the PBI, a new credit enhancement mechanism targeting loan financing by the banking sector (building on the experience of LGTT), as well as loans, guarantees and equity-type debt financing support to corporates.
- ▶ The **Equity Instrument**, currently under development, aims at providing equity or quasi-equity financing to smaller and riskier projects in the field of broadband, transport, and energy. In December 2016, the European Commission and the EIB announced the launch of the Connecting Europe Broadband Fund. The Fund, which would lead to an Investment Platform combining private and public finance commitments, including from National Promotional Banks, should raise EUR 500 million at first closing and will invest in equity and quasi-equity in 7-12 broadband projects each year from 2017-2021. The European Commission will invest EUR 100 million from the budget allocated to CEF Equity Instrument. The Fund should benefit also from support from the European Fund for Strategic Investments (EFSI) and is expected to become operational in mid-2017.

Conclusion

The CEF provides for a useful comparison with the NDAP, even if the two instruments are quite different. A number of good or otherwise interesting practices can be noted:

- ▶ Like the NDAP, the CEF seeks to ensure strong national ownership of project by Member States. This is achieved in implicating the Member States in both the selection and implementation of the projects. In particular, the Member States must approve monitoring reports before they are submitted to the INEA. This may be a relevant practice to consider in the NDAP. Currently monitoring report are submitted by developed by the decommissioning operators, submitted by the implementing bodies and approved by a Monitoring Committee.
- ▶ The CEF provides a multi-annual framework for project implementation with no annual programming cycle. Considering the existence of a clear baseline and controls on project approval, the NDAP may consider discontinuing or significantly altering the annual programming cycle.
- ▶ The INEA ensures strong, harmonised project management procedures through centralised management at INEA. The delegation of implementation of the programme to an EU institution also ensure close proximity in processes and working practices, whereas the reliance on third party implementing bodies can create administrative complexities. However, moving responsibility to an Executive Agency would entail some investment and transaction costs and the current Implementing Bodies under the NDAP have extremely deep knowledge of programmes and good generally good relations with beneficiaries.
- ▶ Compared with the NDAP, the CEF offers a clear cofinancing framework similar to most EU co-finance projects. There is also a strong incentive to ensure effective implementation through risk of decommitment.
- ▶ The CEF has established an online system for the submission of annual monitoring reports, which helps ensure their standardisation and reduced burden on beneficiaries.
- ▶ Like the NDAP, reporting under the CEF is based in part on results-based monitoring indicators defined in the Grant Agreements.

7.2. Budget Support aid delivery mechanism

Introduction

Presentation of the comparator instrument

Project aid has traditionally been the major aid modality for concessional loan and grant-based

aid for much of the post-war era. This historical emphasis springs from the belief that the principal constraint to development was a lack of investment, which could be overcome by channelling capital investment to developing countries in the form of specific project support. Further reinforcing this approach was the conviction that projects, with their own parallel accounting and administrative arrangements, enable donor to more effectively minimise fiduciary risk and ensure a proper level of accountability to tax-payers. Within the EU, the classic project-based modality has historically and continues to characterise many EU programmes and instruments, even if the Commission has continuously introduced innovative new instruments.

However, these “off-budget” funds have become increasingly criticised over time, with a substantial body of academic literature pointing to the negative effects in terms of the coherence of aid, appropriation of development objectives by national authorities and the development of institutional capacity most notably. With these weaknesses becoming increasingly clear the donor community started to seriously consider the need for major changes in the aid delivery system from as early as the 1990s. Budget support represents the other extreme of the aid modality spectrum and provides a response to many of the perceived weaknesses of project-based modalities.

Budget support is a generic term used to describe a wide range of different instruments developed by different donors; however, they all have the same common fundamental characteristics. For the purposes of this case study, budget support is understood as a delivery mechanism which involves a transfer of financial resources to the national budget of a partner country and that will be implemented in accordance with this country's budget procedures, financial management system and public procurement system. This budgetary transfer is accompanied by intense policy dialogue, conditionalities, technical assistance and/or capacity building.

Within the context of the EU, the budget support instrument has been used exclusively as a mechanism for delivering support to third countries, notably within the framework of the EU's development cooperation policy, but also more recently within the context of neighbourhood policy. The Commission has given GBS to ACP countries since the seventh EDF (1990–95) and to Asian and Latin American countries since 2003. Its use has progressively been developed and refined through different policy documents and Guidelines and has been codified in international agreement and EU legislation. Budget support is also now being used to deliver other EU policies. Under the original Instrument for Pre-Accession (IPA) (2007 – 2013), Budget Support was introduced although limited to “exceptional cases”. New rules for IPA II (2014 – 2020) allow for broader and more systematic use of Budget Support, provided the eligibility conditions are in place. Budget support is supporting the movement under IPA II towards a more sector-based approach from a project-based approach.

Rationale for the case study

The budget support instrument has a number of potential benefits that make it an interesting comparative case study, both from the perspective of considering the hypothetical use of budget support-type instrument within the context of the NDAP and cherry-picking potentially relevant good practices to introduce in NDAP governance and management to enhance effectiveness and efficiency. It is a relatively efficient means of supplying large volumes of aid and doing so in a more predictable manner. It has also proven to contribute to the development of stronger national ownership and encourages capacity-building in areas such as public finance management, planning and sectoral expertise depending on the context. Finally, the over two decades of use have shown it to be a useful instrument for strengthening policy dialogue with recipient countries. Issues such as administrative efficiency, long-term stability and encouraging recipient ownership in particular appear as relevant aspects to be explored.

While budget support has little precedent for being used in the 'domestic' Union context, it is increasingly being considered for wider, including internal, use. DG REGIO, jointly with other DGs, has recently launched a study that will provide an overview of alternative delivery mechanisms, including notably budget support, within the context of European and Structural Investment Funds [8].

Management of the CEF

Governance

Governance bodies

High level governance has been reinforced in recent years, in particular to enhance the early

engagement of senior management in the strategic decision-making process.

- ▶ For the management of DG DEVCO budget support operations, governance structures have been set up at Headquarters and EU Delegations in charge of monitoring and implementing budget support operations.
- ▶ At Headquarters, a Budget Support Steering Committee has been created to discuss budget support programmes before being presented to the relevant Management Committee of EU Member States, as well as disbursements of ongoing programmes, where there are substantial or high political and policy implications. This Committee is chaired by the Director General of DEVCO.
- ▶ Regional Budget Support Teams have also been created to serve an advisory and support. The role of these teams is to enhance the capacity of EU Delegations and Geographical Directorates to prepare, oversee and implement high quality budget support programmes.

Under IPA II, budget support programmes and disbursement decisions are presented to a similar IPA Steering Committee.

Procedure for defining priorities / strategic decision-making

DG DEVCO budget support is programmed within the framework of the EU's overall Development Policy and thematic and regional multi-annual strategies. For thematic programmes these are referred to as a Multi-Annual Indicative Programme, whereas for national and regional programmes these are referred to as a National or Regional Indicative Programme. Under IPA II, Country Strategy Papers are the specific strategic planning documents made for each beneficiary for the 7-year period. They identify key sectors where substantial improvements and reforms are necessary for beneficiaries to advance on the path to EU membership. In both cases, these multi-annual frameworks are developed in close cooperation with the recipient countries and taking into account their priorities and strategies.

The strategic framework for EU action and the formulation of budget support operations are closely tailored to existing national strategic frameworks to promote ownership and coherence with national strategy. The NDAP has similarly put national authorities at the heart of the process for defining the strategic framework for assistance in the form of their Detailed Decommissioning Plans, which were submitted to the Commission at the outset of the programme and formally incorporated into the legal base.

Programme management

Instruments

DG DEVCO currently implements budget support using three different instruments

- ▶ Good Governance and Development Contracts to provide budget support to a national development or reform policy and strategy.
- ▶ Sector Reform Contracts to provide budget support in order to address sector reforms and improve service delivery.
- ▶ State Building Contracts to provide budget support in fragile and transition situations.

DG ENLARGE implements budget support through Sector Reform Contracts under the IPA II and through all three types of contracts under the ENI.

Eligibility

The commitment of EU funds through budget support is dependent up the recipient government fulfilling a set of eligibility criteria (*ex ante conditionalities* in the parlance of the NDAP). All budget support programmes are subject to four areas of conditionalities covering national / sector policies and reforms, stable macro-economic framework, public financial management and transparency and oversight of the budget. Under budget support, these criteria must be met at the outset of the programme and at the time of each disbursement. Similar to budget support operations, the NDAP has introduced *ex ante* conditionalities. These are prerequisites for the disbursement of any new financing for decommissioning under the current. However, assessment is only conducted at the outset of the MFF and not continuously as funds are disbursed annually on the basis of Commission Financing Decisions.

Programming process

There is no annual programming process for budget support per se. Before the EU agrees to support a country using budget support, one of the most fundamental preconditions is the existence of a clear national strategy in the target area for budget support. This strategy should clearly outline objectives, broken down into a coherent set of initiatives and actions. Progress is regularly followed in the context of the budget support dialogue and major underperformance may result in a decrease of the amount of aid or even its premature termination. This is in contrast to the NDAP, which has an overall baseline strategy in addition to an annual programming cycle.

Performance monitoring framework

The establishment of the performance monitoring system and related disbursement criteria is at the heart of a budget support operation, providing the framework for conditionality and for policy dialogue. During the formulation stage, EU Delegations work with recipient countries to a number of indicators aligned with the objectives of the budget support and which form the performance monitoring framework. The budget aid is then disbursed in tranches and dependent on the progress made by recipient countries towards objectives as measured by the performance indicators. Tranches are typically variable, meaning the amount disbursed is indexed, although not entirely, on actual performance calculated in an objective manner on the basis of pre-defined indicators and targets. This creates incentives through partial payment for performance, while avoiding damaging "stop-go" volatility. The size and phasing of variable tranches can vary widely depending on the context.

In the selection of indicators, the Commission gives particular attention to outcome indicators, because these promote ultimate accountability for results, stimulate use of evidence-based policy making and allow recipients a large latitude of flexibility for deciding how to achieve the desired results best. The Guidelines further recommend that the number of indicators should not exceed eight per tranche.

The NDAP generally follows good practice with regards to the use of results-based indicators for most programmes. Likewise, the NDAP has restricted itself to relatively simple and high level performance monitoring frameworks, which is seen as best practice. The lack of strong incentive mechanism for performance, however, can be noted in the NDAP, even if a performance based 'bonus' system' may not be adapted to the context of the NDAP.

Budget support policy dialogue

Budget support dialogue is a core element of the package and a centre piece for mutual accountability. At the outset, it provides a framework to take stock of the implementation of the recipient country's policies and reforms and discuss future strategy. During implementation, policy dialogue provides a forum to track performance and to identify policy slippages and reach a common understanding on corrective measures to meet policy objectives. A rolling dialogue strategy should use this analysis to identify the most effective dialogue methods and platforms, and a programme of action. Under instructions given by the Geographical Directors, the relevant Head of Delegation chairs policy dialogue meetings with local authorities. Under IPA II, specific budget support dialogue is also complemented by Sectoral Monitoring Committee meetings and Sectoral Sub-Committees implemented in the framework of the structured EU - beneficiary country policy dialogue.

The NDAP has put in place Monitoring Committees that are similar in some ways to the budget support policy dialogue. They place emphasis on bringing together all relevant stakeholders for programme implementation. Similar to budget support, the Monitoring Committees are seen as an important instrument for building national ownership. However, it can be noted that the role of Monitoring Committees is largely limited to ex post monitoring. It may thus be useful to consider developing more of a prospective decision-making role for the Monitoring Committees.

Implementing bodies

Budget support is implemented through direct management mode. While the nature of budget support reduces the need for some types of (administrative) capacity, it is important to note that experience has shown that a key to success for budget support operations is adequate technical capacity in order to engage with beneficiary countries during the dialogue process. EU Delegations

have a key role in the design, implementation, monitoring and evaluation of budget support programmes.

The NDAP has delegated execution of programme management to third party organisations. This reflects the specific context of the birth of the programme, as well as economic reasons, with such programmes requiring significant levels of administrative and technical capacity to implement.

Project management

Within the framework of budget support operations, project management aspects are entirely under the responsibility of national authorities. One of the key principles of budget support is the use of national management systems. There are thus no parallel project management processes associated with the implementation of budget support. Nonetheless, beneficiaries are required to produce annual reporting to take stock of progress made and report against the results-level indicators.

As a key objective of budget support is to strengthen national systems, almost all budget support operations foresee some complementary capacity building components. This capacity building component will be tailored to the specific needs of the beneficiary, but may cover aspects related to the strengthening of public management systems.

This stands in contrast to the NDAP. While the programme has a strong results-focused performance framework, significant 'input' controls remain, such as the necessity for annual programming and approval of projects and amendment thereof.

Financial management

Budget support operations are disbursed on tranches, the release of which is, at least in part, dependent on the demonstration of meeting eligibility criteria and progress achieved towards objectives as measured through the performance indicators. There is no payment claim or justification of expenditure required. Some budget support operations, however, may have some high level controls to help ensure that resources are flowing to agreed activities. Nevertheless, it is expected that programmes are implemented in strict compliance with national rules and that the beneficiary is capable of ensuring and demonstrating this.

Assistance delivered through the NDAP is similarly released in annual tranches on the basis of Commission Financing Decisions. The Commission Financing Decisions are based on the approved Annual Work Programmes, even if the amount of funds released is not directly tied to this document – being more or less equal every year. This observation may raise some questions as to the added value of the annual programming cycle. The Commission may envisage releasing funds on the basis of demonstration of satisfactory progress.

Conclusion

Budget support provides for a useful comparison with the NDAP, even if the two instruments are quite different. A number of good or otherwise interesting practices can be noted:

- ▶ Budget support encourages strong national ownership through the fact that the beneficiary is entirely responsible for developing the strategy to be implemented with the aid of the donor and implements the strategy using national management systems. Management decisions are left to the national authorities, who are held to account for the results obtained. The NDAP can be characterised by a relatively higher level of controls.
- ▶ Budget support places strong focus on political & technical dialogue with the beneficiaries. The NDAP has taken similar steps through the creation of the programme Monitoring Committees. However, it can be noted that these are focused mainly on ex post monitoring, rather than forward-looking discussion due to their narrow remit.
- ▶ Budget support relies on the use of high level results-based performance indicators. Practice within the NDAP has been in line with the principles followed by budget support.
- ▶ Budget support operations often incorporate a variable component based on performance against the pre-agreed indicators. This creates a strong incentive for effective programme implementation.

If such a performance system may not be appropriate in the framework of the NDAP, it underscores the lack of incentive mechanisms within the NDAP.

- ▶ Programme implementation is inherently multiannual. There is no annual programming process. Beneficiaries are responsible for setting out the overall timeline for programme implementation at the outset and progress is tracked through annual reporting and the performance management framework. The NDAP is likewise based on a multi-annual programme developed by the Member States, with a highly detailed work breakdown structure. However, the NDAP also has a cycle of annual programming, upon which release of funds is dependent.
- ▶ Budget support is to a large extent reliance on beneficiaries and their national management systems for programme implementation, with no parallel financial or project management processes and no 'input' controls. This is made possible through a clear strategy for project implementation and a robust performance management framework. While the NDAP disposes of both of these, it maintains important input controls.

7.3. Major projects under ESIF

Introduction

Presentation of the comparator instrument

The European structural and investment funds (ESIF) group together five funds that make up over half of EU funding and are jointly managed by the Commission and Member States. They aim to invest in job creation and a sustainable and healthy European economy and environment. Under the European Regional Development Fund and Cohesion Fund, 'ESIF Major Projects' represent a substantial share of spending and are frequently of strategic importance with respect to the achievement of Union strategy. During the previous MFF, over 1 000 Major Projects were funded between 2007 and 2013 with the European Regional Development Fund and the Cohesion Fund.

ESIF Major Projects are usually large-scale infrastructure projects in transport, environment and other sectors such as research, energy or ICT. Their eligible cost must be more than EUR 50 million except for projects related to "Promoting sustainable transport and removing bottlenecks in key network infrastructure," for which eligible cost must be more than EUR 75 million due to the typically larger size of investments in that sector. Financial instruments are not considered to be ESIF Major Projects.

Due to their large size and strategic importance, ESIF Major Projects are, in addition to the general regulatory framework set out for ESIF, subject to specific approval procedures under this Regulation. The Regulation No 1303/2013 (Common Provisions Regulation) especially noted the necessity for the application to contain the necessary information to provide assurance that the financial contribution from the Funds does not result in a substantial loss of jobs in existing locations within the Union. It also promotes the use of independent experts supported by technical assistance of the Commission in order to ensure a high level of quality in project preparation and implementation (and also streamline the approval process).

Rationale for the case study

ESIF Major Projects are large scale complex projects with some commonalities with NDAP projects, namely their large size and complexity. Moreover, most ESIF Major Projects have been implemented in the infrastructure sectors among which some in the energy sector. However the governance and management of ESIF Major Projects compared to that of the NDAP projects is very different. While providing an interesting comparison, it should also be noted that ESIF Major Projects (or ESIF generally) do not and cannot be used to finance decommissioning activities²⁵.

The NDAP projects are closely followed by the European Commission with frequent reporting. As mentioned above, ESIF Major Projects are also submitted to a deeper preparation and instruction phase with a quality review of the project and a specific appraisal/approval by the European Commission. However, they are not submitted to additional reporting during their implementation aside and beyond those required of all projects under ESIF²⁶. This upfront additional quality control (compared with additional downstream controls) thus appears as a potentially added-value practice that could hold relevance for the NDAP.

ESIF Major Projects are implemented in the context of a robust regulatory framework covering ESI Funds' implementation. This case study focuses on the aspects of ESIF Major Projects most relevant to the NDAP, notably the approval process, and does not portend to present an exhaustive analysis.

Management of the Major Projects

Governance (ESIF-level)

ESIF Major Projects are developed and implemented within the general governance framework established for the ESI Funds. ESIF Major Projects are developed within the strategic framework set out for the ESI Funds for the MFF, notably the Common Strategic Framework. The latter ensures strong consistency with the Europe 2020 Strategy. During the programming process, Member States establish Partnership Agreements with the Commission acts as overall strategic document, providing an overview of how ESI Funds will be used in each Member State. Within this framework, the specific Operational Programmes are developed and submitted by Member States.

Within this process, the **Managing Authorities have strong ownership over the identification and development of projects that may eventually be submitted as an ESIF Major project and receive Union support.** In effect, they must identify in advance ESIF Major Projects envisaged in their Operational Programme and are responsible for preparatory activities in view of the submission of the official application. As with the Partnership Agreements, the Commission may make comments on the Operational Programmes submitted by Managing Authorities for approval.

One can note from this review of governance that the proposal of ESIF Major Projects is strongly embedded in the ESIF programming process, which ensures strong strategic alignment at all levels (between the project and the Operational Programme, then the Partnership Agreement then finally the Common Strategic Framework and wider Union strategy). Under shared management mode, Member States have a strong role in defining their strategy and underlying programme of actions, which ensures a strong level of ownership. Strong Commission involvement in the process and the Common Strategic Framework ensure at the same time the strategic relevance and added value of Union support.

Programme management (Operational Programme-level)

As mentioned in the previous section, the proposal for ESIF Major Projects are made within the Operational Programme. Following approval of the latter, they are subject to an additional approval procedure set out in the Common Provisions Regulation on the basis of information provided by the Managing Authorities. At programme level, the Monitoring Committee is responsible for providing oversight and guidance for the implementation of the Operational Programme.

²⁵ Article 3(3) of the ERDF Regulation (Regulation (EU) 1301/2013) and Article 2(2) of the Cohesion Fund Regulation (Regulation (EU) 1300/2013)

²⁶ Aside the description of the implementation of the Major Projects on a specific section of the report

Approval process of ESIF Major Projects

The Member States have two procedures at their disposal for the approval of their ESIF Major Projects by the European Commission, set in Articles 102.1 and 102.2 of the Common Provision Regulation. The Member States can directly submitted their project and supporting information set out in Article 101 for a direct Commission appraisal and approval based on the Article 102.2 of the Common Provision Regulation. Alternatively, and to promote the use of independent expert advice in project preparation and streamline the approval process, the Member States may submit an Notification document and an Independent Quality Review (IQR) report by an independent expert based on the same information set out in Article 101, to the Commission for approval based on the Article 102.1 of the Common Provision Regulation. In this later case, the Commission may approve or refuse approval of the financial contribution where it establishes a significant weakness in the independent quality review²⁷. The choice of one of the two procedures is left to the Member States.

Before an ESIF Major Project is approved, Managing Authorities must undertake very exhaustive preparatory activities in view of the submission of the required project related information to the Commission. This information includes:

- ▶ Details concerning the body to be responsible for implementation of the ESIF Major Project, and its capacity;
- ▶ A description of the investment and its location;
- ▶ The total cost and total eligible cost;
- ▶ Feasibility studies carried out, including the options analysis, and the results;
- ▶ A cost-benefit analysis, including an economic and a financial analysis, and a risk assessment;
- ▶ An analysis of the environmental impact, taking into account climate change adaptation and mitigation needs, and disaster resilience;
- ▶ An explanation as to how the ESIF Major Project is consistent with the relevant priority axes of the operational programme or operational programmes concerned, and its expected contribution to achieving the specific objectives of those priority axes and the expected contribution to socioeconomic development;
- ▶ The financing plan showing the total planned financial resources and the planned support from the Funds, the EIB, and all other sources of financing, together with physical and financial indicators for monitoring progress, taking account of the identified risks; and
- ▶ The timetable for implementing the ESIF Major Project and, where the implementation period is expected to be longer than the programming period, the phases for which support from the Funds is requested during the programming.

As mentioned, the 2014-2020 period has also seen the strengthening of the role external expert advice in supporting project preparation. To this effect, JASPERS is a technical assistance partnership between three partners (European Commission and EIB²⁸) that provides independent advice to beneficiary countries to help prepare high quality major projects. This may be provided in the form of the aforementioned IQR, or more generally in the provision of support for project preparation and for preparation of elements necessary for approval. In addition, JASPERS assistance may also cover support to the European Commission in the form of post-submission appraisal function for all major projects submitted directly to the Commission.

This process can be characterised by the high level of efforts required for upfront planning and feasibility assessment activities. These steps are seen as being necessary due to the size of investments and their importance. Compared with the NDAP, it can be noted that no such specific approval process involving outside appraisal is necessary for the approval of large, strategic projects in the decommissioning programmes. Beneficiaries for EBRD-implemented projects are assisted by the embedded PMU units for this preparatory work. In some cases, consultancy contracts have been used

²⁷ Article 102 of Regulation (EU) 1303/2013

²⁸ EBRD has recently left JASPERS. .

to help estimate project budget. Nonetheless, there is no explicit quality checklist for approval as has been defined for ESIF Major Projects.

Programme monitoring

Member States are required to appoint monitoring committees to check that operational programmes are being correctly implemented. They notably make periodic reviews of operational programmes and their progress towards specific targets and, where necessary, may propose revisions to operational programmes. The Monitoring Committees can be considered as being similar to the NDAP Monitoring Committees.

Project management

Beneficiaries are responsible for issues related to project management with no *additional* input controls (beyond those applying to all ERDF/CF projects) and under the supervision of the Managing Authority. This is notwithstanding external support solicited from JASPERS through their Managing Authorities. The beneficiary is obliged to implement projects according to the grant agreement and in accordance with the relevant EU and national rules. Projects are implemented on the basis of a multi-annual schedule defined in the grant agreement. However, deviations from the approved work plan would require approval by the Managing Authority.

Monitoring reports are submitted to the Managing Authority on a regular basis, who may intervene in the case of difficulties. Monitoring indicators and objectives are outlined within the grant agreement and any change thereof requires the approval of the Managing Authority. Managing Authorities report to the European Commission about the progress of their operational programmes' implementation through annual implementation reports.

Project management procedures are thus generally in line with those under the NDAP. However, they stand in contrast to the NDAP to some extent in that the NDAP maintains a higher level of supervision and control at programme and project level through the annual programming process.

Financial management

The project management is the same as for other ERDF/CF projects. The beneficiaries implement the project and refer to the Managing Authority for payment claims (payment advances are also provided at the outset of the project). The Managing Authority conducts a first level of control to ensure that the project has been implemented in respect of EU rules and that all submitted costs are eligible. The Audit Authorities and the European Commission can conduct additional (second or third level) controls.

Like all ERDF/CF projects, there is a clear co-financing framework. Beneficiaries are reimbursed on the basis of a percentage of the eligible costs declared within the limits set out by the grant agreements and dependent upon satisfactory accomplishment of objectives. Another important incentive for effective implementation of projects is the possibility of decommitment.

Conclusions

ESIF Major Projects provides for a useful comparison with the NDAP, even if the two instruments are quite different. A number of good or otherwise interesting practices can be noted:

- ▶ The defining characteristic of ESIF Major Projects is the specific approval procedure to which they are subject. This includes a number of analyses meant to notably ensure the quality of the project proposal, its feasibility and its utility. By contrast, the NDAP does not have a prescriptive quality check list for large / strategic projects, even if they are all subject to approval by the Commission.
- ▶ As with all ERDF/CF projects, ESIF Major Projects offers a clear cofinancing framework. Beneficiaries will thus have a stake in any cost increases. The risk of decommitment also creates strong incentives to effectively implement projects.
- ▶ Strong national ownership is guaranteed by virtue of their strong role during each phase of the project.

- ▶ ESIF Major Projects offers a multi-annual framework for project implementation.
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