Contexte relatif à la publication du rapport d'audit du cabinet TÜV SÜD au sujet du bilan d'évitement des gaz à effet de serre d'un projet de e-méthanol

I. Contexte du projet

Le rapport d'audit joint à cette note fait référence à un projet de production d'e-méthanol porté par Elyse Energy sur une localité différente du projet E-CHO. L'objectif de cette publication est de fournir des éléments qui attestent de l'application correcte par Elyse Energy des méthodologies de calcul en vigueur, et donc du bilan carbone revendiqué par le projet. Il est prévu de soumettre le projet BioTJet, faisant lui aussi partie d'E-CHO, à ce même audit et d'en fournir les conclusions, sous le même format.

Le projet et le document ci-joint ont été présentés à l'appel à projet Européen « Innovation Fund » de 2022, pour lequel est évalué un niveau d'évitement d'émissions de gaz à effet de serre (GES). Le projet, appelé eM-Rhône, consiste en la production de 138 000 tonnes de e-méthanol par an (tenant compte de la montée en charge de l'exploitation), avec le même procédé que le projet eM-Lacq, faisant lui aussi partie d'E-CHO :

- Production d'hydrogène par électrolyse de l'eau
- Captage de CO_2 industriel dans les fumées d'une cimenterie
- Synthèse de méthanol, destiné à un usage « industrie chimique »

Les détails techniques liés au projet ne pourront pas faire l'objet d'une diffusion pour des raisons de confidentialité. Toutes les sources et hypothèses utilisées pour le calcul ont fait l'objet d'une vérification par l'organisme TÜV SÜD dans le cadre de cet audit.

II. Conclusions de la validation et de l'audit

Les conclusions du rapport de validation et d'audit mené par TÜV Süd dans le cadre du projet sont copiées ci-dessous :

> "TÜV SÜD has undertaken the validation of the GHG declaration of the project eM-Rhône, to be implemented by the project proponent Elyse Energy based on the requirements of EN ISO 14064-2 "Specification with guidance at the project level for quantification, monitoring and reporting of GHG emissions reductions or removal enhancements" and the Innovation Fund 2022 program.
>
> The validation has the objective to review all technical data and information, calculations and measured variables of the reference scenario and to confirm the projection of emissions avoidances. Financial aspects and any associated financial review were not part of the ordered validation.
>
> The eM-Rhône project reduces GHG emissions by replacing conventional methanol as feedstock for industrial chemical formulations with e-methanol (sustainable methanol). For this, a green hydrogen production plant will be installed together with a methanol synthesis plant. The green hydrogen produced, and the CO2 captured at a nearby cement plant will be used then in the production of e-methanol.
>
> To arrive to the final validation conclusion and opinion, TÜV SÜD carried out a pre-audit, desk reviews, background investigations, two remote follow-up audits and a closing audit. A site visit was not conducted.

Through the validation process, different clarifications and corrective actions were required. The project proponents have taken actions to address these findings and submitted to TÜV SÜD the revised GHG declaration and other supporting evidence. All findings have been appropriately closed before the issuance of this validation report.
The validation team is of the opinion that the GHG declaration of the project eM-Rhône is in accordance with the relevant GHG program requirements of the Innovation Fund as well as the host country's national requirements and is capable of achieving the following projected emission reductions with a reasonable level of assurance during 10 years after entry into operation:

- Planned project reporting period: 01.12.2027 - 30.11.2037
- Reference emissions: 2.359.878 t CO_2e
- Project emissions: 34.635 t CO_2e
- Accumulated GHG emissions avoidance: 2.325.243 t CO_2e
- Relative GHG emissions avoidance: 99% ».

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Validation Report

VS-3787132

Validation of the Greenhouse Gas Declaration

of the project:

eM-Rhône
- Elyse Energy SAS -

according to

EN ISO 14064 Part 2
and
Innovation Fund Large-scale Projects
(InnovFund-LSC-2022)

dated 14/March/2023

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1. Abbreviations

CO_2	Carbon Dioxide
CC	Carbon Capture
DAkkS	German Accreditation Body (Deutsche Akkreditierungsstelle)
DIN	German Institute for Standardization (Deutsches Institut für Normung)
EC	European Commission
EN	European Norm
EoL	End of life
GHG	Greenhouse Gas
IF	Innovation Fund
ISO	International Organization for Standardization
TÜV SÜD	TÜV SÜD Industrie Service GmbH

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2. Scope of the validation

TÜV SÜD Industrie Service GmbH (in the following referred to as TÜV SÜD) is an accredited verification body according to German Institute for Standardization (DIN) European Norm (EN) International Standard Organisation (ISO) 14065 for the validation and verification of greenhouse gas assertions according to EN ISO 14064 Part 1 and EN ISO 14064 Part 2. TÜV SÜD performed a validation of the Greenhouse Gas (GHG) Declaration for the project: *eM-Rhône* in order to confirm compliance of the GHG Declaration with the requirements of EN ISO 14064 Part 2 and guidelines of the Innovation Fund Large-scale Projects 2022 of the European Commission. The methodology for the calculation of the GHG emissions avoidance is described in *Methodology for GHG Emission Avoidance Calculation* (Version 2.0 01 November 2022).

TÜV SÜD nominated a validation team fulfilling the internal qualification criteria based on EN ISO 14064 Part 3, EN ISO 14065 and EN ISO 14066. The specification of the competence criteria according to IAF MD14:2014 is applied here. The validation process involved an in-depth review of the original set of documentation and records as well as background research regarding applied technologies, benchmarks, data sources, legislative and regulatory guidelines as well as program requirements. Following a strategic analysis in combination with a kick-off meeting and the determination of assessment risks, a detailed audit plan has been developed. The validation included one remote pre-audit, two remote follow-up audits and one closing audit with all required project participants.

Following the strategic analysis, a list of required documents and an audit schedule were delivered to the project proponent.

At the end of the audit, open points were discussed with the project responsible, who subsequently revised the documentation, provided additional documents and clarified open points. The documentation was subject to further review before issuing this final validation report. The final validation report itself has undergone an independent review by a technical reviewer (another TÜV SÜD lead auditor), who has not been part of the verification for final approval of the report. After successful review, the report was issued in its final version by the validation and verification body.

The validation statement provides a reasonable level of assurance. When verifying baseline data, a 5 % materiality threshold has been applied in analogy to the EU ETS approach.

The validation has been carried out in the period from 24th February 2022 until 14th March 2023.

3. Project details

The project is designed to integrate multiple technological blocks (hydrogen production from renewable energy resources, carbon capture from cement plant and e-methanol synthesis and distillation in a harmonized synergy at industrial scale allowing the production of e-methanol).

The project aims to produce 138 kt/y of e-methanol considered as a renewable fuels of non-biological origin (RFNBOs) to substitute the same amount of conventional methanol in the chemical industry.

The project is situated in:	France
The project applicant is:	Elyse Energy SAS 91 rue de la Part Dieu 69003 Lyon, France

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Contact person: Adrien Hallé
phone: +33 6 09 72 43 16
email: ahalle@elyse.energy

Final version of the project documentation:

GHG avoidance document, 13/March/2023
“eM_Rhone_GHG_avoidance_vfinal.xlsx”

Accumulated GHG emissions avoidance: 2.325.243 tCO_2e

Relative GHG emissions avoidance: 99%

Planned project reporting period: 01.12.2027 - 30.11.2037

4. Validation approach

4.1. Contract review

There is an agreement between the project proponent Elyse Energy SAS and TÜV SÜD Industrie Service GmbH for validation services for the Innovation Fund emission avoidance project. The framework agreement is based on a time expenditure calculation which ensures that the necessary personnel and time resources are available for the work. TÜV SÜD holds the required accreditation according to the standards EN ISO 14065, EN ISO 14064-2 and EN ISO 14064-3 and has access to auditors covering the required competences in the sectors related to this activity.

4.2. Assessment team

The assessment was done by the following audit team:

Lead auditor:
Paula Auer-Saupe Scopes: 1, 3, 4, 7, 10, 13

Additional examiner:
Diego Alvarez Florez

4.3. Preparation of the assessment

The project proponent presented project details during the kick-off meeting/pre-audit. It has then been requested to provide the principal project documentation before the start of the remote audit. By reviewing and evaluating these documents a strategic and risk analysis has been performed.

The audit team assessed the likely nature, scale and complexity of the validation tasks. All preliminary information of the project, such as project boundaries, sources and sinks and the required materiality threshold were considered. The inherent risks and control risks were identified and analyzed to develop an assessment plan which allows to reduce all assessed risks and to enable a statement at a reasonable level of assurance that the project complies with the requirements of the referenced standards and regulations.

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The following table presents the areas of concerns, where needs for further investigation beyond the document review have been identified, the associated risks which might result in non-compliance and the initially selected assessment methods. This list has been prepared before drafting a detailed schedule for the audit, which was finally shared with the project proponents and their contracted partners for ensuring appropriate arrangements with regards to the auditing.

Area of concern	Risk	Assessment method
Compliance with IF criteria	Ambiguity and individual interpretation	Discussion and document review
Applicability / boundaries	The project could not be implemented due to legal requirements (e.g., environmental permits for e.g., usage of water resources)	Discussion and review of legal requirements
Project lifetime/ Correctness of underlying data	Inappropriate/non-conversative forecasts; availability of technology and infrastructure	Interviews and document review
Emission factors	Inappropriate usage of emission factors	Interviews and document review, comparison with EU ETS factors and approved data sources
Baseline scenarios	Data of reference scenario Description of alternative scenario	Interviews and document review
Calculations	Mistakes in calculation approach, default values or in excel sheets for calculation	Interviews, review of the methodology for GHG emission avoidance calculation, review of the calculations
Monitoring plan	Incompleteness: procedures, measurements, sampling, quality assurance, data storage	Comparison with requirements and review of the calculations, Interviews
Quality assurance / quality control	Data quality of baseline and project emissions Risk of data losses by monitoring approach Uncertainty based on novelty of the project	Interviews and document review; discussion of risk assessment and risk mitigation procedures

For further preparation of the audits the verification checklist of EN ISO14064 Part 2 activities has been amended by Innovation Fund-specific aspects. The checklist is filled with information collected during document reviews as well as during the audits. All relevant examination criteria and aspects for evaluation are listed. It indicates all findings during the review process and is attached to this report as Annex A and B.

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5. Means of Validation

5.1. Document review

In the course of the validation, the criteria and documents mentioned in the checklist for the individual topics were reviewed and evaluated. The list of reviewed documents is compiled in annex C.

5.2. Remote audits

The auditor in agreement with the project participants decided to have remote audits. Four remote audits were conducted: A pre-audit on 28.02.2023, two follow-up audits on 07.03.2023 and 10.03.2023 and a closing audit on 13.03.2023.

After the introductory pre-audit and after the audits, a list with further required evidence documents and open points was provided to the project proponents. Non-compliances and references for corrections were discussed. The project proponents were then requested to supplement additional evidence, updated documents and calculations.

The proofs (records, databases, documents, agreements/contracts, etc.) that have been checked during the strategic analysis, during and after remote audits, are listed in Annex C.

Annex D to this report provides a list of persons that participated during the remote audits and in additional meetings.

5.3. Onsite visit

No onsite visit was realized as the project is still in the planning phase.

5.4. Sampling

All supporting documents were assessed.

5.5. Follow-up of revisions

After the delivery of requested further evidence and the revision of the project documentation addressing the identified non-compliances, a further round of desk reviews has taken place, assessing these submissions. The final assessments regarding the closure of findings are documented under the finding list, attached as Annex A to this report.

5.6. Independent technical review

Before the report was approved, an internal review had been conducted by a lead auditor assigned by the validation body who was not himself a member of the assessment team. The main focus of this process is the assessment of the completeness and traceability of the validation. If necessary, the assessment team will be asked to correct certain parameters (e.g. emission factors) or to supplement missing documents in order to increase transparency.

For this project the technical review has been conducted by:

Daniel Wittl Scopes: 1, 3, 4, 5, 8

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6. Observations and finding

6.1. General information

The project is described in the feasibility study, GHG avoidance document and supporting documents. All information regarding the project proponent and involved partners, organizational arrangements, the authorization and technical features regarding devices and equipment required for the plants have been reviewed. All technical information for the planned project is plausible and comprehensible.

Permitting procedures are thoroughly identified and in progress in parallel to the project. The project is compliant with the country´s legislation.

6.2. Data quality

Data used to calculate the emission avoidance and to fix ex-ante parameters has been verified along this validation. All required data is considered being accurate and complete. The calculations are based on reproducible data and are technically correct.

Thus, there is a low risk of inappropriate data quality and missing reproducibility.

6.3. Reference scenario and additionality

The GHG avoidance document correctly describes the baseline scenario. The reference scenario is the production of conventional methanol (natural gas based) with a GHG emission factor of 0,474 tCO_2e / t methanol which is calculated based on the reference values given in the Innovation Fund GHG avoidance template. EoL emissions are excluded from the calculation.

6.4. Project scenario

The project scenario was presented in a clear and structured way with detailed explanations of all assumptions, data and calculations. The project scenario was evaluated at first at the pre-audit and additional documents for clarification were provided upon request. During the four audits all relevant aspects of the project scenario were discussed in detail and clarified with sufficient evidence.

Detailed information including studies, technical documentation for the green hydrogen production, CO_2 capture, and transportation and synthesis of e-methanol process were provided. Additionally, supporting documentations including data sources, technical information from potential system suppliers and pre-arrangements with relevant providers associated to the project. All aspects were explained in detail and the project proponent provided sufficient documents and additional information on all processes.

6.5. Monitoring procedures

Elyse will monitor data for the electrolyser and e-methanol plant while Lafarge will monitor the Le Teil site carbon capture unit to provide Elyse with the needed figures for reporting. The monitoring plan and procedures are under construction, as the project is in the planning phase. However, Elyse has already a detailed monitoring strategy pointing out the key parameters and processes of each block (hydrogen production, carbon capture unit and e-methanol synthesis) to be monitored and reported. This monitoring strategy is described in the feasibility study “ELYSE- Feasibility Study_20230313.docx” section “5.5 Monitoring, reporting and verification”.

6.6. Findings

A detailed finding list is provided as Annex A to this report.

All findings have been closed before finalizing the validation.

6.7. Recommendations for improvements

In the feasibility study, the main product is identified as “synthetic methanol” or “e-methanol”. However, in other parts of the same document it is identified just as “methanol”. This can be confusing as conventional methanol is also identified as “methanol”. The same situation is observed in the GHG avoidance document. to avoid confusion, it is recommended to be consistent with the terms used for the main product.

Elyse is advised to ensure that the information in the feasibility study and GHG prevention document is fully consistent with the information in the application form B.

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7. Validation decision

TÜV SÜD has undertaken the validation of the GHG declaration of the project *eM-Rhône*, to be implemented by the project proponent Elyse Energy based on the requirements of EN ISO 14064-2 “Specification with guidance at the project level for quantification, monitoring and reporting of GHG emissions reductions or removal enhancements” and the Innovation Fund 2022 program. The validation has the objective to review all technical data and information, calculations and measured variables of the reference scenario and to confirm the projection of emissions avoidances. Financial aspects and any associated financial review were not part of the ordered validation.

The eM-Rhône project reduces GHG emissions by replacing conventional methanol as feedstock for industrial chemical formulations with e-methanol (sustainable methanol). For this, a green hydrogen production plant will be installed together with a methanol synthesis plant. The green hydrogen produced, and the CO2 captured at a nearby cement plant will be used then in the production of e-methanol.

To arrive to the final validation conclusion and opinion, TÜV SÜD carried out a pre-audit, desk reviews, background investigations, two remote follow-up audits and a closing audit. A site visit was not conducted.

Through the validation process, different clarifications and corrective actions were required. The project proponents have taken actions to address these findings and submitted to TÜV SÜD the revised GHG declaration and other supporting evidence. All findings have been appropriately closed before the issuance of this validation report.

The validation team is of the opinion that the GHG declaration of the project *eM-Rhône* is in accordance with the relevant GHG program requirements of the Innovation Fund as well as the host country’s national requirements and is capable of achieving the following projected emission reductions with a reasonable level of assurance during 10 years after entry into operation:

Planned project reporting period:	**01.12.2027 - 30.11.2037**
Reference emissions:	**2.359.878 t CO_2e**
Project emissions:	**34.635 t CO_2e**
Accumulated GHG emissions avoidance:	**2.325.243 t CO_2e**
Relative GHG emissions avoidance:	**99%**

Based on: “eM_Rhone_GHG_avoidance_vfinal.xlsx” (13.03.2023)

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Datum: 2023.03.15 14:14:36 +01'00'

Lead Auditor

Technical Reviewer

Verification/Validation body

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Annex

A. List of findings and documentation of audit

Documentation Audit closure	
Company	Elyse Energy SAS
Project	eM_Rhone
Project reporting period	01.12.2027 - 30.11.2037
Contact person	Adrien Hallé
Date of the audit	28.02.2023, 07.03.2023, 10.03.2023 and 13.03.2023
Basis of audit / Standard	ISO 14064-2, EC Innovation Fund 2022
TÜV SÜD Order number (ITAS):	3781732
Lead Auditor	Paula Auer-Saupe
Additional examiner	Diego Alvarez Florez
Independent reviewer	Daniel Wittl
External observer (DAkkS)	-

N	Date of audit	Topic	Relevant documents reviewed	Remark	Corrections / Explanations
1	28 Feb 2023	General	Feasibility study, “eM_Rhone_GHG_avoidance_v2_Updated.xlsx”	The planned project reporting period is not specified yet.	Planned project reporting period: 01.12.2027 - 30.11.2037, please see “eM_Rhone_GHG_avoidance_vfinal.xlsx”. Finding closed
2	28 Feb 2023	General	“eM_Rhone_GHG_avoidance_v2_Updated.xlsx”	It was requested to provide the supporting documents of the data sources referenced in tabs “proj conversion factors” and “CC credit_Assumptions” for verification.	All requested documents were provided, please see Annex C. The documents were reviewed and discussed during the audits. Finding closed

3	28 Feb 2023	General	Feasibility study, "eM_Rhone_GHG_avoidance_v2_Updated.xlsx"	There are inconsistencies in the figures written in the feasibility study "section 5 GHG avoidance" and the figures included/calculated in the GHG avoidance document: It was requested to crosscheck all figures and check the consistency between points and commas for thousands and decimals.	The incorrect figures in both documents were verified and corrected. Please see "ELYSE- Feasibility Study_20230313.docx" and "eM_Rhone_GHG_avoidance_vfinal.xlsx". Finding closed
4	28 Feb 2023	General	Feasibility study, "eM_Rhone_GHG_avoidance_v2_Updated.xlsx"	In the feasibility study, the main product is identified as "synthetic methanol" or "e-methanol". However, in other parts of the same document it is identified just as "methanol". This can be confusing as conventional methanol is also identified as "methanol". The same situation is observed in the GHG avoidance document.	**Recommendation:** to avoid confusion, it is recommended to be consistent with the terms used for the main product throughout the documents.
5	28 Feb 2023	Project Boundary	Feasibility study, "eM_Rhone_GHG_avoidance_v2_Updated.xlsx"	Project boundary needs to be clearly defined. Not clear yet if: - The steam required for the methanol synthesis is an input or a process within project boundary - The CC unit is within project boundary or not * GHG emissions avoidance due to the CC are summed-up in the GHG emissions avoidance of the project.	Project boundary was clarified, please feasibility study "ELYSE-Feasibility Study_20230313.docx" - Steam is considered an input to the project since it is produced outside of the boundaries - The CC unit is within project boundary, named "Block 2" Finding closed
6	28 Feb 2023	Process Diagram	Feasibility study, "eM_Rhone_GHG_avoidance_v2_Updated.xlsx"	The process diagram needs to be updated according to the final approach, as it is still considering different sources of CO2.	The process diagram was updated, please see tab "process diagram" of the GHG avoidance document "eM_Rhone_GHG_avoidance_vfinal.xlsx". Finding closed
7	28 Feb 2023	GHG avoidance calculations	Feasibility study, "eM_Rhone_GHG_avoidance_v2_Updated.xlsx"	The formulas used to calculate the different parameters, ratios, emission factors, consumption of inputs and GHG	It was provided a document with all the formulas used "Description_of_Formulas.docx" and a new tab named "Supporting_calculations" was added in the last version of the GHG avoidance docu-

				emissions are not included in the Feasibility study or in the GHG avoidance document. It was requested to provide a description of all relevant formulas used in the GHG avoidance document.	ment “eM_Rhone_GHG_avoidance_vfinal.xlsx” with the detailed calculations used for the carbon capture unit, Hydrogen production and methanol synthesis. This approach was found to be sufficient to provide transparency and traceability to the GHG avoidance calculations. Finding closed
8	28 Feb 2023	GHG avoidance calculations	“eM_Rhone_GHG_avoidance_v2_Updated.xlsx”	In the tab “summary” is specified that the estimated annual production of e-methanol is 138.000 t of e-methanol per year. However, it is not clear, how this number was obtained. It was requested to include a description of how that figure was obtained in the GHG avoidance document.	The quantity of e-methanol produced is linked with the amount of CO2 Lafarge can provide. According to the Air Liquide study on the carbon capture installation, the flowrate of captured CO2 is 24.655t/h of CO2. Over 8000h/year and with a CO2 need of 1.422t of CO2/t of methanol, this is equivalent to a production rate of 138kt of emethanol per year (see the details of the calculations in the tab “Supporting_calculations” of the GHG avoidance document “eM_Rhone_GHG_avoidance_vfinal.xlsx”). Finding closed
9	28 Feb 2023	GHG avoidance calculations	“eM_Rhone_GHG_avoidance_v2_Updated.xlsx”, Feasibility study	In the tabs “reference emission” and “project emissions” is specified that there are ramp-up phases before reaching the nominal production rate: 50% (year 1), 75% (year 2) and then 100% (from year 3 until year 10). It was requested to include an argumentation of this assumption.	A reasonable argumentation was provided: The production rate will not reach its nominal value right away. Indeed, industrial installations always have ramp-up phases. In refineries, classical figures from licensors, confirmed by in-house experience, state that the nominal rating test happens within 3 months after commissioning. However, such a figure is valid for well-known technologies as it is the case in refineries. Since 3 innovative processes will be used in this project, also depending on one another, lower production rates are assumed during years 1 and 2. It is therefore realistic, even though conservative, that year 1 will be at 50% nominal production (69kt of methanol), whereas year 2 will be at 75% nominal production (approx. 103kt). From year 3 on, the production rate shall be nominal. Please see “ELYSE- Feasibility Study_20230313.docx”. Only the efficiency of electrolysis may be reduced (see “Project emissions” section for further details). Finding closed.
10	28 Feb 2023	Application form B	Application form B	The application form B was requested for verification	Not available during the validation. **Recommendation:** Elyse is advised to ensure that the information in the feasibility study and GHG prevention document is fully consistent with the information in the application form B.

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11	07 Mar 2023	GHG avoidance calculations / rations	"eM_Rhone_GHG_avoidance_v2_Updated.xlsx", feasibility study	During the audit, the calculation of the ratios and parameters used to calculate the consumption of inputs/utilities required for the estimated production of e-methanol were explained in detail. However, those calculations were not clearly explained and traceable in the GHG avoidance document. Thus, it was requested to include the detailed calculations used for all the consumption ratios: - H2 per ton of e-methanol - CO2 captured per ton of e-methanol - CO2 incorporated per ton of e-methanol - Water per ton of e-methanol - Cooling water per ton of e-methanol - Electricity per ton of e-methanol - Steam per ton of e-methanol - Ammonia per ton of e-methanol - Sodium hydroxide per ton of e-methanol	A tab named "Supporting_calculations" was added in the last version of the GHG avoidance document "eM_Rhone_GHG_avoidance_vfinal.xlsx" with the detailed calculations used for the carbon capture unit, H2 production and methanol synthesis – in this tab, the calculations of the consumption ratios are detailed, and their respective data sources are referenced. This approach was found to be sufficient to provide transparency and traceability to the GHG avoidance calculations. Finding closed
12	07 Mar 2023	GHG avoidance calculations / emission factors	"eM_Rhone_GHG_avoidance_v2_Updated.xlsx", feasibility study	During the audit, the sources of the emission factors used for the GHG avoidance calculations were verified. The emission factors are taken from JEC-WtT v5 report or EcoInvent if not available in the GHG avoidance calculation template. Which is in accordance with the Hierarchy of data sources for inputs and products in industrial projects, including projects with CCS specified in the IF Methodology for GHG Emission Avoidance Calculation. Nevertheless, the emission factor of methanol decomposition/potential combustion, in the tab "Proj Conversion Factors" section "Alternative factors" in line 117, is calculated as division of mass of	The detailed calculation of the emission factor of methanol combustion was included in the tab named "Supporting_calculations" in the last version of the GHG avoidance document "eM_Rhone_GHG_avoidance_vfinal.xlsx". Finding closed

				CO_2 equivalent in methanol per LHV of methanol. It was requested to include the detailed calculations used for this emission factor in the GHG avoidance document.	
13	07 Mar 2023	GHG avoidance calculations	Feasibility study, "eM_Rhone_GHG_avoidance_v2_Updated.xlsx"	**Recommendation**: it was noticed that the sources of the information included in the Feasibility study and GHG avoidance document had different names to the actual source documents. had different names to the actual source documents. Therefore, it was recommended to use the actual names and point out the details where the information stands (e.g., pg.) to facilitate the traceability of the data.	Recommendation implemented, see "eM_Rhone_GHG_avoidance_vfinal.xlsx"
14	07 Mar 2023	GHG avoidance calculations	Feasibility study, "eM_Rhone_GHG_avoidance_v2_Updated.xlsx"	It was clarified during the audit that the capture CO_2 will be transported between Le Teil and Roussillon, where the plants of Lafarge and Elyse are located. The distance between both sites is 101km. Additionally, it was explained that the CO_2 will be transported per train as it is the most economical alternative, and that Lafarge will be responsible for the transport logistics and installation of the required facilities between the train and the plants. It was requested the supporting document of this information.	The requested information was provided: - the distance has been extracted from Carbon Limits study about CO_2 transport "Carbon_Limits_Elyse CO2 transport.pdf" pg. 107. - maps from Geoportail platform are detailed in the file named "Rail_infrastructure_Le_Teil_Roussillon" - the LOI "LoI_Europorte_CO2_transport.pdf" mentions the potential collaboration between Lafarge and Europorte (railway company) to transport the CO_2 between Lafarge and Elyse plants. Finding closed
15	07 Mar 2023	GHG avoidance calculations / assumptions	Feasibility study, "eM_Rhone_GHG_avoidance_v2_Updated.xlsx", Supporting documents	The CO_2 used in the methanol synthesis is stemming from Lafarge Le Teil plant. This CO_2 is made of: 60% unavoidable CO_2 emissions, linked to the process of cement production and 40% emissions from fuel burning in furnace. It is assumed that the carbon captured by Lafarge, from the fuel burned in the	Information was provided regarding the Lafarge 2026 targets regarding the fuel mix used in the Le Teil plant, See Excel document "LeTeil_fuel_mix.xls". This document shows that in 2026, wood (biogenic source) will have a share of 9% in the fuel mix and it also shows that in 2022, wood had a share of 7,3%. Therefore, the assumed target of 9% biogenic share is reasonable. Finding closed

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				furnace, will have a 9% biogenic share and a 91% non-biogenic share (also called fossil or unavoidable). Therefore, proof of this assumption and information on the current fuel mix share of the Le Teil plant were requested.	
16	07 Mar 2023	GHG avoidance calculations / assumptions	Feasibility study, "eM_Rhone_GHG_avoidance_v2_Updated.xlsx", Supporting documents	It was explained that following a conservative principle, a CO2 leakage rate during capture and transport was assumed to be 1%, in tab "CC credit_Assumptions" line 13 of the GHG avoidance document. It was requested to provide a description of this assumption.	The description was added in the feasibility study, please see "ELYSE- Feasibility Study_20230313.docx" section "5.3 project emissions". Finding closed
17	07 Mar 2023	GHG avoidance calculations / assumptions	Feasibility study, "eM_Rhone_GHG_avoidance_v2_Updated.xlsx", Supporting documents	It was explained during the audit that the steam required for the synthesis of methanol will be provided by GIE Osiris and that they will used a converted boiler that uses wood farmed and wood waste as fuel. This assumption has a significant impact in the heat emission factor associated to the steam production, see line 118 to 121 in the tab "Proj Conversion Factors". Thus, It was requested to clarify this assumption and provide supporting documents on the renovation of the boiler that would be assigned to Elyse.	The requested clarification was added in the feasibility study in section "6.3 LP Steam & Water supply – OSIRIS platform" please see "ELYSE- Feasibility Study_20230313.docx". Regarding the availability of biomass (Refuse Derived Fuel (RDF)), a study led by Elyse named "20230201_Carbone 4_Elyse Energy_Rapport final_vMeeting.pdf" pointed out that there will be an increase of the RDF available resources in France. In addition, since steam supply is one of the main sources of CO2 emissions of the project, a sensitivity analysis was added in the feasibility study in section "5.4.2 Sensibility analysis of the results" please see "ELYSE- Feasibility Study_20230313.docx". Finding closed.
18	07 Mar 2023	buyers/off-takers of e-methanol agreement / contracts	Feasibility study, "eM_Rhone_GHG_avoidance_v2_Updated.xlsx", Supporting documents	It was requested to provide proofs of the potential buyers/off-takers of e-methanol in the sector "Chemicals" (e.g., draft contract or letter of intent).	A LoS with Adisseo was provided, please see "LoS_Adisseo_offtake.pdf". Elyse stated during closing audit that more agreements with buyers/off-takers are in progress, but not signed yet. Finding closed
19	07 Mar 2023	Service providers agreement / contracts	Feasibility study, "eM_Rhone_GHG_avoidance_v2_Updated.xlsx", Supporting documents	Elyse methanol plant and green hydrogen production plant will be located on GIE Osiris industrial platform and will benefit from the utilities already produced on this site such as steam, compressed air, cooling water or nitrogen, etc.	Requested document was provided, please see "Letter of interest_GIE_OSIRIS.pdf" Finding closed

				Thus, it was requested to provide proof (e.g., draft contract or letter of intent) mentioning the utilities to be provided.	
20	07 Mar 2023	Service providers agreement / contracts	Feasibility study, "eM_Rhone_GHG_avoidance_v2_Updated.xlsx", Supporting documents	It was requested to provide proofs of the main service providers involved in the project (e.g., draft contract or letter of intent).	Requested documents were provided. Electricity providers: - Energie d'ici please see "LoI_Elec_Supply_Energie_dici.pdf" - Enoe Energie please see "LoI_Elec_Supply_Enoe.pdf" - Tenergie see "LoS_Elec supply_Tenergie_Elyse.pdf" Electric installations in Elyse plant: - RTE please see "Electrical_connection_PTF_RTE.pdf" Carbon capture unit operator: - Lafarge please see "MOU_LAFARGE_ELYSE.pdf" CO2 transport: - Europorte please see "LoI_Europorte_CO2_transport.pdf" Finding closed
21	07 Mar 2023	Monitoring, Reporting and Verification	Feasibility study, "eM_Rhone_GHG_avoidance_v2_Updated.xlsx", Supporting documents	The documents for monitoring, reporting and verification, such as: monitoring plan and procedures, etc. are still under construction, as the project is still in the planning phase. However, Elyse has already a detailed monitoring strategy pointing out the key parameters and processes of each block (hydrogen production, carbon capture unit and e-methanol synthesis) to be monitored and reported. This information can be found in the feasibility study "ELYSE-Feasibility Study_20230313.docx" section "5.5 Monitoring, reporting and verification". Nevertheless, it was requested to provide a diagram showing all relevant monitoring points and the list of the monitored parameters.	The requested information was added in the feasibility study in sections "5.5.3 measuring points along the process" and "6 Key consumption figures and sustainability of the proposed solution" please see "ELYSE- Feasibility Study_20230313.docx". Finding closed

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B. Checklist of the verification assessment plan

Validation of Innovation Fund Project

Document check - contents of the GHG declaration according to EN ISO 14064-2

Subject / context	Audit result
1) The GHG report contains the name of the project proponent.	Requirement implemented
2) A brief description of the GHG project, including size, location, duration and types of activities	Requirement implemented
3) A GHG statement(s), including a statement of GHG emission reductions and removal enhancements stated in units of CO_2e, e.g. tonnes of CO_2e	Requirement implemented
4) A statement describing whether the GHG statement has been verified and/or validated, including the type of verification or validation and level of assurance achieved.	Not applicable
5) A list of all relevant GHG sources and sinks controlled by the project, as well as those related to or affected by the project, including the defined criteria for their selection for inclusion in quantification.	Requirement implemented
6) A statement of the aggregate GHG emissions and/or removals of GHG for the GHG project that are controlled by the project proponent, stated in unit of CO_2e, e.g. tonnes of CO_2e, for the relevant time period (e.g. annual, cumulative to date, total)	Requirement implemented
7) A statement of the aggregate GHG emissions and/or removals by GHG quality assurance system for the GHG baseline scenario, stated in units of CO_2e, e.g. tonnes of CO_2e, for the relevant time period.	Requirement implemented
8) A description of the GHG baseline scenario and demonstration that the GHG emission reductions or removal enhancements are not over-estimated.	Requirement implemented
9) A general description of the criteria, procedures or good practice guidance used as a basis for the calculation of project GHG emission reductions and removal enhancements.	Requirement implemented
10) A statement on uncertainty, how it affects the GHG statement and how it has been addressed to minimize misrepresentation.	Requirement implemented
11) The date of the report and the time period covered.	Requirement implemented
12) As applicable, an assessment of permanence.	Indirectly through technical assessment of future production of e-mathanol
13) An evidence of the appointment of the authorized representative on behalf of the project proponent, if different from the proponent.	Not applicable
14) If applicable, the GHG programme(s) to which the GHG project subscribes.	Yes, EU Innovation Fund call “InnovFund-2022-LSC-02-INDUSTRY-ELEC-H2”
15) If required by intended users, changes to the project or monitoring system from the project plan and assessment of its conformity to criteria, applicability of methodologies and any other requirements.	Not applicable

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Checklist Validation according to Innovation Fund – Excel Sheet "Checklist"

Nr.	Topic	Item	Audit result
1	Alignment with the methodology	Have the GHG calculations been submitted in an excel sheet that mirrors the GHG methodology, using the same terminology for GHG emission sources and activities within the scope of the given sector? (Please note that an excel template now exists also for energy intensive industries.) Any deviations are explained clearly and justified.	YES
2	Alignment with the methodology	Have ONLY emissions inside the scope of the IF GHG avoidance criteria been considered for the final emissions calculation? (GHG savings that could be claimed under Net carbon removals and other GHG savings should be indicated separately, see next point.)	YES
3	Alignment with the methodology	In case the project presents benefits which are out of the scope of the IF GHG emission avoidance criterion, has an excel-based calculation of these additional benefits with respect to GHG emission avoidance been provided? Does the calculation of the additional GHG emission avoidance follow the logic of the IF GHG emission avoidance methodology? Have you presented the additional calculations in the separate tabs 'Other GHG emission avoidance' and "net carbon removals"? Have you referred to the excel file/tabs, when presenting the additional benefits under "Net carbon removals, other GHG savings" in Application Form B?	NA - no benefit claimed out of the scope of IF GHG
4	Alignment with the methodology	Have sufficient data and explanations to fully explain the project, its boundaries and its interactions with other installations been provided? Have the data used and methods adopted to estimate the GHG emissions and emission factors been documented in a transparent manner, creating a clear verification trail? Have you provided information sources and hyperlinks to the original reference in the application files?	YES
5	Alignment with the methodology	Have the principal product(s) and the reference products they substitute been identified? Do the principal product(s) represent the main objective of the project? Are the principal product(s) all in the same sector?	YES
6	Alignment with the methodology	In case an EU ETS benchmark is used, are these values up to date? The EU ETS benchmarks have been updated in Implementing Regulation determining revised benchmark values for free allocation of emission allowances for the period from 2021 to 2025 pursuant to Article 10a(2) of Directive 2003/87/EC of the European Parliament and of the Council.	NA - the methanol is not an EU ETS benchmark
7	Transparency of the calculation	Have each adopted assumption been disaggregated in the excel sheet (i.e. in easily verifiable units) and with their rationale (i.e. the basis of the calculation) properly referenced and/or any data sources used?	YES

8	Robustness of data	Have projected operational data been backed by robust evidence or, if estimated/extrapolated, linked to the assumptions table? Are the conversions sufficiently visible so they can be easily reviewed and the robustness of the assumptions checked? Are the characteristics of the proposed plant credible and in line with basic engineering principles, e.g. heat and mass balance? Where assumptions have been applied for operational characteristics and KPIs used, have these been selected in a conservative yet accurate manner, i.e. to avoid under/over estimation?	YES Sensitivity analysis performed for steam supply
9	Robustness of the calculation	Have any double-counted emissions or avoidance/reduction been adequately disregarded from the calculations?	YES
10	Robustness of the calculation	In case the relative emissions avoidance exceeded 100%, have you checked whether ONLY the GHG emissions attributed to the chosen “principal products” been considered in the reference emissions in your calculation (see question #7 for additional information)?	NA - it reaches 99%
11	Consistency of the application	Have absolute and relative emissions for the full 10 years of operation and, in the case of EII projects, the EU ETS benchmark used (if applicable) been objectively and visibly declared in the Application Form B? Are these values declared also consistent with the values indicated in the excel sheet? (E.g.: Absolute GHG emission avoidance potential for the project is XXX million tons CO2 for the first 10 years of operation).	YES
12	Clarity of the presentation	For energy intensive industries, has the process diagram in figure 2.1 of the methodology (Annex C) been properly filled in? Have any “zero” values inserted in any of the fields been properly justified?	YES
13	Robustness of the calculation	For energy intensive industries, has the applicant considered the emissions in all steps (inputs - processes - products - use - eol) for the calculation of relative emission avoidance? (When there is no change in emissions in a step, these can be disregarded for the absolute emission avoidance calculation but have to be considered in the relative emission avoidance)	YES
14	Sustainability requirements	For projects using feedstock of biogenic origin: have sufficient assurance that the biomass supplied will meet the sustainability requirements of the recast Renewable Energy Directive (RED II) and that will originate from feedstock with a low risk of causing indirect land-use change been provided?	YES (see doc "Carbone4_SRF_Study.pdf" for details)

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C. Reviewed documents list

1	eM_Rhone_GHG_avoidance_v3.xlsx
2	ELYSE- Feasibility Study.docx
3	eM_Rhone_GHG_avoidance_v2_Updated.xlsx
4	draft_partie_GHG.docx
5	Description_of_Formulas.docx
6	20230201_Carbone 4_Elyse Energy_Rapport final_vMeeting.pdf
7	calculations_CC_CryoCap.xlsx
8	Carbon_Limits_Elyse CO2 transport.pdf
9	CC_AirLiquide_Preliminary Heat and Mass Balance.pdf
10	CC_AirLiquide_Preliminary Utilities.pdf
11	Description_of_Formulas.docx
12	EcoInvent_water production_deionised_Europe without Switzerland_2021.pdf
13	EcoInvent_water_production_decarbonized_FR_2021.pdf
14	Electrical_connection_PTF_RTE.pdf
15	Environmental_study_Roussillon.pdf
16	Haldor_Topsoe_S-11327 Elyse Energy - Package_1_2.pdf
17	JEC_WTTv5_ Appendix 1_Pathways 7_Heat and Power.xlsx
18	LeTeil_mix combustible Four B.xlsx
19	LoI_Elec_Supply_Energie_dici.pdf
20	LoI_Elec_Supply_Enoe.pdf
21	Siemens_Attachment 3_Technical Description.pdf
22	Siemens_Attachment 4_Electrolyzer Technical Data Sheet_Annex 1.pdf
23	Siemens_NDA.pdf
24	Steam_Production_Study_MoM.docx
25	ELYSE- Feasibility Study.docx
26	eM_Rhone_GHG_avoidance_v3.xlsx
27	explanations_calculations_CC_H2_MeOH.xlsx
28	GHG_avoidance_v3_sensitivity.xlsx
29	LoI_Europorte_CO2_transport.pdf
30	LoS_Elec supply_Tenergie_Elyse.pdf
31	MOU_LAFARGE_ELYSE.pdf
32	Rail_infrastructure_Le_Teil_Roussillon.docx
33	sensitivity_steam.xlsx
34	Siemens_Energy_feasibility_study_offer.pdf
35	Siemens_FS_Attachment 6_Typical Process Flow Diagram_50MW.pdf
36	Steam_production_RDF_Carbone 4.pdf
37	eM_Rhone_GHG_avoidance_sensitivity.xlsx

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38	Environmental_study_Roussillon.pdf
39	LeTeil_fuel_mix.xlsx
40	Letter of interest_GIE_OSIRIS.pdf
41	LoS_Adisseo_offtake.pdf
42	eM_Rhone_GHG_avoidance_vfinal.xlsx
43	ELYSE- Feasibility Study_20230313.docx

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D. List of interviewed persons

Validation of Innovation Fund Project – eM-Rhône

List of participants		
Type of audit:	**Verification of the GHG Statement**	
Client:	Elyse Energy SAS	
Subject of the GHG declaration:	eM-Rhone	
Date of the audit:	28.02.2023, 07.03.2023, 10.03.2023 and 13.03.2023	
Order-Nr.:	3781732	
Lead auditor:	Paula Auer-Saupe	
Surname, Name	**Responsibility / Department**	**Signature**
Adrien Hallé	Responsible environment and durability (Elyse Energy)	
Thomas Decharette	Head of decarbonation (Lafarge)	
Paula Auer-Saupe	Lead Auditor (TÜV SÜD)	
Diego Alvarez Florez	Additional examiner (TÜV SÜD)	

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E. Accreditation certificate of Verification Body

DAkkS Deutsche Akkreditierungsstelle

Deutsche Akkreditierungsstelle GmbH

Annex to the Accreditation Certificate D-VS-14153-01-00 according to DIN EN ISO 14065:2013

Period of validity: 27.01.2020 to 13.12.2023 Date of issue: 27.01.2020

Holder of certificate:

TÜV SÜD Industrie Service GmbH
Westendstraße 199, 80686 München, GERMANY

Verification of Greenhouse Gases Emissions Reports and Tonne-kilometres Reports according to DIN EN ISO 14065:2013 and Regulation (EU) No. 2018/2067, EU (NO) 601/2012 and (EU) No. 2018/2066 in the following group of activities according to Annex I of directive 2003/87/EG and other activities according to Art. 10a and Art. 24 of subject directive:

No.	Scope of Accreditation
1a	Combustion of fuels in installations, where only commercial standard fuels as defined in Regulation (EU) No. 601/2012 are used, or where natural gas is used in category A or B installations
1b	Combustion of fuels in installations, without restrictions
2	Refining of mineral oil
3	Production of coke Metal ore (including sulphide ore) roasting or sintering, including pelletisation Production of pig iron or steel (primary or secondary fusion) including continuous casting
4	Production of processing of ferrous metals (including ferroalloys) Production of secondary aluminium Production or processing of non-ferrous metals, including production of alloys
5	Production of primary aluminium (CO_2 and PFC emissions)
6	Production of cement clinker Production of lime or calcinations of dolomite or magnesite Manufacture of glass including glass fibre Manufacture of ceramic products by firing Manufacture of mineral wool insulation material Drying or calcination of gypsum or production of plaster boards and other gypsum products

This document is a translation. The definitive version is the original German annex to the accreditation certificate. 1/3

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Annex to the Accreditation Certificate D-VS-14153-01-00

No.	Scope of Accreditation
7	Production of pulp from timber or other fibrous materials Production of paper or cardboard
8	Production of black carbon Production of ammonia Production of bulk organic chemicals by cracking, reforming, partial or full oxidation by similar processes Production of hydrogen (H_2) and synthesis gas by reforming or partial oxidation Production of soda ash (Na_2CO_3) and sodium bicarbonate ($NaHCO_3$)
9	Production of nitric acid (CO_2 and N_2O emissions) Production of adipic acid (CO2 and N_2O emissions) Production of glyoxal and glyoxylic acid (CO_2 and N_2O emissions) Production of caprolactam
10	Capture of greenhouse gases from installations covered by Directive 2003/87/EC for the purpose of transport and geological storage in a storage site permitted under Directive 2009/31/EC Transport of greenhouse gases by pipelines for geological storage in a storage site permitted under Directive 2009/31/EC
11	Geological storage of greenhouse gases in a storage site permitted under Directive 2009/31/EC
12	Aviation activities (emissions and tonne-kilometre data)
98	Other activities pursuant to Article 10a of Directive 2003/87/EC

Verification and Validation according to DIN EN ISO 14065:2013 for Non-Regulated Greenhousegas Schemes according to the following standards:

EN ISO 14064-1	Greenhouse gases - Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals (ISO 14064-1:2006)
EN ISO 14064-2	Greenhouse gases - Part 2: Specification with guidance at the project level for quantification, monitoring and reporting of greenhouse gas emission reductions or removal enhancements
EN ISO 14064-3	Greenhouse gases - Part 3: Specification with guidance for the validation and verification of greenhouse gas assertions (ISO 14064-3:2006); German and English version EN ISO 14064-3:2012

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Annex to the Accreditation Certificate D-VS-14153-01-00

Abbreviations used:

DIN	Deutsches Institut für Normung e.V.
EN	European Standard
EU	European Union
ISO	International Organization for Standardization