Chapter 6
Euratom Nuclear Safety Framework

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The choice of whether or not to use nuclear energy and to what extent is up to each Member State of the European Union. Member States who decide to use nuclear energy in their energy mix have to apply the highest standards of safety, security, waste management and non-proliferation as well as to diversify nuclear fuel supplies.

The Euratom Community has set up over the last decade a nuclear legal framework which is the most advanced legally binding and enforceable framework of this kind in the world.

Its first cornerstone was the Directive on Nuclear Safety, adopted in 2009 and revised in 2014.

The so-called 'Waste Directive' (2011) regulates safe and responsible management of spent fuel and radioactive waste.

The Directive on transboundary shipments of radioactive waste and spent fuel lays down a Community system of supervision and control and complements the Waste Directive.

The obligation to develop basic safety standards to protect the health of workers and the general public against the dangers of ionizing radiation goes back directly to the Euratom Treaty—60 years ago. The first Directive was adopted in 1959 and it has been updated several times, most recently in 2013.

The Directive on Drinking Water and the Regulation on Radioactive Contamination of Food and Feed complete the EU legal framework in the nuclear field.

ECURIE and EURDEP are emergency preparedness arrangements put in place by the Euratom Community following the Chernobyl accident in 1986.

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The choice of whether or not to use nuclear energy and to what extent is up to each Member State of the European Union. Nevertheless, the European Union, and—within it—the Euratom Community, plays an important role in the fields of nuclear safety, safeguards, nuclear security, nuclear non-power applications as well as fission and fusion research.

When deciding on their national energy mix, Member States have to take into account several considerations: they have to apply the highest standards of safety, security, waste management and non-proliferation as well as diversify nuclear fuel supplies, as emphasized also in the Energy Union strategy, launched in 2015, and the European Energy Security Strategy (2014).

In October 2014, the European Council agreed on a 2030 climate and energy policy framework for the EU, setting an ambitious domestic target of an at least 40% reduction in greenhouse gas emissions for 2030. Last year, the European Commission prepared a set of legislative proposals called the 'Clean Energy for All Europeans' package with a view to implementing these policy objectives. These proposals are currently under discussion.

As a low-carbon energy source, nuclear energy has a role to play, alongside renewable sources, which are mostly intermittent. The EU is consolidating the enabling environment for the transition to a low-carbon economy through a wide range of interacting policies and instruments reflected under the Energy Union strategy.

The Euratom Community has been setting up over the last decade a nuclear legal framework which is the most advanced legally binding and enforceable framework of this kind in the world.

Its first cornerstone was the Directive on Nuclear Safety, adopted in 2009 and revised in 2014.

By adopting the so-called 'Waste Directive' in 2011, the Euratom Community and its Member States have demonstrated their commitment to ensure safe and responsible management of spent fuel and radioactive waste.

The Directive on Transboundary Shipments of Radioactive Waste and Spent Fuel lays down a Community system of supervision and control and complements the Waste Directive.

For many years, the Euratom Community has established a set of basic safety standards to protect workers, members of the public and patients against the dangers arising from ionizing radiation. The new Directive on Basic Safety Standards, which entered into force in 2014, updates the requirements based on the latest scientific developments and knowledge.

The Directive on drinking water and the regulation on radioactive contamination of food and feed complete the EU legal framework in the nuclear field.

ECURIE and EURDEP are emergency preparedness arrangements put in place by the Euratom Community following the Chernobyl accident in 1986.

Ensuring a high level of nuclear safety is a key component of the regulatory framework governing the civil uses of nuclear power. Euratom's competence in nuclear safety was recognized by the European Court of Justice some 15 years ago.

The Nuclear Safety Directive was first adopted in 2009. It establishes a common binding framework for the safety of nuclear installations, defining basic obligations and principles governing nuclear safety throughout the EU. It made international safety principles legally binding and enforceable.

This Directive was amended in 2014 to reflect the lessons learned from the Fukushima accident and the 'stress tests' as well as recent technical developments. The amended Directive is based on various sources of technical expertise, such as the Western European Nuclear Regulators Association (WENRA) and the technical provisions of the IAEA, and has been drawn up in close cooperation with national regulators.

The deadline for transposition of the amended Directive into national legislation was 15 August 2017.

The implementation of the EU safety framework at national level will entail a major effort by Member States, and will be a challenge also for national Nuclear Safety Regulators. The Commission is working closely with Member States to facilitate this process.

The amended Directive aims to ensure *continuous* improvement of safety and reinforces the nuclear safety framework in six key areas:

- Introduces a high-level EU-wide safety objective

An ambitious EU-wide safety objective for all types of nuclear installations has been introduced, with the aim of reducing the risk of accidents and avoiding large radioactive releases.

This objective, applicable to new nuclear installations (licensed for construction after 14 August 2014), calls for significant safety enhancements in the design of new reactors, for which state-of-the-art knowledge and technology should be used, taking account of the latest international safety requirements. In particular, such installations must be designed, sited, constructed, commissioned, operated and decommissioned with the objective of preventing accidents and, should an accident occur, mitigating its consequences.

For existing nuclear installations, this objective enshrines the principle of continuous improvement of nuclear safety by indicating the need to identify and implement in a timely manner reasonably practicable safety improvements.

The objective fully applies to nuclear installations in the context of long-term operation. All possible nuclear safety issues related to ageing of the installations and their designs have to be properly assessed and all identified safety improvements have to be implemented to the installations by the licence holder, under the supervision of the national regulator.

The EU-wide safety objective has a global dimension via the recent Vienna Declaration on the Convention of Nuclear safety.

- Sets up a European system of peer reviews on specific safety issues

The European Topical Peer Review (TPR) is a cooperation and coordination mechanism amongst the EU Member States with the aim of building confidence,

developing and exchanging experience, and ensuring the common application of high nuclear safety standards.

The introduction of the TPR was inspired by the peer review process during the 'stress tests' after the Fukushima accident.

TPRs will focus on specific safety topics. They will complement the already existing reviews according to which the Member States must, at least every ten years, arrange for periodic self-assessments of their national framework and competent regulatory authorities and invite an international peer review of relevant segments of their national framework and/or authorities with the aim of continuously improving nuclear safety.

National regulators (ENSREG) selected 'ageing management' as a common topic to be examined within the 1st TPR this year, particularly in view of plans for long term operation.

- Strengthens the rules concerning the role and independence of National Regulatory Authorities

The Directive further enhances the independence of Regulatory Authorities from undue influence in their regulatory decision making and ensures that they have appropriate means and competencies to properly carry out their responsibilities.

Regulatory Authorities shall have sufficient legal powers, sufficient staffing with necessary qualifications, experience and expertise, and sufficient financial resources for the proper discharge of their responsibilities.

The Regulatory Authorities should be involved in the definition of national nuclear safety requirements so that possible conflicts of interest are prevented.

- Increases transparency requirements on nuclear safety matters, informing and involving the public

The Directive requires both the competent regulatory authority and license holders to provide the public with information on normal operating conditions of nuclear installations as well as prompt information in case of incidents and accidents.

Moreover, the public is given the opportunity to participate in the decision making process relating to licensing of nuclear installations.

- Promotes an effective nuclear safety culture

The Directive includes provisions to enhance an effective nuclear safety culture which aim at promoting the commitment to nuclear safety and its continuous improvement at all levels of staff and management within an organization.

These provisions, related to the human factor, complement the more technical provisions also included (nuclear safety objective, defense-in-depth concept, initial assessments and periodic safety reviews of nuclear installations), reflecting the two pillars of nuclear safety.

- Regulates *on-site* emergency preparedness and response

The Directive enhances accident management as well as on-site emergency preparedness and response and provides for regular safety reassessments of nuclear installations to identify further safety improvements which take into account various issues, including ageing issues.

The adoption in 2011 of a Directive on the safe and responsible management of spent fuel and radioactive waste[1] was a major step towards achieving a comprehensive and legally binding framework at EU level. Through the implementation of this Directive, Member States are required to demonstrate that they have taken reasonable steps to ensure that radioactive waste and spent fuel is managed safely and that no undue burden is passed to future generations.

The safe and responsible management of these materials is of particular importance. This is especially the case now as many existing nuclear power reactors are reaching the end of their operational lives and will need to be decommissioned. The radioactive waste generated in this process will need to be stored and/or disposed of.

In May 2017, the Commission adopted its first report providing a comprehensive overview to the Council, European Parliament and European Union (EU) citizens on this important issue. Such a report will be submitted every three years, on the basis of Member States' reports to the Commission on the status of their implementation of the Directive. Member States will also have to update their national programs when needed and report any significant changes to the Commission.

Having reviewed all national reports, as well as the national policies, frameworks and programs submitted to date, the Commission recognizes Member States' efforts in implementing the Directive and encourages Member States to continue these efforts.

All Member States have reported full transposition of the Directive and the Commission is working on finalization of the conformity assessment.

To date, all Member States have submitted their national reports and most of them also their final national programs.

Three Member States have concrete plans to develop geological disposal facilities in the 2022–2030 period, while other twelve Member States have plans for such facilities in the next decades. Nevertheless, the specific challenge remains in the development of geological disposal facilities, in particular their location. While this is a complex, long-term process in which transparency and public participation will be of great importance, the Directive clearly requires Member States to engage in this process without delay.

The Commission noted that half of Member States are considering the possibility of shared solutions for disposal either as a preferred or as an alternative option

[1]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.

(the 'dual track' approach[2]). However, none of the Member States' programs or reports set out concrete milestones or measures towards the implementation of such a solution.

Although international peer reviews of the national frameworks, and/or programs is one of the challenges until 2023, less than half of Member States have specific plans for such reviews: the first ARTEMIS review took place in Poland in October, to be followed by France, Bulgaria and Spain (2018) and Germany (2019).

The Commission is planning a workshop on the Waste Directive on 7 November 2017 in Brussels.

Council Directive 2006/117/EURATOM[3] lays down a Community system of supervision and control of transboundary shipments of radioactive waste and spent fuel, so as to guarantee an adequate protection of the population. It ensures that Member States concerned are informed about shipments of radioactive waste and spent fuel to or via their territory, with the obligation to give either their consent or reasoned refusal to the shipments. This Directive complements the 'Waste Directive'[4] which focuses on the policy and responsibilities for long term management of radioactive waste and spent fuel.

According to Article 20(1) of the Directive, as of 25 December 2011 Member States have to report every three years on the implementation of the Directive to the Commission.

The Commission is finalizing its second report on the implementation of the Directive, providing an overview of the shipments and related aspects for the period 2012–2014. This report will also provide complementary information to the Commission report on the implementation of the 'Waste Directive'.[5]

The Commission notes that the overall number of authorizations has increased (15%) compared to the previous reporting period (2008–2011).

In the context of this second report, the Commission has not been informed about reshipments related to non-authorized shipments of undeclared radioactive waste (as per Article 4), shipment failures (as per Article 12) or prohibited exports that would fall under the provisions of Article 16(1)c of the Directive. There were only two refusals of authorization linked to contaminated scrap metal and, in one case, incomplete information for shipment. All the cases of refusal were solved by the concerned Member States.

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[2]In this case, Member States are continuing with the development and implementation of their own national programmes, while leaving open the option of a shared solution.

[3]Council Directive 2006/117/EURATOM of 20 November 2006 on the supervision and control of shipments of radioactive waste and spent fuel, OJ L 337, 5.12.2006.

[4]Council Directive 2011/70/EURATOM of 19 July 2011 establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste, OJ L199, 2.8.2011.

[5]Report from the Commission to the Council and the European Parliament on progress of implementation of Council Directive 2011/70/Euratom and an inventory of radioactive waste and spent fuel present in the Community's territory and the future prospects, COM(2017)236 final of 15.5.2017.

The next reports of Member States will need to be submitted by 25 December 2017.

The obligation to develop basic safety standards to protect the health of workers and the general public against the dangers of ionizing radiation goes back directly to the Euratom Treaty—60 years ago. The first Basic Safety Standards Directive was adopted in 1959.

It was successively updated, most recently in 2013. This new Directive has to be transposed into Member States law by February 2018.

It is based on scientific progress in the radiation protection area. The new Directive provides for:

- Better protection of the public, in particular with regard to radon in dwellings, exposure from naturally occurring radioactive material (NORM) activities, exposure from building materials, exposure from existing exposure situations, exposure from emergency situations, and deliberate exposure for non-medical purposes.
- Better protection of workers, in particular for medical staff, workplaces with indoor radon, workplaces with NORM, and emergency workers.
- Better protection of patients, in particular with a view to put more emphasis on the justification of medical exposures, to strive for enhanced safety culture in the medical area, and with measures aiming at a minimization of probability and magnitude of accidental or unintended exposures.
- Strengthened requirements on emergency preparedness and response, especially with a view to the lessons learned from the Fukushima accident.

It provides a framework for the implementation of the internationally recognized main principles of radiation protection:

- justification, or do more good than harm;
- optimization, or maximize the benefit over the detriment; and
- dose limitation, or do not exceed the pre-determined dose limits.

The new Directive provides a coherent framework for radiation protection, in one piece of legislation, to implement these key principles across a range of areas, including regulatory control, specific fields of application, education and training and emergency preparedness and response.

The Euratom Drinking Water Directive[6] provides a framework for controlling radioactivity in drinking water and the radiation dose received from the consumption of different forms of drinking water.

The Directive applies to tap water and to water in bottles or containers intended for human consumption. It does not apply to natural mineral waters and to small private supplies. The Directive deals with natural as well as with artificial

[6]Council Directive 2013/51/Euratom of 22 October 2013 laying down requirements for the protection of the health of the general public with regard to radioactive substances in water intended for human consumption, OJ L 296, 7.11.2013, pp. 12–21.

radionuclides. It lays down general principles for monitoring and gives technical details (frequencies of sampling, analysis methods, measuring methods, etc.).

The recent adaptation of the Directive allocates all radioactivity matters under this Directive. The transposition deadline was 28 November 2015.

All Member States have provided their transposing legislation to the Commission.

The Commission is in process of checking transposition and implementation of the Directive.

Post Chernobyl Arrangements. Following the Chernobyl accident in 1986 emergency preparedness arrangements were put in place by the Euratom Community aiming to improve the exchange of information and to facilitate common responses in case of radiological emergency.

ECURIE (European Community Urgent Radiological Information Exchange) is the emergency communication network between Member State authorities and the Commission.

The Council Decision 87/600/EURATOM requires the Commission and the Member States to establish and maintain a system of rapid alert and information exchange for nuclear and radiological emergencies.

EURDEP (EUropean Radiological Data Exchange Platform) was set up as part of ECURIE arrangements to ensure that effective environmental monitoring is always available. This allows a country to quickly determine when there is a significant rise in the radiation levels either from within its boundaries or from outside.

EURDEP makes radiological monitoring data from most European countries available in nearly real-time: http://eurdep.jrc.ec.europa.eu.[7]

ECURIE and EURDEP together form the technical implementation of Council Decision 87/600/EURATOM.

Following the nuclear accidents of Chernobyl (1986) and of Fukushima (2011), specific EU regulations on import conditions into the EU of agricultural products, food and feed have been put in place.

The European Commission (Directorate-General for Energy) has a direct role in protection of the population by activating Euratom Foodstuffs Regulations to prevent contaminated food or feed reaching the internal market.

The revised 'Food and Feed Regulation',[8] which was adopted in January 2016, is a framework to quickly adopt emergency measures related to foodstuffs. The regulation:

[7]Missing countries, probably soon on-line: Ukraine, Albania, Bosnia-Herzegovina, Moldova, and Montenegro.

[8]Council Regulation (Euratom) 2016/52 laying down maximum permitted levels of radioactive contamination of food and feed following a nuclear accident or any other case of radiological emergency and repealing Regulation (Euratom) No 3954/87 and Commission Regulations (Euratom) No 944/89 and (Euratom) No 770/90.

- consolidates existing Euratom legislation;
- brings the procedure in line with the new Comitology system (set of procedures through which EU countries control how the European Commission implements EU law);
- provides more flexible procedures allowing specific reactions to any nuclear accident or radiological emergency in the EU, in the vicinity of the EU or in a remote country.

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