



DELTA CORRIDOR CONNECTING INDUSTRIES

This feasibility study focussed on the transport of C4-LPG, propylene, hydrogen and CO₂ between Rotterdam and Chemelot. In the course of the study, researchers recognised the potential value of extending the pipelines to Germany. This international component will be worked out in further detail in consultation with the relevant authorities and partners from industry.

FEASIBILITY STUDY FOR PORT OF ROTTERDAM - CHEMELOT - NORTH RHINE-WESTPHALIA PIPELINE(S):

The construction of four pipelines will deliver a strong boost to railway safety, the economy and the energy transition

The construction of four new pipelines between Rotterdam, Chemelot industrial site and North Rhine-Westphalia for the transport of C4-LPG, propylene, hydrogen and CO₂ will yield several benefits:

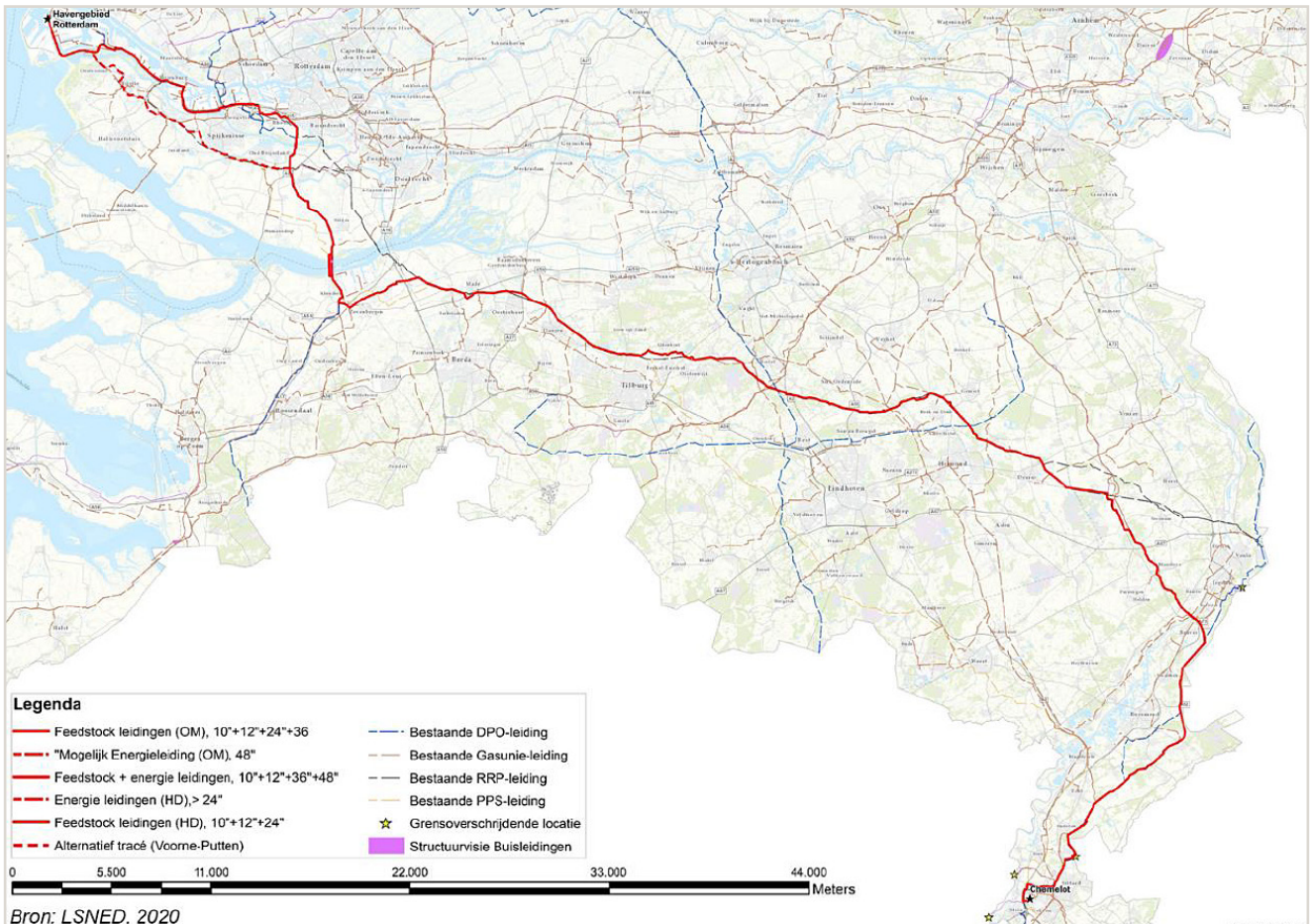
- There will be fewer trains carrying hazardous materials along the Brabant route. Among the opportunities it will create is housing near the railway.
- Industry at Chemelot will benefit from safe, reliable and sustainable connections to other industry clusters. This will strengthen the competitive position of the companies at Chemelot, which in turn will boost the economy and employment.
- The construction of transition pipelines carrying hydrogen and CO₂ will allow industry to make production processes more sustainable. The product lines will also contribute to the transition: C4-LPG is a more sustainable alternative raw material to naphtha, which is widely used at the moment, and propylene can eventually be replaced by bio-propylene.
- The construction of the transition pipelines is key to the Port of Rotterdam developing into a sustainable energy port.
- Any companies located along the route that can use or produce any of these four substances will be able to take advantage of 'linking options'. Industry at Moerdijk is one example.

The simultaneous construction of the four pipelines between Rotterdam and Chemelot will cost over €1 billion including VAT (-/+ 40%). The cost of laying the pipelines one at a time would be €365 million higher, and the inconvenience during construction significantly greater.

The study shows that for the Dutch section alone, the pipeline bundle is almost financially unfeasible. Extending the pipelines to North Rhine-Westphalia and Antwerp will mean they could be significantly better utilised. This is essential in terms of cost recovery.

Industry at Chemelot is set to use more C4-LPG as a raw material over the next few years. As such, it would be preferable to lay the pipes quickly. In the context of making long-term plans, industry will also need clarity with regard to the construction of the pipelines.

The study revealed the Rotterdam-Moerdijk-Tilburg-Venlo-Chemelot route to be the most favourable one. This route is included in the national Structural Vision on Pipelines (2012).



Rotterdam - Moerdijk - Tilburg - Venlo - Chemelot route

Following comparative studies of several possible routes, the Rotterdam-Chemelot route via Venlo came out as the most favourable one. The route would follow the Leidingenstraat (Pipeline street) and the Structural Vision on Pipelines along its entire length; it would have the lowest number of crossings/tunnels in built-up areas and Natura2000 areas; it would provide opportunities to create two connections with Germany (near Venlo and Sittard), and it is expected to have the shortest completion time.

As part of the Structural Vision on Pipelines, the Netherlands has designated a number of routes for underground pipelines across the country. It has been agreed that no new construction work will take place on these strips of land and that nationally important underground transport infrastructure would be concentrated along them. The Leidingenstraat (Pipeline street) between Rotterdam, Moerdijk and Antwerp is also part of the Structural Vision on Pipelines.

Supply by rail and urban development under pressure

In the current situation, the Basic Network risk ceilings along the Brabant route (rail between Rotterdam and Chemelot) are being exceeded. However, legal safety standards are not currently being breached. Studies of future transport demand (and urban development plans) show that along the Brabant Route, these violations are set to increase and take on a structural character. The construction of the two product lines will help to relieve this.

Urgency for rapid completion

Constructing a pipeline (or pipeline bundle) demands a lengthy process of planning and preparation. In order for the project to be completed in time, companies and governments will need to work together on it and to fast-track the operation.

Over the coming decades, industry will undergo major changes. To meet the climate goals, we will need to switch to sustainable, renewable power sources and raw materials and reduce CO₂ emissions. At the same time, we want industry to continue to provide employment and make the products that society uses. Companies at Chemelot already need to make short-term choices and investments so that they can complete the transition in good time. It is also crucial for industry to remain competitive. Raw materials, mainly naphtha and natural gas, currently represent 70% of chemical industry costs. The fact that these raw materials are now brought in by pipeline means Chemelot - an inland industrial area - is able to compete with chemical complexes located on the coast. It is important for Chemelot that C4-LPG and propylene are supplied competitively, safely and reliably.

The two other pipelines are so-called transition pipelines for hydrogen and CO₂. Carbon Capture and Storage (CCS) is mainly needed in the short term to limit CO₂ emissions into the atmosphere. For capturing CO₂ at Chemelot, the issue of whether there will be a CO₂ pipeline to Rotterdam needs to be clarified in the short term. If so, it will be possible to be connected to the Porthos CCS project. By the end of 2022, companies will need to know for certain whether the CO₂ pipeline is coming. This is because, with the alternative of carrying CO₂ by inland barge, contracts will need to be concluded with shipyards in time for them to build inland tankers.

Schedule

The feasibility study shows that to enable completion in four years, several processes need to be run in parallel. As part of the Structural Vision for Pipelines, a process of administrative deliberation for the laying of pipelines of national importance took place several years ago. An EIA PLAN procedure has already been carried out as part of this. Preparing and constructing the pipelines in four years will require a substantial, coordinated effort by all companies and authorities involved. This effort must not be underestimated.

The costs

The study indicates that the combined construction of the four pipelines will cost €1,011 million including VAT, with a 40% margin of uncertainty. Constructing the four pipelines individually would add around €365 million to this price. A simultaneous and therefore bundled construction would also be preferable from the point of view of social support, safety and limiting the inconvenience the work would cause.

The benefits

Several parties could benefit from the pipelines. These include the built-up areas along the Brabant Route (opportunities for urban densification around station locations), residents (reduced transport of hazardous substances by rail), the business community (especially in Chemelot and the Port of Rotterdam), and employees (the improved competitive position and opportunities for making the transition would keep industry competitive on the international stage).

a. Fewer trains carrying hazardous materials through built-up areas

Cities in North Brabant such as Eindhoven, Helmond, Tilburg, Breda and Deurne have considerable ambitions for the construction of housing in zones along the railroad. Plans for at least 20,000 homes are known. In Eindhoven alone, the International Knoop XL project (the redevelopment of the area around Eindhoven's station as the calling card for Brainport Eindhoven) involves 15,000 homes. Its development is under threat from the growth in the carrying of hazardous substances by rail. The laying of pipelines to transport these substances would remove this area of tension.

b. Contribution to the energy transition

The pipeline bundle plays an important role in the transition of Dutch industry, particularly that in Rotterdam and at Chemelot. Moreover, Rotterdam is positioning itself as an international hub for hydrogen, which is set to replace fossil-based raw materials and energy resources. The supply of renewable raw materials and fuels will strengthen Chemelot's position as Europe's safest and most sustainable industrial cluster.

The transition pipelines will not stand alone; they will form part of a Dutch and European network for new energy carriers. Gasunie's plan for a national hydrogen grid, HyWay27, and these transition pipelines complement each other. The CO₂ pipeline can be constructed in such a way that it can eventually be used as a hydrogen pipeline.

c. Competitive position for industry at Chemelot

To guarantee Chemelot's long-term competitive position, Chemelot needs to be part of a European pipeline network. Pipelines provide the safest and most sustainable system of transport.

When it comes to the supply of raw materials, Chemelot's inland location puts it at a competitive disadvantage compared to industries located on the coast. This disadvantage is currently lifted because the main raw materials (naphtha and natural gas) are brought in by pipeline. As such, we should lay a parallel network for new raw materials. Furthermore, Chemelot is now a major producer of 'grey' hydrogen made from natural gas. This process releases a lot of CO₂, which can then be captured (making the hydrogen 'blue') and stored, paving the way for the arrival of 'green' hydrogen produced using 'green' electricity and delivered via Rotterdam by sea or other means.

d. First mover advantage for Rotterdam

Reliable infrastructural connections between Rotterdam and the industrial clusters in Limburg, North Brabant and Germany are of vital importance to the Port of Rotterdam. The energy and raw materials transition is a huge challenge, and the Port of Rotterdam needs to maintain its pivotal role for Europe's energy and raw materials supply (13% of all EU energy is handled by Rotterdam). In the process, fossil-based, non-circular flows must be replaced by renewable flows.

The Port of Rotterdam is committed to the large-scale production and import of hydrogen. Infrastructure is needed to transport that hydrogen from Rotterdam to industry and major consumers in the hinterland. The port that creates this infrastructure first has a 'first mover advantage' because such a pipeline attracts cargo, businesses and employment, enabling the port to build its position as the green hub of Northwest Europe.

e. Robust networks

Climate-resilient and robust networks using multiple modes (pipelines, inland shipping and rail) are important, certainly when it comes to energy carriers. Without investment in the pipelines, potential capacity bottlenecks will arise on the railways, especially along the approach and departure routes of the Betuwe Route and before reaching the destinations at the German end. The substantial increase in transport could potentially create capacity bottlenecks on the waterways of the Rhine and the Maas. Inland shipping alone is not robust enough to cope with supplying industry with the substances in question because of the ever-increasing likelihood of low water in both the Rhine and the Maas.

Pipelines are a safe, reliable and sustainable means of transport. There is an extremely remote chance of incidents and transport by pipeline produces lower CO₂ emissions. The inconvenience is minimal because the pipes run underground.

f. Linking options

For several companies and regions along the route, there will be so-called linking options. Consider, for example, the construction of hydrogen filling stations for freight traffic and inland shipping, connecting industry in Moerdijk to the CO₂ pipeline or using CO₂ in the greenhouses around Venlo.

North Rhine-Westphalia and Antwerp

Extending the pipelines to North Rhine-Westphalia (near Venlo and/or Sittard) and Antwerp (from Moerdijk) will allow many more large industries to be interconnected and more use to be made of the pipelines. This will play a key role in recouping the investment. Pipeline developments are also ongoing in neighbouring countries. One of the recommendations to emerge from the study is to develop the project internationally.

Conclusion

The construction of these four pipelines will provide a powerful boost to safety along railways, the economy and the energy transition. The project is therefore of strategic, national and international importance. The 'safety margin' created in North Brabant due to there being fewer trains carrying hazardous materials will provide space for housing development. The new infrastructure will ensure that industry in Chemelot, Rotterdam, North Rhine-Westphalia and Moerdijk will continue to have reliable and safe supply and distribution lines. What's more, the pipelines are important for industry's transition to a more sustainable way of producing.

The study labels the failure to construct the four pipelines as a missed opportunity from the point of view of safety, fighting climate change and economics.

Recommendation

The feasibility study recommends pressing ahead with developing the plan to lay the four pipelines as a bundle, following the route via Venlo, and aiming for rapid completion. It also recommends intensifying contacts with parties in North Rhine-Westphalia and Flanders, investigating the linking options at a regional level, fine-tuning the business case and working out the details of various PPS structures.


Feasibility study for Port of Rotterdam - Chemelot - North Rhine-Westphalia pipeline(s) was commissioned by the Government (Ministry of Infrastructure and Water Management in association with the Ministries of Economic Affairs and Climate), the Port of Rotterdam and Chemelot. The feasibility study came about through a joint research committee and with substantive guidance from Buck Consultants International. The provinces of Limburg, North Brabant and South Holland were involved in conducting the study.

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Ministerie van Infrastructuur
en Waterstaat



provincie limburg 

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What's next?

The initiators of this feasibility study (central government, the Port of Rotterdam Authority and Chemelot) have decided to proceed energetically with developing the plans for the construction of these pipelines under the title 'Delta Corridor - connecting industries'. Exactly how this is to be organised will be worked out in the spring of 2021.