



**Memorandum of Information European tender** ‘KEM-54 Interactions between salt storage caverns Research’ with reference 202505058

**Date: 18<sup>th</sup> August 2025**

In this Memorandum of Information, the Contracting Authority provides answers to the questions asked in the context of the above-mentioned European tender. This Memorandum of Information forms an integral part of the Tender Document with reference 202505058.

<b>Question</b>	<b>Chapter/ Paragraph from the selection instructions/the Tender Document</b>	<b>Question</b>	<b>Answer</b>
<b>1.</b>	1.2	A conglomerate of salt caverns is addressed in the Tender Document (1.2, page 5). The requirements for modelling (3.2, page 8) demand for considering two caverns in one model (regular, equally spaced grid). However, the design at Zuidwending more or less resembles to a hexagonal salt cavern grid design. Which kind of cavern grid layout shall be preferred? - The structural and containment integrity of the salt dome is mentioned. Is there a requirement to model the full dome with the cluster of caverns in 3D?	It is not required to use the Zuidwending saltdome 1 on 1. However, it is proposed to use the salt characteristics of the dome. As such, at least the layout as modelled as described in section 3.2 should be addressed.  Therefore there is no preference in the grid layout.
<b>2.</b>	2.1	Section 2.1 of the Tender Document refers to "a cluster of caverns that could be leached asynchronously as well as be converted into storage caverns a synchronously". Please could you clarify that the purpose of "production caverns" (as opposed to "gas storage caverns" or "hydrogen storage caverns") are to be used for salt extraction	The purpose for the production caverns is salt production. These caverns become larger than the caverns intended for storage. There is also potential for new salt production caverns to be used for storage in future. In that case the salt production caverns should be equal size to the salt storage caverns.

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		and then brine-filled? or is there potential for "production caverns" to also be used for gas and/or hydrogen storage once salt extraction has concluded	
3.	3.2	Tender asks whether "pressure equalisation occurs". Is a post-abandonment assessment required? For what cavern storage scenario is the relevant? It suggests that caverns are no longer operating.	No, post abandonment assessment is not required. The question is whether pressures in one cavern can affect neighboring caverns.
4.	3.2	Tender document refers to "additional permeation". Does this refer to mechanically induced permeability in the salt pillar?	Yes, but it is not restricted to mechanically induced permeability. Salt heterogeneities inducing a permeability in the salt pillars between caverns are also included.
5.	3.2	Zuidwending is mentioned as the example to base the salt characteristics on. Is it required to consider different depth locations caverns for the modelling of gas storage and salt production caverns, as in Zuidwending, or can comparable designs for both kinds of caverns be used? - What would basis for gas storage operations (cycling pressure and temperature conditions)? Based on field data or generic operations? If based on data, what data and who will provide it?	It is proposed to use the salt characteristics of the Zuidwending salt dome. Comparable cavern designs for both kind of caverns can be used. A salt production cavern may both be deeper and larger as well as smaller and intended for future storage. The data basis is a generic operation for Dutch systems.
6.	3.2	"Using the salt characteristics of the Zuidwending salt dome, a layout of two caverns will be modelled in 3D to address this question. The two caverns vary in size and use:...". Please clarify if we also study the variation of the dome size itself?	No, salt dome size variations are not included. Placement in the salt dome of the caverns can be varied.

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<b>7.</b>	3.2	Reregarding the sensitivity analysis, the influence of in-situ stress state or depth doesn't appear to be listed. Should this be considered as part of the sensitivity study?	Indeed, it should be considered as well.
<b>8.</b>	3.2	Regarding assessment of leakage probability: "What is the probability that stored products in salt caverns may leak into other caverns?". Please clarify what type of probability assessment is anticipated. It is suggested that this is a quantitative assessment based on a large number of simulations	While a Monte Carlo approach can be used to quantify the probability of leakage, other approaches can be considered as well. It is up to the Contractor's preference (to be substantiated by the Contractor in their proposal).
<b>9.</b>	3.2	Can the expected cavern layout be clarified? Based on the wording in the Tender Document, it is expected that only two caverns in 3D will be modelled? It is noted that previous KEM studies have modelled interaction between more than two caverns.	The modelling of scenarios using 2 caverns as described in section 3.2 is required. The contractor does not have to limit to these situations. However, 3D simulations are required.
<b>10.</b>	3.2	Is the ground model and associated assumptions on properties for the Zuidwending salt dome to be provided? Or is the characterisation of a suitable geological model and properties to be used as inputs for the modelling to be included within the scope?	Recent studies have published characteristics of the Zuidwending salt dome. They may be used, amongst others.
<b>11.</b>	3.2	Is there a specific constitutive model that is expected to be used for the numerical modelling?	No, as long as the model can provide the requested sensitivities.
<b>12.</b>	3.2	Are demand figures and/or operational pressure cases to be provided? Or is determination of these profiles within the scope of the research study?	They are not provided. Assume realistic profiles regarding demand.

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<b>13.</b>	3.2	Pressure equalization is mentioned as an interaction (3.2, page 8). What is exactly meant by this term? Can you specify?	Pressures in one cavern influencing the pressures in another cavern.
<b>14.</b>	3.2	CAES as storage option is generally mentioned in the introduction (1.2, page 5), but not repeated in the modeling requirements (3.2, page 8). Shall this be considered or not?	CAES does not have to be considered.
<b>15.</b>	4.3.1	Analytical and numerical modelling expertise in salt behavior, salt mechanics and fracture modelling is requested. What is exactly meant by fracture modelling in this context?	As pressure, temperature and chemical differences can be expected to occur, fracturing is possible. Expertise and/or experience with fracture modelling is therefore preferred.
<b>16.</b>	Annex 2	Both the ARVODI-2025 and the draft contract (annex 2) contain confidentiality obligations. Please confirm that the arrangements in 4.5 and 4.6 of the draft contract are applicable and that article 11 of the ARVODI-2025 terms is therefore void	Both article 11 of the ARVODI-2025 as well as articles 4.5 and 4.6 of the draft agreement are applicable. Article 11 of the ARVODI 2025 concerns confidentiality in general terms. Article 4.5 doesn't concern confidentiality specifically but concerns the obligation of the Contractor to submit information to EASY (after deleting confidential/classified information or information that mustn't be published). Article 4.6 concerns the use and retention of confidential information. There is no conflict between the articles, however, it should be mentioned that, if a conflict occurs, the articles of the agreement prevail over the ARVODI article.
<b>17.</b>	Annex 2	Annex 2 Clause 2.2 refers to the ARVODI 2018, but ARVODI 2025 is provided as Annex 4. Could you please confirm the 2025 version is the relevant terms and conditions document?	Hereby the Contracting authority confirms that the ARVODI 2025 applies to this assignment.

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18.	Annex 2	<p>Article 9 of the model contract addresses 'research materials', please provide a definition for this term. o Is the contractor allowed to use the research materials it retains for the contracting authority based one article 9 of the draft contract for itself (for other research purposes than execution of this contract)? Article 9 only addresses the use during the research period and not during the 4 year retainment period.</p>	<p>Research materials encompass all information, data and sources consulted and obtained during the conduct of the study and intended for that research.</p> <p>Moreover, article 9.1 mistakenly addresses the transfer of research materials to the Contracting authority. However, this is not correct. Article 9 will be amended to:</p> <p><b>9. Research material</b></p> <p><i>9.1 The Contractor will retain the title to all the research material received, acquired and/or produced and processed by the Contractor for the purpose of the research, in so far as the Contractor has such research material at its disposal and in so far as the research material contains information relating to the research.</i></p> <p><i>At the Contracting Authority's request, the Contractor will immediately grant it access to the research material and other documents relating to the research and will make this research material available to the Contracting Authority, even if it is in the possession of a third party. At the Contracting Authority's request, the Contractor will produce duplicates of the research material and make them available to the Contracting Authority at cost price.</i></p> <p><i>9.2 The Contractor will retain the research material referred to in this Contract for the Contracting Authority for ... years free of charge, starting on the date on which the Contract is signed.</i></p>

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			<p>9.3 <i>The Contractor will replace the research material referred to above free of charge for as long as it is in its possession, if all or part of the research material, for whatever reason, becomes unusable, is destroyed or is disposed of. This provision applies in so far as replacement is possible and desired by the Contracting Authority.</i></p> <p>9.4 <i>During the research, neither the Contractor nor a third party engaged by it may use the research material referred to in this Agreement without prior written permission from the Contracting Authority, except for the purpose of activities entailed by performance of the Services.</i></p> <p>Accordingly, we confirm that Contractor is allowed to use the research materials it retains for itself, except for Confidential and Classified information, taking into account the clauses on confidentiality.</p>
<b>19.</b>	Annex 5	There is an inconsistency for core competence 1 in those listed in Annex 5 and tabulated in Annex 5 and that contained in the Tender Document. Please can you clarify whether core competence 1 is for "Analytical and numerical modelling expertise in salt behaviour, salt mechanics and fracture modelling, or "analytical and numerical modelling expertise in sinkhole problems"?	An oversight on Contracting Authority's part. It should be in both cases: Core competence 1: Analytical and numerical modelling expertise in salt behavior, salt mechanics and fracture modelling.
<b>20.</b>	ARVODI 2025 - Article 3	Given the nature of the work, could Article 3 be subject to an overarching standard of 'reasonable	Pursuant to Article 3, the Services to be performed by the Contractor must comply with the requirements set out in the

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		<p>skill and care', which would be commensurate with the professional indemnity insurance we maintain as a professional consultant? If not please could the intended use case be explicitly defined? Propose: "Research findings regarding the stability of a cluster of caverns that could be leached asynchronously as well as be converted into storage caverns asynchronously"</p>	<p>Agreement and be suitable for their intended use as arising from the Agreement. The Contractor shall furthermore perform the Services in a professional and competent manner. In the case of assignments, the Contractor shall also exercise the duty of care of a good contractor, as stipulated in Article 7:401 of the Dutch Civil Code. We do not see why article 3 should be commensurate with indemnity insurance, as article 19 of the ARVODI 2025 stipulates liability and liability in this article is limited.</p> <p>The objective of the research has already been described in the tender document paragraph 2.1:</p> <p><i>The research in KEM-54 is aimed at interactions between salt storage caverns. The objective of this research is to investigate the stability of a cluster of caverns that could be leached asynchronously as well as be converted into storage caverns asynchronously. In the future there may be salt domes with multiple storage caverns. Gas storage salt caverns may be operated next to hydrogen storage caverns, or compressed air storage caverns or salt production caverns. All of these have their own operational envelopes and pressures. In order to assess the safety of making and operating these different caverns next to each other more knowledge about possible interactions and the stability of cavern clusters is needed.</i></p>
<b>21.</b>	ARVODI 2025 - Article 14.3	Please can you clarify that the Contractor shall have the right to refuse additional work that is illegal, impossible or outside of the area of expertise for which the Contractor has been appointed?	For the avoidance of doubt, the Contractor shall have the right to refuse any additional work that is illegal, impossible, or falls outside the Contractor's appointed area of expertise.

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<b>22.</b>	ARVODI 2025 - Article 17	Can it be confirmed that a bank guarantee is not required?	The Contracting Authority confirms that no bank guarantee will be required from the Contractor in connection with the performance of the Services.
<b>23.</b>	ARVODI 2025 - Article 17	We assume that Article 17 (Advance) of ARVODI-2025 is not applicable (i.e., no credit guarantee is required in the case of a public body). Can you confirm this?	The Contracting Authority confirms that no bank guarantee will be required from the Contractor in connection with the performance of the Services.
<b>24.</b>	ARVODI 2025 - Article 18	Please could you confirm that we are entitled to extensions of time and delay costs for all events beyond our reasonable control?	Contractor is not automatically entitled tot extensions of ime and delay costs for all events beyond our reasonable control? Regarding delay costs, article. 19 is applicable and this is to be determined on a case by case basis. Regarding delays should Contracting authority and Contractor examine the possibilities of amending the time schedule; both Contractor and the Contracting authority are expected to be flexible, reasonable and constructive (solution oriented).
<b>25.</b>	ARVODI 2025 - Article 19	Please limit the liability as mentioned in article 19 to once the contract value.	We do not agree with limiting liability, as liability is already limited. Furthermore, it concerns damage that the other Party suffers when a Party imputably fails to fulfil its obligations.
<b>26.</b>	ARVODI 2025 - Article 19.3c	Please could you confirm that Article 19.3c only applies to knowing breaches of intellectual property rights?	Your assumption is not correct: Article 19.3(c) is not limited to "knowing breaches" of intellectual property rights. It applies to all infringements as referred to in Article 23, regardless of whether they are intentional or unintentional. However, as mentioned in the answer of question 25, liability concerns damage that the other Party suffers when a Party imputably fails to fulfil its obligations. This is to be determined on a case by case basis.

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27.	ARVODI 2025 - Article 19.3d	We cannot agree to unlimited liability in respect of data protection, particularly as we will not be processing personal data. Please could you confirm if this clause could be removed?	As Contractor will not process data, there is no risk of Contractor being liable and no breach of the GDPR will occur. However, in the hypothetical situation that Contractor does not adhere to the GDPR in the execution of this agreement, the liability clause will be applicable. Therefore, the clause will not be removed.
28.	ARVODI 2025 - Article 19.3d	Article 19.3(d) (Exception to limitation of liability in relation to data protection) does not apply. As a processor agreement is not part of the assignment, this article is not applicable either. Can you confirm?	The Contract Authority confirms that data processing is not part of the agreement. Article 19.3(d) however, will not be removed.
29.	ARVODI 2025 - Article 19.4	Article 19.4 (Liability for damage to Contracting Authority's property) is not applicable in this case. Considering the nature and scope of the assignment—a research and consultancy study—no potential damage to the Contracting Authority's property is foreseen. Can you confirm?	The Contract Authority confirms that no potential damage is foreseen in this case. Article 19.4 however, remains applicable.
30.	ARVODI 2025 - Article 20	Please could you clarify events which constitute force majeure under this contract? Typically we would expect these to include, for example: (a) war, hostilities (whether war be declared or not), invasion, act of foreign enemies; (b) rebellion, terrorism, revolution, insurrection, military or usurped power or civil war; (c) riot, commotion, disorder, strike or lockout by persons other than the Contractor's personnel; (d) munitions of war, explosive materials, ionising radiation or contamination by radio activity except as may be attributable to the Contractor's actions; (e) inclement weather, flood, drought, fire or natural catastrophe such as earthquake, hurricane, typhoon	Article 20.1 provides examples of circumstances that are not considered to be force majeure, because the contracting parties can influence the circumstances, by taking preventive measures and/or measure in order to respond on the situation. If circumstances can be considered to be a force majeure, is to be determined on a case by case basis and will not be defined in general terms in advance. The examples you have provided are likely to be considered a force majeure, but will nevertheless be determined per specific situation.

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		or volcanic activity; (f) disease outbreak, epidemic, pandemic or public health emergency; and/or (g) restrictions imposed at law in response to force majeure, including embargo, quarantine or travel restrictions.	
<b>31.</b>	ARVODI 2025 Article 23.2	We propose to modify the text of Article 23.2 as follows: "Insofar as the results of the Services performed are (partly) created by using existing intellectual property rights that do not belong to the Contracting Authority, the Contractor grants the Contracting Authority a non-exclusive and non-cancellable right of use for an indefinite period of time against a market-conform related fee. In that case, the Contractor guarantees to be entitled to grant the aforementioned right of use."	The Contract Authority does not agree with your proposal. Article 8.2 of the draft agreement is applicable.
<b>32.</b>	ARVODI 2025 Article 23.1, 23.4, 23.5	The draft contract (annex 2) states that articles 23.1, 23.4 and 23.5 do not apply. Can you confirm that the contractor will indeed remain ownership of all results generated under the contract?	Contract Authority confirms that the ownership lies with the Contractor. Furthermore, Contract Authority confirms Articles 23.1, 23.4 and 23.5 of the ARVODI 2025 do not apply. The Contractor grants the Contracting Authority a non-exclusive, irrevocable right for an indefinite period to publish or reproduce the results of the Services, or have them published or reproduced, which right the Contracting Authority accepts, such in the widest sense, regardless of the method of use or reproduction and regardless of whether such use or method of reproduction is known when this Agreement is signed.
<b>33.</b>	ARVODI 2025 Article 26.2, 26.3	Agreements on employment conditions are highly confidential and we are unable to provide them. Can these clauses be removed?	This is not agreed. The Contractor may assume that the Contract Authority will not act in violation of the General Data Protection Regulation.

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<b>34.</b>	ARVODI 2025 - Article 27.2	We will be able to confirm that at the date of signing the agreement, to the best of our knowledge after making diligent inquiries, no conflict of interest exists with regard to our ability to perform the services or is likely to arise during performance. Please could you confirm if this is sufficient to discharge our obligations under 27.2?	<p>We confirm that your declaration—that at the date of signing the agreement, to the best of your knowledge and after diligent inquiry, no conflict of interest exists or is likely to arise during the performance of the Services—is considered sufficient to discharge your obligations under Article 27.2.</p> <p>However, please be reminded that, pursuant to Article 27.2, if it is subsequently discovered that any member of the Contracting Authority’s Staff holds or held a position with the Contractor without prior disclosure, the Contracting Authority reserves the right to cancel the Contract in full or in part with immediate effect, without notice of default, without recourse to the courts, and without any obligation to pay compensation.</p>
<b>35.</b>	ARVODI 2025	We trust that no penalties will be applicable in this case. Can you confirm?	Notwithstanding the clauses on liability, the Contracting authority confirms there are no penalties applicable in this agreement.