



**REPUBLIC OF CROATIA**

# **NATIONAL REPORT**

AS REQUIRED UNDER ARTICLE 14.1 OF  
**COUNCIL DIRECTIVE 2011/70/EURATOM**  
OF 19 JULY 2011 ESTABLISHING A COMMUNITY FRAMEWORK FOR  
THE RESPONSIBLE AND SAFE MANAGEMENT OF SPENT FUEL AND  
RADIOACTIVE WASTE

**1<sup>st</sup> report**

August 2015

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## Introduction

After decades of use of sources of ionising radiation in medicine, industry, and science, , current quantity of radioactive waste accumulated in Croatia is around 7.5 m<sup>3</sup> with total activity of around  $5.5 \times 10^{13}$  Bq. Today this waste is temporarily stored in two storages that have been closed. Also, according to the Bilateral Agreement with Republic of Slovenia, Croatia is obliged to take over and manage one-half of the radioactive waste and spent nuclear fuel now stored at Nuclear Power Plant Krško, including waste raised from decommissioning. This currently amounts 1130 m<sup>3</sup> of operational radioactive waste with activity of around  $9.2 \times 10^{12}$  Bq and 576 spent fuel elements with activity of around  $2.0 \times 10^{20}$  Bq. Croatia has also the obligation to remediate sites where naturally-occurring radioactive materials have been disposed of.

Independent state administration body competent for activities pertaining to radiological and nuclear safety is the State Office for Radiological and Nuclear Safety. Its obligations cover, among other, licencing and inspection of all activities regarding radioactive waste and spent nuclear fuel management. Implementing agency for these activities as of April 2015 is the Fund for Financing the Decommissioning of the Nuclear Power Plant Krško and the Disposal of Nuclear Power Plant Krško Radioactive Waste and Spent Nuclear Fuel which has the obligation to establish the Radioactive waste management centre as its part.

Croatian national policy is defined in the Strategy for the management of radioactive waste, disused sources and spent nuclear fuel adopted by Parliament of the Republic of Croatia in October 2014. The Strategy prescribes systematic and long-term approach to resolving relevant issues, in compliance with the Act on Radiological and Nuclear Safety, Directive 2011/70/Euratom (SL L 199, 2.8.2011), the international regulations, binding guidelines of the International Atomic Energy Agency and the best international practices in this area.

The Strategy will be implemented through the National programme adopted by the Government of the Republic of Croatia at the proposal of the State Office for Radiological and Nuclear Safety. Currently the draft of National programme is finished and Strategic environmental assessment of the National Program is in progress.

## Summary

Radioactive waste currently present in Croatia consists of waste and disused sources from medicine, industry, science, education. National Strategy also considers remediation of sites contaminated with naturally occurring radioactive material. This radioactive waste is exclusively concern of the Republic of Croatia and managed in accordance with international standards and best practice. As of end of 2013 both storage facilities has been closed and do not accept new quantities of waste. This is why the project on development, construction and operation of the Central National Storage Facility has to be finished as soon as possible.

Besides this, in compliance with the Treaty between the Government of the Republic of Slovenia and the Government of the Republic of Croatia on the regulation of the status and other legal relations regarding investment, exploitation and decommissioning of the Krško Nuclear Plant, the Republic of Croatia is obliged to physically take over and manage one-half of the radioactive waste and spent nuclear fuel currently stored at this power plant. There is a possibility of common arrangements for this issue with Slovenia, but since now talks did not offer solution and Croatia started preparations for takeover.

In October 2014 Parliament of the Republic of Croatia adopted the Strategy for the management of radioactive waste, disused sources and spent nuclear fuel. This Strategy has taken a systematic and long-term approach to all related issues, among which are preparation and implementation of the project on development, construction and operation of the Central National Storage Facility, preparation and implementation of the program on research and development of a long-term storage facility for radioactive waste from Nuclear Power Plant Krško, establishment of a center for informing and educating public etc.

According to the Act on amendments to the Act on Radiological and Nuclear Safety from March 2015, the Radioactive Waste Management Centre will be established and managed by the Fund for Financing the Decommissioning of the Krško Nuclear Power Plant and the Disposal of NPP Krško Radioactive Waste and Spent Nuclear Fuel. All activities regarding licencing and inspection of radioactive waste and spent nuclear fuel management are performed by the State Office for Radiological and Nuclear Safety as an independent state regulatory body.

## General Principles (Article 4)

The Republic of Croatia has the obligation to manage radioactive waste (RW) and disused sources of ionising radiation (DS) that have been generated through the 60-year use of sources of ionising radiation in medicine, industry, science, military and public use. The two facilities in which this waste was temporarily stored do not accept new waste. There are partially remediated and waiting to be decommissioned and waste to be transferred to a new storage facility. Therefore, it is necessary to establish a central RW storage facility as stipulated in the Act on Radiological and Nuclear Safety (Official Gazette 141/13, 39/15) (further referred to as the Act) as soon as possible. Furthermore, the Republic of Croatia has the obligation to remediate localities where there are naturally-occurring radioactive materials, which requires continuous regulatory supervision. Also, in compliance with the Act on the Ratification of the Treaty between the Government of the Republic of Slovenia and the Government of the Republic of Croatia on the regulation of the status and other legal relations regarding investment, exploitation and decommissioning of the Krško Nuclear Plant and Joint Declaration (Official Gazette – International Agreements 9/02) (hereinafter: Bilateral Agreement), the Republic of Croatia is obliged to physically take over and manage one-half of the RW and spent nuclear fuel (SNF) currently stored at Krško Nuclear Power Plant (NPP).

For the purpose of meeting the above obligations, in October 2014 Parliament of the Republic of Croatia adopted the Strategy for the management of radioactive waste, disused sources and spent nuclear fuel. This Strategy has taken a systematic and long-term approach to resolving the above listed issues, in compliance with the Act, Directive 2011/70/Euratom (SL L 199, 2.8.2011), the international standards and guidelines and the best international practices in this area.

According to the Act, RW and SNF generated in the territory of the Republic of Croatia must be disposed in a long-term, sustainable manner in the territory of the Republic of Croatia, except in the cases where bilateral agreements concluded prior to the date of the entry into force of this Act permit disposal of RW and SNF in a territory of another state. Disposal of radioactive waste and spent nuclear fuel in a territory of another state has to guarantee equal or greater safety than that guaranteed under Croatian laws and practice. Generators of RW, DS or SNF must ensure that it is managed in the prescribed manner and transfer of the burden of disposal of RW, DS or SNF to future generations is avoided to the greatest possible extent.

## National framework (Article 5)

### Legislative

In Croatia the issues related to the safety of spent fuel and radioactive waste management are mostly covered by the Act on Radiological and Nuclear Safety (Official Gazette 141/13 and 39/15) (the Act). The Act establishes measures for radiological safety, measures for physical protection and measures for non-proliferation of nuclear weapons in performing nuclear operations and operations involving sources of ionizing radiation. The goal is to ensure adequate protection of individuals, society and the environment against harmful effects of ionizing radiation, as well as to ensure safe performance of operations involving ionizing radiation sources, nuclear operations, radioactive waste management and physical protection of ionizing radiation sources and nuclear installations. Also, some specific issues are regulated by Regulation on Conditions and Method of Disposal of Radioactive Waste, Spent Sealed Radioactive Sources and Ionising Radiation Sources Which are not Intended for Further Use (Official Gazette 44/08).

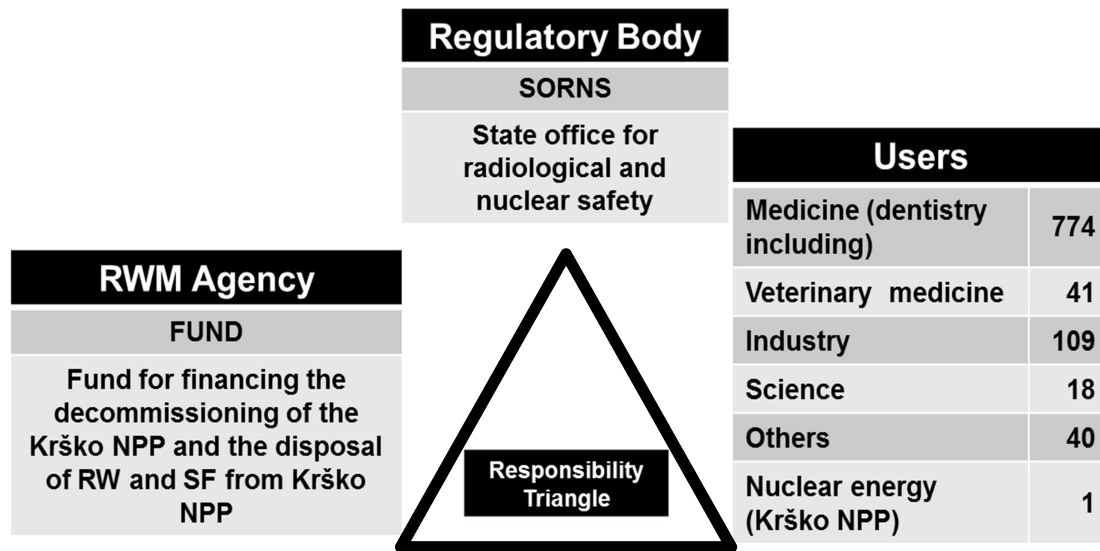
The Act provides solid basis for regulation, administrative processes and inspection and covers wide scope of activities. The provisions of the Act are harmonized with EU directives and regulations.

Relevant international conventions signed and ratified by the Republic of Croatia are:

- Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (Official Gazette – International Agreements 03/99)
- Convention on Nuclear Safety (Official Gazette – International Agreements 13/95)
- Vienna Convention on Civil Liability for Nuclear Damage of 21 May 1963 (Official Gazette – International Agreements 1/06)
- Convention on Access to Information, Public Participation in Decision-Making, and Access to Justice in Environmental Matters from June 1998, Aarhus Convention (Official Gazette – International Agreements 01/07)
- Convention on Environmental Impact Assessment in a Transboundary Context, Espoo Convention (Official Gazette – International Agreements 6/96, 7/08 and 1/09)

## Division of responsibilities

The following scheme describes responsibility triangle for managing RW and SNF in Croatia:



The current status regarding the division of responsibility in Croatia in the area of management of RW, DS and SNF is given below:

**Croatian Parliament:** (1) Adopts the Strategy; (2) Confirms the Decommissioning programme for Krško NPP and the Programme for the disposal of RW and SNF from Krško NPP;

**Government of the Republic of Croatia:** (1) Proposes the Strategy, (2) Adopts the Decommissioning programme for Krško NPP and the Programme for the disposal of RW and SNF from Krško NPP; (3) Adopts regulation on the manner of financing the legal persons for the performance of tasks of managing RW, DS and SNF and the compensation amount and manner of financing of local and regional self-government units in whose territory the Radioactive waste management centre is situated; (4) Adopts the National programme for implementation of the Strategy;

**State Office for Radiological and Nuclear Safety (SORNS):** (1) Establishes the legislative framework in the area of radiological, nuclear and physical safety; (2) Coordinates the drafting of the Strategy; (3) Issues authorisation for performing the tasks of managing RW, DS and SNF; (4) Implements inspection supervision over all facilities and activities of managing RW, DS and SNF; (5) Coordinates the drafting of the National programme for implementation of the Strategy; (6) Participates in administrative procedures for obtaining permits and authorisations for management facilities included under the Strategy; (7) Reporting and public information on the management of RW, DS and SNF.

**Ministry of Environmental and Nature Protection:** (1) Prescribes the conditions of environmental protection for management facilities covered under the Strategy; (2) Implements the environmental impact assessment for management facilities covered under the Strategy; (3) Participates in administrative procedures for obtaining permits and authorisations for management facilities covered under the Strategy; (4) Notifies the competent body of another state of the draft proposal of the Strategy, plan and programme, if it assesses there is a possibility of a significant influence on the environment and/or human health in that other country, or if so requested by the country that could be exposed to a significant impact.

**Ministry of the Interior:** Approves physical safety plans for management facilities covered under the Strategy.

**Ministry of the Economy:** Responsible for the implementation of the Bilateral Agreement.

**Ministry of Health:** Cooperates in the drafting of the legislative framework in the area of radiological and nuclear safety.

**Ministry of the Sea, Transport and Infrastructure:** Competent for the drafting of the part of the legislative framework concerning the area of handling radiological cargo in maritime transport, and for the implementation and supervision over the Act on the Ratification of the European Agreement on the International Carriage of Dangerous Goods by Inland Navigation.

**Delegation of the Republic of Croatia in the Interstate Committee:** (1) Monitors the implementation of the Bilateral Agreement and informs the Government of the Republic of Croatia thereof; (2) Confirms the Decommissioning programme for the Krško NPP and Disposal programme for RW and SNF from Krško NPP.

**HEP (Croatian Electric Utility):** Makes regular payments to the Fund of financial resources allocated for the decommissioning of Krško NPP and the management of RW and SNF from Krško NPP.

**Owners of the RW or DS:** (1) Safe management of RW, DS and SNF until have been transferred to Radioactive Waste Management Centre; (2) Secure financial resources necessary for management.

**Fund:** (1) Establishes Radioactive Waste Management Centre as its part; (2) Maintains and increases the amount of financial resources paid into the Fund account by HEP; (3) Performs the tasks of coordination, preparation and drafting of the Decommissioning plan for Krško NPP and the Management programme for RW and SNF from Krško NPP pursuant to the Bilateral Agreement.

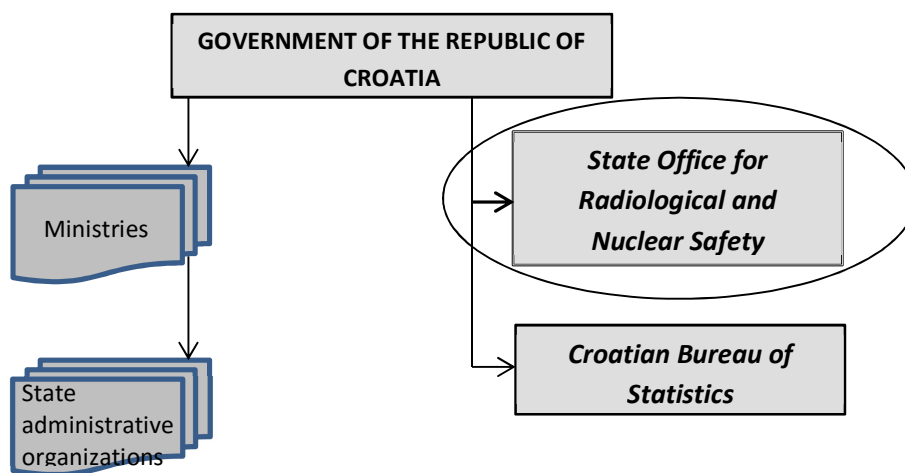


**Professional associations (CNS, CRPA):** (1) Increasing knowledge in the field of peace-time application of nuclear science, technology and safety culture; (2) Participate in public information procedures.

## Competent Regulatory Authority (Article 6)

### Position of regulatory body

Structure of national administration in Croatia and position of SORNS is shown schematically in following picture.



According to the Act on Organisation and Scope of Ministries and Other Central State Administration Bodies (Official Gazette 150/11...148/13), supervision over the work of SORNS is performed by the Government of the Republic of Croatia.

According to tasks and responsibilities of SORNS as defined in the Act on Radiological and Nuclear Safety (Official Gazette 141/13), SORNS is neither promotor nor user of nuclear or radiation related technologies. A clear separation from organizations or bodies charged with responsibilities for the promotion or application of nuclear or radiation related technologies are derived from the fact that SORNS is responsible directly to the Government.

According to the Act, the director of the SORNS shall be appointed by the Government of the Republic of Croatia and he/she shall be responsible to the Government for his/her work.

### Legal powers and human and financial resources

Every year the regulatory body SORNS proposes budget for the next year to the Government, which is in accordance with discharging its responsibilities and performing its functions. The Government adopts the budget for the next year and if necessary, revise it during the year. Also, every year the SORNS adopts strategic plan for next three years in accordance

with its responsibilities and functions in line with the proposed budget. SORNS reports on implementation of the strategic plan twice a year.

Consistent with its effective independence, SORNS has the authority to intervene in any facilities or activities that present significant radiation risks by conducting inspection activities related to supervision of implementation of the provisions of the Act on Radiological and Nuclear Safety and regulations adopted on the basis thereof. In the case of radioactive waste storage facility, SORNS exercised its authority to intervene, irrespective of the costs to the authorized party.

Staffing in SORNS is regulated by the process of admission to the civil service in accordance with the provisions of the Civil Service Act (Official Gazette 92/05...38/13) and the Regulation on issuing and processing public and internal announcements in the civil service (Official Gazette 53/12). Job vacancies in state bodies are completed through a public tender or internal announcements.

The number of staff necessary and the essential knowledge, skills and abilities for them to perform all the necessary regulatory functions are prescribed (predetermined) in the Ordinance on Internal Organisation of the State Office for Radiological and Nuclear Safety (2012, 2013 changes and amendments). Description of each working place in SORNS contains a list of basic knowledge, skills, abilities and the educational qualifications as well as time of working experience.

The number of working places according to this Ordinance is 49, but present number of employees in SORNS is only 22. The staff of the regulatory body has the necessary competence and remain focused on performing their functions in relation to safety. The number of qualified and competent staff in the regulatory body is not sufficient, but with the great efforts and devotion of the present staff, all responsibilities and tasks of the regulatory body are fulfilled.

The regulatory body has adequate arrangements for obtaining technical or other expert professional advice or services in support of its regulatory functions by engaging professional technical services or nuclear safety experts.

In the case where advice or assistance can be obtained only from organizations whose interests potentially conflict with those of the regulatory body, SORNS will assess given advice for conflicts of interests. SORNS has competent staff who could assess advice provided by advisers and information submitted by authorized parties or applicants, in such a way that Director General is able to take responsible decisions.

Formal mechanism of communication between SORNS and authorized parties on all safety related issues is according to the procedure prescribed in the General Administrative Procedure Act (Official Gazette 47/09).

Informal mechanism of communication between SORNS and authorized parties is by conducting a professional and constructive liaison through meetings and other open communication for the purpose of transparency about the basis and justifications for the regulatory decisions.

Policies, principles and criteria to be observed in the implementation of core processes of the regulatory body (e.g. establishment of regulatory requirements, licensing, review and assessment, inspection, enforcement, etc.) as well as formal procedures for the implementation of the regulatory body core processes are defined in the Act and ordinances adopted on the basis of this Act.

The regulatory body's formal process for issuing new regulatory requirements or changing existing ones is prescribed by Act on State Administration System (Official Gazette 150/11). According to the Code of Practice on Consultation with the Interested Public in Procedures of Adopting Laws, other Regulations and Acts (Official Gazette 140/09), in the process of proposing or changing of any kind of legislation (act, regulation, ordinance), public (expert or other) is actively involved. For that purpose, all drafts and proposals are published on the website of SORNS with the announcement of the period of time for interested public to give their opinions or comments.

## Licence holders (Article 7)

According to the Act holder of the approval (licence holder) is a legal or natural person, a state administration body, any other state body or a body of a local or regional self-administration unit that has been granted a licence and that is responsible for performing a certain operation involving ionizing radiation sources, or nuclear operation, or an operation involving management of radioactive waste, disused sources or spent nuclear fuel, or performing operations that are not considered operations involving ionizing radiation sources but that may lead to increased exposure of workers and the population from natural sources of ionizing radiation.

Regulation on Conditions and Method of Disposal of Radioactive Waste, Spent Sealed Radioactive Sources and Ionising Radiation Sources Which are not Intended for Further Use in Article 8 prescribes that the licence holder of radioactive waste, spent sealed radioactive sources and ionising radiation sources which are not intended for further use whose activity changes the composition, quantity or characteristics of radioactive waste shall bear full responsibility for the accepted waste during its treatment and shall establish and maintain a high level of safety, in particular as regards physical and technical safety. The licence holder must prevent unauthorised access, damage, loss, theft or unauthorised transfer so as to prevent the hazard of exposure to ionising radiation or malicious use of RW with the purpose of causing harm to people or the environment or disturbing public order.

Any operations involving ionizing radiation sources shall not begin prior to the issuance of the approval by the SORNS. This approval shall be granted or denied by a decision against which no appeal may be filed, but an administrative dispute may be initiated and shall be issued for a maximum period of ten years. The request for issuance of approval for carrying out those activities shall be accompanied by:

1. precise description of the activity for which authorisation is requested,
2. excerpt from the Commercial Court Register or the excerpt from the Crafts Register,
3. certificate of workers' competence for carrying out a practice involving radioactive sources and the application of measures for protection against ionising radiation,
4. certificate of the competent worker's fulfilment of special medical requirements for carrying out a practice in the exposure area of the radioactive source,
5. act appointing the person responsible for protection against ionising radiation,
6. proof of assured measurement of workers' personal doses and application of measures for protection against ionising radiation,

7. act on application of measures for protection against ionising radiation including the security and quality assurance programme regarding the activities and sources of ionising radiation, the plan of measures for prevention and elimination of potential consequences of an emergency event and the plan of measures for disposal of radioactive waste produced as a result of activities involving radioactive waste, spent sealed radioactive sources and ionising radiation sources which are not intended for further use,
8. proof of technical capacity for carrying out the described activity.

The licence holder has an obligation to adopt and regularly update risk analysis which must contain general information on the practice, exposure to ionising radiation resulting from performing the practice and the disposal of radioactive waste (description of work posts and tasks with the highest risk of irradiation, assessment of irradiation of exposed workers under normal work conditions, assessment of irradiation of a critical group of population resulting from performing the practice involving ionising radiation sources and the disposal of radioactive waste), irradiation in case of emergency, plan for optimising protection against ionising radiation and certification and expert opinion of an authorised technical service with proposed measures for risk reduction.

The licence holder has an obligation to draw up a Plan and programme of measures to be taken in emergency cases, and to submit it to approval to the SORNS. The Plan and programme referred contains the following chapters: Introduction, Emergencies, Emergency response, Immediate activities, Informing the public and competent bodies, Maintaining a state of alert and Annexes. Costs of implementation of the Plan and programme are provided for and borne by the licence holder. The licence holder has obligation to inform public about important facts from this Plan and programme.

The licence holder has obligation to draw up a Security plan for radioactive sources and nuclear materials and is liable for the implementation of physical protection of ionizing radiation sources and nuclear installations. Licence holder bears the costs of this implementation. The manner of implementation of the physical protection is prescribed by the Ordinance on Physical Protection of Radioactive Materials, Nuclear Materials and Nuclear Objects, issued by the director of the SORNS in cooperation with the minister in charge of internal affairs.

Licence holder must ensure that management of radioactive waste, spent sealed radioactive sources and ionising radiation sources which are not intended for further use shall be performed observing the following mandatory measures:

- avoidance and minimisation of radioactive waste generation

- prevention of uncontrolled disposal
- controlled storage
- keeping of logs and accurate records on movement of radioactive waste, spent sealed radioactive sources and ionising radiation sources which are not intended for further use
- assurance of intervention measures in the case of emergency.

According to the Act, all costs of management of radioactive waste, disused sources and spent nuclear fuel must be borne by the generators of the RW, DS and SNF. Every licence holder is obliged to maintain enough material and human resources for its activities.

The Radioactive Waste Management Centre, which will be, according to the Act on amendments to the Act on Radiological and Nuclear Safety (Official Gazette 39/15), established and managed by the Fund for Financing the Decommissioning of the Krško Nuclear Power Plant and the Disposal of NPP Krško Radioactive Waste and Spent Nuclear Fuel, will be financed by disposal compensation paid by the radioactive waste and spent nuclear fuel producers. Currently, fund contains around 180 million EUR.

For the reason of obtaining the approval for management activities of the RW, DS and SNF, every potential licence holder must enclose (among other) certificate of workers' competence for carrying out a practice involving radioactive sources and the application of measures for protection against ionising radiation. Only after assessment that human resources are adequate to assure the safety of RW, DS and SNF management, SORNS will issue the licence.

## Expertise and skills (Article 8)

The existing human resources in Croatia are sufficient for the current level of activities in the area of management, which consisted of tasks of handling disused sources and for the temporary storage of institutional RW and DS in Croatia. However, for the implementation of the future goals, the current resources are insufficient. The establishment of the necessary programmes and management facilities significantly increases the need for educated personnel in the area of management of RW, DS and SNF. Additionally, the facilities and management activities must be under the supervision of the regulatory body, and as such, the regulatory body must have a sufficient number of the appropriately educated and trained employees. If it is necessary to improve the level of expertise among the existing SORNS personnel and/or increase the number of expert personnel, it will be necessary to organise employee education and/or new recruitment to ensure adequate personnel. The recruitment of new expert persons and the training of the existing personnel of the SORNS and other organisations that will participate in the drafting and implementation of the management plan should be planned and implemented prior to the construction of the management facility. Also, it is necessary to plan for and ensure replacements for employees going into retirement.

Education and training in the areas of RW, DS and SNF management are not systematically organised in Croatia. As such, it is planned to establish cooperation with the relevant universities, professional and international organisations, such as the IAEA, in order to enable education and training in line with the need for human resources for the establishment and implementation of RW, DS and SNF management. Reinstating of classes in higher education institutions addressing the issues of RW, DS and SNF and methods for their management and the general issues of security culture, as well as higher education in the relevant areas of management are considered at tertiary education institutions and at research and development institutes. Also, it is necessary to better affirm. Good examples of the organisation of specialist courses, aimed at providing practical knowledge from the area of RW, DS and SNF management are the specialised IAEA courses and workshops that have been organised by the SORNS on the basis of the technical cooperation programme with the IAEA, which it is also required to do pursuant to Article 7, paragraph 2, point 19 of the Act.

Efforts are undertaken that industry and the academic community cooperate at the national and international level, so as to create a functional framework to support education and training. The same is with educational programmes which must be aligned with the professional needs of industry, and with radiological and nuclear safety standards, standardised, and useful



for cooperation programmes to be established with internationally recognised institutions holding developed programmes for the research, development and establishment of RW, DS and SNF management processes.

Currently there are no many research and development programmes covering activities of RW, DS and SNF management, but efforts will be undertaken in its promotion for the purpose of maintaining and improving expertise and the necessary skills.

## Financial resources (Article 9)

Article 9 of Directive 2011/70 defines that Member States shall ensure that the national framework require that adequate financial resources be available when needed for the implementation of national programmes for the management of RW and SNF, taking due account of the responsibility of those generating spent fuel and radioactive waste. It is important to note that the financial resources needed for the implementation of individual activities in the management of RW, DS and SNF must be available at the time of implementation of the appropriate management activity.

Furthermore, Article 4, paragraph 1 of Directive 2011/70 prescribes that Member States shall have the ultimate responsibility for management of the spent fuel and radioactive waste generated in its territory. In line with the above, the financial resources necessary for managing inherited institutional RW and DS will be secured from the Croatian State Budget. It is often very difficult or impossible to determine the owner of this waste, and therefore ensuring the necessary financial resources becomes the subsidiary responsibility of the Republic of Croatia.

By the Act on the Fund for Financing the Decommissioning of the Krško NPP and the Disposal of Radioactive Waste and Spent Nuclear Fuel from Krško NPP (O.G.107/2007) which passed by the Croatian Parliament at its session on 3 October 2007 this Fund was established. The founder of the Fund is the Republic of Croatia, and the founding rights and obligations are held by the state administration body responsible for energy affairs.

The Fund's activities includes activities related to the acquisition, maintenance and increase of value of assets for financing the preparation, review and implementation of the Programme for decommissioning of the Krško NPP and the disposal of radioactive waste and spent nuclear fuel from Krško NPP (Decommissioning Programme) in accordance with Articles 10 and 11 of the Agreement between the Government of the Republic of Slovenia and the Government of the Republic of Croatia on the Regulation of the Status and Other Legal Issues Regarding Investments in Krško NPP and its Exploitation and Decommissioning (Official Gazette - International Agreements, 09/02).

The primary purpose of the Decommissioning programme for Krško NPP and the Management programme for RW and SNF from 2004, which addresses the overall issues at a generic level, consisted of assessing the amount of financial resources that HEP (Croatian Electric) and GEN Energy (Slovenia) needed to pay into each fund annually. On the basis of the results of that assessment, Croatia and Slovenia agreed to make annual payments in the

amount of EUR 14.25 million to the account of the Fund, and about EUR 8 million to the account of the fund in Slovenia. The reason for lower payments to the account in Slovenia lies in the fact that at the time of passing the said decision, the fund in Slovenia had already collected a certain amount of funding. The co-owners of Krško NPP (HEP and GEN Energy) regularly make payments of previously allocated funds into their respective funds. Currently, the funds contain about EUR 181 million at the end of 2014.

By the Governmental decision from the end of 2012, Fund replaced APO d.o.o. as responsible national organization for the activities in coordination of preparing and drafting Programme of decommissioning and disposal of radioactive waste and spent fuel.

With respect to new obligation in October 2012 a revised version of the Statute of Fund was adopted. It defines a new structure in which two separate function of the Fund are recognized. Fund has kept legally regulated manner of collecting financial means for the purpose of financing all affairs related to management of the Croatian part of low and intermediate level radioactive waste, spent nuclear fuel and for the decommissioning of the Krško NPP.

According to the Act on amendments to the Act on Radiological and Nuclear Safety (Official Gazette 39/15), implementing agency for activities regarding radioactive waste and spent nuclear fuel is the Fund for Financing the Decommissioning of the Nuclear Power Plant Krško and the Disposal of Nuclear Power Plant Krško Radioactive Waste and Spent Nuclear Fuel which has the obligation to establish the Radioactive waste management centre as its part. It will be financed by disposal compensation paid by the radioactive waste and spent nuclear fuel producers and by a special purpose fund established by the Act on Fund for Financing the Decommissioning of the Krško Nuclear Power Plant and the Disposal of NPP Krško Radioactive Waste and Spent Nuclear Fuel.

New regulation on the manner of financing the legal person to carry out activities pertaining to disposal or to carry out activities pertaining to storage of radioactive waste and spent nuclear fuel generated out of the territory of the Republic of Croatia, whose obligation regarding disposal ensues from bilateral agreements is going to be promulgated.

In the case that licence holder causes contamination of environment, this licence holder is liable for the damage incurred and must without delay take care of remediation at their own expense.

If the licence holder, due to bankruptcy, liquidation or for another reason, cannot ensure implementation of remediation, or if the licence holder cannot be established or is not on the

territory of the Republic of Croatia, the Republic of Croatia shall ensure the entire remediation process.

The Republic of Croatia covers the costs of the remediation mentioned previously if the financial warranties provided by the licence holder are not sufficient and that person does not have the means to cover the costs in question. If these reasons cease to apply, the Republic of Croatia shall demand remuneration of the costs for carrying out the remediation from the responsible party obliged to carry the costs.

## Transparency (Article 10)

### Legal basis

The issue of public information on RW, DS and SNF in Croatia is regulated by the legislative framework that includes the following:

- Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (Official Gazette – International Agreements 03/99)
- Convention on Access to Information, Public Participation in Decision-Making, and Access to Justice in Environmental Matters from June 1998, Aarhus Convention (Official Gazette – International Agreements 01/07)
- Convention on Environmental Impact Assessment in a Transboundary Context, Espoo Convention (Official Gazette – International Agreements 6/96, 7/08 and 1/09)
- Act on Radiological and Nuclear Safety (Official Gazette 141/13, 39/15)
- Strategy for the management of radioactive waste, disused sources and spent nuclear fuel (Official Gazette 125/14)
- Environmental Protection Act (Official Gazette 80/13 and 153/13)
- Regulation on public notification and participation in environmental protection matters (Official Gazette 64/08)
- Regulation on the strategic assessment of impacts of plans and projects on the environment (Official Gazette 64/08)
- Regulation on the environment impact assessment of projects (Official Gazette 61/14)
- Act on the Right to Access Information (Official Gazette 25/13)
- Public consultation code in procedures of adopting acts and other regulations (Official Gazette 140/09)
- Physical Planning and Building Act (Official Gazette 76/07) and The act on Amendments to the Physical Planning and Building Act (Official Gazette 38/09)

Paragraph IV of the preamble of the **Joint Convention** emphasizes the importance of informing the public on matters relating to the safe management of RW and SNF.

**The Convention on Access to Information, Public Participation in Decision-Making, and Access to Justice in Environmental Matters (Aarhus)** establishes rights involving the environment, and represents a reliable basis for including citizens in environmental policy, and confirms the obligations towards future generations. The provisions of the Convention, like the provisions of the European Commission directives arising from the Convention, have been

transposed into the Croatian legislation through the Environmental Protection Act and through several implementing regulations.

**The Convention on Environmental Impact Assessment in a Transboundary Context (Espoo)** prescribes that for the following activities relating to RW and SNF management:

- the disposal of irradiated nuclear fuel
- exclusively for RW disposal, or
- exclusively for storage (planned for longer than 10 years) of irradiated nuclear fuel or RW at a location other than the location of its generation,

provisions must be carried out that include the introduction of an environmental impact assessment procedure that permits public participation. The country of origin, as soon as possible and no later than the time of informing their own population of that planned activity, is required to inform all signatories it deems could be affected so as to ensure the appropriate and effective consultations in line with Article 5 of the Convention on Environmental Impact Assessment in a Transboundary Context.

Article 59 of **Act on Radiological and Nuclear Safety** prescribes that the SORNS will inform the public regarding RW and SNF management, with the exemption of those data that could potentially jeopardise security interests, in the manner ensuring that the necessary information on the management of RW and SNF are accessible to workers and the population, in line with the national legislation and international obligations.

**Strategy for the management of radioactive waste, disused sources and spent nuclear fuel** describes, among other, the national management system for radioactive waste, disused sources and spent nuclear fuel. It must be organised in the way to ensure accessibility to information to all participants in management activities and the public. System must also provide public education on the management of radioactive waste, disused sources and spent nuclear fuel and ensure public right to participate in decision-making processes.

**Environmental Protection Act** prescribes the principle of the access to information and the manner of public participation in environmental protection matters, which is further regulated by the Regulation on the information of and communication with the public and interested public in environmental protection matters (Official Gazette 64/08). The Act stipulates the public has the right to access information regarding the environment, has the right to timely notification of environmental pollution and has the right to participate in procedures for determining premises, drafting and adopting of strategies, plans and programmes, and the drafting and adopting of regulations and general acts concerning environmental protection. The state administration

bodies are obliged within their competence to regularly release information on the environment. If this is a request for information pertaining to RW and SNF, emissions and other releases into the environment, the state administration bodies are obliged, if they possess such information, to inform the applicant of the place where they can obtain, if they exist, information on measurements procedures, including methods of analysis, sampling, previous processing of samples used in the collection of data or to direct the applicant to the appropriate standardised procedure used, if the public authority body has been informed thereof (Article 159).

**Regulation on the information and participation of the public and interested public on environmental protection matters** regulates the manner of information and participation of the public in the following procedures: strategic assessments, adoption of plans and programmes for which strategic assessments are not carried out, drafting of laws, implementing regulations and other applicable legally binding rules that could have an impact on the environment; assessment of the impact of a project on the environment and determining the uniform conditions of environmental protection for installations. Among other things, the Regulation prescribes the manner of implementing public debates, including public insight and public presentation, and the relevant time frames.

**The Regulation on the strategic environmental impact assessment for plans and projects** regulates the manner of implementing the strategic assessing, including informing the public and public participation. The assessment procedure is carried out for all strategies, plans and programmes that give a framework for projects subject to the environmental impact assessment. Article 73 of the Environmental Protection Act lays down that prior to submission to the adoption procedure, when determining the final proposal of the strategy, plan or project, consideration must be given to public comments, proposals and opinions given to the draft proposal of the strategy, plan and project.

**The Regulation on environmental risk assessment of projects** establishes those projects for which an environmental impact assessment is carried out, and those projects subject to the assessment of the need to assess the environmental impact of the project, and the manner of informing the public and participation of the public and interested public in the said procedures. According to this Regulation, which is aligned with the Convention on the Environmental Impact Assessment with a Transboundary Context (Official Gazette – International Agreements 6/96, 7/08 and 1/09) and Directive 2011/92/EU of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment (SL L 26, 28. 1. 2012), the environmental impact assessment is obligatory for the following installations that regard the management of RW and SNF:

- for the disposal of SNF,
- for the disposal of RW, and
- for the storage of SNF or RW at a location other than the site of generation (planned storage period of longer than 10 years).

**The Act on the Right of Access to Information** regulates the right of access to information and the reuse of information possessed by public authorities, prescribes the principle of the right of access to information, limitations to the right of access to information, procedure for attaining and protection of the right to access information and reuse of information.

**The Code of Consultation with the interested public in procedures for the adoption of laws, other regulations and acts** in procedures of adopting laws, other regulations and acts includes drawing up the draft Strategy and National programme for implementation of the Strategy, and defines the general principles, standards and measures for the implementation of consultation with the interested public, including the timelines for holding internet consultations. The Code defines the following minimal standards and measures:

- timely information
- accessibility and clarity of content
- implementing deadlines
- feedback on the effects of the conducted consultation, and
- alignment of the application of standards and measures of consultation in state bodies.

## **Public relations**

The participation of all interested groups on matters concerning RW and SNF management require the establishment of communication mechanisms among interested parties, and those responsible for decision making. The significant characteristic of a good communication programme is the desire of all parties to establish and maintain constructive two-way interaction. The primary goal for every participant is to listen and understand the concerns, issues and questions raised by each side, and to resolve those relevant questions responsibly and in the most easy to understand way. The characteristic difficulties in this process are: frequent use of emotional thinking, dogmatism or the provision of information from experts that is difficult to understand. Therefore, it is important to understand the public concerns and to establish the level of information on security issues that the public demands.

Communication is currently focused on those issues where there is a great interest, where there is a need for accurate information upon which decision-making is based. Public trust is greater when those issues raised by the public are considered, and carefully and openly



validated. Therefore communication is always based on facts, complete, understandable and timely to the most possible extent. The information is created with goal to be sufficient for obtaining the fundamental knowledge on relevant issues and should enable the public to draw reasonable and informed conclusions on the risks and benefits of RW and SNF management. The timely inclusion of interest groups and transparency in decision-making improve understanding, can improve safety and certainly can contribute to obtaining public trust.

As part of the RW and SNF management programme, professional associations are included and, through their activities, efforts are undertaken to improve dialogue between the interested public on the one hand and those authorised for RW and SNF management and the state administration on the other. Professional organisations, such as the Croatian Nuclear Society (CNS) and Croatian Radiation Protection Association (CRPA), through their participation in informing the public significantly contribute to building the best possible relationship with interest groups. The Fund for Financing the Decommissioning of the NPP Krško and the Disposal of NPP Krško Radioactive Waste and Spent Nuclear Fuel also organized public visits to some interesting locations and maintains web page [www.radioaktivniotpad.org](http://www.radioaktivniotpad.org) with numerous information regarding RW. The objectives and activities of these professional organisations includes improving knowledge and procedures in the area of peaceful applications of nuclear science, technology and the appropriate safety cultures and informing the public of the needs and specificities of using nuclear technology.

Education is important for the public to effectively participate in the decision-making process on RW, DS and SNF management. Decision-making process includes all steps from drafting, discussion with stakeholders to adoption by Government or Parliament. The Act does not define the manner of participation of the interested public in the decision-making process regarding RW, DS and SNF management. Therefore, during the drafting of the National programme for implementation of the Strategy, particular attention is focused on this aspect. Many studies have made the common observation that the public most often has prejudices on various issues concerning radiological and nuclear safety. In many cases, the public overestimates the risk and gravity of possible consequences, while underestimating the efforts of installation managers and regulators in assessing and preventing threats. Preconceived ideas not based on scientific facts can significantly hinder the communication process, and therefore additional efforts are taken, as it is the general right of all participants to be informed and to be included in decision-making, which affects their benefit. Furthermore, reasonable issues and uncertainties presented by the public are taken into consideration in the decision-making process.

Currently the National programme for management of RW and DS is based on assumption that central storage of RW will be located on the territory of Dvor Municipality in Sisacko-Moslavacka County. Therefore numerous activities regarding local population have started recently. Those activities are primarily focused on informing local community about all aspects of this project and are performed by government bodies and other organizations. Experts from various fields of this issue are engaged. Community is included in decision-making process through its legal activities.

## National programmes (Articles 11 and 12)

The National programme for implementation of The Strategy for management of radioactive waste (Official Gazette 124/14), disused sources and spent nuclear fuel is adopted by the Government of the Republic of Croatia at the SORNS's proposal. Strategy considers that National programme defines the manner of implementation of the guidelines provided by the Strategy.

According to the Article 57 of the Act National programme shall contain at least the following:

- overall objectives of the Strategy for management of radioactive waste, disused sources and spent nuclear fuel
- breakthroughs with corresponding deadlines for their accomplishment for the purpose of achieving the overall objectives of the National programme for implementation of the Strategy for management of radioactive waste, disused sources and spent nuclear fuel
- inventory of radioactive waste, spent nuclear fuel and disused sources including decomposition and natural radioactive substances having properties that have been altered by means of technological procedures, for the existing state and expected generation in the future, in a manner that clearly discerns the accompanying locations with the quantity of materials classified according to their level of radiological danger
- concepts, plans and technical solutions for the management of the inventory referred to in subparagraph 1 from its generation to its final disposal
- concepts and plans for the period following closure of the disposal facility, including the period in which appropriate controls are to be conducted, and resources necessary for long-term safekeeping of knowledge on the facility in question
- description of the research and development activities necessary to demonstrate justification of solutions for the management of radioactive waste, spent nuclear fuel and disused sources, including natural radioactive substances having properties modified by means of technological processes
- basic steps to serve efficient monitoring of the implementation of individual parts of the National programme, with clearly defined time lines in which these steps must be achieved and the division of responsibility for their implementation
- basic indicators of success of the implementation of the National programme

- estimation of costs of the implementation of the National programme, with clearly outlined assumptions and hypotheses of the assessment shown in the time profile of interest
- description of the financial scheme which must include all costs with the guarantee for their implementation according to the envisaged schedule
- strategy of informing of and communicating with the public, ensuring that necessary information on the management of spent nuclear fuel and radioactive waste are available to the workers and population in the manner that the SORNS informs the public on occurrences in its area of competence, with the exception of information that may potentially endanger security interests. The Strategy shall also envisage the manner of ensuring efficient participation of the public concerned in the decision-making process regarding management of spent nuclear fuel and radioactive waste
- an agreement or agreements on the management of spent nuclear fuel or radioactive waste, including use of disposal facilities, concluded with EU Member States or third countries, if there are any.

Currently, Strategic environmental assessment of the National programme is in progress. National Program has been drafted and can be found on SORNS web page at <http://cms.dzrns.hr/news/10676/prijedlog%20Nacionalnog%20programa%20RAO%20II%20IN%20G.pdf> and is open for public discussion.

Activities considered in National programme can be summarised in following matrix:

Type of Liability	Long-term management policy	Funding of Liabilities	Current practice/ Facilities	Planned facilities
<b>Spent fuel</b>	Dry storage at Krsko NPP site (joint program with Slovenia)	Krsko NPP up to final shutdown National Funds after shutdown	Wet storage at Krsko NPP site	Dry storage at Krsko NPP site Disposal
<b>Nuclear fuel cycle wastes</b>	Interim storage followed by near surface disposal	Croatian Fund and Operator	Storage at Krsko NPP site	Interim storage
<b>Application wastes</b>	Interim storage followed by near surface disposal	Users and State	Two temporary storage facilities (closed)	Central National Storage Facility
<b>Decommissioning</b>	Immediate dismantling for Krsko NPP (joint program with Slovenia) Deferred dismantling for other facilities	National Funds Users and State for application waste facilities	No facilities in decommissioning	No planned facilities
<b>Disused Sealed Sources</b>	Reuse, repatriation and interim Storage	Users and State	Reuse, repatriation and two temporary storage facilities (closed)	Central National Storage Facility
<b>NORM and Non-fuel cycle Uranium Mining and Milling Waste</b>	Reuse, On-site remediation, release from regulatory control	Owners and State	Long term monitoring on site	Remediation plans and program development, Reuse, On-site remediation, release from regulatory control

## Annex I.

### Inventory of radioactive waste in Croatia

Table 1: Radioactive waste categorization

Radioactive Waste Category	Typical Property
Exempt and cleared radioactive waste	Activity concentrations or total radioactive waste activity at or below prescribed exemption or clearance levels.
Low level short lived radioactive waste	Radioactive waste containing radionuclides with half-life less than 100 days which will decay below clearance levels within 3 years.
Low and intermediate level radioactive waste	Radioactive waste containing radionuclides with half-life less than 30 years and activity concentration or total activity which will remain above prescribed exemption or clearance levels 3 years after their creation, and having a heat generation rate below 2 kW/m <sup>3</sup> .
Short lived waste	Low and Intermediate level radioactive waste containing radionuclides with half-life less than 30 years (limitation of long lived alpha emitting radionuclides to 4.000 Bq/g in individual waste packages and to an overall average of 400 Bq/g in the total waste volume).
Long lived waste	Low and Intermediate level radioactive waste activity concentrations exceeding the limits for short lived waste.
High level radioactive waste	Radioactive waste thermal power above 2 kW/m <sup>3</sup> and activity concentrations exceeding limits for short lived waste.

Radioactive waste categorization described above is based on the recommendations given in Classification of Radioactive Waste, IAEA Safety Guide No. 111-G-1.1, 1994 and Commission Recommendation of 15 September 1999 on a classification system for solid radioactive waste, Official Journal L 265/37 of 13 October 1999. It should be noted here that a new radioactive waste categorization is supposed to be developed in accordance with Classification of Radioactive Waste, IAEA General Safety Guide No. GSG-1, 2009.

Table 2: RW and SF inventory:

Institutional Waste	Current Quantity (m <sup>3</sup> )	Current Activity (Bq)	Expected Quantity, 2060 (m <sup>3</sup> )	Expected Activity, 2060 (Bq)
LLW	7,5	5,3×10 <sup>13</sup>	15,0	1,4×10 <sup>13</sup>
ILW		1,4×10 <sup>12</sup>		3,0×10 <sup>12</sup>
TOTAL		5,5×10 <sup>13</sup>	-	1,7×10 <sup>13</sup>

Krško NPP (1/2)	Current Quantity	Current Activity (Bq)	Expected Quantity After Shutdown, 2043	Expected Activity After Shutdown, 2043 (Bq)
Operational LLW	1.130 m <sup>3</sup>	$9,2 \times 10^{12}$	2.000 m <sup>3</sup>	$1,6 \times 10^{13}$
Dec. LLW	-	-	2.700 t	$5,5 \times 10^{12}$
Dec. ILW/HLW	-	-	41 t	$8,0 \times 10^{15}$
SF	576 SFE	$2,0 \times 10^{20}$	1.142 SFE	$4,2 \times 10^{20}$