ENSREG
European Nuclear Safety Regulators Group

Report of the
European Nuclear Safety Regulators Group

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FOREWORD

As a matter of fact, there are 148 nuclear power reactors operating in 15 European Union (EU) Member States, producing one third of all electrical energy. Some units have already been decommissioned or are in the process of decommissioning, many are undergoing substantial preparations for long-term operation and several new units are under construction or seriously planned. In addition, there is a substantial number of other nuclear and radioactive waste management installations within the European Union. This situation creates varied and dynamic challenges. Every Member State with nuclear power plants has established its own system for regulatory supervision of its nuclear facilities. All Member States that operate nuclear facilities for the generation of electricity are parties to relevant international conventions. All Member States also actively support the International Atomic Energy Agency (IAEA), where standards are developed and through which international programmes for the enhancement of nuclear safety are implemented. This reflects the worldwide nature of nuclear safety — a major incident in one country can affect the use of nuclear power in all others. Under international conventions and standards prime responsibility for nuclear safety rests with the licence holders of nuclear facilities.

For historical and other reasons, the way in which nuclear power utilisation and nuclear safety in the EU is organised differs to some extent from other sectors. Now more than 50 years old, the Euratom Treaty, which furthers cooperation among Member States, provides for the establishment of basic safety standards, ensures the supply of ores and nuclear fuel, monitors the peaceful use of nuclear material and facilitates cooperation with other countries and international organisations, is one of the oldest instruments of pan-European cooperation. Nuclear power and nuclear safety have always had special interest for both governments of Member States and the general public. In addition, the technology for the production of electricity from nuclear power has been developed in several different directions, resulting in a number of differently designed and operated nuclear power plants in the EU.

Some years ago processes were initiated to look for a common platform to ensure equal levels of nuclear safety and environmental protection in radioactive waste management and decommissioning in all EU Member States. There were ideas about an increased role for the European Commission (the Commission), proposals for new Directives and lengthy discussions among Member States concerning the action to be taken, but there was no clear consensus as to the need or the way forward. During that time WENRA developed harmonised Safety Reference Levels for existing nuclear power plants and for waste management and decommissioning. In 2007, the European Council endorsed the creation of the High Level Group on Nuclear Safety and Radioactive Waste and Spent Fuel Management, and the Council of the European Union identified the specific tasks and issues such a group could deal with to assist in promoting the continuous improvement of nuclear safety. This group was eventually established in July 2007. Every EU Member State has appointed two senior experts in nuclear safety and radioactive waste management, mainly heads of relevant regulatory bodies, to this group. Representatives of the Commission are also full members of the group. The group was later renamed ENSREG, the European Nuclear Safety Regulators Group. The group was given a mandate to advise the Council of the European Union, the European Commission and the European Parliament on issues related to nuclear safety and on radioactive waste and spent fuel management.

The first decision of ENSREG was that all of its results should be based on consensus between all members. In the period from October 2007 until April 2009, ENSREG members met eight times and went through a dynamic discussion process, adopting several important decisions and making a number of recommendations. Additionally, ENSREG has considered where it can add value in promoting high standards of nuclear safety through a culture of continuous improvement and learning. One of the most important results is its contribution to the successful development of the Nuclear Safety Directive. Additionally, communication, coordination and cooperation between European nuclear safety regulators have significantly improved. ENSREG's work also contributed to the Council Resolution on spent fuel and waste management.

This is ENSREG's first report to the European Parliament and the Council of the European Union. The activities of the group are described, and its major conclusions and recommendations and their contribution to the continuous enhancement of nuclear safety in all EU Member States are explained.

EXECUTIVE SUMMARY

ENSREG as a group is committed to pursuing high levels of nuclear safety and radioactive waste management in the European Union, but is neither for nor against the use of nuclear power.

Today, nuclear power plants produce around a third of the electricity consumed in the European Union (EU), with 148 reactors spread over 15 Member States. Some units have already been decommissioned or are in the process of decommissioning, many are undergoing substantial preparations for long-term operation and several new units are under construction or seriously planned. In addition, there is a substantial number of other nuclear and radioactive waste management installations within the European Union. Nuclear safety and the safe management of spent fuel and radioactive waste are national responsibilities and each EU Member State with nuclear power plants and/or radioactive waste management facilities has a national regulatory body and national legislation setting out its requirements governing safety. The requirements applied in each Member State have been developed using international standards and guidance on best practice, and take account of the obligations of international safety conventions.

INTERNATIONAL FRAMEWORK

All EU Member States that operate nuclear facilities for the generation of electricity are parties to the Convention on Nuclear Safety (CNS) and the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (Joint Convention). The basic aim of both Conventions is to legally commit participating states ('contracting parties') to maintain a high level of safety by setting international benchmarks to which states would subscribe. Both Conventions require contracting parties to submit reports on the implementation of their obligations for 'peer review' at meetings held every three years.

The International Atomic Energy Agency (IAEA) seeks to build and strengthen nuclear safety and security through the development of advisory international standards, codes, and guides. The mission of the Organisation for Economic Cooperation and Development Nuclear Energy Agency (OECD/NEA) is to assist its member countries in maintaining and further developing, through international cooperation, the scientific, technological and legal bases required for the safe, environmentally friendly and economic use of nuclear energy for peaceful purposes. The Western European Nuclear Regulators Association (WENRA) is an association of national nuclear regulatory authorities of European countries. The main objectives of WENRA are to develop a common approach to nuclear safety, to provide an independent capability to examine nuclear safety in applicant countries and to provide a network for exchanging experience with nuclear safety issues.

ESTABLISHMENT AND WORK OF ENSREG

In May 2007 the Council of the European Union endorsed the establishment of a High Level Group on Nuclear Safety and Radioactive Waste and Spent Fuel Management. This group was established by a Commission decision in July 2007. The group later adopted the acronym ENSREG (European Nuclear Safety Regulators Group).

ENSREG adopted its Rules of Procedure, agreed to work on a consensus basis, adopted a detailed work programme and established working groups in three main areas:

1. Improving nuclear safety arrangements,
2. Improving spent fuel, radioactive waste management and decommissioning arrangements,
3. Improving arrangements for transparency.

Activities for improving nuclear safety arrangements

Continuing improvements in national arrangements

There are well-established IAEA services for helping member states to improve their arrangements for securing nuclear safety. These include peer review missions carried out against IAEA safety standards. In this context, ENSREG determined that it would:

a. achieve benchmarking and continuous learning by encouraging all EU Member States to participate in IAEA Integrated Regulatory Review Service (IRRS) missions to other states;
b. encourage all EU Member States to invite an independent review of their nuclear safety regulatory arrangements by the IAEA and make public the reports on such missions and the Member State's response together with any action plan;
c. encourage all EU Member States that have not benefited from an IAEA IRRS mission (or precursor IRRT mission) in the last ten years to undertake a self-assessment and make such an assessment public together with any action plan;
d. encourage all EU Member States that undertake such a self-assessment to invite suitable experts from other EU Member States to assist;
e. undertake a compilation of all the IAEA and self-assessment reports produced under b. and c. above to establish (generic) lessons learnt and identify priority areas for reasonably practicable improvements to the regulatory approaches in EU Member States;
f. develop a process to repeat this exercise every 6 years, and to include reporting on progress on the implementation of generic lessons and priority areas to ENSREG every 2 years.

Use of the Convention on Nuclear Safety

On a three-year cycle, contracting parties to the Convention on Nuclear Safety (CNS) are required to prepare a written report setting out how they comply with the CNS provisions in relation to their nuclear power plant facilities in operation. ENSREG recommends that:

a. in each CNS cycle, all EU Member States agree on common lessons learned to be taken forward at national level, their progress against which would be monitored through ENSREG;
b. a trial run be undertaken before the next review meeting (scheduled for spring 2011) using the outcomes of the review meetings held to date to develop a procedure for mutual learning.

From the CNS review meetings held so far it has been found that most of the issues appeared to be quite country-specific. However, it was proposed that *human resources* and *safety culture* issues should be subject to a more in-depth study.

Discussion of possible EU instruments in the domain of nuclear safety

At the beginning of ENSREG's work, the Commission and some members voiced expectations that ENSREG would advise about the possible contents of a legally binding instrument. However, some members were not convinced that such an approach would be to the benefit of enhancing nuclear safety. Hence, ENSREG members were highly divided on the need for legally binding EU instruments on nuclear safety. Therefore a 'Pro and Con' study was prepared, which showed that there are substantial pros and cons associated with each option considered for any future instrument. The balance of pros and cons varies for different actors involved in the EU legislation process, depending on different interests in the process and its outcomes.

At the ENSREG meeting on 15 October 2008, a draft Directive was announced. The Commission made it clear that it intended to submit a revised Directive proposal setting up a Community framework for nuclear safety. At an extraordinary meeting on 7 November 2008, ENSREG members provided their comments on the draft Directive proposal. A consensus was reached on a number of key aspects raised. The Directive proposal was then formally submitted to the Council on 28 November 2008. At the next meeting of ENSREG on 15 January 2009, the Czech EU presidency presented ideas on how to take the proposal forward in the Council. The Nuclear Safety Directive was unanimously agreed by the Council on 25 June 2009. The European Parliament voted by a large majority a resolution on 22 April 2009 supporting the establishment of a legally binding Community framework in the nuclear safety area. The European Economic and Social Committee adopted an updated opinion on 10 June 2009 welcoming the draft Directive on nuclear safety.

In early discussions on possible EU legislation in the domain of nuclear safety ten basic principles were drawn up and accepted by consensus by all members of ENSREG at its meeting on 15 October 2008. The principles, which any common instrument should meet in order to be acceptable for the national nuclear regulators and to enhance nuclear safety, are the following:

1. Maintain and seek to continuously improve nuclear safety and its regulation, and add value.
2. Just as every Member State has the right to decide to use nuclear power or not, so every Member State has the right to impose more stringent nuclear safety requirements than those commonly applied.
3. Allow flexibility and not fundamentally change a Member State's national nuclear regulatory approach.
4. Seek to enhance, not reduce, the power, roles, responsibilities or capability of the national nuclear regulatory body.
5. Do not expand the role of the Commission in regulatory decision-making or activities or introduce other bodies.
6. Do not divert resources away from national nuclear regulatory responsibilities or international nuclear safety cooperation.
7. Be compliant with the principles/obligations of the Convention on Nuclear Safety.
8. Any proposals should be non-discriminatory towards those who use or do not use nuclear power.
9. Seek to improve the transparency of nuclear safety and its regulation.
10. Be clear on the roles and responsibilities of any organisations involved.

These ten principles were later reflected in the draft of the new Nuclear Safety Directive.

Activities for improving spent fuel, radioactive waste management and decommissioning arrangements

National programme

ENSREG proposes, as a first step, recommendations for the necessary national arrangements for an effective radioactive waste management policy, followed by continuous improvements of national arrangements as a second step.

A national programme for spent fuel and radioactive waste management should be established that gives clear aims for future actions. It should be consistent with IAEA Safety Standards, but EU Member States would be free to adopt more stringent standards. It should be a key tool for openness and transparency on radioactive waste management.

Benchmarking and peer reviews

The radioactive waste management organisations should ensure that the exchange of information is included in their management systems and should participate in making better use of each other's best practices through benchmarking and peer reviews. The Commission should promote wider use of best practices. Within ENSREG, self-assessments to identify priorities for international peer reviews and workshops to share experiences should be encouraged.

Use of the Joint Convention on the Safety of Spent Fuel and Radioactive Waste Management

The process of the Joint Convention could be improved at EU level by Member States:

- demonstrating an attitude of openness, constructive challenge and a genuine commitment to make improvements as recommended by peers;
- better prioritising issues in their national report with, for instance, clear identification in the report of the main changes since the previous review meeting;
- sharing all the written questions and answers received with EU counterparts;
- promoting waste safety peer reviews in the EU and identifying best waste safety practices and weaknesses that are common for the EU Member States.

ENSREG encourages:

1) the development of a national programme for waste management in each EU Member State and the adoption of an instrument defining the basics of and guidelines for the contents of such programmes in Europe;
2) the development of ENSREG's role in the processes of sharing of lessons learned in waste safety experience among EU Member States;
3) the continuation of ENSREG's role as a think tank and driving force in the search for solutions for improving the safety of waste management at European level.

ENSREG presented its work to the Council, which adopted a resolution underlining some principles for radioactive waste management, recognising the importance of radioactive waste management issues and calling for work to move forward in this field.

Activities for improving arrangements for transparency

In most EU Member States, the operation of nuclear facilities is, to varying degrees, controversial. No matter how careful the work of the regulator, if the work is undertaken in secret, the public will not have confidence that the result is fair, objective, honest or in the public interest. ENSREG decided to concentrate its work on the areas of improving national arrangements and developing an EU website for nuclear safety and the safety of spent fuel and radioactive waste management.

Good practice guidance for regulators

ENSREG is seeking to develop good practice guidance for nuclear regulatory organisations. A detailed questionnaire on transparency was issued to all members of ENSREG and the OECD/NEA's Working Group on Public Communication in January 2009. Completed questionnaires have been received from 16 countries and the ENSREG guidance is due to be available at the end of November 2009. In this context a working paper on current Community and international law with relevance to transparency has been compiled.

Development of an EU website

Each national regulator in each EU Member State has its own website, although there is no 'dedicated EU website with a public space to provide the public and other stakeholders with coordinated and easy access to information on nuclear safety'. ENSREG is developing such a website with the aim of improving public accessibility to the information in a user-friendly format. It is expected that the website will go live by the end of 2009.

In the interim, further information about ENSREG and its work programme is available on a dedicated page on the Europa website http://ec.europa.eu/energy/nuclear/ensreg/ensreg_en.htm.

1. INTRODUCTION

1.1. Content of the report

In its Decision establishing ENSREG (reference **I**), the Commission stipulated that ENSREG was to submit a first report to it within two years of the Group's inception, and thereafter every two years, setting out the outcome of the work undertaken, the results achieved and future actions. The Commission will then forward the report to the European Parliament and to the Council.

This is ENSREG's first report following its establishment. The introductory chapter (Chapter 1) provides relevant background information on the existing arrangements for nuclear safety and radioactive waste management in the European Union together with a short history of ENSREG. Chapters 2, 3 and 4 summarise the work undertaken and results achieved in each of the three work areas set out below, while Chapter 5 outlines future actions.

1.2. Nuclear safety in the EU context

The foundations for a European context for nuclear energy were laid in 1957 by the establishment of the European Atomic Energy Community (Euratom). Its main functions consist of furthering cooperation in the field of research, protecting the public by establishing common basic safety standards, ensuring an adequate and equitable supply of ores and nuclear fuel, monitoring the peaceful use of nuclear material, and cooperating with other countries and international organisations.

Today, nuclear power plants produce around a third of the electricity consumed in the EU, with 148 reactors spread over 15 Member States. Some units have already been decommissioned or are in the process of decommissioning, many are undergoing substantial preparations for long-term operation and several new units are under construction or seriously planned. This situation creates varied and dynamic challenges. Decisions to construct new or replace existing nuclear power plants have been taken in Bulgaria, Finland, France and Slovakia. Firm plans are underway in Romania and the United Kingdom and other EU Member States, including the Czech Republic, Slovenia, Italy and the Netherlands. Lithuania together with Estonia and Latvia, as well as Poland, are also considering new nuclear power plants. Important developments are also foreseen for the long-term management of radioactive waste and spent fuel.

Nuclear safety and the safe management of spent fuel and radioactive waste are national responsibilities, and each EU Member State with nuclear power plants and/or radioactive waste management facilities has a national regulatory body and national legislation setting out its requirements governing safety. The standards applied in each Member State have been developed using international requirements and guidance on best practice.

The two main areas of work that influence the development of national nuclear safety requirements are the international frameworks such as the international safety conventions and the development of international guidance and regulatory methodologies as carried out under the auspices of international bodies like the IAEA and the OECD/NEA, and other international work such as that of WENRA.

1.2.1. International safety conventions

All EU Member States that operate nuclear facilities for the generation of electricity are parties to the Convention on Nuclear Safety and the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management.

The CNS was adopted in Vienna on 17 June 1994. Its aim is to legally commit contracting parties operating land-based nuclear power plants to maintain a high level of safety by setting international benchmarks to which they would subscribe. The obligations of the contracting parties cover the siting, design, construction and operation of nuclear power plants as well as the availability of adequate financial and human resources, the assessment and verification of safety, quality assurance, radiation protection and emergency preparedness. The CNS requires contracting parties to submit reports on the implementation of their obligations for 'peer review' at meetings held every three years.

The Joint Convention entered into force on 18 June 2001. It applies to spent fuel and radioactive waste resulting from civilian nuclear reactors and other facilities dealing with radioactive materials and to spent fuel and radioactive waste from military or defence programmes if and when such materials are transferred permanently to and managed within exclusively civilian programmes, or when declared as spent fuel or radioactive waste for the purpose of the Convention by the contracting party. The Joint Convention also applies to planned and controlled releases into the environment of liquid or gaseous radioactive materials from regulated nuclear facilities. As in the case of the CNS, the Joint Convention also requires contracting parties to submit a report on the implementation of their obligations for 'peer review' at meetings held every three years.

1.2.2. International guidance on nuclear safety and the safe management of radioactive waste

In addition to providing the secretariat for the international conventions described above, the IAEA also seeks to build and strengthen the international safety and security regime through the development of advisory international standards, codes, and guides. In the safety area, these cover nuclear installations, radioactive sources, radioactive materials in transport, and radioactive waste. The IAEA promotes the application of international safety standards for the management and regulation of activities involving nuclear and radioactive materials.

The mission of the OECD/NEA is to assist its member countries in maintaining and further developing, through international cooperation, the scientific, technological and legal bases required for the safe, environmentally friendly and economic use of nuclear energy for peaceful purposes. To achieve this, the OECD/NEA works as a forum for sharing information and experience and promoting international cooperation; a centre of excellence which helps member countries to pool and maintain their technical expertise; and a vehicle for facilitating policy analyses and developing consensus based on its technical work. It includes a Committee on Nuclear Regulatory Activities (for regulatory authorities), a Committee on Safety of Nuclear Installations (covering technical areas of research), a Committee on Radioactive Waste Management and a Committee on Public Health and Radiation Protection.

WENRA is a non-governmental association composed of the heads and senior staff members of the national nuclear regulatory authorities of European countries with nuclear power plants. The main objectives of WENRA are to develop a common approach to nuclear safety, to provide an independent capability to examine nuclear safety in applicant countries and to be a network of chief nuclear safety regulators in Europe exchanging experience and discussing significant safety issues.

1.2.3. Towards the development of a European Community framework for nuclear safety

While there are many arrangements in place as described above to ensure that people and the environment are adequately protected from the risks associated with the operation of nuclear installations, the Commission has stated that further initiatives are needed to respond to the importance attached by EU citizens in having Europe-wide binding safety legislation for the operation of nuclear power plants. For this reason, on 26 November 2008,

the Commission adopted a revised proposal for a Directive setting up a Community framework for nuclear safety. The Directive establishes basic obligations and general principles for the safety of nuclear installations in the EU. Its general objective is to achieve, maintain and continuously improve nuclear safety and its regulation in the Community and to enhance the role of the regulatory bodies. Its scope of application is the design, siting, construction, commissioning, operation and decommissioning of nuclear installations, for which consideration of safety is required under the legislative and regulatory framework of the Member State concerned. The right of each Member State to use nuclear power or not in its energy mix is recognised and fully respected, as is the right of Member States to adopt more stringent measures than those laid down in the EU directives.

The Directive (reference **II**) on nuclear safety was unanimously adopted by Member States, thus confirming the shared will to continuously improve nuclear safety and to strengthen the safety culture within the EU. The Directive builds primarily on the principles of the main international instruments available, namely the Safety Fundamentals established by the International Atomic Energy Agency (IAEA) and the obligations resulting from the Convention on Nuclear Safety to which all EU Member States are parties.

1.3. Establishment of ENSREG

In May 2007, the Council of the European Union, in a set of detailed conclusions, supported the establishment of a High Level Group at EU level aimed at furthering a common approach to the safety of nuclear installations, the safe management of spent fuel and radioactive waste, and the financing of the decommissioning of nuclear installations and safe management of spent fuel and radioactive waste. Such a High Level Group was established by a decision of the European Commission in July 2007. The group later adopted the acronym ENSREG (European Nuclear Safety Regulators Group), to better reflect its membership.

ENSREG is an independent authoritative expert body composed of heads and senior staff members of national regulatory or nuclear safety authorities from all 27 EU Member States as well as a senior representative from the Commission. The IAEA, the Council of the European Union, Switzerland and Norway have observer status.

ENSREG believes that striving for continuous improvement is a vital safeguard against any sense of complacency in the operation of a nuclear facility and nuclear regulatory arrangements, and must be at the heart of any organisation's safety culture. It is a continuous leadership challenge. In adopting this as the fundamental principle for the work of ENSREG, it does not imply in any way that ENSREG considers that nuclear facilities in EU Member States are unsafe or that nuclear oversight arrangements are inadequate.

ENSREG is committed to encouraging initiatives aimed at improving nuclear safety and radioactive waste management at EU level, where they add value to the activities already undertaken in international and national contexts. It also considers that a vital aspect of its work, as an independent authoritative expert body, is to develop proposals to improve cooperation and openness between Member States, and overall transparency, on issues relating to the safety of nuclear installations and effective radioactive waste management practices within their jurisdiction.

1.4. ENSREG work programme

ENSREG held its first meeting in Brussels in October 2007. In May 2008, it adopted a detailed work programme (reference **III**) in the following areas:

1. Improving nuclear safety arrangements,

2. Improving spent fuel, radioactive waste management and decommissioning arrangements,

3. Improving arrangements for transparency.

The principal objectives of each work area are summarised below and set out in more detail on the CIRCA website http://circa.europa.eu/Public/irc/tren/nuclear_safety_and_waste/library?l=/general_archive/public&vm=detailed&sb=Title.

1.4.1. Improving nuclear safety arrangements

- To provide a compilation of the pros and cons of five options for an EC directive or other instrument on nuclear safety, the five options being:
  - no new instrument — use existing international mechanisms and national arrangements,
  - general directive with elements from the Convention on Nuclear Safety,
  - general directive with a provision to develop detailed safety standards,
  - detailed directive including detailed safety standards based on selected IAEA safety standards and/or the WENRA reference levels,
  - non-binding instrument (detailed or not),
- To maximise the nuclear safety improvement benefits of the Convention on Nuclear Safety, and
- To enhance transparency and mutual understanding, and foster continuous improvement in the national arrangements for nuclear safety regulation in all EU Member States.

In addition to the work programme agreed in May 2008, ENSREG also interacted with the Commission and the Czech presidency on the development of the Nuclear Safety Directive between adoption of the proposal by the Commission in November 2008 and final adoption of the instrument by the Council in June 2009.

1.4.2. Improving spent fuel, radioactive waste management and decommissioning arrangements

- To identify elements, approaches and measures for continuous improvement of the safe management of spent fuel and radioactive waste and of decommissioning arrangements,
- To strengthen cooperation among national authorities, and
- To monitor enhancement of the financing of the decommissioning of nuclear installations and the safe management of spent fuel and radioactive waste.

1.4.3. Improving arrangements for transparency

- To promote good practice among Member States with regard to openness and transparency on issues relating to the safety of nuclear installations,
- To propose the features of a website that, once established, will improve the access of European citizens to accurate and timely information on important nuclear safety issues within the EU,

- To identify appropriate methods for notifying interested parties of the existence of the website and other methods of accessing information, and providing feedback to ENSREG or other EU bodies (e.g. European Commission, European Parliament),
- To consider other ways for making information accessible and comprehensive, and allowing engagement with and feedback from EU citizens, e.g. submitting to the European Parliament periodic situation reports on nuclear power plants,
- To propose methods for gauging the effectiveness of efforts made to improve transparency and openness in nuclear safety (such as through the use of Eurobarometer surveys), and
- To disseminate to all EU Member States, via ENSREG, guidance on the types of nuclear safety information that should be made available to stakeholders, and on the means of achieving this.

ENSREG has established three working groups to undertake its work programme. The working groups meet as necessary and report back to ENSREG, which meets at least twice a year. The minutes of the ENSREG meetings are available on the CIRCA website at http://circa.europa.eu/Public/irc/tren/nuclear_safety_and_waste/library?l=/general_archive/minutes/final_minutes&vm=detailed&sb=Title.

2. SAFETY OF NUCLEAR INSTALLATIONS

2.1. Continuing improvements in national arrangements

2.1.1. Background

The foundation stone of high standards in nuclear safety is continuously seeking ways to improve. This applies as much to nuclear safety regulation as it does to nuclear power plant design, commissioning, operation, etc. A questioning attitude and a passion for learning from others and each Member State's own experience helps to ensure that organisations never become complacent and allow standards to slip. Rather, it generates a healthy outward-looking and learning organisation that is required to secure sustained excellence in the safety of nuclear operations and its regulation.

Recognising this vital need to seek to continuously improve the regulation of nuclear safety, improving learning from others, and responding to a fast-changing environment, ENSREG determined that a crucial area for its work was putting in place mechanisms to facilitate continuous improvement in nuclear regulation in the EU Member States.

In putting such mechanisms in place it does not seek to replace those which already exist, but rather build on them and enhance their effectiveness. There is a well-established and well-respected Integrated Regulator Review Service (IRRS) run by the IAEA that many national nuclear regulators in the EU have been exposed to. This consists of a team of high-level nuclear regulators (sometimes including the head regulators) from across the world who review the national practices in member states against the IAEA Safety Standards for regulatory bodies, report on them and provide advice on possible improvements in the form of suggestions and recommendations. They also seek to identify good practices that, in their opinion, should be considered for adoption by other national regulatory bodies. These review missions typically last for one to two weeks depending on the scope of the mission and involve the host body in much preparatory work (several staff years) in undertaking a self-assessment against the IAEA standards. Much is learnt through such self-assessment and review.

While there are many learning opportunities for each nuclear regulatory body that is exposed to such a mission, and also for the mission team members, there is at present no systematic mechanism for wider sharing or learning. In addition, not all nations with a nuclear regulatory body have availed themselves of this service and it will take time for them to do so given the limited number of high-level nuclear regulatory experts around the world and the large number of demands on their time.

ENSREG therefore determined that it would:

a. achieve benchmarking and continuous learning by encouraging all EU Member States to provide senior regulatory experts to participate in IAEA IRRS missions to other countries;
b. encourage all EU Member States to invite an independent review of their nuclear safety regulatory arrangements by the IAEA and to make public in a timely manner the reports on such missions and the Member State's response, together with any action plan for implementing reasonably practicable improvements;
c. encourage all EU Member States that have not benefited from an IAEA IRRS (or precursor IRRT) mission in the last ten years to undertake a self-assessment and make such an assessment public together with any action plan for implementing reasonably practicable improvements;
d. encourage all EU Member States that undertake such a self-assessment to invite suitable experts from other EU Member States to assist;

e. undertake a compilation of all the IAEA and self-assessment reports produced under b. and c. above to establish (generic) lessons learnt and identify priority areas for reasonably practicable improvements to the regulatory approaches in EU Member States;

f. develop a process (and a procedure) for repeating the exercise every 6 years, to include reporting on progress on the implementation of generic lessons and priority areas to ENSREG every 2 years.

2.1.2. Review of IRRS missions to EU Member States and self-assessments

The initial study on the IAEA IRRT and IRRS missions to the EU Member States has been carried out. The study covers missions since 1998. The results of this first phase study are described in the summary report (reference **IV**). The study shows that:

i. In the period since 1998 Member States have benefited from an IRRS or IRRT mission as described in the following table:

Member State	Type	Year
Bulgaria	IRRT, Full scope follow-up	2003
Czech Republic	IRRT, Reduced scope	2000
	IRRT, Full scope	2001
Finland	IRRT, Full scope	2000
	IRRT, Full scope follow-up	2003
France	IRRS, Full scope	2006
Germany	IRRS, Full scope	2008
Hungary	IRRT, Full scope	2000
	IRRT, Full scope follow-up	2003
Lithuania	IRRT, Full scope	2001
Romania	IRRT, Reduced scope	1998
	IRRT, Full scope follow-up	2002
	IRRS, Follow-up	2006
Slovakia	IRRT, Reduced scope	1998
	IRRT, Full scope follow-up	2002
Slovenia	IRRT, Full scope	1999
Spain	IRRS, Full scope plus physical protection	2008
United Kingdom	IRRS, Reduced scope	2006

ii. During each mission a great number of recommendations and suggestions were presented and good practices identified. They are summarised in Table 2 of reference IV. It can be seen that there are considerable opportunities for others to learn from missions to other Member States.

iii. Of the EU Member States with operating nuclear power plants only Belgium, Netherlands and Sweden are still to have a mission.

iv. IRRS missions planned to EU Member States in the next two to three years are presented in the following table:

Member State	Type	Planned year
France	IRRS, Follow-up	2009
United Kingdom	IRRS, Expanded/follow-up	2009
Germany	IRRS, Follow-up	2010
Slovenia	IRRS	2010/2011
Spain	IRRS, Follow-up	2011
Sweden	IRRS	2012

v. There are significant differences among Member States with similar size nuclear power programmes regarding the provision of experts. This indicates that extra IRRS missions could be undertaken to EU Member States if there was a levelling-up of the provision of experts.

vi. For those non-nuclear states which have no experts in the regulation of nuclear power plants, there is a considerable opportunity for them to provide observers who could develop their expertise by attending IRRS missions or taking part in self-assessments. This has many benefits: it helps to build the understanding of and trust in nuclear states' regulatory practices; and it improves the transparency of the process.

In response to the other actions, Belgium and the Netherlands are seeking to host IRRS missions by 2015. All other Member States, nuclear and non-nuclear, will undertake a self-assessment or host an IRRS mission within the same period.

Countries are implementing the other aspects of the agreed procedures. For example, members of the Spanish and Irish regulators took part in the UK regulator self-assessment recently. This helps to build the trust of non-nuclear EU national regulators in other Member States' self-assessments.

ENSREG is taking this work further forward by analysing the information provided in reference IV. During this second phase the results of the missions are being more thoroughly analysed. Based on the analyses, common lessons learned and areas for improvement will be discussed, taking into account the safety importance of different recommendations and suggestions from these missions. The first draft of the analysis report has already been compiled.

A draft process has been developed for repeating the review every 6 years and following up progress in implementing the generic lessons and priority areas. The results of the second phase report and the draft process will be further discussed within ENSREG.

2.2. Use of the Convention on Nuclear Safety

2.2.1. Background

The Convention on Nuclear Safety came into force on 24 October 1996. Up to now, it has been signed by 65 countries and has been ratified, accepted or approved by 62 countries and by Euratom. It is well established and seeks to ensure high standards of safety in nuclear power plants worldwide. It does this by requiring contracting parties to comply with the Articles of the Convention, which includes submitting a written report demonstrating their compliance for peer review.

These reports are provided to all other contracting parties, who can ask written questions to which written answers have to be provided. Additionally, the reports, and questions and answers, are presented to other contracting parties at a review meeting that lasts for up to two weeks. At this meeting, all other contracting parties can ask oral questions and debate issues raised within each report and presentation. The detailed discussions of these National Reports at the Review Meeting result — due to some extent to peer pressure by the other

contracting countries — in appropriate national measures directed towards achieving and maintaining a high level of nuclear safety in all signatory countries. The results of the discussion in the different country groups are summarised in the Rapporteur's Report as highlights, challenges and good practices for every single country, and are presented to a plenary session. The only public document of the Review Meeting is the Summary Report, which reveals the main issues and general lessons learned without mentioning individual countries.

This peer review process is an important global method to achieve and maintain a high level of nuclear safety through the enhancement of national measures and international cooperation. ENSREG decided that it wished to build on this process by:

- in each CNS cycle, all EU Member States agreeing on common lessons learned to be taken forward at national level, their progress against which would be monitored through ENSREG;
- undertaking a trial run before the next review meeting (scheduled for spring 2011) using the outcomes of the review meetings held to date to develop a procedure for mutual learning.

An analysis of the reports of the four CNS review meetings held so far has been completed and it found that there was a multitude of issues with few commonalities. Many of the issues appeared to be quite country-specific. However, two leading issues were identified, i.e. *human resources* and *safety culture*, and it was proposed that these should be subject to a more in-depth study. This study is ongoing. Additionally, based on this experience a draft process has been developed by ENSREG. This will be developed further for use at the next review meeting of the CNS.

2.3. Discussion of possible EU instruments in the domain of nuclear safety

2.3.1. Background

On 28 November 2008 the Commission officially handed over to the Council a proposal for a Euratom Directive setting up a Community framework for nuclear safety. During spring 2009 the proposal was negotiated in the Council and an agreement on the text was finally reached in the Working Party on Atomic Questions at the end of May 2009. The Council finally adopted the Directive on 25 June 2009.

This achievement was part of a long process. The issue of EU legislation in the area of nuclear safety has been extensively discussed among different stakeholders since the Commission originally tabled the Nuclear Package in 2003. This package, that included two directive proposals, did not elicit the necessary majority of votes in the Council in 2004. Instead the Council started a wide-ranging consultation process on the use of existing international instruments by EU Member States on nuclear safety and management of radioactive waste and spent fuel that eventually led to establishment of the High Level Group on Nuclear Safety and Waste Management (now ENSREG), beginning its work in October 2007.

ENSREG members were highly divided on the need for a legally binding EU instrument on nuclear safety. In order to manage this situation, an agreement was reached on the need for the group to discuss pros and cons of EU legislation on the basis of a set of agreed principles, before any contents of such legislation were proposed. The Working Group on Improving Nuclear Safety Arrangements (WG1/WGNS) was asked to prepare an analysis paper to inform this discussion. The final paper was duly distributed to ENSREG members at the beginning of September 2008. A summary of the paper is provided below. The paper was generally well received and considered to be a balanced account of possible consequences of EU instruments in the nuclear safety domain. The final version was adopted in April 2009 (reference **V**).

At the meeting on 15 October 2008, Commissioner Piebalgs informed ENSREG that the Commission intended, within a short timescale, to submit a new directive proposal setting up a Community framework for nuclear safety. One of the main reasons prompting the proposal was the need to respond to social demand for EU legislation in this area. However, the Commissioner underlined that the Commission wished to proceed in close coordination with ENSREG and Member States. As an immediate response to this request, ENSREG unanimously agreed ten principles that have to be met by any draft instrument. Several of these principles were inspired by the Pros and Cons discussion document. They are presented and discussed below.

At an extraordinary meeting, on 7 November 2008, ENSREG members provided the Commission with their first comments on the draft Directive proposal. A consensus was reached on a number of key aspects raised. The Directive proposal was then formally submitted to the Council on 28 November 2008. At the next meeting of ENSREG, on 15 January 2009, the Czech EU presidency presented their ideas on how to take the proposal forward in the Council's Working Party on Atomic Questions. These ideas focused on the following main issues:

- structure of the directive,
- definition of a safety objective,
- requirements related to international peer review,
- consideration of inclusion of 'new reactors',
- references to IAEA and WENRA documents.

ENSREG members were generally supportive of the ideas and looked forward to receiving feedback from the further negotiations. However, ENSREG noted WENRA's advice that its reference levels were not suitable for EU instruments. ENSREG also welcomed further opportunities to comment on the text proposals but recognised that all negotiations would take place in the Council.

At the next meeting on 15 April 2009, ENSREG members received an update on the status of negotiations.

The European Parliament voted by a large majority a resolution on 22 April 2009 supporting the establishment of a Community legally binding framework in the nuclear safety area. On 10 June 2009, the European Economic and Social Committee also expressed its support through adoption of an opinion in favour of the Directive. Following support from these EU institutions, on 25 June 2009 Council unanimously adopted the Directive setting up a Community framework for nuclear safety. The new Directive is the EU response to the need to establish Europe-wide binding legislation governing the safety of nuclear installations. It sets up a legislative framework laying down essential requirements and principles for the safety of nuclear installations in the European Union, based on the Safety Fundamentals of the International Atomic Energy Agency and the obligations of the Nuclear Safety Convention to which the Community and its Member States are parties. The general objective of the Directive is to maintain and continuously improve nuclear safety and its regulation. It aims to ensure that Member States provide appropriate national safety arrangements to protect workers and the general public against the dangers arising from ionising radiation. The Directive will have to be transposed into national legislation within a period of two years.

2.3.2. Summary of the discussion document on the consequences of EU instruments in the field of nuclear safety

Any EU instrument on nuclear safety falls under the Euratom Treaty. This Treaty sets out a specific mandatory legislative process that is unique in the sense that the European Parliament has only an advisory role. In other ways, the process is the same as under the

other Community Treaties. The Commission has the initiative in matters of legislation. The Commission has to consult with specified groups before proposed legislation is put forward to the Council. Three types of legally binding and enforceable instruments are available: regulations, directives and decisions. There are also non-legally binding instruments available, such as recommendations and opinions (conclusions, resolutions). Legislation under Article 31 is adopted by qualified majority in the Council after having consulted the European Parliament. Extension of Euratom's competence requires a unanimous decision under Article 203. In the area of nuclear safety, the Court of Justice has recognised Community competence in Case 29/99.

From the perspective of members of ENSREG, any proposed EU instrument on nuclear safety should ideally add value for safety and regulation, enhance the role of the regulatory bodies, provide efficiency through common processes, promote cooperation and transparency, and contribute to the whole system of existing international efforts. For this purpose an experience-based exercise was undertaken to assess the pros and cons of five options for EU instruments against the following criteria:

A. Impact on achievement and maintenance of a high level of nuclear safety within the Member States,
B. Impact on the national regulatory arrangements, not least the role, responsibilities and powers of the regulator within a Member State,
C. Impact on the efficiency and effectiveness of the regulator within a Member State,
D. Impact on cooperation and exchange of information among all EU Member States, as well as transparency from the public perspective,
E. Impact on the existing international mechanisms.

The instrument options were:

1. No new instrument — use existing international mechanisms and national arrangements,
2. General directive — with elements from the Convention on Nuclear Safety,
3. General directive — with provision to develop detailed safety standards,
4. Detailed directive — including detailed safety standards,
5. Non-binding instrument — detailed or not.

The results show that there are significant pros and cons associated with each instrument option considered. An overview of the key arguments is given in Table 1 in reference V.

Clearly, the balance of pros and cons will vary for the different actors involved in the EU legislation process, depending on their different interests in the process and its outcomes. The powers of each of these actors to influence the process are also different. Hence each actor might advocate different measures if they wished to maximise the pros and minimise the cons from their own perspective. However, the following considerations are probably shared by all:

- added value for safety,
- distribution of roles, responsibilities and powers,
- utilisation of resources,
- efficiency and effectiveness,
- cooperation among MS, and
- transparency and public confidence.

The main actors involved in this process are the governments of EU Member States, the national nuclear safety regulators or similar bodies in the non-nuclear Member States, the Commission, the licensees and the public. The report illustrates a way to structure the thinking when participating in this specific legislation process.

2.3.3. The ENSREG principles

These principles were agreed by consensus in the early discussion among ENSREG members concerning possible EU legislation in the domain of nuclear safety. In the opinion of ENSREG, any draft instrument must ensure that the principles are met in order to be acceptable for the national nuclear regulators and to enhance nuclear safety. The principles could be seen as an application of the legal principle of subsidiarity. As a member of ENSREG, the Commission also agreed to the ten principles. The principles are the following:

1. Maintain and seek to continuously improve nuclear safety and its regulation, and add value.
2. Just as every Member State has the right to decide to use nuclear power or not, so every Member State has the right to impose more stringent nuclear safety requirements than those commonly applied.
3. Allow flexibility and not fundamentally change a Member State's national nuclear regulatory approach.
4. Seek to enhance, not reduce, the power, roles, responsibilities or capability of the national nuclear regulatory body.
5. Do not expand the role of the Commission in regulatory decision-making or activities or introduce other bodies.
6. Do not divert resources away from national nuclear regulatory responsibilities or international nuclear safety cooperation.
7. Be compliant with the principles/obligations of the Convention on Nuclear Safety.
8. Any proposals should be non-discriminatory towards those who use or do not use nuclear power.
9. Seek to improve the transparency of nuclear safety and its regulation.
10. Be clear on the roles and responsibilities of any organisations involved.

It can be concluded from the pros and cons assessment that the different instrument options satisfy the ten principles to different extents and in slightly different ways. Table 2 of reference V summarises this situation. It should be added that this assessment is highly simplified and built on the interpretation of the principles agreed by the WGNS. With regard to the application of principle 5 to legally binding instruments such as a directive, it should be noted that the Euratom Treaty entitles the Commission to initiate legislation, and supervise its implementation. This role has the potential to expand the involvement of the EC in regulatory decision-making depending on the complexity of the directive and the interpretation problems that could arise at national level in transposition of the directive. Except for the role given by the Treaty, an instrument as such does not expand the role of the Commission unless explicitly stated. However, it is expected that any directive would seek to minimise any impact on principle 5.

2.3.4. Role of ENSREG in the EU legislative process

According to its Rules of Procedure the aim of ENSREG is to maintain and further improve the safety of nuclear installations and the safety of the management of spent fuel and radioactive waste. ENSREG must fully respect the prerogatives of Member States and of the institutions, and the institutional balance established by the Euratom Treaty. Furthermore, ENSREG must work to develop a common understanding and, if appropriate, suggest common approaches.

This means that ENSREG does not intervene in the legislative process set out in the Euratom Treaty. All negotiations on Euratom instruments take place in the Council, where Member States act individually. ENSREG can be seen as an advisory group to the Commission. However, the Chair of the Council's Working Party on Atomic Questions could ask ENSREG, as was done in this instance, for advice on a text to be proposed by the

presidency in the further negotiations. ENSREG members give their opinion without prejudice to national positions being put forward by their representatives in the Council. In the same way, ENSREG could provide common feedback or a common opinion on proposals put forward by the Commission, as was the case with the above-mentioned ten principles. ENSREG has no other formal role in the legislative process unless this is assigned by an instrument.

Given its members' wide experience, ENSREG will also develop a unified template for Member States' reports on the implementation of the Directive on Nuclear Safety, thereby facilitating consultation and cooperation among national regulators.

3. SAFETY OF THE MANAGEMENT OF SPENT FUEL AND RADIOACTIVE WASTE

As radioactive waste arises from a variety of human activities, all EU Member States generate radioactive waste, to a greater or lesser extent.

According to the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management, 'radioactive waste' is defined as radioactive material in gaseous, liquid or solid form for which no further use is foreseen, and which is controlled as radioactive waste by a regulatory body under the legislative and regulatory framework.

Usually, radioactive wastes are separated into three classes: low-level waste (LLW), intermediate-level waste (ILW) and high-level waste (HLW). A further distinction is often made between short-lived and long-lived waste. These classes address activity content, radiotoxicity and thermal power. In practice, the vast majority of the waste falls into the short-lived low- and intermediate-level waste categories.

With the development of the nuclear power in the 1970s, social awareness of the need to tackle the issue of radioactive waste grew, and led to improvements on both the technical and the organisational fronts. Today, most countries have dedicated organisations in charge of radioactive waste management and have reached a mature industrial stage, although with different degrees of development.

However, most countries encounter difficulties and obstacles in the implementation of their preferred solution for managing radioactive waste, specifically with the development and implementation of disposal for long-lived, intermediate- and high-level radioactive waste. The management of radioactive waste sometimes requires extremely long-term projects which can generate strong opposition in the local populations.

Radioactive waste management encounters specific challenges:

- implementing a radioactive waste management strategy needs not only scientific and technical programmes and adequate financial resources, but also public and political support;
- long timescales involve specific uncertainties, which the stakeholders are not used to dealing with;
- because of the timescale, decisions on future solutions may be used to delay decision-making by relying on the possible development of new technological solutions, and/or international solutions such as multinational repository or disposal facilities, even if they do not currently exist. It has to be stressed that multinational disposals are not possible in some countries from a legal point of view.

The biggest challenges to undertake the implementation of long-term management solutions are therefore mainly of a societal and political nature. Difficulties in obtaining public support have sometimes been underestimated in the past, and opportunities to involve the public in decision-making have been missed. To overcome these difficulties, the natural solution is firstly to build up an open and transparent decision-making process, involving the public. In this respect, both a phased stepwise approach and suitable legal frameworks have been developed by countries. Secondly, on the technical side, radioactive waste systems have to be flexible in order to be capable of accommodating the changes that will inevitably arise during the long time periods involved. Features such as reversibility, retrievability and monitoring in geological disposal appear to be key issues that need to be thoroughly assessed in terms of repository safety. Lastly, strong international cooperation plays a fundamental role in the scientific and technical work, not least in order to build confidence. At European level, the research and development framework programme contributes to increased cooperation as well as providing a response to specific research needs.

In the light of these observations, it is clear that the national arrangements are essential for the successful implementation of radioactive waste management solutions. On the basis of the work done by the ENSREG Working Group on 'Improving Spent Fuel, Radioactive Waste, Management and Decommissioning Arrangements' (hereafter referred to as the WGRWMD), ENSREG proposes a synthesis report which is aimed at continuous improvement of the safety of radioactive waste management, making recommendations for the national arrangements which form an important component of an effective radioactive waste management policy as a first step, and continuous improvement of these national arrangements as a second step.

3.1. Building national arrangements to frame the waste management policy

As mentioned above, political commitment is a key factor for the success of radioactive waste management and is necessary to maintain consistent progress towards the implementation of a solution. In order to achieve this goal, the political decisions need to be transposed into a national programme that firstly gives clear projections as well as pathways toward actions and, secondly, is a tool for clear communication on the national strategy to all relevant stakeholders.

Experts have underlined the necessity to develop a national programme on various occasions[1]. The Council Conclusions on nuclear safety and the safe management of spent fuel and radioactive waste, adopted on 8 May 2007, asked ENSREG among other things to discuss the provisions of these programmes.

In the light of these considerations, ENSREG's WGRWMD established 'Guidelines for the content and objectives of national programmes for the management and the safety of radioactive waste and spent fuel' (reference **VI**), as follows:

- **Principles in radioactive waste management**. Principles agreed at European level should be consistent with, and referenced to, the relevant IAEA Safety Standards and should be informed by the WENRA reference levels for waste. However, discussions within ENSREG could also provide an opportunity for EU Member States to reach agreement on principles that go beyond, or are more stringent than, the international ones. In the above-mentioned paper, it is proposed that the principles of the IAEA Safety Standards be adopted at EU level where these are relevant to the management of spent fuel.
- **Scope of a national programme**. A national programme should cover all kinds of spent fuel and radioactive waste and all the steps in formulating a policy on radioactive waste management, such as R&D, forecasting the capacities required, decision-making processes.
- **Contents of a national programme**. The necessary components that have to make up the programme are identified:
    - inventory of spent fuel and radioactive waste managed in the Member State,
    - description of plans that is sufficiently precise to guide the technical solutions for different types of waste,
    - strategies and R&D programmes,
    - the main milestones and time schedule,
    - definition of the basis and the methodology for estimating future costs,
    - definition of the principles and the obligations for the financing system,
    - scope of the responsibilities of the relevant stakeholders,
    - description of the decision-making process and the legal framework.

1 IAEA safety fundamentals (2006), Joint Convention, WPNS.

- **Transparency and public participation**. The national programme is a key tool for openness and transparency on radioactive waste management for the public and as a potential way of building confidence through public participation and involvement. That is also the reason why these programmes should be made available to the European citizen, a task that could be undertaken by ENSREG itself.

On the basis of the work undertaken in the WGRWMD, the WGAQ organised a seminar on radioactive waste management issues on 10 September 2008. On this occasion, the WGRWMD presented its work to the Council, which adopted a Council Resolution on spent fuel and radioactive waste management on 16 December 2008 (reference **VII**). The resolution underlines some principles for radioactive waste management; the Council recognises the importance of radioactive waste management issues and calls for work to move forward in this field.

3.2. Building up the sharing of lessons learned and knowledge gained

As already mentioned, international cooperation and sharing of experiences between countries plays a central role in the continuous improvement of the safety of spent fuel and radioactive waste management (hereafter 'waste safety').

Different people in different countries face similar problems, occasionally at different times. The continuous improvement of waste safety therefore involves making good use of the lessons learned from past experiences, comparing and exchanging information on these experiences, and peer assessment of the role of the safety authority, the agency in charge of waste management and the whole system of waste management. Building on these lessons learned, as well as being prepared for new types of waste, is necessary for continuous improvement.

3.2.1. Identification and enhanced use of best practices in EU Member States

The concept of sharing best practices in the area of WS in the EU Member States could bring significant benefits but is still underused. There is a wide variety of techniques, methods, processes, procedures, activities, incentives, etc. involving lots of practical good and 'trial and error' experiences, which the other Member States can, and should, be aware of, analyse the usefulness of, and implement as deemed appropriate in their particular institutional and technological circumstances.

Identifying best practice and improving the use of such best practices can be achieved by various processes.

Recommendations:

1. Waste safety organisations are encouraged to ensure that the process is included in organisational (regulators, implementers, technical support organisations) management systems (or quality management systems) and to participate in making better use of each other's best practices (i.e. in both 'giving' and 'receiving'). Benchmarking and peer reviews serve as two satisfactory ways of addressing the better use of best practices.
2. Waste safety organisations commit themselves to aim at/implement best waste safety practices.
3. Waste safety organisations share and make public best practices which have been identified in their operations (as reported in the IRRS missions and other peer review reports, self-assessments, results from Joint Convention review meetings, etc.).
4. The Commission should promote better use of best practices. One way of doing this is to establish reference points (a database) on best practices.

3.2.2. International peer reviews, benchmarking and regulatory effectiveness

Peer reviews of a Member State's radioactive waste management programme give the opportunity to systematically examine and assess a national programme or a specific aspect of it, with the ultimate goal of helping the requesting country to adopt best practices, comply with established principles and, in some cases, improve policy.

Taking stock of international experience of peer reviews of regulatory systems, especially in the field of nuclear safety, the WGRWMD established the main characteristics of peer reviews (see reference **VIII**). Peer reviews are of great value, both within the reviewed country and for the international community:

Value of peer reviews	
Within the reviewed country	**For the international community**
Self-assessment of the recipient country Action plan produced by the recipient organisation to address the recommendations made by the review team, which, in time, leads to specific improvements Fostering of a learning culture within a nuclear regulatory authority Building public confidence in the safety of waste management	Sharing of information Learning of the solutions found by the recipient country to solve difficulties and achieve solutions

International cooperation to build regulatory effectiveness has played a key role in the early stages of nuclear development. This cooperation has been mainly developed on a bilateral basis. The last two decades have seen peer reviews being more and more developed, with a leading role played by the European Union. At a time of anticipated further development of nuclear power, within and outside the EU, the WGRWMD is convinced of the importance for the EU to promote improvement of regulatory effectiveness and to provide leadership on peer reviews. In this regard, the WGRWMD arrived at the following recommendations:

1. As the value added by peer reviews is generally and internationally recognised, further value is to be derived by:
    - *publishing and sharing of results of action plans to enhance learning and to identify where international cooperation can provide a more effective or efficient response to an action;*
    - *promulgation of good practices; and*
    - *provision of feedback to improve standards or reference documents used during reviews.*
2. Embarking on a more cooperative approach is expected to enhance peer pressure and drive improvements. The results of and concrete improvements achieved through the cooperation could be included in the Joint Convention Reports. ENSREG provides a framework within which the following activities can be organised and promoted:
    - *self-assessments to identify priorities for international peer review;*
    - *further international peer reviews (either full-scope or focused on specific areas of regulatory responsibility);*
    - *workshops to share experience and identify potential for cooperation to enhance effectiveness.*

3. A system should ensure publication of the results of each peer review. ENSREG's aims are that this should be carried out in an open and transparent manner, and that all results should be made fully available.

3.2.3. Better use of experience feedback

Waste safety experience, which is of general interest in EU Member States, is not limited to events, but covers any waste safety issue (operational, institutional, resource questions, research and development challenges, etc.) that can affect safety. Any information that has the potential to assist others in developing their waste safety or in promoting their programme for final waste disposal should be exchanged. Useful experience to be exchanged can therefore be both positive and negative.

In nuclear safety, much effort is being or has been put into the development of OEF (Operating Experience Feedback). Recognising the ongoing work, it would be beneficial for the EU waste safety community to follow closely the developments in OEF which are already underway and see how the framework could be utilised and further developed for waste safety issues.

At EU level, as well as internationally, there is a need for a publicly available system that covers experience feedback on waste safety and encourages waste safety organisations (regulators, implementers, research and development facilities, other licence holders) to exchange information through it. Therefore, the WGRWMD encourages the EU waste safety community to follow closely developments in OEF and see how the framework could be utilised and/or further elaborated for waste safety issues. ENSREG could play a key role in fostering best use of any international system at EU level, in order to make sure that waste safety-related experience is reported and shared in a value-adding and systematic manner. ENSREG could encourage the EU waste safety community to exchange information through it. The EU waste safety community should report, and share reports among EU peers, on new concerns that have led to new safety research programmes being started to address these concerns.

3.2.4. Waste safety of the future design of nuclear power plants

The above considerations have described the way to take stock of past experience and the existing systems and framework in order to continuously improve the safety of radioactive waste management. Continuous improvement of the safety of waste management also involves being well prepared for the future and in particular for the evolution of new technologies. There are important nuclear and radioactive waste safety issues that need to be taken into account early in the design of new plants. These include design requirements for decommissioning, waste minimisation, the availability of disposal solutions for all waste types as pre-condition for new-build, as well as the general continuous improvement of waste management.

Therefore, all of the EU Member States participating in the safety review process for future design of nuclear power plants must ensure that the important issues mentioned above are included from a very early stage in the review process.

3.2.5. Use of the Joint Convention on the Safety of Spent Fuel and Radioactive Waste Management

During and after the 2nd Joint Convention review meeting in 2006, the European participants as well as many others indicated a clear willingness to improve the Joint Convention reporting and review process in terms of its effectiveness and efficiency. Better use of the Joint Convention process would mean eliminating the identified weaknesses, building on the identified strengths and identifying new more practical and effective ways of utilising the results of the Joint Convention process.

In line with its terms of reference, the WGRWMD discussed ways of making better use of the Joint Convention process in the EU and drafted a report (reference **IX**) on this issue. In addition to the views expressed in that report, the WGRWMD was clearly in favour of using other ongoing developments in order not to 're-invent the wheel' but to work in support of and in synergy with other relevant forums where similar activities are taking place (e.g. the IAEA International Nuclear Safety Advisory Group — INSAG, WENRA, and national efforts).

The process of the Joint Convention could be made more efficient and effective at EU level by ensuring that each EU participating party:

- demonstrates an attitude of openness, constructive challenge and a genuine commitment to make improvements as recommended by peers;
- better prioritises issues in its national report with, for instance, clear identification in the report of the main changes since the previous review meeting;
- shares all the written questions and answers received with EU counterparts;
- promotes waste safety peer reviews in the EU and identifies best waste safety practices and weaknesses that are common for the EU Member States.

Adding to these recommendations, it has to be underlined that the Commission has a particular role to play in this process and ENSREG is the best stakeholder to point out the areas that are found to need developments in more than one EU Member State. This kind of information and conclusions could be reported and (if necessary) discussed at a follow-up meeting of EU Member States which could be organised after each Joint Convention review meeting. Beyond establishing common understanding of typical challenges in the EU, such a process would also help to keep the discussions at the subsequent Joint Convention review meetings more focused on the key issues that were previously identified as relevant topics.

The work of the WGRWMD took place in the run-up to the 3rd review meeting of the Joint Convention, held in May 2009. In line with its work programme and its willingness to work in close dialogue with the Council, following the recommendations of the WGRWMD, ENSREG proposed to the Czech presidency of the Council that:

- ENSREG's conclusions concerning better use of the Joint Convention process be presented at a meeting of the WGAQ;
- a follow-up workshop be held after the review meeting, gathering all the EU experts in order to have a debriefing at EU level and collect useful ideas and common lessons.

3.3. Future directions

As in the field of the nuclear safety of nuclear installations, improvement of the safety of radioactive waste and spent fuel management should be a continuous objective for Member States. The following steps should therefore be encouraged, taking account of the work of other international institutions:

3.3.1. The development of national programmes in each European country

Because of the specific long-term horizon of radioactive waste management solutions and the degree of scepticism among local populations, strong and long-term political will is necessary to implement solutions. Setting clear goals for radioactive waste management policy, developing and regularly updating national programmes, and indicating the milestones and pathways to reach these goals is a key tool for addressing both of these challenges.

Each EU Member State should develop a national programme for radioactive waste management. With this in view, ENSREG calls for continuing close cooperation between the Council, the European Parliament and ENSREG.

3.3.2. The development of ENSREG's role as a key player in the processes of sharing lessons learned in waste safety experience among EU Member States

Making better use of lessons learned and peer reviews are key processes for continuously improving the safety of radioactive waste management. In the nuclear safety field, various systems at international level involving peer reviews and the identification of best practices already exist. However, these processes are still underused for waste safety and there is a lack of coordination and exchange among the EU Member States. At European level, ENSREG could become a key player in establishing guidance for peer reviews of waste safety regulation systems and/or management agencies, gathering information and organising the sharing of information across Europe and having a coordination role at European level vis-à-vis international organisations. The initiative taken by ENSREG to organise a follow-up seminar after the 3rd review meeting of the Joint Convention constitutes a first step in this direction.

3.3.3. The continuation of ENSREG's role as a think tank and driving force for solutions to improve the safety of waste management at European level

In accordance with its work programme ENSREG has studied a number of subjects and made some proposals for moving forward. Nevertheless, various issues still need to be studied in greater depth and ENSREG could continue its work on the following issues:

- state of play of human resources and training capacities at European level and proposals for tackling future human resources needs;
- research and development in the waste safety field;
- sharing of experiences and study of the management of specific types of waste: for instance, practices for managing Naturally Occurring Radioactive Materials (NORM) and sites surveillance and control criteria;
- financing spent fuel and radioactive waste management.

Most of these issues have already been studied in different expert groups at different levels (IAEA, European Union, WENRA, OECD/NEA). ENSREG aims to use the results or conclusions already achieved as a starting point, in order to bring added value to these activities, with the constant objective of not duplicating work.

4. OPENNESS AND TRANSPARENCY

The regulation of nuclear safety and the safe management of radioactive waste are, by their nature, highly technical activities. Both involve scientific analysis and engineering judgment. For this reason, it might be concluded that the public will not be able to contribute and that they are not interested, but this is far from the truth.

In most EU Member States, the operation of nuclear facilities is controversial to varying degrees. There are groups within the population that are concerned about the risks that nuclear technology poses to public health, public safety and the environment, either as a result of routine operations or arising from an accident or incident. While it is true that regulatory decisions do include technical elements, they also include social judgments about the acceptability of risk and the balance of costs and benefits. These social judgments are matters in which the public has a stake and on which the affected population is entitled to have its concerns addressed. There is therefore an onus on the regulator to involve the public in its decision-making.

Additionally, with time, public expectations for nuclear safety change, as does the general industrial and social environment. For example, in some countries, the public's attitude to government officials, such as regulators, and technical experts has changed over the years from one of implicitly trusting what they say and decide to one of scepticism and requiring information and evidence on which to make up their own minds. This is why the work ENSREG is undertaking in the Transparency Working Group is essential.

The fact that the public does take an interest in nuclear issues is borne out by the results of the most recently published Eurobarometer survey on this topic, the study on Attitudes towards radioactive waste (Special Eurobarometer 297, June 2008). It concluded that, in the event of a disposal site for radioactive waste being constructed in their immediate locality, EU citizens clearly want to be directly informed and given an opportunity to be involved in the decision-making process.

If regulators fail to make their licensing decisions accessible to the public, they run the risk of losing public confidence. No matter how careful a job the regulator may do, if the work is undertaken in secret, the public will not have confidence that the result is fair, objective, honest or in the public interest.

In its Conclusions of 8 May 2007 on nuclear safety and safe management of spent nuclear fuel and radioactive waste, the Council of the European Union proposed a list of possible actions concerning transparency to be addressed by ENSREG. These are:

1. A high level of transparency on issues relating to the safety of nuclear installations within their jurisdiction;
2. Provision of information to the public in an accurate and timely manner about important nuclear safety issues, while making full use of Council Directive 89/618/Euratom and to that effect taking into account Commission Communication 91/C 103 to implement the abovementioned Directive. Establishment of a dedicated EU website with a public space to provide the public and other stakeholders with coordinated and easy access to information on nuclear safety;
3. Making available annual reports by Member States on safety-related incidents;
4. Assessing the effectiveness of these transparency actions.

Having regard to the actions proposed in the Council Conclusions and the individual experience of the national regulators and mindful not to duplicate similar work already undertaken or planned in relation to openness and transparency by national and international groups, ENSREG initially identified two key areas for its work in which it considered it could make a valuable contribution. These are in improving national arrangements, and the development of an EU website for nuclear safety and the safety of spent fuel and radioactive waste management.

4.1. Continuing improvements in national arrangements

4.1.1. Existing EU and international legal instruments/mechanisms

As indicated above the Council Conclusions called, inter alia, for a 'high level of transparency on issues relating to the safety of nuclear installations'. In this regard reference was made to 'making full use of Council Directive 89/618/Euratom (reference **X**) and to that effect taking into account Commission Communication 91/C 103/03 (reference **XI**) to implement the abovementioned Directive.

The European Parliament has also repeatedly underlined the importance of transparency, e.g. in its recent legislative resolution of 22 April 2009 on the proposal for a Council Directive (Euratom) setting up a Community framework for nuclear safety (reference **XII**) or in its resolution of 10 May 2007 on Assessing Euratom — 50 years of European nuclear energy policy (reference **XIII**).

As a first step, ENSREG compiled a 'Working Paper on Current Community and International Law with relevance to Transparency', which provides a factual overview of already existing legal instruments at European as well as international level in this area (reference **XIV**).

ENSREG is convinced that this working paper could already serve as a reference document for interested stakeholders as it provides clear evidence of the number and scope of already existing instruments on which further improvements regarding transparency and participation could be based.

ENSREG is currently considering identifying 'good practices' as well as 'room for improvements' in the application of existing instruments. Recommendations on better use of these instruments could be derived therefrom.

In the medium term, amendments to existing instruments as well as recommendations on how to cover potential gaps could be envisaged.

4.1.2. Good practice guidance for regulators

In acknowledging the importance of transparency and openness for effective regulation, as national regulators, ENSREG members also recognise that the achievement of real openness and the effective involvement of the public in the regulatory decision-making process can be challenging.

Within the EU, the systems of regulation in place in each country, while based on the same fundamental principles, are not identical and this can sometimes give rise to concerns as to the effectiveness and appropriateness of individual systems.

To assist national regulators in improving their practices in relation to openness and transparency, ENSREG is seeking to develop good practice guidance for nuclear regulatory organisations in this area. As this project overlaps to some extent with work being undertaken by the OECD/NEA's Working Group on Public Communication, the initial data gathering and analysis phases are being progressed as one project.

A detailed questionnaire was issued to all members of both groups in January 2009 covering the following areas:

A: Operating context,
B: Legal position on information disclosure and transparency,
C: Routine access to information,
D: Public engagement — creating mutual understanding,
E: Public and media confidence in nuclear regulatory organisations,
F: Industry transparency and emergency incident handling,

G: Culture of transparency,

H: Evaluating transparency and sharing learning.

Completed questionnaires have been received from 16 Member States and the ENSREG guidance is due to be available at the end of November 2009.

4.2. Development of an EU website for nuclear safety and the safety of spent fuel and radioactive waste management

Although the national nuclear safety and radioactive waste management regulators in the EU Member States each have their own website, there is no dedicated EU website with a public space to provide the public and other stakeholders with coordinated and easy access to information on nuclear safety. To address this deficit, ENSREG is developing a website with the aim of improving public accessibility to the information already available and presenting it in a user-friendly format.

A detailed specification for the website has been developed and the establishment of the website is underway. The ENSREG Working Group on Improvements in Transparency Arrangements is developing the content for each of the web pages and it is expected that the website will go live by the end of the year.

In the interim, further information about ENSREG and its work programme is available on a dedicated page on the Europa website:

http://ec.europa.eu/energy/nuclear/ensreg/ensreg_en.htm.

5. CONCLUSIONS

After two years of work, significant progress has been made in the area of the two prime objectives for which ENSREG was established:

- to advise and assist in progressively developing common understanding and eventually additional European rules in the fields of the safety of nuclear installations and the safe management of spent fuel and radioactive waste, and
- to facilitate consultations, coordination and cooperation among national regulatory authorities.

ENSREG has recognised several areas where improvements in the work of national regulators are possible and has initiated appropriate actions in order to implement these improvements:

- the existing international peer review systems should be promoted and strengthened in EU Member States;
- the relevant results of work under the two existing international safety conventions should be used as the basis for actions in all EU Member States;
- the creation and implementation of national radioactive waste and spent fuel management programmes should be promoted;
- the exchange of operating experiences should be intensified;
- national regulatory authorities should be supported in their efforts for better communication with the public; and
- a comprehensive nuclear safety-related homepage at EU level should soon be made available to the general public.

Members of ENSREG were initially very divided about eventual additional European rules in the area of nuclear safety. The comprehensive pros and cons analysis, which was prepared, did not remove this division, but substantially clarified different positions. Finally, consensus was reached on recognising the social demand for a new EU directive and therefore supporting the Commission's efforts in that direction. The group defined ten basic principles which should be reflected in such a directive. The group was later pleased to see them incorporated into the text of the proposed Directive.

One important result of ENSREG's work is to have established an institutionalised framework within the European Union for communication, coordination and cooperation among national regulatory authorities. Through intensive discussions between top regulators over nine whole-day meetings, so far, the exchange of positions and ideas has helped each member to inform and improve arrangements in their own country based on good practices in other Member States. In parallel, the Commission has had the opportunity to learn more about the situation in each country, while Member States have had the opportunity to better understand the roles and intentions of the Commission.

No problems arose in ENSREG as a result of different attitudes of individual Member States towards the use of nuclear power or between Member States with or without operating nuclear power plants. An overriding interest in the safe use of nuclear power and safe radioactive waste and spent fuel management, coupled with mutual respect, provides a universal focus for all ENSREG members.

In the future ENSREG will continue with the monitoring of implementation and improvement of its existing working programme. Special consideration will be given to the implications of the adopted Nuclear Safety Directive. It will strive to remain the main platform for coordination of the work of national regulatory authorities in EU. It intends to remain the main channel for communication between national regulatory authorities and the Commission whenever this is needed in the areas of nuclear safety, radioactive waste management and spent fuel management. ENSREG will continuously seek possibilities for further enhancements in respective areas and to advise European institutions whenever asked or when it finds it appropriate.

ENSREG is considering the recent proposal for a regular ENSREG-sponsored European conference where all stakeholders will have the opportunity to discuss any topics related to the regulatory framework, nuclear regulation, nuclear safety and security, emergency preparedness and incident response, transparency and public information.

6. REFERENCES

All documents made publicly available by ENSREG can be obtained from the site http://circa.europa.eu/Public/irc/tren/nuclear_safety_and_waste/library?l=/general_archive/public&vm=detailed&sb=Title.

Individual documents referred to in the text of the report are listed below:

I Commission Decision of 17 July 2007 on establishing the European High Level Group on Nuclear Safety and Waste Management:
http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2007:195:0044:0046:EN:PDF

II Council Directive 2009/71/Euratom of 25 June 2009 establishing a Community framework for the nuclear safety of nuclear installations:
http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:172:0018:0022:EN:PDF

III Working programme for the European High Level Group on nuclear safety and waste management (HLG_p(2008-04)_10.v1 — May 2008):
http://circa.europa.eu/Public/irc/tren/nuclear_safety_and_waste/library?l=/general_archive/public/p2008-04_programmepdf/_EN_1.0_&a=d

IV Initial summary of the IRRT and IRRS missions made since 1998 in the European Union Member States (HLG_p(2009-08)_24, 18 May 2009):
http://circa.europa.eu/Public/irc/tren/nuclear_safety_and_waste/library?l=/general_archive/public/p2009-08_missionspdf/_EN_1.0_&a=d

V Discussion Document on Consequences of EU instruments in the field of nuclear safety — (HLG WG1 P/1/08 – 31 March 2009):
http://circa.europa.eu/Public/irc/tren/nuclear_safety_and_waste/library?l=/general_archive/public/p2009-08_instrumentspdf_2/_EN_1.0_&a=d

VI Guidelines for the content and objectives of national programmes for the management and the safety of radioactive waste and spent fuel — (HLG_r(2008-05)_25):
http://circa.europa.eu/Public/irc/tren/nuclear_safety_and_waste/library?l=/general_archive/public/r2008-05_guidelinesdoc/_EN_1.0_&a=d

VII Council Resolution on Spent Fuel and Radioactive Waste Management:
http://register.consilium.europa.eu/pdf/en/08/st17/st17438-re01.en08.pdf

VIII International Peer Reviews and Regulatory Effectiveness:
http://circa.europa.eu/Public/irc/tren/nuclear_safety_and_waste/library?l=/general_archive/public/p2009-09_international/_EN_1.0_&a=d

IX Better use of Joint Convention Process in European Union — (EU HLG_r(2008-05)_27):
http://circa.europa.eu/Public/irc/tren/nuclear_safety_and_waste/library?l=/general_archive/public/r2008-05_better/_EN_1.0_&a=d

X Council Directive 89/618/Euratom of 27 November 1989 on informing the general public about health protection measures to be applied and steps to be taken in the event of a radiological emergency:
http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31989L0618:EN:HTML

XI Commission Communication on the implementation of Council Directive 89/618/EURATOM of 27 November 1989 on informing the general public about health protection measures to be applied and Steps to be taken in the event of a radiological emergency, 91/C 103/03:
http://ec.europa.eu/energy/nuclear/radioprotection/doc/legislation/91c10303_en.pdf

XII Draft Resolution of 22 April 2009 on the proposal for a Council Directive (Euratom) setting up a Community framework for nuclear safety:
http://www.europarl.europa.eu/sides/getDoc.do?type=REPORT&reference=A6-2009-0236&language=EN

XIII European Parliament resolution on Assessing Euratom — 50 years of European nuclear energy policy:
http://www.europarl.europa.eu/oeil/DownloadSP.do?id=13494&num_rep=6598&language=en

XIV Working Paper on Current Community and International Law with relevance to Transparency: http://circa.europa.eu/Public/irc/tren/nuclear_safety_and_waste/library?l=/general_archive/public/p2009-09_instrumentspdf/_EN_1.0_&a=d