Comments and Replies to the Public consultation on the

IGD-TP Strategic Research Agenda (SRA) version December 23, 2010

that was posted on the www.igdtp.eu website

July 19, 2011

Comments from the Public consultation on the IGD-TP Strategic Research Agenda (SRA) as posted on the www.igdtp.eu website December 23, 2010

No.	Section	Concerning, keywords	Comment/Question	Response statement/Corrections Measure
[ID]	*[Page, headline, section, figure, table etc.]*	*[Content, e.g. text that the comment concerns. For example, text that is to be commented may be quoted.]*	*[Specification of comment and/or question, including motivation. If needed, provide advices, instructions and suggestion for improvements]*	*[Brief description of how the review comment has been handled]*
	General comments			
1.			S&B Industrial Minerals fully agrees also with this actualised IGD-TP SRA document and is ready furthermore to cooperate in concept development activities for buffer, backfill and sealing materials encompassing on industrial scale the full sourcing process from mining of materials,to processing, design, manufacturing, storage and logistics until the installation of the buffer and backfill components into a repository.	-
2.		Social-Political influence	The drivers for research seem to come from within the WM community (WMO, regulators, research organisations) only, the 'end-user' (the public at large) does not really appear in the equation. This is the more strange as public acceptance is the single most important obstacle to implementation encountered so far. In other words, I miss a process and procedure by which the overall socio-political context can have a bearing on the development of SRAs.	*The SRA reflects this. Organisations involved with siting have strong interactions with the local communities and the issues of the SRA come from the waste management programmes.*

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3.		Content development transparency	The process for content development in the SRA is not very transparent at. It is not clear by what criteria the priorities have been identified, e.g. through comparison against FEPs? At the moment it seems to be the 'feeling' of the Executive Group (with some input from the June meeting).	*The chapter 2 has been revised to clarify the underlying principle.* *The principle of the TP has been clearly defined of coming from the needs of the industry. This is in alignment with the EC's technology platform concept. The EG represents the industry/WMO's responsible for the implementation of the repositories.*
4.		Stakeholder involvement	There seems to be a fundamental misunderstanding of 'stakeholder' involvement, both semantically and conceptually. First of all in various places one has the feeling that 'stakeholders' are only the IGD-TP members. Then stakeholder involvement is reduced to communicate to them scientific and technical content. So far the typical 'public'stakeholder has had no bearing on the SRA (OK, Greenpeace missed their opportunity by pulling out).	*The SRA reflects this. See comment no 2.*
5.		Clarification RMS & Safety Case	The relationship between 'Requirements Management Systems' (RMS) and the Safety Case has to be clarified. According to my understanding, the safety cases is just the tool for requirements management.	*Requirement Management Systems are tools to manage information to ensure that the safety case addresses all relevant requirements and is complete.*
6.		Clarifications/ Glossary of terms	The topics mentioned as Key Topics together with the Cross Cutting and Specific Aspects described in section 4.1 and 4.2 cover a comprehensive set of relevant issues in research on geological disposal. A glossary of terms might in some context contribute to improve clarity, (e.g. regarding the definition of “decision makers”, the difference between “safety requirements” and “licensing requirements”).	*The IAEA glossary has been used as the basis. The value of a glossary is acknowledged.*

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7.		Competence maintenance	In preparation of the February meeting, I would like to draw your attention to an issue which is to some extent already addressed in points 2 and 4 of my email commenting the previous version (cf. below): As recognised in the SRA document, the cross-cutting issue "Competence maintenance, education and training" is correctly identified as being amongst "important activities supporting the RD&D works". As you are aware, many RWM organisations have to struggle with problems concerning the recruitment of competent staff - one of the reasons being the rather negative or at least reluctant attitude towards issues related to nuclear power in several countries (including my own) during the past years. This seems to be about to change, but competence maintenance, education and training are long-term issues which will need many years to recover.	*The SRA acknowledges that there are many ongoing activities that need to be considered during its deployment.*

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7 cont		Competence, training and education	Many activities are underway to overcome the problems named above, e.g. work being done under the aegis of IAEA, within EU projects, and by organisations such as the ITC school. Some (such as ENEN or ISaR) have a wider focus on nuclear in general. The FP7 project PETRUS 2 aims, amongst other things, at improving mutual recognision and mobility regarding training and education related to geologic disposal. It is, however, recognised that this needs permanent organisational support - something, which cannot be achieved within EU projects limited in their duration. I therefore suggest that IGD-TP considers to address the need for such permanent support. Possibilities for doing that include establishing the issue within the platform itself but also supporting and directing another organisation (see above) when doing that. I am well aware that this coin has two sides: Given the very heterogeneous manifold of activities which are already underway, adding to that heterogeneity and duplicating what others already do has to be avoided. On the contrary, efforts should be undertaken to improve exchange and communication between the "players", aiming at mutual recognition.	*The cooperative activities resulting from the SRA are to be addressed in the IGD-TP's deployment plan and their implementation is decided by the individual members of the EG.*

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8.		Safety case	The Swedish nuclear waste company SKB is planning on March 16 to file an application for permit to construct a Swedish final repository for spent nuclear fuel. Much of the SRA is built on the assumption that SKB has no problems with the safety case for the repository. This is not surprising since representatives for SKB has written much of the SRA. However, there are indications that the formal review of the SKB application will show major and serious problems with the SKB safety case. This will be shown quite early in the process as the regulator, the Swedish Radiation Safety Authority, will make a preliminary statement on the completeness of the application after 2-3 months, perhaps a little longer. It may be prudent not to use the work of SKB on the safety case as a basis for the for a common European strategic research agenda until the work of SKB, a pure nuclear industry entity and stakeholder, has at least had a preliminary review by the Swedish regulator. To delay the publication of the SRA so that account can be taken of a preliminary review of the SKB safety case by the Swedish regulator could decrease the public relations risk that the IGD-TP would otherwise be exposed to.	*This comment is related to a specific national waste management programme. The SRA is a collective research agenda and it reflects the needs of the agencies and the members of the IGD-TP.*

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9.		Implementation of Geological disposal / Scientific basis	This document represents an important statement by the newly established Technology Platform. It establishes clearly that the proposed research agenda is indeed strategic in supporting the planned implementation of geological disposal of high-activity/ long-lived radioactive wastes in national programmes that are closest to achieving that objective while affording access for other interested parties to the relevant scientific and technical knowledge. Given its importance the document should be capable of being considered on a stand-alone basis so it would be beneficial for example to remind the reader that the programmes planning implementation of geological disposal around 2025 are those in Finland, France and Sweden and that these programmes have clearly identified disposal concepts that are not necessarily optimal for other countries having different geological settings and/or waste inventories. The topics identified in Section 3 are generally well justified as priorities for implementation, although some are individually poorly defined. There are in my view some surprising omissions. Also, I expected a specific discussion on the need to ensure a continuing sound scientific basis for geological disposal and how that could be addressed through the SRA. Although the technical content of the proposed research agenda is highly rational, the description of the process to arrive at this content given in Section 2 is far from clear. As noted in general comments above, I would have expected some content concerning the continued development of the sound scientific basis for geological disposal. An example of a topic that might then form part of the SRA could be to build on the NEA Sorption Project and relevant aspects of the FUNMIG Project to establish greater confidence in the mechanisms of sorption as underpinning of the conceptual models and parameter values used to represent this process in radionuclide transport calculations.	*The text of Chapter 2 has been revised and 2.2 addresses this comment.* *Regarding the role of underlying scientific research in the SRA more than 30 years of such studies have led to a strong scientific basis for geological disposal. Nonetheless where required such work will continue and, where sufficiency of information exists and no further research is actively pursued, the scientific basis of safety case needs to be continuously updated. As this underlying research is a broad requirement intrinsic to several of the key topics of the SRA, this aspect has not been directly highlighted.*

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10.			The Strategic Research Agenda (SRA) of IGD-TP is well written and focused and forms a good basis for the startup of the IGD-TP work. The next phase, preparation of the Deployment Plan (DP), determines how well the plan changes to real research projects.	
		SNE-TP	The other EC technology platform in nuclear field, SNE-TP, is dealing with sustainable nuclear technology solutions, including GenIV - reactors and innovative waste and spent fuel handling technologies. New, innovative solutions for waste problems when developing GenIV nuclear reactors play an important role. These two technology platforms shall co-operate and exchange information in such a way, that treatment and final disposal of radioactive waste will be taken into account already in the design phase of the GenIV -reactors.	*The IGD-TP and SNE-TP already exchange information in the framework of the Vision 2025, where priority is given to the committed and existing waste.*
		New nuclear power plant construction programs.	There are some new countries in Europe, like Poland and Estonia, planning to build nuclear power plants. It would be extremely important that these countries join the IGD-TP. This would be one way to guarantee that waste management issues will be taken into account from the beginning of the new nuclear power plant construction programs.	*The IGD-TP is open to all stakeholders endorsing its vision.*
11.		Summary	Due to the fact that the public, i.e. the people in the Member Countries, pay for the research activities, there should be worked out and published a comprehensive summary of about two or three pages. This summary should line out the principles of safe final disposal of radioactive waste and thus create credibility among the general public on the one hand and politicians on the other hand. Moreover the summary should explain the necessity and the aims of further research activities (particularly implementation).	*The intent is to write an executive summary based on the final SRA document.*
			Finally research projects should aim at generic issues and topics which result in added value for all Member States in which final disposal will be realized. Therefore it is important that the Commission clearly decides to support generic research projects and not projects which aim at only dissolving a specific item for one final disposal site.	*The IGD-TP is implementer-driven and interacts with the EC as with any other stakeholder. The importance of sound scientific basis is also recognised in chapter 2 of the SRA.*

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12.			The full draft version of the IGD-TP SRA offers a very broad and complete approach in the field of spent fuel, high-level waste, and other long-lived radioactive waste geological disposal. Due to the consultations that have been performed with the IGD-TP participants and offered a very useful input, all the aspects of geological disposal are very well covered within the seven SRA Key Topics. Given its specialists expertise in the following fields, IFIN-HH could participate in Key Topic 3, Topics 9, 10 & 14. We have the belief that in this way, we can bring our contribution to the common IGD-TP Vision 2025 of safely operate a geological disposal facility.	-

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13.		Closed structure & transparency	The SRA report of the IGD-TP shows some of the fundamental problems that cause the lack of credibility of the platform and can constitute a source for defensive and negative reactions on the development of radioactive waste management options. These include: • The fact that the IGD-TP is not honest about its closed structure; • The fact that the Vision of the IGD-TP is not science-based but based on political choice; • The fact that the SRA report is not transparent. These points are illustrated below on the basis of concrete references to the report.	*The IGD-TP is implementer driven and this has been stated in the SRA and in the IGD-TP's other communications. The IGD-TP is open to all stakeholders endorsing its vision.* *The vision of the IGD-TP is based on several national political decisions about the safe management of nuclear waste. All work within the SRA has a scientific background.* *The consultation covering the SRA draft started in December 2010 that was opened to all public. Long before the actual publishing of the SRA report. The IGD-TP has made and makes every effort to be transparent in the preparation of the SRA.*

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14.		Clarification of participation	Missing in this listing is civil society. The use of the word "participating" is misleading. This is the first content related communication Greenpeace has received from the IGD-TP secretariat and therefore it cannot claim that in December 2010 these organisations have "participated". This is ever so more irritating, because the IGD-TP has given in 2010 advice to the European Commission on the proposal for a directive on radioactive waste without consulting all its participants. It is claimed that consultations have been performed with the IGD-TP participants during a SRA seminar in June 2010 and later during November 2010 on a draft version of the SRA document. Greenpeace has neither been invited to the seminar nor has it been invited to deliver comment on the draft version of the SRA document before this public consultation. On the IGD-TP website, Greenpeace is mentioned as participant of the technology platform. Greenpeace therefore demands either to be treated from now on as a participant of the IGD-TP, or Greenpeace will retreat its participation and publish the way it has been treated by the IGD-TP. In spite of this internal dysfunctionality of the IGD-TP and under protest against the closed character of the IGD-TP so far – even towards its own members –, Greenpeace hereby delivers its comments on the SRA document in the public consultation phase.	*The IGD-TP vision states the prerequisites of IGD-TP participation: The IGD-TP is open to all stakeholders endorsing its vision.* *The IGD-TP has not produced any collective advice to the EC over the proposal for a directive. The EC has published all the consultation results of the directive where this can be verified.* *An invitation to the pre-consultation of the key topics of the SRA (including the SRA seminar) was sent to IGD-TP participants endorsing the vision.* *The IGD-TP Exchange Forums are open to all stakeholders. Despite the fact Greenpeace has not endorsed the IGD-TP's vision, the IGD-TP Secretariat has invited them to the Exchange forum and will continue to do so. The IGD-TP welcomes the continued input.* *e.g. waste management organisations (WMOs), industry, research institutes, research centres and the academic community."*

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15		Biogeochemi-cal processes	It has come to our attention that biogeochemical processes are not considered explicitly in the SRA document. In recent years, biogeochemistry has come to the fore as a key uncertainty in radioactive waste disposal: it clearly has the potential to control the environmental speciation and mobility of key long-lived radionuclides, and furthermore has unexplored, but potentially far-reaching impacts on e.g. waste package performance and gas generation in the unique chemical and radiation altered environment of the engineered geodisposal facility. It is our belief that biogeochemical processes cross cut several of the identified topics within the SRA: * Waste forms and their behaviour e.g. gas generation, corrosion, radionuclide speciation * Long term performance e.g. the evolution pathway of the repository may be influenced by biogeochemical processes * Monitoring. e.g. monitoring programmes need to implement monitoring of microbial populations before and during emplacement We hypothesise that, because of the nature of the waste forms and the engineered environment, biogeochemical processes, linked to the effects of corrosion and radiation chemistry are likely to play a key role in the evolution pathway of the GDF. This has implications in waste form evolution, the long-term performance of the repository and in monitoring programmes during waste emplacement. We would welcome dialog on this issue, and will engage more broadly with the biogeochemical community to explore their view on these issues in the context of the IGDTP in the next months.	*The biochemical processes are not explicitly mentioned in the SRA either in the section 3.1 "Safety case", 3.2 on "Waste forms and their behaviour or in 3.6 "Monitoring". This fact does though not imply that these processes are ignored or that they would not be important. What it reflects is that these issues were not mentioned specifically due to the already existing on-going research and knowledge base in the area. Specific work on related to the understanding of difference processes influencing the repository including biogeochemical processes might well be handled within several topics in the SRA , i.e. Topic 2 in section 3.2.2.*

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1. Introduction				
16.	1.1 p. 4 2nd paragraph	Scientific basis	*"There is increased awareness…"* This is not true and a reflection of the closed nature of the IGD-TP. This conclusion can most certainly not be drawn from the mentioned Eurobarometer. What is true, is that geological disposal (in many different forms) is seen as one of the potential options of risk reduction in radioactive waste management and has by default become the main option under research, because research in other options has been stopped for cost and political, not scientific, reasons. The IGD-TP should not create the illusion that the waste problem is solved when there is no scientific basis for such claim.	*The SRA working group and experts in geological disposal in various publications and scientific studies disagree with the given comment. E.g. OECD/NEA states:* *"• A geological disposal system provides a unique level and duration of protection for highactivity, long-lived radioactive waste. The concept takes advantage of the capabilities of both the local geology and the engineered materials to fulfil specific safety functions in complementary fashion providing multiple and diverse barrier roles.* *• The overwhelming scientific consensus world-wide is that geological disposal is technically feasible. This is supported by the extensive experimental data accumulated for different geological formations and engineered materials from surface investigations, underground research facilities and demonstration equipment and facilities; by the current state-of-the-art in modelling techniques; by the experience in operating underground repositories for other classes of waste; and by the advances in best practice for performing safety assessments of potential disposal systems.".* *The geological disposal has currently no alternative, though RD&D on other waste management technologies like transmutation is on-going elsewhere outside the IGD-TP. Geological disposal is the required end state for all of these technologies in the long-term. The IGD-TP vision is aligned on this and focused on geological disposal. RD&D on other waste management technologies is on-going elsewhere outside the IGD-TP all requiring geological disposal as the end state.*

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16 cont	1.1 p. 4 3rd paragraph	Suggestion of writing	*"Despite the differences…"* It would be more appropriate and closer to the truth to write: "Despite the differences between the timing and the challenges in the different programs, there is a consensus that continued and strengthened cooperation on the scientific, technical, and societal challenges related to deep geological disposal is necessary if potential implementation of the first geological disposal facilities is to happen in the most safe way possible."	*Repositories for spent fuel and HLW need to be implemented safely and cooperation is needed. Agree with emphasising the necessity.* *Change wording:* *...related to deep geological disposal is necessary for the safe and timely implementation....*
16 cont	1.1 p. 4 5th paragraph	Vision statement	*"The IGD-TP vision statement (Vision 2025)…"* Because the vision statement is not based on sound scientific principles, Greenpeace has joined the IGDTP as a member without committing to the vision. The IGD-TP cannot claim to be a platform in which different stakeholders try to improve cooperation in research around deep geological disposal if it closes itself to the debate on this vision statement and even spreads disinformation on the issue.	*The IGD-TP is implementer driven and this has been stated in the SRA and in the IGD-TP's other communications. The IGD-TP is open to all stakeholders endorsing its vision. The IGD-TP has also fulfilled its written promises towards other stakeholders of the IGD-TP, who have not endorsed its vision (see link: letter to GP by Secretariat).* *The vision of the IGD-TP is based on several national political decisions about the safe management of nuclear waste. All work within the SRA has a scientific background. According to the principle of the IGD-TP, the cooperation in the IGD-TP is based on the vision.*

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17.	1.1 p. 5 1st paragraph under the bullet	Scientific approach	*"One of the key technology challenges…"* By binding itself to the marketing goals of the nuclear industry as quoted here from the SET-plan, the IGDTP undermines its credibility as a platform that searches for scientifically sound approaches that could eventually lead to a least-risk storage or disposal option for radioactive waste. If the IGD-TP cooperation is driven by marketing new nuclear fission projects instead of the search for risk-reduction in the nuclear waste problem, it undermines its scientific credentials and becomes a lobby-organisation, with all the negative connotations attached to that. This situation would seriously undermine the objectives expressed in the Specific Programme implementing the Seventh Framework Programme of Euratom for Nuclear Research and Training Activities (as quoted on page 5).	*Inconsistency noted. Text modified.* *Geological disposal is needed irrespective of the future of nuclear power. IGD-TP is not tied to the development of new power plants, but considers new wastes and their implications to geological disposal.*
18.	1.2 p. 5 1st paragraph	Suggestion of writing	*"Geological disposal has been studied since the 1970s…"* It is more honest to state: "Geological disposal has been studied since the 1970s as the nuclear industry's preferred option for the long-term management of high level and/or long-lived radioactive waste."	*Geological disposal has been proposed as the preferred solution based on studies by independent scientific groups and these studies have undergone numerous government reviews. For references see i.e. ref 1-18--1-21 and 2-3 --2-13 in the SRA document.*
19.	1.3 p. 7 2nd paragraph	RD&D	*"Each WMO focuses on carrying out RD&D…"* "… and beyond" (I hope)... It is important that the RD&D is not a closed priesthood that does not look outside of its own order – and that is also the reality today for most of the WMOs.	*Agree. The wording " " ... and beyond" have been added to the text.)*

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20.	Figure 1.3.1 p. 7	Boundary conditions	The left yellow column is far from complete. There are also boundary conditions set beyond the regulatory body and local partnerships – think of national and international law, input from public consultations (to be taken into due account on the basis of the Aarhus Convention, art. 6(8)), regional planning procedures, etc. It should not be a real problem to replace the words *"man and environment"* by "people and environment" (also on page 8). This is not a feminist or pc quirk, but rather to remain alert to the fact that especially pregnant women and children, rather than healthy men in their 40s, are the most vulnerable to low radiation doses.	*Each waste management programme considers and complies with the requirements that come from the international and national legal and regulatory frameworks.* *The figure is a simplification and does not address all details of the boundary conditions.* *Source: IAEA - the IAEA glossary used as a reference. Man is used in generic sense in the figure based on the international agreement of the IAEA.*
21.	1.3 p. 8	Consensus?	*"At the international level, there is a consensus…"* This is not true. There is no consensus about this issue – repeating a claim *ad nauseum* does not make the claim true.	*The SRA working group and experts in geological disposal in various publications and scientific studies disagree with the statement. What e.g. OECD/NEA states on these issues have been explained in question 15 above.* *The geological disposal has currently no alternative, though RD&D on other waste management technologies like transmutation is on-going elsewhere outside the IGD-TP. Geological disposal is the required end state for all of these technologies in the long-term.*
22.	1.3 p. 8 1st paragraph last sentence and 5th paragraph 2nd sentence p. 8 2nd paragraph last sentence	Clarification Grammar suggestion	maybe explain 'phenomenology' in a footnote (different meanings in different contexts) *relied → relies*	*Point taken, meaning is* ***Process understanding*** *(not phenomenology as in philosophical or research approach). The text in the SRA has been changed.* *Change in the SRA to: are the isolation and containment of the radionuclides i.e. the delay and attenuation of their releases.*

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23.	Figure 1.3.1 p. 7-8 End of 2nd paragraph p. 8	Suggestion of writing	It would be better to remain faithful to the cited reference (1-19) and refer to the primary safety functions of isolation and containment.	*Point taken – the text have been changed.*
24.	1.4 p. 9 2nd last paragraph	Suggestions	Interconnectedness stages develop, select & design add societal component? Communicating or discussing?	*Agree, the interaction with the stakeholders continues throughout the staged process of the repository development and implementation. This is assumed implicitly to be included into the process and no changes are made to the SRA text besides what is stated in connection with the key topic 7.*
25.	Figure 1.4.1 p. 9	Safety	Safety is the most important issue of final waste disposal. Taking into account this aspect safety should be more focused on in the SRA. For example on page 9 in figure 1.4.1 safety is in my opinion not mentioned in the second step of "Develop concepts and technology" though both technology and concepts must be based primarily on safety reasons. Therefore the safety issue must be underlined in a much clearer manner.	*The figure is a simplification of the implementation steps. It does not show the process, which is based on safety evaluation.*
26.	1.4 p. 10-11	Guidelines from the EG	The guidelines from the EG on pp. 10-11 are unhelpfully condensed as bullet points. Two very important examples are as follows: *To put the emphasis (should-sic) on safety-related research.* This does not sit comfortably with the later statement (page 17) that the focus of the SRA content is on uncertainties with low to moderate significance for safety. I suspect that the implicit message is that the programmes closest to implementation are already confident in the safety of the as-designed systems at the chosen locations, but this needs to be carefully explained. *To emphasise construction and operational safety issues.* As written this implies that the SRA will concentrate on the safety of carrying out construction and operations whereas I suggest this refers primarily to the level of long-safety that will be achieved by adopting certain methods of construction and operation.	*The feasibility of all programmes closest to licensing was demonstrated through long-term safety. In the construction and operations stage there is a need to address related safety issues besides continuing with the improvement of knowledge about the long-term safety.* *Section 1.4 in the SRA document has been revised.*

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27.	1.4 p. 11	Clarification	High urgency is relative to 2025 check 3rd & 4th bullet	*Text has been added in relation to reaching the Vision 2025* *The different licensing dates of the individual waste management programmes are drivers for when the products are needed = urgency.*
28.	1.4 p. 11 1st paragraph under the bullets	Member organisations & SRA working group	*"The SRA working group consisting…"* Greenpeace has not been invited to the SRA working group – the working group therefore did not consist of representatives from all of the IGD-TP member organisations.	*This is correct. The IGD-TP member refers to the members of the Executive Group.*
2. Framework of the Strategic Research Agenda (SRA)				
29.	2. p. 12 1st sentence	Suggestions	*technologic → technological* delete "references to and interactions with" and change" areas" into "aspects"?	*Text in the SRA has been changed.*
30.	2. p. 12 2nd paragraph	Clarification of statement "unbiased SRA"	Paragraph 2 on page 12 refers to an "unbiased SRA". Particularly given the contentious nature of work in this field it would be helpful to explain what is intended by this statement and then comment specifically at the end of the document how such requirements have been/ will be met.	*Text in the SRA has been removed /changed.*
31.	2.1 p. 12 1st paragraph	Clarification of statement	The first paragraph under 2.1 could be seen as addressing some of the issues raised under my comment above (See No. 29). However, it is difficult to reconcile the two sets of statements and indeed to reconcile either of them wholly to the topics and discussion that come later in the document.	*Modifications have been made to this part of the text and the comment has been addressed in the new version of the text.*

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32.	2.1 p. 13	Clarification, Communication & Stakeholder	Specify who the information and consultation process and open communication that SRA entails are aimed at: clarify "stakeholders": are stakeholders all people living in the vicinity of a site or even all energy consumers (who is "the public"), or people with specific education & training / business interests?	*The stakeholders consultations were especially aimed at the IGD-TP participants and other stakeholders with direct interest in the IGD-TP vision and SRA, but open to all public* *The text in chapter 2.1 has been changed: ... a SRA seminar with the IGD-TP participant endorsing the vision, who were given an opportunity to ...*
33.	2.2 p. 14	Clarification, Main issues and Key topics	In Section 2.2 it is very difficult to understand the transition between main issues and key topics. One would expect there to be some mapping of the key topics onto main issues but the description implies effectively two different analytical processes and fails to explain why some identified aspects of the main issues are not carried through to key topics.	*The text in the SRA has been modified for more clarity of the rationale of the steps.*
34.	Figure 2.1.2 p. 14	Terms	*"Acceptance*" is a dangerous term here, because throughout the programmes it is not a question of acceptance, but of acceptance or non-acceptance, or rather of decision-making. My proposal is to use the term decision-making rather than acceptance. This should be done throughout the document. I only want to remind that in most procedures the "opt-out-at-any-time option" for local communities accepting development of radioactive waste management on their territory (the basis of voluntarism) needs an open-ended language – "acceptance" is not open-ended. This is also true for the safety case: if any technical or site-specific issue blocks the safety case, it should be possible to stop further development. That means a scientifically honest and open-ended approach – and language.	*In the SRA the word "acceptance" has been replaced with the word "decision-making" where applicable in the text. Acceptance is only one aspect of decision making.*

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35.	2.2 p. 14	Main issues	…an essential point is missing in the list of main issues: Management of human interference. This includes the question of reversibility and/or retrievability, unintended human interference and intended human interference (for instance for the harvesting of materials – radioactive or nonradioactive). Because three programmes are progressing relatively fast (Sweden, Finland, France) this should be an RD&D area of high priority. Possible human interference has site related aspects as well as technology related aspects, but also technical-scientific as well as social-scientific ones.	*Consideration of human interference is included in the national legal frameworks and addressing it is a waste management programme specific issue. This is considered in the safety cases.* *Key topic 3 addresses reversibility and retrievability.*
36.	2.2 p. 14-15 bullets	Suggestion of topics	3 bullets: all through modelling, i.e. within the boundaries of our spatio-temporal frames → add " " to "demonstration" & "confirmation"? add social acceptance as a requirement? long term safety: add "societal background conditions"? or skip the issue for now and change into long term passive safety? What about security?	*Key topic 7 addresses these concerns. Security is addressed in Key topic 5.*
37.	2.2 p. 15	Key Topics	Page 15 gives a list of seven Key Topics. Have you considered the safeguards issues when preparing the SRA ? It's a common issue for all waste management organizations and independent of the type of the host rock or the repository.	*The safeguards concerns fall under Key topic 5, but are already addressed e.g. by IAEA.*

No.	Section	Concerning, keywords	Comment/Question	Response statement/Corrections Measure
38.	2.2 p. 15 see box	Clarification, Governance/ Communication	box + + but - governance and open communication shouldn't be limited to confidence building with stakeholders, but to better research in general. - to convey scientific or (and?) technical issues to stakeholders and the public (see also comment p.13) but also the other way around, to convey societal, ethical, cultural… issues to the scientific and technical community - last §: suggestion: "Procedural issues make up a separate class of Cross-cutting Activities related to issues of *governance*. Governance refers to … . It thus entails the decision making process in general, licensing requirements management, communication practices, etc. Research in the framework of governance for IGD commonly focuses on the siting process, but in a broader understanding it entails all aspects related to the justification of choices made in the context of RWM." adding a definition of governance will for one thing make you drop "stakeholder" before "governance" as it is now in this § Don't know if the last sentence is justified in an ethical sense, why would you want to streamline scientific and technological aspects (i.e. safety standards ss) on a European level but leave aspects of governance completely up to the national level? In any case international frameworks like the Aarhus convention and the Strategic Environmental Assessment exist already.	*An IGD-TP "Interfaces Working Group" has been decided by the EG to interface with non participants of IGD-TP.* *The focus of the SRA is limited (as explained in Chapter 2) and the work is focused on cooperation that can be carried out together. The key topic 7 is in alignment of this. National specifics are handled in each waste management programme given the local conditions.*
	p. 16		Maybe you could make clearer that the TP in the first place aims to be what it is, a Technology Platform, but the covering / uptake / interaction of / from more social sciences needs to be further specified / will be encouraged. P.16 partly does this.	*In the IGD-TP Vision Report (available at the www-igdtp.eu website) the concept of technology platforms and the aims for the IGD-TP are explained.*

No.	Section	Concerning, keywords	Comment/Question	Response statement/Corrections Measure
39.	2.2 Top of p. 16	Clarification Key topics and topics	The sub-division of key topics into topics at the top of page 16 is very difficult to understand. In some ways this seems to reflect a project management device to make work streams tractable, but the SRA is not later described as being implemented in such a manner. Having established main issues, key topics and topics the document then discusses RD&D issues without relating these to any of the established categorisation until Step 3 is described. Then key topics and topics are introduced in a different manner to previously as a means, which is never explained, of supporting prioritisation.	*The text in the SRA has been modified for more clarity and consistency. The order of the text in Chapter 2 has been changed.*
40.	2.2 p. 16 last paragraph	Issues/ Clarification	Was the objective of the consultation to get comments on the appropriateness of the selected topics of the Strategic Research Agenda (SRA)? If so, it is difficult to formulate comments because the rationale for selecting and prioritizing topics is not explicit in the report and the information on the compilation, classification and identification of the topics is not detailed. For example, the criteria used during Step 1 & 4 of the "systematic approach in developing the SRA" are not clear. It is stated on p.16 that "For selecting issues the basic criteria are the state-of-the-art, the best practice established in the different scientific areas and appropriate technologies available so far." However, these elements are not criteria. It is then explained that the "importance, urgency and RD&D needs" of the issues are considered. But, it is not known how the "importance" of an issue is assessed (does it relate e.g. to the relevance to safety?).	*Yes, in relation to achieving the Vision 2025. The chapter 2 has been modified to increase the clarity of the rationale.* *The classification basis for issues was initially stated in the Vision Report and the individual issues are derived from the WMO's published RD&D plans. The SRA does not apply explicit "criteria", but the five step rationale is explained.*
41.	2.2 p. 17 2nd paragraph 3rd paragraph	Issues/ Clarification	Why focus on uncertainties with low to moderate significance? Why in particular technologies that contribute to pre-closure phase?	*The text has been modified for clarity.* *The pre-closure phase can be influenced in terms of long-term safety. The post-closure phase relies on passive safety.*
42.	Figure 2.2.3 p. 18 & box		Can imagine that figure 2.2.3 is disputable? box ++	*The figure has been changed.*

No.	Section	Concerning, keywords	Comment/Question	Response statement/Corrections Measure
43.	Figure 2.2.3 p. 18	Clarification – Stages of repository development	The meaning of the Figure 2.2.3 is not clear. The figure should describe the "*Uncertainties in geological disposal relation to RD&D at different stages of repository development*". However, the different stages of repository development are not visible in the figure. It would also be informative to shortly justify the levels of uncertainty in the text.	*The text in the SRA has been changed.*
44.	Figure 2.2.3 p. 18	Clarification – Text and intention	Reading through the SRA, it looks rather familiar. The same topics as covered by FUMNIG, NF-PRO and the IGSC programme are invoked. So I am missing a bit the 'S' in the SRA. This is on the first glance though: Figure 2.2.3 (p. 18) seems to come up with a different message; the research should concern only site/programme specific problems, if I understand correctly. This disparity between text and intention needs to be clarified.	*The geological disposal has been studied for 30 years and the studies have confirmed that major new issues have not arisen in the process. The SRA builds on the requirements of the waste management programmes and on the state-of-the-art, see text and Figures in Section 2.2.*
45.	Figure 2.2.3 p. 18	Clarification of figure	It is very unclear what Figure 2.2.3 is trying to convey. It does not seem to reflect the unduly abbreviated associated text. I imagine that a literal reading that the highest uncertainty is associated with the suitability of repository and site is not intended to apply to those programmes nearing implementation, particularly when the work needed is stated to be "mainly done". The document is not well-served by the gratuitous text on epistemic and aleatory uncertainties, particularly when Figure 2.2.3 defines new classes of uncertainty which are difficult to distinguish and therefore understand. Given the title of the figure one would expect some timeline in its presentation.	*Figure has been changed.*

No.	Section	Concerning, keywords	Comment/Question	Response statement/Corrections Measure
46.	2.2 p. 18 box	Uncertainties in decision making	I have reviewed the document and think it is thoughtful and comprehensive. I was especially pleased to see that the box on page 18 (handling of uncertainties in decision making) emphasised that both epistemic and aleatory uncertainties need to be addressed appropriately. These are sometimes mixed together, and even sometimes convoluted with time dependence, whereas each of these needs to be treated separately by appropriate techniques. Epistemic uncertainties, which are often dominant in geological systems, can be treated using Evidence Support Logic (ESL) and for this reason we have used this approach for a wide range of decisions relating to both the geological disposal of radioactive waste and the geological storage of carbon dioxide (e.g. site selection for Shell). I was also pleased to see your emphasis on Knowledge Management and think this is a very pertinent topic for international collaboration.	-
47.	Figure 2.2.5 p. 20	Clarification	Figure 2.2.5 and associated text refer to **importance** and urgency as the main factors in prioritisation but Section 3 then discusses priority and urgency as equal, separate metrics.	*The text in the SRA has been clarified.*
48.	2.2 p. 21 2nd paragraph		*"In particular the selection of Key Topics…"* Why has this only been done with participants and stakeholders who endorse the Vision 2025, and not with a wider group? This means that important questions may have fallen off during the process because of "performance bias". The involvement of "outsiders" seems within the SRA, and the IGD-TP in general, not a continuous process, but one of stop and go. This creates a strong defensive attitude among those who are excluded and negatively impacts the quality of output.	*The IGD-TP is implementer driven and the SRA complies with the vision. 30 year of studies in geological disposal have developed the identified issues that support the selection of the Key topics and this open consultation of the SRA draft has confirmed this finding for the IGD-TP's first SRA.*

No.	Section	Concerning, keywords	Comment/Question	Response statement/Corrections Measure
49.	3. p. 22	Clarification Topic and RD&D	It would be beneficial to have a list of the topics needed to be covered for implementing a geological disposal together with the justification of whether or not a particular topic requires further RD&D effort (e.g.: on the form of a table). The estimated priorities should then be justified against clear criteria taking into account the advancement stage of the various national programs. This would allow a clear understanding of what still requires some RD&D efforts and what is already considered as sufficiently mature by the most advanced countries for implementing safe geological disposal of radioactive waste. This would also be helpful to understand the appropriateness of the RD&D topics set retained.	*The figures in Chapter 3 concerning the Topics under the Key topics are intended to convey this information.* *The explicit criteria have not been applied as noted in reply for comment 39. Such an evaluation takes place in the individual waste management programmes in relation to the local conditions, see figure 1.3.1.*

No.	Section	Concerning, keywords	Comment/Question	Response statement/Corrections Measure
50.	3.1 p. 22 1st bullet	Key Topic 1 Safety Case	We agree that the Safety Case plays a central role in the licensing procedure for a geological repository. But beyond this the stepwise development of the Safety Case during different phases of repository planning, development, implementation and closure is pointed out in various publications (cf. e.g. the NEA RWM IGSC). This aspect is not explicitly covered by the definition (p.22). With regard to Topic 2 "*Communication*" and Topic 3 "*Confidence in further refinement; sensitivity and uncertainty analyses*" the stepwise character of the Safety Case is of major relevance and should be considered in the research topics 2 and 3. Furthermore the first bullet in the "objectives" (p.22) can be understood contradictory to the definition above as in this bullet "long-term safety assessments" are mentioned as "the scope and contents of safety cases". This excludes the need to assess operational safety in the Safety Case and blinds out the relevance of the safety case for the other phases (planning, construction, operation, closure, and post-closure) and the interdependencies between those phases. With regard to increasing confidence (Topics 1 + 3) and communication (Topic 2) the scope of the safety case should not be reduced to describing *"the evolution of the repository in a way that can be seen as a reasonable representation of what might happen."* (p.22). In order to give a comprehensive proof of long term safety the safety case should treat the "possible" but also all "impossible" evolutions, as their "impossibility" has to be proofed beyond any reasonable doubt there.	*As mentioned before, the focus of the SRA is limited (as explained in Chapter 2) and the IGD-TP work is focused on cooperation that can be carried out together. The key topic 7 is in alignment of this. National specifics are handled in each waste management programme given the local conditions.* *The safety cases are always specific to the site and the concept. They are repeated in the different stages of the repository development programme with new research findings and developments.*
51.	3.1.1 p. 22 2nd paragraph	Clarification	*"The safety case must be able to describe…"* "… and give a clear indication of uncertainties in the description."	*Yes, the uncertainties assessment is an integral part of the safety case and is stated explicitly in the definition of safety case. Also chapter 2 discusses the uncertainties.*
52.	3.1.1 p. 22 4th bullet	Objectives	Dialogue with the authorities is a national issue, not so much an issue for the TP.	*Agree, but a common basis for regulatory requirements is needed.*

No.	Section	Concerning, keywords	Comment/Question	Response statement/Corrections Measure
53.	3.1.1 p. 22 4th bullet	Objectives	*"Further improve fruitful dialogue with the authorities"* "…and other stakeholders…" (as is already acknowledged on page 23)	*An "Interfaces working group" is set up by the IGD-TP EG - no text change in the SRA.*
54.	3.1.1 p. 22	Safety case	When talking about consistent safety cases it should be remembered, that safety cases developed e.g. for L/ILW repositories are different than those prepared for the spent fuel ones. Hence, the type of the waste and facility shall be taken into account (graded approach). Review of the safety case with other WMOs is a good idea but might be difficult in practice, due to the large amount of work needed for such a review.	*True. The IGD-TP focuses on deep geological disposal of spent fuel, HLW and other long-lived radioactive waste. Learning from the L/ILW repositories have been and continue to be applied also in the safety cases of deep geological disposal.*
55.	3.1.2 p. 23	Key Topic 1 Topic 2 & 3	Communication to which direction? General public, regulator or all stakeholders? Confidence of whom? Those who make the analysis or general public?	*Regulators, decision-makers (representing the general public).* *Confidence of the WMO's first and the regulators and decision makers.* *No change in the SRA text.*
56.	3.1.3 last sentence p. 24, beginning of p. 25	External balance	*"Since the normal routes through which scientific…"* And, I would suggest, by a pre-defined core of independent academics. When peer review is only done by participants of the TP, there is too much risk of bias, certainly given the strong Vision. Some sort of external balance should be introduced here.	*There are several levels of reviews: First the review of the results by the WMO's prior publication, then by scientific community, and by the regulators engaging the independent experts. The peer review intended to promote learning between the IGD-TP members is an addition to the existing review structure, not a replacement of it. No change in the SRA text.*

No.	Section	Concerning, keywords	Comment/Question	Response statement/Corrections Measure
57.	3.2 p. 25	Key Topic 2 Waste forms	The main aspects named here are the dissolution properties of increased burn-up fuel and MOX fuel. Fuel with burn-up of 50 GW/tU as well as MOX fuel have been used and are known for several years. If - in spite of the existing knowledge - research on dissolution properties of high burn up and MOX fuel is necessary from the IGD-TP's point of view it remains unclear why the two fuel types are differently ranked regarding priority and urgency. Even if a "*deferred disposal*" is expected to be likely for MOX fuel the criterion applied for high burn up fuel "*license applications related to the disposal of such fuel may be inadequately supported unless further work is performed*" would apply for MOX fuel as well if knowledge gaps exist.	*The cooling time of the MOX fuel is longer and there is therefore more time for producing the results.*
58.	3.2.1 p. 25	Objectives	Inventory as well as chemical and physical form of the waste are both important.	*yes.*
59.	3.2.2 p. 25	Key topic 2 Topic 1	The importance attached to Topic 1 under Key Topic 2, concerning rapid release fractions from high burn-up spent uranium oxide fuel, seems surprising given that highly conservative assumptions and modelling of this process appear not to result in significant safety consequences.	*The importance is derived from the RD&D plans of the WMOs and from the stepwise process of the SRA.*
60.	3.2.2 p. 26 2nd paragraph	Key Topic 2 Topic 2	Chemical form of C-14 in activated metal waste can be mentioned as an example.	*Chemical species is mentioned in the SRA.*
61.	3.2.2 p. 26	Key Topic 2 Topic 2	I agree with the importance attached to Topic 2 under Key Topic 2, concerning radionuclide release from long-lived ILW but would have expected inclusion of: i) consideration of optimised waste packaging to limit releases; and ii) improved modelling of releases in safety assessments.	*The details of the topics planned for cooperation are developed further in the deployment plan.*
62.	3.2.2 p. 26	Key Topic 2 Topic 5	What is the reason for putting topic 5 so early? Why have these issues of vitrified waste to be solved before 2016?	*There are waste management programmes with licensing needs by 2016.*

No.	Section	Concerning, keywords	Comment/Question	Response statement/Corrections Measure
63.	3.3 p. 28	Key Topic 3 Repository components	Many of the aspects named under this key topic seem to be very much project related, e.g. those issues that refer to optimisation, esp. cost optimisation, or the detailed adaption of buffer material to the disposal concept, geological conditions, and regulatory requirements. We agree that these questions have to be clarified by the implementer in the context of the advanced technical layout and design of a repository but we would not necessarily define all the issues named under this key topic as part of a strategic European research agenda.	*The topics are derived from the RD&D programmes of the WMO's and from the stepwise process.* *The SRA is the IGD-TP's SRA not "a European research agenda".*
64.	3.3 p. 28	Key Topic 3	The Key Topic 3 comprises the Topics 1-17. From the research point of view, Keytopic 3, Topics 9-17 are very important because they are realated to the long-term performance of the geological disposal	*Yes, they are important, otherwise they would not be in the SRA. However, there importance and urgency have been judged by the WMO according to the Figure 3.3..1 in the SRA.*
65.	3.3.1 p. 28 5th paragraph	Rationale and benefits	*"The work performed…"* The IGD-TP is fooling itself. Until research is finished, we cannot know whether these technologies are available. Better formulation: "The work performed […] will contribute to finding and defining construction technologies that meet the performance targets […]"	*The IGD-TP aims to demonstrate technologies that have already been defined and developed. The proposal does not reflect this.*
66.	3.3.3 p. 31	Key Topic 3 Topics 15 & 17	It is unclear that Topics 15 and 17 under Key Topic 3 are different and it is therefore worrying that they are accorded different priorities.	*The text for Topic 15 and 17 has been clarified in the SRA.*
67.	3.3.3 p. 31	Priorities	What is important is to understand the interactions between the buffer and other repository materials in realistic way, so that the facility operation issues together with the long term safety issues are taken into account in a reasonable, balanced way. Topic 17: to <u>better</u> understood. We already understand something !	*see comment 66*

No.	Section	Concerning, keywords	Comment/Question	Response statement/Corrections Measure
68.	3.3.3 p. 31 (Topic 17)	Sources	In general, technical claims are not sourced. This happens throughout the report. It would be good to add sources of available peer-reviewed and public studies on which these claims are based. An example can be found on the end of page 31: *"For the case of temperatures up to 100°C this understanding is considered quite good."*	*see comment 65* *We have not chosen to reference all technical matters for easier readability of the SRA. The relevant references can be found in the WMO's RD&D plans, see SRA reference list references 2-3 –2-13.*
69.	3.3.4 p. 32	Clarification	I strongly advise that the text under "Demonstration of full-scale operations" is revised to clarify that the descriptions are for the specific programmes that are close to implementation. It implies that there are fixed disposal concepts for given types of host-rock. This is dangerous since, for example, the geochemical conditions in all crystalline rocks are not necessarily suited to the use of copper containers. It is particularly difficult to understand what is meant by "the rock salt disposal concept" (see also general comments above).	*The statement is not intended to state what happens in different site specific conditions. Some text changes have been done in the SRA to clarify what was meant.*
70.	3.3.4 p. 32 Middle of page, (Topic 2)	Sources and transparency	The descriptions of where certain claims are tested is intransparent and unsourced. An example: page 32: *"Full-scale production of buffer blocks of the required density has been demonstrated, along with their emplacement in boreholes."* Where has this been demonstrated, by whom, and where can the information be found? Without this crucial information, the report is nothing but an unsubstantiated collection of claims that cannot be checked on their validity. This problem appears throughout the report.	*See comment no 67 and the limited approach to referencing chosen for better readability.*

No.	Section	Concerning, keywords	Comment/Question	Response statement/Corrections Measure
71.a	3.4 p. 34	Key Topic 4 Development strategy of the repository	The objectives of this key topic touch the aspect of optimisation over the long time span that lies between planning and closure of a repository. We very much agree that this is an important aspect in geological disposal. The aspect of safety optimisation in waste management activities can also be found in literature (cf. e.g. IAEA) and is the basic principle of the safety management which is an established tool in nuclear and other hazardous industries. The scope of this key topic should therefore be broadened to the objective of developing the baseline for a comprehensive safety management system that includes all elements of a systematic approach for safety optimisation over the whole cycle from repository planning to closure.	*The Vision 2025 is the focus. The closure of the repositories is not planned by 2025. The post-closure is considered in the requirements that are dealt with in the individual waste management programmes.*
71b	p. 50 p. 54	Knowledge Management & Requirements management systems (RMS)	The topics 4.1.3 "*Knowledge management*" and 4.2.3 "*Requirements management systems (RMS)*" also touch some of aspects which are of importance in this context. With regard to section 4.1.3 it should be considered that the reduction of "knowledge management" to "Nuclear knowledge management" is neither consistent with the integrative character of nuclear and non-nuclear (e.g. mining or technology related) requirements in geological disposal nor is it reflected within section 4.1.3 itself where many non nuclear issues are mentioned in the list of bullet points (p. 50). As the safety management and the early implementation of a comprehensive safety management system is an important feature for the safe realisation of nuclear waste disposal and the necessary basis does not yet exist priority and urgency of this topic should be ranked high.	*Nuclear knowledge is defined in the text derived from the IAEA's definition, which is the reference glossary underlying the SRA.*

No.	Section	Concerning, keywords	Comment/Question	Response statement/Corrections Measure
72.	3.4 p. 34	Key Topic 4	The most surprising omission from Key Topic 4 is the absence of a topic on repository design, development and operation to manage gas generated from waste packages. I am aware of the activities being conducted under the FORGE and LASGIT Projects but at the very least would expect some discussion on the extent to which these projects will address the key issues in this area.	*This is implicitly addressed in Key topic 1 in the safety case and in key topics 3 and 5 in the design and safety of constructions and operations as a part of detailed design optimisation. The Key topic 4 is intended to cover the adaptation, but not details of design. As stated, cooperative work is currently on-going around the scientific basis.*
73.	Figure 3.3.1 p. 34	Priorities and Planning	It is important to mention here that, in the IGD-TP SRA schedule, Topics 9&10 are considered of high priority and urgency, whereas Topic 14 is considered of medium priority. Therefore Topics 9 & 10 are scheduled to initiate in 2011-2012 (see Figure 3.3.1). This is important because a significant part of future Euratom Framework Programmes calls for proposals will be based on the priorities and planning of the IGD-TP SRA and DP. As part of the overall prioritisation of research carried out collectively within IGD-TP, the IGD-TP's Executive Group shall be prepared, if requested to assist the EC in identifying relevant topics for possible inclusion in future FP calls.	*The IGD-TP is implementer driven and not EC driven. EC is one of the stakeholders to the IGD-TP.*
74.	3.4.1 p. 35 last paragraph	Reversibility and retrievability	The IGD-TP appears not to understand the issue of reversibility and retrievability very well in its political consequence. It is unlikely that during future developments, European citizens will accept different standards within the Union concerning this issue, and reversibility and retrievability may well become rule throughout the Union. That means that reversibility and retrievability are not a problem to be considered for *"some waste management programmes"* (page 35), but for all waste programmes and its consequences need to be taken into account in all RD&D efforts.	*This topic is addressed in international work like OECD/NEA conference in Reims in December 2010.* *The texts on reversibility and retrievability have been modified in the SRA.*

No.	Section	Concerning, keywords	Comment/Question	Response statement/Corrections Measure
75.	3.4.1 p. 35 6th paragraph	Safety conditions	*"Improving the safety conditions…"* This once more demonstrates the misconception of the IGD-TP concerning public acceptance of its work. A better formulation would be: "Improving the safety conditions and its demonstration will be beneficial to gain or to maintain support for the continuation of research into deep geological disposal."	*The waste producers and/or the WMO's are responsible for the safe management of the nuclear waste and the related RD&D. No modification to the SRA text.*
76.	3.5 p. 37	Key Topic 5 Operational safety	Operational safety can be evaluated and developed only after the disposal facility has been designed. Before that the experience from the other operating nuclear facilities can and shall be taken into account.	*Applies to the evaluation, but development can start from the beginning of the staged repository development process. No modification to the SRA text.*
77.	3.5 p. 37	Key Topic 5 Operational safety	The topic covers a broad range of issues. Regarding the issue of "design and stability of openings in clay formations" we agree that there is a generic interest and a safety related research need. For many other issues the description in our view does not show clearly enough the generic research needs that go beyond project specific planning or "the state of the technical art in underground mining and safety-related nuclear design".	*The topics are derived from the RD&D programmes of the WMO's and from the stepwise process. Details are addressed in the SRA's deployment.*
78.	3.5.1 p. 37 3rd paragraph	Rationale and benefits	*"Even though geological repository development…"* Currently, safety culture is within the nuclear industry largely based on ALARA, whereas in the chemical industry as well as the treatment of hazardous wastes, prevention and the use of BAT are the leading principles. Because of the undermining influence of economic and political considerations in the interpretation of the term "reasonable" in ALARA, for credibility and safety quality reasons a consequent use of BAT instead of ALARA is necessary. This also should extend to safety culture: the use of best practice should be standard, irrespective of cost implications.	*The ALARA (As low as reasonably achievable) is a radiation protection principle as BAT (best available techniques) is a technical principle. The actual use of BAT can result in higher radiation impact than ALARA. The philosophy behind the concepts is not comparable.*

No.	Section	Concerning, keywords	Comment/Question	Response statement/Corrections Measure
79.	3.6.2 p. 41	Key Topic 6 Topics 1-5	The text under 3.6.2 concerning monitoring seems unduly prescriptive. Given the highly contentious nature of the topic it seems essential to define "performance confirmation" since most interested parties perceive this as a promise to monitor that the system will deliver no more than the calculated long-term radiological impacts. The justification for the prioritisation of Topic 1 seems to flow from an unsupported assertion of what will be required by all regulators whereas national regulations are generally carefully non-specific in this area. The terms "environmental reference state" and "initial reference state of the environment" under Topic 3 are not familiar but the work proposed hardly seems to warrant inclusion as a priority topic, being rather better suited to cooperative benchmarking of well-established (in many cases) national practices against national regulations. The details under Topics 4 and 5 beg the question as to the nature of the tools to be covered by Topic 1. I suggest that this Key Topic should be carefully reviewed and revised before the SRA is finalised.	*The topics are derived from the RD&D programmes of the WMO's and from the stepwise process.* *Performance confirmation in this context means the conformance to regulators' requirements that can be tested prior closure. (ref. to IAEA definition)* *No modification to the SRA text.*
80.	3.6.2 p. 41 3rd paragraph	Key Topic 6 Topic 3	Monitoring of the environmental reference state. It should be stressed, that the current choice of sites in Finland and Sweden, as well as site discussions in England, lead to an extra problem. Because the reference state will have to be compared with the actual state over very long periods of time, and in these cases the sites are near existing nuclear facilities that have a life-time far shorter than these periods of time, the reference values will have to be corrected for the presence of these nearby nuclear facilities. This is an extra challenge given the uncertainty around impacts of the nuclear power stations and reprocessing installations found on the above mentioned sites. Nevertheless, reference state data should reflect a true zero-state – the base-situation without impact from standing nuclear installations – in order to properly be able to assess longer term impacts of deep geological disposal facilities. The argumentation "but this was already a contaminated area anyway" is not acceptable.	*Reference to MODERN web page is /3-10/* *This is not a comment related to the SRA.*

No.	Section	Concerning, keywords	Comment/Question	Response statement/Corrections Measure
81.	3.6.2 p. 41 6th paragraph	Key Topic 6 Topic 5	Post-closure monitoring. Because the post-closure time will start at the earliest one to two generations from now, it is important that post monitoring strategies include options that are so robust – and probably technically simple – that they can also operate when economic and technical circumstances have strongly deteriorated. One cannot rely solely on high-tech solutions, including wireless systems and highly computerised systems. This issue is more or less indicated on page 47, but could be made more explicit.	*The geological repository relies on passive safety. No modifications into the text, since the details are developed in the deployment plan, not in the SRA.*
82.	3.7 p. 43	Key Topic 7 Governance and Stakeholder involvement	We agree that stakeholder involvement and the governance of such processes is crucial for the realisation of nuclear waste disposal. Contrary to the "definition", however, the statements on "objectives" and the description of "topics" are very much focussed on the issue of communication – which is only one, rather limited aspect of involvement. Accessing the goals described under "rationale and befits" "*to build stakeholder support, confidence and trust*" needs tools for stakeholder involvement and participation processes that go far beyond communication. Stakeholder involvement should be considered in the research topics with this broader understanding. This comprises that stakeholder involvement measures which enable participation should not be reduced to a local level during the licensing application phase (topic 3) but have to start earlier on a national level. Furthermore it remains unclear who are the decision makers that shall be addressed by the communication processes in topic 1. The "*integration of technical, social and economic information*" refers to a crucial aspect of radioactive waste disposal. But it is primarily an issue of stakeholder dialogue to elaborate on and define the *social* aspects of those issues which are often well understood and described regarding their *technical* dimension. The needs for mutual learning and stakeholder participation that has a true potential for shaping and influencing the planning and decision making process in geological disposal and its boundary conditions should be strengthened in key topic 7.	*The topics are derived from the RD&D programmes of the WMO's and from the stepwise process.*

No.	Section	Concerning, keywords	Comment/Question	Response statement/Corrections Measure
83.	3.7.1 p. 43 2nd paragraph	Objectives	*"The purpose of this Key Topic…"* This formulation implies once more a strategy of massaging the public into acceptance, instead of honest and open dialogue. To prevent that, the IGD-TP could add: "... and give decision makers and stakeholders the possibility for feedback to identify weaknesses and concerns that need to be taken into due account in research, development, decision-making processes as well as implementation."	*SRA text has been modified.*
84.	3.7.1 p. 43 3rd paragraph	Rationale and benefits	*"It is essential that effective…"* This is one of the better illustrations of the Vision-2025-based bias of the IGD-TP. It is better formulated in the following sentences of the report: dialogue, reviews, consultations and transparency should be used to enhance the quality of the decision-making in the process of development of radioactive waste management – including RD&D of deep geological disposal. Whether or not this will lead to implementation of deep geological disposal projects, and if so, in which time frame, is depending on the developments in RD&D, the above mentioned interactions and the resulting decision-making processes. By linking itself to the Vision 2025, the IGD-TP constantly gives the impression of wanting to massage the public into acceptance of what is until now still an unproven radioactive waste management method. It is striking to notice, that the IGD-TP has not followed the recommendations in this paragraph during the preparation of this SRA report – including transparency and the facilitation of dialogue (e.g. by explicitly excluding Greenpeace from the activities of the IGD-TP leading up to the report).	*The sentence is detached from the context where it is presented. No modification of the SRA text.*
85.	3.7.1 p. 43-45 1st paragraph	Clarification - Emphasis and aim	Start with defining stakeholders? (cf. supra also) → start with last § on p. 45? "dialogue an review on research results" (a posteriori) or co-production of research results, shared research activities? focus on communication or deliberation? Is the aim "support, confidence and trust" or better research for better decision making? 3.7.2 and 3.7.3 have a different emphasis than 3.7.1 (more integrated and inclusive focus)	*SRA text has been modified.*

No.	Section	Concerning, keywords	Comment/Question	Response statement/Corrections Measure
86.	3.7.3 p. 45	References	There is no reference to the existing international legal framework under which the IGD-TP is working, e.g. the Aarhus Convention, the Espoo Convention and its SEA Protocol and the different EU Directives on transparency, access to information, public participation and access to justice. This legal framework has direct consequences for the form and quality of stakeholder and public participation and communication / dialogue as well as foreseen time-lines.	*IGD-TP is working under the Terms of Reference defined and published for the IGD-TP. The legal frameworks apply only to individual waste management programmes in their respective countries, see Fig. 1.3.1.*
87.	4. p. 47 bullets	Management program specific activities	is (it ok that) waste acceptance (quality assurance and safeguard issues) (is) a 'national, program specific' issue?	*Not a national issue but waste management programme/ organisation specific.*
88.	4.1.2 p. 48	Knowledge management	The skills of older personnel shall not be over-valued. New generation bring new skills and knowledge, which is missing from older ones. These include better knowledge of IT, social networks, etc.	*Geological disposal due to its multidisciplinary nature requires various competencies independent of the age of the holder of the competence.*
89.	4.1.3 p. 50 4.2.3 p.54	Knowledge Management RMS	The collection and management of the design basis information, including the requirements to which the design is based, is of vital importance. The typical operating times for a waste disposal facility could be as long as 100 years. Future modifications to the facility shall be based on the original and correct design base data. Otherwise wrong decisions and modifications could be done.	*SRA text has been modified.*
90.	4.1.3 p. 50 last paragraph	Grammar suggestion	*"<u>its</u> usefulness"*	*SRA text has been modified.*
91.	4.1.3 p. 51 2nd paragraph	Openness & Transparency	*"The management of knowledge…"* This sentence is incomprehensible and the fact that there is no "." at the end indicates that there has probably been more explanation in an earlier version. However, increased requirements for openness and transparency are likely to *reduce* the challenges rather than increase them, as implied here. This report is an illustrative case – were the information contained here properly sourced, it would be easier to use it as an entrance into the full discussion and for better comprehension of issues related to geological disposal and radioactive waste management in general.	*SRA text has been modified."The management of increased knowledge in repository development is one of its major challenges. This includes all data and information and in particular the basis of the decisions. This is the major requirement for creation and preservation of the developed knowledge related to openness, traceability and transparency."*

No.	Section	Concerning, keywords	Comment/Question	Response statement/Corrections Measure
92.	4.1.3 p. 51 5th paragraph	Stakeholders	*"However, the geological repository…"* The participants of the processes mentioned are not the only current stakeholders. This group is far wider and also this wider group of current stakeholders needs to acquire the necessary knowledge. Better would be to say: "… and other stakeholders (including those of future generations) with…"	*see comment on the definition of stakeholders in 84*
93.	4.1.4 p. 52 1st paragraph	Communication	first 2 sentences still reveal an instrumental vision on communication (PR), remainder of the page ++	*This sentence is detached from its context and as a standalone may convey a message of lack of dialogue and exchange.* *Text in SRA has been modified.*
94.	4.1.4 p. 52	Communication	By the same token, I do not quite understand why there is a section on Communication (4.1.4) in the chapter on cross-cutting issues, while stakeholder involvement is a Key Issue for the SRA.	*Key topic 7 is specific to communication related to governance and stakeholder involvement in waste management programmes RD&D activities.* *The communication as a cross-cutting activity addresses general aspects of all supporting communication activities of geological disposal.*

No.	Section	Concerning, keywords	Comment/Question	Response statement/Corrections Measure
95.	4.1.4 p. 52 1st paragraph	Communication	*"It is essential that effective…"* Yet another example of expert bias… The mentioned approaches are foremost meant to secure exchange of experience, knowledge and views between the small community of experts and wider society / the wider public. When that leads to acceptable decision processes and transparent development of projects, it may create stakeholder support, confidence and trust. But these are consequences of good process, not goals. The goal of good process is the exchange itself – and the expert community could gain a lot from that – a lot more, and more important things, than just support, confidence and trust. When this expertocratic bias is not broken within the process of the IGD-TP (and currently it is still very strong – see e.g. the exclusion of Greenpeace from processes), any proposed approach is doomed to fail gaining support, confidence and trust. In general, this chapter quite well describes what is wrong within the current approach of the IGD-TP towards other stakeholders, including critical members. When the process leading to this report does not fulfil the basic communication criteria set in it, how can it finally result in support, confidence and trust?	*see comment 92:* *This sentence is detached from its context and as a standalone may convey a message of lack of dialogue and exchange.* *Text modifications have been done to the SRA.* *There is no clear relevance of the later comment to the content of the SRA draft as such.*
96.	4.2.1 p. 53 2nd sentence	Site characterisation	*"For the programs approaching…"* This pre-supposes that no problems are and will be encountered in any of the programmes currently under way in Finland, Sweden and France. Given the still existing uncertainties, that is a bold supposition. There is a small but existing chance that the current sites will not fulfil the requirements from the regulator or wider governance structures and that other sites will have to be located. In that case it is important that the knowledge and information created is developed in such a way that it is also as much as possible usable in a new round of site-selection (in case not the principle of deep geological disposal itself appears to be at fault, but merely the site). Although it is true that this will push the goals of the Vision 2025 beyond 2025.	*The SRA does not address the decision making and review processes in the individual waste management programmes.*

No.	Section	Concerning, keywords	Comment/Question	Response statement/Corrections Measure
97.	4.2.2 p. 54	Transportation	There is no reference to the Euratom Directive on Transportation of Radioactive Materials.	*The SRA does not include detailed references to legislative documents which are publicly available. This is included in the boundary conditions described in Fig. 1.3.1 and in the text itself.*
98.	4.2.2 p. 54 3rd paragraph	Transportation	*"A combination of regulatory…"* Uhhh? My perception is that exactly confidence in safety and security of transports is at an all time low – not only in a country like Germany, where we see every year enormous protests around transports, but also in countries like the US, Canada, Japan – and the many sea-bordering states confronted with SNF and plutonium transports between Japan, France and the UK –, France, the UK, the Netherlands, Belgium, Norway, Sweden, Denmark, Estonia, Poland, Romania, Bulgaria, Hungary, Slovenia and Russia, to name a few that have known credibility problems around nuclear transports in the last decade. I think that integrated research in 1. the need for such transports, and 2. The form of those transports remains an important issue.	*The topics are derived from the RD&D programmes of the WMO's and from the stepwise process.* *Transportation is already carried out safely under the existing rules and regulations and thus the transport related RD&D are not included in the SRA.*
99.	4.2.3 p. 54 2rd paragraph	Suggestion, choice of words	*"Furthermore, as the waste management program continues over a period of 100 years…"* Add: "or more".	*The suggested change has been inserted in the SRA.*
100.	4.2.4 p. 55	Waste acceptance criteria	Waste acceptance criteria shall be specified in such a way, that the whole waste management chain is optimized. Therefore it would be good, if the definition of WAC were an interactive process between the waste producer and the WMO. Please note that in some countries, like in Finland, the waste producer and the organization disposing of the waste could be the same. This is the case e.g. in Loviisa where Fortum is producing low and intermediate level waste and disposing it of at the same site.	*yes*

No.	Section	Concerning, keywords	Comment/Question	Response statement/Corrections Measure
101.	4.2.6 p. 56	Costs	Costs – this paragraph is not sufficiently worked out and would need input from economists. There is a large list of costs and cost factors that are not considered here, including the costs of risk, the risk of cost overdraws, the capital development of funds, the timing of payments, and so on.	*The economics of funding are dealt with to ensure that sufficient funding is available for the management of waste. The uncertainties related to costs are referred to in the 2nd paragraph of 4.2.6.*
3. Way forward				
102.	5.1 p. 57 end of 5th paragraph	Implementing organisations	*"Other implementing organisations…"* Parallel to expansion of regulations for public procurement to (partly) state-owned enterprises with a public function like in electricity generation, it is likely that where maybe not all involved organisational structures may be legally bound by public procurement rules, they will be expected – for the sake of transparency and the related credibility – to fulfil the same criteria. I.e. RD&D efforts should take into account that the transparency introduced in public procurement procedures will have to permeate the entire branch.	*The procurement procedures are defined by European directives and national legal frameworks. The IGD-TP's deployment plan will address the procurement of the joint efforts.*
103.	5.2 p. 57 1st paragraph	Suggestion, choice of words	*"The strategic research agenda (SRA) developed […] is based on the state-of-art in RD&D prevailing at the time of writing."* As communication expert, I have to conclude that this is at least not true in the area of communication and I have doubts about certain technical issues. I think that a bit more modesty would help keeping credibility on an acceptable level. Proposed formulation: "... is based on an attempt to include the state-of-the-art..."	*The RD&D state-of-art is described in the individual waste management programmes published RD&D plans that have been used as one basis of the process of producing the SRA.*

No.	Section	Concerning, keywords	Comment/Question	Response statement/Corrections Measure
104.	5.3 p. 58	SRA Deployment Plan	Regarding the SRA Deployment Plan (DP), IFIN-HH contribution may consist mostly of modelling studies with emphasis on CANDU spent fuel disposed in crystalline and salt rock. The reason for Romania interest in these Topics and the proposed contributions is due to the fact that in the vicinity of the NPP "Cernavoda" (which uses CANDU fuel) there is a potential geological disposal location for spent fuel inside green schist, which is a crystalline rock. This location, as well as "Varful Pietrii" granite massif in Carpathians Mountains and some other salt locations in Transylvania Depression, are comprised in the Romanian national strategy regarding final disposal of spent fuel as candidate sites.	*This refers to the deployment of the SRA and actions to engage interested stakeholders are developed in the near future.*

No.	Section	Concerning, keywords	Comment/Question	Response statement/Corrections Measure
105.	5.4 p. 59 1.1 p. 4	Networks & Future collaborations Vision commitment	As explained in the document some vary important tasks are already addressed by established networks or in other words, work pertinent to IGD-TP is already ongoing, whether in other areas, issues are still open to future collaborations. For the case of potential members looking for possible collaborations it would be valuable to create a mechanism that facilitate the entrance of new members in networks that although not established today are already virtually formed. We believe that for the majority of issues there are already such network structures "on the air". Facilitating the entrance of newcomers is particularly important for academia where some "rigid structures" may be a barrier for new and interested partners to take the step into a valid participation. Another mechanism that we find of value to consider and that we want to repeat here, even if it has already been suggested in the past, is the possibility to integrate "an open work-package" in every coming EU-project within IGD-TP. For the "open work-package" a limited (and relatively small) amount of resources that would be the same for every project, should be at the disposition of the coordinator so that his/her project, freely and after the EU--contract has been signed, can easily include a partner coming from the "outside" of the network to perform a given task. If not used, the resources allocated to that "open work-package" should be returned to the Community. We believe that such an "open work-package" should be attractive for new partners with no previous experience from Community research programs.	*The IGD-TP is implementer-driven and not responsible for the EC or Euratom framework programme or calls.*
106.	5.5 p. 60 3rd paragraph	Evaluation	Is this also the opinion of the EC ? Will the IGD-TP evaluate the FP project proposals before there are submitted to the Commission for evaluation in the official FP call ?	*A representative of the EC DG RTD has participated as an observer in the IGD-TP. EC is one of the stakeholders in the IGD-TP.* *The EC carries out such evaluations independently according to its own rules. IGD-TP does not evaluate the EC project proposals.*
4. Conclusions				

No.	Section	Concerning, keywords	Comment/Question	Response statement/Corrections Measure
107.	6. p. 61 1st sentence	Conclusions	*"... show that the setting up and the cooperative work of the IGD-TP will result in benefits..."* "... of the IGD-TP may result in benefits..." – modesty is a prerequisite for obtaining credibility...	*The IGD-TP is committed to working together for the benefits. Without benefits, there is no justification for the IGD-TP.*
108.	6. p. 61 1st bullet	Conclusions	"… by demonstrating viable options for risk-reduction in managing spent fuel..." There are no solutions for managing spent fuel and high level and long-lived radioactive wastes. Several of the indicated research questions indicate that we maximally can reduce risks. It is important to be aware at every moment that risks still remain.	*The geological disposal has currently no alternative, though RD&D on other waste management technologies like transmutation is on-going elsewhere outside the IGD-TP. Geological disposal is the required end state for all of these technologies in the long-term.* *The risk of radioactive waste and managing it is known. Therefore the safety assessments and safety cases are used to check and demonstrate that the solutions result in risks that are below the acceptable limits. This does not stop desire for joint work to reduce risk by optimisation according to the ALARA principle.*