DECARBONISATION AND THE PORT OF ROTTERDAM: CHALLENGES & OPPORTUNITIES

Caroline Kroes – Port of Rotterdam
INTERNATIONAL RESEARCH NETWORK FOR LOW CARBON SOCIETIES – Wuppertal, September 7 2016
Over 25 miles!
Port areas

Maasvlakte 1

Europoort

Botlek

Maasvlakte 2
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.
Core tasks of the Port of Rotterdam Authority

1. Shipping
2. Energy
3. Containers
4. Fuel Hub
5. Tank storage
6. Industry
7. Refining
8. Digital services
9. Road transport
10. Rail
11. Inland shipping
12. Pipeline
Dominated by fossil fuels and logistics

Cargo ratios in 2015

- Liquid bulk: 48%
- Containers: 19%
- Dry bulk: 27%
- Breakbulk: 6%
In Rotterdam 19% of the Dutch CO2 is emitted (17% in the port)
The Wuppertal Institute designed pathways to ‘deep decarbonization’

Wuppertal report:

• 3 Pathways towards a CO2 neutral port (at least 80-95% CO2 reduction)
• No de-industrialization scenarios
• The challenge is enormous, but there are various opportunities to decarbonize the port
• Business opportunities that result in a ‘low-carbon port’
  • ‘Clean fossil’
  • Renewables
• Next steps: looking for ‘coalitions of the willing’, position Rotterdam as flagship decarbonization region
<table>
<thead>
<tr>
<th>Scenario</th>
<th>Reduction</th>
<th>Key Mitigation strategies</th>
<th>Strategy for the cluster</th>
<th>Key changes in market environment by 2050</th>
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</thead>
<tbody>
<tr>
<td>BAU</td>
<td>-30%</td>
<td>(slow) adoption of BaT</td>
<td>Efforts focus on keeping cluster in current form</td>
<td>Decrease in demand for oil refining products</td>
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<tr>
<td>TP</td>
<td>-75%</td>
<td>Rapid adoption BaT</td>
<td>Efforts focus on keeping cluster in current form</td>
<td>Strong decrease in demand for fossil transport fuels, Phase out of unabated coal</td>
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<tr>
<td>BIO</td>
<td>-98%</td>
<td>Rapid adoption BaT, Some P2H, Coal CCS</td>
<td>Oil as feedstock for chemicals, Power plants continue with biomass and CCS</td>
<td>Demand for fossil fuels virtually zero, Phase out coal power generation</td>
</tr>
<tr>
<td>CYC</td>
<td>-98%</td>
<td>Rapid adoption BaT, P2H, Recycled plastics for chemicals</td>
<td>Recycled plastics are used as feedstock for chemicals</td>
<td>BIO: large amounts sust. biomass available on world market, CYC: No biomass, but large amount of carbon-free power and/or H2 available</td>
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CHALLENGES AND OPPORTUNITIES
Energy 1: Reduce environmental impact of fossil energy

• Raise energy efficiency
  – Use residual heat (and CO\textsubscript{2}) of industry and coal-fired plants for greenhouse farming and district heating (Cluster West Heat Roundabout)
  – Use residual heat of industry for other industry (Botlek Steam Pipe)
• Carbon Capture & Storage pilot project / ROAD
• Co-firing of biomass in new coal-fired power stations
Energy efficiency: Cluster West Heat Roundabout

- Pipeline between the port - Westland - The Hague: distribution network for greenhouses
- Energy savings: 7.3 PJ per year;
- Reduction in CO\textsubscript{2} emissions: 450 ktons/year;
- Reduction in NO\textsubscript{x} emissions: 2 ktons/year
Carbon Capture & Storage: ROAD-project

Maasvlakte
Power Plant 3

CO₂ Capture Plant
Compression & Metering

5 km Pipeline onshore Maasvlakte

20 km Pipeline offshore North Sea

Platform

3,5 km

Reservoir

Not on scale
LNG as a transport fuel
Energy 2: Develop renewable energy sector

- Rotterdam already has the largest biobased cluster in the world and aims to maintain its position as front-runner
  - 2 biochemical plants; 4 biofuel plants; 4 palm oil refineries
- Neste to start building biopropane plant (strengthening the biobased cluster)
- Wind turbines and solar panels in the port
- Location of Sif Verbrugge

January 2016: Start of Slufter solar panel test project
Neste to build biopropane plant at Maasvlakte
Sif Verbrugge to produce pylons for wind turbines at Maasvlakte 2
Sustainability: Scope and influence

Port of Rotterdam Authority
Influence: ++
Effect: --

Port and industrial area
Influence: +
Effect: -

Chain
Influence: +/-
Effect: ++
Sustainability: Port of Rotterdam Authority

• Fleet using low-sulfur fuel
• Use of soot filters and catalytic converters on new vessels
• Three hybrid patrol boats (from 2016 on)
• ‘Green’ flights and green fleet of cars
• Climate neutral since 2011
• Active nature policy
• Clear assessment framework as basis for air-related measures and sustainability in allocation policy

Low-sulfur fleet
Sustainability: Port and Industrial area

- Co-siting geared towards energy saving
- Shared use of steam
- ROAD pilot project in the capture and storage of CO$_2$
- Residual heat from port used to heat homes and greenhouses in the region
- Voluntary agreement nautical service providers on use of low-sulfur fuel
- Shore-based power for inland shipping and StenaLine Hoek van Holland
Sustainability: Chain

• Modal split demands terminal Maasvlakte 2
• Environmental zone Maasvlakte 2
• Discount for clean ships with Environmental Ship Index (ESI)
• Encouraging clean engines in inland shipping
• Green Award for inland shipping
• Promote use of LNG as a transport fuel
• International cooperation with other ports: World Ports Climate Initiative
• Container Transferium Alblasserdam

Clean engines in inland shipping
QUESTIONS?