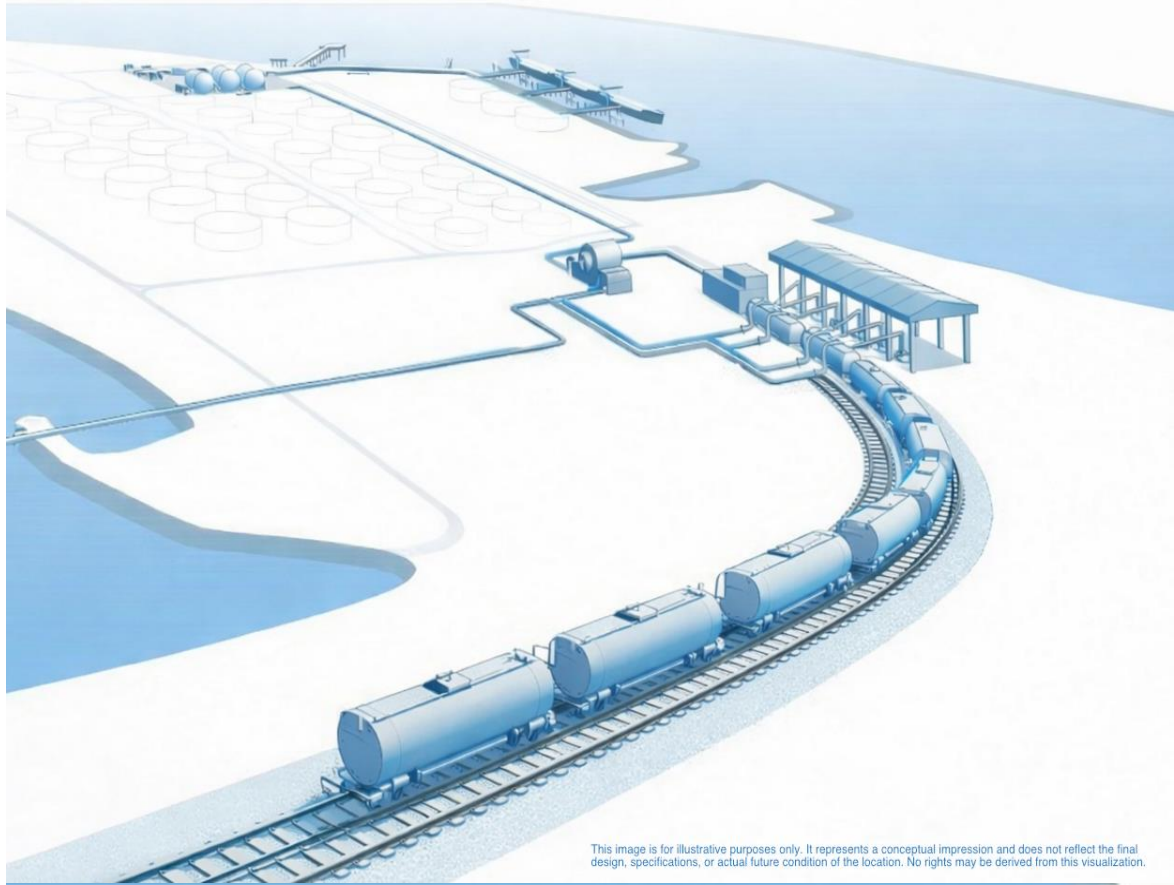


## Summary

# CO<sub>2</sub> railcar unloading Feasibility Study

November 2025



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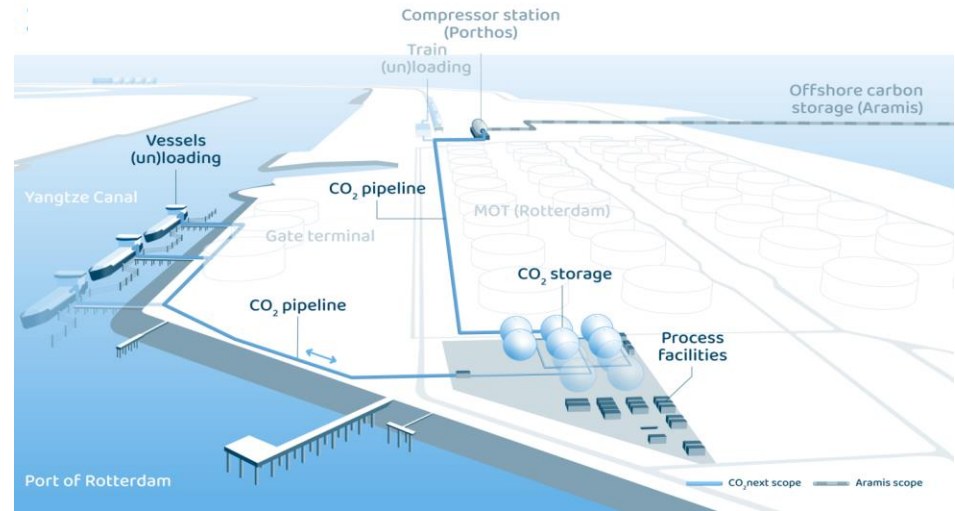
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# Introduction to CO<sub>2</sub>next and the CO<sub>2</sub> railcar unloading facility

## CO<sub>2</sub>next terminal

- The CO<sub>2</sub>next project is developing an independent open access hub terminal for the reception and delivery of liquid CO<sub>2</sub> (LCO<sub>2</sub>) via coasters and barges on the Maasvlakte in the Port of Rotterdam.
- Its strategic location allows it to serve markets across the Netherlands, Germany, Belgium, France, Austria, Switzerland, Poland, Spain and the Baltic States.
- The project aligns with the Dutch climate agreement and the European climate goals, with CO<sub>2</sub> infrastructure playing a crucial role in achieving these objectives.
- CO<sub>2</sub>next has received European recognition with a PCI status on the 15th list and secured CEF funding in 2023.
- The CO<sub>2</sub>next project is investigating to offer additional CO<sub>2</sub> railcar unloading services to receive LCO<sub>2</sub> via rail cars next to the current model of receiving LCO<sub>2</sub> via ships and send out the CO<sub>2</sub> into the Aramis trunkline.



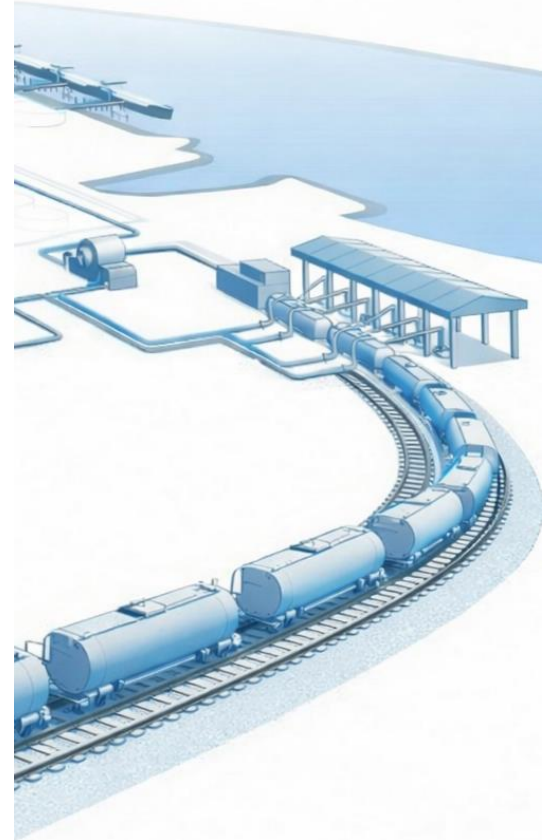
# Introduction to CO<sub>2</sub>next and the CO<sub>2</sub> railcar unloading facility

## Trigger of the CO<sub>2</sub> railcar unloading facility

- Increased interest of potential customers in LCO<sub>2</sub> transport via rail, as multiple emitters in inland Europe have no other alternatives, or perceive it as more financially viable.
- As an example, volumes by rail in Germany are expected to range between 6-8 Mtpa by 2030 and 9-18 Mtpa by 2035 according to SRP, Deutsche Bahn and VGZ.
- Proximity to rail infrastructure presents a strategic opportunity to expand the CO<sub>2</sub>next proposition with CO<sub>2</sub> rail unloading services.

## Feasibility study

- To understand the technical, operational and economic feasibility of a LCO<sub>2</sub> railcar unloading facility, a feasibility study was conducted with three other parties in the value chain.
- The Feasibility study consisted of three different elements: conceptual layout designs, a permitting scan and a Quantitative Risk Assessment.



# Conceptual Layout Designs

## Scope

Developing preliminary layout designs based on different infrastructure configurations, focusing on the spatial integration of railway infrastructure. Including a 40% cost estimate of rail infrastructure investments.

## Main starting points & assumptions

- A plot with the dimensions of approximately 1000m x 50m is the area and limit of the conceptual layout designs.
- A maximum block train configuration of 26 wagons of each 15.8 meters long, resulting in a total train length of approximately 411 meters.
- The required (upper-boundary) center-to-center distance for unloading tracks is assumed to be 9.25 meters.

## Results

### Design 1

1. Arrival- and departure track without shunting possibilities. **Shunting at site not required.**
2. 4 unloading tracks that can accommodate a maximum block train length each (26 RTCs x 15.8m = 411m);
3. Transfer table at the end of the plot to move loc towards departure track;
4. Potential throughput: **1.4 - 2.7 Mtpa, 3-6 block trains p/d**, depending on number of unloading stations in series.

### Design 2

1. Arrival- and departure track with shunting possibilities. **Shunting at site is required.**
2. 4 unloading tracks that can accommodate half of a maximum block train length (13 RTCs x 15.8 m);
3. Railroad switchyard at the end of the plot to move loc towards departure track;
4. Potential throughput: **0.9 - 1.8 Mtpa, 2-4 block trains p/d**, depending on number of unloading stations in series.

# Conceptual Layout Designs

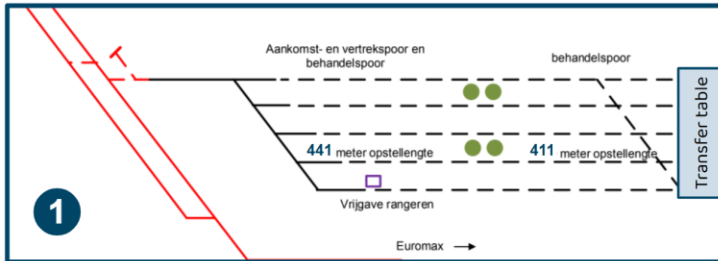
## Design 1

1.4 - 2.7 Mtpa, 3-6 block trains p/d

No shunting required

Full (411m) block train can be unloaded at unloading track

Transfer table at the end of track to move loc



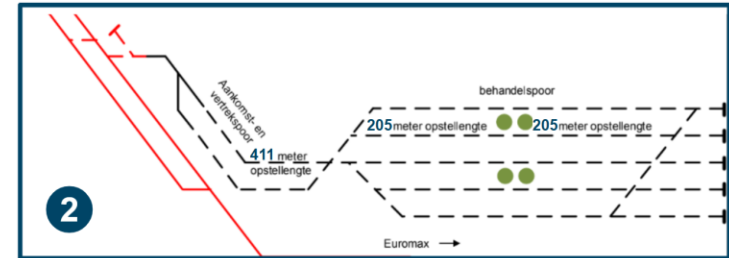
## Design 2

0.9 - 1.8 Mtpa, 2-4 block trains p/d

Shunting required

Half of a block train can be unloaded at unloading track

Switchyard at the end of track to move loc



# Permitting scan & QRA

## Permitting scan

### Scope

A permit scan was carried out to identify the necessary permits for the CO<sub>2</sub>next railcar unloading facility, including the open access & non-discriminatory CO<sub>2</sub> rail unloading facility, and a pipeline connecting to the liquid CO<sub>2</sub> storage tanks. Moreover, the expected lead times were estimated.

### Results

The realization of the CO<sub>2</sub>next expansion with a rail yard, CO<sub>2</sub> unloading facility, and pipeline infrastructure requires an extensive permitting process. Up to 30 legal procedures are expected. Six of those are the most critical and will dictate the overall lead time. The estimated **total lead time**, including preparation and formal appeal procedures, is **2 to 3.5 years**.

## QRA

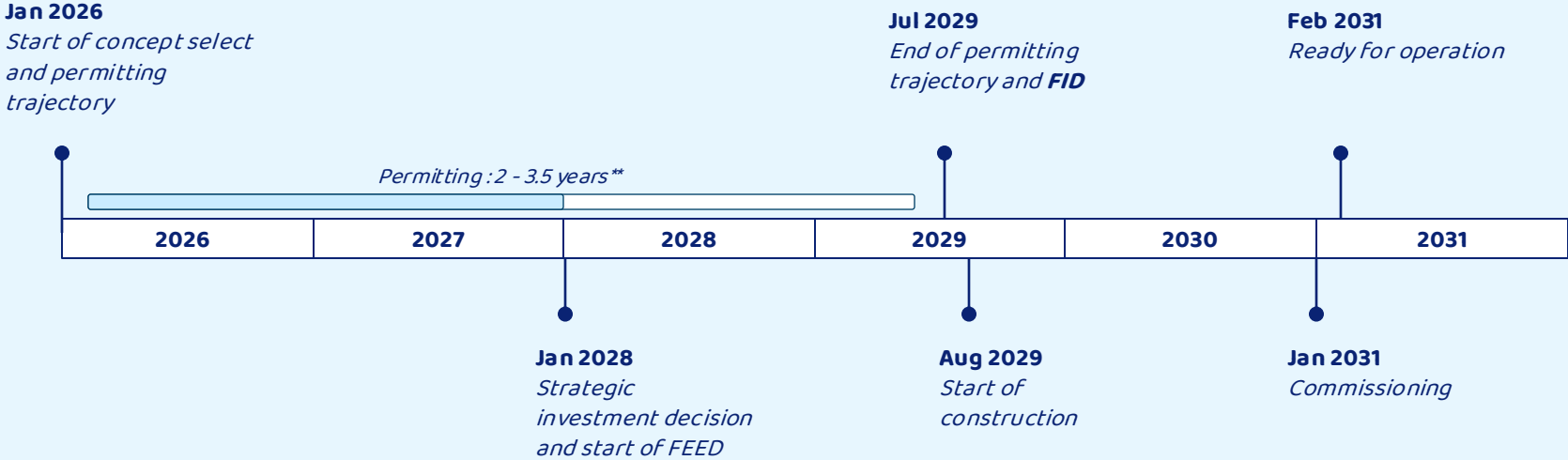
### Scope

A Quantitative Risk Assessment (QRA) was performed for the CO<sub>2</sub>next railcar unloading facility, focusing on Place-Bound Risk (PR), Toxic Cloud Area (GAG), and Group Risk (GR).

### Results

According to the safety criteria of the Besluit Kwaliteit Leefomgeving, the place bound risks are fully acceptable and remain well within the designated risk zones of Maasvlakte 1 en 2. The increase in group risk is limited and remains well below the (lapsed) orientation value. As a result, **no safety constraints are expected for the environmental safety assessment**.

# Project timeline



\*Subject to a go/no go rail decision from the CO<sub>2</sub>next project partners and timeline of the CO<sub>2</sub>next terminal.

\*\*Depending on appeal / no appeal, and critical strategic permitting pathways that will be determined in first phase of permitting works.

## Next steps

1. **Open season:** We aim to launch an open season for the next phase of the railcar project with interested emitters.
2. **Permitting process initiation:** As part of the next project phase, start the permitting process to prevent conflicts with project timelines, given the long lead times expected.
3. **Alignment:** Keep relevant stakeholders informed about project developments to ensure spatial and logistical alignment.
4. **Other project deliverables:** such as updating the market analysis, performing risk assessments and defining project scenarios.

*Above next steps are subject to a go/no go decision from CO<sub>2</sub>next and timeline of the CO<sub>2</sub>next terminal.*