Disclaimer:

This draft joint letter of intent is intended to provide a basis for discussion, it does not constitute a binding commitment and remains subject in its entirety to all necessary internal approvals. The execution of the joint letter of intent is subject to the fulfilment of the conditions precedent as set out in this joint letter of intent.

JOINT LETTER OF INTENT

PARTIES:

1. the **State of the Netherlands** as represented by:
   I. the **Minister of Economic Affairs and Climate Policy**, Mrs. M.A.M. Adriaansens, acting in her capacity as administrative body (*bestuursorgaan*);
   II. the **State Secretary of Infrastructure and Water Management**, Mrs. V.L.W.A. Heijnen, acting in her capacity as administrative body;
   III. the **State Secretary of Economic Affairs and Climate Policy**, Mr. J.A. Vijlbrief acting in his capacity as administrative body,
   hereafter also referred to as the "**State**";

2. [the Province of Groningen as represented by […], hereafter also referred to as: ["Province Groningen"];

3. [the Province of Overijssel as represented by […], hereafter also referred to as: ["Province Overijssel"];

4. [the Province of Zuid-Holland as represented by […], hereafter also referred to as: ["Province Zuid-Holland"];

5. **Nobian Industrial Chemicals B.V.**, with its registered office in Amersfoort and its office address at Van Asch van Wijckstraat 53 in Amersfoort (3811 LP), represented by its CEO Michael Koenig, hereafter also referred to as "**Nobian**".

Parties [1, 2, 3, 4 and 5] hereafter jointly also referred to as "Parties".

GENERAL CONSIDERATIONS

Legal and policy framework for CO_2 reduction

1. Parties acknowledge that additional efforts for reduction of CO_2, are required to achieve the goals in the Paris Agreement, in the European Climate Law, in the Dutch Climate Law (*Klimaatwet*) and in the Dutch Coalition Agreement (*Coalitieakkoord*);
2. In the Dutch Coalition Agreement as presented on December 15, 2021, CO_2 reduction targets are increased to at least 55% in 2030 (versus 1990), while the Dutch government aims for 60% CO_2 reduction, for Climate Neutrality in 2050 and for establishing a green economy that is climate neutral, fossil free and circular;
3. For the industry, the Dutch Coalition Agreement aims to increase the ambition within the framework of obligations under the European 'Fit-for-55' package. In the letter regarding sustainability of the industry of April 5, 2022[1] the Minister of Economic Affairs and Climate Policy expressed the intention to develop and implement fundamentally new sustainable technologies with the largest industrial emitter group, while at the same time agreeing on a program for faster and more ambitious additional CO_2 reduction;
4. The State aims to facilitate the climate transition of the industry in the Netherlands with amongst others a tailor-made approach for the 10-20 largest industrial emitters;
5. The aim of the tailor-made approach is to support these companies, based on mutual efforts, in achieving additional and accelerated CO_2 reduction and having a sustainable future in the Netherlands, and where possible, contribute to meeting other sustainability challenges in the Netherlands, also in the long term;
6. If needed, the State, as stipulated in the Dutch Climate Plan and [Draft] Climate Policy Programme, intends to support amongst others Nobian in its endeavors to contribute to additional CO_2 reduction, while taking into account European principles regarding state aid and a level playing field on the internal market. In doing so, the State aims for a level playing field both within Europe and globally.

Tailor-Made Approach Sustainable Industry (*Maatwerkaanpak Verduurzaming Industrie*)

7. With the tailor-made approach the State intends to structure the discussions with the 10-20 largest industrial emitters along the following lines:
   i. discussions will be held to see whether parties can come to an expression of principles, in which they express their intention to further discuss the possibilities for additional reduction of CO_2 emissions and reduction of impact on the local environment by these emitters and the possibilities for the State to assist therewith;
   ii. after conclusion of the expression of principles, parties will discuss and define the specific measures that could be taken and agree on those in a draft joint letter of intent;
   iii. a draft joint letter of intent will be submitted to the advisory committee "Maatwerk Verduurzaming Industrie" for an expert advice to the Minister of Economic Affairs and Climate Policy with respect to, among others feasibility, cost-effectiveness and level of ambition;
   iv. if a final joint letter of intent has been agreed upon and signed, parties intend to implement and elaborate their agreements in tailor-made agreements.

[1] Letter to parliament, April 5, 2022 (Kamerstukken II 2021/22, 29826, nr. 135).

SPECIFIC CONSIDERATIONS

Introduction Nobian

8. Nobian is the EU's largest producer of high-purity vacuum salt at a quality level required for strategic chemical and industrial production and value chains, and a European leader in the production of essential chemicals, also providing contributions towards the sustainable energy transition;
9. Parties acknowledge that salt mining based in the Netherlands is essential for the production of important materials contributing to the chemical industries, industrial and consumer product base in the Netherlands and Europe, and that it is therefore of great importance for the Dutch and European economy and society as a whole;
10. Parties acknowledge that by producing high-purity salt, various chlor-alkali products and hydrogen, Nobian provides indispensable products for the manufacturing of essential materials for daily life, and which are also needed for the transition to a sustainable economy, including PVC, Polyurethane, poly carbonate, aluminium, paper, and epoxy, applications of which include, among others, insulation materials, battery materials, windmill blades and magnets, solar cells, cleaning and water purification materials, as well as chlorine for the pharmaceuticals sector including for the production of medicines;[2] [*EZK to insert statement on 'validate' Roland Berger study*]
11. Nobian has committed itself to play an important role in sustainability, the energy transition and the circular economy, actively pursuing these commitments through the (co-) development of innovative projects in, for example, the reduction of carbon emissions and the usage of natural gas, water electrolysis for hydrogen production, underground storage of hydrogen, recycling of heat, water and raw materials, and stabilising the Dutch electricity network by operating at flexible production levels;
12. Parties acknowledge that Nobian as a knowledge partner actively contributes to the development of green initiatives through, among others, (i) active participation in the setup and implementation of growth fund proposals, such as GroenvermogenNL, CircularPlasticsNL and FutureCarbonNL, (ii) conducting joint research projects with Dutch universities and knowledge institutes, (iii) developing and strengthening academic competencies and capacity at Dutch universities, particularly in the area of electrochemistry and energy technology, (iv) providing its expertise in sustainable development schemes, (v) co-developing green hydrogen projects and water electrolysis technology through its joint venture company HyCC, and (vi) co-developing projects with other partners for large-scale underground renewable energy storage in salt caverns;
13. Nobian's principal office and legal seat are based in the Netherlands, as are a large part of its research and technology activities, and the Nobian group intends to maintain operations in the Netherlands, Germany and Denmark;
14. Parties believe Nobian can play an important role in the energy and sustainability transition in the Netherlands;

Policy of Nobian regarding CO_2 reduction

15. Nobian aspires to become one of the most sustainable chemical companies in Europe, and to this effect has set the initial goal to become climate neutral by the year 2040, 10 years ahead of the target under the Paris Agreement, building on credentials of past performance, including a 40% reduction in its carbon dioxide emissions in the period between 1990 and 2020, 35% renewable energy use, a platinum rating from EcoVadis, participation in the Carbon Disclosure Project (CDP), and commitment to the Science Based Target initiative (SBTi);
16. Nobian aims to reduce its impact on the environment and endeavours to address the full Environmental, Social and Governance (ESG) agenda as laid down in Nobian's

[2] Salt Impact Study, Roland Berger, July 2022.

audited Sustainability Report, including targets on diversity, process and people safety;

17. Nobian emphasises its responsibility to (i) reduce Greenhouse Gas Emissions by working towards its objective of Climate Neutrality by 2040 (subject to its ambition to accelerate the objective of Climate Neutrality as a result of the tailor-made approach) and (ii) contribute to the national 2030 CO_2 reduction target laid down in the Dutch Coalition Agreement and Dutch Climate Law;
18. Parties acknowledge that for the regional market for high-purity salt solution mining in the Netherlands is the option with the lowest CO_2 footprint, whereby local production and regional distribution of salt limits the need for salt imports, reduces its CO_2 footprint and enhances the economic and competitive position of users;
19. Parties acknowledge that the innovations required to achieve Nobian's objective of Climate Neutrality in 2040 will create the opportunity to simultaneously decrease emissions other than CO_2 (including NO_x), and increase circularity and external safety;

Living environment

20. Parties recognise the EU Zero Pollution ambition, in which environmental quality is progressively improved towards 2050 to levels no longer considered harmful to human health and natural ecosystems, and subsequent national emission reduction and health gain ambitions as formulated in the Clean Air Agreement (in Dutch: *Schone Lucht Akkoord*), the National Water Programme (in Dutch: *Nationaal Water Programma*), the National Environmental Policy Framework (in Dutch: *Nationaal Milieubeleidskader*), the National Government wide programme Netherlands Circular towards 2050 (in Dutch: *Rijksbreed programma circulaire economie*), and the State policy regarding substances of very high concern (in Dutch: *zeer zorgwekkende stoffen*, "*ZZS*") that includes the legal obligation to minimise the emissions thereof and inform the authorities on achieved reduction and next steps every 5 years;
21. Parties acknowledge the Clean Air Agreement goal of 50% health gains in 2030 relative to 2016, by decreasing emissions of air pollutants, notably NO_x, ammonia and fine particulate matter, which amongst others should be realized by decreasing industrial air emissions to levels comparable to the lower end of the Best Available Techniques (BAT) Associated Emission Level bandwidth;
22. Parties acknowledge that the Dutch Coalition Agreement aims to decrease its reactive nitrogen emissions in order to reduce the deposition thereof in Natura 2000 nature areas, and that each sector, including the industrial sector, is expected to contribute fairly to the necessary reduction of reactive nitrogen emissions;
23. the State has laid down more detailed policy goals regarding sustainable energy, circular economy, sustainable mobility, strategic and green industry in several policy briefs;
24. Parties are aligned in their interests in building a clean, climate neutral and circular economy by 2050, and intend to cooperate within their capacities to achieve an accelerated and significant reduction of CO_2 emissions as well as a reduction of the use of natural gas and reduction of other emissions to air and water, among which NO_x;

Infrastructure and renewable electricity

25. Parties acknowledge that timely realisation of energy-infrastructure is in their joint interest and crucial for the success of industrial decarbonisation projects;
26. the State has developed a national and regional infrastructure programme (*Cluster Energie Strategieën "CES'' and Meerjarenprogramma Infrastructuur en Klimaat "MIEK"*) to (i) take stock of all infrastructural needs for the industry, including for Nobian, and (ii) to enable acceleration of infrastructural projects where desirable and possible;
27. Nobian's production processes are energy intensive and currently require substantial amounts of steam, natural gas and electricity, as a result of which Nobian has recently made investments in projects including (i) participation in offshore wind projects, (ii)

further electrification of its production processes as well as more efficient utilisation of energy and heat used in its own production processes and (iii) participation in projects in cooperation with other companies, operating in the same chemical clusters as Nobian;

28. as part of this JLoI, Nobian expresses the ambition to electrify a significant part of its salt production, which will result in a net increase in electricity demand, whereby Parties acknowledge that access to new renewable power generation is essential to achieve zero Scope 2 CO_2 emissions;
29. Nobian operates an electricity production plant (Delesto 2) unrelated to its production processes, falling inside the scope of Nobian's power sector CO_2 emissions and for which Nobian will develop a separate decarbonisation plan, but outside the scope industrial CO_2 emissions pertaining to the tailor-made agreements;
30. Nobian will continue to implement the best possible application of residual heat from its existing and new installations in line with the Energy Efficiency Directive (Directive 2012/27/EU) and in anticipation to the forthcoming new Heat Act, and Nobian is prepared to engage with local authorities and stakeholders at their request to provide insight in its residual heat potential for sustainable district heating plans;

Energy storage in salt caverns

31. Nobian works, together with partners, on the development of a first series of salt caverns for energy storage in the Zuidwending area in the province of Groningen as an element of the sustainable energy infrastructure of the Netherlands and Europe;
32. Parties acknowledge that storage in salt caverns are among the options investigated in the National Roadmap for Energy Storage ('Routekaart Energieopslag') as promising storage methods for large-scale energy storage, and that Nobian, with its knowledge and existing operations in the Netherlands, has the ability to contribute to the realisation of additional salt caverns for energy storage;
33. Parties acknowledge that developing salt caverns for energy storage is a multi-year process, from preparation to commissioning, requiring timely investment and permit decisions;
34. Parties acknowledge that sufficient post-saturation capacity in existing caverns is required to achieve the intended storage capacity by 2030 and any additional storage capacity in a timely manner;
35. Parties acknowledge the importance of converting the brine resulting from the development of salt caverns for energy storage into vacuum salt, thereby ensuring that the salt can be converted in essential raw materials;
36. Parties acknowledge that by implementing the energy efficiency project in Nobian's Delfzijl plant as contemplated by this JLOI, the processing of brine necessary for the development of salt caverns for renewable energy storage can be conducted in a sustainable and environmentally friendly manner.
37. Parties acknowledge that Nobian, as part of its regular operations, will regularly plan and develop new salt caverns;

Engagement with local community

38. Nobian pursues an open dialogue with civil society, local communities, local and regional authorities and the State, and aims for optimal transparency regarding its transition plans and the associated environmental risks, including risks from mining, spills and air and water emissions;
39. Nobian aims to maintain and improve its active dialogue with citizens and other stakeholders in the areas where it conducts its mining and production activities, and for that purpose has introduced various local initiatives to engage with stakeholders and to support communities;
40. Parties acknowledge that early alignment, effective prioritisation, planning and cooperation between the State, the relevant (local) governmental authorities, the

relevant public institutions and Nobian are important for effectively conducting permitting processes to obtain the relevant permits;

41. the State acknowledges that accelerating Nobian's path toward Climate Neutrality is only warranted so long as the continuity of Nobian is sufficiently ensured, in particular through the timely obtainment of salt mining permits (including environmental permits) in the Netherlands;

Financial

42. Parties acknowledge that investment in the technologies required to achieve sustainability targets carry a significant market risk as the development of the gas, electricity and CO_2 emission prices (influenced by emission trading scheme and carbon taxation), which largely drives the project return, are challenging to predict and significantly influenced by geopolitical developments and governmental policies; [*extend/review based on insights business case review*]
43. the required investments for Nobian's current ambition to achieve Climate Neutrality in 2040 are planned over a period of 17 years, since, as a result of its annual revenues and the investments required to sustain its operations and regulatory compliance, it is not economically viable for Nobian to significantly invest to accelerate its already ambitious targets without additional State support as a result of the tailor-made approach; and
44. Parties acknowledge that additional reductions by companies under the tailor-made agreements should not be offset by other companies doing less, and therefore CO_2 dispensation rights that directly ensue from the CO_2 reduction realised by the tailor-made approach should not be traded to other parties.

Documentation entered into between the Parties and path to and tailor-made agreements

1. On 12 December 2022 Parties 1 and [5] signed the EoP (as defined in Article 1 of this JLoI and attached hereto as Annex I), in which they have outlined the considerations, the scope of a potential agreement, targets related to the different Projects (as defined in Article 1) and the constraints that need to be removed to meet the targets.
2. In line with the EoP, Parties discussed the aforementioned topics in further detail and wished to conclude this JLoI, in which the steps to be taken are further concretised. Parties agreed that this JLoI was concluded in two phases.
3. In Phase I the JLoI was drawn up in draft form (*concept*) and the State conducted a financial, legal and technical due diligence investigation on Nobian's strategic plan as mentioned in Article 5 and on Nobian's business case as mentioned in Article 6 hereof.
4. The draft JLoI was subsequently submitted to the Advisory Committee for advice as stipulated in the letter of the Minister of Economic Affairs and Climate Policy dated 27 February 2023.
5. The Advisory Committee has rendered a non-binding advice to the Minister of Economic Affairs and Climate Policy with respect to, among others, feasibility, cost-effectiveness and level of ambition of the intended tailor-made agreements.
6. In Phase II – after receipt of the advice of the Advisory Committee – the Minister of Economic Affairs and Climate Policy concluded that this JLoI would be finalised and signed.
7. The Parties acknowledged that the obligations of the State under this JLoI are subject to the condition precedent of compliance with the applicable state aid framework and if necessary the approval of the European Commission.
8. Parties have expressed that they will continue their discussions and intend ultimately by November 2023 (i) to reach agreement on the tailor-made agreements for the Delfzijl and Rotterdam Projects and (ii) to reach agreement on the tailor-made agreement or on the approach leading towards the tailor-made agreements for the Hengelo Project. These dates are related to Nobian's stage gate process as described in Annex IV. For the Projects 'Energy Storage' and 'Portfolio Project' project no tailor-made agreements will be entered into as no financial support is requested from the

State in respect of these Projects. Nevertheless, the intentions under Articles [7.4.2, 7.4.3 and 7.4] in respect of these Projects shall be binding between the Parties (Nobian, the State and relevant Provinces).

Parties have agreed to conclude this JLoI in accordance with the terms and conditions set out below.

PARTIES HAVE AGREED AS FOLLOWS:

Article 1 – Definitions

1. The following terms, if capitalized as indicated, shall have the following meanings:

a. **Advisory Committee**: the advisory committee "Maatwerk Verduurzaming Industrie" established by resolution of the Minister of Economic Affairs and Climate Policy dated 16 February 2023;
b. **Carbon Capture and Storage (CCS)**: the process of capturing, transporting and permanent storing of carbon dioxide to prevent it for entering the atmosphere;
c. **CO_2**: all Greenhouse Gases, in CO_2 equivalent terms, unless stated otherwise;
d. **CHP**: combined heat and power plant;
e. **Climate Neutrality**: net-zero greenhouse gas emissions in scope 1 and 2 (as applicable) in CO_2 equivalent terms;
f. **CPD:** Chemie Park Delfzijl at Nobian's Delfzijl Site;
g. **European Climate Law** means European climate law for Europe's economy and society to become climate-neutral by 2050 that was published in the Official Journal on 9 July 2021 and entered into force on 29 July 2021;
h. **Dutch Climate Agreement**: the agreement dated 28 June 2019 between the government, Dutch companies and other interested parties for the reduction of greenhouse gases as part of the Dutch climate policy, also known as the "Klimaatakkoord";
i. **Dutch Climate Law**: the law enacted on 2 March 2022, also known as the "Klimaatwet";
j. **Dutch Climate Plan**: the Climate Plan 2021-2030, published on 1 April 2020, also known as "Klimaatplan 2021-2030";
k. **Dutch Climate Policy Programme**: the policy program published on 6 June 2022, also known as "[Ontwerp] Beleidsprogramma Klimaat";
l. **Dutch Coalition Agreement**: the coalition agreement of the government dated 15 December 2021, also known as the "Coalitieakkoord";
m. **E-flexing:** support stabilizing the Dutch electricity transmission system;
n. **EoP**: the expression of principles between Parties 1, 2, 3 and 6 signed on 12 December 2022;
o. **Existing Subsidy Programs**: each, on the date of signature of this JLoI, existing subsidy schemes and program in the context of the Projects for which Nobian is potentially eligible;
p. **Greenhouse Gases**: gases listed in Annex II to Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the European Union;
q. **Greenhouse Gas Emissions**: the emissions of Greenhouse Gases;
r. **Industrial Emissions Directive**: Directive 2010/75/EU of the European Parliament and the Council on industrial emissions;
s. **JloI**: this joint letter of intent;
t. **MWI**: municipal waste incinerator;
u. **NIKI**: an aid scheme currently being developed by the State aimed at, among others, (i) the reduction of CO_2 emissions in energy-intensive industrial sectors and (ii) the acceleration of the further upscaling of technologies from demonstration phase to commercial scale, by financially supporting first-movers. In Dutch: Nationale Investeringsregeling Klimaatprojecten Industrie;
v. **Nobian:** Nobian Industrial Chemicals B.V., aforementioned;

w. **Nobian's Strategic Sustainability Plan**: has the meaning ascribed thereto in Article 5;
x. **Paris Agreement** means the international treaty on climate change adopted at COP 21 in Paris on 12 December 2015 and entered into force on 4 November 2016;
y. **Parties**: the Parties to this JloI;
z. **Permits**: any permits, licenses, exemptions, consents or other formal authorisations that Nobian requires from the State, (local) governmental organisation or other competent authorities for the realisation of the Projects, and **Permit** means any of them for one or more individual Projects;
aa. **Projects**: the projects listed in table 6.1 in Article 6, as further specified in Annex V, and each individually referred to as a **Project**;
bb. **Process water**: non-drinkable water used in relation to industrial processes and facilities;
cc. **RCR**: the Dutch governmental coordination scheme for the central coordination by the government of decisions including spatial planning, permitting procedures, exemptions, and any other authorizations in relation to projects and programs deemed in the national interest also known as the "*Rijkscoördinatieregeling*";
dd. **SDE++**: the aid scheme 'Stimulation of sustainable energy production and climate transition' through which the Minister of Economic Affairs and Climate Policy can subsidize the unprofitable component of a project during the operational period of that project;
ee. **Site**: means each of Nobian Industrial Chemicals B.V.'s production sites in the Netherlands being Delfzijl, Hengelo and Rotterdam, collectively referred to as **Sites**;
ff. **State**: the State of the Netherlands, aforementioned;
gg. **tailor-made agreement**: each legally binding project agreement to be entered into in respect of a Project as contemplated by this JLoI, collectively referred to as **tailor-made agreements**; and
hh. **VEKI**: an aid scheme for (proven) market-ready CO2-saving measures with a longer payback period of 5 years.

Article 2 – Aim

The primary aim of this JloI is to come to tailor-made project agreements to be entered into between the Parties in respect of Projects (i) through (iii) as set out in Article 3, and to lay down binding terms and conditions of Projects (iv) and (v) in this JLoI. The aim of the Projects is to contribute to the following joint objectives:

a. more and faster investments in Nobian's sustainability projects in the Netherlands;
b. an acceleration of Nobian's CO_2 targets;
c. a reduction and eventual end of the use of natural gas by Nobian;
d. a reduction and eventual end of air (notably NO_x emissions) and water emissions by Nobian;
e. enabling Nobian to contribute to the realisation of the energy transition and renewable hydrogen market; and
f. other climate and societal benefits.

Article 3 – Scope of JLoI and the intended tailor-made agreements

1. In the EoP, Nobian and the State identified 5 Projects in connection with all Sites in the Netherlands. These Projects form the scope of this JLoI and the intended tailor-made agreements and are set out in Article 6 and in detail in Article 7. The 3 Projects identified in the EoP for the tailor-made agreements are: (i) Delfzijl, (ii) Hengelo and (iii) Rotterdam. For the Projects (iv) Energy Storage and (v) Portfolio Projects non-financial support (e.g., in field of permitting and other efforts) by the State is requested under the umbrella of this JLoI. Since all Projects contribute directly or indirectly to the aims mentioned under Article 2 paragraphs a through f, Parties agree to work together on realising each of the Projects.
2. Focus of the tailor-made agreements is on all of Nobian's production-related activities in the Netherlands. In short, the activities in scope are:

a. Groningen: salt mining in the Heiligerlee and Zuidwending salt domes, with subsequent salt and chlor-alkali production in Delfzijl. On the Delfzijl site, Nobian is also responsible for providing energy and utilities to other parties on the CPD (e.g. Teijin Aramid, Delamine);[3]
b. Overijssel: salt mining in the surroundings of Hengelo, and subsequent salt production in Hengelo. Part of the salt production is based on self-generated steam in Nobian's CHP; and
c. Zuid-Holland: production of chlor-alkali in the Botlek chlorine cluster, based on high purity vacuum salt produced at Nobian's salt production locations.

3. Beyond the Parties, other relevant stakeholders for the Projects need to be involved directly or indirectly. It is a possibility that one or more of these stakeholders will also co-sign one or more of the tailor-made agreements. The relevant stakeholders are, without limitation:
   a. local communities and municipalities in the vicinity of Nobian's operations (production locations Delfzijl, Hengelo, Rotterdam, and brine fields in the Twente area and the North of the Netherlands);
   b. Twence, as current steam supplier to Nobian in Hengelo and with the potential to increase steam delivery to Nobian's salt production in Hengelo;
   c. EEW and BGR/Eneco, as current steam supplier to Nobian in Delfzijl;
   d. chemical companies co-located and partially integrated with Nobian's production processes, such as partners in the chlorine cluster in Rotterdam, an on-site specialty salt producer in Hengelo and various site partners on the CPD;
   e. partners developing energy storage caverns together with Nobian in the Zuidwending area, i.e. HyStock (Gasunie subdiary for the realisation of hydrogen storage) and Corre Energy (for the realisation of compressed air storage);
   f. grid operators responsible for the electrical grid and connections to Nobian's locations (Transmission System Operator (TenneT) & Distribution System Operators);
   g. water related companies such as water utilities Waterbedrijf Groningen and Northwater; and
   h. regional port companies such as Groningen Seaport and Havenbedrijf Rotterdam;
   i. permitting, supervising and advising bodies as listed in table 7.xx, 7.yy and 7.zz below such as EZK (SodM), ODG, RWS, Province of Groningen, Province of Overijssel, Province of Zuid-Holland and DCMR.

Article 4 –

[ARTICLE KEPT INTENTIONALLY BLANK]

Article 5 – Nobian's Strategic Sustainability Plan

The Projects outlined under Article 6 are part of Nobian's "Grow Greener Together" public strategic sustainability plan launched in 2021 and aimed at becoming carbon neutral in 2040 (hereinafter: **Nobian's Strategic Sustainability Plan**).

Nobian's Strategic Sustainability Plan and progress made in the context thereof is published in Nobian's annual sustainability report which can be found at "Sustainability (nobian.com)". Below is a description of the key elements of the Nobian's Strategic Sustainability Plan in relation to the Projects.

[3] Nobian's standalone power plant (CCGT, Delesto 2) is excluded from the scope of the tailor-made agreements. Yet Delesto 1 Combined Heat and Power plant (CHP) is included

Greenhouse Gas Emissions reduction

More than 90% of Nobian's current scope 1 company emissions are generated in the Netherlands. The aim in this respect is to achieve Climate Neutrality in scope 1 and 2 emissions by 2040 and to have reduced our scope 3 emissions with at least 50% by that time. The intermediate and renewable energy targets are listed in Table 5.1 below.

CO_2 reduction	▪ Scope 1 and 2 reduction: 25% by 2025, 50% by 2030 and 100% by 2040 compared to 2020 ▪ Scope 3 reduction: 2% by 2025, 20% by 2030 and 50% by 2040 ▪ Carbon neutral in Scope 1 and 2 by 2040
Renewable energy	▪ 50% share of renewable energy by 2025 ▪ 66% share of renewable energy by 2030 ▪ 100% renewable energy by 2040

Table 5.1: Climate targets Nobian

The overview in Figure 5.2 is based on the current ambition of Nobian to become achieve Climate Neutrality scope 1 and 2 in 2040. Project 1, 2 and 3 in Table 6.1) are an integral part of the project portfolio that should lead to this ambition. Aim of this JLoI and the tailor-made agreements is to accelerate these Projects to achieve Climate Neutrality in scope 1 in 2030 in the Netherlands. To reduce the emissions related to Nobian's Delesto 2 electricity power plant (CO_2-emissions from power sector), Nobian will develop a decarbonisation plan in parallel to the tailor-made agreements.

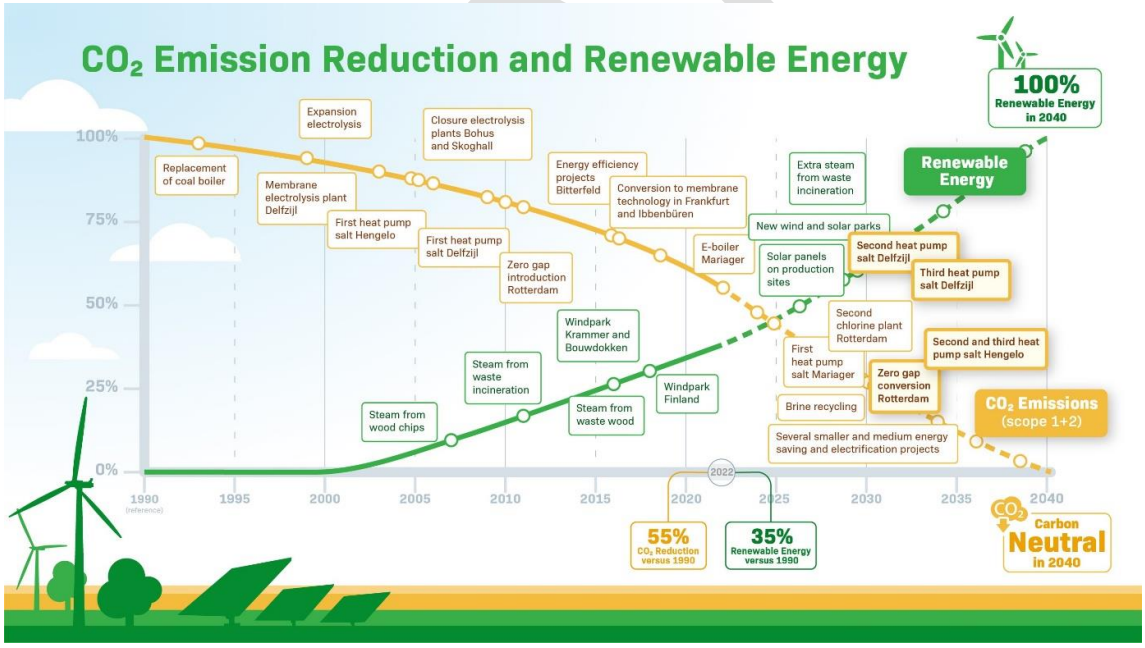


Figure 5.2: CO_2 reduction and renewable energy projects

Figure 5.2 shows what Nobian has already done and achieved with respect to Greenhouse Gas Emissions reduction and renewable energy initiatives. Since 1990 Nobian has already reduced its Greenhouse Gas Emissions with 55% and increased our renewable energy share to 35% over the same period. As can be seen in Figure 5.2 Nobian also has a long history in the production and use of renewable energy.

A more detailed view on the contribution of the Projects in scope of this JLoI to accelerate reaching Greenhouse Gas Emissions reduction targets is set out in Table 6.1, with further detail in Article 7.

Sustainability reporting and independent validation

Nobian's sustainability approach and data are being independently verified. Nobian participates in three internationally recognized standards:

a. Nobian's sustainability management system and performance are validated via EcoVadis.[4] In 2022 after first submission, Nobian reached a platinum rating placing it in the top 1% best rated companies.
b. Nobian has also committed to the Science Based Targets initiative (SBTi)[5] where it will have its climate targets scientifically evaluated in 2023.
c. Nobian has joined the Carbon Disclosure Program (CDP)[6] to report in detail progress in its climate ambitions and water management.

Nobian's sustainability report and ESG data complies with the Sustainability Accounting Standards Board (SASB)[7] and is independently verified and assured by DNV[8].
In addition, Nobian performs Life Cycle Assessments (LCAs) in accordance with ISO 14021 on almost its complete range of products.[9]

[4] https://ecovadis.com/
[5] https://sciencebasedtargets.org/
[6] https://www.cdp.net
[7] https://www.sasb.org/
[8] https://www.dnv.com/assurance
[9] For more details in this topic reference is made to paragraph 4.2 of Nobian's sustainability report.

Article 6 – Summary of Nobian's Projects

6.1 Overview

This JLoI concerns 5 Projects with the potential to reduce in total the emission of more than 600 kton per year CO_2 and more than 500 ton per year NOx in the Netherlands per year by 2030. Table 6.1 shows summary of benefits for society beyond CO_2 and NO_x, Key milestones towards project realisation, related financials of Nobian and financial support by State, critical pre-requisites and risks.

	1 Delfzijl	2 Hengelo	3 Rotterdam	4 Energy Storage	5 Portfolio Projects
Description	Electrification of **salt production** based on proven 'heat pump technology'	Electrification of **salt production** based on proven 'heat pump technology'	Modernization of **chlor-alkali production** based on zero-gap electrolysis	**Energy storage caverns in Zuidwending** as cornerstone for NL/European H_2 network (part 1) and Compressed Air (part 2)	Portfolio of smaller **energy efficiency** measures across the 3 sites
Annual benefits for society					
CO_2 (scope 1)	295 kt	245 kt			100 kt
	Total: 540 kt of which Industrial: 285 kt				
NOx	205 ton	245 ton			75 ton
Natural gas	165 mln m^3	135 mln m^3			50 mln m^3
Electricity			135 GWh		
Water	1 mln m3 water and 65-85 MW heat reduction towards Waddenzee	0,6-0,8 mln m3 water, < 25 MW heat reduction towards Twente kanaal			
E-flex	7 MW	7 MW	25 MW	**Compressed Air Caverns** serve as batteries and help avoid curtailment of renewables / store energy for periods of lower renewable availability (**2** caverns provide 320MW for 3-4 days)	
Other		Explore intermediate step to increase steam usage of MWI (Twence), which could partly pull forward emission reduction and delay MVR investment with 3 years	Freeing up significant E-grid capacity allows other parties to execute CO2/NOx reduction projects	The first **4 hydrogen caverns** are needed to support the set-up of the hydrogen backbone (incl. ambition to realize 3-4 GW electrolysis capacity). The 4 caverns can store 1 TWh hydrogen	
Key Milestones					
Cond. FID Costs: -20%/+30%	Q4 – 2023 Binding Agreement	Q4 – 2024 Agreed approach to Binding Agreement	Q4 – 2023 Binding Agreement		Phased No Binding Agreement required
FID Costs: -10%/+10%	Q4 - 2024	Q4 - 2026	Q4 - 2024		phased
Operational	2027 - 2028	2029 - 2030	2027 - 2029	2025 – 2030 4 caverns for H2 and 2 for Compressed Air	2023 - 2030
Financials					
Total Capex	[xxx] mln € -30%/+50%	[yyy] mln € -30%/+50%	[zzz] mln € -30%/+50%	Together with partners, > 500 mln €	[xx-yyy] mln €
Investment by Nobian	[Xx] mln € for projects 1,2,3 and 5				

Financial support from State	[xx - yy] mln €			No support requested	No support requested
Support/CO2 reduction	Xx – yy €/CO2 reduction				
Ancillary requirements					
Expected critical Permits and key authority	Impact of changed due to 'omgevingswet' on processing of permit requests related to Maatwerk agreement				
	ODG - Environment & RWS - water	EZK/SoDM - Environment	DCMR - Environment	EZK and relevant advisors for mining activities (e.g. SodM)	DCMR & ODG - environment
Salt Permits	Streamlined permit process (RCR, local stakeholder participation)				
Renewable Energy	Access to PPA at acceptable prices and ensure green electricity			Cornerstone to store renewable Energy	
Additional project risks					
Project	Solution for back-up steam supply Chemie Park Delfzijl	Trade-off effort in short / long term solution	Permit complexity of portfolio of projects/permit revisions	Societal acceptance on mining & energy storage	Complexity of steam production for customer(s)
Financial	Key parameters of business case significantly change			Risk with Nobian and partners	

Table 6.1: *Climate and energy transition projects with potential for a binding agreement.*

6.2 Overview of climate, environmental and other impacts

Specific climate related targets of CO_2 reduction, electricity consumption and steam are:

a) Scope 1 CO_2 emissions: acceleration of the scope 1 CO_2 emission reduction at the Sites by more than 600 kton per year (compared to reference year 2020), with the ambition to reach close to zero[10] CO_2 emissions in 2030, being 10 years earlier than the current Nobian ambition of 2040. Approximately 285 kton of this emission reduction qualifies as reduction of industrial emissions. This reduction is (almost) completely in addition to the targets set by Dutch Climate Tax for 2030[11]. This accounts for ca 2% of the Dutch climate target for industrial emissions of 14.3 Mton.
b) Scope 2 CO_2 emissions: Nobian strives for zero scope 2 emissions with Projects 1 and 2 under the condition of sufficient availability of renewable electricity at economically viable costs.
c) Scope 3 CO_2 emissions: Projects will lead to a reduction of scope 3 emissions, with no transfer from scope 1 and 2 emissions to scope 3.
d) NO_x emissions: reduction of about 500 tons (the level in 2020), bringing emissions close to zero in 2030.
e) Natural gas: reduction of the consumption at the Sites from approximately 350 million m^3 today to almost zero by 2030.
f) Electricity consumption: achieve electricity savings of 135 GWh per year at Nobian's electrolysis plant at its Rotterdam Site by 2030, to free up 15-20MW on the power grid.
g) Steam use: achieve more efficient use of steam from existing external biomass and waste incineration at the Hengelo Site.
h) Water: fresh water reduction of approximately 1 million m^3 per year at the Delfzijl Site, reduction of residual heat into Waddenzee of about 65 – 85 MW, fresh water

[10] Nobian currently estimates that approximately 20 kton CO_2 (scope 1) cannot be mitigated before 2030.
[11] Since Nobian works with 'Warmte-kracht koppelingen' that also generate electricity, about 50% of its emissions counts for the industry table and 50% for the electricity table.

reduction of 0.6 – 0.8 million m^3 per year and a reduction of residual heat into Twente Kanaal of up to 25 MW.

E-flexing capabilities

Nobian, with its electricity-intensive Sites in Rotterdam and Delfzijl, has developed the ability to help stabilise the grid by operating its production plants in a flexible way through ramping down when there is a shortage of electricity on the grid and ramping up when there is sufficient grid supply.
Transmission System Operator (TSO) TenneT uses a combination of products to ensure the stability of the Dutch electricity transmission system. Currently Nobian is using a combination of mFRR (manual Frequency Restauration Reserve [Emergency Power]) and aFRR (automatic Frequency Restauration Reserve [Reserve Power]) to support the system. As a result of Project 1, 2 and 3 this technical capability will be enhanced. The relevant enhancements are that:

- for the Delfzijl and Hengelo Sites each 7 MW capacity is added for flexibility to act on mFRR (mainly) and aFRR markets; and
- for the Rotterdam Site 25 MW additional capacity for flexibility to act on mFRR and aFRR markets,

provided that, since the Projects do not increase production capacity, the capacity available for E-flexing also depends on the maximum production capacity of a plant considering contractual obligations to customers.
In 2022, the total capacity in Netherlands of aFRR was approximately 325 MW (up / down) and of mFRR was approximately 950 MW (up / down). Nobian could offer approximately 12% on the aFRR market or alternatively this capacity could be made available on the mFRR market.

Schematic overview reduction scope 1 and industrial emissions

Figures 6.1 and 6.2 below provide graphs to visualise the potential impact of the Projects on reduction scope 1 and industrial CO_2 emissions respectively.

Figure 6.1 shows the original ambition of Nobian to reduce the total scope 1 CO_2 and natural gas consumption as well as the acceleration of this ambition as a result of realising the Projects.

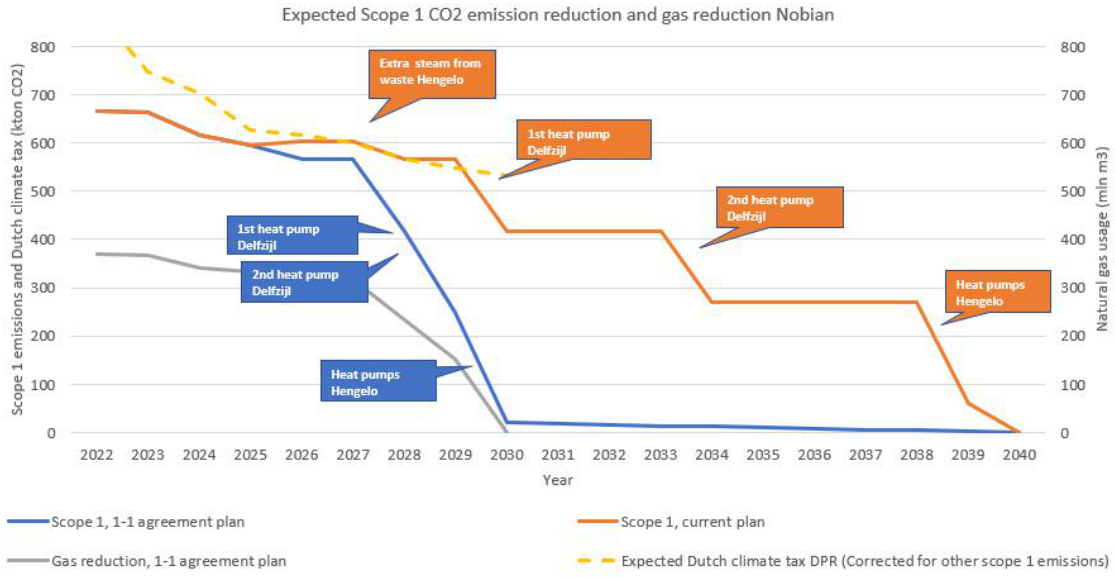


Figure 6.1: *Ambition of the acceleration of climate targets and gas reduction as a result of tailor-made agreements. The line for the Dutch climate tax is calculated as: number of dispensation allowances (DPR) under the Dutch climate tax + emissions associated with electricity production. Please note that reaching Climate Neutrality by 2030 as set out in this figure 6.1 is Nobian's objective and expectation based on successful*

realisation of the Projects set out in this JLOI, but that reaching this objective is ultimately dependent on many internal and external factors and therefore cannot be guaranteed.

Figure 6.2 provides an overview of the expected industrial CO_2 emitted over time and the acceleration of the reduction of these emissions that realising the Projects at the Delfzijl and Hengelo Sites are expected to have.

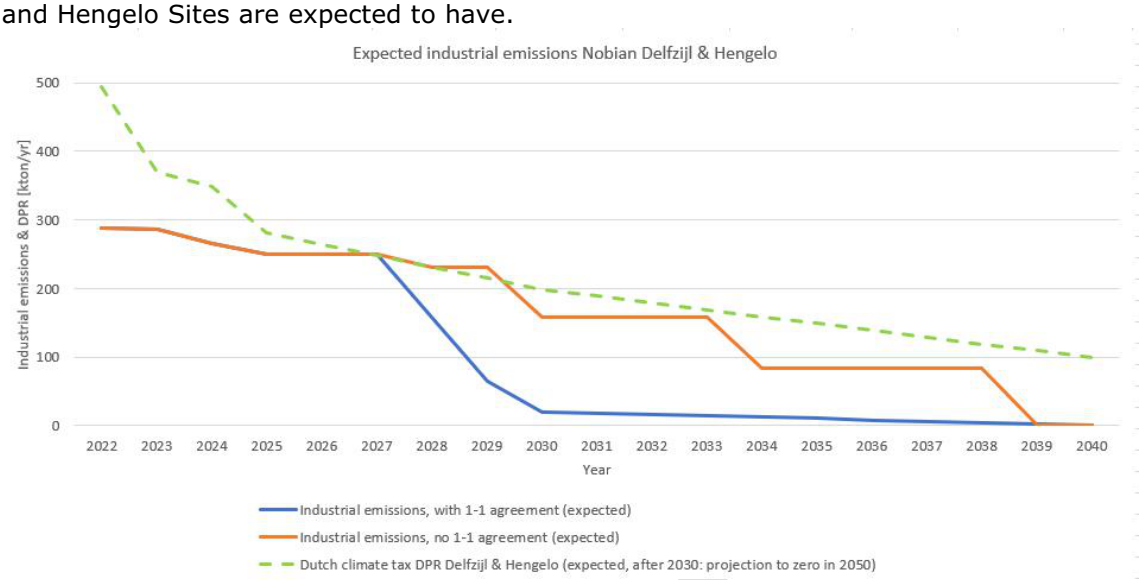


Figure 6.2: *Acceleration of **industrial** emission reduction as a result of tailor-made agreements. Please note that reaching Climate Neutrality by 2030 as set out in this figure 6.2 is Nobian's objective and expectation based on successful realisation of the Projects set out in this JLOI, but that reaching this objective is ultimately dependent on many internal and external factors and therefore cannot be guaranteed.*

6.3 Financials and key elements of the agreement

6.3.1 Introduction

Only for the Projects in Delfzijl, Hengelo and Rotterdam (i.e. Project 1, 2 and 3), financial support is required:

- Delfzijl and Hengelo: replacing installations running on natural gas-based steam (and equivalent CO2) with installations running on electricity (MVR technology)
- Rotterdam: 24 electrolysers replaced with electrolysers using less electricity

Nobian prepared a financial model to assess the business cases for the individual Projects, and the resulting financial support. Important to stress is that these business cases need to provide gains purely based on the 'efficiency savings' (e.g., lower energy use, lower CO2 emissions, lower maintenance cost), as none of the Projects leads to a capacity expansion. The model, and the assumptions made therein, were validated by EZK/ RVO [at the moment of signing the JLOI; at this moment EZK and RVO are still validating the model/assumptions].

Key parameters of the financial model: Project 1 and 2 (Salt plants Delfzijl and Hengelo)
In the current setup, natural gas is burned in Nobian's CHP plants, which produces steam and electricity (see also paragraphs 7.1-7.2). Nobian uses the steam in the salt production process, and the generated electricity is either used at the Site, or is sold to the grid. In the future set-up, Nobian's salt production process is electrified, and the business case is based on the following key elements:

- Energy and CO2 efficiency: improved energy efficiency and lower CO2 emissions

- Electricity income: stopping the CHPs results in loss of income on generated electricity
- Other: impact on maintenance cost, grid connection cost, energy taxes, reduced steam portfolio optimization opportunities, etc.

No production loss is expected during construction and change-over, so no costs are foreseen in the business case model.

Key parameters: Project 3 (Rotterdam)
The new technology in Rotterdam will significantly increase efficiency compared to the current setup of 24 electrolysers (ELOs). Key driver in the Rotterdam business case is the electricity saving of approx. 135 GWh annually. Other benefits for the Project include 'new-for-old' assets (less maintenance costs) and reduction of labour costs. The business case model also includes the effect of production loss during construction.

Key financial risks beyond Nobian control:

The acceleration of the sustainability ambition of Nobian by 10 years introduces the following risks:

- Geo-political/-economic developments: recent events such as Covid 19, the war in Ukraine and the resulting energy crises have significantly disrupted the European chemical sector (e.g., energy prices, lower demand due to higher import, high inflation on wages and materials, etc.). Furthermore, in Europe several European and national climate policies were announced, with (to-date) unclarity on the exact workings of these policies and the resulting impact on the European chemical sector. Given these uncertainties, it is difficult to prepare for large investment decisions
- Electricity, Gas and CO2 prices: as energy curves are a key driver in the business case, deviations and volatility have significant impact on the business case (pre-FID, but also in the years after)
- Permits: timelines for the Projects are realistic from a technical point of view. However, based on recent experience, Nobian assesses the permit timelines as ambitious. Delays in obtaining the relevant permits will impact the business case of the individual projects
- Capex costs and resources: with various companies starting to execute their de-carbonisation agenda, there is a risk of increasing scarcity of skilled labour, manufacturing facilities for large heat pumps, and materials. This can impact both the timelines and the capex of projects

The aforementioned risks can have a substantial impact on the business case – more details are provided in Annex VIII.

6.3.2 Investment, benefit for society and financial support from State

Total investment
As shown in table 6.1, the investment requirement for Project 1, 2 and 3 is approximately 550 mln. Euro (with a -30% / +50% accuracy at this stage of the Projects). The required investment will become more accurate in the next phases of the projects (Q4 2023 -20% /+30% and in Q4 2024 -10% /+10%).

[Agreed] financial support from State

Based on the current insights and available forecast, Nobian requires a capex subsidy in the range of 200-300 mln Euro to realise the Projects 1 through 3. This range will be further finetuned as the Parties work towards the tailor-made agreements (planned for Q4 2023), with refinements expected on updated capex estimates, updated energy and CO2 curves, etc.

After signing this JLoI, but before entering into tailor-made agreements, Parties will further align on the exact subsidy mechanism and the associated conditions. Among others, the following needs to be further agreed upon:

- How to structure the subsidy (also in line with relevant guidelines on state aid)?
- What is an appropriate mechanism to avoid 'over-subsidisation'?
- How to deal with unforeseen 'black swan' events[12]?
- How to 'freeze government policies' at a moment of (conditional) investment decisions?
- How to balance between 'fast decision making on investments to start saving CO2 as soon as possible' versus 'waiting for confirmation that all permits are granted, even if that leads to 1-2 years of delay'?

Support in perspective

The expected required financial support of 200-300 mln Euro for the three projects can be placed in the following perspective:

- The required subsidy translates in ca. 30 - 50 Euro per ton of avoided CO2 emissions.
- Gas consumption will reduce with ca. 350 mln M^3 natural gas per year. This is equivalent to the gas consumption of ca. 250,000 households, which could only be achieved after investing in large scale isolation, electrification and/or heat pumps.
- NOx emissions will reduce with ca. 500 ton per year. This is the equivalent of approximately 100 dairy farms.
- In the Botlek area, the reduced electricity consumption of Nobian (ca. 135 GWh, or ca. 15-20MW, or the consumption of ca. 50,000 households) frees up capacity on the locally congested electricity grid. The free capacity can be leveraged by other companies to further electrify.
- The E-flex capacity realized with this program which is 12% of aFRR capacity currently available in Netherlands.
- Key enabler for the Energy Transition by developing caverns for storage of Energy (H2 and Compressed Air).

[12] For instance, what if natural gas prices drop and is uncoupled of the electricity price (due to e.g., renewable energy or lack of natural gas demand in Europe)? This means CHP plants (current setup) are significantly cheaper, resulting in a highly worse project return.

Article 7 –Project details, efforts ad actions of parties

7.1 Project 1: Delfzijl – electrification of two salt production plants based on heat pump technology (MVR)

7.1.1 Description of the project

7.1.1.1 Introduction and efforts by Nobian

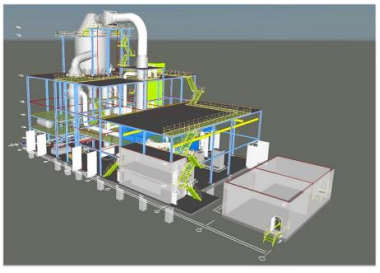
Nobian's largest salt plant, situated on its Delfzijl Site, is an integral part in one of the largest chlor-alkali sites in Western Europe. Its annual capacity is 2.7 million ton of high purity vacuum salt, which is produced from brine in three Multi Effect Evaporation (MEE) units (approx. 85%) and one Mechanical Vapor Recompression (MVR) unit (approx. 15%). In these units, water is evaporated creating a salt slurry, which is further dried in various process steps by which the dry salt is finally produced. The brine for the Delfzijl Site is obtained via solution mining in the nearby salt deposits in Heiligerlee and Zuidwending. More technical details and background on MVR technology can be found in Annex [V].

Nobian's salt production in Delfzijl employs approximately 100 people (direct), and salt produced in Delfzijl is partly used by Nobian's electrolyser plant at Chemie Park Delfzijl (CPD) to produce caustic soda, chlorine and hydrogen. These products are subsequently used at the CPD by companies including Delamine, Nouryon, Teijin, Lubrizol and others to produce various products. Total employment at CPD is approximately 1200 people. Salt not used in the CPD is shipped to Nobian's chlor-alkali site in Rotterdam, and to other customers.

In the MEE units, the required heat to evaporate the water is obtained from steam. This steam is partly produced by Nobian's gas fueled "Delesto 1" Combined Heat and Power (CHP) plant, and partly sourced from nearby third party waste- and biomass incinerators outside the CPD. In 2010 Nobian installed the first MVR in Delfzijl. In the current set-up of utilizing own produced steam, external steam and electricity, Nobian has the ability to produce in a cost-efficient way due to the flexibility using different sources with specific market dynamics and prices.

The salt plant of Nobian in Delfzijl also plays a vital role in realizing the ambition of creating energy storage in caverns in the North of the Netherlands: brine coming from these to-be-developed caverns will be processed in Delfzijl. For more information on energy storage in caverns reference is made to Article 7.4.

7.1.1.2 Technical description



The Project concerns the replacement of two (of the three) steam driven MEE plants for salt production by two electricity-driven MVR plants. As a consequence, a significant amount of energy will be saved, since MVRs are more energy-efficient than MEEs. Furthermore, the shift from steam to electrical power will result in substantially lower steam demand for salt production, enabling ramping down or even completely shutting down the Delesto 1 CHP plant. The third MEE plant will continue to run on steam from external sources with a low carbon footprint (EEW-waste and BGR/Eneco-biomass). MVR is a proven technology. Nobian has already two (smaller) MVRs running on its Delfzijl and Hengelo Sites. The 2 new 750 kt/yr (final dimension to be defined in study phase) salt MVRs will be among largest in Europe to date. In line with the renewable energy targets of Nobian, these MVRs are currently targeted to run on 66% renewable electricity by 2030, and 100% by 2040.

7.1.1.3 E-flex capability

The design of the MVRs will support E-flexing capabilities for mFRR (mainly) and potentially aFRR of approximately 7 MW.

7.1.1.4 Timeline

Nobian follows a proven and stage-gated project management methodology (more details in Annex IV). It is anticipated that a tailor-made agreement is agreed between Nobian and the State in Stage 2, which means that conditional FID can be taken. Engineering and construction of the two MVRs will be done simultaneously.

It is critical for Nobian to have sufficient certainty on the future of salt mining in North of the Netherlands (Heiligerlee, Zuidwending and Zuiderveen as stated in the permits section 7.1.3) by Gate 3 in 2024 (final FID).

To ensure minimal production loss during construction and change-over to new technology, it is essential that in the planned bi-annual turn-round in 2025 the required tie-ins will be executed. Final commissioning and start-up [of the respective MVRs] is planned in Q4 2027 and Q1 2028 to be done sequential with minimal time between the two start-ups.

Project phase	Main activities	Milestone - schedule
Initiation (FEL-1)	Define alternatives to be evaluated, -30/+50% cost estimate	Gate 1 - March 2023
Study (FEL-2)	Discuss permit approach with authorities Safety and environmental studies -20/+30% cost estimate, update business case Evaluate alternatives, select one alternative Prepared grand order	Gate 2 - November 2023
Pre-project (FEL-3)	Basic engineering, define project scope Hazard and operability study, environmental calculations -10/+10% cost estimate, update business case Prepare permits application documents Permits approval process	Gate 3, FID - November 2024
Realization	Detail engineering, construction Commissioning & Start-up – start operation 1st MVR Commissioning & Start-up – start operation 2nd MVR	 Q4 2027 Q1 2028
Utility study CPD	Investigate Steam/Electricity/Water needs & consequences of MVR project for the site	In parallel to Study phase

7.1.2 Infra & impact to utilities at Chemie Park Delfzijl (CPD)

7.1.2.1 Introduction

CPD hosts high-performance chemical companies which are highly integrated to optimize efficiency across parties at the Site. At CPD Nobian currently is the main utility supplier for steam and to a lesser extend of electricity and other utilities such as process water. The MVR project has an impact on the existing balance with regard to utilities on the CPD in total. The exact impact requires further investigation and is to be addressed in the tailor-made agreement.

7.1.2.2 Efforts Nobian

Steam supply: balancing and reliability

Nobian both supplies and balances the steam grid on the CPD using its Delesto 1 CHP plant. Nobian also integrates the third-party steam supply from both the waste incinerator of EEW and the Eneco biomass plant into the CPD steam portfolio. Nobian secures the steam reliability to current customers with a combination of the Delesto 1 CHP plant, third party steam and the flexible operation of the steam driven salt plants (MEEs). The shutdown of the Delesto 1 CHP plant and 2 MEEs will require modifications at

the Site to ensure a continued reliable steam supply to current customers. The resulting steam balance will be studied and translated to measures to ensure continuation of reliable steam supply.

Therefore:
a. In parallel to the MVR project, Nobian will make reasonable efforts to facilitate and enter into good faith discussions for the future set up of the steam supply and distribution to the current steam consumers on the CPD cluster after termination of the relevant utility contracts. Participation of regional stakeholders like Groningen Seaports (GSP), EEW, BGR/Eneco, Province of Groningen, I&W (policy MWI) and others is expected as the longer-term demand and supply of steam in the CPD area needs to be mapped out. This should include the future and legislation of [AVIs] and biomass plants and potential new future steam generators, if any. A non-fossil based back-up will be explored and included in the tailor-made agreement of this Project, including the related investment.

Electricity infrastructure
With the new MVRs in operation, the electricity demand on the CPD will increase by about 25 MW, whereas shutdown of the Delesto 1 CHP plant results in a reduction of about 50 MW electricity generation. Based on first calculations, the e-infrastructure [towards] the CPD is sufficient to support these modifications. However, future electrification opportunities on the CPD might be become limited as its electrical infrastructure is reaching its limits.

Therefore:
a. Nobian proposes to engage with CPD and other stakeholders (including Groningen Seaports (GSP), the Province of Groningen, Chemport, Enexis, TenneT and others) to investigate options for further electrification of the CPD. If required, additional measures and investments will be addressed in the tailor-made agreement for the Delfzijl Project.

Water
With the conversion to MVRs, about 1 million m^3 /yr additional process water will become available at CPD. This water could potentially be of interest for other (new) companies in the region.
a. Nobian to engage with stakeholders to explore opportunities for better use of this water. As a consequence, also reduction of residual heat into the Waddenzee will be reduced with approx. 65-85 MW.

7.1.2.3 Efforts State
Steam supply: balancing and reliability
a. Policy, legislation and taxation of CO_2 and other Greenhouse Gases impacts MWIs and hence the future of EEW and BGR/Eneco, which will become the key steam suppliers of CPD. The State therefore is an important stakeholder in the roadmap to define a solution for the steam supply to CPD when Delesto 1 is being shut down.

Electrical infrastructure
a. The State will continue to coordinate the accelerated realisation of MIEK projects, notably the 380kV electrical infrastructure at the Delfzijl Site.
b. The State endeavours to make renewable electricity accessible to acceptable prices (within policies & regulations) to the industry.

7.1.2.3 Efforts Province Groningen [province will share feedback first]
Steam supply: balancing and reliability
a. Province Groningen, together with Nobian and other parties such as Chemport Europe and Groningen Seaports, to support in mapping out future demand and expected

demand of steam at CPD and neighbouring facilities. Province Groningen can play a neutral role (e.g. facilitate data room if needed) to ensure a smooth process.

b. Province Groningen together with Nobian and other stakeholders investigate usage of available water as a result of the MVR project

Electrical infrastructure

c. Province of Groningen to support parties (TenneT/Enexis/Seaport/etc) in investigating options to facilitate further electrification of the CPD and required investment in electrical infrastructure to and at CPD, as Nobian most likely will not be the only party embarking on the electrification roadmap.

Water

d. Province of Groningen to align with key stakeholders in the region to explore opportunities for better use of the 1 mln m^3 freed up process water.

7.1.3 Permits

7.1.3.1 Introduction

The Delfzijl Project will result in improvements with regard to nature, environment and water. However, based on Nobian's initial assessment, Nobian has identified the following general risks in connection with permitting:

1. interference of permit application process with other (new) key initiatives;
2. interference by revisions of existing permits;
3. interference by new legislation (e.g., Omgevingswet applicable 1/1/2024); and/or
4. capacity of staff of competent authorities ('*bevoegd gezag*').

In the following table the relevant competent authority is highlighted, indicating areas in which Parties required additional effort. Permit complexity is considered a high risk for Water/RWS. Capacity of the competent authority is considered a high risk for Environment/ODG.

Competent Authority	Nature	Environment	Water
Province of Groningen (ODG)	Prov. Groningen	Prov. Groningen (ODG)	RWS

Summary: The Project will lead to improvements for water, air, and use of natural gas. Design measures are required to ensure that the Project fits within noise limits.

7.1.3.2 Efforts Nobian

a. Nobian to prepare and submit permit requests specific to this Project and expand the internal team.
b. Nobian will periodically schedule meetings with competent authorities to review the project portfolio with associated impact on applications (running and planned), with the aim to enhance insight in upcoming projects, in order to jointly assess impact and potentially prioritise.
c. Nobian and the State will periodically schedule a meeting between them and the coordinating authority to discuss the progress in the permitting process.

7.1.3.3 Efforts State

a. The State will facilitate, where possible and within its purview, timely decision-making on permit applications for any Permit and, whilst respecting their respective authority and function under public law, encourage relevant public entities and authorities whose actions and/or decisions are required for obtaining any Permit to contribute to timely decision making.
b. The State to explore options with Nobian to process permits in parallel if possible within the applicable legal framework

c. Parties will consult with the State, relevant regional and local authorities and their advisers (if any) to come to an aligned view on relevance and prioritisation of the Projects.
d. [EZK to update: The State and Nobian will periodically schedule a meeting between them and the coordinating authority to discuss the progress in the permitting process. The State endeavours to set up a similar process for such Project(s) as for RCR projects to solve bottlenecks and shorten lead times.
e. [EZK to update: expertpoule om druk omgevingsdiensten te verminderen]

7.1.3.4 Efforts Province [province will share feedback first]
a. Province (ODG) to ensure capacity and capabilities are in line with demand to ensure the agreed process (timing and milestones) is reached.
b. Province (ODG) to explore options with Nobian to process permits in parallel if possible within the legal framework
c. Support Nobian in reviewing project portfolio with associated impact on applications (run and planned), with the aim to enhance insight in upcoming project in order to jointly assess impact.
d. Support Nobian and the State in scheduling a meeting between them and the coordinating authority to discuss the progress in the permitting process.

7.1.4 Summary (all to be validated and finalised in tailor-made agreement)
Technical changes by Nobian
a. Realisation of 2 new salt production plants of about 1500 kt/yr, based upon Mechanical Vapor Recompression Technology (MVR).
b. Brine purification and salt centrifuge capacity unchanged, so total Site production capacity will remain unchanged.
c. 2 of the 3 existing salt production plants, based on steam (MEE technology), will be stopped, reducing the steam demand and thereby the CO_2 and NOx emission.
d. The MEE plant that stays in operation will continue to use third party steam currently sourced from EEW (waste) and/or BGR/Eneco (biomass).
e. The MVR will be designed to operate in a flexible way to be able to support the balancing of the electricity grid.

Expected results by 2029 to be realized by Nobian
a. Scope 1 CO_2-emission reduction: 295 kton CO_2/yr
b. NO_x emission reduction: 235 ton NO_x ton/yr
c. Natural gas saving: 165 million m^3/yr
d. Extra volume of high-quality process water availability (condensate from brine evaporation): 1mln m^3/year; which will be validated during the Study phase
e. Reduction of residual heat into Waddenzee ca. 65-85 MW; which will be validated during the Study phase
f. E-flex capability of approximately 7 MW
g. The ability to sustainably process brine coming from to-be-developed energy storage caverns in the Zuidwending area

Conditions, requirements and risks

a. Obtaining the relevant mining permits and/or concessions for Heiligerlee, Zuidwending and Zuiderveen (see for more details section 7.4), for Nobian's Delfzijl salt plant. For these permits and/or concessions, Parties also depend on parties other than signatories of this JLOI.
b. Impact of the revision of the 'Omgevingswet' on the permit process of the MVR project, especially with regard to timelines, as applications need to be executed in sequence.

c. Agreement on financial support to obtain a reasonable return, compared with alternative investment opportunities, and acceptable risks.
d. Back-up solution for steam at CPD.

7.2 Project 2: Hengelo – electrification of large salt production plant based on heat pump technology (MVR)

7.2.1 Description of the Project

7.2.1.1 Introduction and efforts by Nobian

Nobian's second largest salt plant in Europe is located in Hengelo, with an annual capacity of approximately 2.6 million ton of high purity vacuum salt which is produced from brine in two Multi-Effect-Evaporation (MEE) units (approx. 85%) and one Mechanical Vapor Recompression (MVR) unit (approx. 15%). More technical details and background on MVR technology can be found in [Annex V]. The technology used at the Hengelo Site for the production of salt is comparable to the technology used at the Delfzijl Site. Total employment of Nobian employees at the Hengelo Site is approximately 200 people (direct) and approximately 400 in total.

The brine for the Hengelo Site is obtained via solution mining in the nearby salt deposits in the region of Hengelo. Dependent on production rate, about 50% of the required steam is produced by Nobian's own gas fuelled steam production from a Combined Heat Power (CHP) installation. The remaining required steam sourced from Twence, a municipal waste incinerator (MWI), from three different installations: the waste to energy plant, the biomass energy plant (BEC) and the Empyro pyrolysis installation. In 2006 Nobian installed the first MVR in Hengelo.

Nobian and Twence have a long relationship (as of 2010) utilising each other's strengths in the chain of energy production, steam- and salt production and supporting the region with residual heat. In the current set-up, steam from Twence is utilised by Nobian to provide heat to the MEEs.

Any residual heat after the evaporation process of Nobian in one of the MEE installations is made available to the regional heat system of Hengelo Zuid (free of charge without supply commitment).

Critical for this Project to go ahead is for Nobian to obtain the relevant mining permits and concessions for in the Haaksbergen area.

7.2.1.2 Technical description

The Project concerns the replacement of 1 large steam driven MEE plant for salt production by two electricity-driven MVR plants. As a consequence of this replacement, a significant amount of energy will be saved, since MVRs are more energy-efficient than MEEs. Furthermore, the shift from steam to electrical power will result in substantially lower steam demand for salt production, enabling ramping down or even completely shutting down the CHP. The 2 new 700 kt/yr (final dimension to be defined in study phase) salt MVRs will become one of the largest in Europe to date. In line with the renewable energy targets of Nobian, the MVRs are currently targeted to run on 66% renewable electricity by 2030 and 100% by 2040.

7.2.1.3 E-flex capability

The design of the MVRs will support e-flexing capabilities for mFRR (mainly) and potentially aFRR of approximately 7 MW.

7.2.1.4 Timeline

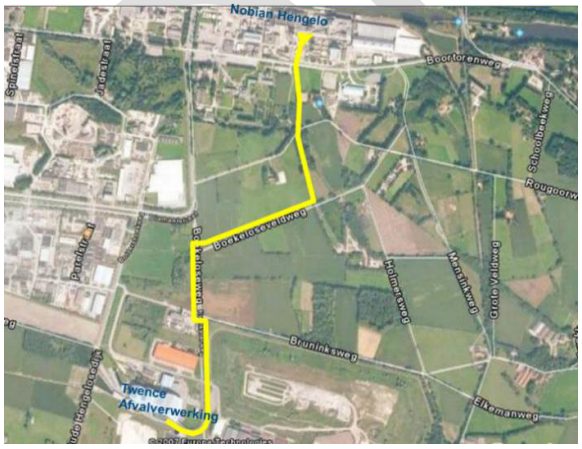
Nobian follows a proven and stage-gated project management methodology (more details in Annex IV). It is anticipated that a tailor-made agreement is entered into between Nobian and the State in Stage 2, which means that conditional FID can be taken. Engineering and construction of the 2 MVRs will be done simultaneously.

To ensure minimal production loss during construction and change-over to new technology, it is essential that in the planned bi-annual turn-round in 2027 the required tie-ins will be executed. Final commissioning and start-up is planned in H2 2029 and H1 2030 to be done sequential with minimal time between the two start-ups

Project phase	Main activities	Milestone - schedule
Initiation (FEL-1)	Define alternatives to be evaluated, -30/+50% cost estimate	Gate 1 - November 2023
Study (FEL-2)	Discuss permit approach with authorities Safety and environmental studies -20/+30% cost estimate, update business case Evaluate alternatives, select one alternative Prepared grand order	Gate 2 - Q2 2024
Pre-project (FEL-3)	Basic engineering, define project scope Hazard and operability study, environmental calculations -10/+10% cost estimate, update business case Prepare permits application documents Permits approval process	Gate 3, FID - Q4 2026
Realization	Detail engineering, construction	
	Commissioning & Start-up – start operation 1st MVR	H2 2029
	Commissioning & Start-up – start operation 2nd MVR	H1 2030
Twence Steam extension	Investigate together with Twence opportunity to accelerate emission reduction by (temp.) extension of existing steam intake	In parallel to Study phase

7.2.2 Option to further accelerate

As of 2010 a dedicated steam pipeline delivers steam produced by the Twence waste incineration installation and biomass plant to Nobian.



An option which will be investigated by Nobian and Twence in parallel to the Electrification project, is a further expansion of this existing steam delivery. This option could potentially facilitate an *additional acceleration* of reaching (significant part of) the sustainability targets by reducing operating hours of the Nobian CHP unit. Based on current insights, this could technically be realised on relatively short notice (in 2025) as a temporary and intermediate solution. Details on this scenario are described in Annex VI.

Figure 7.2.1: existing steam pipeline (marked yellow) between Twence and Nobian

This intermediate step could bring value from a sustainability and economic point of view, however the robust and long-term solution for making Nobian's production process in Hengelo sustainable remains electrification via MVR technology (for details is Annex VI).

This intermediate solution is being worked out between Nobian, Twence and other key stakeholders. If the intermediate solution is viable, Nobian will align with the State whether to implement this solution and under which conditions the MVR project can be postponed for a couple of years, provided that the FID for this project will be taken by the end of 2029 at the latest.

7.2.3 Infra & impact to utilities at Hengelo Site and region

In the following paragraphs the emphasis is on the electrification project (MVRs).

7.2.3.1 introduction

The Hengelo electrification project has an impact on the Hengelo Site and the region it is situated in. Nobian currently supplies intermediate pressure steam to other party co-located on the Hengelo Site, for this supply an alternative solution is required. In addition, as Nobian's CHP is also a reginal supplier of electricity, shutting down the CHP will reduce production of electricity.

7.2.3.2 Efforts Nobian

Intermediate pressure steam supply to on-site customer

For the intermediate-pressure steam supply obligation to a third party at the Hengelo Site, Nobian is in the process of implementing a temporary solution.

a. As part of the MVR project and also of the investigation to accelerate, Nobian will define a future solution [for continued intermediate-pressure steam supply].

Electricity infrastructure

Both having the new MVRs in operation or implementing the intermediate solution results in a net electricity demand increase in the region of approximately 80 MW. Due to 55 MW less generation by Nobian CHP and 25 MW intake by MVRs or equivalent less electricity production by Twence in intermediate solution.

This might have an impact on the local and/or regional and potentially the Dutch national grid. In order to support the green electrification ambition of the region as well as Nobian's green electricity ambition, the electrical infrastructure towards the Hengelo region might need to be enforced. This lies outside the scope of Nobian's responsibility but might play a role in the timing of putting the MVR capacity in operation.

b. Nobian to engage and collaborate with the State, the Province of Overijssel, Enexis and TenneT to jointly investigate the forecasted electricity demand and supply.

Water

To minimise the suppletion of fresh water from the Twentekanaal, the evaporation plant and the extraction of brine from the brine fields operate in a closed circuit. However, in the process 100% recycling (quantity and temperature) is not possible. When switching from MEE to MVR technology this suppletion will be further reduced leading to a reduction of approximately 0.6 – 0.8 million m^3 water intake per year from the Twentekanaal and a potential reduction of up to 25 MW of residual heat into the Twentekanaal.

c. Nobian to engage with the municipality of Hengelo and other competent authorities to ensure a positive impact on the environment and permitting process.

7.2.3.3 Efforts State

Steam supply

a. Policy, legislation and taxation of CO2 etc impacts MWIs and, as a consequence, the future of the Twence MWI which will become the key steam supplier of Nobian at its Hengelo Site. The State therefore should take on the role of stakeholder in the roadmap to define a solution when Nobian's CHP can be shut down.

Electrical infrastructure

b. The State will continue to coordinate the accelerated realisation of MIEK projects, notably the 380kV electrical infrastructure in the Hengelo region.
c. The State will engage and collaborate with the State, the Province of Overijssel, Enexis, TenneT, Twence, Nobian and others to jointly investigate the forecasted electricity demand and supply.
d. The State will undertake efforts to make renewable electricity available to the industry (in each case within applicable policies and regulations).

7.2.3.4 Efforts Province of Overijssel [province will share feedback first]
Electrical infrastructure

e. Province of Overijssel to support in engage and collaborate with the State / Enexis / Tennet / Nobian / Twence / other regional stakeholders etc. to jointly investigate the forecasted electricity demand and supply

7.2.4 Permits

7.2.4.1 Introduction

The Hengelo Project will result in improvements with regard to nature, environment and water. However, based on Nobian's initial assessment, Nobian has identified the following general risks in connection with permitting:

1. interference of permit application process with other (new) key initiatives;
2. interference by revisions of existing permits;
3. interference by new legislation (e.g., Omgevingswet applicable 1/1/2024); and/or
4. capacity of staff of competent authorities ('*bevoegd gezag*').

In the following table the relevant competent authority is highlighted, indicating areas in which Parties required additional effort. Special attention is required for the combination of running projects and revisions, and the MVR project. Permit complexity is considered a high risk for with EZK (SodM).

Competent Authority	Nature	Environment	Water
EZK	Prov. Overijssel	EZK	RWS

Summary: The project will lead to improvements for water, air, and use of natural gas. Design measures are required to ensure that the project fits within noise limits.

7.2.4.2 Efforts Nobian

a. Nobian to prepare and submit permit requests specific to this Project and expand the internal team.
b. Nobian will periodically schedule meetings with the relevant competent authorities to review its project portfolio and associated impact on applications (running and planned), with the aim to enhance insight in upcoming projects in order to jointly assess impact and potentially prioritise.
c. Nobian and the State will periodically schedule a meeting between them and the coordinating authority to discuss the progress in the permitting process.

7.2.4.3 Efforts State

a. The State (including EZK/SodM and RWS) will facilitate, where possible and within its purview, timely decision-making on permit applications for any Permit and, whilst respecting their respective authority and function under public law, encourage relevant public entities and authorities whose actions and/or decisions are required for obtaining any Permit to contribute to timely decision making.

b. The State (EZK/SodM and RWS) to explore options with Nobian to handle permit application procedures in parallel if possible within the legal framework
c. Parties will consult with the relevant national, regional and local authorities and their advisers (if any) to come to an aligned view on the relevance and prioritisation of the Projects.
d. [EZK to update: The State and Nobian will periodically schedule a meeting between them and the coordinating authority to discuss the progress in the permitting process. The State endeavours to set up a similar process for such Project(s) as for the RCR to solve bottlenecks and shorten lead times.
e. [EZK to update: expertpoule om druk omgevingsdiensten te verminderen]

7.2.4.4 Efforts Province

a. Support Nobian and the State with a meeting between them and the coordinating authority to discuss the progress in the permitting process.

7.2.5 Summary (all to be validated and finalized in tailor-made agreement)

Technical changes by Nobian

a. Realisation of 2 new salt production plants of about 1400 kt/yr in total, based on Mechanical Vapor Recompression Technology (MVR), final configuration of MVRs and other (existing) equipment/assets to be determined during study phase taking the (physical) constraints at the location into account.
b. Brine purification and salt centrifuge capacity unchanged, so total Site production capacity will remain unchanged.
c. 1 (largest) of the 2 existing salt production plants, based on steam (MEE technology), will be stopped, reducing the steam demand and thereby the CO_2 and NOx emission
d. The MEE plant that stays in operation will continue to use third party steam currently sourced from Twence (municipal waste/biomass).
e. The MVR will be designed to operate in a flexible way to be able to support the balancing of the electricity grid.

Expected results by 2030, or at any later moment of Commissioning, to be realised by Nobian

a. Scope 1 CO_2-emission reduction: 245 kton CO_2/yr
b. NO_x emission reduction: 195 ton NO_x ton/yr
c. Natural gas saving: 135 million m^3/yr
d. Reduction of intake of fresh water from 'Twente kanaal' of 0.6 – 0.8 mln m^3/year
e. Reduction of residual heat into Twente kanaal up to 25 MW
f. E-flex capability of 7 MW

Conditions, requirements and risks

a. Obtaining the relevant mining permits/concessions for Nobian's Haaksbergen activities. For this, the Parties depend also on parties other than the signatories of this JLOI.
b. Impact of 'Omgevingswet' revision on permit process of the MVR project, especially with regard to timelines as request need to be executed in sequence (typically parallel not possible/very challenging)
c. Agreement on financial support to obtain a reasonable return, compared with alternative investment opportunities and acceptable risks.
d. [additional points to be inserted]

Detail out option 'to further accelerate'

e. Nobian to share with Maatwerk team the outcome of the study in Q3 2023 together with Twence to further accelerate as a temporary measure before embarking on the

MVR project and thus potentially postponing the MVR investment. Latest moment of the Final Investment Decision (FID) for the MVR project will be taken by end of 2029.

7.3 – Project 3: Rotterdam - New electrolysis technology in Rotterdam

7.3.1 Description of the project

7.3.1.1 Introduction and efforts by Nobian

At the Botlek park, Nobian produces caustic soda, chlorine and hydrogen by applying electrical current (electrolysis) on dissolved high purity salt. These products are used at the Rotterdam Site and in the Rotterdam area by several customers and delivered directly via pipeline to them. Nobian and its customers produce e.g., PVC, Epoxy and Polyurethane and together form a strong and fully integrated chlorine-based cluster in Europe. Total direct employment of Nobian Rotterdam is approximately 220 people, and approximately [xx] in the integrated Botlek cluster.

Nobian's chlor-alkali electrolysis plant in Rotterdam, when built in 1983, was equipped with the best available technology for the electrolysers based on membranes. In 2005 new technology called *zero gap* was developed, making the electrolysis process much more energy efficient and bringing it close to its theoretical optimum in terms of electricity consumption. This proven technology is already operational at 8 of the 32 electrolysers in Rotterdam and at other sites of Nobian in the Netherlands and Germany.

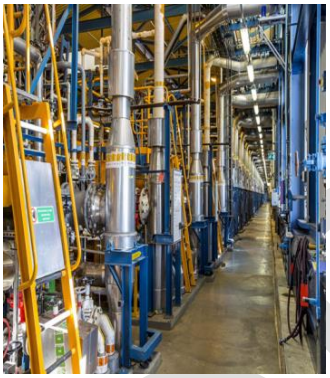


Figure A3: *Electrolysers for chlor-alkali production in Rotterdam*

7.3.1.2 Technical description

The aim of this Project is to upgrade the remaining 24 electrolysers towards zero gap technology and related equipment, such as caustic evaporators, tanks and condensers. This saves of 15% electricity consumption compared to current technology, translating into a reduction of approximately 135 GWh[13] on the highly congested electricity grid in Rotterdam.

7.3.1.3 E-flex capability

With the current set-up of the electrolysers, Nobian's site in Rotterdam already provides significant E-flex capabilities to support the balancing of the electricity net. With the new technology, an additional e-flex capacity of ca. 25MW will become available.

7.3.1.4 Timeline

Nobian follows a project management methodology as included in Annex IV, which includes decision gates. It is anticipated that a tailor-made agreement between Nobian

[13] Equivalent of 25% of wind park Amalia

and the State is agreed at Stage 2 (November 2023, i.e. conditional FID), and that FID will be taken in August 2024.

After FID, the Project will commence with detailed engineering and subsequently construction. To minimise production losses and ensure a safe work environment, most of the conversion will be executed in the bi-annual turnarounds of 2027 and 2029 (with preparatory activities such as tie-ins already being realized in the turnaround of 2025). It is foreseen that the turnarounds of 2027 and 2029 need to be extended with ca. 4 weeks. The consequential production losses are included in the business case.

Although the technology is well known, replacing the electrolysers is expensive, complex and time consuming. Therefore it can only be done in combination with a turn-around to limit production loss and create a safe work environment for the execution of the Project. Hence the replacement is planned to be executed during 2 consecutive turn-arounds (2027 and 2029), provided that during the turn-around in 2025 preparations (e.g. tie-ins) will be executed. In the period between 2025 and 2027 the plant will be prepared for the conversion. To complete the conversion, it is expected that the bi-annual turnarounds in 2027 and 2029 need to be extended by ca. 4 weeks.

Project phase	Main activities	Milestone - schedule
Initiation (FEL-1)	Define alternatives to be evaluated, -30/+50% cost estimate	Gate 1 - May 2023
Study (FEL-2)	Discuss permit approach with authorities Safety and environmental studies -20/+30% cost estimate, update business case Evaluate alternatives, select one alternative Prepared grand order	Gate 2 - November 2023
Pre-project (FEL-3)	Basic engineering, define project scope Hazard and operability study, environmental calculations -10/+10% cost estimate, update business case Prepare permits application documents Permits approval process	Gate 3, FID - August 2024
Realization	Detail engineering, construction	
	Tie-ins during Turn Around	Q2 2025
	Commissioning & Start-up – start operation first 50% of Elo's during an extended Turn Around	Q2 2027
	Commissioning & Start-up – start operation remaining 50% of Elo's during an extended Turn Around	Q2 2029

7.3.2 Infra & impact to utilities at Rotterdam site and region

7.3.2.1 Introduction and efforts Nobian

The Project has a positive impact on the electricity consumption of the Site and the region. Nobian currently supplies steam to other companies on the Site in a fully integrated manner. Together with a neighbouring company Nobian will detail out solution to further reduce emissions as stated in Project 5 'portfolio projects'.

7.3.2.3 Efforts State

[TBD]

7.3.2.3 Efforts Province
Electricity infrastructure
The relieve provided on the grid will enable Electrification projects of other companies at Site or in the area. Province to engage with stakeholders in order to optimize leveraging this relieve.

7.3.3 Permits

7.3.3.1 Introduction
The Rotterdam Project will result in improvements with regard to nature, environment and water. However, based on Nobian's initial assessment and past experience, Nobian has identified the following general risks in connection with permitting:
1. interference of permit application process with other (new) key initiatives;
2. interference by revisions of existing permits;
3. interference by new legislation (e.g. Omgevingswet applicable 1/1/2024); and/or
4. capacity of staff of competent authorities ('*bevoegd gezag*').

In the following table the relevant competent authorities for permitting are set out, indicating areas in which Parties require additional efforts to be made. As multiple projects as well as revisions of permits are in progress, or about to commence, this poses a significant risk for delays, especially related to the environment which is handled by DCMR.

Competent Authority	Nature	Environment	Water
Province of Zuid Holland (DCMR)	ODH	Province of Zuid Holland (DCMR)	RWS

Summary: The project will lead to improvements for use of electricity and to some extend noise. No significant negative environmental impact foreseen.

7.3.4.2 Efforts Nobian
a. Nobian to prepare and submit permit requests specific to this project and expand internal team.
b. Nobian will periodically schedule meetings with the relevant competent authorities to review its project portfolio and associated impact on applications (running and planned), with the aim to enhance insight in upcoming projects in order to jointly assess impact and potentially prioritise.
c. Nobian and the State will periodically schedule a meeting between them and the coordinating authority to discuss the progress in the permitting process.

7.3.4.3 Efforts State
a. The State (RWS) will facilitate, where possible and within its purview, timely decision-making on permit applications for any Permit and, whilst respecting their respective authority and function under public law, encourage relevant public entities and authorities whose actions and/or decisions are required for obtaining any Permit to contribute to timely decision making.
b. The State (RWS) to explore options with Nobian to handle permit application procedures in parallel if possible within the applicable legal framework
c. Parties will consult with the relevant national, regional and local authorities and their advisers (if any) to come to an aligned view on relevance and prioritisation of the Projects.
d. EZK to update: The State and Nobian will periodically schedule a meeting between them and the coordinating authority to discuss the progress in the permitting. The State endeavours to set up a similar process for such Project(s) as for RCR projects to solve bottlenecks and shorten lead times.
e. [EZK to update: expertpoule om druk omgevingsdiensten te verminderen]

7.3.4.4 Efforts Province [province will share feedback first]

f. Province (DCMR) to ensure capacity and capabilities are in line with demand to ensure the agreed process (timing and milestones) is reached.
g. Province (DCMR) to explore options with Nobian to handle permit application procedures in parallel if possible within the applicable legal framework.
h. Support Nobian in reviewing its project portfolio with associated impact on applications (running and planned), with the aim to enhance insight in upcoming projects in order to jointly assess impact.
i. Support Nobian and the State with a meeting between them and the coordinating authority.

7.3.5 Summary (all to be validated and finalized in tailor-made agreement)

Technical changes by Nobian

a. Replacement of existing 24 electrolysers; including membranes, frames, related electrical units, piping, instrumentation and analysers towards Zero Gap technology.
b. Modification of required process units e.g. purge brine system, catholyte and caustic system.
c. Demolition of obsolete part of the caustic evaporation unit.

Expected results by 2030 to be realized by Nobian

a. Reduction electricity consumption of 135 GWh/yr
b. E-flex capability increase of 25 MW
c. Fresh water reduction 0.1 mln m^3 /yr
   Indirect benefits: as TenneT [and Stedin] grid is highly congested, the significant reduction of electricity consumption enables other parties to embark on electrification roadmap

Conditions, requirements and risks

a. Impact of 'Omgevingswet' and other pending permit applications of Rotterdam Site might create complexity, especially with regard to timelines, as request need to be executed in sequence (typically parallel application processes are not possible, or very challenging).
b. Agreement on financial support to obtain a reasonable return, compared with alternative investment opportunities, and acceptable risks.
c. The current proposed REACH dossier might give a delay as a derogation for use of PFAS within Chlor-Alkali production is not yet foreseen.
d. [additional points to be inserted]

7.4 Project 4: Energy Storage caverns in the Zuidwending area

7.4.1 Description of the project

Introduction
As the share of wind and solar energy increases, and as more end-users are switching from fossil fuels to either electricity or renewable gases for their energy supply, it is important to build a resilient energy system capable of handling the volatility in production (e.g., no photovoltaics during the night, periods of low wind). This resilience can be realised by combining 'flexible offtake' (e.g., asking large industrials to reduce intake during periods with limited renewable production) and ensuring sufficient 'energy storage'. In addition to 'energy security', this also helps to avoid curtailing wind farms in periods of 'over-supply' (thereby increasing the financial attractiveness of investments in renewable electricity generation).

Already today, salt caverns play a role in energy storage: in the Netherlands, Nobian has realised six (6) caverns for the storage of natural gas (in Zuidwending, together with Gasunie's EnergyStock), one (1) cavern for nitrogen storage (in Heiligerlee, together with Gasunie) and two (2) caverns for the storage of diesel oil (in Twente, as part of the Dutch National Reserve overseen by COVA).

Project comprises of two parts
Nobian is currently working together with partners to realise additional energy storage caverns in the Zuidwending area (in the period until 2030):

a. Four (4) hydrogen storage caverns (1 mln m^3 per cavern), together with Gasunie's EnergyStock, acting on behalf of HyStock. These caverns are planned to be in operation before 2030, and will be part of the hydrogen transport network currently being developed. Realizing these caverns falls under the RCR;
b. Two (2) compressed air storage caverns (CAES, 0.5 mln m^3 per cavern), together with Corre Energy and planned to be in operation before 2030. These caverns will serve as batteries for the electrical grid (capacity of circa 320MW for a period of 3-4 days). Eneco will operate these caverns.

To realise these energy storage caverns and associated infrastructure, Nobian and partners will invest over EUR 0.5B in the period until 2030 (for the development of caverns, but also for compressor stations).

Background on the development of energy storage caverns and the importance of 'post-saturation capacity'

Developing energy storage caverns requires extensive permitting and also the leaching phase is time-consuming. To ensure timely completion of the planned energy storage caverns (i.e. before 2030), it is essential that Nobian can continue operating existing caverns as these provide 'post-saturation'-capacity:

a. To develop energy storage caverns in the shortest timeframe possible, Nobian will follow the accelerated leaching method. This accelerated leaching method leads to unsaturated brine coming out of the new caverns, and brings back the leaching phase of a cavern from ~8 years (conventional leaching) to 3-4 years.
b. As the Delfzijl Site requires saturated brine, Nobian will route the unsaturated brine coming from the future energy storage caverns, to existing caverns in the Zuidwending and Heiligerlee area. In these existing caverns, the unsaturated brine mixes with the saturated brine already present in these caverns (i.e. post-saturation). The resulting saturated brine is subsequently transported to the Delfzijl Site via existing pipelines.
c. Without this post-saturation capacity in existing caverns in Zuidwending and Heiligerlee, Nobian would have to revert to a slower pace of leaching and the leaching period would take ~8 years per cavern of 1 mln m^3. In addition, this would also lead to substantial brine shortage in Delfzijl (impacting Nobian's future and the supply of high purity vacuum salt to the European chemical sector).

Critical success factors to realize the project

As there is no expected need for financial support by the State to realize the energy storage caverns, it is agreed between Parties that no binding tailor-made Agreement is required for this specific Project. However, the successful realization of these sub-projects requires extensive permitting and community engagement – please see the overview of critical success factors below. Efforts to be undertaken by both Parties on these topics are therefore captured in this Article 7.4, and are binding pursuant to this JLoI.

a. Extension of the existing extraction plans ("winningplannen") for existing caverns in Heiligerlee and Zuidwending, as some of these caverns will be needed for post-saturation (i.e., process to more than half the development time of new storage caverns). The current extraction plans for these caverns expire in November 2025, and Nobian started preparations to apply for a permit extension.
b. Over time, the existing caverns in Heiligerlee and Zuidwending will become end-of-life and need to be replaced by new caverns. For this, Nobian is planning a new brine field in Zuiderveen and 4-5 replacement caverns in the Zuidwending area (additional to the aforementioned 4 hydrogen and 2 compressed air caverns). These caverns will ensure a robust supply of brine to Nobian's salt site in Delfzijl, and in the future can also act as 'post-saturation' caverns in case more energy storage caverns are needed in the period after 2030.
c. Until 2030, several initiatives will be developed in the same area (i.e. hydrogen storage caverns, compressed air storage caverns, extension of existing extraction plans, new caverns in Zuiderveen and in the Zuidwending area). Many of these initiatives follow separate and parallel permit procedures (e.g., the 4 hydrogen caverns fall under the RCR, the other permit procedures do not fall under the RCR). It is important to align the permit approach and timelines of the various initiatives
d. With various initiatives executed in parallel, it is important to align the community engagement approach. If this approach is not aligned across the various initiatives, or if not executed correctly, there is a risk that local stakeholders are (or: feel) mis-informed and that frustration / resistance against these initiatives builds up
e. Next to a well-organised community engagement process, Nobian is also of the opinion that local stakeholders should benefit from Nobian's (energy storage) activities in their region.

Required efforts of Parties - permits

a. Nobian will prepare an integrated Permit application overview for all Nobian's mining activities in the North of the Netherlands, and provide monthly updates to the State.
b. Nobian and the State will organise upfront alignments on the required process and level of detail for Permits related to mining activities in the North of the Netherlands. As part of this alignment, the State also provides clear and upfront guidance to Nobian on the role of local stakeholders in the various permitting procedures (e.g., whether a "Verklaring van Geen Bedenkingen" is required for exploration permits).

a. Nobian will prepare and submit Permit applications specific to this Project. As part of this, Nobian will, together with partners, perform the necessary studies and seek timely alignment with local stakeholders and competent authorities.
b. The State will use its best endeavours to procure that permitting authorities and their advisers are sufficiently staffed to handle incoming permit applications for Nobian's mining activities and to handling these applications in a timely manner (i.e., within the procedural time limitations as stipulated in the applicable public and administrative laws and/or guidelines). If this is not possible, the State will engage with Nobian proactively to discuss possible mitigations with the intention to avoid that permitting gets on the critical path.

Required efforts of Parties – community engagement

a. The State and Nobian will jointly develop a local community engagement plan to support the realisation of the planned energy storage caverns before 2030 (incl. associated initiatives, such as securing 'post-saturation'-capacity by extending the permit of existing caverns, and realising new caverns in Zuiderveen and Zuidwending). The plan includes the creation of a clear narrative on the importance of energy storage, how this will be implemented in practice, and how local stakeholders will benefit from the development of energy storage caverns in their neighbourhood. This plan needs to be aligned and agreed with Nobian's partners involved in developing energy storage caverns in North Netherlands.
b. Province of Groningen to provide support in the joint preparation of a local community plan (see further explanation above).

Required efforts – outlook to 'energy storage caverns beyond 2030

a. The State and Nobian continue the collaboration on the "Routekaart Energieopslag". As part of this "Routekaart Energieopslag", the State provides clarity and guidance on the role of energy storage in onshore salt caverns in the future energy mix, including guidance on required volumes for storage caverns and a clear process to designate areas for the development of large-scale energy storage.
b. The State and Nobian engage in an open discussion on how Nobian can support the further development of energy storage in salt caverns beyond 2030, including the requirements to make this a success (e.g., investments in brine transport capacity etc.).
c. For the 4-5 planned replacement caverns in Zuidwending (i.e. beyond the 4 hydrogen and the 2 compressed air caverns), Nobian will plan and design these caverns in a way that these – over time – could be used for energy storage. Important to note is that it is currently not foreseen that these caverns will be used for energy storage in the future. If this changes, it will be subject to relevant permitting and stakeholder engagement activities.

7.5 Project 5: Portfolio Projects (outside scope tailor-made agreements)

The Projects 1 - 3 result in a reduction of scope 1 CO_2 emissions of approximately 85%. For the remaining scope 1 emissions Nobian has identified various opportunities which are bundled in a portfolio of smaller projects at its Sites in Delfzijl and Rotterdam. Nobian is committed to execute these projects, without financial support from State under tailor-made agreement, in the same timeframe as Projects 1 – 3.

For some of the projects in the portfolio the plans are already advanced to the level that they will demonstrably achieve the envisaged emissions reduction, while for other projects a final approach still needs to be determined. Prioritisation of these projects will be based on the potential impact in the reduction of scope 1 CO_2 emissions, in combination with other factors determining timing and logic.

Efforts as stated in paragraphs 7.1 (Delfzijl) and 7.3 (Rotterdam) with regard to permits also apply to the projects forming part of the Portfolio Projects. As these projects will proceed in parallel with Project 1 and 3, permit procedures for these projects might interfere with permit procedures of the Projects that are part of the tailor-made agreements. This may lead to inconvenient delays of any of the projects. The Parties will discuss an adequate solution should such interference of permit procedures occur or become foreseeable.

For two of the projects forming part of the Portfolio Projects, Nobian requires cooperation of other companies in the chemical cluster of the relevant Site.

More details and background can be found in Annex VII.

Article 8 – [Other intentions] [Nobian's intentions in the Netherlands]

Nobian has the ambition to remain a leading Dutch and European essential chemicals company and employer of choice. Nobian anticipates for the long term, beyond the term of the conclusion of the tailor-made agreements and the realisation of the Projects, to maintain the centre of its business operations and production capacity in the Netherlands. To that effect Nobian intends, among others:

a) to continue investing in its Dutch production facilities in a sustainable way;
b) to keep one or more registered offices in the Netherlands;
c) to keep its production in the Netherlands at least at current levels (with a preference to increase if the opportunity passes by);
d) to remain a substantial employer (local and national) at its Sites and its Dutch offices;
e) to keep investing in innovation and knowledge institutions in the Netherlands; and
f) to keep investing in local communities.

Nobian's Dutch ambitions and intentions as set out above are based on a business environment that continues to create adequate conditions for investment and the required permits to enable it to conduct its business. The ownership of Nobian can change over time, but as the majority of its business operations, (physical) assets and workforce are based in the Netherlands, and given the nature of its business and production, Nobian's Dutch presence can be expected to remain strong in the future.

Article 9 - Governance

1. Both Nobian and the State will appoint a dedicated project team consisting of different areas of expertise. The project teams of Nobian and the State will meet on a frequent basis to further develop and monitor progress on the tailor-made agreements and the other Projects. Until at least the binding tailor-made agreements are signed or the Projects for which no tailor-made agreement will be entered into are into will have reached a satisfactory phase (including by having obtained the necessary permits and efforts made, as set out in this JLOI), the same project team will remain in place and continue to perform its duties.
2. If the Parties cannot reach agreement on certain (sub)topics, the following options for escalation will be available (in that order):
   a) the matter should first be discussed between the department ''verduurzaming industrie'' of the Ministry of Economic Affairs and Climate Policy, management of Nobian and if applicable the provincial deputies involved, ;
   b) if an agreement cannot be reached between parties mentioned under paragraph a) above, the matter will be discussed between the senior management of Nobian and the director-general for Industry Policy and Innovation of the Ministry of Economic Affairs and Climate Policy;
   c) ultimately, if an agreement cannot be reached between parties mentioned under paragraph a) above, the matter will be discussed between the CEO of Nobian and the Minister of Economic Affairs and Climate.
3. Nobian's CEO and the Minister of Economic Affairs will meet once a year to discuss progress on the Projects, the tailor-made agreements and/or ancillary matters.
4. Upon signing the tailor-made agreements, the Parties will agree the adequate future governance structure.
5. If requested by one of the Parties or the Parties jointly, an independent programme management officer shall be appointed. The primary task of such officer shall include monitoring and stimulating progress towards the execution of the steps, principles, terms and conditions as set out in this JLoI with respect to each of the Projects and the terms and conditions agreed in the subsequent tailor-made agreements (each of which shall also include separate governance provisions).

Article 10 – Change of Law

1. In this JLoI, unless the context requires otherwise, references to a statutory provision include references to that statutory provision as amended from time to time, extended or re-enacted and any regulations made under it, provided that in the event that the amendment, extension or re-enactment of any statutory provision or introduction of any new statutory provision has a material impact on the obligations of one or more Parties, the Parties will negotiate in good faith to agree such amendments to this JLOI as may be appropriate in the circumstances as to minimise the consequences for any terms and obligations hereunder.
2. If, within a reasonable period of time, the Nobian and the other Parties cannot reach agreement on the nature of the changes required or other terms and conditions, either Party may seek to have the matter determined in accordance with Article 23 (Jurisdiction) below.
3. [*Paragraph to address specific change of law issues that may come up, in addition to the generic arrangement in paragraph 1 of this Article 10*]

Article 11 – Legal status, term and termination

1. This JLoI comes into force after all Parties have signed the JLoI and shall then constitute legally valid, binding and enforceable obligations on the Parties hereto.
2. A Party may terminate (*opzeggen*) the JLoI with immediate effect, upon serving a notice in writing, if:
   a. Parties have not reached an agreement on the final tailor-made agreements on [datum] at the latest; or
   b. another Party becomes bankrupt or insolvent, goes into liquidation, has a receiving or administration order made against it, compounds with its creditors, or carries on business under a receiver, trustee or manager for the benefit of its creditors.
3. The State may terminate the JLoI with immediate effect, upon serving a notice in writing,
   i. if there is a change in the identity of the entity or entities that directly or indirectly control Nobian, provided that this change in the identity materially affects the legitimate interests of the State; or
   ii. if performing its obligations under the JLOI constitutes non-compliance with the applicable state aid framework and if necessary the approval of the European Commission.
4. Nobian may terminate the JLoI with immediate effect, upon serving a notice in writing, if:
   a. it does not obtain the salt permits or extensions thereof relating to its salt mining operations in the Province of Overijssel (Haaksbergen) by ultimately 30 September 2023; or
   b. there is a material change in Nobian's regulatory or business environment as a result of which Nobian can no longer be reasonably expected to perform its obligations under this JLOI, including but not limited to:
      i. material regulatory changes in applicable regulation on per- and polyfluoroalkyl substances (PFAS) obliging Nobian to phase out PFAS within [*time indication*]];
      ii. a change of law adversely affecting (i) the ability of Nobian to perform its obligations under this JLoI or (ii) financial consequences for Nobian by performing its obligations under this JLoI; and
      iii. [*extend as applicable*].
5. The terminating Party is not liable for damages or compensation of costs towards (any of) the other Parties.

Article 12 - Implementation in accordance with the law

The agreements set out in this JLoI and their further elaboration will be implemented in accordance with international law, European law and Dutch law, in particular to the extent that the agreements are within the scope of the international, European and Dutch rules on procurement, competition, state aid and technical standards and regulations.

Artikel 13 – Notices
Any notice and correspondence under this JLoI must be in writing and is sent to a Party by letter or email to the address set out in [Annex III] of this JLoI.

Article 14 – Costs
Each Party bears its own costs incurred with the negotiation, preparation, signature and performance in connection to this JLoI (and any documents referred to in the JLoI) and its own costs associated with the activities intended to be carried out under this JLoI, unless otherwise specified in this JLoI or if and when Parties agree otherwise in writing.

Article 15 – Assignment
Unless provided otherwise in this JLoI, no Party may assign this JLoI (*contractsoverneming)* or assign any of its rights thereunder, or have such rights transferred by way of a legal merger or demerger, without the prior written consent of all other Parties.

Article 16– Amendments
Any amendments or additions to this JLoI shall be valid and binding only if made in writing and signed by all Parties.

Article 17 – Partial Invalidity
If, at any time, any term of this JLoI is or becomes illegal, invalid or unenforceable in any respect, or this JLoI is or becomes ineffective in any respect, under the laws of any jurisdiction, such illegality, invalidity, unenforceability or ineffectiveness shall not affect:

a. the legality, validity or enforceability in that jurisdiction of any other term of this JLoI or the effectiveness in any other respect of this JLoI in that jurisdiction; or
b. the legality, validity or enforceability in other jurisdictions of that or any other term of this JLoI or the effectiveness of this JLoI under the laws of such other jurisdictions.

Article 18 – Third Party Rights
Parties do not intend for any third party to have any rights under this JLoI or be able to enforce this JLoI and Parties exclude to the extent permitted under applicable law any such third-party rights that might otherwise be implied.

Article 19 – Entire Agreement
This JLoI constitutes the entire agreement between Parties with respect to the subject matter thereof.

Article 20 – Counterparts
This JLoI may be executed in any number of counterparts and this has the same effect as if the signatures on the counterparts were on a single copy of this JLoI.

Article 21 - Governing law
This JLoI and any non-contractual obligation arising out of or in connection with it are governed by the laws of the Netherlands.

Article 22 – Jurisdiction
Any dispute in connection with this JLoI, including a dispute regarding the existence, validity or termination of this JLoI or the consequences of its nullity or any non-contractual obligation arising out of or in connection with this JLoI, shall be subject to the exclusive jurisdiction of the courts of The Hague, the Netherlands.

[*Remainder of the page intentionally left blank – signature page on the next page*]

Signed in [xx] original copies, each in the English language.

Minister of Economic Affairs and Climate Policy,
acting in her capacity as administrative body (bestuursorgaan) and as representative of the State of the Netherlands,

_____
By: Mrs. M.A.M. Adriaansens
Place:
Date:

State Secretary of Infrastructure and Water Management,
acting in her capacity as administrative body (bestuursorgaan) and as representative of the State of the Netherlands,

_____
By: Mrs. V.L.W.A. Heijnen
Place:
Date:

[State Secretary of Economic Affairs and Climate Policy],
acting in his capacity as administrative body (bestuursorgaan) and as representative of the State of the Netherlands,

_____
By: Mr. J.A. Vijlbrief
Place:
Date:

[Province A]

_____
By:
Place:
Date:

[Province B]

_____
By:
Place:
Date:

[Province C]

_____
By:
Place:
Date:

Nobian

_____
By:
Place:
Date:

- Annex I: Expression of Principles between [Company], and Minister of Economic Affairs and Climate Policy and [other party]
- Annex II: Nobian's sustainability plan/roadmap
- Annex III: Notices
- Annex IV: Stage gate process Nobian projects
- Annex V: Technical background on MVR technology
- Annex VI: Background on potential intermediate solution to further accelerate in Hengelo (project 2)
- Annex VII: Portfolio Projects
- Annex VIII: **Confidential**: business case for the Advisory Committee

[*Annex I to be inserted*]

Annex II – Nobian's Strategic Sustainability Plan

[*Note to EZK: we propose to include somewhere a link to Nobian's sustainability report* https://www.nobian.com/en/sustainability**]**

Nobian's Strategic Sustainability Plan includes at least the following elements:

1. Strategic vision and objectives and reduction pathway for sustainability up to 2030 and in the longer term (2040-50);
2. The planned efforts for reducing scope 2 and 3 emissions;
3. A roadmap/step-by-step plan with milestones [result + date] for achieving these goals;
4. An explanation of the contribution of the intended tailor-made agreement to the realisation of the strategic plan; and
5. Project descriptions.

Annex III – Notices

[*specific information for notices to be included*]

Annex IV – Stage gate process Nobian projects

The aim is to reach binding tailor-made agreements between the Parties for the Projects at the moment a project is at Gate 2 (see table IV.1 below), which is the moment Nobian can take conditional FID.

1. Each tailor-made agreement will have a concrete timeline for the realisation of the relevant Project(s) as from the signing of the Project Agreements pertaining to that Project.

2. The tailor-made agreements will follow the decision gates as described in table IV.1 and when all the deliverables are met positively the FID will be made.

3. The tailor-made agreements will include:

    a. a clear stage gating process with well-defined go/no-go decisions with clear deliverables and commitments from the Parties to move to the next phase;
    b. a financing structure of the Project(s) based on the business plan, the assumptions in this plan and the 'subside beschikking';
    c. an integral governance structure with all relevant stakeholders to ensure on time completion of the Projects.

Topic	Initate Phase - Deliverable in this phase:		Study phase - Deliverable in this phase:		Pre project phase - Deliverables in this phase:	
Engineering & Cost est.	Technical concept, scope & capacity chosen		One technical alternative		Basic engineering package	
	Cost estimate (-30%/+50%)		Cost estimate (-20%/+30%)		Budget (-10%/+10%)	
	Project plan and costs for FEL2 (study)		Project plan and costs for FEL3 (basic engineering phase)		Commitment from equipment suppliers Project plan for execution phase	
Finance	Conceptual financial instrument portfolio identified		Approval by Board Nobian to start basic engineering (FEL3)		Subsidy request submitted in time, finance secured	
	Financial stakeholders identified and case discussed		Commitment from all financial stakeholders on time schedule and financial instruments		Financial instruments available in time for submission and accessible for Nobian	
	Check for requirement for EU check	Gate 1	State support check at EU started	Gate 2: Cond. FID		Gate 3: final FID*
	Clarification of Government support for FEL2 engineering committed		Clarification of Government support for FEL3 engineering committed			
Permits	Permit plan ready and discussed with authorities.		Concept permit application ready for submission and pre-discussed with competent authorities.		Permit application submitted in time. All requirements for permits for construction and license to operate clarified and accounted for in design and plan.	
	Stakeholder analysis for permits prepared		Permit requirements clarified and accounted for in project scope and plan.		Delivery of permits according to planning. Joint stakeholder management in operation.	
	Permit plan ready & competent authorities involved and first indication that granting the permit is possible and identification of right approach for those elements where legislation is less clear. Agree meeting structure and escalation model. First indication of resource and compatency required.		Stakeholder analysis ready, aligned with bevoegde gezagen.			
			Clearification on resource availability at permit authorities (e.g. omgevingsdienst NoordNL (Delfzijl), DCMR (Botlek), EZK (Hengelo)) and legal periods for permits incl governance structure.			
Business case	Feasibility proven		Subsidy 'beschikking' covering the financial aspects and 'frozen' govermental policy parameters impacting the business case		Frozen	
	Identification of required support					

* Key milestones after Gate 3: Detailed engineering, Construction, Commissioning & Start-up

Table IV.1: Nobian Project Stage Gate process

As part of the Nobian Project Stage Gate process, the cost estimate includes the following items:

- Project management
- Engineering & Procurement
- Construction (static, rotating, piping, civil, instrumentation, electrical, insulation)
- Construction in-directs (management/supervision, scaffolding/cranes)
- Special (duty/freight/spare parts)
- Commissioning and Start-up
- Contingency

ANNEX V – Technical background on MVR technology

Vacuum salt production is based upon recrystallisation of solid salt crystals from a purified brine to create high purity salt. This crystallization is achieved by the evaporation of water from the saturated purified brine, originating from the Salt caverns. This evaporation takes place in the crystallizer/evaporator: the incoming brine is finally heated until boiling point in the large circulation heat exchanger and flashes out in the crystallizer/evaporator creating two streams: a salt slurry and water vapor. The salt slurry is sent to the salt centrifuges to segregate the solid salt crystals from brine. The water vapor leaves the crystallizer/evaporator from the top, is cleaned in a scrubber and after that compressed to a higher pressure and temperature in the compressor. The heated vapor at the outlet of the compressor is used for the heating, in the circulation heat exchanger, of the boiling salt slurry/ brine to maintain the crystallization process
As a result of the heat flux from the vapor to the salt slurry the vapor condenses into water (condensate). This hot condensate is being used to pre-heat the incoming cold feed brine to enhance over-all thermal efficiency of the process.
By making use of this MVR-technology (Mechanical Vapor Recompression)the energy in the vapor is being recycled in the most efficient way like a heat pump. Therefore a high over-all efficiency is obtained.
Further reduction of energy is achieved by smart heat integration as will be applied in the project.

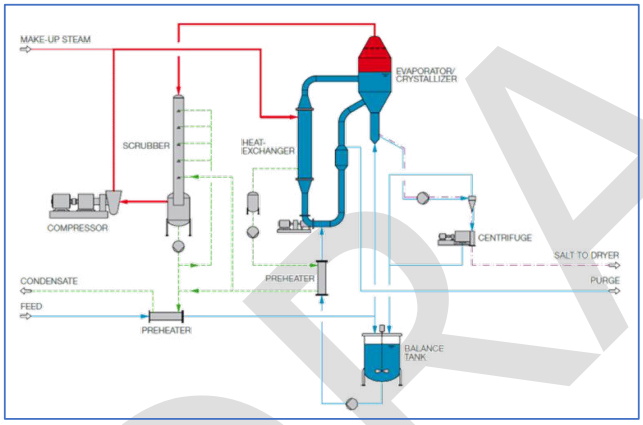


Figure V.1: Schematic diagram of MVR

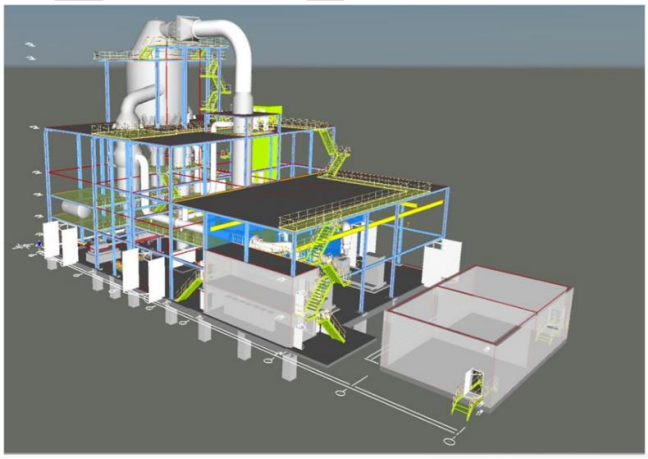


Figure V.2: 3D model of a single 700 kt MVR unit. Typical footprint: 32m wide, 61m long and 33m high.

Annex VI: Background on potential intermediate solution to further accelerate in Hengelo (Project 2)

It is expected that in future the steam supply from Twence towards Nobian declines making this option not future proof for Nobian. This for the following reasons:

a. Development and maturity of the regional heat hub of Hengelo region (100,000 household equivalents) resulting in increased heat demand in the region resulting in reduced supply to Nobian
b. Sticter Policies/legislation of waste incineration in Netherlands in general and the position of Twence specifically
c. Decline of supply of waste for Twence (circular economy, import of waste from Germany etc)
d. Roll-out of Carbon Capture Utilisation technology by Twence which increase the demand of steam
e. Cooperation between Twence and Nobian with regard to 'Waste to Energy' innovation roadmap ('create green molecules from waste'), resulting in decline of available heat available for steam

Increase of price of steam supplied by Twence driven by the factors above

Another reason to move away from MEE to MVR technology is that this reduces water intake from Twente Kanaal with 0.6-0.8 mln m^3 per yr and reduces 0-25 MW residual heat towards Twente Kanaal.

Although the ultimate set-up, as described under [7.2.1.], is clear and robustly positioned, the indicated intermediate option to accelerate the transition phase, as described under [7.2.2.], seems feasible. Current initial insights show that until 2030 on average there would be enough steam for Nobian to run its large MEE on Twence steam. To further explore this opportunity on behalf of Nobian and Twence, a third party [BlueTerra] was engaged and is currently executing an analysis of heat demand and supply of the region around Twence, taking into account both residential as well as industrial demand/supply . The outcome will be available in 2nd half of Q2 2023 and will be used as input for the study whether extension/debottlenecking of the existing steam pipeline is to be considered. Next to analysis on heat, also an analysis on electricity demand and supply is required. Twence and Nobian are both also electricity producers. With the switch from steam produced by Nobian to steam consumed from Twence, Nobian's electricity production will decline so will the electricity production of Twence This might have a negative impact on net production of electricity in the region. See for more details paragraph [7.2.3.3.]. Third component is that Nobian and Twence require a commercial agreement.

Annex VII: Portfolio Projects

Projects at the Site Delfzijl

3 projects in the portfolio at CDP:
- The future of utilities situation at CPD
- Caustic evaporator
- Delsalto circular brine

Future of utilities at CPD

Completion of installation of the MVRs (Project 1) would in principle enable the shutdown of the CHP unit Delesto 1. This would make additional steam from biomass and municipal waste available for other users at CPD. Since these utilities are essential for the CDP as a whole, an overall future proof utility plan needs to be developed, the future role of Nobian in this respect. Nobian will initiate the activities to come to a plan with all relevant stakeholders at and around the CPD, as also stated in Article [7.1.2].

Caustic evaporator

Most of the caustic (NaOH) produced in the electrolysis plant in Delfzijl is concentrated to 50% in a relatively inefficient single-step evaporator running on steam. At this moment it is being investigated what the most efficient solution is to reduce the energy usage and/or become independent of fossil fuel-based steam.

Delsalto circular brine

This project concerns the recycling of a residual brine stream from one of the chemical companies at CDP. Though the project results in a reduced carbon footprint per kg of product, it does not result in an overall CO_2 emissions or energy consumption reduction, since the project increases production. The project, however, is included because of the circular character, environmental benefits and complexity of permitting in line with the scope of this JLoI.

Projects at the Site Rotterdam

3 projects in the portfolio at Rotterdam Site:
- Bifuel boiler
- Caustic evaporation
- The steam boilers producing steam for Nobian and other companies

At the Rotterdam Site the utilities are well integrated with a neighbouring chemical company. Because of many interdependencies, the overall reduction of the scope 1 emissions is being worked out in close cooperation between both companies.

Bifuel boiler
At this moment boilers are mainly using natural gas and to a lesser extent hydrogen and waste gas from the neighbouring company as fuel. From the electrolysis process at the Site, hydrogen could be used in the boiler to further reduce the use of natural gas and thus reducing scope 1 CO_2 emissions. Installation of a bifuel boiler will enable boilers to run both on natural gas and hydrogen.

Caustic evaporation
The caustic evaporation on the Rotterdam Site runs takes place in an efficient multi-effect evaporator running on steam. At this moment about 80% of the steam is coming from the boilers and about 20% of the steam from the neighbouring company where energy is added to the used steam exothermic process. In the future, when the relevant neighbouring

company is moving more to electrification of their processes, it could enable Nobian to run the evaporator on the excess steam from the exothermic process only. This will be a incremental process requiring several investments in equipment and infrastructure that need to be worked out in the coming years.

Steam boilers

Once the bifuel boiler has been installed and the neighbouring company has started the electrification of their processes, the use of natural gas can be further reduced step by step, since the amount of steam needed will be reduced and hydrogen can be used as an alternative fuel. Eventually a boiler will still be needed to burn the waste gas, where also some additional fuel (potentially hydrogen) will be needed to reach the required energy content. In that case the only remaining CO_2 emission (max. 10-20 kton/yr) will come from the waste gas.

Annex VIII: Confidential: business case for the Advisory Committee