CAPSULE PROFESSIONNELLE 8

Amsterdam: Energy port in Transition

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Biographies

Carla Jong *is Project Manager at the Port of Amsterdam in The Netherlands. She is well experienced in spatial planning and environmental issues specialized in Port – City areas. Areas where it is all about the impact of the port and creating interaction and cooperation with his surroundings. At the moment she manages projects for sustainable and safe port development like expansion of the wind energy park and LNG port facilities.*

Carla graduated in Process engineering at the University of Applied Sciences in Utrecht and in Public administration at the University of Amsterdam. After working as an policy advisor for the Dutch cities of Rotterdam and Amsterdam, she has now worked for 7 years at the Port of Amsterdam, a corporatized organisation into which she fitted well as it operates at the intersection between government and private maritime and industrial companies.

Port of Amsterdam is Western Europe's fourth largest port and plays a large role in the transhipment and processing of energy products. Port of Amsterdam is committed to being a smart port and to adding value for customers and the environs in a sustainable and innovative manner.

It seeks to promote growth at companies, while still taking a careful approach to the available space and the quality of water, soil and air. Port of Amsterdam aims to achieve this through intensive cooperation with partners in the business community (national and international), city and region.

Wouter Jacobs *is research fellow and lecturer at the RHV of the Erasmus School of Economics (ESE). Wouter lectures in the minor-program (Port Cities and Regional Development) and in the Masters Seminar 'Ports and Global Logistics'. His research interests include the economic geography maritime business services, planning of port cities, economics of commodity trading and regional development policy. He has also been involved in strategy development for the Port of Amsterdam, City of Antwerp and the City of Rotterdam.*
Wouter holds a PhD (2007) in Management Sciences from the Radboud University Nijmegen, the Netherlands. His PhD deals with the 'Political Economy of Port Competition' and provides empirical analysis of institutionalized practices in the port management of Rotterdam, Dubai and Los Angeles-Long Beach. After his PhD Wouter worked as postdoctoral fellow at ESE (Dept. Applied Economics) and Utrecht University (Dept. Economic Geography). The last two years Wouter was employed as Assistant Professor at the University of Antwerp, Belgium and he held a one-year guest professorship in economic geography at Ghent University. He is currently also involved as guest lecturer 'Global Production Networks and Regional Development' at Chongqing University, China.

Some key publications

Jacobs, W. (2014), Rotterdam and Amsterdam as Trading Places?. In search of the economic-geographical nexus between commodity chains and world cities, *Tijdschrift voor de Economische en Sociale Geografie*, 105: 483-491

Jacobs, W., Koster, H.R. and F. van Oort (2013), Co-agglomeration of knowledge – intensive business services and multi-national enterprises, *Journal of Economic Geography*, 14: 443-475.

Hall, P.V. and W. Jacobs (2012), Why are maritime ports (still) urban and why should policymakers care?, *Maritime Policy & Management* 39: 189-206.

Jacobs, W., Koster, H. and P.V. Hall (2011), The location and global network structure of maritime advanced producer services, *Urban Studies*, 48: 2449-2669.

Jacobs, W., Ducruet, C. and P.W. De Langen (2010), Integrating world cities into production networks. The case of port-cities, *Global Networks* 10: 92-113.

Introduction

The port of Amsterdam is Western Europe's 4th busiest in terms of throughputs (95 million tons per year, see figure 1) and is part of a wider port-industrial complex (including the ports of Beverwijk, Zaandam and Velsen/ IJmuiden) stretching along a canal to the North Sea (see figure 2). The port is specialized in the handling of oil derivatives (gasoline, diesel and jet fuels), minerals (coal, fertilizers) and agri-bulk (cocoa, vegetable oils) and, as such, is an important global commodities trading hub of the ARA-region (Jacobs & Van Dongen, 2012).

Figure 1 : Annual Throughput

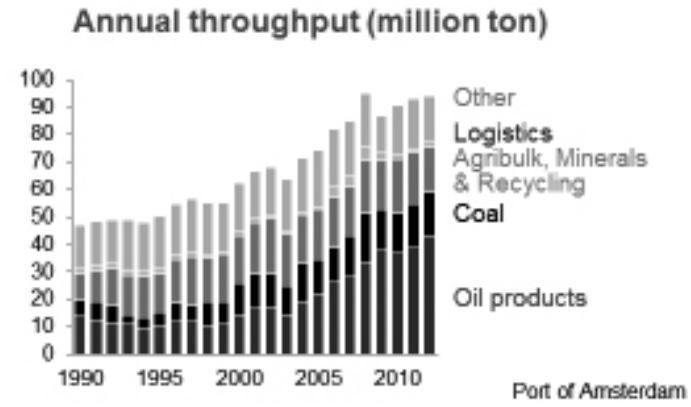
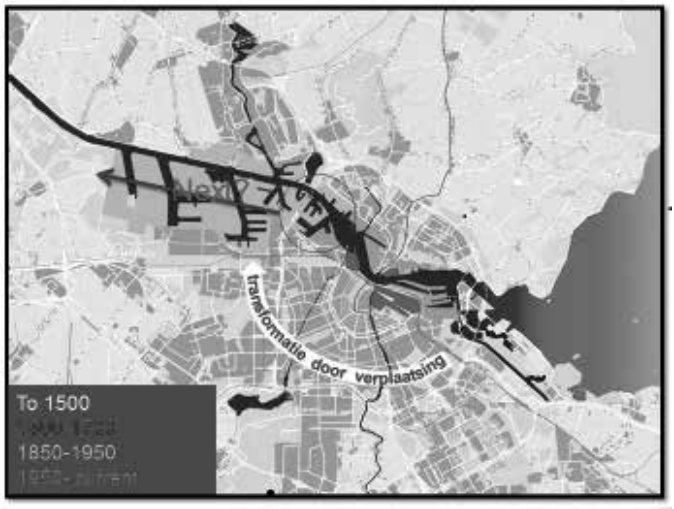


Figure 2 : Map of port region

The port is located in a fast growing metropolitan region, with urban development and expansion often leading to conflicting claims over the use of prime, but scarce, waterfront land (Wiegmans & Lauw, 2011). Although the city of Amsterdam owes much of its commercial wealth and entrepreneurial spirit to the historical presence of its port (Smith, 1984), the symbiotic relationships between port and city had started to erode since the 1970s onwards, just as happened in many other port-cities in the developed world (Bird, 1973; Hayuth, 1982; Hoyle, 1989; Norcliff *et al.* 1996; Ducruet, 2006; Daamen & Vries, 2013).

Figure 3 : Port-city transition ABOUT HERE



Spatially, the increased intensity of port-industrial activity, in combination with urban growth, lack of available land for further expansion, and environmental constraints have led to the move of port facilities away from city centers. Indeed, much of port-city policy and planning efforts of the earlier 1980s onwards dealt with the redevelopment of derelict, largely brownfield urban waterfront sites that were formerly used for shipping activities. In economic terms ports have become less dependent on the urban labor market due to increased automation and operational rationalization. Cities have also become less dependent on 'their' ports for local economic growth as much of the cargo is destined for distant hinterlands, but still experience the nuisances of such flows. The German transport geographer Markus Hesse (2006) has referred to these developments as a dichotomy between *global chains and local pains*. As ports have become part of globalized systems of production and distribution with value capturing often taking place far away, the negative externalities of these processes mainly reside locally and affect the local quality of life (noise, pollution, congestion).

Looking at the interface between port and city simply from the perspective of land uses, waterfront transformations and mitigations indeed obscures how port

and city can mutually benefit from each other's nearby presence. Many major ports across the world remain indeed fundamentally 'urban': ports continue to occupy urban spaces, are embedded in localized knowledge systems, still draw on urban labor markets and infrastructure, and are subject to local politics and policy concerns (Hall & Jacobs, 2012; Hesse & Hall, 2013). The authors emphasize that innovation and 'new combinations' are more likely within large and diversified urban (port) spaces (Glaeser, 2011), because they provide more access to skilled labor as well as wide set of actual or potentially complementary industries. Moreover, it are precisely those ports located in or nearby dense urban agglomerations which find themselves confronted with tighter regulations and therefore in need to implement new technologies and business solutions first that will be more capable to move 'beyond the lock-in' (Atzema *et al.,* 2010) and cater to the demands of a sustainable future.

Ports still provide vital infrastructures that allow for the access to global markets and for the metropolitan supply of goods and production inputs. Port-city interfaces can be understood as a driver for the implementation of circular economy. The certain mix of commodities passing through ports allows for 'new combinations' and localized value-added 'transformations', such as in all kinds of bio-based applications. Ports also provide experimental zones for high-tech companies located in the city to implement various smart technologies that optimize cargo handling, storage and logistics planning. The co-siting of various related manufacturing industries allow for the re-use of wastes and residuals and as inputs for the urban built environment (e.g. heating). In short, ports provide urban economies access to global markets while at the same time can serve as hubs in regionalized circular systems of flows: global chains- local gains. Recent developments in the port of Amsterdam will demonstrate this. The Port of Amsterdam is a Landlord port that corporatized in 2013, and which launched a new port vision with its stakeholders that same year: Port Vision 2030.

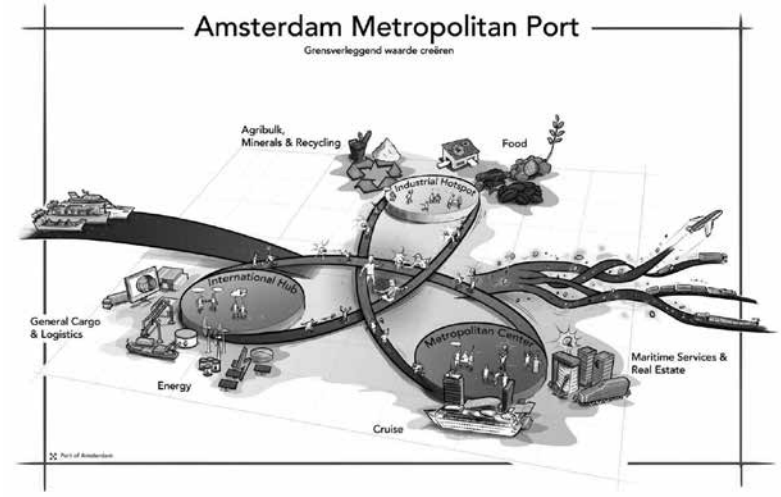
The Port Vision 2030

The Amsterdam port in 2030 is a dynamic, versatile, adaptable and metropolitan "port ecosystem". A system which is able to shift and respond flexibly to new situations, recognise opportunities early, and mobilise the capacity for innovation swiftly. It is more than a transhipment centre. It is a tightly integrated hub where raw materials, cargo, residual flows, data, people and ideas all come together, where new technologies are given a chance, and where there is the scope for experimentation. In this system the strengths of the port, the city and the wider metropolitan region will be combined. The interconnectedness between different flows and industries in spatial proximity brings with it the added benefits of economies of scale, cross-pollination and innovation. By mobilizing renewable energies and stimulating innovations in the areas of the bio-based and circular

economy, the Port of Amsterdam aims to strengthen its competitive and innovative potential and that of its users and neighbours. This reflects itself in the growth of transhipments, an increase in productivity and added value and therefore will strengthen the port's proposition as a driver of- and for- the regional economy.

This metropolitan "port ecosystem" consists in three interconnected worlds: International Hub, Industrial Hotspot and the Metropolitan Centre. In the next sections we will present the rationale of each, and we will provide illustrations of initiatives and actual developments currently taking place in Amsterdam.

Figure 4 : Metropolitan Port system



International hub: where Fossil meets Bio

The international hub builds upon the current function and backbone of the port, that is linking international markets through the handling of commodity flows such as oil and agribulk. It is this backbone of an ecosystem that constitutes an essential building block for the energy transition and for biobased recycling activities as it allows for 'new combinations' between commodity flows while building upon the existing network of expertise and the infrastructures in place.

The Biobased economy is based on organic renewable sources instead of the current dependence on fossil reserves. It is about energy from raw materials like biomass (agricultural crops and residues) and biofuels (bioethanol and biodiesel). The use of advanced biobased technologies and expertise in the transhipment of raw materials will lead to a dynamic ecosystem. Amsterdam is ready to make the transition to a bio based economy due to its available infrastructure, market know-how, and long standing experience in the handling

of related types of cargo. It is only a small step for the oil terminals to store biofuels and for the bulk terminals to tranship biomass. The share of biofuels is approximately equal to the mandatory percentage that energy producers are required to blend (approximately 5% in 2012).

The annual throughput of biofuels (bio ethanol and biodiesel) in the port of Amsterdam already numbers up to 1 million tons. This number is expected to rise to 3.5 million by 2020. Two bio diesel plants are located in the Amsterdam port area: 1) the Vesta biofuels plant (owned by the Swiss commodity trader Mercuria) which is located on the site of Oiltanking which provides Vesta with the required port facilities such as quays, tanks, storage, transhipment and blending and 2) the Greenmills biodiesel plant which produces renewable biofuels from organic residues, such as used deep fryer oil and organic waste. The power plant NuonHemweg is supplied directly by Bulk Terminal Amsterdam (Overslag Bedrijf Amsterdam – OBA) via a conveyor belt. The NuonHemweg power plant has a gas- and coal-fired plant. Nuon is currently fine-tuning plans for the co-firing of sustainable biomass. In 2016 they will start and the goal is co-firing more than 50% biomass in 2018.

Industrial Hotspot: where Waste meets Energy

Industrial Hotspot is about high-quality production, cargo handling and processing in the region. Medium-sized, more diversified flows find their way from and to the regional food and manufacturing industries, the wholesale trade, and to regional construction and infrastructure projects (building materials). Here, international flows meet with local production cycles, urban logistics and a regionalized industrial innovation system. It is the base for the Circular Economy: where waste meets energy.

The port of Amsterdam manages to make smart use of the convergence of waste flows. The agricultural business activities taking place in the surrounding area (including the flower auction and the horticultural sector in the area south of the port and the food-processing industry in Zaanstreek north of the port) offer possibilities for the supply of organic material. The Amsterdam Metropolitan Area has the potential to provide many re-usable organic materials and waste flows. Amsterdam-based renewable energy sources offer new possibilities for the industry. Port of Amsterdam works closely with Innovation Lab Chemistry Amsterdam, an incubator for start-ups and spin-offs in the chemical industry based in the Amsterdam Science Park, by building on links between the port, chemical production plants and the scientific community.

Greenmills is a large ecological industrial complex. Wastes are turned into sustainable fuel which can power cars and green electricity and heating for homes in Amsterdam. They pick up kitchen and production wastes and organic

fats from 25,000 addresses in the Netherlands, Germany and Belgium use these to produce biodiesel for companies such as Shell and BP. Greenmills makes a homogeneous mix from the remaining organic waste which its neighbour Orgaworld turns into heating and electricity. Commodity trader Cargill transports residual pulp from its fruit juices installation in the port to Greenmills through a pipeline. ICL Fertilizers Europe C.V. uses phosphate-rich waste flows from the port area as raw material for the production of fertiliser and is working on plans to expand this activity. Traditional waste collecting companies such as Icova, Van Gansewinkel and Granuband on their turn are now involved in refined recycling processes. Icova, for instance, annually produces approximately 60,000 tonnes of fuel pellets from industrial waste.

The waste-to-energy plant of AEB converts household and industrial waste into energy and raw materials. AEB is not only a waste processor but also a renewable energy and raw materials company and is constantly improving its methods for gaining returns from waste. Every 1,000 kg of waste results in 91 kWh of heat, 900 kWh of electricity, 209 kg of building materials and other useful rest products. It is a good example of an urbanized cycle: the AEB produces electricity from Amsterdam's household wastes and which is enough to meet the needs of 75% of Amsterdam's households and generates heating that now supplies 5% of the households. Waternet's Water treatment plant is co- sited near the AEB, the sewage sludge is converted in the AEB installation to biogas. Nearby is the gas station of Orangegas, supplying cars and (garbage) trucks. In conjunction with Waternet and AEB, Port of Amsterdam is currently researching the conversion of biogas from sewage sludge into bio-LNG and which can be used as bunker for the emerging market of LNG-powered vessels. The waste-to- energy plant and biogas installation, Waternet's sewage treatment plant and Orgaworld's fermentation plant are all sources of district heating. Due to this combination of sources, as much as 70 % of the district heating is completely climate neutral and contribute to the city's climate ambitions.

Metropolitan centre: where Global meets Local

This function involves more finely-meshed logistics flows within the region like waste, electricity supply and water supply. It is about the interconnections of Port and City.

The City of Amsterdam recently outlined her new plans in the Sustainability Agenda (Agenda Duurzaamheid, March 2015) to accelerate sustainable development in the Dutch capital. The Sustainability Agenda sets out both quantitative and qualitative targets with the philosophy of the circular economy as a common thread: innovation, doing more with less, becoming smarter and renewable. Achieving a circular economy fits well with the activities in the port

area as mentioned above. In 2020, energy consumption per capita will decrease by 20 per cent while 20 per cent more renewable energy will be generated per capita than in 2013. This will be achieved by allowing more wind and solar power to be generated at Amsterdam territory and by increasing the number of connections to the district heating system.

Amsterdam port is in the Amsterdam territory a suitable area for windmills. The vision for wind in the Amsterdam Port Area (windvisie Westpoort, 2012) concluded correctly that windmills contribute to the industrial landscape of the port with its oversized objects like cranes and chimneys. The Port of Amsterdam area is home to a large wind farm with a total capacity of more than 64 Megawatts. This is enough to meet the electricity needs of approximately 40,000 households. In the next few years, new larger windmills and new locations will expand the overall capacity to at least 100 megawatts. Local generated sustainable wind energy will supply local demand. Enabling Amsterdam's residents to participate in a wind mill by making it possible to take a small share in it, the Port of Amsterdam can fulfil the sustainable ambitions of the city and their residents.

Conclusion: Global Chains and Local Gains!

Sustainable development, circular systems and smart technology are creating enormous opportunities for business development and innovative cross-overs between industries. Port cities are *the* locations to experiment, introduce and valorize such cross-overs. This is because 'ports in cities' and 'cities with ports' are faced with numerous dilemma's and antagonisms. 'Cities with ports' are looking for ways to expand their economies yet a purely consumption-based growth strategy will ultimately come at the cost of lack of accessibility and access to markets. Claiming port land through speculative real-estate development and environmental zoning will not only push existing productive places out of the area (and out of the economy as a whole), it will also alienate existing (often globally active) users from making the necessary investments in the sustainable upgrading of their productive places. 'Ports in cities' on their turn are confronted with the dilemma that their business model is often simply tailored to facilitating more international cargo flows and traffic, yet often at the cost of the local quality of life. The only way out of this conundrum is to embrace the opportunities that are now given by the 'Third Industrial Revolution' (Rifkin, 2011) and all the major transitions that are re-shaping our lives. Indeed, nearby cities are assets for ports as they provide a local market for the goods 'to be transformed' in ports and they

are reservoirs of human capital and business intelligence needed to implement such transitions. Likewise, nearby ports are assets to the urban economy as they remain to give access to international markets and clients, yet now provide the necessary 'transformative' infrastructures and logistical skills to service the sustainable growth of an expanding urbanized economy: global chains, local gains.

The case of the Port of Amsterdam illustrates how key stakeholders, globalized and local players, from the wider region of Amsterdam have been on the forefront in identifying these business opportunities. New combinations are sought and implemented on various levels locally (technical, commodities and materials-wise, business models, governance) and through various types of strategic interfaces (B2B, Triple Helix, G2G, spatially or economically). Such transitions are still strive with uncertainty and risks, such as unclear mandates and potential conflicts about uses. Some experiments will indeed fail and cognitive distances among the decision-makers about the opportunities will remain (Hall & Jacobs, 2012). Yet, that is exactly what an eco-system is: an evolving ensemble of public and private risk-bearing enterprises. We hope to push forward these lines of thoughts and collaborate on developments (inter-) nationally in similar port cities to Amsterdam. The case of the port-city of Ghent in Belgium, where various public and private stakeholders (including from nearby Terneuzen in the Netherlands) have joined forces to stimulate innovation and to strengthen the biobased cluster, for example the BioBased Europe Pilot Plant, provides us with confidence that the ARA as a whole is on the right track.

References

Atzema O., Boelens L. and B. Veldman (2010), Voorbij de lock-in. Een economisch institutionele herpositionering van de Rotterdamse haven, Utrecht: Strategem/Utrecht University.

Bird J. (1973), 'Of central places, cities and seaports', *Geography* 58, pp105-118.

City of Amsterdam (2015), *Sustainability Agenda 'Sustainable Amsterdam' (Agenda Duurzaamheid)*, new plans to increase the pace of improving sustainability in the Dutch capital, Amsterdam.

City of Amsterdam (2012), *Wind vision Westpoort, urban vision for new locations for wind energy in the Amsterdam port area*, Amsterdam.

Daamen T.A. and I. Vries (2013), 'Governing the European port-city interface: institutional impacts on spatial projects between city and port' , *Journal of Transport Geography*. No. 27, pp 4-13

Ducruet C. (2006) 'Port-city relationships in Europe and Asia', *Journal of International Logistics and Trade,* 4(1), 13-35.

Glaeser E. (2011), *The Triumph of the City,* New York: Penguin

Hall P.V. and M. Hesse (2013), *Cities, Regions and Flows,* Routledge: London and New York.

Hall P.V. and W. Jacobs (2012), Why are maritime ports (still) urban and why should policymakers care?, *Maritime Policy & Management* 39: 2, p189-206.

Hayuth Y. (1982), The port-urban interface: An area in transition, *Area*, 14(3): 219-224

Hesse M. (2006) Global Chain, Local Pain: Regional Implications of Global Distribution Networks in the German North Range. *Growth and Change* 37:4,570–596.

Hoyle B.S. (1989), 'The port-city interface: trends, problems and examples', *Geoforum,* 20, pp. 429-435

Jacobs W. and F. Van Dongen (2012). *Amsterdam Smartport in Global Trade. Een Strategische verkenning naar de wisselwerking tussen de Amsterdamse havenen dienstverleningsclusters,* Onderzoek in opdracht van Haven Amsterdam, Utrecht: Universiteit Utrecht.

Norcliffe G., Bassett, K., and T. Hoare (1996). 'The emergence of postmodernism on the urban waterfront, *Journal of Transport Geography* 4(2): 123-134.

Port of Amsterdam Authority (2014), Vision 2030: *Port of Amsterdam, Port of Partnerships*, Amsterdam.

Rifkin J. (2011), *The Third Industrial Revolution: how lateral power is transforming energy, economy and the world*, Palgrave Macmillian: New York

Smith W.D. (1984), The Function of Commercial Centers in the Modernization of European Capitalism: Amsterdam as an Information Exchange in the Seventeenth Century. *The Journal of Economic History* 44, pp. 985–1005.

Wiegmans B. and E. Lauw (2011), Changing port city relationships at Amsterdam: a new phase in the interface? *Journal of Transport Geography* 19, p.575-83.