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Identifying remaining socio-technical challenges at the national level: Slovenia

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1 State of the affair

1.1 General Overview

The use of nuclear energy has a strong tradition in Slovenia. In 1949 the Institute Josef Stefan was founded, devoted to research in physics, with great emphasis on nuclear physics. A few years later (1966) the research nuclear reactor TRIGA started to work in the vicinity of capital city Ljubljana, to support its research. Slovenia is having one NPP (in coownership with Croatia) located in Krško municipality, in operation since 1983, and one Central interim storage (82 m³ stored waste) for LILW from medicine, industry and research at the same site as research reactor, in operation from 1986. There are plans to build second NPP at the same location, but the final decision has not been made yet.

According to Slovene legislation (see Appendix 1) several categories of radioactive waste are formally distinguished in Slovenia: transitional radioactive waste, very low-level radioactive waste, short-lived and long-lived low- and intermediate-level radioactive waste (LILW), high-level radioactive waste (HLW) and NORM (Normally Occuring Radioactive Material). At the moment only a LILW repository is being discussed for only short-lived radioactive waste. Source of radioactive waste is mainly the NPP Krško operation. There is also waste which arises due to maintenance of NPP and due to different replacements.

VOLUME OF LILW

LILW Volume for disposal	
LILW type	Volume LILW (m ³)
A. LILW from NPP Krško	
LILW from NPP Operation	3.600
NPP Decommissioning LILW	13.000
Other NPP LILW	1.000
Sum A	17.600
B. Other LILW	
Brinje storage LILW	250
Research reactor Triga LILW Decommissioning	150
Repository Decommissioning LILW	200
Sum B	600
Sum 50% A + B	9.400
Sum A + B	18.200

Table 1 Radioactive waste type and volume for disposal

The large volume of LILW waste is expected during decommissioning of NPP Krško, foreseen in 2023 (if there will be no prolongation of NPP's life time until 2043) in which more than 13.000 m³ will be produced. The LILW also comes from medicine, industry and research activities (altogether about 80 m³ with yearly production of 2 m³ in the near future), mainly stored at the Central interim storage facility in Brinje near Ljubljana, but also at the producers' premises. The waste originates only from civilian use of nuclear applications, as there is no military application of this kind. The total sum gives two numbers, only the Slovenian waste volume and common Slovenian and Croatian volume.

Currently Slovenian responsibilities regarding decision making in RWM are divided between a number of actors on different levels, from government, across several ministries, their agencies and boards, to local communities, waste producers, etc. On the operative level responsibility for RWM is with the implementer i.e. national Agency for Radwaste Management (ARAO). Its task is to assure efficient, safe and responsible management of all kinds of radioactive waste in Slovenia, from producers to the final deposition. The storage of RW from NPP is responsibility of operator NEK.

Regarding the siting and decision making process on site selection there are many players and their roles differ depending on the level of observation: general, basic, and local. Undoubtedly the state (through its different bodies) is involved, as well as local communities and NGOs. More concretely, on some basic level we have the following actors (stakeholders) or groups of them: Agency for Radwaste Management (ARAO) and other official bodies of Ministry for planning and environment, including technical experts; Nuclear sector, mainly the NPP Krško and the Slovenian owner of NPP Gen energija; Local communities, involved in the siting procedures (namely municipalities Krško, Brežice and Sevnica); NGOs on local and/or state level; Expert communities; Political parties; Media. Organizations represented in National Stakeholders Group (NSG) Slovenia which has been organised during the siting phase were: Ministry of the Environment and Spatial Planning, Slovenian Nuclear Safety Administration; Ministry of the Environment and Spatial Planning, Spatial Planning Directorate; Ministry of the Environment and Spatial Planning, Environment Directorate; Ministry of the Economy, Energy Directorate; Gen energija company; Krško Nuclear Power Plant; Fund for Financing Decommissioning of the Krško Nuclear Power Plant; Municipality of Brežice, Local Partnership (LP) Brežice; Municipality of Dol pri Ljubljani, LP Dol; Municipality of Krško, LP Krško; REC; Slovenian Human Rights Ombudsman; PIC-Legal-information centre for NGOs; ZEG-Association of ecological movements of Slovenia; Slovenian nuclear society; University of Ljubljana; national Agency for radioactive waste management – ARAO.

Decisions about RWM are therefore in the hand of the state, but regarding the location of the site of the LILW facility, the relevant local communities have in fact quite strong decision-making power. The nuclear sector is economically strong, though it is state owned. It is influencing the siting process through interaction with the state and local politics. The role of local communities involved in the siting process is ambivalent due to the public opposition to the facility being sited in their community, but wishing to receive high compensation offered by the state to community in which facility will be located. The site has been selected at the end of 2009 with adoption of Decree on spatial planning act for LILW repository in Vrbina, Krško municipality. According to the Decree on the measures for compensation due to the limited land use the compensation of approximately 5,2 mio € per year, distributed 50 % to Krško municipality and the rest of 50 % to all municipalities in 10 km radius.

There is a number of NGO's focusing on environmental problems. Regarding nuclear energy they mainly oppose it. During the siting process for LILW repository new opposing groups have emerged.

The problem is, that some of them wishing to gain political recognition in the local population by defending NIMBY attitudes stimulate the opposition to the siting of the repository using sometimes rather controversial claims and manipulating people.

Regarding attitudes toward RWM process, different media play different roles, depending on the occasion and nature of the event. They are not leading consistent policy with regard to RWM, but mainly emphasize the problems (what is in principle not bad), while not supporting search for the solutions of the problem. Some of the reasons for this lie in inconsistent governmental policy toward the issue of RWM. The role of political parties is not transparent enough, but most often at the local level most parties are following the predominant public opinion on the siting of RW disposal although at the national level their position is different.

Organizations represented in National Stakeholders Group (NSG) Slovenia which has been organised during the siting phase were: Ministry of the Environment and Spatial Planning, Slovenian Nuclear Safety Administration; Ministry of the Environment and Spatial Planning, Spatial Planning Directorate; Ministry of the Environment and Spatial Planning, Environment Directorate; Ministry of the Economy, Energy Directorate; Gen energija company; Krško Nuclear Power Plant; Fund for Financing Decommissioning of the Krško Nuclear Power Plant; Municipality of Brežice, Local Partnership (LP) Brežice; Municipality of Dol pri Ljubljani, LP Dol; Municipality of Krško, LP Krško; REC; Slovenian Human Rights Ombudsman; PIC-Legal-information centre for NGOs; ZEG-Association of ecological movements of Slovenia; Slovenian nuclear society; University of Ljubljana; national Agency for radioactive waste management – ARAO.

1.2 Spent Fuel Management Policy

In 1996, the Slovenian Government adopted the **Strategy for Long-Term Spent Fuel Management**. According to this Strategy, the decision on the final solution of spent fuel disposal in the Republic of Slovenia should be adopted by 2020, while the siting and the construction of the repository should be finished by the year 2050. Until then the fuel should be stored in the Krško NPP spent fuel pool or in dry storage at the reactor site. The Republic of Slovenia and the Republic of Croatia jointly prepared and approved a Revision 1 of the Programme for Decommissioning of the Krško NPP and Disposal of LILW and High Level Waste in 2004. According to this Programme for all domestic scenarios, the disposal in deep geological formations is considered to be the only technically feasible and safe long-term solution for spent fuel and high level waste. In preparing the evaluation, the adjusted Swedish concept of geological disposal for NEK spent fuel was used as a guideline.

The basic characteristics of the concept are:

- direct disposal of spent fuel in appropriate cooper canisters,
- two variants were investigated dependant on NEK life time:
 - capacity for 1553 fuel elements or 620 metric tons of metallic uranium with a small additional volume of high level waste ($\sim 36 \text{ m}^3$) for NEK operation until 2023 (variant 1),
 - capacity for 2281 fuel elements or 912 metric tons of metallic uranium with a small additional volume of high level waste ($\sim 36 \text{ m}^3$) for NEK operation until 2043 (variant 2).

The following phases were studied and evaluated: research and development including site selection and characterisation, repository design and construction with underground test facility,

encapsulation plant, above and underground facilities, operation, decommissioning, closure and institutional control and monitoring.

As an alternative to the disposal in deep geological formation either in Slovenia or in Croatia, also an option of export and disposal of spent nuclear fuel in a third country was evaluated in Revision 1, but is not considered in Revision 2 of Decommissioning Programme any longer because such option does not exist in the world.

The Decommissioning Programme in its long-term strategy for spent fuel management foresees spent fuel storage in dry CASTOR casks. Spent fuel will be moved from NEK spent fuel pit in variant 1 to dry storage between 2023 and 2027 and will be stored until 2068, when a deep geological repository is assured. The operational phase of the spent fuel repository will end in 2077 and the repository should be closed in 2084. In the case of extended NEK life time until 2043 (variant 2) all activities will be shifted for 20 years: the dry storage will start with operation in 2043, repository will start with operation in 2088 for 15 years and will be closed in 2109.

The above solutions comply with The Resolution on the 2006-2015 National Programme for Managing Radioactive Waste and Spent Nuclear Fuel, adopted by the Slovenian Parliament in February 2006. In parallel also multinational solutions for disposal of spent fuel and HLW have to be investigated therefore ARAO joined the ERDO – European Repository Development Organisation in 2008 with the aim to analyse possibilities for implementation for shared geological repository in Europe.

1.3 Siting of RW

The first attempt to site a RW repository in Slovenia was linked to the construction of the NPP Krško in the 70's. As was the case of many other countries at that time only a technical criteria were used. This is why the process was labelled in public as “technocratic” approach. At the time the first NPP was constructed it was part of the large Yugoslav project to construct ten or even more NPPs. In this frame it was planned to build one centralized disposal facility for radioactive waste from all the NPP's. However, later on the idea of construction of several additional NPP was abolished due to financial problems, and later disintegration of Yugoslavia. But the responsibility for the construction of LILW repository stayed. First attempts to site disposal facility in Slovenia failed in 1993 due to strong opposition at the local levels, but also because political support at the national as well as at the local level was rather weak and unsustainable. (More about this first siting failure see in: Kos, D., & Polič, M., 1999.)

The second siting of LILW depository was initiated by ARAO in 1995. It was divided into 4 stages according to IAEA recommendations:

1. Conceptual and planning stage (selection of approach, development of procedure, planning public involvement and participation);
2. Area survey stage (identification of potentially suitable areas following with identification of potentially suitable sites);
3. Site characterization stage (preliminary site(s) evaluation);
4. Site confirmation stage (performance and safety assesement of suitable site(s). In 2009 the siting reached its final phase with the confirmation of one of the potential locations in volunteering local community.

Mixed-mode approach was used in site selection process meaning that besides technical screening, searching for public acceptance at each step was implemented. It was supposed to take into consideration equally both technical criteria and social aspects, and presumes a high involvement of the public in the process. Local partnerships (LP) were organized as “joint venture” of ARAO and two “nuclear municipalities” (Krško and Brežice) to support the mixed mode approach and to address all local needs. Main objectives of LP were postulated according to Aarhus convention: 1. to provide all the relevant information on the topic and to disseminate knowledge; 2. to enable the local public to take part in the discussions, to express opinions, demands; 3. to involve the local public in the decision making process within the legislation provisions from the very beginning; 4. to build trust among participating parties. Public accepted LP as a forum for discussion and platform for individual and community standards improvement.

In May 2005, Slovenia's Agency for Radwaste Management (ARAO) prepared the theses for local partnerships; they were based on the Belgian approach, but at the same time introduced concrete solutions adapted to Slovenia's specifics and in particular its legislation: the municipality is free to withdraw from the procedure; the principal task of the local partnership is to inform the public and communicate with it; a part of the costs of the local partnership is financed by the government; the funds are used for the operational costs of the partnership, to pay the coordinators, communication activities, logistic support, additional independent studies, organised visits, lectures by experts, etc. A local partnership is established as a contractual relationship between a municipality and the ARAO; its principal objectives are adequate spatial siting of an LILW repository and the active inclusion and cooperation of the municipality and its inhabitants in the siting procedure for an LILW repository. The local partnership actively participates in the decision-making on all issues related to the preparation of the national spatial plan for LILW repositories, the repository's design and the related infrastructure.

The functioning of the LP is formalised with participation in preparation of National spatial plan for LILW repository, EIA process and other formal administrative procedures as well as informal with discussion about field investigations, design solutions, safety, development possibilities due to compensation, societal and health issues. The local partnerships have the responsibility to organize broader discussion between citizens and to form working groups, inform the public, acquire independent expert opinions. Nevertheless decision making process stays with local council and other bodies of local autonomy while LP has advisory role. Possibilities of optimization of some activities regarding radioactive waste repository design have been suggested by international peer-review of the preliminary design, therefore different other variants of activities and corresponding structure needs are being studied and will be incorporated in the repository documentation during the next phases of documentation preparation. Expectations of the participants were high and numerous but apparently not recognised by everybody: to produce new ideas for inclusion of the public; to include national stakeholders in the partnership; to reach a consensus for the inclusion of facilities in the environment; to compile various views; to discuss the subjects and exchange of opinions; to pragmatise approach and substantively reasoned dialogue; to build trust among the stakeholders; etc.

The LP participants proposed the goals of the NSG: To estimate the so far existing practices of participation management in Slovenia; to identify problem areas, hindrances and challenges; to determine which of these areas require research or exchange of experience with other European countries; to prepare recommendations together; to improve quality of life and sustainable development of all parties involved.

Proposals of participants regarding the principles of functioning of the NSG: clarity; transparency; judgement and co-operation in decision-making; information sharing; co-operation in decision-making; equality of all stakeholders; expertise (independent judgements), realistic influence on the environment; capability of judging the facts (collective clear understanding of the problem); compromise regarding key matters; level of trust (from the state downwards); definition of individual problems, to not mix everything; to structure the attitude of the municipality; principle of publicity; psychological »aspect«; orientation towards the future; etc.

A number of recommendations to improve the public participation was produced:

1. Provision of relevant information is a precondition for "informed" public participation, while it is also important that information is of good quality, appropriate in terms of quantity and content, and above all, understandable to target groups they are intended for.
2. At the very beginning of every process where the public is participating, **identification of key¹ stakeholders who should be actively involved in the process is required**. The stakeholders' analysis can be carried out to examine their interests, responsibilities as well as their potential contributions to shaping solutions. These key stakeholders as well as the general public have to **be informed regularly on cooperation possibilities and on how public participation contributed to decision making**. If these influences are obvious, there will be also a considerable possibility that the stakeholders retain their trust and motivation for cooperation in the process.
3. The public participation goal is to enable interested **citizens to be adequately informed and to participate in the exchange of opinions, information and knowledge in the decision-making process before decisions are made**. When the inclusion process is carried out appropriately, the citizens are able to express their opinions and give proposals, they can discuss them with other stakeholders and in this way get familiar with their positions, they can overcome conflict situations and understand the foundations on which the decisions were made. The public participation process raises awareness, improves knowledge and creates affiliation and support for further coordinated implementation in practice.
4. Non-consideration or even **ignoring the opinions and proposals given by participating stakeholders means violation of the basic principle of public participation** according to which citizens affected by decisions must be given the opportunity to express their opinions regarding the problems as well as the opportunity to discuss and consider with other stakeholders best solutions for these problems. Such a discussion reduces conflicts, creates affiliation and fosters mutual trust. The public should be involved exclusively when there is a sincere intention of actually considering their opinions and proposals and take positions with regard to them. In such cases opinions and proposals are properly noted and published together with positions taken. Reporting is also made on how the proposals given by the public influenced decision making.
5. The public **participation process needs to be monitored and evaluated** continually at the end of each phase of the process, while further activities have to be amended and adapted with regard to current evaluations and findings. Two groups of parameters for the evaluation of public participation success were recommended: a) content-related parameters and b) parameters related to inclusion process.

¹A word of warning is in place here – identification of only key stakeholders may narrow the stakeholders' base. Even identification of all stakeholders can make place for manipulation – who is the one to identify them if this is not by an objective rule.

6. It was expressed from many different stakeholders in the CIP project that **similar process should be organized also in the future**, after the site for LILW repository will be selected while such national assembly with the presence of international experts helps to organize the stakeholders dialogue and normalized the discussion. In this way international inputs as examples of practice with positive and negative recommendations can be involved in the radioactive waste management governance in Slovenia. That would enabled possibility to identify deficiencies in the processes on the general levels as well as available solutions. (See more in CIP country report.)

In spite of these recommendations the Local Partnerships were closed down in 2009 immediately after the siting process reached its final phase with confirmation of one of the potential location in volunteering local community. Formally this was according to law, but was perceived from the local stakeholders as a kind of manipulation and would worsen any future siting or similar process.

2 Analysis

2.1 A Selection Of Studies, Researches, Into And Expertise On The Reception Of Nuclear Technology In Slovenia

The fact that the first Slovene public opinion survey on people's attitude to nuclear technology (NT) was carried out in 1986 certainly was not a coincidence. The Chernobyl catastrophe indeed changed until then idyllic relationship between the public and the nuclear sector in Slovenia (Yugoslavia). In the former common state of Yugoslavia, nuclear programmes were not put into question; they were considered evidence of the system's (regime's) capability of independently carrying out demanding high technology projects in a country ranked among the so-called "developing countries"² by the then common standards. An important consequence of this optimistic framing of NT was the fact that the construction of the first nuclear power plant (in Krško) did not include the construction of a low and intermediate level waste (LILW) and spent fuel (SF) repository.

The Chernobyl catastrophe occurred only three years after the Krško NPP was given permission to start regular operation, and greatly influenced the position of NT in the public eye. From then on there was a significant increase of studies and research, which directly or indirectly addressed the social issues or the way of "social construction" of NT in Slovenia. The technological research was largely aimed at developing a methodology for the siting in physical space of LILW repositories. In the mid 1980s, the Krško NPP was thought to be merely the first step of an extensive nuclear energy

² Although there is no established convention for the designation of "developed" and "developing" countries or areas in the United Nations system, in common practice, Japan in Asia, Canada and the United States in northern America, Australia and New Zealand in Oceania, and Europe are considered "developed" regions or areas. In international trade statistics, the Southern African Customs Union is also treated as developed region and Israel as a developed country; countries emerging from the former Yugoslavia are treated as developing countries; and countries of Eastern Europe and the former USSR countries in Europe are not included under either developed or developing regions. Source: <http://stats.oecd.org/glossary/detail.asp?ID=632>

programme, foreseeing the construction of a series of NPPs³, but no research was carried out into spent-fuel repositories. The reason for this opportunistic behaviour, was assumption that the problem was “too big to fail” and we (Slovenia) are “too small to act”. But the other less known reason lay in the connection(s) with the military part of the nuclear programme that was carried out in strict secrecy. To date the official position maintains that Yugoslavia had no such programme, though several sources at least indirectly contradict this (Bogovčič, 2008). Considering Yugoslavia’s international political-security position after the Second World War, attempts to develop a military nuclear programme would not have been a surprise. In this context, spent-fuel management was a highly important military and security issue which was not to be discussed in public. In the 1980s, the time of the political and economic overture to the disintegration of Yugoslavia, the issue continued to be neglected and suppressed. By then it had also become clear that the extensive Yugoslav nuclear energy programme was not to be realised, and this automatically meant that the construction of an SF repository for a relatively small quantity of HLW produced in Slovenia was not economically viable. The fact that half of the waste is responsibility of Croatia further complicated some initial attempts to solve the problem.

The question of an HLW repository is therefore not on Slovenia’s agenda yet. There is only one strategic document - “Strategy on spent fuel management” - adopted by the government in 1996. According to this strategy, the decision on the final solution for spent fuel disposal in the Republic of Slovenia should be adopted by 2020, while siting and construction of the repository should be finished by 2050. Until then the fuel should be stored in the Krško NPP spent-fuel pool or in dry storage at the reactor site. The strategy mentions that multinational solutions for the disposal of spent fuel and HLW should be investigated. This strategy is about all there is to be analysed, if we are dealing with geological disposal(GD) “socio-technical” issues only. There has been no expert or public debate and no activity related to this issue so far, and no research dealing with the siting of HLW repository. Instead a lot of studies have been done to support the siting of LILW repository.

Studies carried out after 1986 can be roughly divided into four categories.

1. The majority of studies dealt with the methodology of the spatial siting of radioactive waste. It is interesting and indicative that the first phase, from 1986 to 1993, was largely dominated by physical space, i.e. geological research. The responsible state institutions apparently held the naive belief that the public would support the construction of inevitably necessary infrastructure, which should actually have been planned and appropriately verified simultaneously with the approval of the project for the first NPP in Slovenia.
2. It was only when it became clear that research dealing merely with technological and geological issues would not lead to a socially acceptable construction of a repository, and when new political actors appeared on the scene (e.g. the Green Party of Slovenia, founded in 1989), whose prior political objective was Slovenia's withdrawal from the nuclear energy option, that the research interest in the public perception of NT hugely increased, and consequently also the interest in the spatial and social siting of a nuclear waste repository. Public opinion surveys on NT then became standard items of the survey repertoire.
3. Actually, public opinion surveys already dealt with the distribution of information, understanding of press releases and communication in the triangle formed by experts, politicians, and the public. When the exclusively technical procedure for siting a LILW repository failed, the responsible agency for nuclear waste management introduced a so-

³ Some sources indicate that Yugoslavia intended to build four additional NPPs (<http://dk.fdv.uni-lj.si/diplomska/pdfs/bogovcic-gregor.pdf>) or even more.

called combined “sociotechnical” approach and the search for the most suitable communication model became a central theme. In this period several studies and analyses were conducted that were not directly purposeful, but dealt with the general issues of siting “risk technologies” in a social environment that was increasingly sceptical about accepting technologies, especially of the kind that is beyond average common-sense acceptance, or which is held to have less acceptable effects on the environment

4. Many studies showed beyond any doubt that the reputation of nuclear technology deteriorated considerably after the Chernobyl catastrophe and that “nothing will be like it used to be before”, and in particular that it had become very difficult to legitimize nuclear projects. When, in 1991, the political system changed, it became quite obvious that the emergence of so many new political actors had made decision-making on nuclear power energy highly complex and unpredictable. This was most evidently illustrated by the dreadful failure of an exclusively technical project for siting a LILW repository in 1993. At that time it seemed that all political actors had realised that without the inclusion of the directly affected population and other interested parties it would no longer be possible to legitimize NT projects. This then encouraged research into participation models of decision-making.

2.2 Studies of The Methodology Of The Siting Process

The first study on nuclear energy waste disposal was conducted by Elektroprojekt Zagreb (Croatia) in 1986 and entitled “Disposal of radioactive waste and spent nuclear fuel for the Yugoslav construction programme of NPPs until 2000”. The study among others resulted in a procedure for selecting locations that was largely based on geological criteria and on establishing a list of possible macro locations⁴, three of which were in the (then) Republic of Slovenia. Information on the study's results spread to the political and wider public and opposition to the programme set back further procedures from the very beginning.

In 1987, SEPO, IJS⁵ and the University of Ljubljana (Biotechnical Faculty - Chair of Landscape Architecture) elaborated a study on a LILW repository and the options for siting it in the Socialist Republic of Slovenia. The study resulted in a selection of 39 possible locations for a repository within the republic, which were based on their geological, demographic and spatial features. However, the procedure revealed that there were no optimal locations, because the geologically most promising areas were ranked in the fourth and fifth category.

In 1989, SEPO elaborated the study “Methods and criteria for selecting LILW repositories in the Socialist Republic of Slovenia”, which was then adopted as the basis for the selection of LILW repository with accurately defined excluding and comparative criteria, based on the recommendations of the International Atomic Energy Agency (IAEA, 1985). In the same year, a first sociological study was made (Gantar, P., Kos, D., 1989) on the decision-making aspects of interventions in space in the case of decision-making on the LILW repository in the SRS. The study, however, did not lead to a more participative procedure for siting an LILW repository. The procedure that was actually performed was a huge failure and strongly resonated with the local and national

⁴The study proposed 13 potential locations across the territory of the Socialist Federative Republic of Yugoslavia: the areas selected in Slovenia included Velenje (suitable), Slovenj Gradec (very suitable) and Novo Mesto (less suitable).

⁵SEPO: The Environmental Impact Assessment Expert Centre of the Jožef Štefan Institute (IJS) at the time the most prominent scientific institution in Slovenia.

publics. This resulted in a long delay and later in a redefinition of the starting-points for finding a legitimate location.

A number of new studies were then performed in preparation for a repeated selection of a possible repository. New criteria were elaborated for the location of a LILW near surface repository. The experiences of the failed procedure led to the adoption of a “combined socio-technical procedure”. The discussion of the experiences from the previous procedure included an analysis of the economic feasibility, geological conditions, spatial use, and legal aspects (ARAO, 1998), as well as an analysis of the experiences of the local community with the siting procedure (Kos, D., & Polič, M., 1999). If anything, it was the latter analysis that pointed out that the local population had been treated totally inadequately, and this not only highly reduced the legitimation of those who performed the procedure, but also of all actors connected with nuclear technology, not only at the local level, but also at the regional and national levels.

In 2000, a final remediation of the provisional storage near Zavrteč was performed, a procedure which following the recommendations of sociological experts was conducted for the first time in a way that the local public actively co-operated and monitored the sanitation, indeed the actual removal of a totally inadequate LILW repository. Though positive, this experience highly resonated with the local and wider publics and did not improve much the negative image of the nuclear energy sector in the public eyes.

During the preparations for a new LILW siting procedure, several studies and expertises were performed, which confirmed the importance and social viability of the combined procedure for selecting a LILW repository after the Belgian model. There were also a number of professional reflections on the principal reasons for the failed siting in the past. In these analyses, in which technical experts participated as well, there was a marked shift in the understanding of the issue’s social dimensions. Nevertheless, at least one analysis revealed that this shift was merely “politically correct” and not really a voluntary adaptation to the existing situation brought about by the obviously failed, merely technical siting procedure. Later occurrences and research revealed that actual acceptance of the social facts concerning the (non-)acceptance of nuclear technology or rather radioactive waste was not completely achieved or internalised. New circumstances, generated by the intensive discourse on climate change in the media, re-established the disproportions between the technical and social aspects of RW management and NT as a whole. From the aspect of siting a geological repository for spent fuel, it is interesting to note that the public opinion surveys do not differ between LILW and HLW. This means that the findings from the studies and analyses on social responses to siting a LILW repository can be largely generalised for siting a HLW repository.

2.3 Public Opinion Surveys

Public opinion surveys are undoubtedly the most common sociological research method used in keeping track of social responses to nuclear technology. Extensive information bases are now available on the public opinion's perception of NT and they make it possible to compose a clear enough picture of how the Slovene public opinion on this theme changed from 1986 onward. Due to methodologically uncoordinated research instruments there are some difficulties for longitudinal comparisons, but we nevertheless have relatively clear information on how the general and local publics perceive NT at the general level and concerning individual concrete issues. The first public opinion survey dedicated to the issue of a LILW repository was carried out already in the “Chernobyl” year (Kozmik V., Polič M. 1986). The respondents were polarised about the un/acceptability of a

repository, and a NIMBY effect was evident, as well as the need for additional information to support more reflexive attitudes. The public opinion surveys also included indirect questions, e.g. on the attitude to the energy policy and the attitude to other sources of energy supply. "Nuclear themes" became part of the standard repertoire of the foremost longitudinal public opinion survey in Slovenia, the "Slovene Public Opinion" project (Toš et al. 1993 – 2011). Surveying the public opinion's attitude to nuclear issues strengthened in the first parliamentary mandate of the newly established state of Slovenia, i.e. in the period when the Green Party of Slovenia was an influential parliamentary party and part of the governing coalition in the 1990-1992 period.

The public opinion intensified further after the collapse of the first technical siting process in 1993. The key dilemma was whether the public opinion agreed with the efforts of the Green Party of Slovenia, which at the time demanded to abandon nuclear energy by 1997. Although the public opinion was never strongly in favour of the nuclear energy option, the idea to close down the practically "brand new" Krško nuclear power plant appealed even less to the public opinion. The failed efforts to have a referendum on closing down the nuclear power plant sealed the political fate of the Green Party. The supporters of nuclear energy managed to convince the public opinion about the importance of the NPP for ensuring independent electrical energy supply.

ARAO, the Radioactive Waste Agency established in 1991, systematically monitored the changing attitude of the public to nuclear technology in Slovenia, in particular the public's attitude to a RW repository, at the local, regional and national levels. When the second, combined socio-technical procedure for siting a repository was put in motion, public opinion surveys were one of the most important research methods for assessing the social acceptability of a repository in the municipalities which showed interest in participating in the procedure. These surveys often revealed that there was a wide gap between the ambitions of local political leaders and the local public opinion on the acceptability of RW repository. They also proved quite convincingly that in environments which had experience with nuclear structures, a slightly higher level of willingness to accept a RW repository existed. It was this particular finding that contributed to the fact that the formal and informal efforts to establish a suitable repository then concentrated on these locations. We must however point out that the highest registered support for the construction of an RW repository never exceeded 50 % of the local population (the highest value measured in survey form 2009 (Ninamendia) were in municipality Krško where 41,8 % would vote for repository and 44, 3 % against in the case of referendum).

The public opinion surveys also revealed that a certain, quite substantial part of the people involved in the debate on nuclear technology was unresponsive to both professional arguments and the promised financial compensation. This fact was interpreted, especially in professional circles, as evidence that professional arguments do no work at the level of the public opinion, because the lay public does not understand professional debates. To a certain extent, this is a misleading argument, and at the same time it can be turned into a question: whether really everything had been done to assure that everybody or at least the majority understood the essential technical features of nuclear technology. Public opinion surveys also made it possible to confirm the assumption that there are probably highly educated people who are not willing to accept even a discussion on the suitability of nuclear technology or e.g. an LILW repository in their vicinity. In view of the limited range of public opinion surveys regarding the deeper motives for the rejection of the nuclear option in general, the preparations for conducting the combined siting procedure included several quality surveys at the local level, which showed that improving information does not eliminate all "stubborn" opposition to nuclear technology.

2.4 Communication Analyses

Siting nuclear infrastructure in the physical and social environment has been accompanied by communication difficulties from the very beginning. Initially, the prevailing mood in the professional circles was narcissistic self-satisfaction because of the gap between the experts and the lay community in the ability to professionally communicate. Many nuclear experts interpreted these communication problems as a normal consequence of the general (lay) public's inability to correctly understand professional information and to competently communicate with experts about potentially open questions. In the light of this attitude, most problems in siting nuclear technology in the social space were understood as resulting from the cognitive inability of non-experts. However, a range of truly "tragicomic" complications later led to the at least partial assertion of the demand that the experts should learn communication skills, because they would allow them to convey essential information on NT, in particular on its safety components. Nevertheless, even after more than twenty years of occasionally heated public debates on the safety (or lack of it) of nuclear technology, and on many basic safety issues, the opinions and views of (part of) the public still widely differ from the professional assessments. See the Attachment 1).

It is obvious, then, that communicating is not merely a cognitive process, but that its success depends on many other factors as well. What is particularly important is the level of trust in the proper operation of the formal institutions in the field, and this trust largely depends on the general social climate and the general level of trust in society's institutions. Since communication was thus identified as a major problem, and in some cases actually as the decisive legitimation factor for siting nuclear technology in the physical and social space, several researches were commissioned and executed on this theme. What probably influenced this turn in the direction of the research was the communication disaster during the siting of a RW repository, based exclusively on technical criteria, in 1993. Amateurish communication or the general lack of communication before and during the field geological research of course highly upset the local public. How great the shock was, was revealed by a survey which five years after the events established a high level of indignation among the local public, especially because of the totally inadequate communication with the directly involved local communities.

The research on communication in the course of siting NT in space which then followed can be divided into two conceptually different groups. The classification is in line with the theoretical differences in addressing the role of lay groups in the execution of professional projects. The first group includes research and approaches that treat information and communication about the problems of siting NT in space as a basic human right, i.e. as the right of the inhabitants within the impact area to be substantially informed on the events, and about all known effects that may change the quality of living and the value of real estate. The essential emphasis is on the realistic information and on establishing a substantial communicative rationality that is simultaneously part of the decision-making process (participation) of different interest groups. In these approaches communication is totally open; the right to all information is legally protected in accordance with the Aarhus Convention. This also means that opinions opposing the realisation of the project's objective may prevail.

The second group includes research and expertises approaching the issue instrumentally and purposefully, where the set objective determines the ways and range of communication. According to professional public relations, all forms of communication contributing to achieving the objects must have clear priority over conveying information that may generate doubt or even strengthen the opposition to the project's objectives, regardless whether the information is justified or not.

In the preparations for the second, socio-technical procedure for siting a nuclear waste repository the responsible circles accepted the need for the procedure to be supported by adequate communication, but it was (and still is) an open question which communication approach is the most suitable. Moreover, in spite of intense discussions on these dilemmas, the differentiation between these two essentially diverse approaches has not been accepted widely. It even appears that expert elitism, based on the assumption that lay people cannot competently understand and discuss high technology issues, is on the rise again. From this point of view, only instrumentally purposeful communication is meaningful, i.e. conveying information in a way which presumably benefits achieving the project's set objective, since the lay public is anyhow incapable of essentially assessing high technology dilemmas. Ethical aspects of the issue are in this case abandoned and trust relationships are not priority.

2.5 Research Into Participation In Decision-Making

Exhaustive, all-round, interactive information is actually already the first phase of participation in decision-making. At the principle level, the openness of decision-making procedures is a largely accepted standard in Slovenia. Concerning interventions in the natural environment this right is formally and legally protected by the Aarhus Convention. Difficulties of course arise with many interventions in space when the high principles are not adequately applied at the practical level, or when it is clear that adopting participation in decision-making procedures in principle often does not amount to much more than using the "politically correct" jargon. We have witnessed changes in the siting procedures of NT in the last decades, ranging from totally exclusive decision-making to "partnership" inclusion of different groups at the local and regional levels. When it was accepted that everybody who is interested in NT issues, or wants to be a party in the procedure, should participate in the decision-making procedures, it was held that the decision-process should welcome civil society organisations as well, including NGOs and all other actors.

Studies and analyses however revealed that this was not a linear development, but rather a cyclical one and that it depended on the social, political and, of course, economic position of nuclear technology. As pointed out above, nuclear technology was initially discussed exclusively within narrow military-political circles because of its military component and heritage. This position suited the experts to some extent as it relieved them from their "social responsibility". The spread of the peaceful use of NT logically introduced different and less exclusive standards to "nuclear" decision-making processes, and this was quite of a shock to some institutions and experts, who were not well prepared for it. This development caused substantial conflicts and failures in the social siting of NT and greatly influenced the public's perceptions of the nuclear sector. The peaceful use of nuclear technology later led to the adoption in principle of the same standards of democratic decision-making. As this shift assumes interactive communication, it was actually the first step towards participation in decision-making procedures. Partner decision-making is probably one of the highest forms of deliberation democracy. It assumes that all actors, all interest groups, who will (may) be affected by a given decision, are included in the decision-making procedures.

Such a partnership model was used in siting a radioactive waste repository in Slovenia. Analytical and research monitoring of the operation of local partnerships, established in three municipalities, candidates to host a radioactive waste repository, quite clearly revealed that partnership is actually too high a standard. It is not surprising then, that the local partnerships extinguished or were abandoned even before the actual construction of a radioactive waste repository was started. It looks as if the decision-making space is again narrowing or closing. Research may not yet have

proven the following quite clearly, but it has become evident that many principles were adopted just “pro forma”, and that the real decision-making process occurred in a totally different way and mostly hidden from the public. The duplicated formal and informal procedures often make it look as if progress has been made in decision-making on NT, but in reality we are not getting anywhere and over and over again deal with the same “teething troubles”. In this respect it is highly probable that the siting of potential HLW repository will face many already recognised obstacles and that the experiences of siting LILW repository will not alleviate much this new, much more demanding sociotechnical procedure.

2.6 Evaluation of the public participation in siting decision making

Establishment of local partnership LP in 2006 on a local level was based on theoretical as well as practical domestic and foreign experiences with siting of risk objects in physical and social space. This was a positive measure aimed at increasing the trust between ARAO and local community. Establishment of LP advanced the process of inclusion of interested and potentially affected into more active decision making. **Nevertheless the key goal of LP, increased trust, was not achieved.** Analyses of experiences with LP (interviews with key actors and focus groups with inhabitants) showed, that the main sources of the failure are communication and procedural errors. Criticisms apply to state (governmental) but in great degree also to local representatives and institutions. Important finding is that distrust is mutual: ‘people’ do not trust neither political nor professional institutions, and they do not trust ‘people’, which – according to them – fight only for their material profit. Also more detailed comparison of local residents attitude toward construction of permanent RW storage before establishment of LP and after two years of its activity confirm this general estimation.

In spite of this critical finding we could on the basis of analysis of experiences with activity of LPs Krško and Brežice confirm sensibleness of LP design. Crucial is that organisation of LP itself will be legitimized, i.e. that all or at least great majority of interest groups will perceive LP as institution which in greatest possible degree enable argumentative confronting and decision making. The goal of LP will be achieved when the majority of active participants as well as passive public believe that for the LP activity the argumentative logic is the most important, i.e. achievement of understanding of the whole problem and not only establishment of the individual or particular groups interests.

Findings that should contribute to more efficient and legitimate establishment and work of a new local partnership:

1. Goals should have been not stated and formulated realistically. Current goals definition seems too ambitious or gives the impression of unreality because it involves almost all that could be mentioned under the concept ‘good partnership cooperation’, e.g. open dialog, active public, access to information, trust between partners, equality of all, respect for the other, etc. The final goal is consensually accepted permanent LILW repository. We suggest abandonment of otherwise quite common practice that in establishing documents declarative discourse is extensively used, forming the impression that political fiction is in play. We estimate that this presents counterproductive pose automatically triggering doubt in all that at least approximately know real social relationships. How hard is change achievement is well illustrated with comparison of situation analysis before LPs Krško and Brežice establishments and afterwards. Undoubtedly there were changes to better in certain degree also the

consequences of LP activity, but comparison shows that declared ideal goals were not achieved.

2. Accurate definition of procedural rules and sensibility of organisational structure for participatory inclusion of LP is needed. Although usually people are much more motivated for a discussion of substantial questions, accurateness and unambiguity of procedures is the best defence from comply that somebody misuse procedure or gain advantage because of interpretation of unclear rules in his favour. Organisational structure should be simple and clear as much as possible. Experiences show that too complex institutionalisation do not work because people simply have not enough time and energy to drive very complex organisational structure. This otherwise general finding is concrete and plastically confirmed by comparisons of experiences LP Krško and LP Brežice.
3. Equalisation of unequal positions do not lead to partnership relations. In concrete case tripartite structure is clear (state, local community, people), as well as inequality of three partners. That is why in establishing new partnership this should be taken into account, i.e. establish rules in such a way to empower the weakest participant, e.g. with positive discrimination. Partnership means also that decisions are not accepted by outvoting, appealing possibility in such tripartite organisations. Complain that this principle decrease possibility of efficient decision making is sometimes perhaps reasonable, but in many cases means only conducting a pressure to those that who do not agree.
4. Representativeness is crucial for legitimate activity of LP. Basic for representativeness is knowing and consideration of all groups of interest. It was found that one of the key unresolved or poorly solved questions is representation of those groups that live, or have property in the vicinity of the potential repository or are somehow differently more intensive connected to discussed space. If this question will not be solved adequately it will present constant source of problems. LILW repository could not be treated isolated from other existing or planned nuclear objects.
5. At first glance it seems that at least at local level spread of information already reached its maturity or even saturation, while analysis showed information flow is deficient. Particularly doubt in credibility of certain professional information and transparency of financial data are problematic. Partnership should react to complaints about low credibility of certain key information. This is crucial for achievement of legitimacy or trust in partners relationships. Beside classical especially local media in future it is sensible to use possibilities of two way communication offered by new technologies and media.
6. Rivalry between locally limited institutions is unproductive. Such a relationship is established 'automatically' and is not necessarily the consequence of planned activity. It is more a kind of a byproduct of activity of two organizations, working in the same area. It could be said that LP really work against establishment of partner's relationships and that existence of two rival institutions is not in accordance with partnership idea. On the other side concurency and possibility of comparison of partnerships activities sharpened images about more reasonable organisation of participatory settling of repository.
7. There are undoubtedly differences in a hierarchy of questions to be solved. Determination of their order should be one of the first. It seems that current practice caused discordance just at this point. Efficient operation demands legitimately accepted program of work. Only when consent about hierarchy and structure of problems is achieved it is reasonable to continue solving them. As long as this is not achieved it is not possible to talk about partnership, but more about informal negotiations between rival interest groups. It is not possible to establish partnership only on declarative level or formally, but only if minimal

consent is achieved about priority of problems. In our analysis we often find that in existing LP this consent was not achieved.

8. Establishment of partnership demands willingness for learning and knowledge of attitudes and interests of the partners. From this point of view learning on past experience is key demand necessary for new partnership establishment as well as inclusion of new knowledge in the process of participatory decision making. This demands open flexible organisational structure capable of including new element and taking into account new contextual factors. In a concrete case it is therefore reasonable taking into account experiences with construction and operation of NPP Krško and especially ideas about second bloc construction.
9. It should be considered that solving the problem of LILW repository is a part of a wider and very complex nuclear or energy problem. This means that even very complete local efforts for establishment of participative democracy could be useless if in the decision making arena very powerful overlocal, overnational interest groups are activated. This was and is already going on as a consequence of global energy problems.

3 Short summary of some remaining socio-technical challenges in RW siting

- More than fifty years the problem of RW remains unsolved in Slovenia. In last thirty years a lot of human energy was spent but very modest qualitative shift achieved, mainly due to the fact that those in power do not understand the nature and need for partnership and use it only formally for narrowly defined goal of ‘successful’ site selection. Because of that the trust among stakeholders (especially regulators and local public) is permanently low and any new attempt to solve the problem is very much “path dependant” i.e. accompanied with suspicion and disbelief due to past neglect of public opinion, attitudes and concerns.
- The socio-tech relations are best described as unproductive competitiveness (debate i.e. “de battere”) and not as dialog. Technical and governmental stakeholders still holds monopoly on discourse while psychological reactance on the side of public is developing. The experts are still the most trusted actors, but on general there is low trust in institutional, professional actors and it is continuing to drop. However, the battle to control the discourse on nuclear question is still open. There is weak or no synergy as result of established institutional “partnership” relations. Instead dichotomies like social vs. technical experts, politics, vs. civil society institutions (NGO), local vs. national interest groups are persisting. Mutual understanding is weak, different discourses and theoretical concepts are harming communication. Instead of developing communicative relations between stakeholders relying on instrumental communication public relations techniques is proliferating. (unproductive competitive decision making)
- Formal informal dichotomy in institutional arrangements and communication processes should be considered. Pro forma participative procedures and double speak are not alleviating deliberative decision making process. Abandonment of already established “local partnership cooperation” clearly showed that its institutionalization was considered as “pro forma” strategy only and not as substantially necessary form of cooperation in democratic relations between different groups. How to open the decision making process or how to include all “stakeholders” and assure participation permanency is still an open question. (decision-making (in)flexibility, elitist – participative oscillation)

- Although in decades a number of researches, studies, elaborations of the socio-tech relation in RW management were produced there exist quite weak accumulation of applied knowledge. Substantial part of the public remains uninformed, lack of knowledge is especially apparent in evaluating risk consequence of RW. On the other side technical experts are surprisingly “immune” to social construction of nuclear risks. In fact they still preserve prescient conception of social/behavioral sciences and rather mechanical knowledge of human society. This is reason of misunderstanding of the idea that social construction of NT is going beyond rational pragmatism. “Inhuman” time span of NT decay, enormous power, contribute to irrational social construction of NT (prevalent technical nuclear know-how / skills)
- At the local level the process of RW siting was increasingly motivated by rather high financial aspiration. In course of time the municipal representatives learned to use social, political psychological etc. sensitivity of NT to raise money, i.e. financial or “natural” (barter) compensations. Such “adaptation” to the long lasting process of RW siting contributed also to the expanded production of expertise which partly contribute to construction of the problems and not only to solving the problems. (regimes, roles, responsibilities)
- Failure of first “technocratic” RW siting process open space for more participatory “mixed mode” approach. But as soon as the location was adopted, the ideas that lay groups have no rights to participate in the decision making process are renewed. The common interpretation was that they only have the right to be informed. Modality of decision making process depends also on general image of NT on the global and national level. Oscillation between elitist and participative mode is recognized here as well. (See the classification in CARL - 2007 report). Such oscillation in the decision making process contributed to the fact that existing RW repository location is far from optimal. (regimes, roles, responsibilities)
- The siting of LILW lasted decades and the process is still not accomplished. In this respect siting of geological disposal for high level spent fuel seems paramount problem. There are some formal documents dealing with this problem but there is no discussion on HLW not even at the expert level. It looks like that responsible institutions rely on so far not yet existing international solution. The explanation is that disposal for relatively small quantity of HLW produced in Slovenia is not rational at all. This attitude could be summarized as: the HLW is “too big problem to fail”, but Slovenia RW production is “too small to act”.

Socio-technical issues	Slovenia
Regimes, roles, responsibilities	X
Definition of waste	
Options: flexibility/path dependency	X
International solution	X
Decision-making (in)flexibility,	X

Site selection process / criteria	
Energy policy / inventory / reproc?	
Reversibility / retrievability (GDF)	
Nuclear know-how / technical skills only prevalent	
Stakeholder engagement with R&D	X
Safety case	
Design / construction challenges	
Societal memory	X

Table 2

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Appendix 1

(1) Legislative and Regulatory Framework

The main Act of the Republic of Slovenia in this area is the Ionising Radiation Protection and Nuclear Safety Act (the 2002 Act, see Addenda 4 to the Report) which regulates also radioactive waste and spent fuel management. The Act was amended in 2003 and 2004. Next amendment of the Act is foreseen in the middle of 2011. The 2011 amendments will not bring any significant changes in the area of radioactive waste and spent fuel management.

On 6 March 2006 the Minister of the Environment and Spatial Planning adopted the Rules on Radioactive Waste and Spent Fuel Management.

On 1 February 2006 the Parliament of the Republic of Slovenia passed the Resolution on the 2006-2015 National Programme for Managing Radioactive Waste and Spent Nuclear Fuel (Official Gazette RS, No. 15/2006). The Programme for managing radioactive waste and spent fuel is a part of the National Environment Protection Programme and sets goals and tasks in the field of radioactive waste and spent nuclear fuel management.

The resolution foresees general timelines and financing for activities related to radioactive waste and spent fuel management for all radiation and nuclear facilities. The resolution foresees the construction of a repository for LILW with the capacity to satisfy the needs of the Slovenian part of LILW generated in the operation and decommissioning of the Krško NPP and for the disposal of waste of all other Slovenian waste generators. In parallel the resolution requests provision of technical possibility for the construction of a full-capacity repository for all waste from the Krško NPP, if appropriate agreement with the Republic of Croatia on a joint solution of this issue is reached.

(2i) National Safety Requirements and Regulations for Radiation Safety

In addition to the main principles (among others also "justification", "optimisation", "ALARA" and "prime responsibility for safety" principles), the 2002 Act also includes, with respect to radiation protection areas, provisions on:

- reporting an intention to carry out radiation practices or to use a radiation source,
- licensing of the radiation practices or use of a radiation source,
- general principles on protection of people against ionising radiation,
- classification of facilities (nuclear, radiation and less important radiation facilities),
- licensing procedures with respect to siting, construction, trial operation, operation and decommissioning of nuclear, radiation and less important radiation facilities,
- radioactive contamination and intervention measures,
- radioactive waste and spent fuel management,
- import, export and transit of nuclear and radioactive materials, radioactive waste and spent fuel,
- physical protection of nuclear materials and facilities,
- non-proliferation and safeguards,

- administrative tasks and inspection,
- penal provisions.

Based on the 2002 Act seven decrees have been adopted and issued by the Government and twenty-one rules have been adopted and issued by the competent Ministers. Three more second-level acts are in the process of adoption. In the period since the third report under the Convention the following decrees and rules have been adopted:

- Decree on safeguarding of nuclear materials,
- Decree amending the Decree on the criteria for the determination of the compensatory amount due to the limited use of the environment in the area of a nuclear facility,
- Decree amending the Decree on the implementation of Council Regulations (EC) and Commission Regulations (EC) on the radioactive contamination of foodstuffs and feedstuffs,
- Rules on radiation and nuclear safety factors,
- Rules on operational safety of radiation and nuclear facilities,
- Rules amending the rules on the monitoring of radioactivity,
- Rules on transboundary shipments of radioactive waste and spent fuel,
- Rules on the transboundary shipment of nuclear and radioactive substances,
- Rules on the use of potassium iodine.

The Slovenian legislation is based on broadly accepted international standards. Furthermore all the European Union directives from the field of radiation and nuclear safety have been completely transposed into Slovenian legislation.

Within the legislative and regulatory framework, which covers spent fuel and radioactive waste management, the following decrees and acts should be mentioned:

- Decree on Establishment of a Public Agency for Radwaste Management,
- Decree on the Method and Subject of and Conditions for Performing a Public Utility Service of Radioactive Waste Management,
- Act Governing the Fund for Financing Decommissioning of the Krško Nuclear Power Plant and Disposal of Radioactive Waste from the Krško NPP,
- Permanent Cessation of Exploitation of the Uranium Ore and Prevention of Consequences of the Mining in the Uranium Mine at Žirovski vrh Act.

(2ii) Licensing System

A system of licensing of spent fuel and radioactive waste management is provided in the 2002 Act, while Rules on radiation and nuclear safety factors lay down details on documentation which must be submitted in particular phase of licensing. The prescribed licensing process is of general nature, thus it is applicable to whole spectra of nuclear and radiation facilities.

The basic classification of facilities is provided by the Act itself, where in definition No. 22 of Article 3 it provides that a nuclear facility is "... a facility for the processing or enrichment of nuclear materials or the production of nuclear fuels, a nuclear reactor in critical or sub-critical assembly, a research reactor, a nuclear power plant and heating plant, a facility for storing, processing and disposal of nuclear fuel or high radioactive waste, a facility for storing, processing or disposal of low and

intermediate radioactive waste". Therefore the entire spectrum of licensing requirements (for siting, construction, trial operation, operation, decommissioning, and/or closure of the repository) has to be taken by the applicant (investor or operator of the facility) in accordance with provisions of 2002 Act and of Rules on radiation and nuclear safety factors.

An investor planning to construct a radiation or nuclear facility shall compile and submit in application for the facility among other the following principal documents demonstrating nuclear and radiation safety:

- The special safety analysis in the procedure of approval of the national spatial plan;
- The environment impact assessment in the procedure of approval of the use of land;
- The safety analysis report in procedure for approval of construction.

General requirements for the design basis for a radioactive waste or spent-fuel storage facility and for a radioactive waste or spent-fuel repository are laid down in Rules on radiation and nuclear safety factors.

In the licensing processes the investor/operator shall attach to the license application, in addition to the design documentation, a Safety Analysis Report, and the opinion of an authorised radiation and nuclear safety expert (authorised by the SNSA) and other prescribed documentation set by Rules on radiation and nuclear safety factors.

In the subsequent licensing processes (for approval of trial operation, operation, decommissioning or closure of facility) the licensee has to submit above described application containing appropriately amended set of documents and opinions. The operating experience and feed back, and modifications of facility have to be clearly documented and described.

General provisions and responsibilities of the holder of the radioactive waste and spent fuel (as well as of the State) are defined in section 4.8. - "Radioactive waste and spent fuel management" of the 2002 Act. The 2002 Act (Articles 93 to 99) contains the following provisions:

- on radioactive waste and spent fuel management,
- on the national public utility service for radioactive waste management,
- on the national public utility service for the disposal of waste from energy producing nuclear facilities,
- on repositories of mining and hydro-metallurgical tailings,
- on national public utility institutions,
- on the national programme of radioactive waste and spent fuel management,
- on national infrastructure facilities.

On the basis of the provisions of the 2002 Act, the Rules on Radioactive Waste and Spent Fuel Management were adopted. The Rules (see Addenda 5 of the Report) contains inter alia the following provisions:

- on classification of radioactive waste with regard to the aggregation state, the level and type of radioactivity,
- on requirements for radioactive waste and spent fuel management (general requirements – radioactive waste or spent fuel management procedures, programmes, plans; special requirements – sorting, treatment and packing, labelling, keeping, storing, decay-keeping, handover and takeover, reshuffling, liquid and gaseous radioactive waste releasing, disposal,

acceptance criteria for storage or disposal, waste from exploitation and reprocessing of raw nuclear mineral material, very low level radioactive waste management),

- on recording and reporting (holder's records, central records, reporting, loss and findings).

The Decree on the Method and Subject of and Conditions for Performing a Public Utility Service of Radioactive Waste Management contains beside others the following provisions:

- on the scope and type of public service,
- on general requirements of discharging the public service,
- on requirements which have to be fulfilled by the performer of the public service,
- on the rights and duties of the use of the public service,
- on financial sources and the method of establishing the price,
- on inspection.

The public commercial institution for radioactive waste referred to in Article 97 of the 2002 Act was established already in 1991 as the ARAO (Governmental Decree on Establishment of a Public Agency for Radwaste Management).

(2iii) System of Prohibition of the Operation of a Spent Fuel or Radioactive Waste Management Facility without a License

The spent fuel and radioactive waste management facilities are defined by the 2002 Act as nuclear facilities. Consequently, all relevant licenses are needed, including the operating license. Operation of such a facility without a license is prohibited according to Article 57 of the same Act.

In the penal provisions of the 2002 Act it is foreseen that a financial penalty between 250 and 375,000 EUR shall be imposed on the legal entity which violates the above stated prohibition; in addition to this a financial penalty between 125 and 12,500 EUR shall be imposed on any responsible person appointed by a legal entity for the same violation. If the violation is committed by a sole trader, a financial penalty between 1,250 and 187,500 EUR shall be imposed on him.

(2iv) System of Appropriate Institutional Control, Regulatory Inspection, and Documentation and Reporting

Institutional control and regulatory inspection with respect to safety of spent fuel and radioactive waste management rests with the SNSA. Within the scope of inspection an inspector may:

- issue decisions and orders within the framework of administrative proceedings,
- order measures for radiation protection and measures for radiation and nuclear safety to assure that the licensee fulfils all legal requirements regarding the safety,
- order to terminate radiation practices or use of a radiation source in the case the inspector finds that a proper license has not been issued, or if there is a failure in following the prescribed methods for handling the radiation source or radioactive waste. An appeal against such a decision of an inspector shall not hinder its execution.

The 2002 Act has only one article on inspection, since the Inspection Act prescribes the general principles of inspection, its organisation, status, the rights and duties of inspectors, inspection measures and other issues relating to inspection, which is to be followed also by nuclear and radiation safety inspectors.

(2v) The Enforcement of Applicable Regulations and of the Terms of the Licenses

The enforcement of applicable regulations and of the terms of the licenses is ensured by the application of penal provisions, inspection and provisions related to the issuing, renewal, amendment, withdrawal and expiration of licenses, as provided for in the 2002 Act.

Based on the Inspection Act, as well as on the 2002 Act, a graded approach in enforcement policy is ensured. The inspector may (if by his/her assessment such a measure is sufficient and appropriate) only warn the licensee about the irregularities and set a date (period) for corrective measures to be carried out. The inspector may also (among other measures) perform all measures in line with the Minor Offences Act, or report (in the case of a criminal offence) the licensee to the public prosecutor.

The inspector may also terminate radiation practice or use of radiation source (if the operator operates without the license), but may not revoke or suspend the license. This can be done by the authority which has issued the license (in most cases the SNSA); however, the inspector may propose such a measure.

(2vi) Allocation of Responsibilities

As described above, the legislative framework (the 2002 Act, the Decree on the Method and Subject of and Conditions for Performing a Public Utility Service of Radioactive Waste Management and the Rules on Radioactive Waste and Spent Fuel Management) provides a clear allocation of responsibilities of the bodies involved in the different steps of regulating the spent fuel and radioactive waste management (producer, holder, mandatory state-owned public services, regulatory body) and also defines the system of recording and reporting.

References to National Acts, Regulations, Requirements, Guidelines, etc.

Besides the 2002 Nuclear Act (Law on protection against ionizing radiation and nuclear safety) other Acts and regulations stated below should also be mentioned.

Nuclear and Radiation Safety, Physical Protection, Safeguards, Quality Assurance

On the basis of the 2002 Act, the following decrees and regulations for carrying into effect radiation protection and nuclear safety provisions are in force:

- Rules on the Specialist Council on Radiation and Nuclear Safety (Official Gazette RS, No. 35/2003),
- Rules on Functioning of the Expert Council for the Issues of Ionising Radiation Protection, Radiological Activities, and the Use of Radiation Sources in Human and Veterinary Medicine (Official Gazette RS, No. 62/2003),

- Rules on the Requirements of Using Ionising Radiation Sources in Healthcare (Official Gazette RS, No. 111/2003),
- Rules on the Requirements and Methodology of Dose Assessment for the Radiation Protection of the Population and Exposed Workers (Official Gazette RS, No. 115/2003),
- Rules on Health Surveillance of Exposed Workers (Official Gazette RS, No. 2/2004),
- Rules on the Obligations of the Person Carrying Out a Radiation Practice and Person Possessing an Ionising Radiation Source (Official Gazette RS, No. 13/2004),
- Rules on Approving of Experts Performing Professional Tasks in the Field of Ionising Radiation (Official Gazette RS, No. 18/2004),
- Rules on the Method of Keeping Records of Personal Doses Due to Exposure to Ionising Radiation (Official Gazette RS, No. 33/2004),
- Decree on the Areas of Limited Use of Space Due to a Nuclear Facility and the Conditions of Facility Construction in these Areas (Official Gazette RS, No. 36/2004 and 103/2006),
- Decree on Activities Involving Radiation (Official Gazette RS, No. 48/2004 and 9/2006),
- Decree on Dose Limits, Radioactive Contamination and Intervention Levels (Official Gazette RS, No. 49/2004),
- Rules on Inputs from and Outputs in the EU Member States and on Import and Export of Radioactive Waste (Official Gazette RS, No. 60/2004 and 80/2005),
- Rules on the Conditions to be Met by Primary Health Care Centres for Breast (Official Gazette RS, No. 110/2004),
- Rules on Physical Protection of Nuclear Materials, Nuclear Facilities and Radiation Facilities (Official Gazette RS, No. 31/2005),
- Rules on the Conditions for Workers Who Carry out Physical Protection of Nuclear Materials, Nuclear Facilities or Radiation Facilities and on the Conditions for Workers Who have Access to Nuclear Materials as well as on other Conditions with Respect to Physical Protection (Official Gazette RS, No. 36/2005 and 64/2005),
- Regulation on Conditions to be Fulfilled by Workers Performing Safety-Significant Tasks at Nuclear or Radiation Facilities (Official Gazette RS, No. 74/2005),
- Program on Systematic Monitoring of Working and Residential Environment and Raising Awareness about Measures to Reduce Public Exposure Due to the Presence of Natural Radiation Sources (Official Gazette RS, No. 17/2006),
- Rules on the Use of Radiation Sources and on Activities Involving Radiation (Official Gazette RS, No. 27/2006),
- Rules on Radioactive Waste and Spent Fuel Management (Official Gazette RS, No. 49/2006),
- Rules on Authorised Experts on Radiation and Nuclear Safety (Official Gazette RS, No. 51/2006),
- Decree on the implementation of Council Regulations (EC) and Commission Regulations (EC) on the radioactive contamination of foodstuffs and feedstuffs (Official Gazette RS, No. 52/2006 and 38/2010),
- Rules on the Monitoring of Radioactivity (Official Gazette RS, No. 20/2007 and 97/2009),
- Decree on Safeguarding of Nuclear Materials (Official Gazette RS, No. 34/2008),
- Decree on Checking the Radioactivity for Shipments of Metal Scrap (Official Gazette RS, No. 84/2007),
- Rules on the transboundary shipment of nuclear and radioactive substances (Official Gazette RS, No. 75/2008),

- Rules on transboundary shipments of radioactive waste and spent fuel (Official Gazette RS, No. 22/2009),
- Rules on operational safety of radiation and nuclear facilities (Official Gazette RS, No. 85/2009),
- Rules on radiation and nuclear safety factors (Official Gazette RS, No. 92/2009),
- Rules on the use of potassium iodine (Official Gazette RS, No. 59/2010).

On the basis of the 1984 Act, the following regulation for carrying into effect radiation protection and nuclear safety provisions is still in force:

- On Maximum Permitted Levels of Radioactive Contamination of Human Environment and on Decontamination (Official Gazette SFRY, No. 8/87, 27/90), **Regulation Z-9** – approximately half of the provisions of the regulation have been derogated, the other half are still in force

Third Party Nuclear Liability

- Act on Liability for Nuclear Damage (Official Gazette RS, No. 77/2010),
- Ordinance on determining the persons to whom the conclusion of the insurance of liability for nuclear damage is not obligatory (Official Gazette RS, No. 110/2010),
- Third Party Liability for Nuclear Damage Act (Official Gazette SFRY, No. 22/78 and 34/79) - The Act shall cease to apply on the day Act on Liability for Nuclear Damage enters into force (4 April 2011), except the provision of Article 20 which shall apply until a full application of the Act on Liability for Nuclear Damage,
- Act on Insurance for Nuclear Damage Liability (Official Gazette RS, No. 12/80 and 17/91) - The Act shall cease to apply on the day Act on Liability for Nuclear Damage enters into force (4 April 2011)
- Decree on Establishment of the Amount of Limited Operator's Liability for Nuclear Damage and on Establishment of the Amount of Insurance for Liability for Nuclear Damage (Official Gazette RS, No. 110/2001) – The Decree shall apply until a full application of the Act on Liability for Nuclear Damage.

Civil Protection and Disaster Relief

- Protection Against Natural and Other Disasters Act (consolidated text - Official Gazette RS, No. 51/2006 and 97/2010),
- Decree on the Contents and Drawing up of Protection and Rescue Plans (Official Gazette RS, No. 3/2002, 17/2002 and 76/2008).

Administrative

- Public Administration Act (consolidated text - Official Gazette RS, No. 113/2005, 126/2007 and 48/2009),
- Inspection Act (consolidated text - Official Gazette RS, No. 43/2007),
- General Administrative Procedure Act (consolidated text - Official Gazette RS, 24/2006, 126/2007, 65/2008, 47/2009 and 8/2010).

Energy and Environmental

- Energy Act (consolidated text - Official Gazette RS, No. 27/2007, 70/2008 and 22/2010),
- Decree on the Transformation of the Krško NPP, p.o. into the Public Limited Company NPP Krško, d.o.o. (Official Gazette RS, No. 54/98, 57/98, 59/2002 and 10/2003),
- Environment Protection Act (consolidated text - Official Gazette RS, No. 39/2006, 49/2006, 66/2006, 112/2006, 33/2007, 57/2008, 70/2008 and 108/2009),
- Decree on the Categories of Activities for which an Environmental Impact Assessment is Mandatory (Official Gazette RS, No. 78/2006 and 32/2009),
- Decree on the Criteria for the Determination of the Compensatory Amount due to the Limited Use of the Environment in the Area of a Nuclear Facility (Official Gazette RS, No. 134/2003 and 100/2008),
- Instruction on the Methodology of Preparing Reports on Environmental Impact (Official Gazette RS, No. 70/96),
- Permanent Cessation of Exploitation of the Uranium Ore and Prevention of Consequences of the Mining in the Uranium Mine at Žirovski vrh Act (consolidated text - Official Gazette, RS, No. 22/2006),
- Decree Determining the Area and of the Compensatory Amount due to the Limited Use of the Environment in the Area of Žirovski vrh Uranium Mine (Official Gazette RS, No. 22/2008 and 50/2009),
- Fund for Financing Decommissioning of the Krško Nuclear Power Plant Krško and Disposal of Radioactive Waste from the Krško NPP Act (consolidated text - Official Gazette RS, No. 47/2003 and 68/2008).

Transport, Export and Import

- Act on Transport of Dangerous Goods (consolidated text - Official Gazette RS, No. 33/2006, 41/2009 and 97/2010),
- Decision on the publication of Amendments to Annexes A and B of the European Agreement Concerning the International Carriage of Dangerous Goods by Road (ADR; Official Gazette RS, No. 9/2003, 66/2003, 9/2005, 9/2007, 125/2008 and 97/2010).

Export of dual-use items

- Act Regulating the Exports of Dual-Use Goods (Official Gazette RS, No. 37/2004 and 8/2010),
- Regulation on procedures for issuing authorisations and certificates and on competence of the Commission for the control of exports of dual-use items (Official Gazette RS, No. 34/2010),
- Decree on restrictive measures against Iran and on implementation of Council Regulation (EU) No 961/2010.

General

- Decree on Administrative Authorities within Ministries (Official Gazette RS, No. 58/2003, 45/2004, 86/2004, 138/2004, 52/2005, 82/2005, 17/2006, 76/2006, 132/2006, 41/2007 and 64/2008, 63/2009 and 69/2010),
- Maritime Code (consolidated text - Official Gazette RS, No. 120/2006 and 88/2010),
- The Criminal Code (Official Gazette RS, No. 55/2008, 39/2009 and 55/2009),
- Minor Offences Act (consolidated text - Official Gazette RS, No. 3/2007, 29/2007, 58/2007, 16/2008, 17/2008 and 76/2008, 108/2009, 109/2009 and 45/2010),
- Spatial Planning Act (Official Gazette RS, No. 33/2007, 108/2009 and 80/2010),
- Construction Act (consolidated text - Official Gazette RS, No. 102/2004, 92/2005, 93/2005, 111/2005, 120/2006, 126/2007, 57/2009, 108/2009 and 61/2010),
- Decree on Establishment of a Public Agency for Radwaste Management (Official Gazette RS, No. 5/91, 45/96, 32/99, 38/2001, 41/2004 and 113/2009),
- Decree on the Method and Subject of and Conditions for Performing a Public Utility Service of Radioactive Waste Management (Official Gazette RS, No. 32/99 and 41/2004),
- Standardisation Act (Official Gazette RS, No. 59/99).

Multilateral and Bilateral Treaties, Conventions, Agreements/ Arrangements

Based on the Constitution of the Republic of Slovenia all announced and ratified international treaties also constitute an integral part of the Slovenian legislation and can be applied directly. The following international instruments to which the Republic of Slovenia is a party should be mentioned:

Multilateral Agreements

- Statute of the International Atomic Energy Agency (including the Amendment of Article VI and XIV),
- Agreement on the Privileges and Immunities of the International Atomic Energy Agency,
- Convention on the Physical Protection of Nuclear Material,
- Convention on Early Notification of a Nuclear Accident,
- Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency,
- Convention on Nuclear Safety,
- Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water,
- Treaty on the Non-proliferation of Nuclear Weapons,
- Treaty on the Prohibition of the Emplacement of Nuclear Weapons and other Weapons of Mass Destruction in the Sea-Bed and the Ocean Floor,
- European Agreement Concerning the International Carriage of Dangerous Goods by Road (ADR),
- Convention on International Railway Carriage (COTIF) including Appendix B (RID),

- Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management,
- Comprehensive Nuclear-Test-Ban Treaty,
- Convention on Third Party Liability in the Field of Nuclear Energy of 29 July 1960, as Amended by the Additional Protocol of 28 January 1964 and by the Protocol of 16 November 1982,
- Convention of 31 January 1963 Supplementary to the Paris Convention of 29 July 1960, as Amended by the Additional Protocol of 28 January 1964 and by the Protocol of 16 November 1982,
- Joint Protocol Relating to the Application of the Vienna Convention and the Paris Convention,
- Agreement between the Kingdom of Belgium, the Kingdom of Denmark, the Federal Republic of Germany, Ireland, the Italian Republic, the Grand Duchy of Luxembourg, the Kingdom of the Netherlands, the European Atomic Energy Community and the International Atomic Energy Agency in Implementation of Article III, (1) and (4) of the Treaty on the Non-Proliferation of Nuclear Weapons,
- Protocol Additional to the Agreement between the Republic of Austria, the Kingdom of Belgium, the Kingdom of Denmark, the Republic of Finland, the Federal Republic of Germany, the Hellenic Republic, Ireland, the Italian Republic, the Grand Duchy of Luxembourg, the Kingdom of the Netherlands, the Portuguese Republic, the Kingdom of Spain, the Kingdom of Sweden, the European Atomic Energy Community and the International Atomic Energy Agency in implementation of Article III, (1) and (4) of the Treaty on the Non-Proliferation of Nuclear Weapons.