

Country/Organization	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
UK/ONR (NUSSC)		General comment	In general, the UK has no objections to this proposed guide as set out in the DPP. It is noted that the scope of the proposed guide is ambitious (everything from components to new reactor designs). It is going to need care to ensure it does not grow too large and/or does not become so general it adds no value. The UK understands that when the DPP was discussed at a consultancy meeting, the title (and therefore the work that went into the DPP text) was focused on FOAK reactors. The title is now on innovative technology		X Text has been added in the scope section to clarify the scope			
ENISS	1	General comment	How will this Safety Guide interact with the future new SG D5536 on Safety Assessment and Verification for NPPs? As "safety demonstration" is not included in the IAEA safety glossary, which difference does IAEA make between "safety demonstration" and "Safety Assessment" in those SGs?		X First comment: Text has been added to the scope section (5) to clarify the difference between the two safety guides Second Comment: It is accepted that safety demonstration is not in the glossary and the difference with safety assessment is not clear. We suggest to use a terms different from safety assessment as the SG will also look at 3S and regulatory approaches. The terminology will need to be clarified as part of the SG, the different elements are to be defined in section 3 of the SG. We have made this clear in DPP section 7.			
Japan / NRA	1	General comment	The scope of this DPP is too qualitative. It should be defined more clearly. For example, it should be mentioned whether safety assessment methods, the confirmation of the adequacy of safety assessment results, and safety criteria, etc. are addressed in this DPP. It would be better to address some examples of expected problems or issues and their solutions. The contents of section 7 should be appropriately modified according to the change in the scope, if necessary.		X Text added to sections 5 and 7 to clarify scope. Examples of expected problems have been also provided in section 5. General overview of potential solutions was already mentioned in section 4. Further information on resolution is not available as that will be part of the safety guide development phase.			
UAE	8	General comment	To ensure that the reactor designs using innovative technology can be safely built and operated, in addition to the current requirements, the applied innovative technology have to be: •Bested and the functional performance to be examined if it's part of a specific safety function and connected to its Structures, Systems and Components (SSCs) •Study of the interaction and impact to other safety functions to ensure that, it has no raised risk in implementation of the innovative technology on other safety functions. •Safety analysis need to be carried out to prove the proposed innovative technology. •If the proposed innovative technology associated with new components, systems and human actions, the probabilistic risk assessment (PRA or PSA) should be considered to ensure that the available data for the failures is used or to develop a new methodology to estimate the risk associated with new innovative technology. •Consideration of the maintenance period of the innovative technology in the PSA (PRA). •If it is related to a specific safety function, the consideration of the impact to the current technical specifications is needed. •Ensuring that the innovative technology has no negative impact on the human performance and it does not increase the human failures and therefore a Human Reliability Assessment (HRA) need to be considered for any related safety actions with innovative actions.	Rebted to the requirements of the PSA for components, systems and human actions for the safety functions and how it could be applied to the innovative technology.	X Thank you, these suggestions will be accounted for in the development of the SG			
UAE	1	General comment	Overall, the proposed safety guide D5537 would be very useful and timely for use by regulators, developers of technology, developers of code and standards, R&D supporting institutions dealing with innovative technologies including SMRs.		X			
UAE	2	General comment	To provide guidance to safety demonstration, IAEA would need to start from the design requirements that are applicable to innovative technologies including SMRs, and provide guidance as to how these requirements can be met. Although there is no specific IAEA requirements document for the design of innovative technologies, a good starting point would be to adapt SSR 2/1 Safety of Nuclear Power Plants: Design. SSR 2/1 considered to be largely applicable to innovative designs including SMRs although it was primarily developed for land-based stationary nuclear power plants with water cooled reactors for electricity generation. So the proposed guide needs to establish the requirements that are applicable to innovative technologies.		X This will be done in the safety guide, we have added text in the scope section to indicate that we will identify the requirements of relevance in the SG.			
UAE	3	General comment	It should also be recognized that there is a wide variety of innovative technologies (e.g., SMRs) in terms of power level (~10 MWe to 300 MWe), design (water cooled reactors including light water cooled or heavy water cooled; fast neutron reactors including liquid metal fast reactor; molten salt reactors including chloride salt cooled or fluoride salt cooled; high temperature gas cooled reactors), and the resulting safety characteristics. Their applications include various purposes such as electricity production, heating, hydrogen production, desalination, or a combination. So the proposed guide needs to cater for a wide variety of innovative technologies as to what constitutes "adequate" safety demonstration of each representative group of the technologies.		X Added in scope section			
UAE	4	General comment	SMR designs of innovative technology also vary widely in terms of their maturity and readiness for deployment. So the proposed guide may consider addressing safety demonstration of each category of innovative technologies in different stages of maturity and readiness: a. Conceptual design – conceptual safety assessment, pre-licensing; b. Preliminary design – preliminary safety assessment, for construction license; c. Final design – final safety assessment for an operating license		X Added in scope section			
UAE	5	General comment	As the stages advance, the levels of maturity and readiness of innovative technologies increase with gaining more knowledge and experience. The proposed guide needs to provide guidance as to what specific aspects of safety demonstration can be achieved through: a. R&D support (tests demonstrating concept, performance); b. Design and safety assessment; c. Experience from relevant applications; d. Needs for a prototype, first commercial demonstration unit		X This is noted in section 4 objective. The more detailed suggestions will be accounted for when developing the SG.			
UAE	6	General comment	As per SSR 2/1 requirement 1D, safety assessment in different stages needs to be performed. To do this, possible scenarios of plant states – normal, anticipated operational occurrences, design basis accidents to design extension conditions need to be identified. For each plant state, a bounding or a limiting scenario may be selected for safety assessment. Where design or safety margins are considered to be small, main uncertainties are identified in view of gaps or deficiencies in knowledge given the phenomena, geometry and physical conditions of interest. So the proposed guide needs to provide guidance how such preliminary information can be used to make design decisions or prioritize the R&D activities and schedule.		X This is noted in section 4 objective. The more detailed suggestions will be accounted for when developing the SG.			
UAE	7	General comment	As mentioned, IAEA SSR2/1 NPP requirements would be adapted for use in innovative technologies. The challenge would be as to how a graded approach can be applied to each of the design requirements. Innovative designs often claim inherent safety features and passive safety features. The proposed guide may consider addressing how inherent safety of innovative technologies can fulfill current five-level defense-in-depth requirements. Once credited, the proposed guide needs to consider how to satisfy each level of defense-in-depth, for instance: •Applicability of industry codes (ASME, IEEE, etc.) and application of industrial code requirements as to how a graded approach can be applied •Safety systems and safety support systems requirements especially how to factor in inherent safety features of a design to satisfy the requirements for redundancy, diversity and separation and independence aspects of the design •Is traditional NPP-like containment required? What would be the requirements for "confinement" function? •Should an exclusion boundary needed? To what extent emergency preparedness and response would be needed?		X This will be done in the safety guide, we have added some text in the scope section to indicate that we will identify the requirements of relevance in the SG.			
Russian Federation (SECNRS)	1	Para 7/Line 17 – Line 28	Add new line: "Para should include consideration of specific requirements / recommendation for light water-cooled small modular reactors, high temperature gas cooled reactors, fast neutron liquid metal cooled reactors, molten salt reactors".	Are specific strategies (or recommendations?) supposed to separate by type of installations, for instance, light water-cooled small modular reactors, high temperature gas cooled reactors, fast neutron liquid metal cooled reactors, molten salt reactors? If yes, it should be clear specified in Item 4 in para 7.	X The Safety Guide is not planned to separate the type of installations (e.g. LWCRs, HTGRs) but we have mentioned in section 5 that recommendations will be applicable to a wide range of reactors types			

Belgium	1	Section 1 (Document Category)	Specific (?) Safety Guide	The IAEA SS series includes SSG and GSG. It seems useful to specify whether it will be a SSG or a GSG (the answer on the question hereafter might have an impact).	X			
Belgium	2	Section 1 (proposed title)	Safety demonstration of innovative technology in power (?) reactor designs ¹	"Reactor designs" can cover both power reactors and research reactors. Extending this SG to research reactors (with often very specific designs) might go too far. Therefore, it seems useful to reflect this in the title or (if not modified) to explain in the DPP that the SG will cover both power and research reactors.	X			
UK/ONR (NUSSC)	1	Section 2	Suggest changing sentence "The main unknowns..." to "Amongst the challenges that can be faced when making safety demonstrations for innovative technologies can be:"	Editorial Sentence starting "The main unknowns...." This sentence needs to be properly introduced/rearranged. "Unknowns" have not been mentioned up till this point, but the sentence starts with a definite article "The main unknowns". It also uses a definite article for "the safety demonstration" in the same sentence.	X			
Germany	1	Section 2 Line 1	There is a growing interest amongst States in advanced reactors such as <u>accelerator driven systems (ADS)</u> , small modular reactors (SMRs) etc.	The development of a new Safety Guide for Safety demonstration of innovative technology in reactor designs is highly appreciated. Since years many new technologies have been developed and reactors of a new design are under construction. Many of these prototypes are called research reactors (e.g. MBIR in Russia or MYRRHA in Belgium). To avoid compromising the safety of such prototypes by using safety standards for NPPs in a meaning of graded approach (procedure that is often used by research reactors), a comprehensive consideration of all new technologies should be given in this document. Additionally, safety guides for research reactors declare accelerator driven systems as out of their scope (e.g. Para 1.8 of SSG-3), this issue should be cleared up.		X		ADS are considered in the scope, but mentioning them specifically is considered to be not relevant, since the list after the "such as" is not intended to be complete.
ENISS	2	Section 2 para 2	Among others, Para 4.29 of Requirement 10 in GSR Part 4 (Rev. 1) and Paras 4.4-4.14 and 4.16 of Requirement 9 of SSR-2/1 are of specific relevance...	Please correct as per Requirement 9 of SSR-2/1.	X			
Germany	2	Section 2. Line 20	The IAEA has completed a high level review of applicability of the IAEA safety standards to various technologies, including SMRs, and non-water-cooled reactors and ADS.	We suggest to add ADS as well, so that comprehensive consideration of all new technologies will be given in this document. See also our comment above.		X		Unfortunately ADS were not included in the review so we cannot modify the text as the review we refer to is already finalised. However ADS could be considered in the future.
Pakistan /PNRA	1	Section 3 (line 3 Para 4)	Even if experience with assessing the safety of innovative equipment already exists, May be rephrased as: Even if experience with assessing the safety of innovative technology already exists.	More meaningful with regard to the proposed safety guide	X			
UK/ONR (NUSSC)	2	Section 3	Para starting "There is sufficient" Suggest "Even if experience with assessing the safety of innovative equipment already exists, it has not been systematically gathered and documented in the IAEA safety guides or in other international and national guidance documents"	It is stated "Even if experience with assessing the safety of innovative equipment already exists, it has not been systematically gathered and documented in the IAEA safety standards or in other international and national guidance" Would it be expected that experience for specific equipment would be gathered and documented in IAEA safety standards? It would not be in safety fundamentals or requirements documents (although experience would inform them), is it worth being precise by saying specific safety guide?		X		The concern understood and accepted. The overall idea was about the Safety Standards in general, therefore, the wording was revised to address the comment.
Germany	3	Section 3. Line 15	There is also a limited guidance on approaches that regulatory bodies and responsible organizations can implement to address the knowledge gaps and uncertainties of reactor designs with innovative technologies and manufacturing techniques. These Such approaches may include special design features, specific quality assurance and qualification requirements, programmes of inspections and acceptance testing in the factory or facility and approaches for maintaining oversight of the first of a kind supply chain, as well as the use of expert elicitation and data from other industries.	Wording	X			
Germany	4	Section 3. Line 27	Additionally, the development of this Safety Guide complements the medium-term plan in design and construction as there is not sufficient information and experience currently to develop requirements and recommendations that cover the design of specific innovative technologies.	Wording for more logical construction of the text	X			
Germany	5	Section 4. Line 10	The Safety Guide will provide recommendations on approaches to address, mitigate, and/or resolve unknowns associated with innovative technology, including designs plants, systems, components, materials and advanced manufacturing techniques.	What exactly plants are meant here? Designs perhaps? Please clarify, otherwise delete	X			
Germany	8	Section 4. Line 14	The impact of issues associated with innovative technology on during the design lifetime and the interface between safety, security and safeguards will also be considered.	"Design lifetime" is not a term from the IAEA Safety Glossary. Is it possible to avoid it? The same for Parts 5 and 7, where the same/similar formulation is used.	X			
Germany	6	Section 4. Line 3	... The objective of these approaches is to support safety demonstrations by developers, operators and other stakeholders that would meet requirements in each State. These are intended to could be considered used by regulatory bodies in making the necessary and timely decisions to ensure that reactor designs using innovative technology can be safely built and operated	Clarification to make it clear that the new guide is taking account of the situation of regulatory bodies when assessing innovative technologies.	X			
Germany	7	Section 4. Line 7	The Safety Guide will provide recommendations on the elements that are necessary to ensure the safety of innovative technology as well as on the use of specific approaches that can be used at different stages of design, licensing, manufacturing and construction. For example, the use of expert opinion and expert elicitation, the use of data from experiments and operating experience from non-nuclear industries, specific design solutions, safety analysis, codes, quality assurance and approaches to equipment qualification.	Since the target audience includes regulatory bodies, licensing is an essential part. Addition of codes might be useful.	X			
UK/ONR (NUSSC)	4	Section 5	Add a statement that this guide is not providing guidance on the application of innovative methods (such as artificial intelligence in safety demonstrations) but that does not prevent innovative methods being used as part of safety demonstrations for innovative technologies	Query on scope: The guide seems to be focused on safety demonstrations for innovative technologies. Does it include innovative safety demonstrations for components, systems or reactor designs (whether they be innovative or not)? For example, artificial intelligence potentially has a large role to play in demonstrating safety in the future. Many of the "unknowns" identified on page 2 could apply for the application of artificial intelligence in safety demonstrations, modelling, core design, fault detection etc.		X		During the development of the document some statements could be formed based on the feedback or experience connected with the use of the advanced or innovative techniques. Therefore, we would suggest not to completely leave that out of scope of the document and to explore the available experiences later during the SG development.
UK/ONR (NUSSC)	3	Section 5 first paragraph	Suggestion "This Safety guide will provide guidance on how the necessary technical aspects of safety demonstration of reactor designs can be achieved for innovative technologies. It will consider design safety and safety assessment, including lifetime issues and potential interfaces between safety, security and safeguards in design."	The first sentence starting "This safety guide" from an editorial perspective is quite long. From a technical perspective, it is very ambitious. For mature technologies, multiple safety guides eg SSG-2, SSG-3, SSG-4, DSS36 are required to cover these aspects. In section 4 of this DPP, it is stated the guide will give recommendations. In section 5, the ambition has grown to addressing technical aspects. The danger is the guide fails to do this or becomes too ambitious to write. There is no way this guide can address every necessary technical aspect from component level up to advanced reactors, for technologies that may not exist yet.	X			
Japan / NRA	2	Section 5. Scope	The verification and validation method for safety analysis models dealing with plant behavior in accident conditions for an innovative technology under development should be specified in the scope or the overview. Because only a small-scale test is not sufficient and a full-scale test or a combination with safety analysis is necessary.					
Germany	10	Section 5. Line 12	[...] and the management of lifetimes issues once operation has started.	The term "lifetime issues" appears also in Part 7 Line 27. A definition of the term "lifetime issues" in the context of the guide would be helpful.		X		Lifetime is defined in the IAEA Glossary. In the text the "lifetime issues" were replaced according to the context (e.g. lifetime phases, lifetime management)
Germany	9	Section 5. Line 6	The Safety Guide will focus on areas where existing safety standards do not apply or are not sufficient to address specific aspects related to the innovative technologies in reactor designs; any overlap that causes conflicts with existing Safety Guides will be avoided Alternative The Safety Guide will focus on areas where existing safety standards do not apply or are not sufficient to address specific aspects related to the innovative technologies in reactor designs; any overlap duplication with existing Safety Guides will be avoided.	In a cross-cutting guidance some overlaps are probably unavoidable. Or is perhaps duplication of statements/requirements meant here? Please clarify.	X			

UK/ONR (NUSSC)	5	Section 6	Add IAEA safety standards associated with fuel storage and waste	This guide is stated to be of interest to WASSC and TRANSSC. Innovative reactors, especially non-water-cooled could have different fuel routes and waste arisings to existing designs, which are not supported by existing experience or technologies. However there is little mention in the DPP to what extent the guide will take this into account (apart from the inclusion of WASSC and TRANSSC in the committee list). As minimum, it is suggested some relevant safety standards are identified.		X	As it is mentioned in Section 6 the list of references is not intended to be exhaustive. It would be hard to list all potential safety standards which could have relation to this guide. Therefore, it is proposed to keep the list concise focusing on the main references where the interfaces are expected. However, based on this comment we clarified the scope in Section 5 more precisely to highlight on how the waste and decommissioning aspects are going to be considered (i.e. from design perspective similar to SSR-2/1(Rev.1))		
Belgium	3	Section 6	Add an explicit reference to "SSG-28 Commissioning for Nuclear Power Plants"	This is certainly an important topic for innovative technology. Item 4 of the TOC foresees indeed this topic; the reference to the IAEA guide should be explicitly added in the interface with IAEA guides	X				
Germany	11	Section 6, Line 10	DS508: Assessment of the Application of General Requirements for Design of Nuclear Power Plants Assessment of the Safety Approach for Design Extension Conditions and Application of the Concept of Practical Elimination in the Design of Nuclear Power Plants	Please update the list of indicated IAEA safety standards	X				
Germany	11	Section 6, Line 22	DS536: A potential new Safety Guide on Safety Assessment and Verification for Nuclear Power Plants	Please update the list of indicated IAEA safety standards		X	In addition the 'proposed to be developed' has been added in the brackets, since this guide is not yet fully approved		
Germany	11	Section 6, Line 25	DS533-NST067: A potential new Safety Guide on Management of the Interfaces between Nuclear and Radiation Safety and Nuclear Security	Please update the list of indicated IAEA safety standards		X	In addition the 'proposed to be developed' has been added in the brackets, since this guide is not yet fully approved		
Belgium	4	Section 7 TOC-item 3	<i>"This section will outline general recommendations on the elements that are necessary to ensure the safety of innovative technology. This may include a comprehensive identification of knowledge gaps, the study of uncertainties to understand their impacts and potential mitigation, the use of general approaches to address the knowledge gaps and uncertainties and to gather knowledge so the uncertainties can be progressively reduced."</i> Add: "The use of prototypes of smaller size to develop a new reactor type may be discussed"	Innovative technology could be introduced by means of smaller prototype reactor. This should be discussed		X	Section 5 paragraph is quite general and covering the specific type of information to be reflected there. It is not describing the type of reactors which will be covered. Therefore, we propose to keep the text focused on the content of the chapter regardless of the reactor types to be considered. We added text to mention this in section 4 as an example		
Belgium	5	Section 7 Annexes	Add an appendix with some historical elements and lessons learnt on the deployment of the current NPPs.	At the beginning, the now well proven technologies (PWR/BWR/CANDU...) were also "innovative". For example, core melt accident was not considered... Overview and lessons learnt from the past could be useful – and could illustrate potential issues that could occur.		X	The requested information is definitely useful for the analysts and all stakeholders. Given that this is a high level document, it typically does not include such kind of Annexes with an overview. However, the overview could be foreseen and provided at the level of IAEA TECDOCs and Safety Reports Series, rather than in the Safety Standards.		
UK/ONR (NUSSC)	6	Section 7, Contents Section 3	Review the sentence "The objective..." to make sure it is consistent Section 4 which states recommendations will apply to "plants, systems, components, materials and advanced manufacturing techniques."	With respect to the sentence: "The objective of these general approaches is to demonstrate how the regulatory requirements can be met to ensure that reactor designs using innovative technology can be safely built and operated" It is understood the consultancy group drafting the DPP were considering FOAK reactors but since then the scope of the DPP has changed. This sentence seems to be a legacy from that. The current objective of the guide is set out in the first sentence of Section 4. The demonstration of claims for eg components or materials is not necessarily enough to show a new reactor design can be safely built and operated.	X				
UK/ONR (NUSSC)	7	Section 7, Contents Section 4	Change the first sentence from "This section will provide recommendations on specific strategies when dealing with innovative technology safety features in terms of" to something like: "This section will provide recommendations on specific strategies designers and operators should follow when proposing innovative technology safety features and what assurance regulatory bodies should seek in safety submissions associated with the points below."	Section 4 states "The target audience for this Safety Guide includes regulatory bodies assessing the safety demonstration for reactor designs using innovative technology." It does go on to state that it also applies to developers. However it does start by talking about regulators. The items identified in Section 4 of the proposed contents list are largely NOT for regulators. It will be the designers/operators who will have to gather data, undertake the design and analysis phase, implement, manufacture and test, address lifetime issues and consider interfaces. So, for examples regulators do not need specific strategies for gathering data.	X				
Germany	16	Section 7, Chapter 4, Line 6	Design, and analysis phase, including testing, modelling, and verifications and validation of codes and licensing phases;	Clarification that the regulatory body is also involved.		X	modified considering other comments		
Germany	15	Section 7, Chapter 4, Title	SPECIFIC STRATEGIES TO ENSURE SAFETY FOR INNOVATIVE TECHNOLOGY SAFETY FEATURES	Clarification	X				
Germany	12	Section 7, Chapter 3, Line 2	This may include a comprehensive identification of knowledge gaps; the study of uncertainties to understand their impacts and potential mitigation; the use of general approaches to address the knowledge gaps and uncertainties and to gather knowledge so the uncertainties can be progressively reduced; Comprehensive identification of issues and knowledge gaps Study of uncertainties to understand their impacts and potential mitigation Regulatory approaches	Bullet points help to illustrate the main points. Please add also an issue about regulatory approaches, as the new guide should take more account of the situation of regulatory bodies when assessing innovative technologies. Therefore, specific recommendation for different challenges during the assessment would be helpful.		X	modified considering other comments		
Germany	13	Section 7, Chapter 3, Line 5	Recommendations for applying alternative regulatory approaches like for example a graded approach based on risk considerations to innovative technology may be included	Recommendations for the regulatory approaches should be more comprehensive.		X	Regulatory approaches are disconnected from the sentence and the bullet point is revised. We propose not to use the term 'alternative approaches' since graded approach is specifically required by GSR Part 4(Rev.1)		
Germany	14	Section 7, Chapter 3, Line 7	The objective of these general approaches is to demonstrate how the regulatory requirements can be met to ensure that reactor designs using innovative technology can be safely built and operated.	Editorial		X	modified considering other comments		
Germany	18	Section 7, Chapter 4, New pullet point	Recommendations for regulatory bodies	The new guide should take more account of the situation of regulatory bodies when assessing innovative technologies. Therefore, specific recommendation for different challenges during the assessment would be helpful.	X				
Germany	17	Section 7, Chapter 4, New pullet point	Developing assessment criteria which can be used for the safety analysis and evaluation	Additional bullet point. Assessment criteria result from the design expectations.		X	Added as a part of current bullet 5 'safety analysis...'. We propose not to use the term 'criteria' but to say 'approaches' instead		