# FOOD CLUSTER ROTTERDAM

## A LIVING LAB FOR DEVELOPING A METROPOLITAN BIO-ECONOMY

City of Rotterdam

ALTERRA
WAGENINGEN UR

# Food Cluster Rotterdam

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The European Sustainable Development Strategy (CEC 2006, CEC 2009) addresses a broad range of 'unsustainable trends' ranging from public health, poverty and social exclusion to climate change, energy use and management of natural resources. A key objective of the SDS is to promote development that does not exceed ecosystem carrying capacity and to decouple economic growth from negative environmental impacts. A report commissioned by the European Commission (Best et al. 2008) came to the conclusion that the Ecological Footprint approach should be used by EU institutions within the Sustainable Development Indicators (SDI) framework.

Ecological footprint assessments using global hectares should be considered as virtual, though valid indications for the total impact of human consumption. Local hectare figures, in contrast, project the surface area that is actually required for urban food consumption (see Figure 1). Both figures must be considered as important references when addressing different agro-food systems, e.g. from the local to the cross-boundary, European and even global scale.

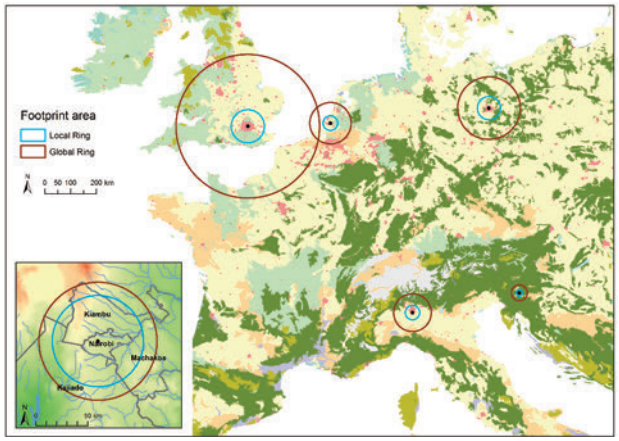


*Figure 1: Ecological footprint projected as global and local hectares for London, Rotterdam City Region, Berlin, Milano, Ljubljana and Nairobi[1]. Large dark circles as global hectares and small blue circles as local hectares showing the land requirements in terms of food production areas based on national accounts (Wascher et al. 2015)*

## Assessing the Role of Innovation

Funded by the European Commission's 7th Framework Programme, the project '**Food** Planning and Innovation for Sustainable **Met**ropolitan **Re**gion**s** ( www.foodmetres.eu ) has developed a series of assessment and decision support tools allowing stakeholders from Berlin, London, Milano, Ljubljana, Rotterdam and Nairobi to enter a knowledge-driven debate on how to optimise the regional supply function of metropolitan areas around cities. Recognising that food production and consumption is not only linked via one-directional food chains in terms of processing and logistic pathways, but also part of cross-sectoral and hence multi-directional value chains associated with bio-economy, Foodmetres has explored the role of metropolitan agriculture as a driver of system innovation.
In practical terms this has meant that the Foodmetres approach is rooted in both European as well as regional data supply, allowing cross-scale assessments at different resolutions.
Central to these efforts has been the attention to different types of food chain innovation, namely product, process, governance and various social forms of innovation (see Figure 2).

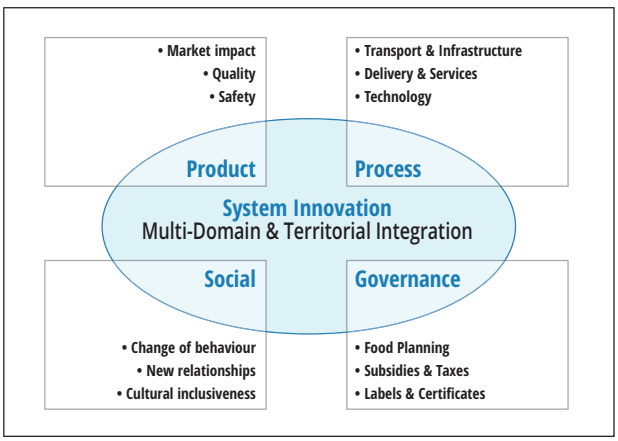


*Figure 2: Different system innovation dimension relevant for sustainable food chains*

## The Role of Metropolitan Regions

Being the global hotspot for agricultural world trade, the Metropolitan Region Rotterdam – Den Haag (MRDH) holds extremely high stakes in food logistics, safety and quality. At the same time it is a place where local, regional and global agro-food processes have a great potential for generating synergy. This area can therefore be considered as a living laboratory when developing implementation targets for agro-food system innovation at the level of metropolitan regions. It is hence not surprising that Dutch researchers and policy makers have coined the notion – if not the vision – of a Metropolitan Agro-Food System (MAS) as being "a deliberately designed system of intelligently connected production sites that uses the available resources, conditions and infrastructure in metropolitan areas to produce material and immaterial demands for the same metropolitan area" (van Latesteijn 2008). The latter suggests nothing less than to fundamentally rethink and redesign the agricultural value chain with the goal of establishing a more resilient link between food security and food safety at the level of metropolitan regions. Such an approach needs to adhere to the following principles:

1. spatial-functional entities with boundaries which are determined by system integration at the production level thereby defining what constitutes a metropolitan area;

2. sustainable principles, among them the limitation of agriculture's ecological footprint by improved use of resources, conditions and infrastructure that are available in the area of demand;

3. a multifunctional approach by covering society's material as well as immaterial demands (commodity and non-commodity goods and services).

The above interpretation links well with the political goal-setting for the Metropolitan Region Den Haag Rotterdam. However, it also becomes obvious that administrative regions are of limited value if it comes to the question of food security and resource-efficiency: land use, soil quality, agricultural supply capacities and biomass streams are hardly guided by administrative boundaries, but follow bio-physical and entrepreneurial criteria.

## Tracking down biomass volumes

Establishing a long-term perspective for biomass management at the metropolitan level must be considered as key to enabling bio-economy to happen. Having analysed the perspectives for The Netherlands, Sanders and van der Hoeven (2008) propose a step-wise transition from a traditional agro-food system towards an innovation-driven circular economy system, starting with the utilisation of 25 per cent of the Dutch agricultural acreage (thus in total 250,000ha of grassland and 200,000ha of arable land) for bioenergy feedstock production. Assuming a yield of 22 tonnes of dry matter per hectare, this would provide some 10 million tonnes of biomass. Such yield levels are obtained for sugar beet and grass, and – under favourable conditions – for silage maize. During the first stage, biomass utilisation would be limited to electricity and biofuel production. In a second step, 10 per cent of the biomass could be used for the production of chemicals, the remaining 90 per cent still being used for biofuels and electricity. The share of biomass-for-chemicals, finally, may be increased to 20 per cent (third step).

Contrasting a Global Economy and Regional Communities scenario (see Figure 3) for an integrated analysis of biomass delivery chains in The Netherlands, Annevelink et al (2012) translated the 2020-2030 energy demand into a renewable energy and bioenergy demand. The Dutch biomass streams to be used for the production of biofuels are: used oil, grass, residues from food and stimulants industry, potato and beet crops, rapeseed, salt-tolerant

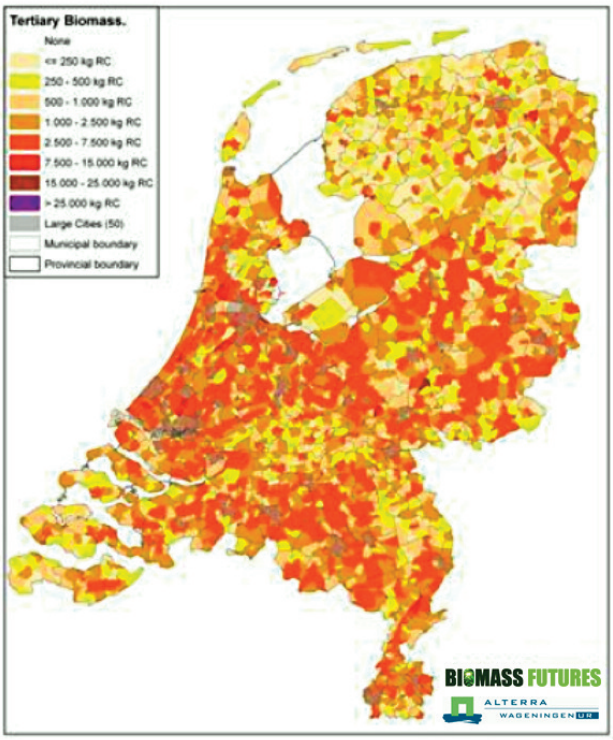


*Figure 3: Tertiary biomass potential on the basis of a Regional Community scenario for 2020 (Annevelink et al., 2012)*

grasses and other crops (cultivated on the Dutch coastal areas), and seaweed. The Dutch tertiary biomass streams to be used for the production of chemicals are grass, residues of rapeseed and wheat processing, manure (urea for fertilizers, proteins for chemicals), potato and beet crops (N- or O-functionalised chemicals), salt-tolerant grasses and other crops (cultivated on the Dutch coastal areas), and seaweed. A comparison between the total biomass potential of The Netherlands shows that the Regional Community scenario (see Figure 3) offers a far larger potential than the Global Economy scenario. According to the map one of the best regions in The Netherlands to set up biomass feedstock chains are concentrated in the Metropolitan Region Den Haag Rotterdam.

## Rotterdam as the Biohub of Europe

In developing a bio-based economy, the Netherlands can benefit from its agricultural resources (soils, climatic conditions, crops) and well-developed refining and transportation infrastructure, to replace fossil-based products by biomass (end products, intermediates or raw). Rotterdam, one of the world's leading harbours hosting a range of agro-food, chemical and petrol-based industries, can play a special role here by making its storage, refining, processing and distribution infrastructure available to new production chains. Combining available refining, upgrading and transformation facilities with extensive agricultural, chemical and agro-food infrastructure provides interesting advantages, such as outlets for co-products. Rotterdam Port offers 300,000 $m^3$ of storage space in silos and flat storage for dry agri-bulk, and more than 1.2 million $m^3$ of storage capacity in carbon steel, coated and stainless steel tanks for liquid agri-bulk such as edible oils & fats (PRA 2014). One of the main advantages of Rotterdam, however, is its strategic location in Northwest Europe and its optimal accessibility, from both the sea and land side. Bulk carriers and tankers can enter the port 24 hours a day, irrespective of their size and dead weight, without being restricted by tides or locks. For efficient hinterland transport throughout the European market, the Port of Rotterdam Authority actively encourages the use of environmentally-friendly modes of transport (see Figure 4). Further advantages are:

Situated on the estuary of the rivers Rhine and Maas, barges are the ideal mode of transport for reliable and cost-effective movement of larger volumes to and from, among other places, Belgium, Germany, France, Central Europe and, of course, the Netherlands itself.

For rail, the port is the start and end of the Betuweroute, the 160-kilometre dedicated freight railway between Rotterdam and Germany, with a direct connection to the extensive European railway network.

Rotterdam is also well situated for ship-to-ship transhipment. The open connection with the North Sea forms the basis for short turnaround times and efficient connections with the UK, Scandinavia and the Baltic.


*Figure 4: Overview on the types and locations of Rotterdam's bio-based economy infrastructure (PRA 2014)*

Recognising the privileged position of Rotterdam as the logistic-operational switchboard of the agro-food sector at both the global and national level, the city government has launched the Rotterdam Food Cluster to be one of their key policy strategies. In cooperation with Wageningen UR, the city promotes resource-efficiency, bio-based economy and system innovation as the cornerstones of a sustainable metropolitan region as part of the global economy.

References:

Annevelink, E., Elbersen, B., Elbersen H.W. and Sanders, J.P.M., 2012. An integrated framework to assess spatial and related implications of biomass delivery chains. Wageningen, Report KvR 048/12, 35 pages.

CEC, 2008. Potential of the Ecological Footprint for monitoring environmental impacts from natural resource use: Analysis of the potential of the Ecological Footprint and related assessment tools for use in the EU's Thematic Strategy on the Sustainable Use of Natural Resources. Report to the European Commission, DG Environment.

CEC, 2009. Mainstreaming sustainable development into EU policies: Review of the European Union Strategy for Sustainable Development. , Communication of the European Community, Brussels, COM(2009) 400 final, 16 pages.

PRA 2014. Rotterdam – your world-class agriport. Port of Rotterdam Authority, Rotterdam.

Sanders, J.P.M. and van der Hoeven, D. A., 2008. 'Opportunities for a Bio-based Economy in the Netherlands', Energies, vol 1, issue 3, pp105–119.

Sanders, J.P.M., 2010. A Biobased Economy for the Netherlands. In: Langeveld, H., Meeusen, M. and Sanders, J. 2010: The biobased economy : biofuels, materials and chemicals in the post-oil era. Earthscan, London, pp 341-360.

Van Latesteijn, H.C., 2008. TransForum: Organizing the Transition towards Metropolitan Agriculture. Contribution to the workshop 'Transitions in Agriculture'. October 27th 2008, Ede.

Wascher, D. et al., 2015. Indicators, Tools and Method for Metropolitan Footprint Tools. Deliverable Report 3.3 of the EU Project FOODMETRES ( www.foodmetres.eu ), Alterra, Wageningen, 50 pages.

1 Calculations of both global and local hectares for Milano, Ljubljana and Nairobi are based on estimates.

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FOOD METRES
Food Planning and Innovation for Sustainable Metropolitan Regions

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