







Port of Rotterdam, The Netherlands

- Deepwater port, no locks
- Existing area: 10.500 hectares,
- 435 million tons in 2011
- More than 33.000 seagoing vessels each year
- No. 5 port in the World
- No. 1 port in Europe
- Market share in Hamburg – le Havre range: 37%
- Private investments in the port 2008-2015: € 15 billion



PORT OF ROTTERDAM

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Port expansion project

Maasvlakte 2

- 2000 extra hectares of which approx. 1000 hectares land

Of this 1000:

- Appr. 600 container terminals and logistics
- Appr. 400 industry
- Biobased industrial cluster
- Total project costs: € 3 bln.

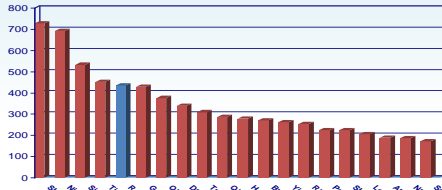


MAASVLAKTE 2

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World Top 20 ports

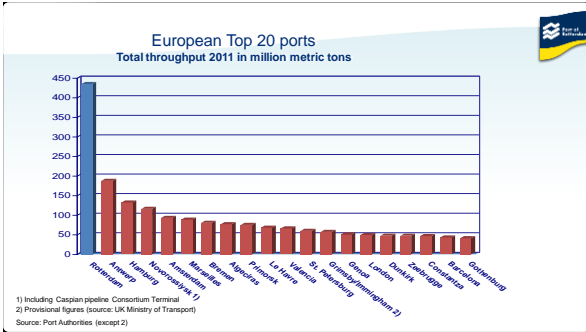
Total throughput 2011 in million metric tons



Port	Throughput (million metric tons)
Shanghai (1)	750
Singapore	680
Los Angeles	550
Rotterdam (5)	435
Antwerp (6)	420
Guangzhou	400
London (7)	380
Dallas	350
Amsterdam (8th place)	330
London (9th place)	320
Shanghai (10)	310
North Korea (11)	300
Yokohama	280
Richmond	270
Port of Montreal	260
Southwest	250
Los Angeles	240
Amsterdam	230
Rotterdam (1)	220
South Louisiana (2)	210

1) Incl. domestic trade
 2) Ports combined in 2006
 3) Incl. river trade
 4) Converted from freight ton to metric ton
 5) Converted from short ton to metric ton
 Source: Port Authorities

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Drivers for biobased development in Europe

- Increasing competition from Middle East and US on chemicals (Shalegas vs. Nafta in Europe)
- Energy & fuels get scarce and expensive in Europe
- Consumer asks for green products, market pull for green materials
- Government stimulation programmes for renewable energy and fuels

➔

- Industry in Europe needs to innovate and invest**
- Biobased will be compared with fossil derived products**
- Green chemicals can compete, upscaling is necessary**
 - Efficiency en process optimisation in existing plants
 - Making products from renewable feedstocks as competitive advantage

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Small but growing market of biobased chemicals

Global capacity petrochemicals:

- Approx. 250-300 mt
- Rotterdam: ca. 18 mt
- Antwerp: ca. 20 mt

Global capacity biobased chemicals / materials:

- 2011: 3.8 mt
- 2016 outlook: 9.2 mt

Source: Lux Research

BIOBASED CHEMICALS MARKETS


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Critical succes factors & opportunities

- Availability of feedstocks
- Technology development
- Possibility of upscaling the technology
- Long term political support
- Sustainability of biomass

Opportunities:

- Agricultural development in Europe
- Biotech developments, R&D with universities
- New industrial investments



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Port Vision 2030: Global Hub

- In 2030 Rotterdam is the leading European hub for global and intra European cargo. The global hub for **containers, fuel and energy**.
- With its **hinterland** Rotterdam is an integrated network. Rotterdam is frontrunner in **sustainable and efficient** supply-chains



GLOBAL HUB

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Port Vision 2030: Europe's Industrial Cluster

- In 2030 the Rotterdam industry and energy sector functions as an **integrated complex** with Antwerp. Thus it is the largest, most **modern and sustainable** petrochemical and energy complex of Europe.
- This complex competes on world scale through its **cluster advantages**, integrated supply chains and energy-efficiency.
- The **transition to sustainable** energy supply and **biobased chemicals** is in full swing.



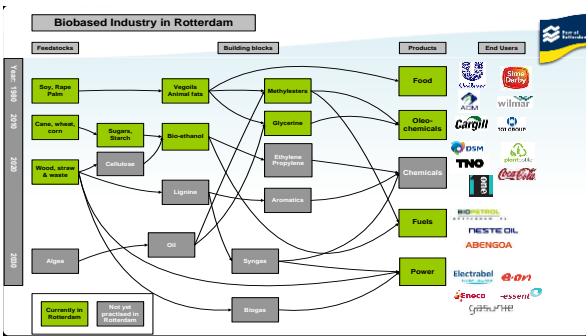
INDUSTRIAL CLUSTER

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Biobased industry in Rotterdam

- Biomass for co-firing in power plants**
 - Legislation: 20% in 2020
- Biofuels production and storage**
 - RED European legislation: 10% renewable fuels in 2020
- Biochemicals**
 - No legislation yet: market pull

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Biobased Hub Rotterdam

- Solid biomass:**
 - Rotterdam 800.000 tn / yr
 - Expected growth to 5 – 10 million tn /yr
- Liquid biomass:**
 - Veg oils: 8 mln tn/yr
 - Biofuels 3,5 mln tn/yr

GLOBAL HUB

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Biobased Hub: terminals and (tank)storage

Agri- and biomass transshipment/storage terminals

- 1 ADM
- 2 EBS
- 3 EMO
- 4 EBS
- 5 Marcor
- 6 RBT
- 7 ZHD

Independent tankstorage

- 1 Caldic
- 2 Vopak TTR
- 3 Rubis
- 4 Vopak Botlek
- 5 Odjfell
- 6 LBC

BIOBASED HUB

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BioPort Rotterdam: generation and production

Power production with Biomass Co-firing

- 1 E-ON MV 1&2
- 2 E-ON MV 3
- 3 Electrabel
- 4 AVR-BEC

Bio-production plants

- 1 Neste OS
- 2 IOILodera Crokiaan
- 3 ADM
- 4 Abengoa (ethanol)
- 5 Lyondell
- 6 Cargill
- 7 Biopetrol
- 8 Wilmar

BIOPORT GENERATION

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Rotterdam Chemical Cluster

ABENGOA HUNTSMAN DSM phelps dodge
 INDOFIJAMA P&T MOMENTIVE Linde Gas Linde
 INVISTA kemira ALCAN CALDIC
 ARKEMA bp Cabot Lucite International
 PRODUKTS Shir-Etsu AIR LIQUIDE AIRZ NOBEL
 AIR LIQUIDE Esso BRENNTAG
 Bayer ExxonMobil Q8 Shell lyondellbasell
 TRONOX
 Cargill MICRO ORGANIK KIMYA ADM ALMATIS Nufarm KOCH

Bio-Energy in the Port

- Expansion E.On in construction, from 1000 MW to 2100 MW
- GDF Suez (Electrabel): 800 MW

Power plants need significant volumes of biomass for co-firing:

- Powerplants in Rotterdam: 3 mln tons
- Powerplants in the hinterland: 2 mln ton
- Powerplants in Germany, the UK, 4 mln tons



E.On POWERPLANT EXPANSION PROJECT

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Renewable diesel

- Neste Oil officially opened its Rotterdam plant in December 2011
- Nameplate capacity: 800.000 tns of renewable diesel (HVO)
- Multi feedstock: vegetable oils, used cooking oils etc.
- Increasing market in Europe
- Propane is re-used as feedstock in powerplant



NESTE OIL BRAND NEW PLANT (2011)

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Bio-ethanol

- The Abengoa ethanol plant was officially opened in September 2010
- Capacity 480.000 tons
- Feedstock: wheat and corn
- CO2 is used for enhanced crop growing in greenhouses
- DDGS is used as feed for cattle
- Plans for second generation feedstocks (pilot in the US)

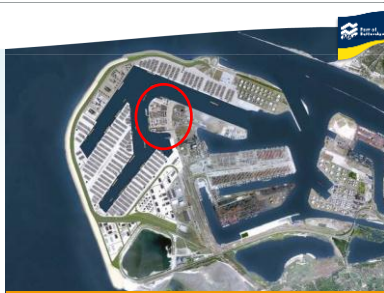


ABENGOA, NEW BIO-ETHANOL PLANT (2010)

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Developing a worldscale biobased industrial cluster

- Clustering and integration with existing (petro)chemical cluster
- Plug and play utilities and nautical infrastructure
- CO2 infrastructure for CCS and CO2 shipping
- PlantOne: facility for biobased pilots and demo's
- Biomass exchange and trading facilities



BIOBASED INDUSTRIAL CLUSTER

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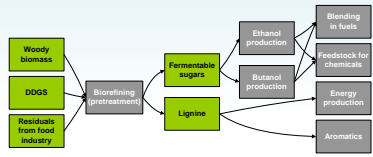
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Biorefinery project in Rotterdam

Using **existing** and **developing** sources of biomass

Developing **partnerships** with all links in the chain
 Connecting **new technologies** with existing **petrochemical** industry
 We are open for new **potential partners** to join us in this development



Biorefining of solid biomass

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Port of Rotterdam's contribution to the BBE

- Logistics is key to your biobased ambitions
- Rotterdam as hub for biobased feedstocks
- A developing biobased industrial cluster
- Co-developing with universities and government of Netherlands
- The Port of Rotterdam offers a good starting point for BBE projects



ROTTERDAM BIOPORT

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