Born in 1963 – The Port Year

- Celebration of the Centennial of the *Law on the New Waterway*, signed in 1863
- Necessary in order to accommodate ever larger seagoing vessels with bulk cargo for Ruhr Area in Germany
- Short-cut to the sea was realized in 1872, and the New Waterway was at commercial depth in 1896
- Since then continuous growth of throughput, > 100 Mt in 1963 ➔ Rotterdam largest port in the world

![Map of New Waterway](image-url)

- Port access mid 19\textsuperscript{th} century
- New Waterway end 19\textsuperscript{th} century

19 juni 2018
The port in 2018

Half of it: industrial cluster & liquid bulk

Surface area port 12,600 ha
  of which water 4,800 ha
  land 7,800 ha
  of which sites 6,000 ha

Companies 1,200
Value added € 22,3 bln
Employment 188,000

Depth up to 75 ft (= 24 m)
Seagoing vessels 30,000 p/a
Throughput 467 Mt p/a

> Largest port in Europe
> 9th port worldwide
## Rotterdam Port Industry Cluster

<table>
<thead>
<tr>
<th>Type</th>
<th>Production Capacity</th>
<th>Share in NL</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 crude oil refineries</td>
<td>58 Mt</td>
<td>88%</td>
</tr>
<tr>
<td>30 chemical companies</td>
<td>17 Mt</td>
<td>40%</td>
</tr>
<tr>
<td>3 biofuels producers</td>
<td>2 Mt</td>
<td>56%</td>
</tr>
<tr>
<td>4 edible oil refineries</td>
<td>2.6 Mt</td>
<td>75%</td>
</tr>
<tr>
<td>6 power plants, 11 heat/power plants, 1 waste incinerator, 86 wind turbines</td>
<td>5.4 GW</td>
<td>16%</td>
</tr>
</tbody>
</table>
ARA-Ruhr Cluster as motor of economic growth

1. Large export centre for oil & chemical products
   • 20% of oil refining in the EU
   • 30% of base chemical production in the EU
2. Unrivalled infrastructure: deep sea ports, river delta, pipeline systems
3. Efficient seaport and hinterland logistics
4. Production integration between refineries and chemical industry
5. Highly qualified labour force, education and R&D, based on more than a century of regional development in oil and chemicals
Port of Rotterdam Authority

Mission:
The Port of Rotterdam Authority creates economic and social value by working together with clients and stakeholders on the realisation of sustainable growth in Rotterdam’s world-class port.

Unlisted public limited company, with shareholders:

- Municipality of Rotterdam (70%)
- the Dutch government (30%)

Core tasks

- Development, management and operation of the port
- Maintaining the safe and smooth handling of all shipping

Key Figures 2017

- Turnover € 712 mln from land lease and port dues
- Investments € 214 mln in land and infrastructure
- 1,150 employees
2017

DECARBONISE PORT INDUSTRY

PATHWAYS TO A DECARBONISED PORT

30 Mton CO₂ emissions [~ 20% NL]

2018

DECARBONISE PORT TRANSPORT

To...RTM ...From

25 Mton CO₂ emissions
PATHWAYS TO A DECARBONISE INDUSTRY

CLOSED CARBON CYCLE
- LARGE SCALE AVAILABILITY OF 100% RENEWABLE ELECTRICITY PRODUCTION
- LARGE SCALE WATER ELECTROLYSIS (H₂ PRODUCTION)
- SYNTHETIC CHEMICALS FROM WASTE STREAMS

BIOMASS AND CCS
- 100% BIOMASS & WASTE-FIRED (+ CCS)
- LARGE SCALE AVAILABILITY OF SUSTAINABLE BIOMASS
- LARGE SCALE CCS (FOR POWER PLANTS AND REFINERIES)

TECHNOLOGICAL PROGRESS
- SYNTHETIC FUEL & BIOBASED PRODUCTION
- LARGE SCALE AVAILABILITY OF SUSTAINABLE BIOMASS

BUSINESS AS USUAL
- CARBON CAPTURE AND STORAGE
- HEAT GRID EXTENSION
- RAPID ADOPTION OF BEST AVAILABLE TECHNOLOGIES (ENERGY EFFICIENCY)

PARIS AGREEMENT

"Decarbonization pathways for the industrial cluster of the Port of Rotterdam" Wuppertal Institute. Simplified for clarity reasons.
Reduction CO₂ emissions 2015 - 2030 - 2050

Closure of old Coal Fired Power Plants (2017)
Closure of new Coal Fired Power Plants (2030)
Closure of Gas Fired Power Plants (including CHP)
Energy efficiency
Diminishing demand

CO₂ EMISSION

CO₂ (IN MTON)

49% REDUCTION AS COMPARED TO 1990

Includes Power-to-heat, as well as using Renewable Electricity to power machines.
Includes Bio-to-chem, Wasteto-chem as well as Recycling. In a later stadium also Power-to-hydrogen-to-chem.

Renewable Energy (Power-to-heat and Electricity)*
Renewable Feedstock (Bio and Waste)**
Geothermal Energy

Effect outside the port:
- Residual Heat
- CCU
- Alternative Fuels (Shipping, Air transport)

Port of Rotterdam

19 juni 2018
PATHWAYS TO DECARBONISE TRANSPORT.
2 pathways for sea-going vessels
New energy infrastructure for LT-Heat and CCUS

• 40 PJ heat transport network in South-Holland for potentially 500,000 households, greenhouses and enterprises

• Joint venture Gasunie – Port of Rotterdam, FID in 2018

• Natural gas avoided: 1.3 bcm; CO₂-reduction: 2 Mt p/a

• Back bone for transport and storage of CO₂ in empty offshore gas fields

• Feasability study EBN - Gasunie - Port of Rotterdam, in consultation with companies and ministery of EZK

• CO₂-reduction: 2-5 Mt p/a
Closed carbon cycle with renewable energy

- 360 kt waste transferred into 220 kt green methanol
- Consortium Enerkem, Air Liquide, AkzoNobel & Port of Rotterdam Authority, FID in 2018
- CO$_2$-reduction: 0,3 Mt p/a

- Opportunity: internationally coordinated, large scale development of far-shore wind energy at the North Sea, producing renewable energy at competitive prices from 2030
- Feasibility study on hub-and-spoke energy infrastructure for electrons and molecules (hydrogen) by a consortium of Tennet (NL and Germany), Energinet (Denmark), Gasunie & Port of Rotterdam
Port Year 2032
Centennial Port of Rotterdam Authority

- Exhibition: 15 years energy transition in the port
  1. 250,000 households on port heat
  2. CCS: 1st field filled and sealed, 2nd in operation
  3. After start in 2020, extension waste-to-chemicals capacity
  4. Bio refinery attracts new customers in bio-chemicals
  5. Refineries start co-processing synthetic fuels from renewables
  6. Use of natural gas in industry declined because of electrification
  7. First sea-going vessels on synfuels and syngas
  8. Rotterdam connected to the North Sea Wind Power Hub

- World Port Days: first excursion to Doggerbank