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COMMISSION OPINION

of 16.12.2025

on the draft permit to permanently store carbon dioxide in block sections K14-FA and K14-FC of the Dutch continental shelf

Only the Dutch text is authentic

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1. LEGAL CONTEXT

Directive 2009/31/EC of the European Parliament and of the Council of 23 April 2009 on the geological storage of carbon dioxide and amending Council Directive 85/337/EEC, European Parliament and Council Directives 2000/60/EC, 2001/80/EC, 2004/35/EC, 2006/12/EC, 2008/1/EC and Regulation (EC) No 1013/2006 ('Directive 2009/31/EC')[1] establishes a legal framework for the environmentally safe geological storage of CO_2 to contribute to the fight against climate change.

Directive 2009/31/EC covers CO_2 storage in geological formations in the Union during the entire lifetime of storage sites and harmonises the requirements for selecting and operating CO_2 storage sites. Chapter 3 of Directive 2009/31/EC requires Member States to ensure that no storage site is operated without a storage permit and establishes the requirements for the national permitting process and the content of storage permits.

Article 10 of Directive 2009/31/EC establishes an additional safeguard to ensure that storage permits are in line with Directive 2009/31/EC through the dialogue between the Member State concerned and the European Commission ('the Commission'). In this respect, Article 10 of Directive 2009/31/EC requires the Member States to inform the Commission of all draft storage permits and to provide all material taken into consideration for the adoption of the draft decision to award the storage permit.

Article 10 of Directive 2009/31/EC provides for the Commission to issue a non-binding opinion within four months after receipt of a draft storage permit. Where the Commission issues a non-binding opinion, the competent authority is expected to take the utmost account of it when adopting the final storage permit. Where the competent authority decides to depart from the Commission's opinion, Article 10(2) of Directive 2009/31/EC requires the competent authority to state the reasons.

The competent authority for issuing the storage permit in the Netherlands is the Minister of Climate Policy and Green Growth. The Dutch State Supervision of Mines ('SSM') is responsible for inspections.

[1] Directive 2009/31/EC of the European Parliament and of the Council of 23 April 2009 on the geological storage of carbon dioxide and amending Council Directive 85/337/EEC, European Parliament and Council Directives 2000/60/EC, 2001/80/EC, 2004/35/EC, 2006/12/EC, 2008/1/EC and Regulation (EC) No 1013/2006 (OJ L 140, 5.6.2009, p. 114, ELI: http://data.europa.eu/eli/dir/2009/31/oj).

2. PERMITTING PROCESS

2.1. APPLICATION FOR A STORAGE PERMIT

On 13 June 2022, Shell Exploration and Production (107) B.V.[2] ('SEP (107)') and Shell Gas and Power Developments B.V. ('SGPD')[3] jointly submitted an application ('the Application') to the Minister for a permit for the permanent storage of CO_2 in the K14-FAFC depleted gas field (CO_2 storage site). SEP (107) is the proposed operator.

The Applicants indicate that the K14-FAFC storage site is part of a large-scale CO_2 transport and storage project in the Netherlands called Aramis CCS. The Aramis CCS project currently involves the following partners: TotalEnergies, Shell, Energie Beheer Nederland (EBN), and Nederlandse Gasunie. Shell and TotalEnergies are expected to contribute primarily to CO_2 storage development, whereas Gasunie and EBN will contribute primarily to the CO_2 pipeline development[4].

This consortium aims to create *"a decarbonisation solution for the industrial sectors by enabling the transport of CO_2 to depleted offshore gas fields under the North Sea"*[5].

The Aramis CCS project can be described by the following four components:

- The CO_2 transport component – transporting by ship or onshore pipeline the captured CO_2 to a terminal at the Maasvlakte, from where CO_2 will be pumped into a subsea pipeline;
- The CO_2 collection point component – the collection point is located at the Maasvlakte in the port of Rotterdam. In addition to a shipping terminal, a compressor and a pumping station, there will be storage tanks for temporary storage of liquid CO_2 from ships to create sufficient redundancy for a continuous and sufficient supply of CO_2. The different CO_2 streams, cryogenic and gas phase, are combined at the collection point and brought to the adequate temperature and pressure;
- The subsea pipeline component – from the collection point, CO_2 is transported to offshore platforms via a subsea pipeline. The planned subsea pipeline has a much larger capacity than required for the first phase of the project. This approach enables the later addition of industrial emitters and storage sites; and,
- The CO_2 storage component – when the CO_2 reaches the offshore platforms, it is injected into depleted gas fields. The injection wells will be adapted or drilled specifically for this purpose. Injection takes place three to four kilometres below the

[2] SEP (107) B.V. (to be renamed to Shell Carbon Capture and Storage B.V.) is registered in the trade register under number 75749629. SEP (107) B.V. is a 100% subsidiary of Shell Overseas Investments B.V., which is a 100% subsidiary of Shell Petroleum N.V., which in turn is a 100% subsidiary of Shell plc. The statutory objective of SEP (107) B.V. is currently to prospect for, produce, transport and process petroleum, natural gas and other minerals, as well as to generate, transmit, sell and trade in electricity and other forms of energy, including sustainable energy. Objectives of SEP (107) B.V. will be adjusted to the activities that the company will carry out in accordance with the License for Permanent Storage of CO_2. As soon as amendments to the Articles of Association have been introduced and the entity has been re-named, updated Articles of Association will be submitted.

[3] SGPD is registered in the Trade Register under Chamber of Commerce number 27173224. SGPD is a 100% subsidiary of Shell Gas B.V., which is a 100% subsidiary of Shell Petroleum N.V. which in turn is a 100% subsidiary of Shell plc.

[4] Website of the Aramis CCS project – 'Aramis takes next step towards investment decision' – 25 April 2025.

[5] Website of the Aramis CCS project – Main page.

seabed into a storage site comprising of a depleted gas field reservoir and overlying and laterally sealing rocks.

2.2. PROJECT DESCRIPTION

The CO_2 storage project include the following elements:

- CO_2 storage reservoirs formed by Permian Lower Slochteren sandstones. These sandstones were mainly deposited as mixed aeolian and fluvial deposits. The top of the reservoir is located approximately 2,900 metres below the seabed;
- the K14-FA field is defined as the storage site;
- the adjoining K14-FC field is part of the storage complex and the combined unit is designated as the K14-FAFC storage complex. The K14-FAFC storage complex is part of the hydraulic unit including the adjacent depleted gas field K15-FH;
- the geological capping layers above the K14-FAFC storage complex comprise the Zechstein Group consisting of evaporites (halite, anhydrite and minor amounts of bitter salt) and carbonates with some thin intercalations of claystones. The Zechstein Group is present over the entire area of the storage site, but its thickness is highly variable due to salt thickness variation. In the centre of the K14-FA field, the Zechstein is approximately 700 metres thick and forms a salt ridge, thinning towards the Southern and Northern flanks of the ridge to just less than 50 metres at one location. That these rocks could hold the original gas column proves the sealing property of these overlying layers with respect to CO_2;
- the formations under the storage reservoir, comprised of Carboniferous shales of the Limburg Group;
- the fault zones surrounding the K14-FAFC storage complex;
- the new CO_2 injection wells in storage site K14-FA; and,
- the injection facilities and associated above-ground facilities on a new platform to be used for the project, up to and including the wellheads.

The geographical area to which the storage application applies is clearly specified and displayed in the Application and the geographical coordinates of the storage permit area are presented under Article 2 of the draft permit. Detailed maps of the storage site and complex are presented in Annexes I and II of the draft permit.

The K14-FAFC CO_2 storage complex is part of a larger hydraulic unit, which includes the depleted gas field K15-FH. There is minimal pressure communication between the two areas via the aquifer, and this is not expected to affect the operation and management of the K14-FAFC storage complex. No other storage sites are located within this hydraulic unit. Therefore, pressure interaction requirements under Article 8(1)(c) of Directive 2009/31/EC do not apply.

Specific details of the K14-FAFC injection plan are described in Annex III of the draft Decision. All existing exploration and production wells (seven in total) will be fully decommissioned prior to the start of CO_2 injection. New surface facilities will be installed, and four new wells will be drilled for the injection of CO_2.

The injectate stream will be delivered to the K14-FAFC storage complex by a trunkline off the Aramis CCS pipeline and will have a CO_2 content greater than 95%. The injectate stream composition is set by the overall composition of the Aramis CCS project injectate stream,

which shall have a CO_2 content greater than 95%. The CO_2 specifications for the Aramis CCS transport infrastructure are available on the project website[6].

The K14-FAFC storage project expects to store up to 43 million tonnes of CO_2 over a 25-year period, starting no later than 1 January 2035. This equates to approximately 1.7 million tonnes of CO_2 per year.

The maximum injection pressure has been specified not to exceed the storage complex hydrostatic pressure of 314 bar at 2,859 metres True Vertical Depth Subsea (TVDSS), assuming a hydrostatic gradient of 0.110 bar/metre. Maximum allowable well head injection pressure is 180 bar.

[6] Website of the Aramis CCS project – CO_2 Specifications for Aramis CCS transport infrastructure.

3. REVIEW BY THE COMMISSION

On 22 July 2025, the Dutch Government submitted to the Commission the Minister's draft decision on a CO_2 storage permit and the application for a storage permit for K14-FAFC.

The draft permit, the Application, and supporting documents provided by the Dutch Government constitute the basis for the Commission's review of the K14-FAFC draft permit in light of the requirements set out in Directive 2009/31/EC and for this Non-Binding Opinion ('Opinion').

The Commission notes that the draft permit does not include elements referred to in paragraphs 5, 6, 7, and 8 of Article 9 of Directive 2009/31/EC, while the inclusion in the permit of all elements referred to in Article 9 is mandatory pursuant to that Directive. The draft permit must be revised as to include these missing elements. The Dutch authorities informed the Commission that national law sets out legally binding rules relating *inter* alia to the following requirements of Directive 2009/31/EC:

- Preparing and operating approved monitoring and corrective measures plans (Articles 9(5), 9(6), 11 and 16 of Directive 2009/31/EC);
- Keeping a register of the quantities and characteristics of the CO_2 streams, including their composition delivered, stored, and where applicable, leaked (Article 12(3)(b) of Directive 2009/31/EC);
- Ensuring regular reporting to the competent authority of the results of the monitoring and the quantities and properties of the CO_2 streams delivered and injected (Articles 14(1) and (2) of Directive 2009/31/EC);
- Immediately reporting leakages and significant irregularities to the competent authority (Article 16 of Directive 2009/312/EC); and
- Transferring obligations from the operator to the competent authority after closure (Article 18 of Directive 2009/31/EC).

4. OPINION

Based on the review of the Application, draft permit and other supporting documents, the Commission assessed the technical, environmental, and financial aspects of the draft permit as outlined in the following points.

4.1. Technical requirements

Directive 2009/31/EC requires that applications for storage permits include, among others, a characterisation of the storage site and storage complex, an assessment of the expected security of the storage site, the total quantity of CO_2 to be injected and stored, the prospective sources and transport methods, the composition of CO_2 streams, the injection rates and pressures, and the location of injection facilities. Applications must also include a proposed monitoring plan, corrective measures plan, and provisional post-closure plan.

Directive 2009/31/EC requires that storage permits include, among others, the precise location and delimitation of the storage site and storage complex, the requirements for storage operation, the total quantity of CO_2 authorised to be geologically stored, the reservoir pressure limits, the maximum injection rates and pressures, the requirements for the composition of the CO_2 stream, the approved monitoring plan, the approved corrective measures plan, the conditions for closure, and the approved provisional post-closure plan.

The Commission notes that the suitability of the storage site is demonstrated by the detailed characterisation and assessment of the storage site and storage complex contained in the Application and confirmed by the technical reports[7,8]. The technical assessment provided in the Application contains static, dynamic, geomechanical, geochemical and well performance modelling proving the K14-FAFC storage site is hydraulically isolated (other than minor aquifer pressure communication with the adjacent depleted and non-producing K15-FH gas field that is not expected to affect the operation and management of the storage site) and suitable for the long-term storage of CO_2.

In addition, the maximum permissible volumes to be injected (total quantity of CO_2 authorised to be geologically stored) has been set in the draft permit[9] at a maximum of 43 million tonnes of CO_2, equivalent to approximately 1.7 million tonnes per annum.

The maximum 25-year period of injection[10] starting no later than 1 January 2035[11], the proposed maximum injection rates and pressures[12] in the wells and in the reservoir established in the draft permit, both during and after cessation of injection, are reasonable. The maximum permissible pressure and rates are linked to the maximum hydrostatic pressure gradient of 0.110 bar/metre. Maximum reservoir pressure allowed is set at 314 bar at 2,859 metres TVDSS and maximum wellhead injection pressure is set at 180 bar. These limits have been based on detailed static, dynamic and well performance modelling using a significant database of information and standard industry techniques and technologies.

The requirement of the draft permit for the CO_2 stream to consist of a minimum content of 95% CO_2[13] is in line with Article 12 of Directive 2009/31/EC. This composition is monitored at several points, including at the compressor station[14]. The draft permit only allows a clearly specified and limited range of naturally occurring process impurities and these should not affect the integrity of the storage system or process. No waste products or other additives are allowable or specified.

The Commission notes that the monitoring[15] and corrective measures plans[16] presented by the Applicants, as well as the requirements related to their updating prior to the start of the injection period contained in the draft permit[17], are compliant with Directive 2009/31/EC.

Regarding potential leakage, the Commission takes notes of the independent scientific opinions of TNO's Advisory Group for Economic Affairs (TNO-AGE) and the SSM that the risks of leakage during operation and after closure of the storage complex are very limited. The site has stored natural gas for millions of years; the decommissioning of the gas production wells and drilling of new, specifically designed for CO_2 injection, wells using up to date technologies and injection practices are considered to be industry standard and fit for

7 Technical review of Aramis K14-FA storage permit application – SINTEF – 3 August 2023.

8 Bijlage B – Evaluation storage license application K14-FA storage permit application – TNO – 26 April 2023.

9 Article 7(3) of the draft Decision.

10 Article 5(3) of the draft Decision.

11 Article 5(1) of the draft Decision.

12 Article 7(1) and (2) of the draft Decision.

13 Article 8 of the draft Decision.

14 Shell Storage Licence Application – Part IV: Monitoring Plan: Section 4.2.5: Continuous online CO_2 stream monitoring at emitters delivery.

15 Application Part IV Measurement, Monitoring and Verification plan.

16 Application Part V: Corrective Measures Plan.

17 Articles 12 and 13 of the draft Decision: Monitoring Plan and Corrective Measures Plan.

purpose. It is noted that appropriate risk assessment, monitoring and corrective measures are planned.

The Commission take notes of the conclusion of TNO-AGE and SSM that the construction, operation and closure of the storage site and necessary facilities will not pose a significant danger to the environment and human health[18].

The Commission welcomes the requirement for a six-month period at the start of the injection period during which time the facilities and monitoring equipment will be tested *"to refine/improve the identification and correction for risk management of injection and storage of CO_2"*[19].

The Commission is of the view that the draft permit provisions on the closure of the storage site satisfy the requirements of Directive 2009/31/EC. The closure conditions contained in the draft permit specify that closure shall take place when up to a maximum of 43 million tonnes of CO_2 has been injected and, in any case, no later than 31 December 2059[20].

In addition, upon cessation of injection, the draft post-closure plan[21] contained in the Application includes a non-specific period during which monitoring, corrective measures and reporting to the competent authority on the site conditions will be maintained until the competent authority is satisfied there are no irregularities, at which time the injection wells and facilities can be decommissioned. The period can be extended for as long as required by the competent authority until the competent authority is satisfied the site is safe and the CO_2 securely and permanently contained.

The Commission however notes that the financial security plan contained in Part VII of the Application[22] in Section 3.1 headed "*Obligations certain to occur*" includes a cost provision for a period of 20 years of post-closure monitoring prior to handover to the competent authority pursuant to the requirements of the Directive 2009/31/EC.

The Commission invites the competent authority to approve the draft post-closure plan in the draft permit as required under Article 9(7) of Directive 2009/31/EC.

The Commission considers that, from a technical point of view, the K14-FAFC storage site is suitable for permanent geological storage of CO_2 and the draft permit includes the necessary requirements for the safe operation of the storage site in line with Directive 2009/31/EC.

[18] Section 4.2.3: Activities Review in the Application Assessment by TNO-AGE and the SSM.

[19] Article 9 of the draft Decision.

[20] The injection period must start by 1 January 2035 and last a maximum of 25 years (based on Article 5 of the draft Decision).

[21] Shell Storage Licence Application – Part VI: Closure Plan: Section 3: Steps to Closure and Transfer.

[22] Application Part VII: Section 3.1.2 Monitoring Costs.

4.2. Environmental requirements

CO_2 storage sites require an environmental impact assessment under Article 5 of Directive 2011/92/EU, except if they are exempted by Member States under Article 2(4) of Directive 2011/92/EU. Applications for storage permits must include relevant environmental impact assessment information under Article 7(9) of Directive 2009/31/EC.

As stated under point 4.1 of this Opinion, the Commission takes note of the views of independent scientific bodies that the construction, operation and closure of the storage site and necessary facilities will not pose a significant danger to the environment and human health. The Commission also notes the Minister's view, included in the draft permit, that there is no significant risk of leakage and no significant environmental or health risks linked to storage[23].

However, the environmental impact assessment prepared ahead of the storage site's operational start[24], as required under Article 7(9) of Directive 2009/31/EC and Article 4(1) of Directive 2011/92/EU, suggests that more information regarding the effects of the project on the biosphere, such as benthic and marine fauna, seabirds, and atmosphere, is needed. In addition, in line with Directive 2008/56/EC[25], Member States shall take the necessary measures to achieve or maintain good environmental status in the marine environment (such as those related to seabed integrity, biodiversity, chemical contamination or underwater noise in the Dutch marine waters). Where relevant, elements missing from the environmental impact assessment should also be reflected in the corrective measures plan.

Furthermore, the Commission highlights that under Article 6(3) of Council Directive 92/43/EEC[26], any plan or project likely to have a significant effect on a Natura 2000 site, either individually or in combination with other plans or projects, must be subject to an appropriate assessment of its implications for the site in view of the site's conservation objectives. The competent national authorities can agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned. The Commission asks the competent authority to ensure that Natura 2000 sites and protected species under Council Directive 92/43/EEC and Directive 2009/147/EC are not adversely affected by the project before authorising it[27].

The Commission asks the competent authority to refer to the environmental impact assessment and its outcomes in the draft permit, while also clearly indicating the corrective measures to be taken.

In addition, the Commission recommends to the competent authority that the storage project is included in any revision of the currently adopted Dutch Maritime Spatial Plan[28], under Directive 2014/89/EU, notably in the associated strategic environmental assessment under Directive 2001/42/EC.

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23 Draft Decision – Section 4.2.3.2: Significant risk of leakage or significant environmental or health risks.
24 Website of the Netherlands Enterprise Agency – Aramis – Phase I – Environmental Impact Assessment.
25 OJ L 125, 18.5.2017, p. 27.
26 OJ L 206, 22.7.1992, p. 7.
27 OJ L 20, 26.1.2010. p.7.
28 Website of the Ministry of Infrastructure and Water Management – Programma Noordzee 2022-2027.

4.3. Financial requirements

Directive 2009/31/EC requires that applications for storage permits include, among others, proof of the technical competence of the proposed operator and proof that the financial security will be valid and effective before commencement of injection. Directive 2009/31/EC requires that storage permits include, among others, the requirement to establish and maintain the financial security.

The draft permit notes that SEP (107), the proposed operator, has no employees and no experience of managing the proposed operation. However, the draft permit also mentions the following: *"The applicant states that SEP (107) will be able to make use of the underground, project management and other technical and non-technical expertise, skills and capabilities that are already available within the Shell group"* adding that *"for the various phases of the K14-FAFC storage project identified by the applicant, more specifically the assessment and selection phase, the definition and implementation phase and the operational phase, various organisations specified in the application will be set up under the responsibility of SEP (107). The key positions mentioned in the relevant provisional organisation will be filled in accordance with the minimum specifications of the job competency profiles included in the application"*[29]. Finally, the draft permit mentions that *"Shell Petroleum B.V. confirmed by letter of 26 April 2024 that it will make available to SEP (107), whether or not through its subsidiaries, the technical means necessary to carry out the activities under storage permit K14-FAFC. This is subject to the granting of storage permit K14-FAFC and approval of the investment decision"*[30]. The Applicant states that *"more than 150 employees are currently working on CCS at Shell"* and describes Shell plc's involvement in active CO_2 storage facilities across the world, including Quest in Canada, Gorgon in Australia, and Northern Lights in Norway[31].

The Commission asks the competent authority to make the final permit conditional on Shell plc providing SEP (107) with the required resources and technical competence ahead of injection.

The Commission notes that the draft permit states that *"Shell Petroleum B.V. confirmed by letter of 26 April 2024 that it will make available to SGPD and SEP (107), whether or not through its subsidiaries, the financial resources necessary to carry out the activities under storage permit K14-FAFC and the financial resources necessary to fulfil the obligations arising therefrom, subject to the granting of storage permit K14-FAFC and approval of the investment decision"*[32]. The Commission also notes that the Netherlands Enterprise Agency considers that Shell Petroleum B.V. has the capacity to *"carry out the investments and operations budgeted for the permanent storage of CO_2 without external financing"* and finds that *"the business case […] gives a sound impression"*[33].

The draft permit[34] provides a general framework for the financial security scheme while making the start of injection subject to the future lodging of the financial security for the duration of the permit. The Application includes proposed initial amounts of financial security and mentions that *"a proposal for the specific form of financial security shall be submitted by means of an application to the Ministry with a request for approval no later than six months*

[29] Draft Decision – Section 4.2.2.1 Technical Possibilities.
[30] Draft Decision – Section 4.2.2.1 Technical Possibilities.
[31] Application for a CO_2 storage permit – Section 3.3.5. Shell's global experience with CCS.
[32] Draft permit – Section 4.2.2.3 Applicant's financial capacity.
[33] Draft permit – Section 4.2.2.3 Applicant's financial capacity.
[34] Article 14 of the draft Decision.

before the injection starts". The Application suggests that a parent company guarantee could be used for certain costs, combined with an insurance policy for uncertain costs[35].

The Commission understands that the draft permit cannot be expected to provide the same level of detail as the final financial security scheme that will be later approved by the competent authority before injection. In the Commission's view, the final permit should at least require that:

- the insurance policy and the parent company guarantee are valid, effective and adequate, and submitted with sufficient time for the competent authority to review and approve them, and,
- annual reporting demonstrates that financial security continues to be maintained as valid and effective.

The draft permit includes cost estimates for the financial security[36]. The draft permit states that an update of these cost estimates is required under Dutch law before the start of injection[37]. The Commission also considers that the final permit should require that the parent company guarantee obliges the guarantor to accept cost estimate updates and adjustments from their subsidiaries and for the parent guarantors to adjust the amounts of their guarantees accordingly.

The Commission notes that the draft permit agrees with the Applicant's proposed use of an insurance policy, with financial security for any residual risks provided through a parent company guarantee. Subject to the completeness of the coverage of the financial security scheme, the Commission views the use of insurance policy combined with parent company guarantees as a prudent and pragmatic decision by the competent authority, given the novelty of covering CO_2 storage obligations under Directive 2009/31/EC using offshore oil and gas insurance policies not originally designed for that purpose.

This Opinion is addressed to the Kingdom of the Netherlands.

Done at Brussels, 16.12.2025

For the Commission
Wopke Hoekstra
Member of the Commission

35 CO_2 storage permit application K14-FA – Amounts of financial security.
36 Article 15.3 of the draft Decision.
37 Section 5.1.10 of the draft Decision.