COUNCIL DECISION

of 19 December 2011

concerning the specific programme, to be carried out by means of direct actions by the Joint Research Centre, implementing the Framework Programme of the European Atomic Energy Community for nuclear research and training activities (2012-2013)

(2012/95/Euratom)

THE COUNCIL OF THE EUROPEAN UNION,

Having regard to the Treaty establishing the European Atomic Energy Community, and in particular Article 7 thereof,

Having regard to the proposal from the European Commission submitted after consultation of the Scientific and Technical Committee,

Having regard to the opinion of the European Parliament [1],

Having regard to the opinion of the European Economic and Social Committee [2],

Whereas:

(1) In accordance with Council Decision 2012/93/Euratom of 19 December 2011 concerning the Framework Programme of the European Atomic Energy Community for research and training activities (2012-2013) [3] (hereinafter 'the Framework Programme') the Framework Programme is to be implemented through specific programmes that define detailed rules for their implementation, fix their duration and provide for the means deemed necessary.

(2) The Framework Programme comprises two types of activities: indirect actions in fusion energy research and research on nuclear fission, safety and radiation protection, and direct actions for activities of the Joint Research Centre (JRC) in the field of nuclear waste management, environmental impact, safety and security, especially related to nuclear events and taking into account lessons learned from previous experiences. The direct actions should be implemented by this specific programme.

(3) The JRC should implement the research and training activities to be carried out by means of direct actions under this specific programme.

(4) In implementing its mission, the JRC should provide customer-driven scientific and technical support to the Union policymaking process, ensuring support for the implementation and monitoring of existing policies and responding to new policy demands. In order to achieve its mission, the JRC should carry out research of the highest European quality, including by maintaining its own level of scientific excellence.

(5) In implementing this specific programme, emphasis should be given to promoting the mobility and training of researchers and promoting innovation, in the Union. In particular, the JRC should provide appropriate training in nuclear safety and security.

(6) This specific programme should be implemented in a flexible, efficient and transparent manner, taking into account the relevant needs of the JRC users and Union policies, while protecting the Union financial interests. The research activities carried out under this specific programme should be adapted where appropriate to these needs and to scientific and technological developments and aim to achieve scientific excellence.

(7) For implementing this specific programme, cooperation under the Agreement on the European Economic Area or under an Association Agreement may be complemented by international cooperation, in particular on the basis of Article 2(h), Article 101 and Article 102 of the Treaty, with third countries and international organisations.

(8) In the context of enlargement and integration activities, the JRC aims to promote the integration of the organisations and researchers of new Member States within its activities in particular for implementing of the science and technology components of the Union *acquis*, as well as increased cooperation with organisations and researchers from accession and candidate countries. A progressive opening should also be envisaged towards the neighbouring countries, specifically on priority topics of the European Neighbourhood Policy.

(9) The JRC should continue to generate additional resources through competitive activities. These include participation in the indirect actions of the Framework Programme, third-party work and, to a lesser extent, the exploitation of intellectual property.

[1] Opinion of 15 November 2011 (not yet published in the Official Journal). Opinion delivered following non-compulsory consultation.
[2] OJ C 318, 29.10.2011, p. 127. Opinion delivered following non-compulsory consultation.
[3] See page 25 of this Official Journal.

(10) Sound financial management of this specific programme and its implementation should be ensured in an effective and user-friendly manner, while ensuring legal certainty and the accessibility of the results of the programme for all participants, in accordance with Council Regulation (EC, Euratom) No 1605/2002 of 25 June 2002 on the Financial Regulation applicable to the general budget of the European Communities [1] and Commission Regulation (EC, Euratom) No 2342/2002 of 23 December 2002 laying down detailed rules for the implementation of Council Regulation (EC, Euratom) No 1605/2002 on the Financial Regulation applicable to the general budget of the European Communities [2].

(11) Appropriate measures — proportionate to the Union's financial interests — should be taken to monitor both the effectiveness of the financial support granted and the effectiveness of the utilisation of these funds in order to prevent irregularities and fraud. The necessary steps should be taken to recover funds lost, wrongly paid or incorrectly used in accordance with Regulation (EC, Euratom) No 1605/2002, Regulation (EC, Euratom) No 2342/2002, Council Regulation (EC, Euratom) No 2988/95 of 18 December 1995 on the protection of the European Communities financial interests [3], Council Regulation (EC, Euratom) No 2185/96 of 11 November 1996 concerning on-the-spot checks and inspections carried out by the Commission in order to protect the European Communities' financial interests against fraud and other irregularities [4] and Regulation (EC) No 1073/1999 of the European Parliament and of the Council of 25 May 1999 concerning investigations conducted by the European Anti-Fraud Office (OLAF) [5].

(12) The Commission should in due course arrange for an independent assessment to be conducted concerning the activities carried out in the fields covered by this specific programme.

(13) Research activities carried out within this specific programme should respect fundamental ethical principles, including those reflected in the Charter of Fundamental Rights of the European Union,

HAS ADOPTED THIS DECISION:

Article 1

The specific programme, to be carried out by means of direct actions by the Joint Research Centre (JRC), implementing the Framework Programme of the European Atomic Energy Community for nuclear research and training activities (2012-2013) (hereinafter the 'specific programme'), is adopted for the period from 1 January 2012 to 31 December 2013.

Article 2

The specific programme shall establish the activities for the nuclear actions of the JRC, supporting the whole range of research actions carried out in trans-national cooperation in the following thematic areas:

(a) nuclear waste management, environmental impact and basic knowledge;

(b) nuclear safety of reactor systems of relevance to Europe;

(c) nuclear security (including nuclear safeguards, non-proliferation, combating illicit trafficking and nuclear forensics).

The objectives and broad lines of the activities referred to in the first paragraph are set out in the Annex.

Article 3

In accordance with Article 3 of Decision 2012/93/Euratom, the maximum amount for the execution of the specific programme is EUR 233 216 000.

Article 4

All research activities carried out under the specific programme shall be carried out in compliance with fundamental ethical principles.

Article 5

The specific programme shall be implemented by means of direct actions as established in Annex II to Decision 2012/93/Euratom.

Article 6

1. The Commission shall draw up a multiannual work programme for the implementation of the specific programme, setting out in greater detail the objectives and scientific and technological priorities set out in the Annex, and the timetable for implementation.

2. The multiannual work programme shall take account of relevant research activities carried out by the Member States, associated states and European and international organisations. It shall be updated where appropriate.

Article 7

The Commission shall arrange for the independent monitoring, assessment and review provided for in Article 6 of Decision 2012/93/Euratom to be conducted concerning the activities carried out in the fields covered by the specific programme.

[1] OJ L 248, 16.9.2002, p. 1.
[2] OJ L 357, 31.12.2002, p. 1.
[3] OJ L 312, 23.12.1995, p. 1.
[4] OJ L 292, 15.11.1996, p. 2.
[5] OJ L 136, 31.5.1999, p. 1.

Article 8

This Decision shall enter into force on the third day following its publication in the *Official Journal of the European Union*.

Done at Brussels, 19 December 2011.

For the Council
The President
M. KOROLEC

ANNEX

SPECIFIC PROGRAMME OF THE JOINT RESEARCH CENTRE

1. Objective

The overall objective of the specific programme is to provide customer-driven scientific and technical support to the Union policy concerning nuclear energy, and to meet the obligations of the Treaty. To achieve this goal, knowledge, skills and competence need to be continuously updated, in order to provide the required state-of-the-art expertise in the domains of nuclear reactor safety and nuclear safeguards and security.

2. Approach

The nuclear activities of the JRC aim to meet the research and development (R & D) obligations of the Treaty and to support both the Commission and Member States in the fields of safeguards and non-proliferation, waste management, safety of nuclear installations and the fuel cycle, radioactivity in the environment, and radiation protection. In the light of the reinforced emphasis on nuclear safety contributing to reorientation of nuclear research, the area of non-proliferation shall receive the greatest possible attention.

For the Framework Programme, research and support activity will continue to focus on:

(a) nuclear waste management, environmental impact and basic knowledge;

(b) nuclear safety of reactor systems of relevance to Europe;

(c) nuclear security (including nuclear safeguards, non-proliferation, combating illicit trafficking, and nuclear forensics).

Moreover, the JRC will further strengthen its role as a European reference for the dissemination of information, training and education for young scientists.

3. Activities

3.1. Nuclear waste management, environmental impact and basic knowledge

3.1.1. Spent fuel and high-level waste characterisation, storage and disposal

The management of spent fuel and nuclear high-level waste involves their processing, conditioning, transport, interim storage and geological disposal. The ultimate goal is to prevent the release of radio-nuclides into the biosphere during all these stages over their very long decay time scale. The design, assessment and functioning of engineered and natural containment barrier systems over the relevant time scales are key to achieving these objectives and depend among other things on fuel and/or waste behaviour in the geological environment. Such studies are covered by this specific programme.

3.1.2. Partitioning and transmutation

The main strategy considered for nuclear energy systems includes closing the nuclear fuel cycle, with the aim of reducing the long-term radio-toxicity of the nuclear waste and enhancing the safe and efficient use of resources. The major challenges for this concept remain the optimisation of partitioning techniques, to separate selected long-lived radio-nuclides from the spent fuel, and the fabrication and qualification of safe and reliable fuels for actinide transmutation. Experimental work on partitioning at the JRC includes research on both aqueous dissolution and pyro-metallurgical processes (in salt media).

3.1.3. Basic actinide research

To maintain competence and a leading position in the field of civil nuclear technology, it is essential to foster interdisciplinary basic research on nuclear materials as a resource from which new technological innovations can emerge. In turn, this requires knowledge of the response of the so-called '5f electronic layer elements' (i.e. the actinides) and compounds to (usually extreme) thermodynamic parameters. Because of the small experimental database and the intrinsic complexity of modelling, our current knowledge of these mechanisms is limited. Basic research addressing these issues is crucial for understanding the behaviour of these elements and to remain at the forefront of contemporary condensed matter physics. Developments in advanced modelling and simulation will be leveraged to boost the impact of the experimental programmes.

The JRC's basic actinide research programme will remain at the forefront of actinide physics and chemistry, the main goal being to provide world-class experimental facilities to scientists from universities and research centres. These will allow them to investigate the properties of actinide materials, in order to complete their education and to contribute to advances in nuclear sciences.

3.1.4. Nuclear data

The proposed designs for dedicated minor actinide burners and advanced concepts for nuclear energy production result in new demands for nuclear data with significantly improved accuracy. The quality of experimental data is a key issue for better safety standards and reduced error margins, and hence cost effectiveness in the design and construction of new reactor systems. The data files used, including those of OECD Nuclear Energy Agency, by industry and research laboratories have to be complete, accurate and validated by well-defined quality assurance procedures.

The JRC will produce internationally required data and will also continue the safe operation of the Van de Graaff and GELINA linear accelerators.

3.1.5. Medical applications from nuclear research

New cancer therapies called targeted alpha therapy (TAT), are taking advantage of the unique physical properties of alpha particle radiation (in particular its high energy and short path length in human tissue) to selectively target and destroy diseased cells while sparing surrounding healthy tissue. These techniques can be used for the treatment of cancer and infectious diseases.

The JRC will continue to support the development of TAT in close cooperation with national organisations with a special focus on alternative processes for the production of alpha emitters and the radio-biological testing of radio-labelled bio-molecules, assessing their efficiency and feasibility and making these new applications available for implementation by hospitals and the pharmaceutical industry.

3.1.6. Monitoring of radioactivity in the environment

Title II, Chapter 3, of the Treaty provides for the establishment of basic safety standards for the health protection of workers and the general public against the dangers arising from ionising radiation. Articles 31 to 38 of the Treaty provide rules on the role of the Member States and the Commission with regard to the protection of human health, the control of levels of radioactivity in the environment, release into the environment, and nuclear waste management. This will also include key aspects related to accident management. Under Article 39 of the Treaty, the JRC provides assistance to the Commission in carrying out this task.

In view of the new limits for radio-nuclides in drinking water and food ingredients, the JRC will develop analytical techniques and produce corresponding reference materials. Inter-laboratory comparisons will be organised with the monitoring laboratories of the Member States to assess the comparability of the reported monitoring data under Articles 35 and 36 of the Treaty, and to support the harmonisation of the radioactivity monitoring systems with reference test materials.

3.1.7. Knowledge management, training and education

It is important to maintain and deepen the nuclear knowledge of the new generations of nuclear scientists and engineers, through dissemination of experiments, results, interpretations and skills acquired in research and applied programmes.

The JRC will contribute to making this knowledge readily available, properly organised and well documented and to supporting higher education activities in Europe for both operating and innovative Generation IV reactors. Furthermore, the JRC will develop the European Nuclear Human Resources Observatory to analyse the trends in Europe and provide scientific support for the Union policy making. The JRC will also continue to contribute to better communication on nuclear issues, in particular regarding public acceptability and more globally on strategies for overall energy awareness. The long experience and unique facilities for nuclear data measurements are also an excellent opportunity for the education and training of nuclear scientists and engineers, supplementing education at universities by giving hands-on access to nuclear installations.

3.2. Nuclear safety

3.2.1. Nuclear reactor safety

In order to maintain and improve the safety level of nuclear power plants, advanced and refined safety assessment methodologies and corresponding analytical tools have to be extended and validated. Targeted experimental investigations are carried out at the JRC to improve the understanding of the underlying physical phenomena and processes in order to enable validation and verification of deterministic and probabilistic safety assessments, based on advanced modelling of plant processes (reactivity and thermal-hydraulic), of components under operational loads/ageing, and of human and organisational factors. The JRC will also continue to play a central role in the establishment and operation of the European Clearinghouse for Operational Experience Feedback for the benefit of all Member States. It will provide topical reports on specific plant issues and facilitate the efficient sharing and implementation of operational experience feedback to improve the safety of nuclear power plants, both for the benefit of all European regulators and in order to minimise the probability of nuclear accidents. It will carry out research programmes in support to the development of safety requirements and advanced evaluation methods for reactor systems of relevance to nuclear safety. It will also include key aspects of research on decommissioning of reactors and their infrastructures (methodologies, training, scientific background).

3.2.2. Nuclear fuel safety in power reactors operating in the Union

Generation II and III light-water reactors will probably operate throughout the 21st century. In order to maximise their safety, an improved understanding of the in-pile behaviour of the fuel rod system (fuel and cladding) must be ensured, especially in relation to extended operation schemes, covering normal, incidental and accidental conditions. The two main aspects of this research are the mechanical integrity of the fuel rods during reactor lifetime and the fuel response to transient conditions (including severe reactor accident conditions up to core meltdown).

Ultimately, experiment and theory on well-defined physical and chemical mechanisms must be incorporated into multi-scale models and eventually fuel performance codes.

JRC research will also be devoted to improving the experimental benchmark for UO_2 and MOX fuel behaviour at high burn-up.

3.2.3. Safe operation of advanced nuclear energy systems

New reactor concepts for increased safety, safeguards and sustainability are considered worldwide to be a new research topic, in particular within the Generation IV International Forum (GIF). The JRC has been given a mandate by the Member States to act as the Implementing Agent for the participation of the Community in GIF. As such, the JRC will further coordinate the European contributions (through direct or indirect actions, or via the Member States) in the various GIF projects.

The studies performed in JRC laboratories primarily cover the safety aspects of new innovative designs and innovative fuel cycles, in particular the characterisation, irradiation testing and post-irradiation examination of new fuel types, as well as innovative structural and cladding materials characterisation and qualification. Furthermore, studies are being carried out into the safety requirements of the new generation of reactors, and the advanced evaluation of relevant nuclear systems. The aim is to support the establishment of a common European approach to the safety evaluation of new innovative designs. In this regard synergies with SNETP will be sought as appropriate.

3.3. Nuclear security

3.3.1. Nuclear safeguards

Due to the enhanced role played by nuclear energy in the production of electricity in Europe, and in the world, the handling of nuclear materials in the fuel cycle is continuously increasing. To prevent any diversion of these materials from their intended use, a strong and reliable system of nuclear safeguards and non-proliferation is crucial. Technical innovations and improvements continue to be required to implement the evolving safeguards policy. Today's challenge is to implement increased automation and better tools for information analysis to reduce both inspector workload and the burden on the nuclear industry. New and innovative safeguards approaches will also be applied for reactor systems of relevance to Europe and their corresponding fuel cycles.

3.3.2. Additional Protocol

The Additional Protocol aims to prevent undeclared nuclear operations. Its implementation requires a number of techniques different from (or more evolved than) those used in verifying nuclear material accountancy. Increased work is anticipated for checking the completeness of declarations, which will require more R & D on methods to detect clandestine programmes, in some cases by using the same techniques as in nuclear forensics. Major efforts will be needed to improve methods of trace particle analysis for the verification of declared activities or for the detection of undeclared activities.

3.3.3. Open-source information collection on nuclear non-proliferation

With the aim of supporting Commission services and collaborating with IAEA and Member State authorities, the JRC will continue to systematically collect and analyse information from a variety of sources (Internet, specialised literature, databases) on nuclear non-proliferation issues. This information will be used to produce country reports to closely monitor the evolution of nuclear activities and the import and/or export of direct and dual-use nuclear equipment and technology in selected countries. In addition, the JRC will follow the technical evolution of export control regimes and will provide technical support to relevant Commission services.

3.3.4. Combating illicit trafficking of nuclear materials, including nuclear forensic analysis

The concerns arising from illicit trafficking of nuclear and other radioactive material, the proliferation risks associated with it and the threat of nuclear terrorism call for a set of measures to address prevention, detection and response. Nuclear security is getting increased attention at all levels, ranging from international initiatives (Global Initiative on Combating Nuclear Terrorism, Proliferation Security Initiative, UNSC 1540, and others) to multilateral cooperation and technical developments. Training of staff is of key importance for the implementation of nuclear security measures. The JRC shares with the Member States and with international organisations its experience and expertise in the nuclear area in general and in the nuclear security area in particular.

To this end, different training programmes need to be developed or improved and the associated training modules have to be produced or updated. The JRC is going to establish a European Security Training Centre, which will initially focus on nuclear and radiological security.

4. Ethical aspects

During the implementation of this specific programme and in the research activities arising from it, fundamental ethical principles are to be respected. These include the principles enshrined in the Charter of Fundamental Rights of the European Union.

In compliance with the principle of subsidiarity and given the diversity of approaches in Europe, participants in research projects must conform to the current legislation, regulations and ethical rules in the countries where the research will be carried out. In any case, national provisions apply and no research forbidden in any given Member State or other country will be supported by Euratom funding in that Member State or country.

Where appropriate, those carrying out research projects must seek the approval of the relevant national or local ethics committees prior to the start of the activities. An ethical review will also be undertaken systematically by the Commission for proposals dealing with ethically sensitive issues or where ethical aspects have not been adequately addressed. In specific cases, an ethical review may be held during the implementation of a project.

Article 13 of the Treaty on the Functioning of the European Union requires the Union and the Member States to pay full regard to the welfare requirements of animals in formulating and implementing Union's policies including research.