ENVIRONMENT AGENCY AUSTRIA umweltbundesamt

Proposal of the National Energy Programme of Slovenia

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Bilateral Consultation

ENVIRONMENT AGENCY AUSTRIA umweltbundesamt

REPORT ON THE TECHNICAL CONSULTATION ON THE PROPOSAL OF THE NATIONAL ENERGY PROGRAMME OF THE REPUBLIC OF SLOVENIA FOR THE 2010–2030 PERIOD

10–11 November 2011 in Ljubljana

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1 INTRODUCTION

On behalf of the Republic of Slovenia the Slovenian Ministry of Economy has developed a draft proposal for a National Energy Programme for the 2010–2030 Period ("Active Energy Management").

The Republic of Slovenia has notified the draft proposal for the National Energy Programme according to Art. 10 of the Protocol on Strategic Environmental Assessment (SEA-protocol) to the Convention on Environmental Impact Assessment in a Trans-boundary Context (Espoo-Convention) and according to Art. 7 of Directive 2001/42/EC of the European Parliament and of the Council on the Assessment of the effects of certain plans and programmes on the environment.

Two main documents describe the Slovenian National Energy Programme:

- Proposal of the National Energy Programme of the Republic of Slovenia for the 2010–2030 Period: "Active Energy Management", draft, June 2, 2011 (DRAFT NEP PROPSAL 2011).
- Environmental Report for the Comprehensive Assessment of Environmental Impacts for the National Energy Programme (for the 2010–2030 period), June 2011 (ER 2011).

The Republic of Austria, represented by the Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management, has been participating in the trans-boundary process according to the SEA-protocol and to Art. 7 of Directive 2001/42/EC due to possible significant impacts on its environment, caused by the implementation of the planned NEP. In particular, the nuclear part of the draft NEP can lead to nuclear events or severe accidents with significant impacts on the population and the environment of the Republic of Austria.

The Austrian Energy Agency was commissioned by the Federal Environment Office – on behalf of the Ministry of Agriculture, Forestry, Environment and Water Management – to prepare an expert statement on the draft National Energy Programme of the Republic of Slovenia. This expert statement focuses in particular on the nuclear relevant aspects of the draft National Energy Programme and was presented to the Slovenian Ministry of Economy.

Following the presentation of the expert statement, a bilateral consultation was held in Ljubljana on November 10–11, 2011. On behalf of the Federal Ministry of Agriculture, Forestry, Environment and Water Management (BMLFUW) the Austrian Energy Agency, under the project leadership of the Federal Environment Office, created this consultation report on the draft National Energy Programme of the Republic of Slovenia.

The document at hand provides a summary of the questions and the replies from the Slovenian side as well as the final recommendations from the Republic of Austria, represented by the Federal Ministry of Agriculture, Forestry, Environment and Water Management of Austria. The detailed written replies are summarised in the Annex to the Minutes of the technical consultation.

2 OPENING AND PRESENTATIONS

Mr. Peter Gašperšič, State Secretary, Ministry of Environment and Spatial Planning**,** welcomed the participants and thanked Austria for the good cooperation in transboundary cases. Mr. Johannes Kresbach, Espoo Contact Point in the Federal Ministry of Agriculture, Forestry, Environment and Water Management welcomed the participants on behalf of the Austrian delegation. He also thanked Slovenia for the good cooperation in many transboundary cases, early notification and submission of information on the Strategic Environmental Assessment (SEA) and the draft NEP.

Ms. Andreja Urbančič (Institut Jožef Štefan) presented the draft NEP-proposals. Following this presentation, Mr. Andreas Molin and Mr. Stephan Renner pointed out the lack of alternative scenarios in the draft NEP-programme, especially the lack of a scenario without lifetime extension of Krško NPP. Mr. Radovan Tavzes (Private consultant) then presented the contents of the Environmental Report for the Strategic Environmental Assessment of the draft NEP and emphasised the importance of the goals of the draft NEP-proposals.

Following the opening, the questions that were raised by the expert statement were discussed.

3 ENERGY-ECONOMIC ISSUES

3.1 Energy policy targets

Question 1a and 1b

Which are the reasons for Slovenia not reaching several targets, which were defined in the existing energy policy strategies?

How can it be ensured that the new targets will be reached, specifically for energy efficiency and RES?

Background

In the draft NEP-programme it was argued that in 2008, on average, less than half of the final energy savings proposed in the National Energy Efficiency Action Plan (NEEAP) plan were achieved, which was developed according to Directive 2006/32/EC. In 2008, the energy-intensive use of primary energy was still 54% higher in comparison to the EU-27-levels. According to Directive 2009/28/EC, Slovenia needs to increase its RES share in its gross final energy consumption from 16% in 2005 to 25% in 2020. However, in 2008, the share of RES in the gross final energy consumption amounted to 14.9% and the share of RES has actually decreased from 2005 to 2008 by 1.1%.

Slovenian reply

Slovenia argues that most EU goals have been reached and Slovenia is on track. However, some problems remain and some national targets have not been reached. The reason for that is the late beginning of the implementation of some measures. The introductory remarks in the draft NEP-programme are outdated. In the final version of the draft NEP-programme the chapter on reaching the targets will be amended according to new statistics from 2009 and 2010. No information was given regarding progress in reaching the binding RES target of Directive 2009/28/EC.

Final recommendation

It is recommended to increase the share of RES in its gross final energy consumption from 16% in 2005 to 25% in 2020 as demanded by Directive 2009/28/EC.

3.2 Objectives of the National Energy Programme

Question 2a

Until which year should the operational lifetime of Krško NPP be extended?

Slovenian reply

It is foreseen to extend the operational lifetime of Krško NPP for 20 years until 2043. A decision on the continuation of its operation will depend on favourable outcomes of the Periodic Safety Reviews which are conducted every ten years. According to international and EU recommendations, the operational lifetime extension of Krško NPP will be a matter of EIA, and Austria would get more technical information during an Environmental Impact Assessment (EIA). It is argued that an impact assessment is also of benefit for Slovenia.

Final recommendation

It is welcomed that a possible extension of the operational lifetime of Krško NPP will be a matter of EIA. However, already the NEP programme should survey additional scenarios that also consider a shutdown of Krško NPP at the end of its originally planned lifetime and a replacement of its capacity by an alternative power generation mix.

Question 2b

Which potential of energy efficiency measures and the use of RES will be exploited with the measures in the different scenarios and which technical and economically feasible potential remains unexploited?

What factors are affecting the decision on the new NPP (mentioned in NEP)

Why is there no scenario without nuclear option?

Background

The draft NEP proposal contains an incomplete comparison of supply scenarios for electric energy and the key options of energy supply. Scenarios abandoning nuclear generation in the medium and long-term are lacking. There are at least two important scenarios missing in the draft NEP proposal:

- A non-nuclear based scenario, with the shutdown of Krško NPP until 2023 and the replacement of its capacity by RES and conventional high efficient fossil fuelled power plants for CHP.
- A scenario with an early shutdown of Krško NPP before 2020.

Slovenian Reply

For Slovenia, there is no reason to open the question of not extending the operational lifetime of Krško NPP. If there are no technical difficulties and safety problems, there is no reason not to grant extension of lifetime. It is the decision of the owner of the Krško NPP to propose an expansion of lifetime, and the decision will be taken in spring 2012. The scenarios were prepared before Fukushima, but also since then no alternative options came up.

In all scenarios of NEP, based on the intensive strategy, the expected effects for RES and energy efficiency by 2030 are:

- Electricity savings of the order of 2,1 TWh relative to scenario without additional policies and measures;
- Additional 4,6 TWh from distributed electricity generation units based on RES or high efficient CHP;
- Additional 2,6 TWh from large scale hydro power plants (560 MWe);
- Additional 0,9 TWh of electricity from large scale highly efficient CHP.

Final recommendation

The draft NEP should include an additional scenario that considers a shutdown of Krško NPP at the end of its originally planned lifetime and a replacement of its capacity by an alternative generation-mix.

3.3 Extension of hydropower

Additional question during technical consultation

What is the timeframe for the expansion of hydropower at the Mura River? How can be guaranteed that the environmental status of the protected area will be preserved?

Background

The draft NEP-proposal foresees the utilisation of the Mura River – the border section with Austria to the motorway bridge at Vučja vs on the inner Mura (total power from 1.5 MW to 55 MW depending on the environmental suitability by 2030).

Reply by Slovenia

The total technical potential is around 200 MW. However, possible are around 1.5 MW to 55 MW from the border at Ceršak to highway bridge Vučja vas. At this stage it can not be defined how many power plants will be realised. The current timeframe is 2018–2030 for realising the projects. For the borderline Mura there is currently no planning, for one plant the planning has started but this is not on the border to Austria.

All protected areas in both sides of the borders will be taken into account in SEA and the habitat directive assessment process. A state spatial plan will be developed for these projects; a Commission has already been established and will serve as a common body for trans-border discussions to reach common goals in border area. For Slovenia it is important to reach common understanding and joint decisions with Austria.

Final recommendation

It is recommended to continue with the trans-border discussions to reach common goals in the border area.

3.4 The Slovenian electricity market and electricity exports

Question 3a

How will it be ensured that the enhancement of transmission capacities to neighbouring countries will be financed by the beneficiaries of these measures, which are the electricity exporting companies?

Background

The main beneficiary of an expansion in the nuclear capacity will be the state-owned utility GEN-Energija. Increasing the market share in electricity capacity will, however, massively distort the regional electricity market. Moreover, large investments into the transmission capacities to the neighbouring countries, especially Hungary and Italy, are necessary.

Slovenian Reply

No additional lines will be built with the exception of those that are already planned.

The draft NEP includes all necessary measures to charge electricity producers with a part of the costs of operation/construction of the electricity transmission and distribution networks (except for RES and high efficient CHP), proportional to the size of production unit. The necessary legislative acts that need to be adopted are included in the draft NEP.

These producers shall bear particularly the following costs:

- All disproportionate costs caused to the system, particularly the costs of providing system services and network related costs;
- Costs related to additional reserve capacities: according to the draft NEP, transmission system operator (TSO) may impose an obligation to project holders to provide for the tertiary control reserve, while taking into consideration the disproportionate costs incurred by the unit for the system;
- The costs of interconnectors to the existing network are part of the power plant construction projects, both organisationally and financially.

Question 3b

What are the expected investment requirements into the transmission grid? Which investments into the transmission grid would become unnecessary if Krško NPP2 were not constructed?

Background

Krško NPP2 will be a power plant exclusively or at least mainly used for electricity export. Large investments into the transmission capacities to the neighbouring countries, especially Hungary and Italy, are necessary.

Slovenian Reply

The priorities for further development of the electricity transmission network in Slovenia are

- a construction of internal connections (completion of an internal loop to a 400-kV network by installing the Beričevo– Krško power line),
- strengthened connections with neighbouring countries (Hungary and Italy),
- strengthening of the 110-kV network due to expected growth of decentralized electricity production.

The connection with Hungary and enhanced connection with Italy are not interlinked and not conditioned with construction of the Krško NPP2. The connection with Italy (Udine Ovest (IT) – Okroglo (SI)) is one of the Trans-European Energy Networks projects.

Final recommendation

It is recommended to base a National Energy Programme on domestic energy demand and not deliver a strategy to increase the electricity exports of one single state-owned utility.

Question 3c and 3d

Which generation capacities would be sufficient for Slovenia if the National Energy Programme did not intend to increase electricity exports?

Which share of the new NPP's electricity production would be exported?

Background

The draft NEP-programme assumes an increase in electricity consumption from around 11.7 TWh in 2010 to around 14.2 TWh in 2030. However, in the intensive scenario (which favours the efficient and local use of energy) energy generation will increase up to 21.8 TWh in 2030 and in the intensive nuclear scenario it will increase dramatically up to 29.7 TWh in 2030. NPP2 will therefore mainly be constructed in order to export electricity. Already today Slovenia is the 6th largest electricity exporting country in the EU and exports between 2 and 3 TWh. The estimated annual electricity export in 2030 will range from 7.6 TWh (BS INT scenario) to 10.2 TWh (NS INT). This is more than the overall production of the planned Krško NPP2 with an annual production of about 7.8 TWh.

Reply by the Slovenian Ministry

There have been discussions within Slovenia how capacities should be expanded. At the moment Slovenia has a favourable energy mix. However, building Krško NPP2 is not an export strategy but a diversification strategy with the side effect of having overcapacity at least for the period, in which both NPP (Krško NPP1 and Krško NPP2) will be in operation. The Slovenian power system is relatively small sized. Therefore, an orientation towards adequate diversification of energy mix for electricity generation (sources, locations and technologies) results in excess capacities in certain transition periods. If nuclear electricity generation should be continued in Slovenia, then there is a need to build at least a 1000 MW reactor because there are currently no smaller units on the market.

The Slovenian electricity exports are only a statistic value because half of the electricity generated in Krško NPP is owned by Croatia. Thus in reality Slovenia is an importer of electricity. Apart from this, however, in a common European energy market the national demand is not a relevant category.

There are no state subsidies to the current Krško NPP. Regarding Krško NPP2, Slovenia will probably not be able to pay for it of its own but have to look for a strategic investor. In any case, it is the intention that Krško NPP2 will be built by a private company and there is no intention that a state-owned company builds the reactor.

Final recommendation

If a new NPP is built with the envisaged capacity, electricity generation in Slovenia will depend heavily on nuclear power, and large amounts of electricity would have to be exported. The period of unfavourable overlapping operation of Krško NPP1 and Krško NPP 2 could be up to 20 years. An over-capacity and unfavorable generation mix for such a long period should be avoided.

3.5 Transmission System and reserve capacities

Question 4a

Is it guaranteed that the capacity of the new NPP will be compatible with the national grid?

Background

The share of nuclear power in electricity production of Slovenia is almost 40%; this is quite high in international comparison (50% of Krško NPP belong to a Croatian utility). Constructing a new NPP with a capacity of up to 2.5 times that of Krško would create a very large nuclear capacity in Slovenia with significant effects on the electricity grid.

Slovenian Reply

Yes, it is guaranteed that the capacity of the new NPP will be compatible with the national grid. Milan Vidmar Electric Power Research Institute, ELES national grid operator and GEN have performed an analysis for transport of electricity and a grid stability analysis that demonstrated that the new unit can be connected to the existing grid and the planned grid upgrades.

Final recommendation

The construction of a 1,000 MW unit within a control area with a peak load of about 2,100 MW is inefficient, and causes additional costs. It is recommended to increase the generation capacities by building smaller units.

Question 4b

Which additional secondary and tertiary reserves are necessary for Slovenia, when the biggest unit in the ELES control area will be the 1,000 MW nuclear unit of Krško NPP2?

Background

The national Transmission System Operator ELES is responsible for the Slovenian control area within the ENTSO-E grid area and is obliged to provide secondary active power reserves (±80 MW) and tertiary reserves to cover the outage of the largest generation unit in the control area. In Slovenia the total amount of tertiary active power reserves currently is 348 MW which equals 50% of the power produced at Krško NPP.

In Austria the largest unit has around 400 MW within its control area, with a peak load of about 8,300 MW. The construction of Krško NPP2 would mean that reserve capacities for a 1,000 MW unit within a control area that represents a peak load of about 2,100 MW has to be provided.

On the other hand, the draft NEP-proposal (p. 8) correctly notes that “smaller generation units are more appropriate in the Slovenian system, since less reserve capacities need to be provided upon failure of the largest unit. With smaller units it is easier to achieve a diversification of sources, locations of generation capacities and also of suppliers.”

Slovenian Reply

A new CHP will be built in Ljubljana, but 900 MW will be phased out by 2019. Because of that there will not be such a large overcapacity. According to the draft NEP it is expected that 550 MW for tertiary control reserve will be available in Slovenia before 2016. It is also expected that 100% of the secondary control reserve is going to be kept geographically within the control area. As a consequence, in the case of a new 1,000 MW unit in Krško, Slovenia will need additional 450 MW for tertiary control reserve. This will be decided once a decision on Krško NPP2 is made.

In any case, this is an autonomous political decision of Slovenia and is not part of this technical consultation process.

Final recommendation

See above (question 4a).

3.6 Independence of the Assessment of the Environmental Acceptability

Question 5

Are there any plans to assess the economic rationales of an extension of the operational lifetime of Krško NPP and the construction of Krško NPP2 and the ecological impact of these measures by an independent organisation to provide both the public and the decision-makers with neutral information about the benefits and costs of nuclear energy to their community?

Background

The Assessment of the Environmental Acceptability of the sub-programme "nuclear energy" is taken from a study that was ordered by GEN energija d.o.o, the initiator of the programme "nuclear energy."

Slovenian Reply

According to the Environmental Act, the SEA Report may be prepared by any private company with a certificate issued by the Slovenian Environmental Agency. The study ordered by *GEN energija d.o.o* was taken into account only to assess the magnitude of local impacts of the existing NPP on surface water (cooling system) and on ambient air due to emissions.

Regarding a quantification of the impact of a nuclear accident there is currently no accepted method on how to include potential environmental impacts of severe accidents and nuclear events in such an analysis at the SEA stage.

Final recommendation

It is recommended to include an assessment on potential impacts of severe accidents in an evaluation of the potential benefits and costs of the NEP.

Additional question

Are there any plans to cover possible cross border impacts of potential severe accidents and nuclear events in nuclear facilities for electricity generation, treatment and storage of nuclear waste and spent fuel in the Assessment of the Environmental Acceptability?

Background

It is argued in the SEA Report that "risks associated with nuclear safety and the implementation of the sustainable handling of high level nuclear waste are not included in the evaluation of environmental impacts of NEP measures."

Reply by the Slovenia

Methods of European Environmental Agency are used to assess the external effects of operating plants. It is planned to include an assessment on impacts of severe accidents. Examples are given in the minutes of the technical consultation.

Additional question

How reliable is the data on mortality and other possible effects? The data on frequency of releases are based on probabilistic safety assessment (PSA). This method is appropriate and useful for certain applications (e.g. getting an overview of event sequences, identifying important risk contributors, comparing different technical solutions). However, PSA results are beset with large uncertainties. Furthermore, there are factors which cannot be included in PSAs and there are indications that the results of a PSA systematically underestimate the actual risk. Is that taken into account and why is data used from OECD countries only, excluding Chernobyl? The root cause of the Chernobyl event was bad safety culture. This is a problem relevant in all countries with NPPs, for example in Germany as well (e.g., incorrect installation of anchors at Biblis NPP, discovered 2006). Hence, the frequencies for core damages and large early releases as calculated in a PSA should not be taken at face value; they are not very reliable.

Additional reply

Even the European Environmental Agency accepts uncertainties in the calculations. The basis of the report will be the OECD-report on mortalities and the numbers are considered as quite reliable. Regarding the probabilistic safety assessment it is based on data on OECD countries. This is legitimated by the safety standards in OECD countries which are higher than in Non-OECD countries; in particular, it is assumed that there are no cover-ups of recognized safety deficits in OECD countries (as there was in Chernobyl). The human factor always contributes to accidents in some way. Nevertheless, in Slovenia everything is attempted to create a safety culture that will prevent from human mistakes.

Final recommendation

It is recommended to include an assessment of potential impacts of severe accidents in an evaluation of the potential benefits and costs of the draft NEP.

4 ISSUES OF NUCLEAR POWER AND NUCLEAR SAFETY

4.1 Lifetime extension of Krško NPP

Question 7a

To which extent will the WENRA safety objectives for new power reactors, and the WENRA position papers on key issues of new reactors which are being elaborated at present, be taken into account in the licensing procedure for life extension of the Krško NPP?

Background

The WENRA safety objectives for new nuclear power plants were formulated with the primary purpose to make new nuclear power plants in Europe safer than the existing ones.

However, they are also to be applied to existing NPPs as a reference for identifying reasonably practicable safety improvements. It will usually not be possible for existing plants to fully achieve the standards of new ones. The longer the remaining lifetime of an existing plant, the higher the safety standards which should be aimed at.

Slovenian Reply

For the existing plant the WENRA Reference Levels are applicable. Slovenia is one of the first countries that has fully harmonised its legislation with WENRA Reference Levels and has them fully implemented in the Krško NPP.

All this kind of improvements are introduced during the Periodic Safety Reviews. The first report is due 2012. The procedure has to be finished in 2013. Wherever it will be possible, primarily in the scope of the Periodic Safety Reviews, also the Safety Objectives for the new plants will be taken into account to the extent which would be reasonable, focusing on decreasing the gap between the objectives and actual design.

There are currently updates being implemented to improve safety of Krško NPP. The stress test progress report also summarises the improvements which were speeded up post-Fukushima. The final report might contain additional improvements.

Final recommendation

The WENRA safety objectives primarily target new NPP. One explicit intention of WENRA is, however, that these objectives should also be applied to existing NPP, in particular in the case of a lifetime extension. The longer the operating time of the lifetime extension, the higher should be the effort to achieve the WENRA objectives for new NPP. Improvements should be made, if reasonably practical.

Question 7b

Is it planned to postpone further steps concerning Krško lifetime extension until the results of the European "stress test" (including the peer review conclusions) are available?

Background

Stress tests for nuclear power plants are currently being conducted in the EU member states.

Slovenian Reply

The process of approval of technical aspects of lifetime extension is proceeding in parallel with the stress tests evaluation. Of course, any Action Plans from the stress test will have to be implemented thereafter.

Final recommendation

Sufficient time should be allowed in the lifetime extension procedure for fully taking into account the stress test results, in particular regarding possible further investigations which might be considered necessary, and regarding improvements.

Question 7c

What type of aging management was implemented at Krško NPP before the new AMP started after 2005?

Background

An aging management programme (AMP) has been recently initiated as part of the first periodic safety review of NPPK. However, a late establishment of a systematic AMP might have negative impact on nuclear safety.

Slovenian Reply

Originally, the main focus was given to big components, particularly the reactor pressure vessel. The reactor pressure vessel is in good condition. With the lifetime extension the focus shifted to other aspects. The aging monitoring process has to cover all other passive components such as cables, pipelines and structures and other parts.

During the next outage there will have to be some update on the containment. The decision for a lifetime extension will be conditional on improvements.

NPP Krško had a majority of activities required by AMP programs in place even before the AMP process started. In accordance with the NRC 10CFR54 regulation and NUREG 1800, some additional systematic approaches and programs had been developed and put in function.

Question 7d

Are there specific challenges at NPP Krško the AMP is focussing on – e.g. systems, structures or components requiring special attention?

Background

See above – a late establishment of a systematic AMP might have negative impact on nuclear safety.

Slovenian Reply

The whole process of preparing AMP and conditions for lifetime extension was so complex that it is hard to select the most challenging part. During the next refuelling outage in spring 2012, several modifications related to environmental qualification of equipment will be implemented, to fulfill the last condition for the approval of technical aspects of lifetime extension.

4.2 Construction of a new nuclear power plant in Krško (Krško NPP2)

Question 8a

Which safety standards would be applied to the new NPP project, in particular concerning the exclusion of accidents with large or early releases?

Background

The draft NEP proposal foresees the construction of a second NPP with a capacity of 1,100–1,700 MW.

Slovenian Reply

The basic design conditions for any nuclear facility are prescribed in the Rules on radiation and nuclear safety factors (JV5). Detailed safety standards to be applied to the new NPP project are not yet prescribed. It is left to the investor to come to the regulatory body with the proposal which standards to apply. The regulatory body will have the possibility to review and agree or reject them as a design basis. Of course, the WENRA safety objectives for new nuclear reactors will have to be taken into account.

Currently, in the Krško NPP American safety standards are used. In case another vendor is chosen, other standards will have to be followed. This has to be a longer process and will only be able to apply once a vendor is chosen.

Slovenia is following all WENRA safety objectives. The position papers on key issues presently developed by WENRA will also be taken into account. Internationally agreed objectives and standards are very important for Slovenia as a small country. Slovenia would welcome the development of more concrete European standards.

Final recommendation

Regarding safety standards, the licensing authority should not too much rely on the investor's proposals. The basic approach to guarantee high nuclear safety in design, operation etc. should be codified by the authority independent of the vendor chosen, in a technology-neutral way.

Question 8b

Which guarantees can be given to ensure sufficient resources at SNSA for the licensing procedure for a new NPP? Are there presently concrete activities already under way?

Background

In the context of the CNS framework it was highlighted that the Slovenian Nuclear Safety Administration (SNSA) "*does not have sufficient resources for licensing and overseeing the design, construction and operation of a possible new plant."*

Slovenian Reply

The regulatory agency has recently published an estimation that around 20 more persons are required in the case the Krško NPP2 is built. However, it is of course difficult to assess the exact number of additional staff. Currently, 46 people work at the regulator, i.e. about 50% more staff is necessary for Krško NPP2.

Human Resources and Technical Knowledge Analysis needed for the Licensing Process for the New Nuclear Build: the SNSA Approach, presented at the conference in Portorož 2010: **http://www.djs.si/proc/port2010/pdf/1206.pdf**

Since the project of the new NPP is currently on hold, also the SNSA has stopped further preparations.

Final recommendation

It is important that the regulatory authority has sufficient personnel capacity – not only in terms of numbers of experts, but also their qualification and experience. It should be guaranteed that there is sufficient time for on-the-job training for new employees.

Question 8c

Which conditions, business decisions will be relevant to take the decision for building a new unit at NPPK?

Background

The draft NEP proposal states that the actual realisation of the project Krško NPP2 should *depend on conditions in the market, business decisions and social acceptability of the project*.

Slovenian Reply

The long-term deployment of nuclear energy at Krško location as part of Slovenian energy mix is found to be justified and in line with all goals set for National Energy Program. As such, long term retention of nuclear electricity production at Krško location is assumed in the draft NEP.

The conditions are competitiveness, security of supply, environmental impacts, fuel availability and strong balance sheets which will also determine which technologies can thrive.

Final recommendation

It is recommended to evaluate the macro-economic benefits and costs before deciding on the construction of a new NPP in Krško.

Question 8d

In which form will the social acceptance of the population be included in the decision-making process? Will there be a referendum to decide on the implementation of the project Krško NPP2?

Background

According to the draft NEP proposal the construction of Krško NPP2 will depend on social acceptability, on the market conditions and business decisions. The draft NEP-proposal makes repeated references to the social acceptability of the further long-term exploitation of nuclear energy in Slovenia (pp. 1, 33, 35, 39, etc.).

Slovenian Reply

If there will be a referendum it will depend on a decision by the government that will be in place at the time when a decision has to be made. Participation by the public is necessary for all issues and in particular for a decision on Krško NPP2. Public debate on the project is part of the process of strategic planning and spatial planning, site licensing and construction licensing.

A final decision for the construction of Krško NPP2 will be prepared by the Government of the Republic of Slovenia and the Parliament.

Question 8e

Which indicators will be used for an assessment of the social acceptability of the project?

Background

The draft NEP proposal repeatedly refers to the social acceptability of the further long-term exploitation of nuclear energy in Slovenia (pp. 1, 33, 35, 39, etc.). A survey on the attitudes of EU citizens towards the EU Energy Policy showed already in 2007 – a long time before Fukushima – that a majority of the citizens of Slovenia believe that the nuclear energy share should decrease.

Slovenian Reply

Before deciding on the construction of a new NPP in Krško, economic, environmental and social benefits and costs will be assessed. An example of the three-pillars approach to sustainable development is the set of indicators in the study of NEA (2007). For LILW there was high social acceptability for the disposal. People seem to understand that nuclear energy can be operated safely.

4.3 Disposal of low and intermediate level radioactive wastes (LILW)

Question 9a

What is the reason for the apparent discrepancy regarding the completion of the LILW-repository, between the CNS-Report 2010 and the draft NEP proposal of 2011?

Background

The draft NEP proposal includes the plan for a final disposal of low and intermediate level waste (LILW) at Vrbina in the Krško municipality by 2023. The latest Slovenian CNS report however states that an Act from 2002 requires a LILW repository to be operational by 2013.

Slovenian Reply

Preparatory activities for LILW repository are in progress, national spatial plan for LILW repository location was adopted in 2009. However, Slovenia is aware that it will be practically impossible to achieve the milestone 2013 from the Nuclear Act (ZVISJV). This is the main reason for a difference in the two documents.

Slovenia is seeking an agreement with Croatia on LILW repository and for this reason a potential change of the previous national target year is under discussion in the frame of the adoption of the draft NEP. In 2 years the deposit at the NPP site will reach its full capacity. Some measures can be adopted to prolong the use (volume reduction of waste), but this cannot go on unlimitedly.

At the moment, Slovenia has reserved a site for half of LILW near NPP Krško (50 m underground, below aquifer). The spatial plan and the consent of the local community is given for the 50% of the total waste for this deposit. There is a discussion process going on about covering the total amount of waste. Building only one repository would be advantageous; the costs for 100% of the waste would only be about 10% higher than for 50%.

Final recommendation

The question of having one or two repositories should be answered primarily on the basis of a safety assessment.

Question 9b

What are the present funds available and what is the share of public funds for the construction of the LILW-repository?

Background

The expected costs of a nuclear waste disposal (for both LILW and HLW) need to be internalised into the cost of electricity. A decision on the lifetime extension of Krško NPP and the construction of Krško NPP2 should be made conditional on the operability of a permanent disposal of low and intermediate level waste.

Slovenian Reply

GEN energija is paying to the Slovenian decommissioning fund for the amount of electricity taken into Slovenia power grid. As per 30 June 2011, the accumulated funds amounted to 154.512.986 EUR. There is no public share in funds for LILW. Croatia is also collecting funds in a special fund and official information from their respective Ministry shows that as per 31 December 2010 the Croatian accumulated funds amounted to 109.165.017 EUR.

Final recommendation

Recent studies from Switzerland[1] point to increasing costs of nuclear waste disposal. The disposal cost for the five Swiss NPPs are expected to amount to around EUR 12,2 billion. It is, therefore, recommended to significantly increase the levy on the price of electricity in order to internalize all external costs.

4.4 Disposal of high level radioactive waste (HLW)

Question 10a

Which protection does the fuel handling building provide for the spent fuel pool, in case of external events (e.g. aircraft crash)? Is this protection equivalent to that provided by the reactor building?

Background

All high-level radioactive waste from Krško NPP is currently stored in the NPP spent fuel pool, outside the reactor building. The available information does not show to which extent this building is protected against external events.

Slovenian Reply

There is a spent fuel storage installation on the site of the NPP, not within the containment, yet built with a robust structure. In the stress test it is also reported that the safety of the pool is reasonably strong. However, most of the information is of the confidential nature and could not be made public. The seismic capacity of the spent fuel building is of the same level as the main nuclear island.

[1] *Swissnuclear* (2011). Kostenstudie 2011 (KS11) Mantelbericht, Fachgruppe Kernenergie der swisselectric, 13. Oktober 2011, Olten.

Final recommendation

The protection of the spent fuel pool against external events (natural and human-made) should be of the same standards than that of the reactor building.

Question 10b

Any generator of electricity needs to have a permanent solution for dealing with the accumulated waste. What are envisaged solutions for the high-level waste in NPPK? What are the expected costs for a permanent storage of this high-level waste?

Background

The draft NEP proposal includes the objective to prepare a "*proposal of the resolution concerning decomposition and management of high-level waste (HLW)."* The expected costs of a permanent storage of HLW has to be included in the electricity price.

Slovenian Reply

The National Strategy on Radwaste Management (**http://zakonodaja.gov.si/rpsi/r02/_predpis_RESO42.html**) foresees that the spent fuel remains in the spent fuel pool of the plant until the end of its operational life. Several years later it should be transferred into the dry storage (in casks) and left there for about 35 years. Only after that period Slovenia will look for the permanent solution, if such does not emerge sooner. Slovenia hopes that some day it would be possible to share costs and burden of high level disposal on a regional or global basis.

The capacity of the spent fuel pool has already been increased by re-racking. Freshly unloaded fuel is distributed in the pool, not concentrated, to keep local heat loads lower. A second phase of re-racking has been under consideration, storing some spent fuel horizontally.

After the Fukushima event the possibility of shortening of the wet storage period is being considered. It is likely that spent fuel will be transferred to cask storage earlier than previously planned. It should be possible to find space for the cask storage facility; possibly at the repository site nearby.

The cost for high level waste disposal represents the considerable part of the levy, which is being paid to the decommissioning fund (3 EUR/MWh). This figure is taken from the Swedish calculation in order to collect the funds for a permanent storage facility.

The decommissioning plan was made and is publicly available.

One of the options is to reprocess the spent fuel and to use the rest of material as a fuel in NPP2 (or to export this fuel).

Final recommendation

The spent fuel should be transferred from the pool to cask storage as soon as possible (cask specifications permitting), to decrease the hazard of storage.

Reprocessing should be avoided, since it can lead to considerable radioactive emissions and to hazardous accidents.

Question 10c

With which state does the Republic of Slovenia intend to find a bilateral solution to the permanent disposal of radioactive waste?

Background

The decision regarding the concept for final disposal of spent fuel is to be taken by 2020. A repository should be operational by 2065. Multinational disposal is also seen as an option.

Slovenian Reply

A decision on a regional solution for HLW has not been reached. The new EU directive is fostering multinational solution. However, for political reasons a regional solution is currently not possible. At the same time a unilateral Slovenian HLW deposit is too costly. The current strategy is to place HLW into dry deposit for 35 years and then try to find a solution ("wait and see").

Final recommendation

Slovenia should consider a scientifically based procedure for selecting a site for a HLW repository – performed with the participation of the population, and fully transparent (also including neighboring countries). The experiences in Switzerland with the on-going "Sachplan Geologische Tiefenlager" (Sectoral Plan for Deep Geological Repositories) should be taken into account in this context.

Question 10d

Will the expected costs of a permanent storage of high-level radioactive waste be internalized in the price of energy as is formulated as a "key element in the transition to sustainable energy options" in the draft NEP-proposal (p. 35, 128)?

Background

Currently a strategy and a cost estimation of the disposal for radioactive waste as well as the strategy on international partners for constructing a shared repository are lacking.

Slovenian Reply

Slovenia (*Gen energija*) is paying for the time being a contribution of 3 EUR/MWh for electricity taken by Slovenian owner of Krško NPP. With a revision of the decommissioning plan, this amount will increase. For the calculation, the Swedish final disposal concept is assumed, which is rather costly and should cover all possible variants.

Final recommendation

It is a paradox that on the one hand it is argued that at this stage it is not possible to evaluate the possible costs of a permanent HLW deposit and, on the other hand, all costs for a final deposit are already included in the electricity price. International experience (e.g. Switzerland) shows that a levy of 3 EUR/MWh will most likely be only a share of all total external costs (decommissioning, nuclear waste disposal etc.). It is recommended to considerably increase the levy on the electricity price.

Question 10e

What plans or concepts are there at present for the storage of spent fuel (to the extent it is not reprocessed) – regarding amounts, site(s) and periods of time? In particular, how will the time period 2023–2043 be bridged? Is it considered as an option that the capacity of the spent fuel pool would be increased by increasing the density of the storage? Is it planned to postpone further steps regarding the planning of spent fuel storage until the results of the European "stress test" (including the conclusions of the peer review) are available?

Background

It is not clear where HLW will be stored between 2023, when the storage pool at Krško is full, and 2065.

Slovenian Reply

NEK performed all required safety analyses in 2002 for the extended life time operation until 2043. The first phase of re-racking was done at that time. Implementation of second phase of SFP re-racking allows NEK to operate and store SF until 2043. The Decommissioning plan predicts options for long term SF storage and handling. The final decision of phase 2 for re-racking has not been reached yet, partly due to the request of SNSA to investigate all possible long term solutions for SF storage at the site.

Final recommendation

See above (10b).

Question 10f

How much of the spent fuel is expected to be reprocessed – in which facility? Where would the reprocessing wastes be stored?

Background

It remains unclear to which extent reprocessing will be implemented.

Slovenian Reply

Currently the accepted strategy for spent fuel handling is based on the National Strategy on Radwaste Management".[2] Decision will be made among several options, reprocessing is one of the options. Slovenia does not have any action plan to reprocess the fuel at this time.

Final recommendation

See above (10b).

Question 10g

How does the Government of the Republic of Slovenia intend to fulfil the requirements of the Radioactive waste and spent fuel management directive (Council Directive 2011/70/Euratom)? In particular, what are the plans for a permanent disposal of radioactive waste, what are the expected costs and the intended financing schemes for the additional waste aggregated by an extension of the operational lifetime of Krško NPP and the construction of Krško NPP2?

Background

On 19 July 2011 the Council adopted the Radioactive waste and spent fuel management directive (Council Directive 2011/70/Euratom) that requires member states to draw up national programmes that include plans with a concrete timetable for the construction of disposal facilities, as well as a description of the activities needed for the implementation of disposal solutions, costs assessments and a description of the financing schemes.

Slovenian Reply

After the first screening of our legislation against the new directive no significant gaps are determined. The detailed screening will be done in spring 2012 and may result in some changes of rules or ordinances. The additional costs of waste management in the case of lifetime extension or the new NPP will be taken into account in the cost of electricity.

The existing Slovenian legislation foresees that the price of the electricity from nuclear energy covers all costs for high as well as low and intermediate waste long term storage and disposal. Slovenia (*Gen energija*) is paying for the time being a contribution of 3 EUR/MWh. This is covered by NPP decommissioning and waste disposal plan, which is revised every 5 years.

Final recommendation

See above (10d).

[2] http://zakonodaja.gov.si/rpsi/r02/predpis_RESO42.html

4.5 Uranium mining

Question 11

Are there any plans for a re-activation of the Žirovski vrh uranium mine? If yes, what do these plans look like in detail?

Background

The draft NEP proposal (p. 137) mentions *"research with the aim to record natural resources (coal, uranium, oil and natural gas)."* In the latest Slovenian CNS report (2010), the Žirovski vrh uranium mine is mentioned. This mine was in operation from 1985 to 1990. The site is reported to be decommissioned and the clean-up completed. In 2005 it was finally closed and access to the mine is no longer possible.

Slovenian Reply

The Government of Slovenia already accepted the plan for closing of the Žirovski vrh uranium mine. There are no plans for re-activation.

4.6 Funding for the sub-programme nuclear energy

Question 12a

Are possible updates in the security architecture of Krško NPP included in the estimated costs for the extension of Krško NPP operational life?

Background

Stress tests for nuclear power plants are currently being conducted in the EU member states. Additionally, WENRA develops position papers on selected key issues relevant for new NPP (e.g. airplane crash, practical elimination) that will be available by the end of 2012.

Slovenian Reply

Safety upgrades, which were planned before stress tests, are all included in estimated costs for the extension of Krško NPP operational lifetime and are also included in cost of electricity produced in Krško NPP. Additional costs, resulting from stress tests will be included in the annual budget and business plans and will be also included in cost of electricity produced in Krško NPP.

Final recommendation

See above (question 7b).

Question 12b

What are the estimated overnight investment costs for the extension of the operating lifetime of Krško NPP and for the construction of a new reactor in Krško?

Background

The total value of investments for the sub-programme electricity generation from 2010 to 2030 is announced to amount to EUR 3.4 billion for the basic scenario and EUR 7.4 billion for the nuclear scenario. As a consequence, the construction of a new nuclear reactor is estimated to require investment costs of EUR 2.2 (this is the difference in the investment costs between the nuclear and the basic scenario in Image 13) and EUR 4 billion (p. 87). The expected financing costs are not included in this estimation. No public funds are said to be provided for these investments.

Slovenian Reply

Estimated overnight investment costs for the extension of the operating lifetime of Krško NPP are around 360 EUR_{2008}/kW and for the construction of a new reactor in Krško around 3.675 EUR_{2008}/kW.

These data are taken from two studies:

- Electro Institute Milan Vidmar on economic and environmental aspects of NPP lifetime extension (2007)
- International Energy Agency / Nuclear Energy Agency on projected costs of generating electricity (2010).

Final recommendation

Nuclear energy has a history of cost overruns. In order to provide the complete macro-economic costs of nuclear energy it is recommended to assume realistic investment costs. Recent literature provides an overview of currently expected overnight costs and should be taken into account.[3]

Question 12c

Which discount rate was used for calculating the cost estimation in the draft NEP-proposal for the sub-programme nuclear energy?

Background

The total value of investments for the nuclear programme are presented in the draft NEP proposal without financing costs (p. 87). However, the presentation of investment costs without the financing costs is misleading and hides the actual costs. For investments in nuclear energy a discount rate of 11% is realistic, resulting in significant costs that need to be transparently calculated in order to provide decision-makers with comprehensible and relevant information.

[3] e.g. *Sovacool, Benjamin K.* (2011). Contesting the Future of Nuclear Power. A Critical Global Assessment of Atomic Energy, Singapore, p. 101-113

Slovenian Reply

Investment figures in the draft NEP are given without financing costs. Sensitivity analysis was made using different interest rates of 7%. Inclusion of the project in NEP does not replace further economic analysis for a future business decision.

Final recommendation

In order to provide realistic costs for both the decision-makers and the general public it is recommended to calculate the costs of a Krško NPP2 with interest rates of 11% and include the financing costs into the draft NEP.

Question 12d

Which direct or indirect subsidies in the form of loan guarantees, caps on liability resulting from an accident or attack, socialization of costs and delivery risks associated with managing nuclear waste, etc., are currently provided to the operator of Krško NPP?

Background

Worldwide, there is no single reactor where the financial risk for the construction was exclusively borne by private actors.

Reply by the Slovenia

In 1974 there was a loan with state guarantee. Krško NPP2 will have to be financed without state guarantees. There is reluctance for any state guarantees for the new reactor, but no decision has been made. For the time being, no guarantees are planned.

Final recommendation

Experiences from the UK show that without public subsidies no new nuclear reactors are built. By 2010, the utilities that were planning to build nuclear plants were beginning to suggest that 'support' in some form would be needed if they were to build new plants.[4] In 2011 the UK government therefore suggested a carbon floor price as an indirect subsidy. However, it is recommended to leave a decision upon building new nuclear reactors to the sound judgement of the market without interference by the state.

[4] Thomas, Steve (2010). Competitive energy markets and nuclear power: Can we have both, do we want either?, in: Energy Policy 38 (9), 4903-4908.

4.7 Externalities and low-carbon society

Question 13

To what extent does the environmental report take into account the waste, decommissioning, and risk-related costs of nuclear power and internalise them in the electricity prices?

Background

In the draft NEP, the gradual inclusion of external costs in the price of energy is called to be a key element in the transition to sustainable energy options.

Slovenian Reply

According to Slovenian legislation, costs of radioactive waste management and of decommissioning of nuclear facilities are internalised in electricity prices. Nuclear facilities are liable to pay a special levy to the Fund for Financing Decommissioning of the Krško Nuclear Power Plant and Disposal of Radioactive Waste from the Krško NPP (3 EUR/MWh).

No external costs for nuclear risk specific costs are included in the estimations given by the present version of the SEA Report. However, the SEA Report will be amended or additional explanation will be prepared about potential environmental impacts of severe accidents and nuclear events. Probabilities for various scenarios will be compared (i.e. nuclear vs. fossil).

Final recommendation

See above (10d).

4.8 Nuclear liability

Question 14a

Are any reserves in the budget of the Republic of Slovenia dedicated to compensations in case of a major accident, if the damages exceed the capped liability of nuclear operators? In other words, can the Republic of Slovenia afford a nuclear accident in the size of Chernobyl or Fukushima?

Background

In case of a nuclear accident like Chernobyl or Fukushima any economy will struggle to limit the environmental damages and compensate the victims of the accident. Estimates of the damages resulting from the Fukushima accident range from USD 25 billion to USD 130 billion. The EU-funded ExternE project estimates costs of a severe nuclear accident to range from EUR 431 million to EUR 83 billion. The Slovenian GDP reaches 0.85% of the Japanese GDP.

Slovenian Reply

The “Third Party Liability” regime in Slovenia is based on the Paris/Brussels Conventions (as revised in 2004 – but not yet entered into force) and new Slovene Third Party Liability Act, adopted in September 2010. The national legislation becomes effective after the conventions enter into force.

As a rule, the operator of nuclear installation has to have his liability insured. State is liable for nuclear damage if it exceeds the amount of operator’s liability.

The part of the question asking if Slovenia can afford the major accident is a rhetorical one. Of course any natural or human-induced event of such magnitude is not desired and there are no financial provisions foreseen in current state budget. But it is foreseen that after such an event the government and parliament would decide about allocation of necessary funds.

Final recommendation

It is recommended to amend the national legislation and to bring the amount of liability for the operator of the NPP in line with the overall costs of actual possible damages.

Question 14b

Which impacts on the Republic of Slovenia must be expected in case of a severe accident in a Slovenian NPP and which impact on the country’s economy and society would occur?

Background

The total available compensation due to Slovenia’s international obligations under the Paris regime amounts to EUR 356 million. This amount will not be sufficient in the case of a nuclear accident in the size of Chernobyl or Fukushima.

Slovenian Reply

Impact on the country's economy and society depends on the type and specific circumstances of an accident and as such cannot be predicted in advance. As regards nuclear liability, Slovenia is a member of the Paris Regime (Paris 1960 and Brussels 1963) and ratified the joint Protocol of 1988 and 2004 Paris Convention which amends the 1960 Paris Convention and the 1963 Brussels Supplementary Convention, like western European countries.

Final recommendation

See above (14a).

Question

What are the strategies by the government of Slovenia to cope with the economic consequences of a nuclear accident and the compensation of victims of a nuclear accident?

Background

The Slovenian GDP reaches 0.85% of the Japanese GDP. If this relation is to mirror the ability of a country to cover the costs of a potential nuclear disaster, serious doubt remains whether Slovenia would be able to compensate for the damages of the impacts caused by radioactive releases on the neighbouring countries.

Slovenian Reply

Regarding compensation of the victims in case of a nuclear accident in Slovenia, the provisions of Paris/Brussels conventions and Slovene Third Party Liability Act would apply. The Act provides for the basic rules of distribution of the compensation (if damage exceeds available resources of the operator).The resources of the State would be made available in the budget of RS: their amount, the manner and dynamics of their drawings shall be stipulated by (special) act, based on the assessment of the damage, prepared by the special (ad-hoc) commission.

Final recommendation

See above (14a).

5 ABBREVIATIONS

AS.....Additional Scenario

BS.....Basic Scenario

CEIA.....Comprehensive Assessment of Environmental Impacts

CHP.....Cogeneration of Heat and Power

EIA.....Environmental Impact Assessment

ELES.....Elektro – Slovenija, d.o.o.

ENSREG.....European Nuclear Safety Regulators' Group

ENTSO-E.....European Network of Transmission System Operators for Electricity (successor of UCTE)

ER.....Environmental Report

EU.....European Union

EUE.....Efficient use of energy

GAS.....Gas Scenario

GHG.....Greenhouse gas

HLW.....High level radioactive waste

KNPP.....Krško Nuclear Power Plant

LILW.....Low and intermediate level radioactive waste

NEP.....National Energy Programme

NPP.....Nuclear power plant

NS.....Nuclear Scenario

RES.....Renewable energy sources

UCTE.....Union for the Coordination of Transport of Electricity

WENRA.....Western European Nuclear Regulators' Association

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