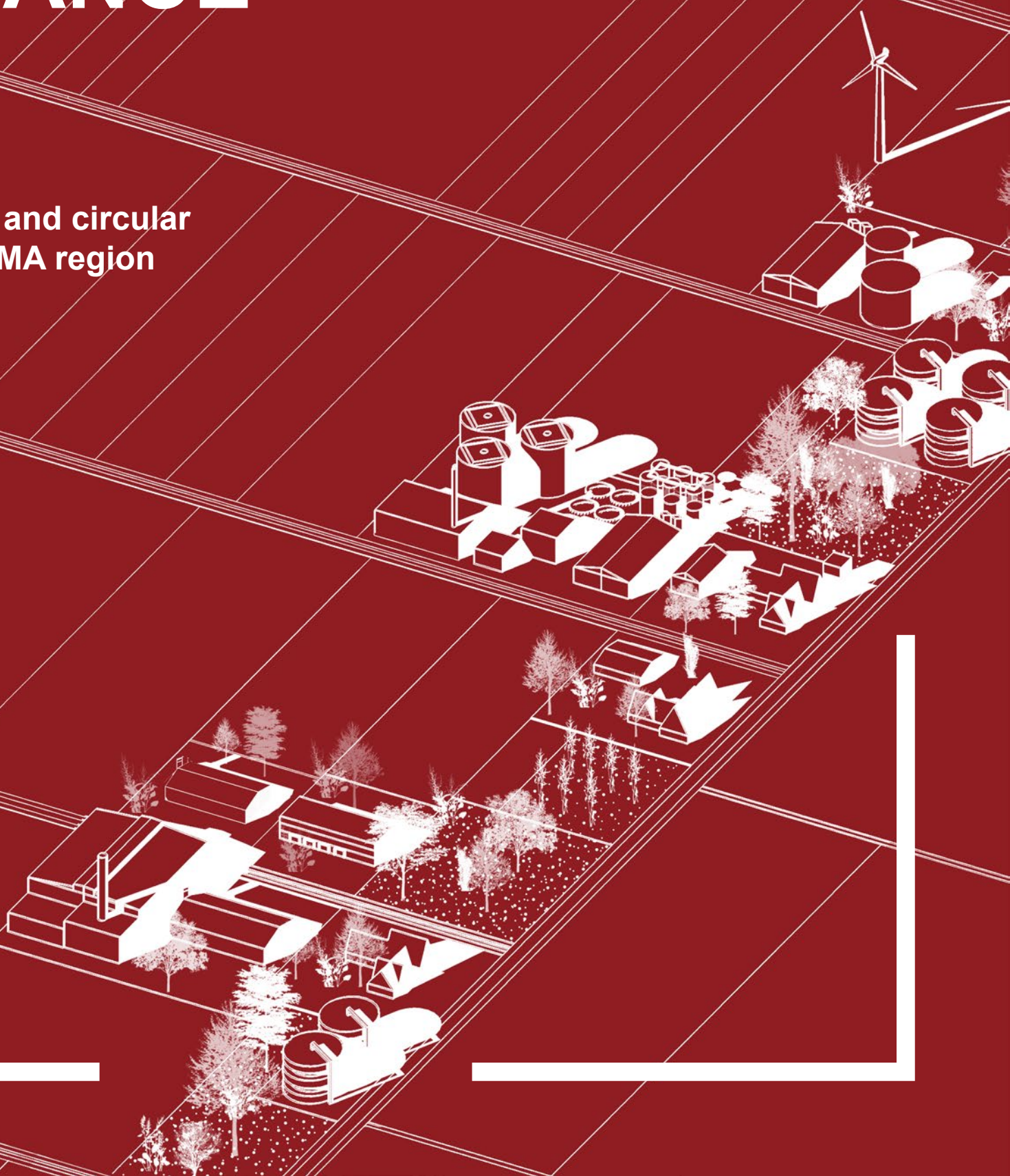
AGRONOMIC RENAISSANCE

Towards a socially fairer and circular agrifood system in the AMA region



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ABSTRACT

The AMA region wants to make the transition towards a circular economy. To make the circular economy happen, social, environmental and economic challenges have to be integrated in the transition. This report will identify these challenges and propose a vision, a development strategy and projects/policies to propose a new system in the sector where most of these challenges come together: the agrifood sector. The agrifood sector being one of the most polluting sectors in the world plays a key role in a circular economy. The project uses the circular economy as a tool to establish normative change in the case of the imbalanced agrifood sector. The development strategy of the project provides a framework for a future circular economy in a fairer agrifood sector. The framework encompasses localising the food network and creating a local circularity in the flows of energy, water, heat, fodder, CO2 circulation and organic material. This localisation aims to create jobs for the low to middle educated people that are struck by socio-spatial polarization. It also suggests new ways of protein production and of the usage of peatlands. The conclusion is that, while already a big portion of the circular economy can be realised, more research is needed to be able to make the circular economy happen in the agrifood sector. To balance the sector, it has to be deconcentrated and localised. This localisation is essentially a modern form of the traditional sector from the 18th and 19th century. Therefore it's called an agronomic renaissance. Due to the traditional nature of the sector, institutional change has to happen, which can only be achieved by a long term strategy, strong policy and a periodical review. Giving the sector guidance and a perspective is important to instigate the change needed for a circular agrifood system that also accounts for the social, environmental and economic challenges mentioned. This project gives a possible direction for this long term perspective.

Key words: circular economy, agrifood sector, deconcentrating, new farmer, localising, Amsterdam Metropolitan Area

INTRODUCTION

X-RAY OF AMA

In the introduction the project gives an overview of the problem statement, the vision, the theoretical framework and the methodological framework. This chapter lays the basis for the further project and serves as a short overview of the report.

- Introduction of region
- Problem statement
- Vision statement
- Theoretical framework
- Methodological framework

INTRODUCTION OF REGION

A REGION ON A CROSSROAD

The area which this project is about is the Amsterdam Metropolitan Area (AMA). This area is named after Amsterdam, the capital of the Netherlands. The area has approximately 2,3 million people living there now, which is expected to grow by 250.000 households in 2040.

The AMA is also part of the Randstad region that is composed of three major sub-regions: the aforementioned AMA, the Utrecht agglomeration and the Rotterdam-The Hague metropolitan area.

While the AMA plays an enormous logistic role with Schiphol and the Amsterdam Port, the Rotterdam port also contributes largely to the logistics sector in the Randstad (CBS, 2016c).

However, when considering all facets of the Dutch economy the AMA is by far the winning region in the Randstad. With the region being in the top 5 of Europe's most important economic regions and leading positions in terms of knowledge, innovation and connectivity, the area is the most important area in the Netherlands.

The region holds three logistic mainports: the Aalsmeer greenport, the Amsterdam sea port and the Schiphol international airport. Amsterdam also has a big high services sector and is becoming an increasingly high-educated knowledge HUB.

When considering the configuration of the area itself, one can see the polycentric morphology of the AMA region. Important components of the region include Almere, Lelystad, Haarlem, Amsterdam, Schiphol, Zaandam and Hilversum.

Another striking characteristic of the region is the holistic mix of landscape and urban environments. In a country with a strong planning tradition, even the landscape is planned. This resulted through time in an orchestrated pattern of urban function and productive landscape. The configuration of this landscape/urban metropolitan pattern is unique in the world and gives the region a specific identity.

Zooming in to Amsterdam this holistic mix is visible by the green wedges that divide the city. The pattern follows the masterplan 'Algemeen Uitbreidings Plan' from Van Eesteren that proposed these green wedges already in 1934.

However, the AMA region has structural social, environmental and spatial challenges that threaten the sustainability of these aspects. This report will identify some of these challenges and propose a vision, a strategy and projects/policies to tackle these challenges.

The project will use the agrifood sector as a tool to solve multiple challenges at once, while being realistic about the impact on the current system.

Source: openstreetmap

PROBLEM STATEMENT

COMPACT OVERVIEW OF THE CHALLENGES

The Netherlands is a small country (41.540 km^2, including 7.750 km^2 of open water) with an average population density of 504 people per sq. km land area in 2016 (CBS, 2016b). Its geographical location has always been a stimulus for transport and trade to and from the European hinterland and across the world (Wintle, 2000).

The Amsterdam metropolitan region which lies in the polycentric Randstad has been a economically strong global area. It comprises of 36 municipalities with a population of 2.4 million people, i.e. more than 14 percent of the total population of the Netherlands (Amsterdam Metropolitan Area, 2018). It has gained this position based on its long history in farming due to its natural conditions -a temperate climate with a fair rainfall distribution (total annual average of 952 mm for 2014) (www.cbs.nl), relatively fertile soils in a flat landscape, fresh water supplies and excellent logistics.

The combination of these factors, together with a governmental policy that strongly supports a competitive agricultural sector, good entrepreneurial skills, support from a state-of-the-art agricultural research and education system, innovative supply and processing industries, the availability of inexpensive natural gas supporting greenhouse horticulture and floriculture. Moreover, as the production of cheap fertilizers, -and since the nineteen fifties- the emergence of the European Union and the associated market enlargement has resulted in a very strong agricultural sector in the Netherlands (Bruchem et al., 2008).

To add to this already very strong sector, the AMA has since the 1930's gradually grown into an economic and especially logistic heavyweight in Europe. The agrifood sector profits a lot of this logistic function as the import of agrifood materials combined with the domestic production and processing industry, produces enough value to be the second largest exporter of agrifood products in the world in terms of value (Noordhoff, 2014).

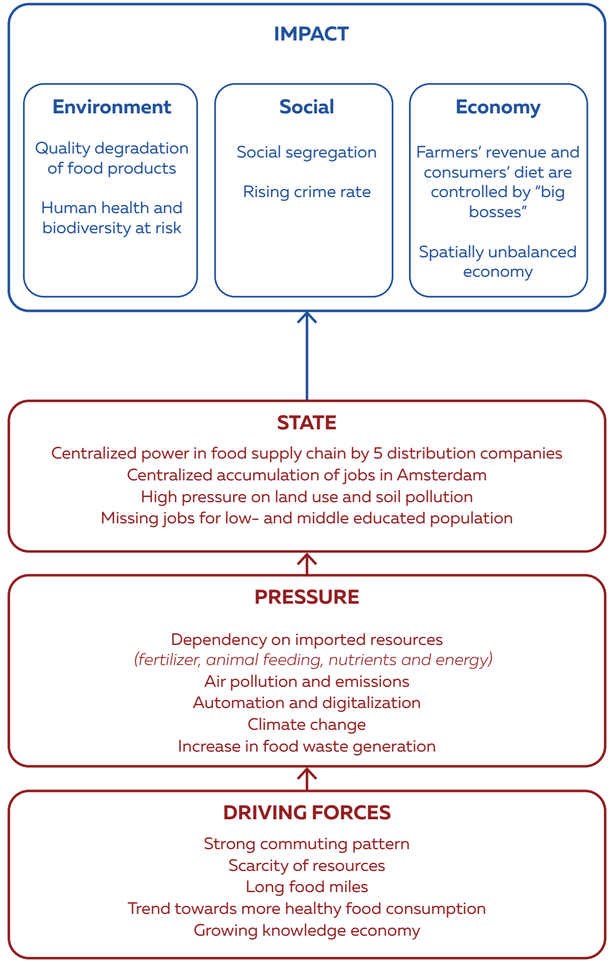
However, urbanisation has brought with it tremendous shifts in economic activity and is also one of the predominant forces shaping food systems. These systems are becoming more globalised, with increasingly centralised networks involving fewer individual actors and supplying an increasing proportion of meat, dairy products and processed food.

The AMA is no exception to this worldwide trend. Counting with the cargo focused Schiphol Airport and also Amsterdam Harbour, the region stands out with its big logistic function and agrifood exporting sector. These components contribute a lot to the before mentioned shift in the food system. Not only is the agrifood exporting market affected by this, also in the region itself the agrifood sector is experiencing an enormous trend in concentration. 55.000 farmers in the Netherlands are being controlled by only five big purchasing offices (PBL, 2012). This forces farmers to upscale and modernize their activities in order to meet the demands of these purchasing offices. These farmers can relatively easily upscale their production because of the current land consolidation laws and the growing knowledge economy in the agrifood sector. This causes a big decrease in low and middle educated jobs and an downwards trend in the amount of agrifood companies. From 400.000 agrifood companies in 1950 to only the 55.000 in 2016 (Noordhoff, 2014).

This concentration of power also causes a non-circular food sector in terms of waste, energy, nutrient-reuse, water and also a big amount of unnecessary extra transporting miles from producers to processors, to distribution, to supermarkets and only then to consumers.

Research question:

How can the agrifood sector in the Amsterdam Metropolitan Area be reformed through spatial policies and projects into a more local and circular form, which ultimately contributes directly to social, environmental and economic sustainability?



VISION STATEMENT

COMPACT OVERVIEW OF THE VISION

Food is one of the basic needs for human beings. The agrifood system in the city is also connected to many other urban issues in different stages of production, processing, consumption and food waste management. Thus, optimizing the agrifood system can promote improvements in many aspects of the region. As the world's second largest agricultural products exporter, the Netherlands has a vital agrifood system that plays a crucial role in the region development. Facing the challenge of increasing population and limited resource, the AMA is very representative in the Netherlands in terms of agrifood system optimization.

Because of the rise of the knowledge economy the low to middle educated people are under pressure in the AMA. Jobs in Amsterdam require more and more high educated workers, which drives creates a big influence of knowledge workers. The sheer popularity of the city and the direct surrounding area, causes a rise in land value prices. This results in socio-spatial polarization: low to middle educated social groups being forced out of the city towards the edges of the AMA region.

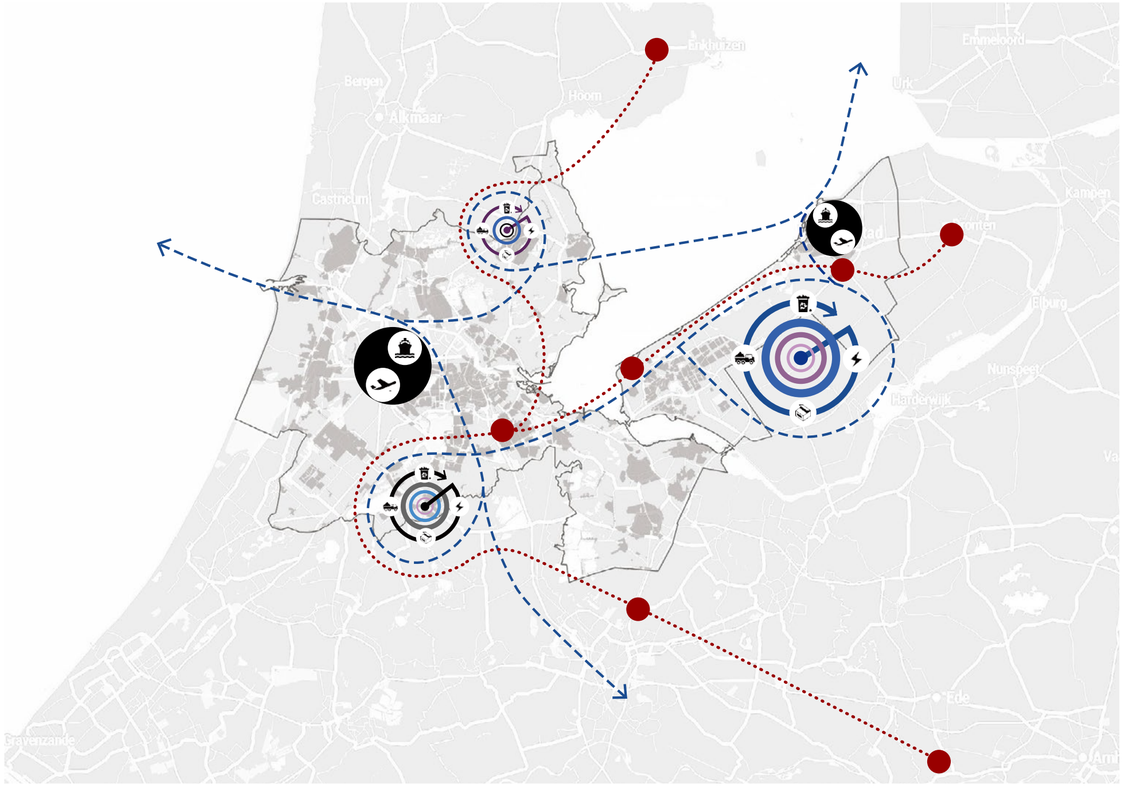
To tackle the main problem that we found in the AMA, the lack of power of farmers and the loss of local jobs caused by the concentrated agrifood system and the focus on the knowledge economy, our vision is the deconcentration of the agrifood chain and converting the agrifood system in the AMA towards a localised indegenous one, which makes use of local potentials and resources. This localised agrifood system aims to downscale the agrifood system, provide much healthier and more local agricultural products, improve the agrifood transport, create jobs for vulnerable social classes and on top reduce the food miles. All while making comprehensive steps towards a circular agrifood economy.

More spatially, our vision focuses on the areas with great opportunities.
- Almere and Lelystad can work together as twin-cities. Lelystad functions in agriculture production, distribution, processing and consumption. Almere functions well as a residential center with corresponding services. The cities can work together to create a local balance in the Flevoland region. Based on the Flevokust harbour and the Lelystad airport, Flevoland can also strengthen the synergy of food components with other cities within the region and even with other regions.
- Zaanstad can turn the current monoculture of grassland and meat/dairy production into a more diverse agrifood production, which also reduces the global carbon footprint, and improve the current food processing system on a local level.
- The seed valley in the northern Enkhuizen is now export oriented, but in the new agrifood system, the valley also has the opportunity to increase the domestic production rate according to the local demand.
- Wageningen University and other agriculture research institutes in the region can provide technical and intellectual support for the new system.

As the tool that helps us to create the new agrifood system, circular economy plays an essential role in connecting the food cycle and other flows in the regional scale. This contributes to side effects, such as bioenergy production, water reuse and organic waste recycling.

As aforementioned, another side effect lies in the social aspect. The reformed and circular agrifood secor can provide more job opportunities in different sectors. After deconcentrating, the selected areas will form their own agriculture centres in a local scale, which will create more diverse posts and enhance the synergy between high and lower educated people. Thus, in the regional scale, has also positive effects on reducing the existing socio-spatial polarization.

Concluding, the vision relates normative values like social, environmental and economic sustainability, while providing a framework for a future circular economy and a fairer agrifood sector.



THEORETICAL FRAMEWORK

THEORETICAL BASIS OF THE PROJECT

This project is based on 5 spatial theories that structure the concepts and vision in a supporting way. These theories are the circular economy, localised food networks, socio-spatial polarization, borrowed size or twin cities and the knowledge economy.

1 Circular Economy

The circular economy functions as a tool and the umbrella theory that connects the other theories, the vision and the development strategy. The localised food networks theory is the main theory this project focuses on, while the socio-spatial polarization, borrowed size and knowledge economy theories support the project in a more specific form.

The circular economy is the theory about the economic system where resource flows are circular instead of linear. This means that the ends and beginnings of linear resource chains are connected in a circular or repetitive way. The paper 'the circular economy: towards a new sustainability paradigm' from Geissdoerfer et al. uses the definition:
"the Circular Economy as a regenerative system in which resource input and waste, emission, and energy leakage are minimised by slowing, closing, and narrowing material and energy loops. This can be achieved through long-lasting design, maintenance, repair, reuse, remanufacturing, refurbishing, and recycling." (Geissdoerfer et al., 2016: 759)
The relation between the circular economy and sustainability is a beneficial one (Geissdoerfer et al., 2016: 767), circular economy is deemed a condition for a sustainable society. The concept of the circular economy has in Europe largely been limited to literature and research, while the actual regional implementation through policy, still lags behind (Geissdoerfer et al., 2016: 767). This project can serve as a laboratory for the actual spatial implementation of the circular economy in regional planning.

Zooming-in to the Amsterdam Metropolitan Area, the municipality of Amsterdam and the metropole region itself are already implementing circular economy policy. Private stakeholders like AEB, a waste incinerator, has come a long way in circularizing the waste flow in the AMA (AEB, 2018). The municipality of Amsterdam states that it wants to experiment with the circular economy in living lab Amsterdam (Gemeente Amsterdam, 2014: 7). In this living lab the city wants to allow new circular business cases and stimulate a sharing economy with a self-producing economy. In another publication from the municipality of Amsterdam the municipality worked together with circular economy researchers from Circular Economy and TNO fabric. In their report circular Amsterdam: 'a vision and action agenda for the city and metropolitan area' (Gemeente Amsterdam, 2016), they list action points and already formulate a vision and spatial implementation of a circular economy in the AMA region.

What is typical for the current state of the circular economy in the AMA region, is the lacking communication that exists between different governmental structures. The province Noord Holland has its own action agenda (Provincie Noord Holland, 2016), while the municipality of Amsterdam and the Amsterdam metropole region all have their own action agendas (Gemeente Amsterdam, 2014, 2016). What is missing is a regional vision on a circular economy in the AMA region where local components are linked to regional potentials.

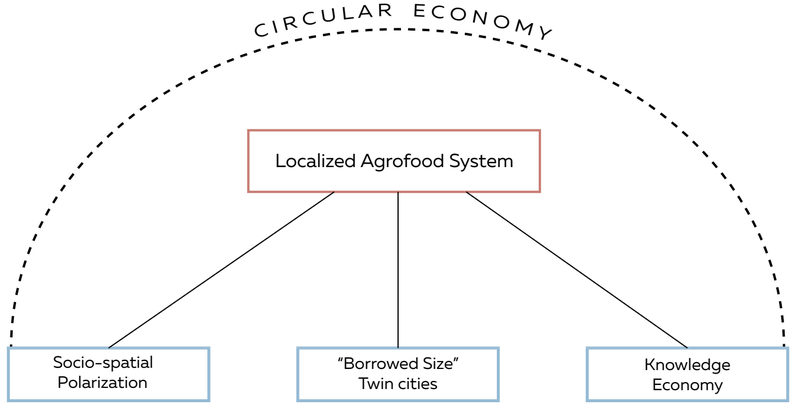
2 Localised food networks

Localised food networks are a popular policy tool to battle the environmental impacts of global agrifood systems (Coley et al., 2009: 150). That the agricultural sector has a big environmental impact, has already been proven for some years (Aspinall et al., 1992). Especially the battle against food miles is an important reason to localize food networks. While this notion of reducing food miles was first based on the idea that food production had to be linked to the particular region to reach a balanced global food order, the debate later on switched to the reduction of carbon emissions and climate change (Coley et al., 2009: 150). Localising food networks can reduce these food miles and thereby battle climate change. However, what has to be noted is that a decentralisation of a national food network into a local network will mean other forms of transport will have to emerge. In this case, Coley et al. distinguish two different scenarios: (1) the localised food products will be delivered to consumers using an extensive food network of home deliveries, or (2) consumers have to drive to local "food hubs" where they can buy their food products (Coley et al., 2009: 151). Coley et al. concluded that when consumers have to drive more than 7,4 km to a "food hub", they produced more carbon emissions than when a centralised deliveries system is used. The overall case study led to the conclusion that:
"the food consumer is not confronted simply with a choice between 'local-good' and 'global-bad', purchasing the most geographically local produce per se does not necessarily mean the lowest carbon impact. Many factors are involved" (Coley et al., 2009: 154).
However, localised food networks do not only focus on the reduction of food miles. It also has social and economic aspects that can distribute the power more equally. That is why in this report the localised food networks will be researched as a multifaceted solution to circular and social challenges.

3 Socio-spatial polarization

Connected to the localised food networks is the concept of socio-spatial polarization. Socio-spatial polarization in the AMA region can be understood as the continuous sprawl of lower social-economic classes towards the edges of the metropolitan area. This because of the rising prices in Amsterdam city due to its sheer popularity as a high knowledge/services city. Rising land values result in low to middle educated people not being able to afford their stay in Amsterdam city, resulting in them moving to Almere or even Lelystad.

There is not much literature about the socio-spatial polarization in the AMA region. However, Amsterdam seems to follow the same path as the metropolitan region of London, where lower social classes have already moved further and further away from the city centre. About socio-spatial polarization in the London metropolitan area more literature is written. To be able to get an understanding of the phenomenon, in this theoretical framework an assessment of the London situation will be given.



In the paper 'Beyond the compact city: a London case study - spatial impacts, social polarisation, sustainable development and social justice' (Bowie, 2009), D. Bowie critiques the continuing focus on a compact city of London that considers the administrative region instead of the functional region of the London metropolitan area. The implementation of the 'London Plan' of 2004 failed to produce enough affordable housing in the administrative region of London, thereby leading to rising housing prices and the displacement of lower income households. This ultimately lead to an increase in socio-spatial polarization. The paper argues that an approach based on the functional London metropolitan area needs to be given much fuller consideration in planning policy. This way the city could grow in a social sustainable way. To decrease the socio-spatial polarization, a metropolitan vision that includes cities around London with a good public transport connection has to be created (Bowie, 2009: 22). In these cities a full range of built forms, housing typologies and tenures that are affordable to lower social groups have to be included. In the project this case-study can help to learn from mistakes made in planning policy in London. What is important to state is that socio-spatial polarization doesn't necessarily have to be a bad effect. When a realistic policy that accounts for this polarization is implemented, more social equality and sustainability can be reached.

4 Borrowed size

Another theory used in this project is the theory of borrowed size, primarily written about by E.J. Meijers and M. Burger in their paper 'stretching the concept of borrowed size' (Meijers, Burger, 2016). They conclude that the concept of borrowed size needs to be stretched across several dimensions in order for it to function in urban practice (Meijers, Burgers, 2016: 286). These dimensions are multiscalar and comprise of different elements like housing, mobility, food distribution and production, relations between multicentric components and a balance of agglomeration benefits and costs, among others. The paper concludes that borrowed size occurs when
"Size borrowing occurs when a city exhibits urban functions and/or performance levels normally associated with larger cities as a product of interactions within networks of cities on multiple spatial scales that provides a substitute for the benefits of agglomeration." (Meijers, Burgers, 2016: 288)
Borrowed size will play a role in the project as the polycentric model of the AMA facilitates the creation of twin cities. Specialising certain aspects of the strategy into specific related urban centres, is expected to create positive borrowed size effects where both cities can benefit from. This can strengthen the strategy and contribute to a spatial implementation of borrowed size that is measurable.

5 Knowledge economy

The last theory used in the project is the theory of the knowledge economy. The knowledge economy is an ambiguous term, as its widely used to describe multiple phenomena (Berg, 2017). Literature research of Berg concluded that the knowledge economy tends to take place in larger cities with a background in multiple economic fields. Cities with a traditional connection to just raw materials and a seaport, tend to be less prosperous in a knowledge economy (Berg, 2017). Less is written about the role medium sized cities play in a knowledge economy. Berg raises fundamental questions like the assumed role of scale, specialisation and the role of cities in an urban network like the AMA. What can be expected is that cities may develop a functional specialisation within the urban region. Applying this specialisation in combination with the theory of borrowed size could help realize a knowledge economy that also

influences prosperity in medium sized cities at the edges of a metropolitan region. Another aspect that is hardly written about is adequate policy at the local level for the knowledge economy. The existing recommendations tend to be general or directed towards specific aspects (Berg, 2017).

Considering the case study Berg did of the Amsterdam knowledge economy, he concludes that
"the Amsterdam strategy towards the information society takes the form of a strategy towards a diverse economy, with emphasis on the knowledge based sectors. The approach is more bottom-up than top-down and local government focuses on general conditions. (...) Generally speaking, the approach is rather to stimulate the actors in the knowledge infrastructure and the business sectors to envisage the relevant developments." (Berg, 2017)

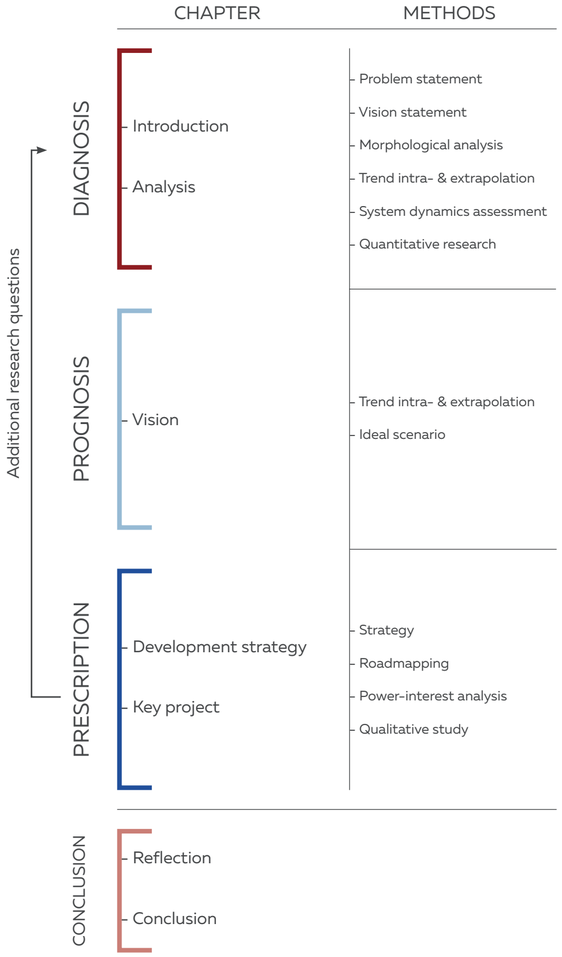
Where Amsterdam is doing very well on the aspect of the knowledge economy because of a big amount of positive pull factors, the other cities in the region are not profiting of the knowledge economy. That the knowledge economy can have a negative effect on social cohesion, is observed in the paper 'diverging solidarity' which reports about the labour workers being progressively left out of the knowledge economy in Sweden and Denmark (Ibsen, Thelen, 2017). The paper states that the transition from a Fordist manufacturing economy to a high-educated and very liberal knowledge economy, confronts labour workers unions with very acute dilemmas. The knowledge economy primarily leads to rapid technological changes that enhance the opportunities for high-educated individuals, while the lower educated jobs are marginalized and middle educated jobs are eliminated in a high pace (Ibsen, Thelen, 2017: 409). This leads to social inequalities and ultimately to socio-spatial polarization if the knowledge economy is considered in a regional spatial way.

Conclusion

Concluding the theoretical framework, one can state that the project and its underlying theories is complex and very multifaceted. The challenge will be to relate the theories to each other in such a way that it supports the project and creates the correct synergies between the different components. One should be wary of the negative effects some of the underlying theories can have on other aspects of the project. However, projects and policymaking always brings about difficult choices in which a responsible urbanist should find the ideal balance. This is what this project tries to achieve, a balance of interconnected theories in an explicit and spatialized way.

METHODOLOGICAL FRAMEWORK

DIAGNOSIS, PROGNOSIS AND PRESCRIPTION



The methodological framework of the project consists out of three phases. The first phase is the diagnosis, this comprises the introduction and the analysis which lead to a problem statement of the challenges the region faces. Through this phase we understand where we are with the region. The second phase is the prognosis which comprises the vision. This phase formulates a foresight of what we propose could happen if our vision is implemented. The third and last phase is the prescription that comprises of the development strategy and the key project. In this phase there will be decided what should be done to realize the prognosis by introducing projects and policies.

The first phase gives an overview of the project in the introduction with the problem statement and the vision statement. In the analysis we start with the morphogenesis which is a morphological analysis of the 'birth' of the region. This method puts the region into a historical perspective which results in leads for regional development. After the morphogenesis the graphs and trends chapter will give an overview of the current agrifood sector in the Netherlands and the AMA. In this chapter we will use the method of trend extrapolation. By visualizing data from various institutions like the CBS and the Planbureau voor de Leefomgeving we will identify trends in the agrifood sector. The food system and the flows related to it will be identified by performing a system dynamics assessment. In a system dynamics assessment we look for dynamic patterns, and describes them in terms of structural relationships between their multiple positive and negative feedback loops and the levels and rates of the primary variables. The food & society chapter zooms in on the relation between social challenges and the food sector. It will be analysed by a quantitative research of workers, jobs, education level and travel flows. This will be represented in maps and graphics.

The second phase is a foresight of what challenges from the diagnosis could be handled and in what way we see the future. In the vision we will first use trend extrapolation to project our wished change of trends in power positions in the food sector. After this we will propose a new food cycle. This eventually leads to the vision map that encompasses an ideal scenario for the AMA region that responds to the challenges stated in the problem statement.

The third phase shows what should be done to realize our vision. It mainly consists of a strategy, stakeholder analysis, business models, a road map and our key project Flevoland. In this phase we will assess our strategy by doing power-interest analysis and a qualitative study to current trends in the Flevoland province. Furthermore, we will explain the most important steps that have to be taken to realize our key project.

To conclude our project, we will reflect on the circular economy and give a conclusion of the project. After the conclusion we make recommendations for further research into the topic.

ANALYSIS

DNA OF THE REGION

In the analysis the research done in the project is shown. It lays the foundation for the vision and the development strategy. In this research the traditional and the modern food sector will be explored, while the circular economy becomes spatially explicit.

- Morphogenesis
- Trends
- Traditional & contemporary food chain
- Current food system
- Food & Flows
- Food & Society
- Conclusion of analysis

MORPHOGENESIS

THE BIRTH OF THE MORPHOLOGY OF THE AMA

Through time, the Amsterdam metropolitan area has had multiple functions. However, trade has always been a pinnacle of activity in the region. Roughly, the morphogenesis of the region can be divided in three important eras: stacking port, transit (air)port and stacking brainport.

Amsterdam was founded around 1275 AD. Then still being a small village, the economic crossroad the dam in the Amstel formed, meant that it grew into a local port and market which resulted in the first trade activities. While these first trade activities were initially focused on beer and herring, soon Amsterdam started to incorporate other goods like agricultural produce. This meant that the economy and demographics of the city steadily grew.

Going forward in the history, around 1680 the Amsterdam region is the most important trade region in the world. The region grows to a stacking port and market where high services like banking, insurances cartography and printing start flourishing. At this time the Zaanstad region is the number one manufacturing region in the world. In the agricultural sector, more value is continuously being added by the introduction of food processing and better logistics.

Around 1700 the processing takes on a dominant role in the port. The importing of raw materials from colonies, adding value and then exporting again of goods makes Amsterdam very rich. This means huge popularity as it becomes a real immigration city. The immigration influx creates unplanned city expansions while the wealth results in the creation of the canal rings. Amsterdam is the financial hub of the Netherlands. The colonial voyages of the VOC and the WIC means that goods processed in Amsterdam could make as much as 400% profit.

The growth eventually stagnated at the end of the 18th century. This is caused by a lack of Dutch innovation in the political system and continuous power struggles. The Netherlands still is wealthy and rich but other countries like the United Kingdom start to gain momentum using the industrial revolution. In the meantime the Amsterdam region focuses on the map making industry, harbour activities, print media, logistics companies and money exchange. Amsterdam is a global city with still a great variety of cultures being present.

Throughout the 19th century, the Amsterdam region almost misses the industrial revolution because of the aging manufacturing industry still being based on old windmills and sawmills. This results in the region becoming more and more impoverished and old fashioned, as opposed to other centres in Europe. Cities in the region start to specialise in labour. Amsterdam stays the financial and cultural centre of the Netherlands. The agricultural sector in this time however experiences what is referred to as the 'golden age of agriculture'. Great production is achieved by rapid mechanical innovations and local food services are efficient in delivering food to consumers. The farmers are among the richest people in society.

Going into the turbulent 20th century, the AMA still trades in colonial goods like tea, tobacco, coffee, spices and condiments. The market is very liberal oriented. Social housing is built around the old city caused by comprehensive housing laws in the 1920's. While the neutral status in the first world war makes the country rich, the economic crisis of 1929 hits hard in the region because of its international and banking focus. The second world war causes the last big famine of Europe in the region.

After the second world war, the region rapidly changes. Schiphol airport becomes important because of the pioneering of the KLM in civil air services. In Amsterdam there is a high grade of unemployment. Material damage due to the second world war causes a big shortage in housing. The Jewish persecution causes a 10% drop of demographics in the region. Economic consequences of the second world war include the diamond and textile industry being in an economic crisis, while the basic industries like clothing, beer breweries, manufacturing and vehicle production flourishes.

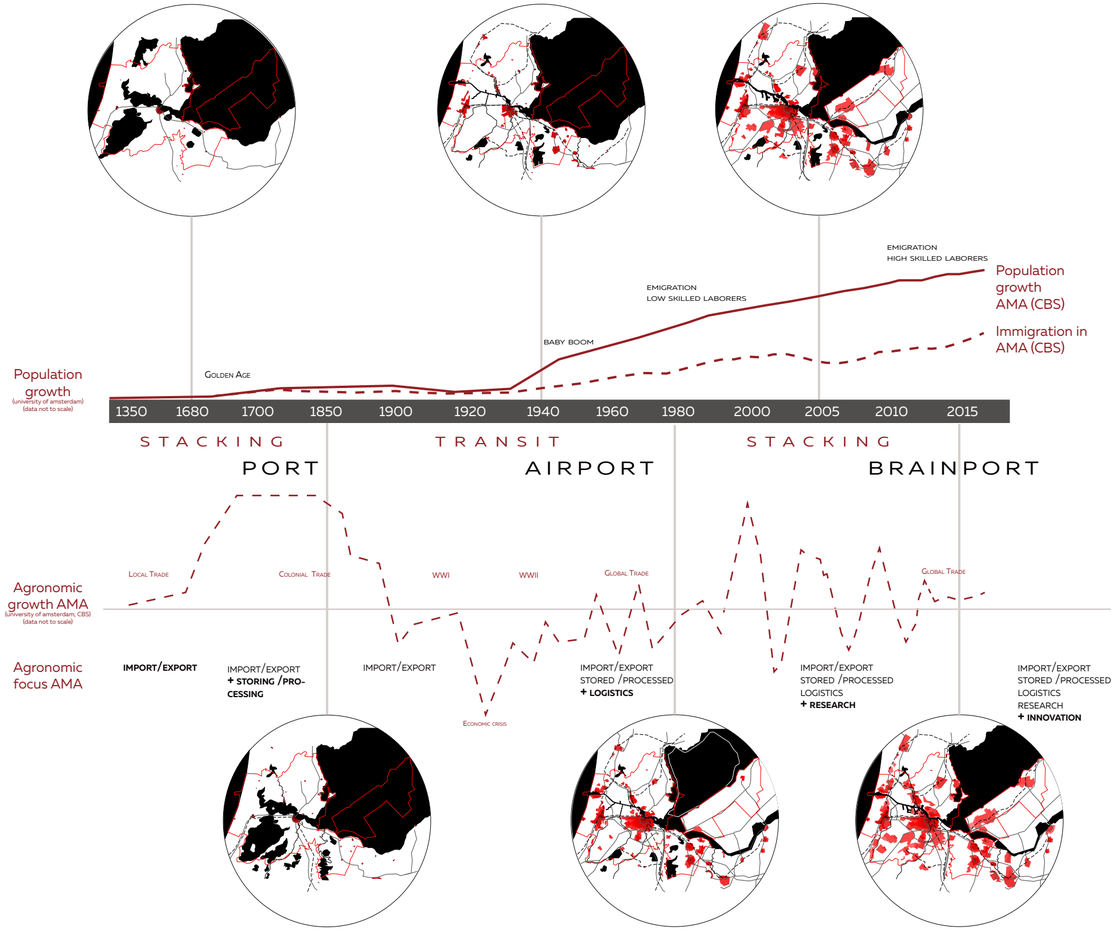
Towards the 70's and 80's, there is a recovery of growth and an explosion of youth culture. The region retains its position on the world map by investing in business offices, machine industry, manufacturing and especially high yield food production. Workers from Morocco and Turkey are flown in to work in the low to middle educated jobs. Because of the aforementioned famine in the second world war, Dutch agricultural policy shifts towards a policy that's driven on high agricultural output. The agricultural production is also used to create a trade surplus to restore the economy after the war.

The change of the millennium sparks infrastructure development and Amsterdam becoming an inclusive city. Urban renewal changes from demolition to restoration. Schiphol becomes a big international economical hub. The trade now encompasses high yield food production and processing industries, information technology and high services.

In 2005, Amsterdam loses its stacking port function and becomes a transit (air)port, being the gateway to Europe. The Zuidas is developed as a central business district and the region is developed more and more towards a polycentric metropolis.

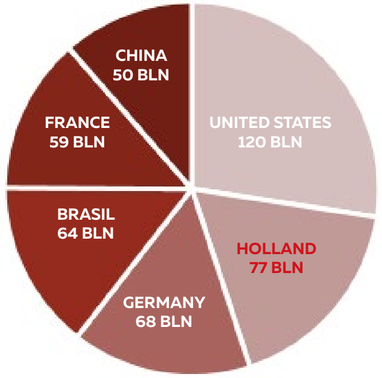
From 2010 onwards high tech industries and the knowledge sector become more important. Creative industries spark the economy and the high yield food production and processing still is an important part of the economy. However, the environment gets a bigger role in planning and policy. Urban metabolism and the circular economy are introduced.

Based on:
(Bontje, Sleutjes, 2007)
(Wintle, 2000)



AGRICULTURAL PRODUCTION AND EXPORT

BIGGEST EXPORTERS



Source: Noordhoff, 2014

The Netherlands is the second biggest exporter in the world of agrifood products in terms of value (Noordhoff, 2014). This is mostly caused by the big multinational companies like Nestle and Unilever being located in the Netherlands. These companies import food products, add value to them and then export them again to mostly European destinations.

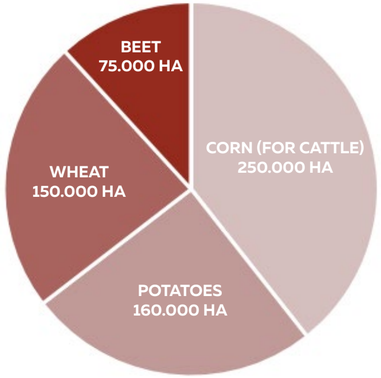
In terms of production the Netherlands is found on the 22nd place in the world (Noordhoff, 2014). This is still a big achievement as its on the 133rd place in the world in terms of land surface (CIA, 2013).

This high placement in terms of production is caused by the high yields/hectare the Dutch agricultural lands produce. These high yields are a result of post-war policy and the big knowledge sector.

After the second worldwar and the famine of 1944, the Dutch government wanted to create food security and a surplus on the trade balance. To accomplish this, the government invested heavily on agricultural production which ultimately through policy led to one of the highest production/hectare in the world.

The knowledge factor also came into play with the leading position the Agricultural University of Wageningen plays in the sector.

TOP 4 USE OF AGRICULTURAL LAND



Source: Noordhoff, 2014

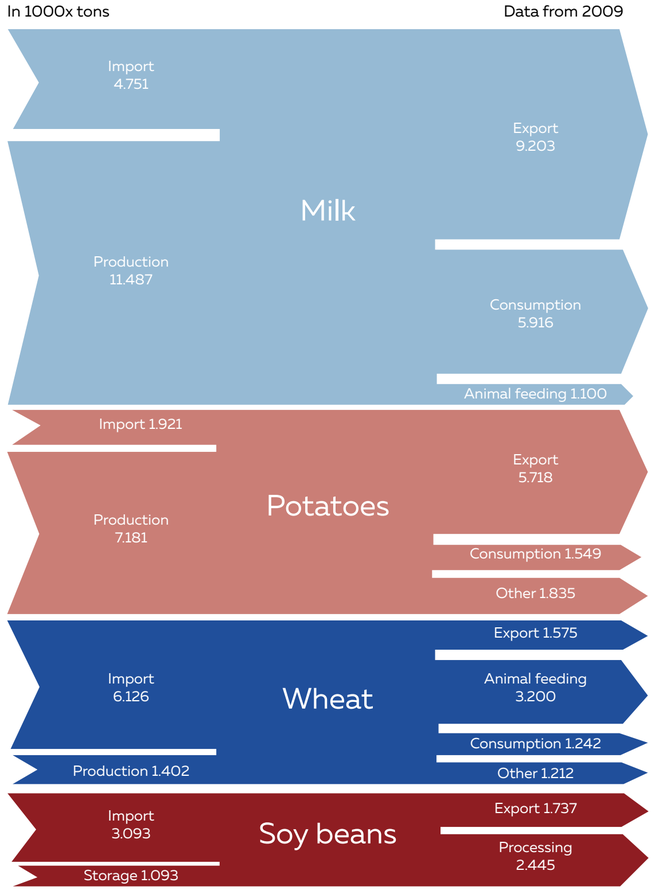
When considering the agricultural land in the Netherlands in terms of use, corn is the most used crop. The corn produced in the Netherlands is mostly for animal feeding and in this way directly connected to meat and dairy production.

Potatoes is on the second place in terms of land-use. This crop has become very popular in the Netherlands due to its short production to consumption chain. It is also relatively easy to produce and holds a good amount of proteins/gram. The Netherlands produce as many as 6.801.000 tons of potatoes per year (FAO, 2013). This enormous production of potatoes means that the Netherlands is 300% self-sufficient in this product (Knijff et al., 2011).

Other popular crops are wheat and beets. These are also easy to produce and have a relatively high profit/hectare.

HANDLING OF AGRICULTURAL PRODUCTS

TOP 4 HANDLED PRODUCTS - DESTINATIONS



The import of agrifood products, adding value and then exporting again is the core business of the Dutch food sector. Mainly caused by big multinationals like Unilever and Nestlé, the adding value food industry delivers a big contribution to the country's GDP.

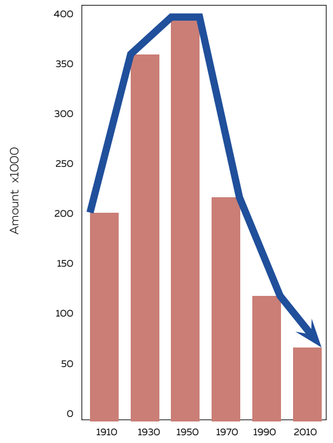
When looking at the top handled products in the Netherlands according to the FAOSTAT, products like milk and potatoes are for the most part being exported. This export consists of imported, domestically produced and enriched products.

What is striking in the graphic is the small role domestic consumption plays in the total amount of handled goods. Animal feeding is also a big destination of imported and produced goods.

Sources:
Noordhoff, WRR, 2014

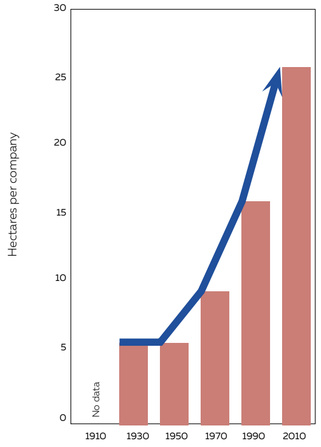
TRENDS OF AGRICULTURAL COMPANIES

Amount of agrifood companies



The amount of agrifood companies has through time went down dramatically. From more than 400.000 companies during its peak in the 1950's, it from then went down to around 55.000 in 2016 (CBS, 2016).

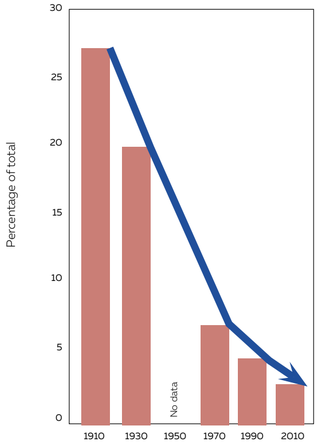
Scale of companies



A cause of the dramatic decline in companies, is the exponential growth in scale of a single company. From around 5 hectares in 1930 to around 26 hectares in 2010. What has to be noted is that within this time the Flevoland polders were introduced. This caused a huge new source of big agricultural land parcels.

Another cause for the dramatic rise is land consolidation. In order to be economically competitive farmers could trade their lands with one another to create bigger consecutive pieces of land.

Percentage of workers in agrifood

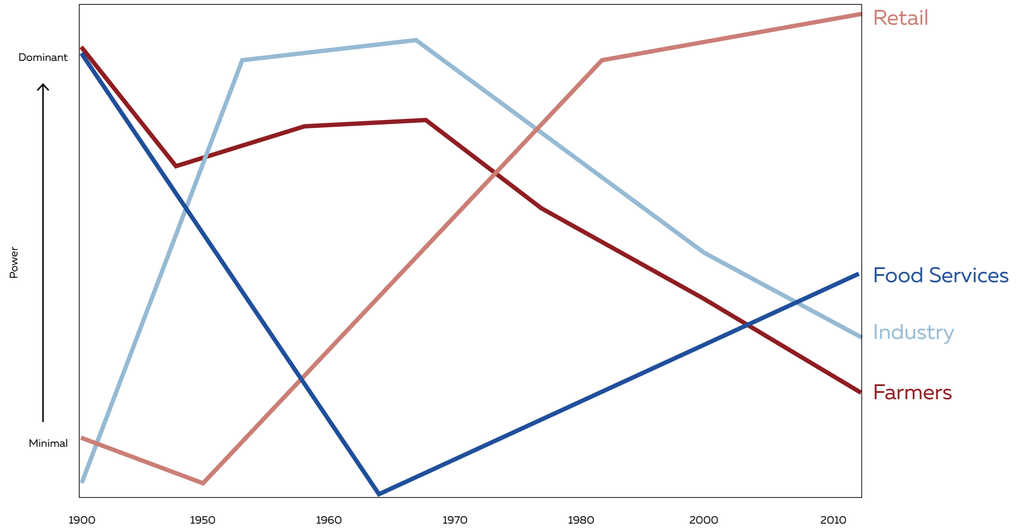


The percentage of workers in the agrifood sector has like the amount of companies gone down dramatically. The drop has multiple causes, one being that other sectors have become more and more important in the Dutch economy, providing more jobs than the agricultural sector. Another reason however is the mechanisation of agricultural processes and the decline of companies. This decline in jobs has consequences for job oppertunities in agricultural areas.

Sources:
Noordhoff, 2014

SHIFTS OF POWER THROUGHOUT TIME IN THE AGRIFOOD SECTOR

EVOLUTION OF POWER IN THE AGRIFOOD INDUSTRY

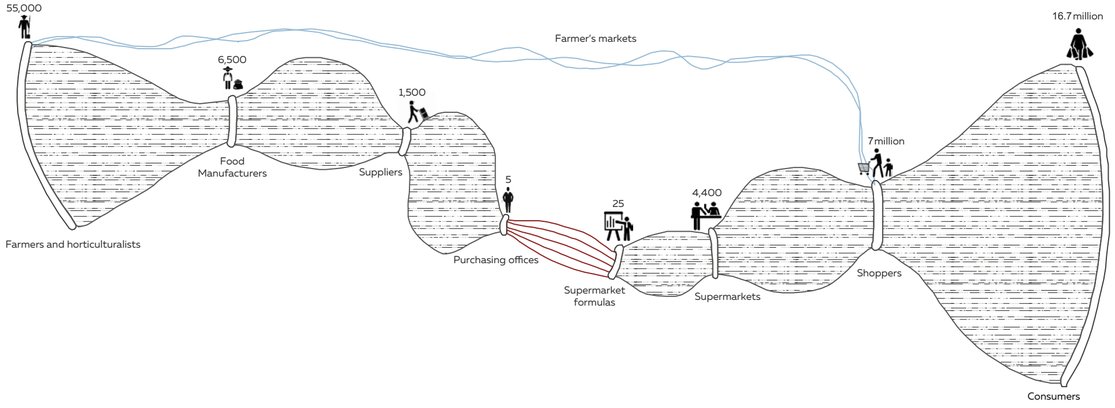


The power positions in the agrifood sector has through times changed. In this graph power is measured by how much influence a specific stakeholder has on the pricing of an end product. What can be seen is the dominant position of local food services and the farmer in the years before 1900. Retail and industry do not play a significant role during those years. However, after 1900 The industry becomes dominant as food processing comes up. The farmers lose some power but stay in a comfortable position. The biggest change takes place from the 1950's forward. The consumer society is created in the United States and also starts to influence the European market.

Throughout the years, retail becomes bigger and bigger. With this shift in scale, there is also a shift in power. Farmer's become more and more dependent on the processing and distribution networks of the retailers, while local food services are almost entirely left out. This results in the retail sector asserting dominant power over farmers, enforcing lower margins and changing the sector into a very tough and unchangeable institution. However, local food services trends are in the rise since the 90's and can play a key role in the change of the system.

Sources:
WRR Wetenschappelijk Raad voor Regeringsbeleid, 2014

THE CONCENTRATED AGRIFOOD SECTOR



ACTOR	MARKET-SHARE (2017)	REVENUE (2017)
1. Ahold (Albert Heijn)	35,3%	13 billion euro
2. Superunie (multiple formulas)	30,0%	No Data
3. Jumbo Group	18,7%	6,7 billion euro
4. Lidl	9,9%	3,7 billion euro
5. Aldi	6,8%	2,5 billion euro

The power positions assessed on the last page shows the clear dominance of the retail sector. This dominance is also seen when making a lines pattern of the flows in the agrifood sector. 55.000 farmers deliver their goods to 6.500 manufacturers which then cascade their goods to the 1500 suppliers in the Netherlands. These suppliers do business with only 5 purchasing offices. These offices are Ahold, Superunie, Jumbo Group, Lidl and Aldi. All of these groups are multinational companies which means most of the enormous revenues made in the sector, go abroad.

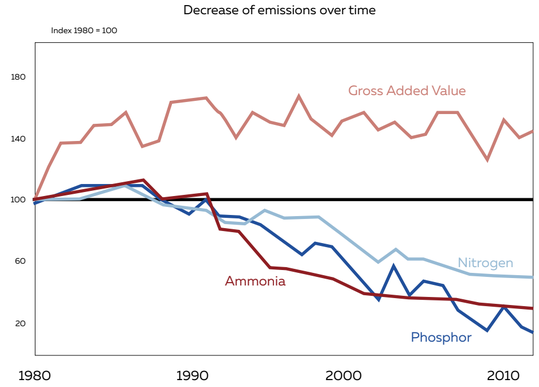
The locality of the producers therefore do not see the financial and spatial effects of these profits. The 5 purchasing offices deliver the goods to 25 supermarket formulas who ultimately distribute to 16,7 million customers in the Netherlands.

The supermarket is a big part of Dutch shopping culture. 90% of inhabitants do their groceries weekly or even daily at these supermarkets. In these supermarkets most food is pre-packaged and carefully selected on beauty. The consumer stands far from the producer in this system.

Sources:
Planbureau voor de Leefomgeving, 2012
Distrifood, 2017

SHIFTS OF POWER THROUGHOUT TIME IN THE AGRIFOOD SECTOR

EMISSIONS

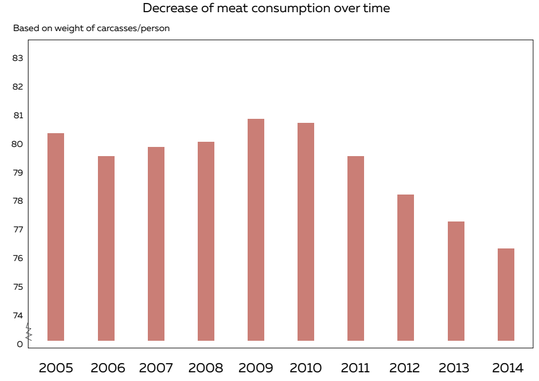


Emissions are an important subject in the agricultural sector. Research showed that the agricultural sector has a big environmental impact (Aspinall et al., 1992).

The Dutch agrifood sector however, seems to succeed in getting emissions down, while the gross added value of the sector stays up. The emissions of ammonia, phosphor and nitrogen have trended downwards since the 1990's.

To reach the climate goals stated in the Paris agreement, there is still alot to be done in terms of emissions.

MEAT CONSUMPTION



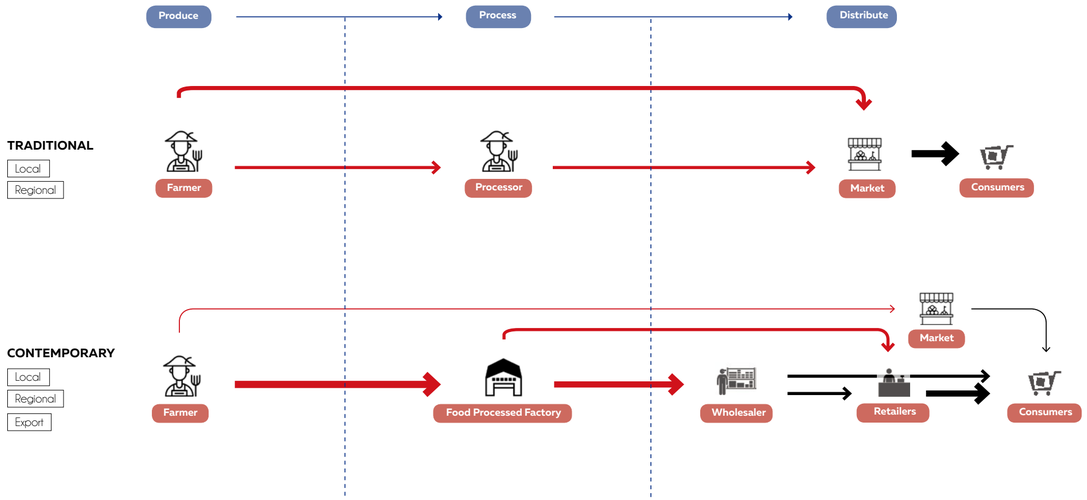
Meat consumption has the biggest environmental impact within the agricultural sector. More than 90% of emissions can be traced back to cattle breeding (Aspinall et al., 1992). Other bad effects of cattle breeding are the subsidence of peat soils, the disappearance of jungle forest in favor of soy plantations and the huge areal of food production needed for animal feeding.

To be able to make an impact towards an environmentally sustainable agriculture sector, meat consumption has to decrease. This means that food patterns have to change and alternatives for proteins have to be found and cultivated.

The trend over the last couple of years already shows a decline in meat consumption in the Netherlands.

Sources:
CBS, PBL, RIVM & WUR., 2014
LEI Wageningen, 2015

TRADITIONAL & CONTEMPORARY FOOD CHAIN



From the brief overview of the morphogenesis analysis and the trends, the conclusion of traditional and contemporary food chain can be figured out.

In the traditional food chain, farmers can face directly and easily to the consuming market and most of time they also process and distribute the products themselves.

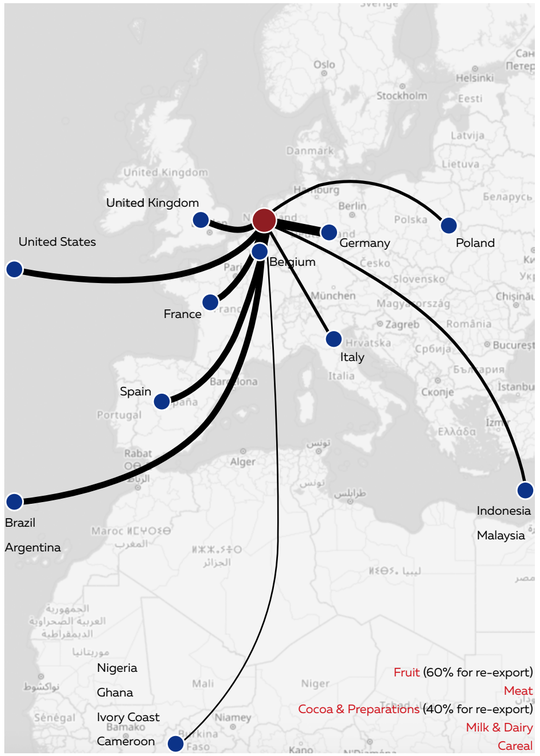
In the contemrary food chain system, however, because of the upscaling, farmers now become only producers and they have very limited opportunities to sell their products directly to the consumers.

Today,there are lots of steps and stages that should be taken before the food can be dilivered to the consumer's table. What's more, because of the globalization and the development of transportation, farmers now produce less and less food for local demand.

In order to figure out the specific situation of food system in AMA region, deeper research and mappings about food and other related sectors are taken and presented in the following part.

CURRENT FOOD SYSTEM

FOOD SUPPLY - IMPORT



Source: CBS Internationalisation Monitor 2016-II Agribusiness

	2000	2005	2010	2015
	Billion euros			
Imports				
All goods	216	250	332	378
Agricultural products	25	29	42	55
Exports				
All goods	232	281	372	426
Agricultural products	44	50	68	81

FOOD SUPPLY - EXPORT

Exports of agricultural products far exceed the imports.

From 2000-2015, the imports of agricultural products have more than doubled during these 15 years versus a 75 percent growth of total imports.

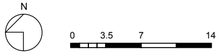
The export value of agricultural products grew almost as fast (about 85 percent)as the total export value.

CURRENT FOOD SYSTEM

SOIL TYPE

Source: Based on EduGIS

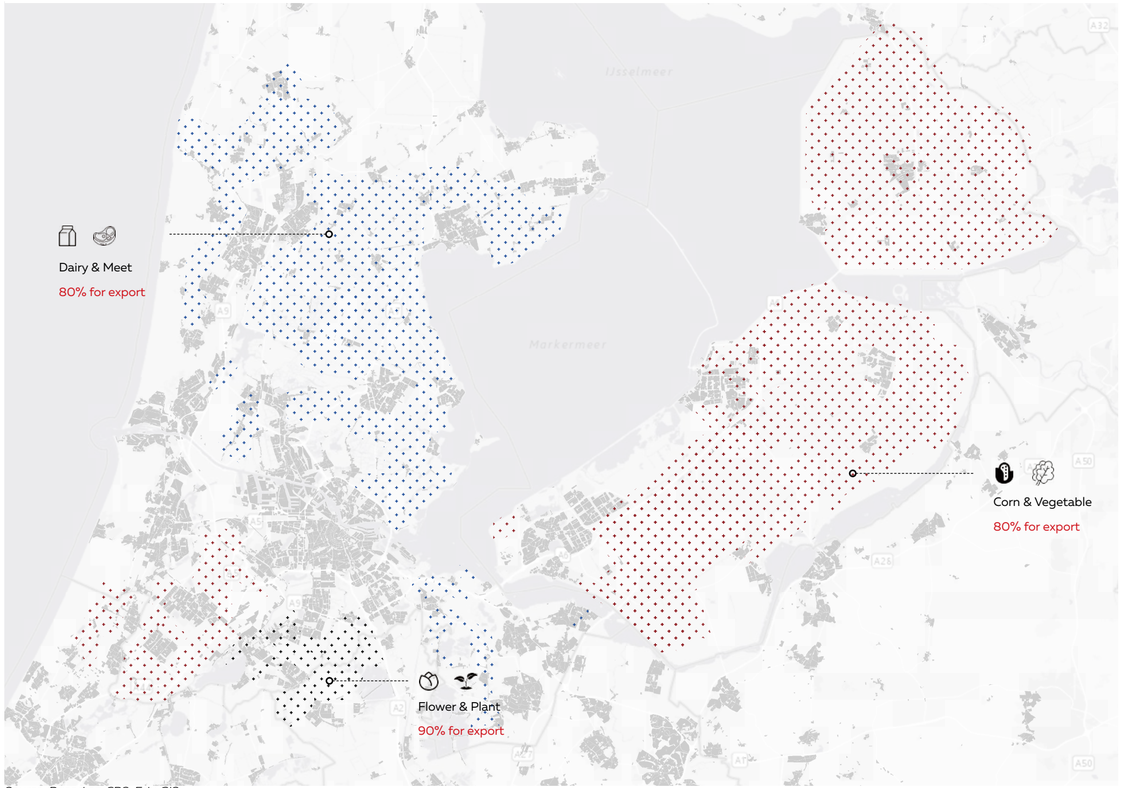
Sand
Peat
Lichte zavel
Zware zavel
lichte klei(light clay)
zware klei(heavy clay)



Sand: Sandy soils are ideal for crops such as watermelons, peaches and peanuts, and their excellent drainage characteristics make them suitable for intensive dairy farming.
Peat: Peat is an important raw material for horticulture
Zavel: Zavel is suitable for horticulture.
Clay: When clay combinds with sand and silt, it becomes loamy soil and its suitable for growing crops like vegetables and fruits.

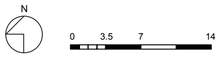
CURRENT FOOD SYSTEM

FOOD SUPPLY - LOCAL PRODUCTION



Source: Based on CBS, Edu GIS

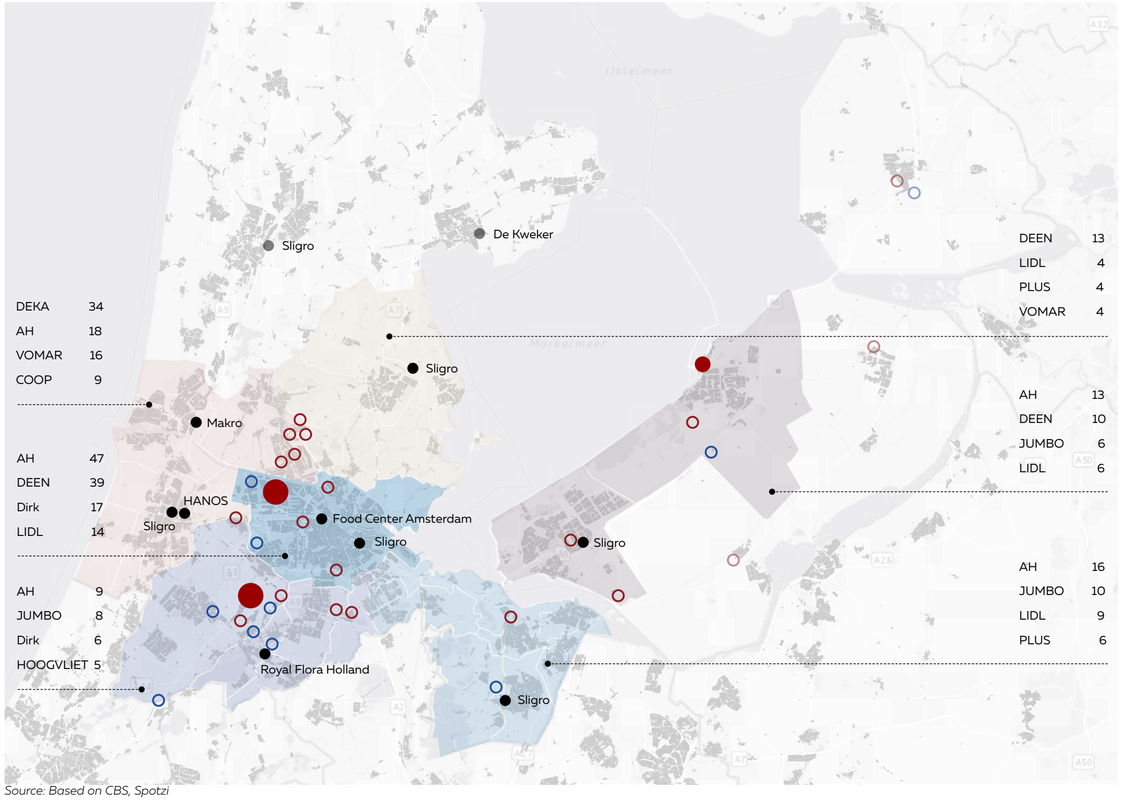
Cropland (mainly)
Grassland (mainly)
Greenhouse (mainly)



There are three main production area in the AMA region. Flevoland (light clay land) is suitable for crops like corn and vegetables. Zaanstad (peat and sand) is mainly grassland that produce dairy and meat. Aalsmeer (zavel) is area for horticulture. Three areas are all export oriented.

CURRENT FOOD SYSTEM

FOOD DISTRIBUTION - STAKEHOLDERS



Source: Based on CBS, Spotzi

Port
Wholesaler
Food Logistics Company
Food Processor
Main Retailer

N

0 3.5 7 14

CURRENT FOOD SYSTEM

FOOD DISTRIBUTION - INFRASTRUCTURE

Port
Wholesaler
Food Processor
Food Logistics Company
Railway
High Way
Main Road

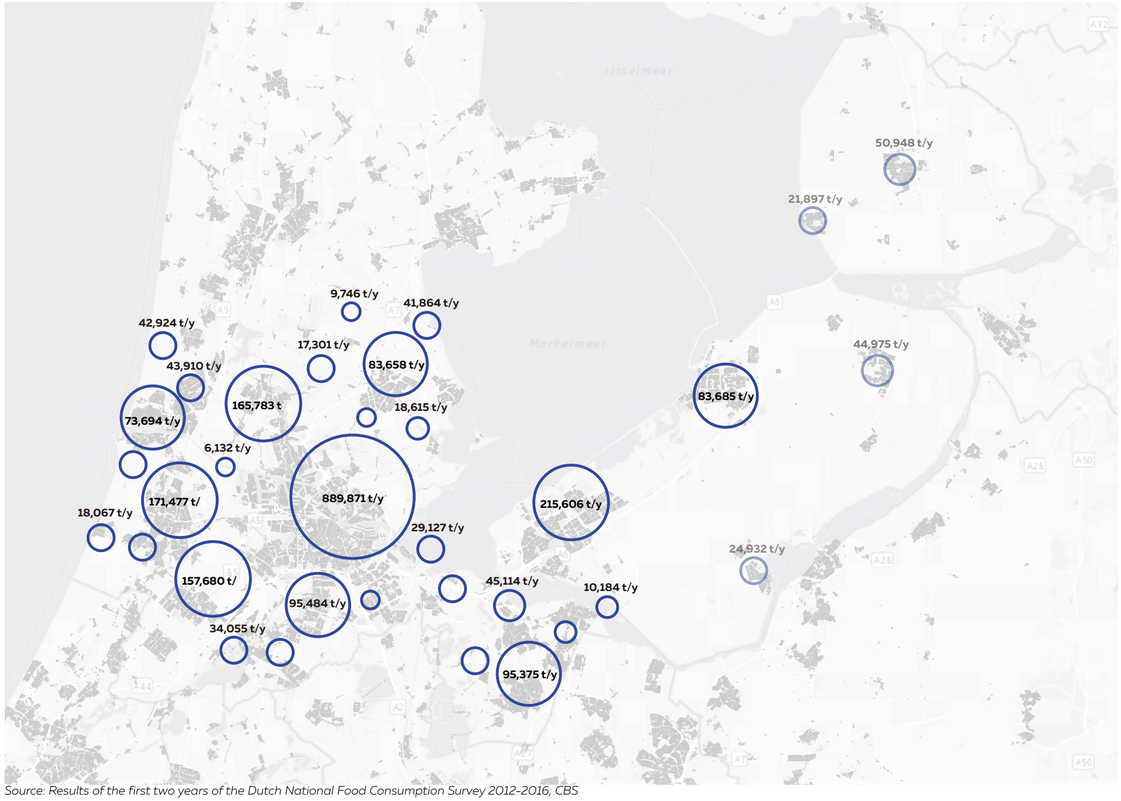
N

0 3.5 7 14

Current food distribution system in the AMA region mainly relies on the road transportation.

40% trucks is food related..

FOOD CONSUMPTION



Source: Results of the first two years of the Dutch National Food Consumption Survey 2012-2016, CBS

Quantity of Food Consumption

N

0 3.5 7 14

People in Netherlands (1-79 years of age) consume on average a total of 3 kg drinks and foods per day. Almost 2 kg of this concerns beverages (other than dairy beverages) such as tea, coffee, water, soft drinks, juices and alcohol. Approximately 40% of the remaining foods including dairy is of animal origin.

CONCLUSION - FOOD MILES

Import - Processing - Export
> 1000 km

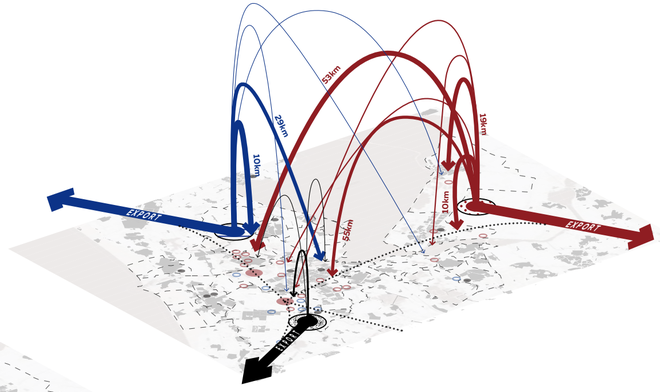
Producer - Export (80%)
> 500 km

Producer - Processor - Wholesaler - Retailer - Consumer(15%-19%)
100km

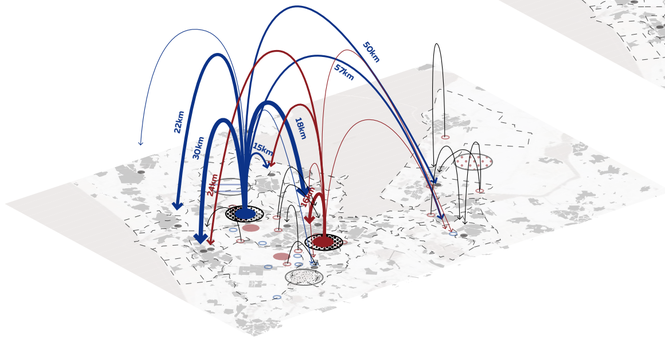
Producer - Consumer(1%-5%)
25km

In the current food system, most products are export oriented which means the farmers dont produce what local people demand. Besides, 'Producer-Consumer' only contributes little part in the system, which is mostly done by the limited current open markets (time limited and location limited). The food transport is mainly by tranditional trucks.

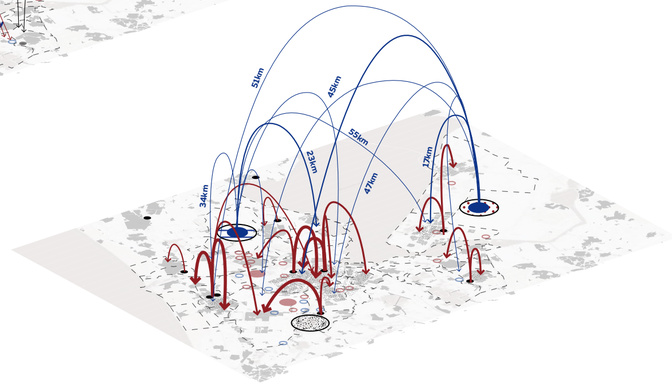
This current food system causes large quantities of food miles which causes lots of pollution and waste.



PRODUCER TO PROCESSOR & PRODUCER TO EXPORT



PROCESSOR TO WHOLESALER



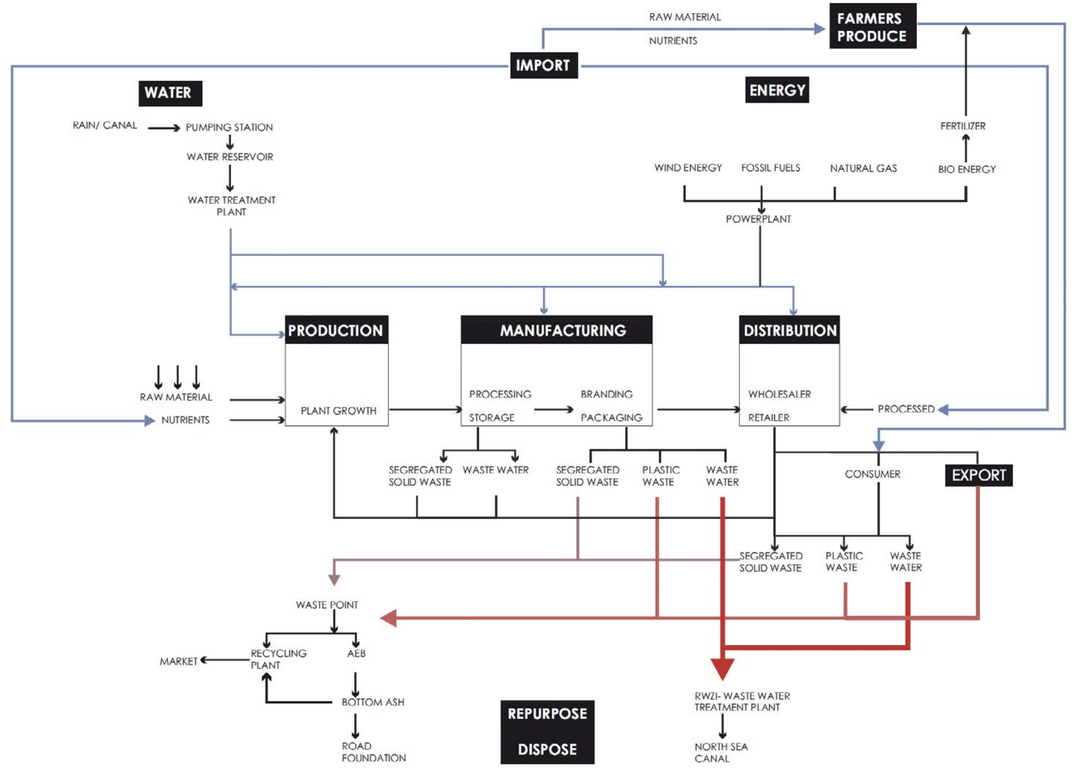
WHOLESALER TO CONSUMER (RETAILER) / PRODUCER TO CONSUMER

- Food Processor
- Export Connection
- Food Logistics Company
- Green House
- Port
- Wholesaler
- Grassland
- Cropsland
- Food Processing Center
- Open Market Area

Source: Based on CBS, Spotzi

FOOD & FLOWS

INTERRELATION



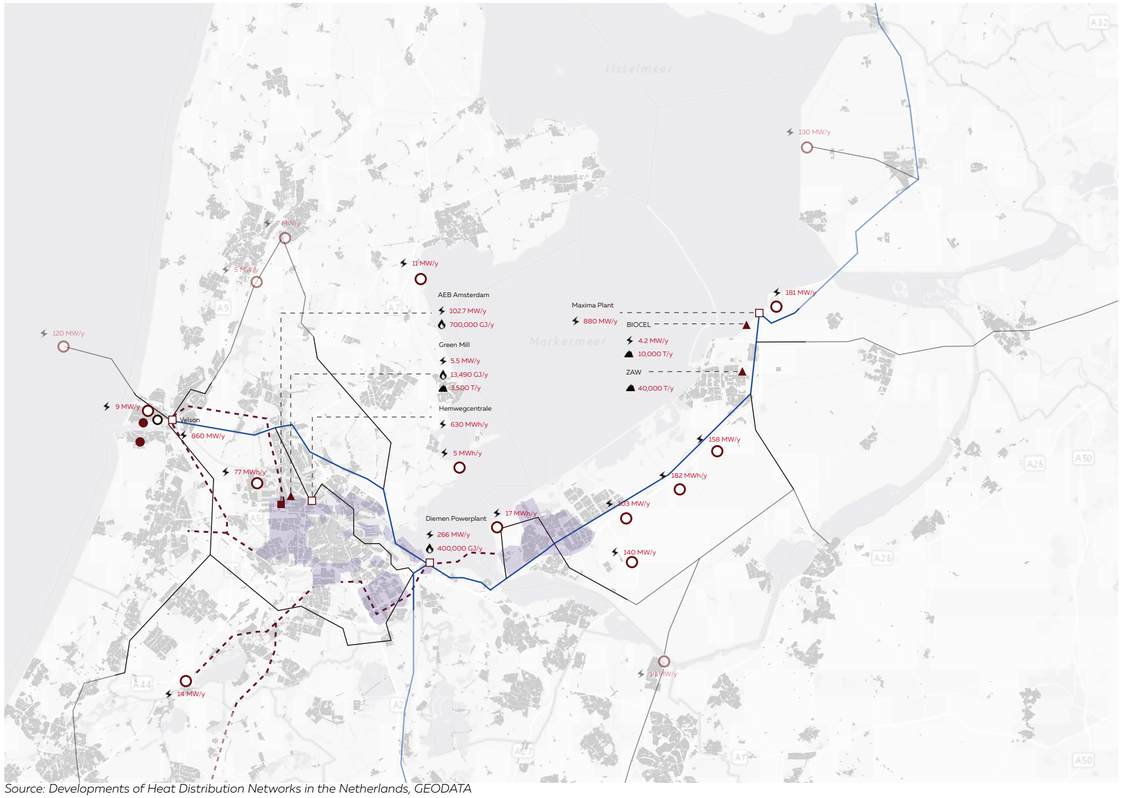
There are many different flows involved in the different stages of food system. For example, food production is always linked to water flows and food distribution has a close connect to energy flows.

In order to understand the food system depper, it is necessary to clarify the flows that related food system.

The diagram shows how different flows connect to food system in different stages.

FOOD & FLOWS

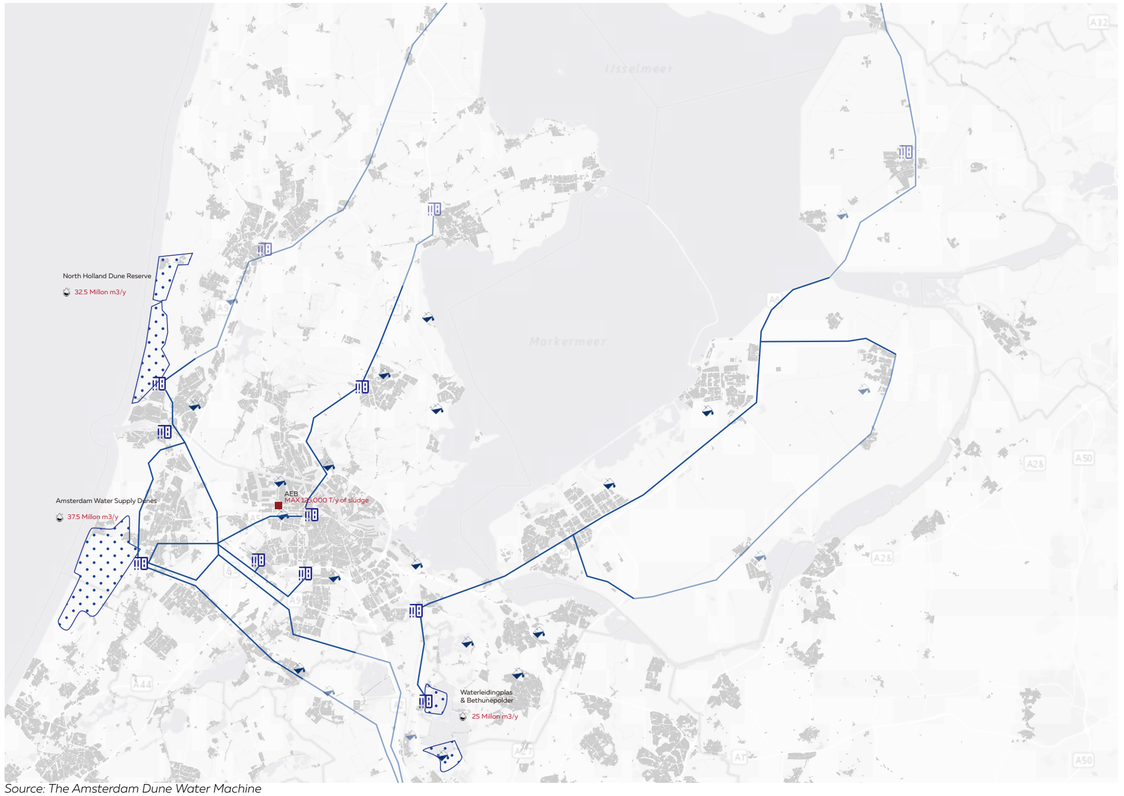
ENERGY



Source: Developments of Heat Distribution Networks in the Netherlands, GEODATA

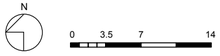
FOOD & FLOWS

WATER



Source: The Amsterdam Dune Water Machine

Water Reservoir & Storage
Pumping Station
AEB
Water Pipeline
RIZW

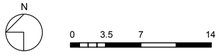


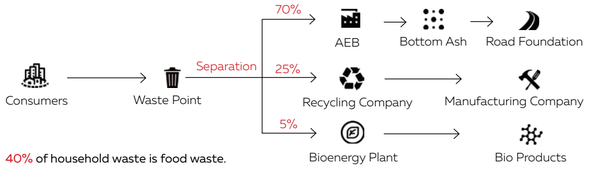
FOOD & FLOWS

WASTE

Source: GOOGLE map, AEB annual report

AEB
Waste Point
Bioenergy Plant
Transport Route
Recycling Company





40% of household waste is food waste.

AGRIBUSINESS IN THE NETHERLANDS

primary component

Production

Livestock farming
Arable farming
Horticulture
Fisheries

secondary component

Services & Goods

Manufacturing of machines and specialized instruments,
Breeding of seeds and crops
Production of fertilizers

Purchaser

Processors

Wholesale & Retail

JOBS IN AGROFOOD SECTOR PER MUNICIPALITY

Source: Internationalisation Monitor 2016, CBS

Total Population
Working Population
Jobs
Jobs in agrifood sector

N

0 3.5 7 14

The municipalities of Amsterdam and Haarlemmermeer offer the most jobs in the AMA region, but just a small amount of agrifood related work opportunities. The horticulture region, the municipalities Uitgeest and Aalsmeer, employ toegether nearly 10.000 people, which is around 35% of all the offered jobs in this area. This results because of the concentration of production, processing and distribution within the same territory. Whereas in the grassland region Zaanstrek, the total amount of agrifood relatet jobs is relatively low, because it is limited to the primary component, the production sector. Activities of the secondary sector are not located in the same area, but concentrated in Amsterdam. The same phenomenon occurs in Flevoland. Due to the concentration of facilities in Amsterdam, Almere and Lelystad provide very few jobs in the secondary component of the agrifood sector, but mainly in the direct production sector. (CBS, 2016d)

EDUCATION LEVEL

Source: CBS, Economische Verkenningen Metropoolregio Amsterdam 2017 - Gemeente Amsterdam

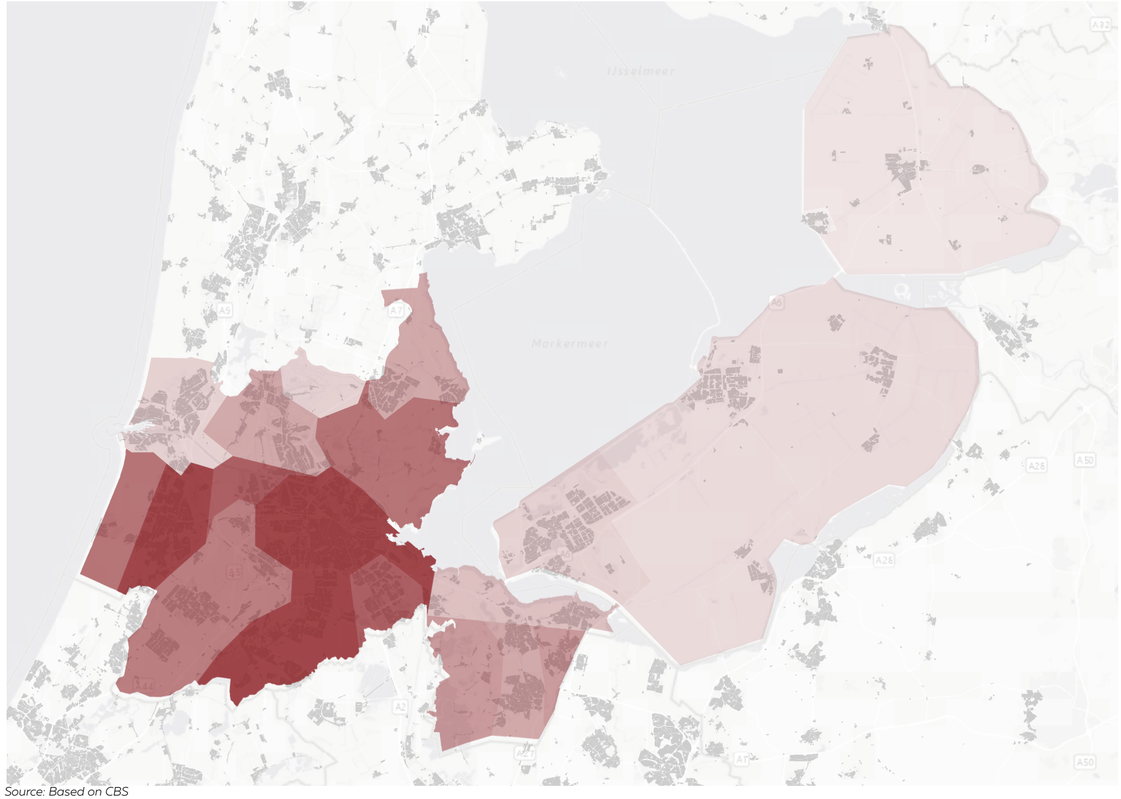
- Highly educated percentage
- Middle Educated Percentage
- Low educated percentage

N

0 3.5 7 14

Acoording to the "Economische Verkenningen Metropoolregio Amsterdam 2017" the average education level of the workforce of the AMA in 2015 is divided into 19% lower, 40% middle and 42% higher educated. Compared to to 2009 the hig educated population rose 5%, whereas the middle educated stagnated and the lower educated decreased 5%.
In Amsterdam and Haarlem around half of the workingforce is high educated, whereas in areas like Almere-Lelystad and Zaanstrek-Waterland just around 30% and the stake of low educated is relatively high. (Gemeente Amsterdam, 2017)

LAND VALUE



Source: Based on CBS

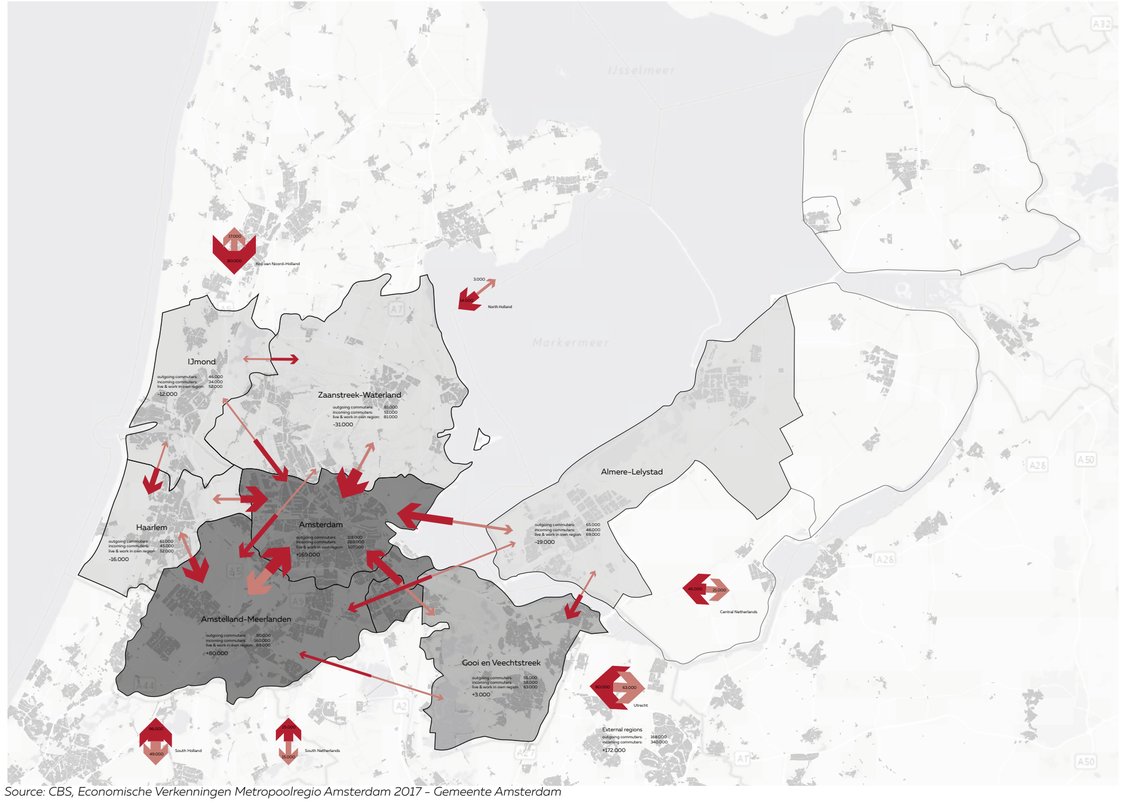
< 15 €/m2 > 140 €/m2

N

0 3.5 7 14

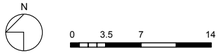
Amsterdam and Haarlem are standing out with their extreme high land value, not just in the AMA, but also in the entire Netherlands. Amsterdam is especially for the high educated population a popular place to live due to its global connectivity and its broad offer for culture and recreation. The same counts for Haarlem city. With the rising land value in time the middle and low educated population is banished out of this popular areas and has to move further away to less expensive places, like Flevoland. (CBS, 2016)

COMMUTING PATTERNS



Source: CBS, Economische Verkenningen Metropoolregio Amsterdam 2017 - Gemeente Amsterdam

The region of Amsterdam and Amstelland-Meerlanden shows a high positive difference of commuting patterns. Especially Amsterdam with more than 288.000 daily incoming commuters stands out with its amount of work opportunities. The surrounding regions apart of Gooi en Veechtstreek count with a negative difference of commuting. In Zaanstreek-Waterland are commuting daily 81.000 persons towards other regions, and in Almere-Lelystad nearly 65.000.
The concentration of jobs in the city of Amsterdam and Amstelland-Meerlanden diesn´t only attract people to commute within the AMA, but also from outside this region. In total 340.000 persons travel daily for work from external regions. (Gemeente Amsterdam, 2017)



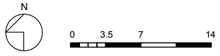
FOOD & SOCIETY

COMMUTER FLOW AND EDUCATION

Source: Based on CBS

High educated workers

Low educated workers



because of the high availabiliy of jobs in ICT, financial and business services and also in culture, sport and recreation, especially high educated workers commute daily from sorrounding regions to Amsterdam. The Schiphol airport offers a lot of jobs in the logistic sector for low and middle educated workers., which is clearly shown in the commuting scheme. (Gemeente Amsterdam, 2017)

FOOD & SOCIETY

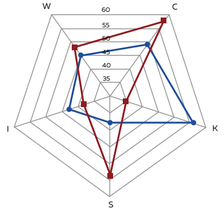
INDICATORS

W - Work C - Competitiveness K - Knowledge S - Spacial Location Condition I - Infrastructure and Accessibility

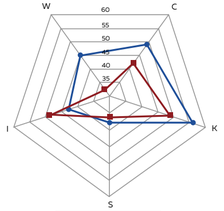
AMA Region Municipality

Source:waarstaatjegemeente

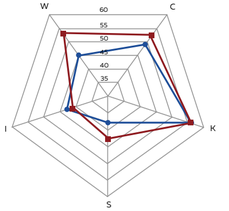
From indicator analysis, we can find that areas around Zaanstad and Flevoland are the weak point in the AMA region.



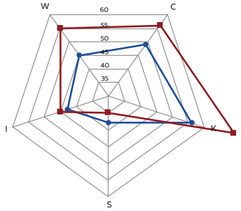
Aalsmere



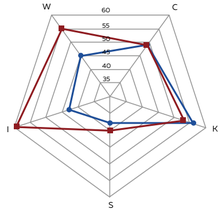
Almere



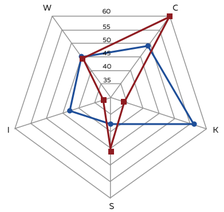
Amstelveen



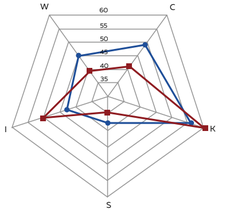
Amsterdam



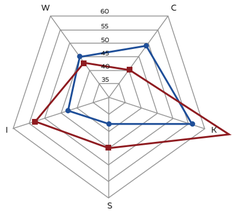
Diemen



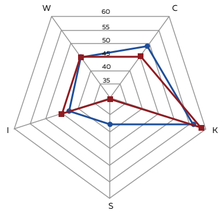
Edam-Vollendam



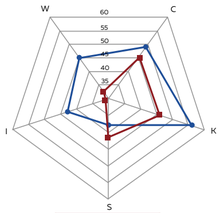
Gooise Meeren



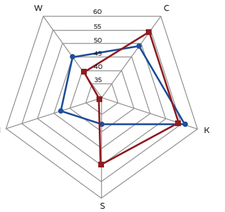
Haarlem



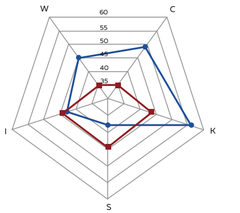
Hilversum



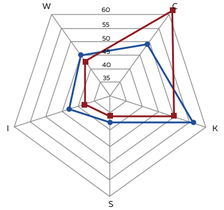
Huizen



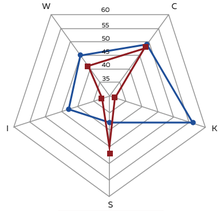
Landsmeer



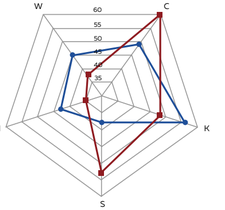
Laren



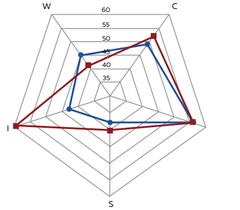
Uithoorn



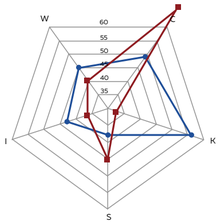
Velsen



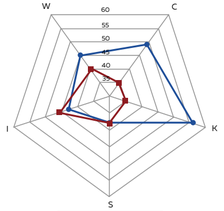
Waterland



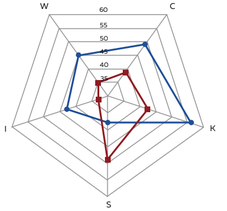
Weesp



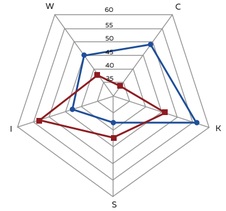
Beemster



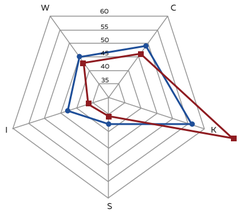
Beverwijk



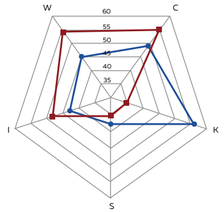
Blaricum



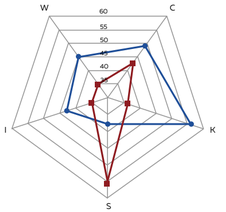
Bloemendaal



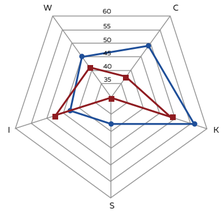
Haarlemmerliede



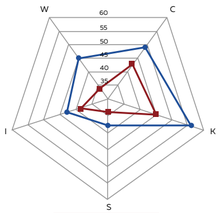
Haarlemmermeer



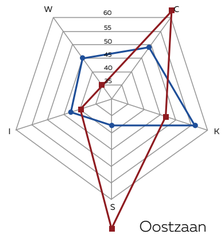
Heemskerk



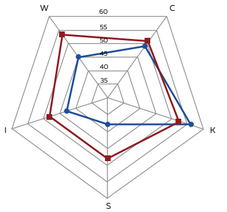
Heemstede



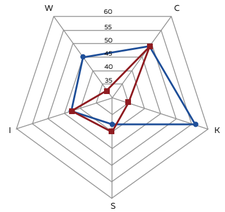
Lelystad



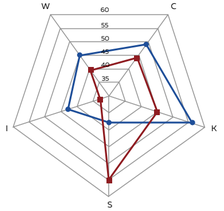
Oostzaan



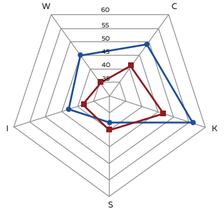
Ouder-Amstel



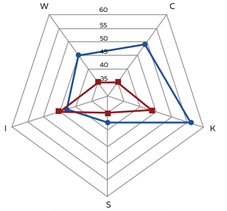
Purmerend



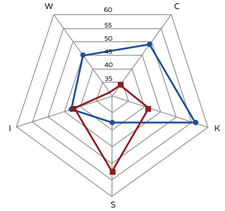
Wijdemeren



Wormerland



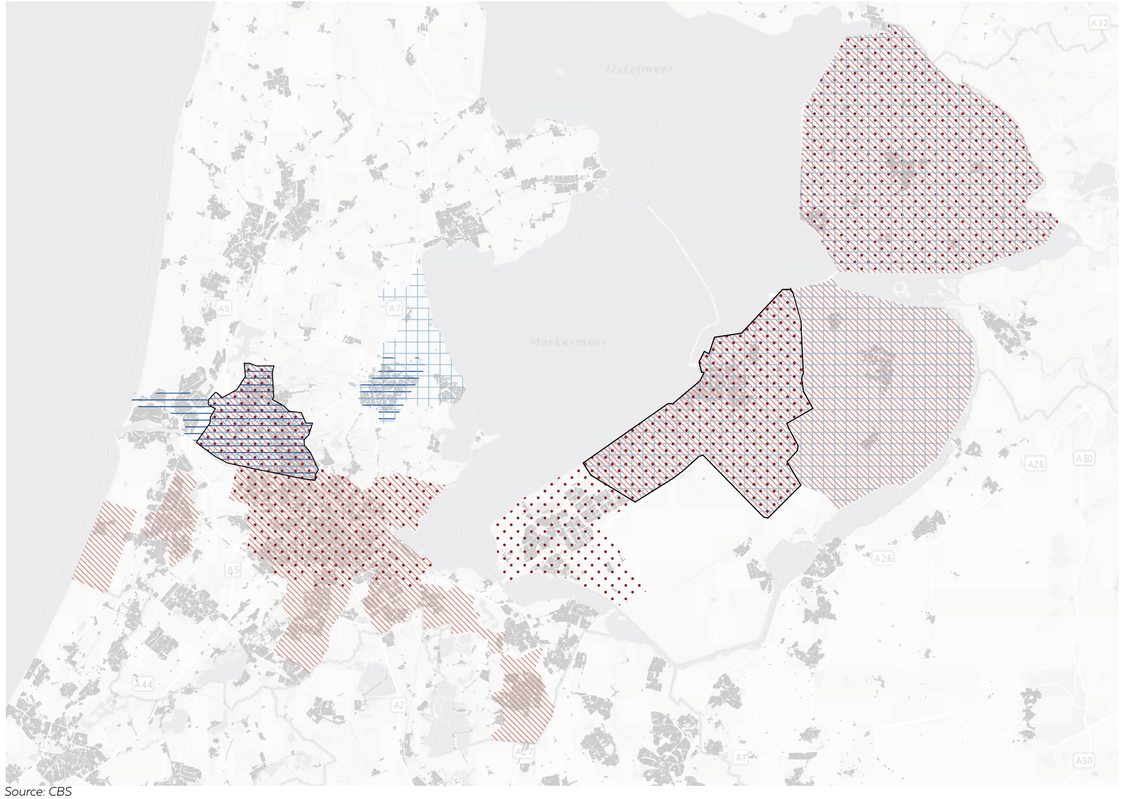
Zaanstad



Zandvoort

FOOD & SOCIETY

CONCLUSION - SOCIAL SEGREGATION



Source: CBS

High percentage of non western immigrants (>18%)

High percentage of low skilled population (>23%)

Very low average income (< 30.000€/year)

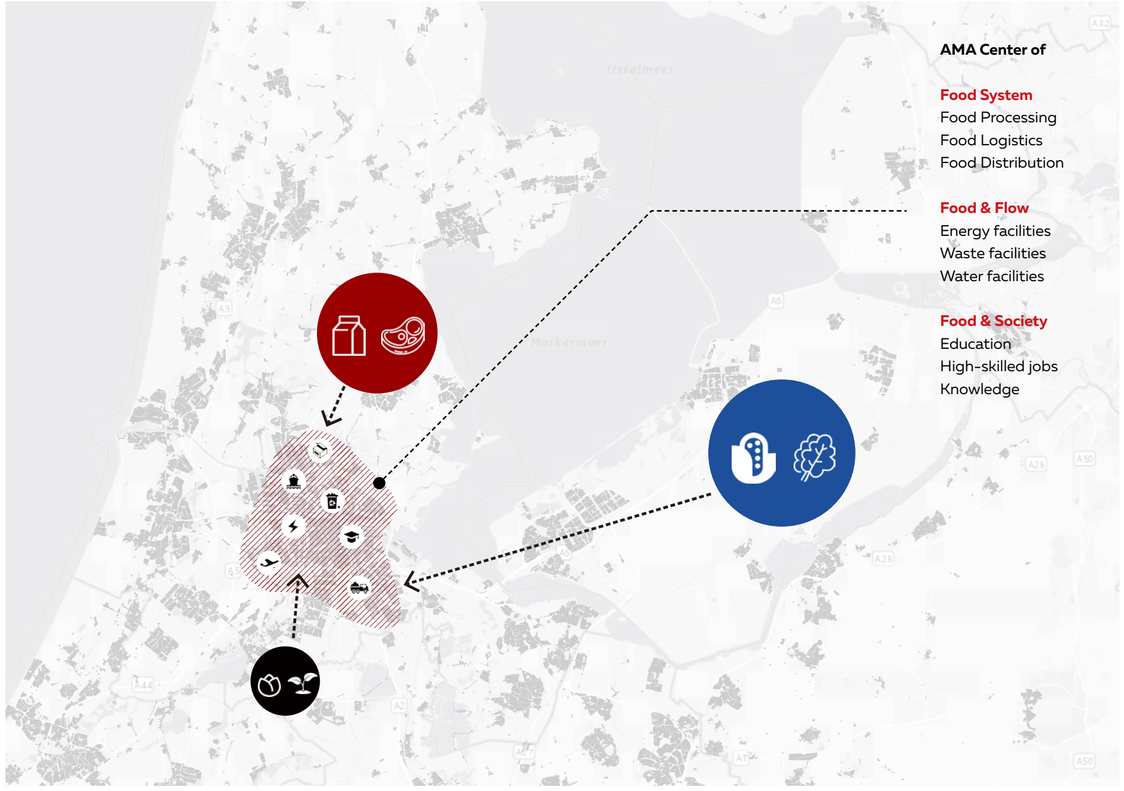
High unemployment rate (>7%)

N

0 3.5 7 14

After analyzing the income, unemployment rate, amount of low educated population and non-western immigrants, it is clear, that the municipalities of Lelystad and Zaanstad are showing the highest socio-economic vulnerability in the AMA. (CBS, 2016)

CONCLUSION OF ANALYSIS



Through the analysis of current food system, food & related flow, food & society, we can draw a conclusion that almost everything is concentrated in the Amsterdam and surrounding area.

From food system perspective, it is the center of food processing, food logistics and food distribution.

From food & flow perspective, it is the center of energy production (fossil fuel energy) , waste and water treatment.

From food & society perspective, it is the center of high-skilled jobs, education and knowledge.

REGIONAL VISION

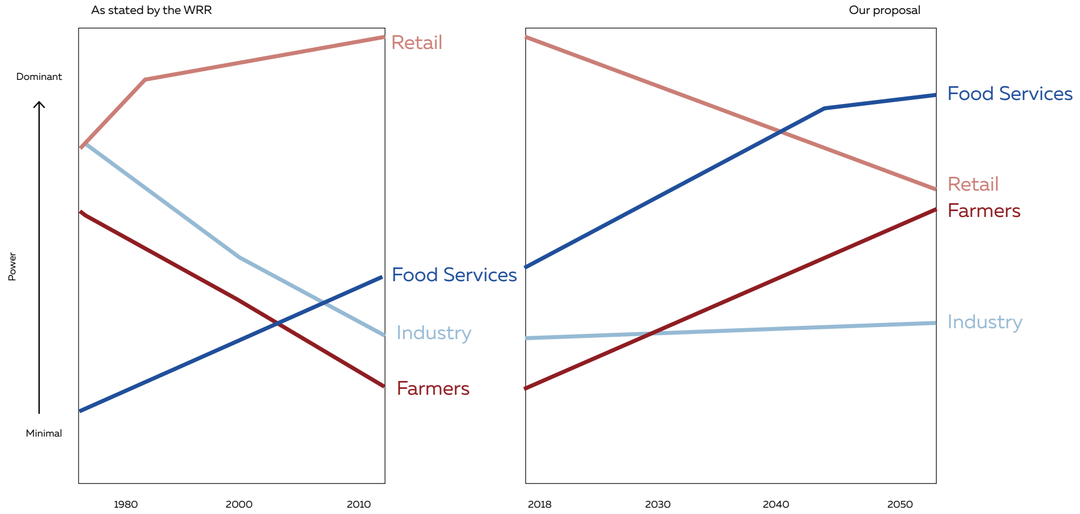
RECIPE FOR RESILIENT AMA

The regional vision states the direction in which the AMA has to go. Using maps and sections the vision on the food sector and the other aspects that were previously researched, will be shown.

- Power positions
- The new agrifood sector
- Vision map

POWER POSITIONS

HOW THE POWER SHOULD BE DISTRIBUTED

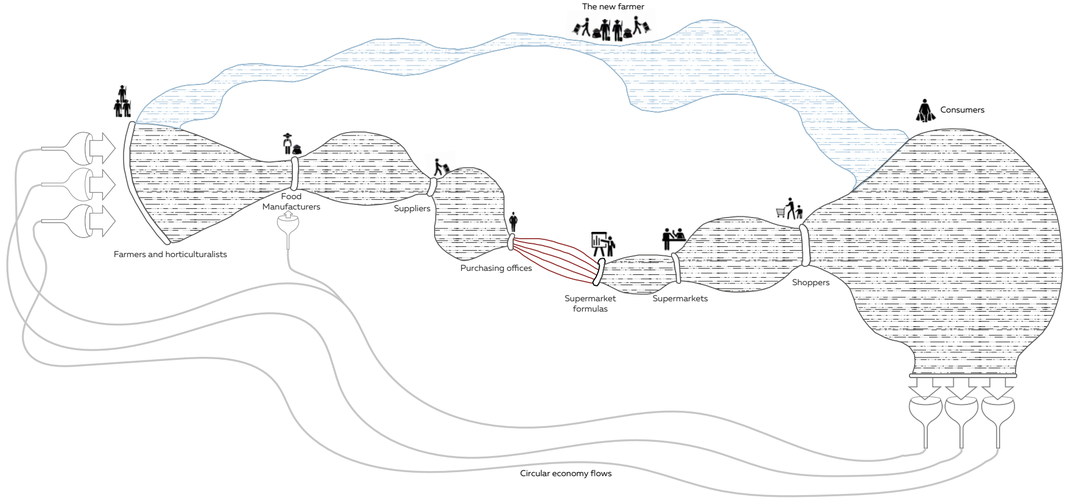


In our vision we strive to reform the power of the four traditional stakeholders in the sector. These stakeholders, the retail, food services, industry and farmers have over the recent years shown clear trends as to what direction they were going in the future. The retail sector nowadays has the biggest power position, followed by the upcoming food services, the down-trending industry and the farmers.

We propose a reinforcement of the food services trend, a more powerful position for farmers while the retail sector loses some power. This balances the power more evenly throughout the sector and complies to our goals in localising the food sector. Food services can play a key role in the realisation of a local food infrastructure, while the farmers process and distribute their own produce.

THE NEW AGRIFOOD SECTOR

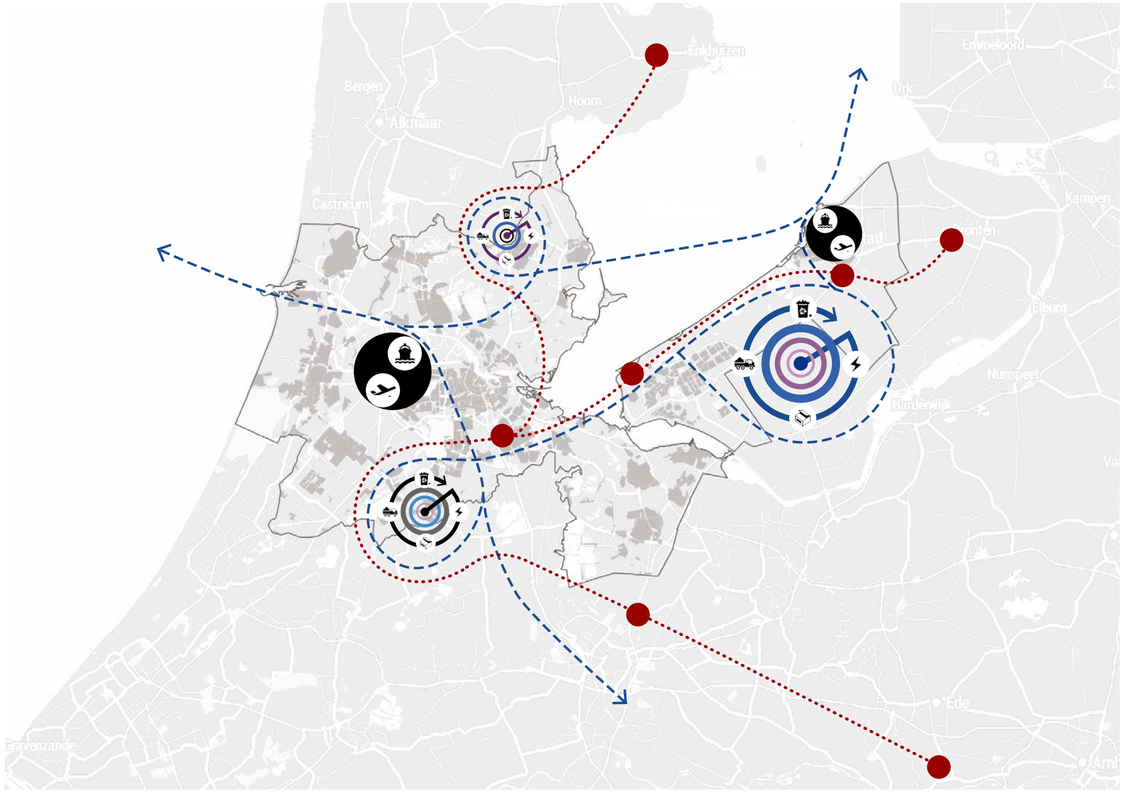
THE NEW FARMER PROMINENT PLACE IN CIRCULAR AGRIFOOD SECTOR



The new food cycle will integrate multiple new aspects. The farmers will create a new localised market in which they produce, process and distribute their own crops. This new market is supported by food hubs in the cities and based on food services that work in the same way as Picnic and HelloFresh. The new farmer does not only integrate the processing and distribution as new forms of activity, he or she also directly uses a localised form of circular economy to produce ground materials and new environmentally sustainable products like biodiesel and bio plastics by re-using residual streams. For the new sector model this means the power of a farmer grows because he or she gets an viable business alternative to the traditional food chain.

This limits the power of the five big purchasing offices in the chain. For the locality it will mean more low to middle educated technical jobs in the sector which positively affects the socio-spatial polarization.

VISION MAP



AMA regional vision is based on three different layers:

- Agrifood hub & localized economy

Diversify

Deconcentrate

Localise

- Transportation connection

Multiple

Sustainable

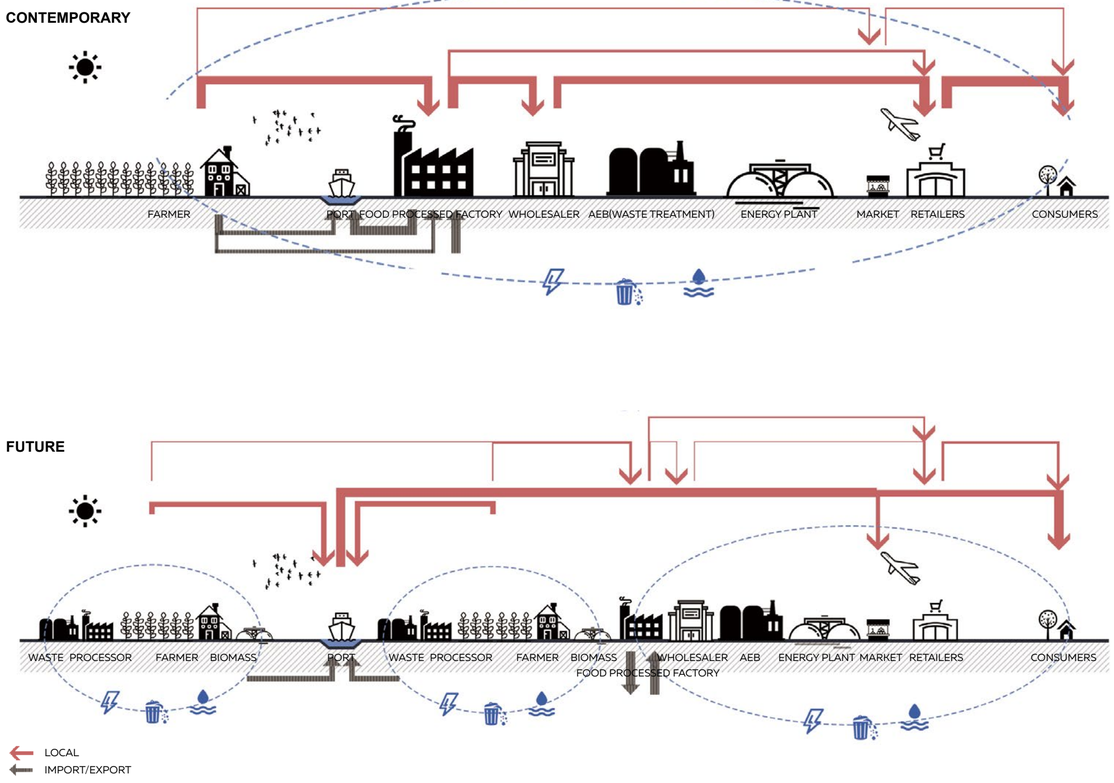
- Knowledge corridor

Communication

Cooperation

VISION MAP

SCHEMATIC SECTION



VISION MAP

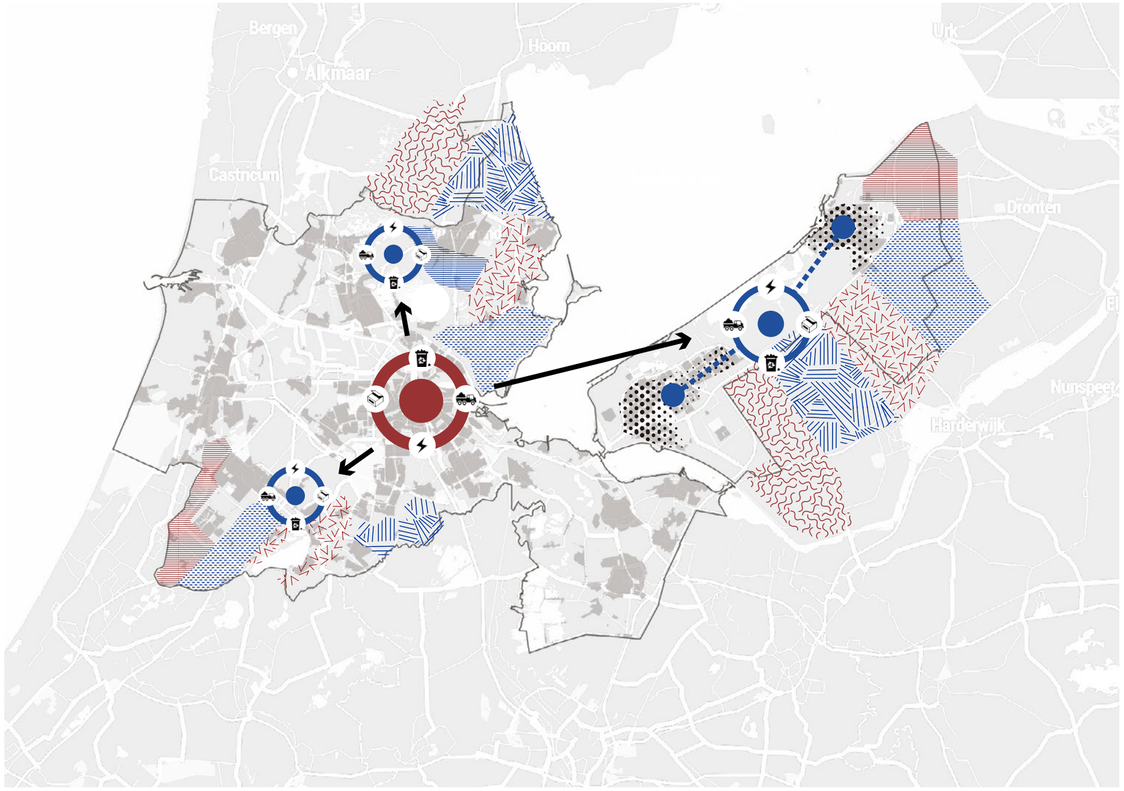
AGRIFOOD HUB & LOCALIZED ECONOMY

Vision Goals

- Diversify the agriculture products according to local demand.
- Deconcentrate the processing and distribution function, create several local 'Agronomic hub' to partly combine the food production, processing and distribution. Also make the resource circular in the local scale by improving the food system.
- Strengthen the relation between Almere and Lelystad, creat twin-cities and make them support and complement each other.
- Create local jobs in local sector and improve new economic products.

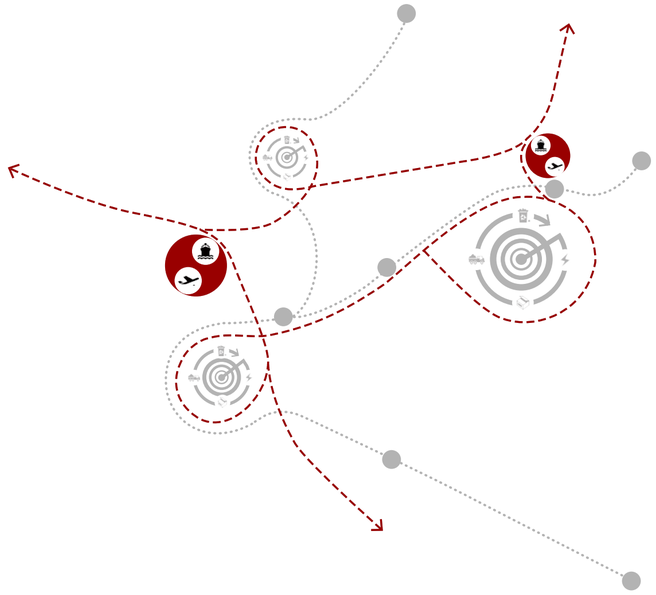
VISION MAP

AGRIFOOD HUB & LOCALIZED ECONOMY



VISION MAP

TRANSPORTATION CONNECTION



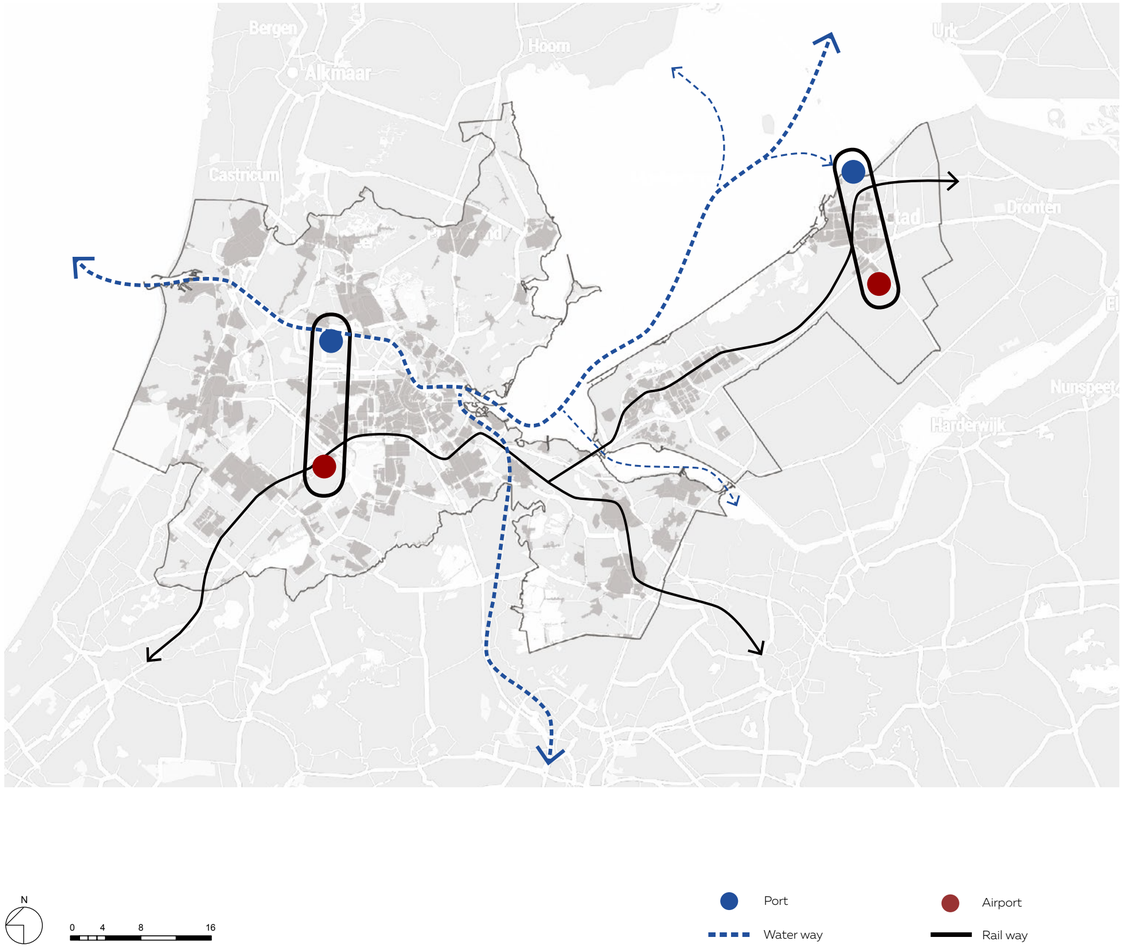
Vision Goals

- Enhance the relation between port and airport for food import and export in the global scale.

- Reuse the waterway and make use of the railway system.for food transport and distribution in the regional scale.

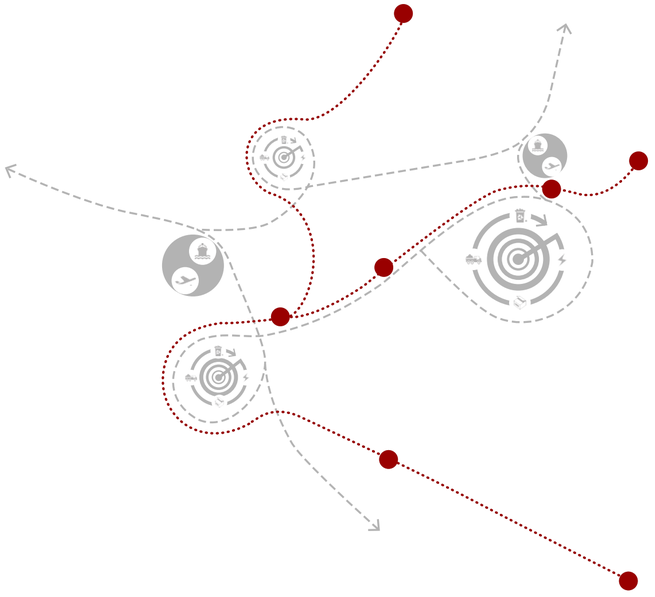
VISION MAP

TRANSPORTATION CONNECTION



VISION MAP

KNOWLEDGE CORRIDOR

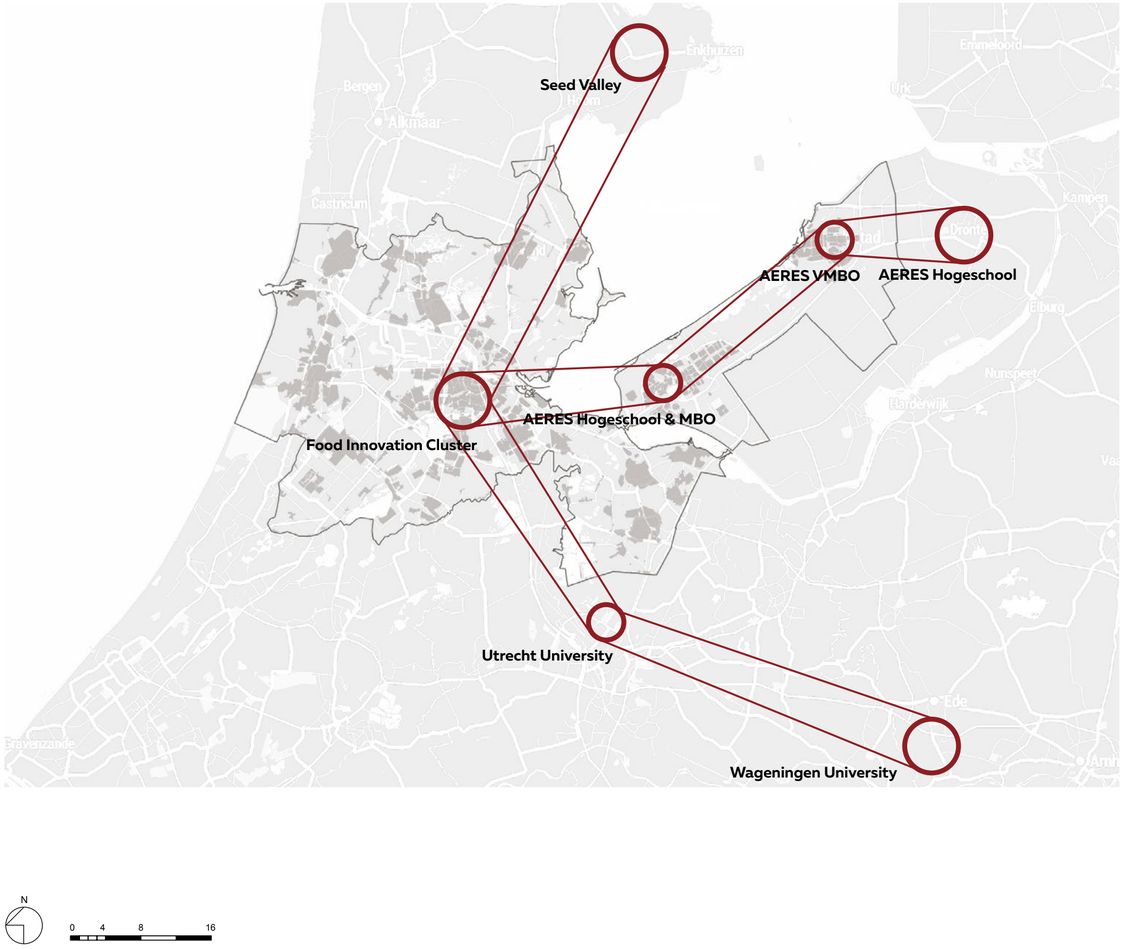


Vision Goals

- Strengthen the connection between different food related knowledge clusters and offer the support to the high-tech food system.

VISION MAP

KNOWLEDGE CORRIDOR



DEVELOPMENT STRATEGY

BLUEPRINT FOR AGRONOMY

In the development strategy the report states the essential policies and projects needed to reach the vision. The development strategy is multiscalar and will go from the supranational scale to the local scale. It also holds a roadmap and a timeline in which a suggestion of steps to be taken is included.

- Strategy map
- Stake holder analysis - regional
- Nutrition for sustenance
- Alternative protein research
- Business model - regional
- Road map
- Proposed policy outlook

DEVELOPMENT STRATEGY MAP

In the regional strategy traditional water- and railwaytransport is reinforced. Flevokust Harbor will be directly connected to the harbor of Amsterdam, Zaanstad and the seed valley in Enkhuizen via waterway.

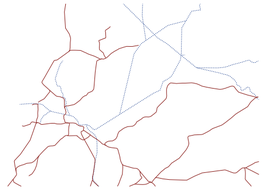
There will be introduced four different kinds of food hubs in the AMA region according to their surrounding production and condition. In Flevoland and Haarlemmermeer the main trading products of the proposed food hubs will be crops, alternative proteins & vegetables, whereas in Zaanstad region with its grasslands the main stake will be organic fertilizer, meat and dairy products. The food hub in Enkhuizen will be mainly for regional seed distribution. In our proposal the Food Center Amsterdam trades exclusively regional products and redistributes them to its sorrounding areas. This variety in production allows the AMA to work in a circular way in a regional scale. The organic fertilizer produced in Zaanstad can be used in Flevoland and Haarlemmermeer, the in Flevoland produced crops, proteins and vegetables can be consumed in the whole region, seeds breeded in Enkhuizen can be grown in the production lands. Thereby the trading between the new introduced products and food hubs will happen via sustainable collective transport ways.

Conclusively in the region are two main distribution hubs for agrifood: Lelystad with the direct connection to the Flevokust harbor and the new airport with cargo potential, and Amsterdam Food Center with the closeby harbor and Schiphol airport.

Another important point is to introduce new bio-energy plants and deconcentrate energy production in the region. New plants are projected in proximity to the before explained food hubs and agricultural production land, as for example in Almere, Zaanstad and Emmeloord.

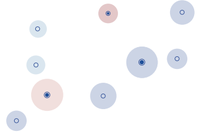
Besides that, we also propose an upgrading of the existing water purification plants in the region, in order to increase the capacity and facilitate integrated water reuse systems to close loops of waste water flows.

Production land



Transport

Logistics



Food hubs

projected bio-energy plant

existing bio-energy plant

upgrading of water purification plants (water reuse)

Food hubs

Distribution hub

Distribution & re-distribution hub

Reinforcement of existing transport ways

ship transport

rail transport

Main trading products of food hubs

crops, alternative proteins & vegetables

Organic fertilizer through paludiculture, Meat & Dairy products

Seeds

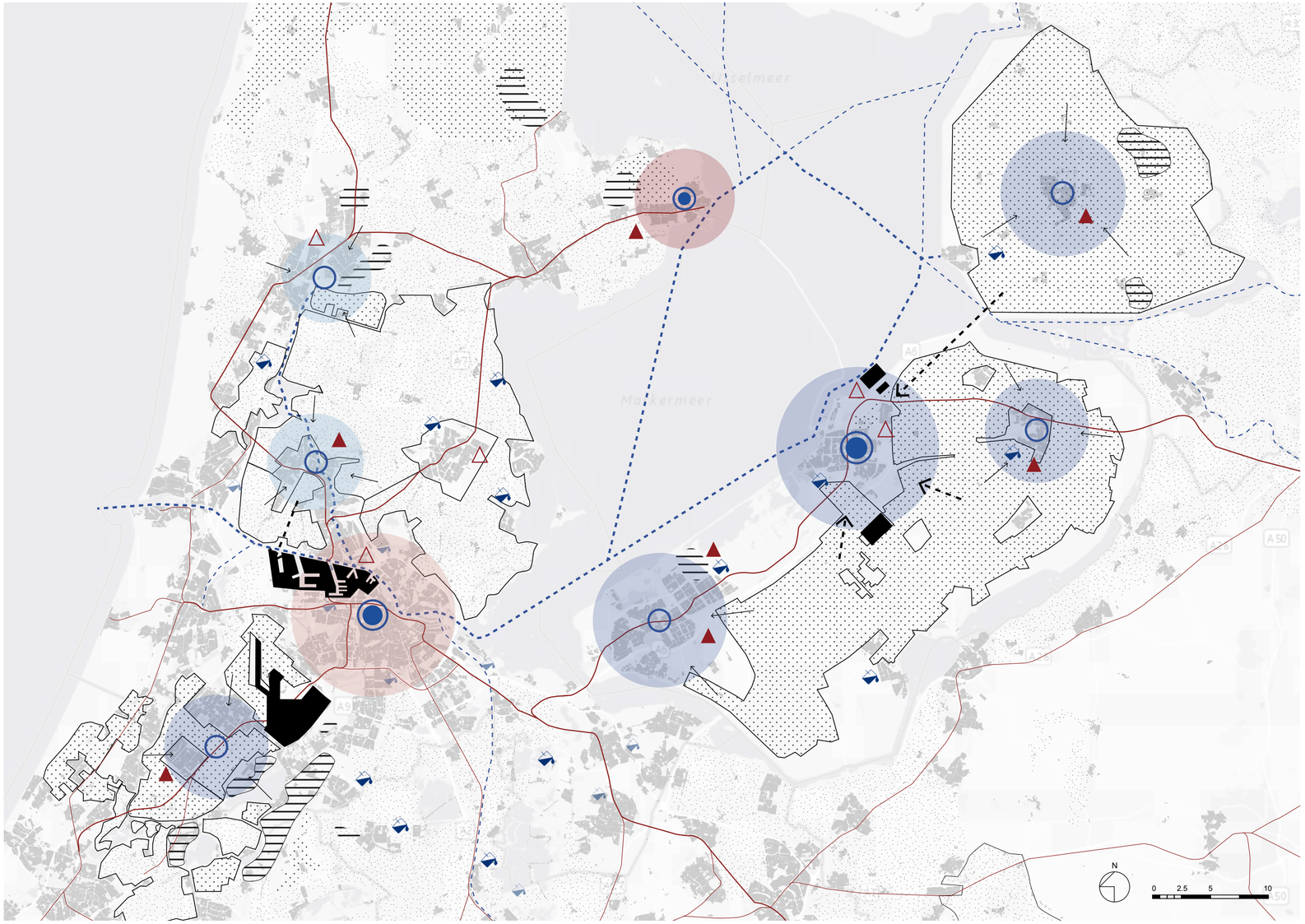
Re-distribution

Main agricultural landuse

grassland

arable farming

greenhouses



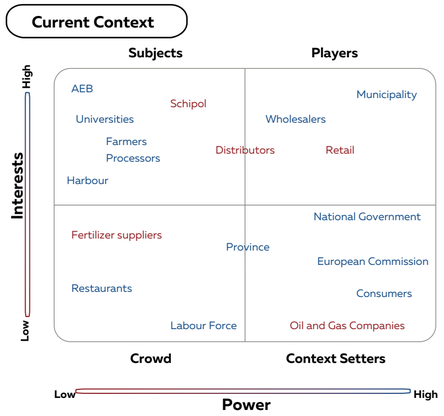
IMPRESSION

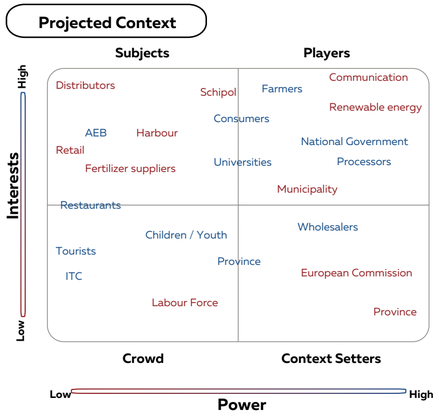
FOOD HUB

IMPRESSION

TRANSPORT

STAKE HOLDERS ANALYSIS - REGIONAL





Producers

Cropland farmers
Green house workers
Grassland animal rearers
Labourers
Organic farmers
Seed cultivators
Fertilizer & Manure producers

Energy Producers

Wind energy farm producers
Bio energy producers
Solar energy farm workers
water treatment plant workers
Other energy producers

Manufactures

Processors
Packaging & branding

Bio-energy
- Green mill
- Biocel
- ZAW

Wind power
- Noordoostpolder
- Princess Alexia
- Rachel Carson

Solar power
-Delta Ohm
-Vermeer
-EKO

Fossil fuel
-Demen
-Maxima
-Wlison
-Hemweg Centrale

Knowledge workers

AMS Insitute
Seed Valley
AERES Hogeschool / MBO
AERES VMBO
Urecht University
Wageningen University

Distributors & Logistics

Siligro Hanos
Makro
Royal Flora Holland
Deka
Coop
Lidl
Jumbo
Dirk
Plus
Albert Heijn
Schiphol aiport
Haarlem port
Amsterdam port

Food Hubs
Food Enterpreneurs
Farmers Market

Governance

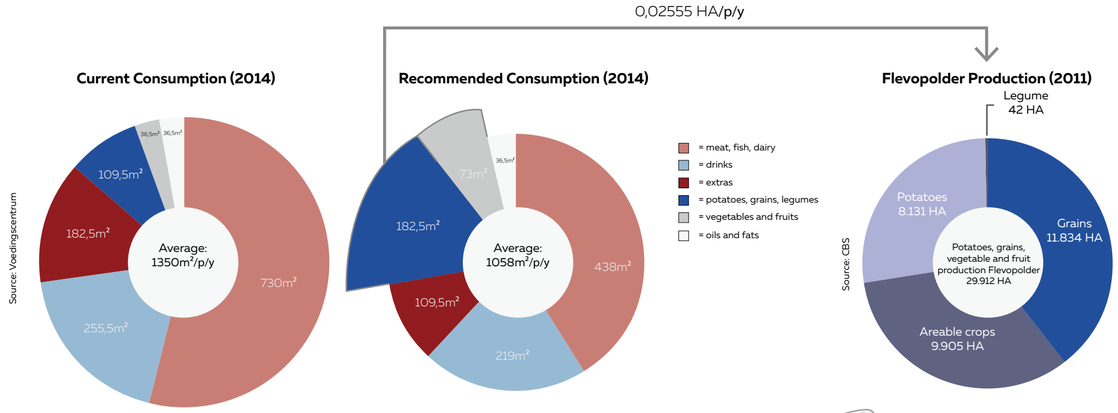
Metropolitan Region Amsterdam
32 municipalities in AMA

Food Tables (municipal)
Food Council (regional)
Rabobank

Other players

Catering and hospitality
Restaurants
Tourism sector

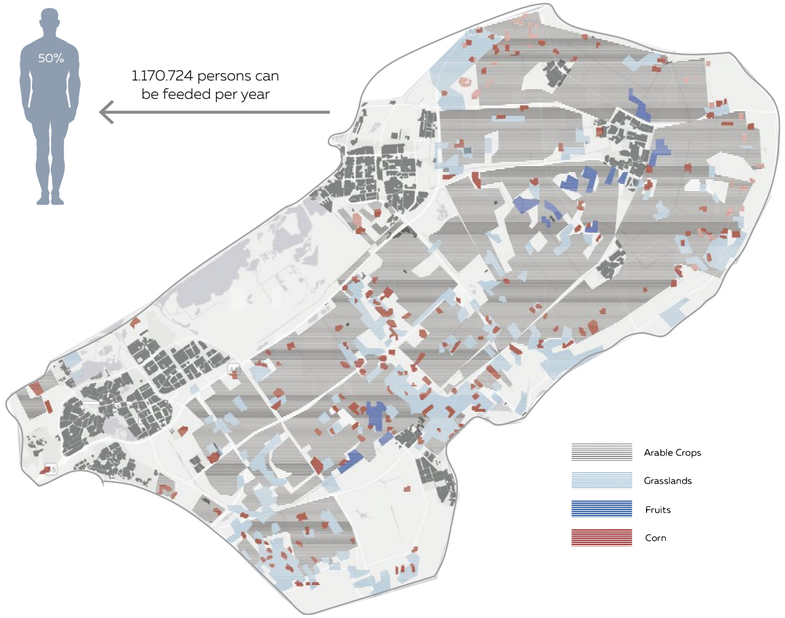
NUTRITION FOR SUSTENANCE



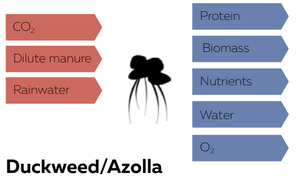
When looking at the current average consumption of an AMA inhabitant, one can calculate the area needed for the production of the products consumed. As seen in the graphic, meat, fish and dairy products take up most space in an average diet: as much as 730m² per year. When looking at the recommended consumption, the amount of space needed per year is considerably lower.

In the Flevopolder already a big chunk of potatoes, grains, areable crops and legumes are grown for human consumption. Most of it is export oriented, however when these crops would be solely for the local market, the recommended consumption of potatoes, grains, legumes and vetables/fruits can be realised for as much as 1.170.724 persons.

In the current business model this is not realistic as the exporting of these products is more viable. However, when the business model would be overturned to a more indeginous local one, already most of the people in the direct region and even parts of Amsterdam can be fed solely by the Flevopolder.



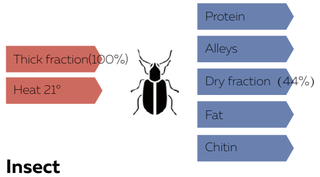
ALTERNATIVE PROTEIN RESEARCH



Duckweed/Azolla

Vegetable protein / raw materials
35-43% PROTEIN

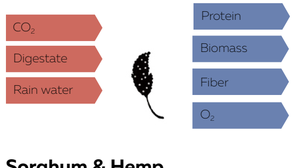
Duckweed is the smallest and fastest growing flowering plant on earth and is full of proteins. It exists 35 to 43 percent from protein, about the same amount as soy and it can double within 16 to 24 hours. because of this the yield in biomass per m2 is ten times higher than that of soy. It grows in water and therefore does not use it farmland and feed on nutrients from the water, which purifies the water. It is a good candidate for generating biofuel because it is 5 to 6 times as much starch as corn, now mainly used for making biofuel. Farmers also use it for feeding cattle, both fresh and ensiled. For the soy requirement (in addition to the regular grass) on an average company with 70 cows to replace with Duckweed requires 3 hectares of cultivation. From recent research has shown that duckweed is competitive with soy. The cultivation of duckweed can be done outdoors basins, fed with diluted thin digestate from the manure fermentation. The revenue is than 15 tonnes of dry matter per hectare. At the moment duckweed is only used as cattle feed allowed when cultivated within the same company and being fed. Duckweed as a biofuel anaerobic digestion provides 3000 cubic meters of biogas per hectare per year. Duckweed as farmed fish supplies 10 tons of tilapia fillet per hectare of duckweed per year.



Insect

Human food / feed
80% PROTEIN (Cricket)

Insects are an indispensable element in the processing of residual flows. However, at this time they are not yet on a large scale in the humane food chain, because insects are allowed considered livestock and cattle may not consume cattle.
An average of 1.5 kg of feed is needed for 1 kilo of insects.Insects based on animal protein flows, such as the larvae of the black soldier fly, lined with for example offal or the thick fraction of digestate from the manure fermentation are not (yet) used as animal feed or food. Also breeding fish fed with insects animal proteins are not (yet) permitted. Exceptions are the live-fed insects in, for example, chicken farming and processing oil particles used in cattle feed. Insects that do with animal proteins are fed are used as (home) animal feed, bird feed, ornamental fish feed or in fishing.
The black soldier fly is currently being used to process manure in a trial in Flanders. The animals are grown for a month on the manure and have a feed conversion of 4 (4 kg feed per 1 kg body weight). The larvae are used for it manufacture of products. Fats are soap and cleaning products and chitin can be used at purifying water or making a bandage. The manure that the larvae produce is low in phosphate and nitrate and is therefore good to use as fertilizer for agriculture



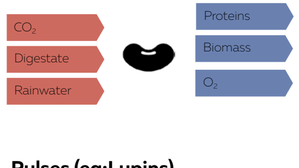
Sorghum & Hemp

Vegetable protein / raw materials
8%-11% PROTEIN

Sorghum is used as a vegetable protein in animal feed. Cultivation of sorghum is possible Northern Europe is profitable. That proves field trials from KU Leuven. Local cultivation of sorghum is not only economically interesting, but especially an important evolution in the sustainability of Western European agriculture. The cereal can handle with little water and thus offers opportunities to prevent desiccation. Sorghum has the advantage that it is more drought-tolerant than corn. Hemp is also used as a vegetable protein in animal feed. On fields in Twente and the Achterhoek is hemp grown on a small scale. The is used as cattle feed for, for example, dairy cows. Hemp is a fiber-rich product and therefore suitable to stimulate the contraction of the rumen and the improve digestion. In addition, hemp can serve as a raw material for various purposes. In front of for example rope, paper amplifiers and insulation materials. But, also for fibers that are used in the automotive industry to strengthen dashboards.

Source: StudioMarcoVermeulen_ArgoAsdePeel_Boek_webversie
Sciencedirect
Keydollar
Wageningenur
Feednavigator
Pigprogress
Fao.org
Eenvandaag
Naar nieuwe ketens voor het benutten van eendenkroos,WUR Animal Sciences Group

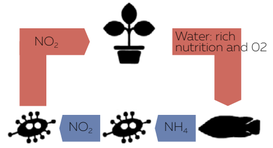
ALTERNATIVE PROTEIN RESEARCH



Pulses (eg:Lupins)

Vegetable protein / raw materials
48-65% PROTEIN

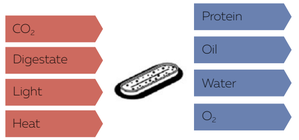
Lupins are perennials that are a possible replacement are from soy in pig feed. These plants are now hardly used because the yield per hectares (currently 2 tons / ha) is lower than that soy (currently 3.2 tons / ha). The theoretical however, the yield of the two plants could be the same are bred as Lupines. Research shows that with a total replacement of soy with skinned lupine beans there is a small growth gain in respect to it of a diet with soy. I would feed pigs theory for 35% (350g / kg) may consist of lupins.
In the Netherlands is currently on the farm Annechien ten Have made use of lupins as pig feed. The price of the pork is higher than the normal price but there is use of Lupines requires less antibiotics and taste seems to be better. This plant has a landscape also benefits because it is a beautiful colored flower that could enrich the landscape.



Aquaponics

Vegetable proteins / animal proteins / raw materials

In an Aquaponics system, the cultivation of fish (aquaculture) combined in a symbiotic way with growing plants (symbiotic culture).
The excrement (mainly NH4) of fish that getting into the water by bacteria first converted to NO2 and then to NO3. This serves as food for the plants that use the water to grow. Because of the soil and the plants the water purified and rich in O2. The fish are fed with insects and remains of the plants.
An aquaponic uses on average 90% less water than traditional agriculture and plants grow twice as fast. In addition, produces the farmer has two products and is therefore less sensitive to fluctuations in the market.



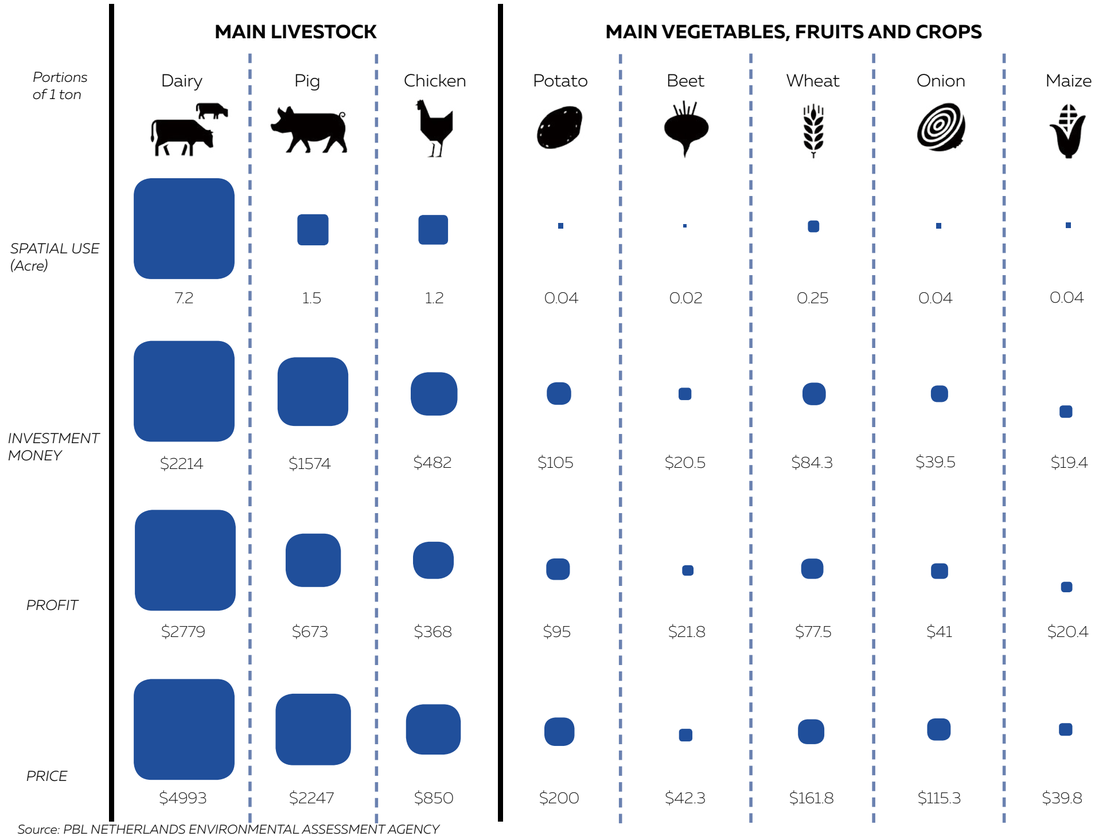
Algae

Vegetable protein / water purification
>60% PROTEIN

Algae are also called the green gold because there are many different types with different properties and applications. Algae are very versatile. They are now mainly grown for the production of biofuel. Some species are processed into oils. Other algae species contain a lot of proteins. Due to the high protein content algae excellent animal feed, as a substitute for soy. from research shows that algae up to 30% of the pig feed and can make up to 17% of the chicken feed.
In addition, pigs have a 10% better growth and a better final weight if they are fed algae. Algae grow on water and also use light, heat, CO2 and nutrients to grow. If nutrient can excrete the thin fraction of the digestate a bio-digester can be used. The influence of light is hereby very important for the growth rate. Therefore the thin fraction of the digestate must be diluted to 1:20 so that enough light can penetrate into it turbid water. A yield can be obtained in open basins from 20 to 25 tonnes of dry matter per hectare become a year. Options for special algae crops they grow in fermentation tanks, without light and with sugar input, causing omega 3 fatty acids.
Also for algae, it applies only in the human food chain (food and feed) come when they are not on animal manure grown unless the algae are pasteurized.

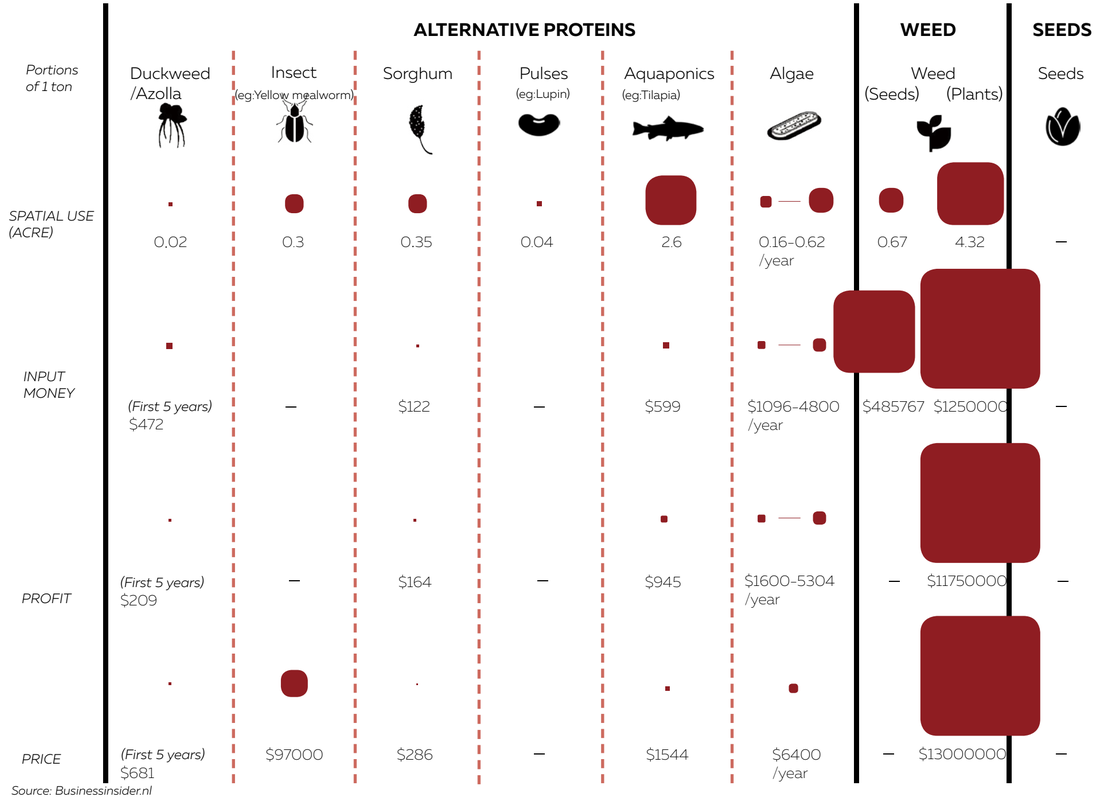
Source: Accress Lelystad Feeding Lupines to Pigs
Groenkennisnet
De groene belofte Algen. Biowetenschappen en maatschappij. Kwartaal 3 2013
Opportunities for micro algae in animal nutrition
Dagelijkse-kost-anno-2020-3-gebruik-van-algen-in-de-voeding-door-imogen-...
Dossier, insecten in veevoeding of als mestverwerker? Boerenbond.
Management & Techniek 10 22 mei 2015
Insecten als belofte, Veeteelt Tijmen van Zessen. 21 mei 2013.
Tijm Protix, 2015. "BPF – EEN NIEUWE PROTI-KETEN"
Topsectorenergie
Feedipedia

ALTERNATIVE PROTEIN RESEARCH



Source: PBL NETHERLANDS ENVIRONMENTAL ASSESSMENT AGENCY
Farmfolly
Agrifarming
Digitalcommons
Gov.mb.ca
Ers.usda.gov
Coststudyfiles.ucdavis.edu
Opendata.cbs.nl

ALTERNATIVE PROTEIN RESEARCH



Source: Businessinsider.nl
Fao.org
Sciencedirect
The Cannabis Seeds Business
An economic analysis of sweet sorghum cultivation for ethanol production in North China
Sciencedirect
Economic profitability of Nile tilapia (Oreochromis niloticus L.) production in Kenya
Insects_as_food_2015
Allaboutfeed
Opendata.cbs.nl
Procrop-lupin-growth-and-development

AGRIFOOD APPLICATION OF AZOLLA

1. Alternative and sustainable protein source

Azolla can be used as an alternative source of proteins. It is very suitable for animal feeding and has potential for human conspumtion. Nowadays 25% of cow-feeding can already be substituted by Azolla. Research can heighten this percentage significantly. For human consumption Azolla proteines can be used for alternative forms of meat, drinks, sauces and cosmetics. EU regulations are now being reconsidered to allow this extraction of proteines from azolla.

If 50% (10.000 hectares) of the Noord-Holland peatlands would be used for azolla paludiculture (production of 21% x 20 ton/hectare x 10.000 hectares = 42.000 tons of protein) , 5% of soy import would be unnecessary.

2. Biodiesel/bioplastics

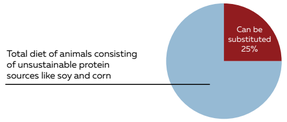
Considering the fatty acids profile, Azolla is suitable for usage as biodiesel or bioplastics. Per hectare of open paludiculture of Azolla, 600-800 liters of biodiesel can be produced. This isn't enough to be competitive against palmoil, but offers options when the extraction of Azolla is cascaded.

3. Fertilizer

Because Azolla is able to subtract nitrogen from the air, it can be harvested as a fertilizer. This method is already successfully being used in wet agriculture in China and India.

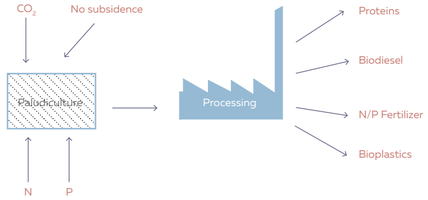
4. Phosphorus source

Azolla is being used as a method of bioremediation and water purification. This because Azolla subtracts phosphorus from Phosphate polluted grounds and waters. Case studies show that Azolla can succesfully absorb 100kg of phosphorus per hectare per season. This phosphorus can subsequently be used in agriculture



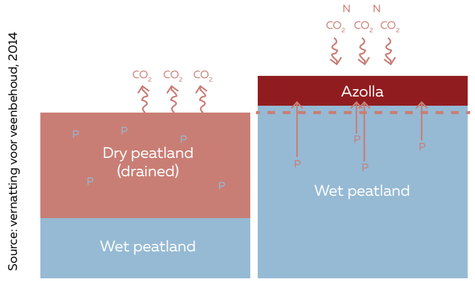
Source: Marktverkenning Paludicultuur, 2016

Source: Marktverkenning Paludicultuur, 2016



The system

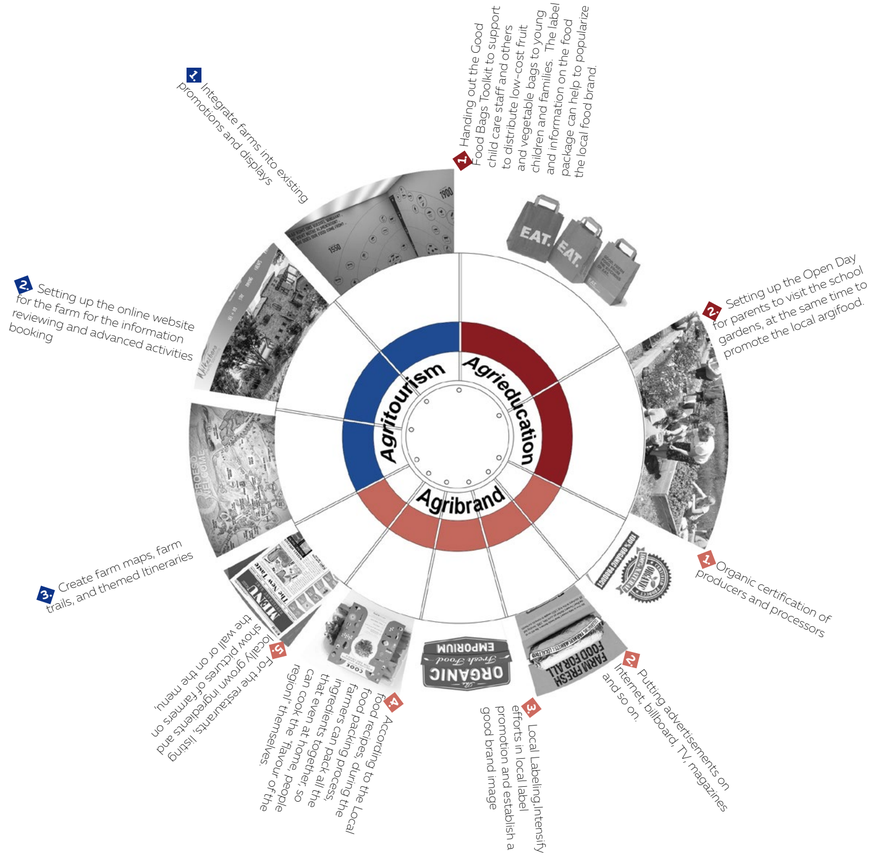
grasslands on peat that are suitable for paludiculture. This results in less to no subsidence and brings down CO2 emissions caused by peat. (Source: vernatting voor veenbehoud, 2014)



Before paludiculture

After paludiculture

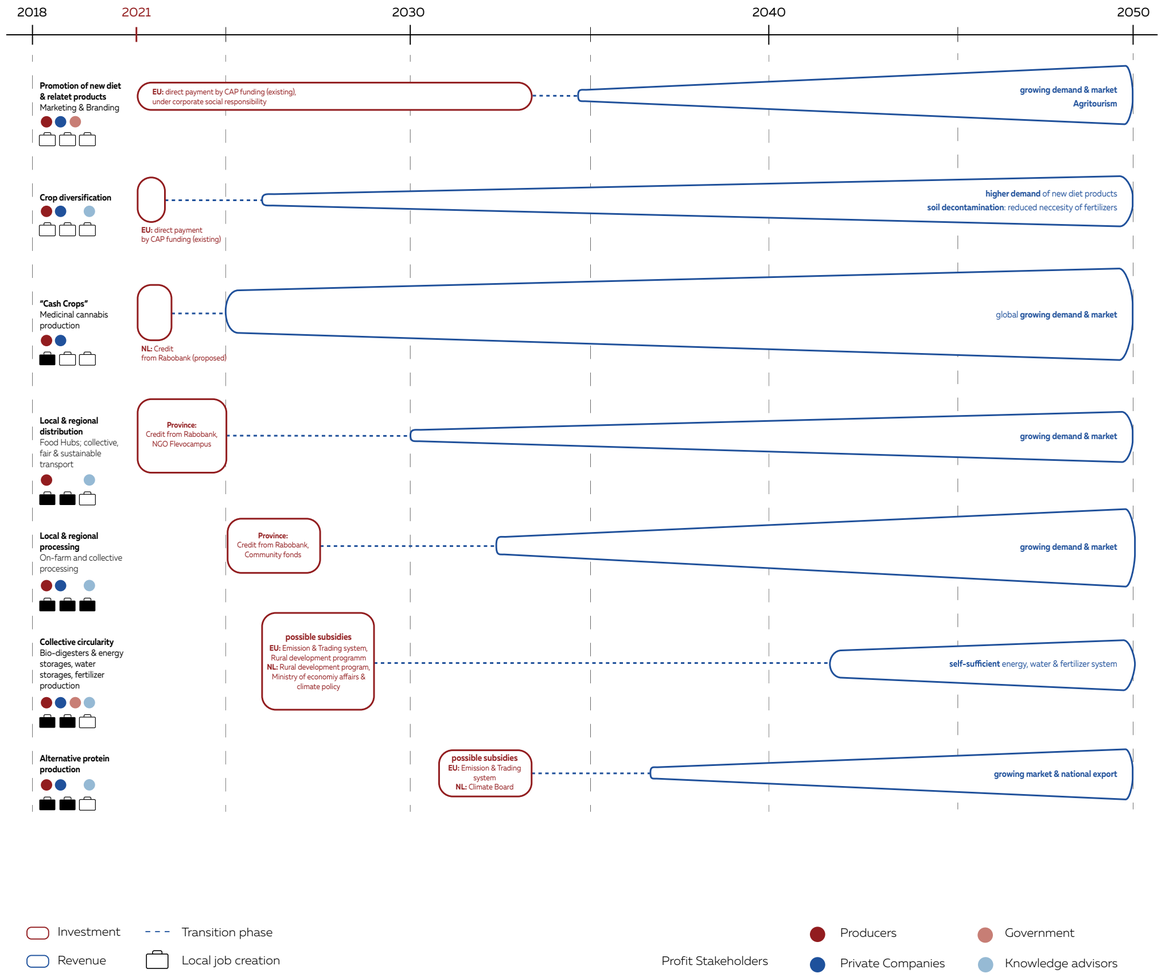
PROMOTION



http://www.wafarmtoschool.org/Page/98/promotion
https://attra.ncat.org/attra-pub/viewhtml.php?id=270
http://www.farmkingcounty.org/marketing-promotion.html#guides

In order to introduce the new diet better to the inhabitants, new sectors such as Agrieducation, Agribrand and Agritourism can be created and improved for promotion.

BUSINESS MODEL - REGIONAL



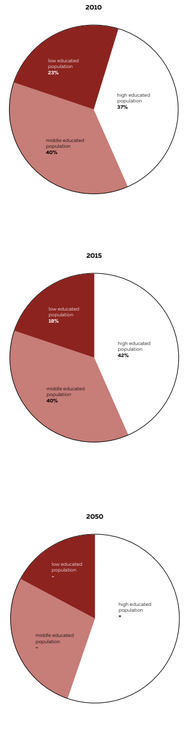
BUSINESS MODEL - REGIONAL

The regional business model gives an answer to the following questions:
How can a localized and regionalized agrifood system be introduced and made feasible within the context of the current globalized agronomy? Does is create new jobs in the transition phase, and if yes, in which moment? How can the agrifood sector be prepared to adapt towards the growing knowledge economy and the connected increasing amount of high educated population?

The introduction of "cash crops" gives the producer the opportunity to reach really high revenues after a short time and a relatively small investment. This allows further investments which require higher inputs, such as localized processing and the facilities for the collective circularity on the farm communities. This can be founded by proposed credits from the Rabobank and possible subsidies of the European Union and national government, such as the rural development program or the ministry of economic affairs. Especially with the introduction of local processing and distribution new working opportunities will be created, where they are needed. Alternative protein farming and the proposed circularity allow the integration of innovation in the agrifood sector and thereby the adaption towards the growing knowledge economy.

An accompanying ongoing investment besides direct on-farm transitions is the promotion of new diets and relatet products. This can be directly funded by the existing CAP policy of the European Union and can thereby also create a few new jobs in person-to-person promoting programes. Indirect revenues of this investment will come in time, when the demand and market for regional products has grown.

Population development and education level in the MRA

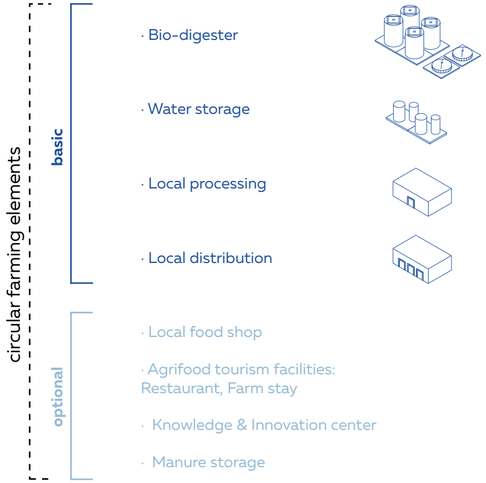


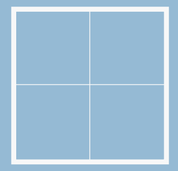
Source: Economische Verkenningen – Metropoolregio Amsterdam 2017

BUSINESS MODEL - REGIONAL

The current energy, water, food processing and distribution system of the AMA is concentrated in Amsterdam. The local business model proposes the creation of circular farming communities in order to deconcentrate the before mentioned functions within the region and close small loops of waste, energy and water streams. Thereby a more localised economy will be created and the farmer has the opportunity to regain power by working in a cooperative way.

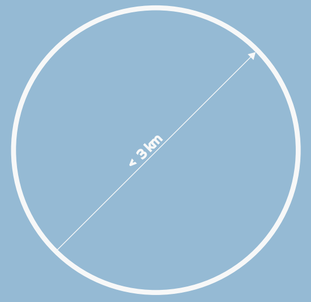
The minimum size of a farming community is determined by the needed amount of four stakeholders, which fulfill the follow ing functions: Energy production through a bio-digester, water storing, local processing and local distribution. The largest community size is limited by the maximum distance of 3km between two farms in order to keep the food miles and emissions low.
Bigger communities can include more circular farming elements than the four basic ones. In order do diversify and strengthen the cooperation, possible additions could be a local food on-farm shop, which sells the food products of all community members, agrifood tourism facilities like a restaurant or a farm stay hotel, a knowledge and innovation research center or in case of lifestocl farming, a communal manure storage.





Minimum size

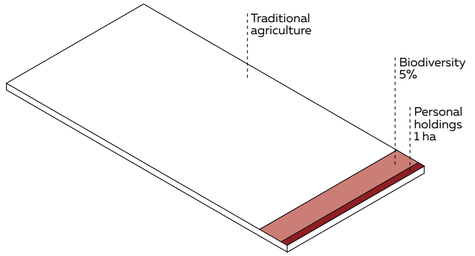
The smallest size of a circular farming community is determinded by the minimum amount of **4 stakeholders** due to the necessary basic elements for local circularity.



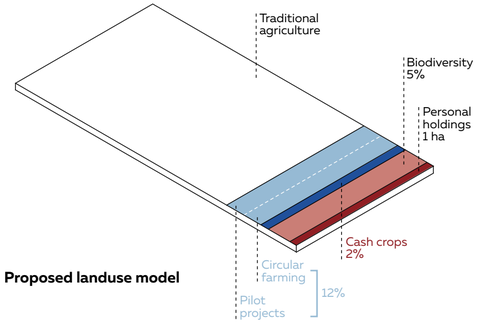
Maximum size

The largest size of a circular farming community is determined by the maximum **distance of 3 km** betweenn two different farms in order to reduce emissions and create a sustainable system.

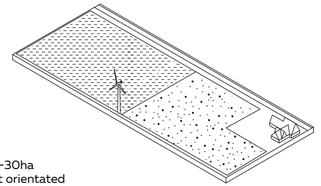
BUSINESS MODEL - REGIONAL



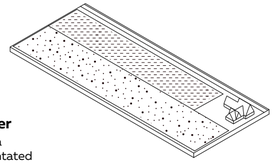
Current landuse model



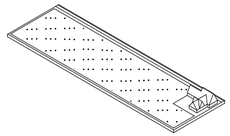
Proposed landuse model



Flevoland
· average size ~30ha
· mainly export orientated crops, wind farming



Haarlemmermeer
· average size ~20ha
· mainly export orientated crops



Zaanstad region
· average size ~5ha
· mainly grasslands

Pilot projects

alternative protein farming
- Insect farming
- Algae farming
- Cultivation of pulses
- Cultivation of sorghum

wet agriculture *[paludiculture]*
- Phosphor farming
- Production of organic fertilizer
- Protein farming

Cash Crops

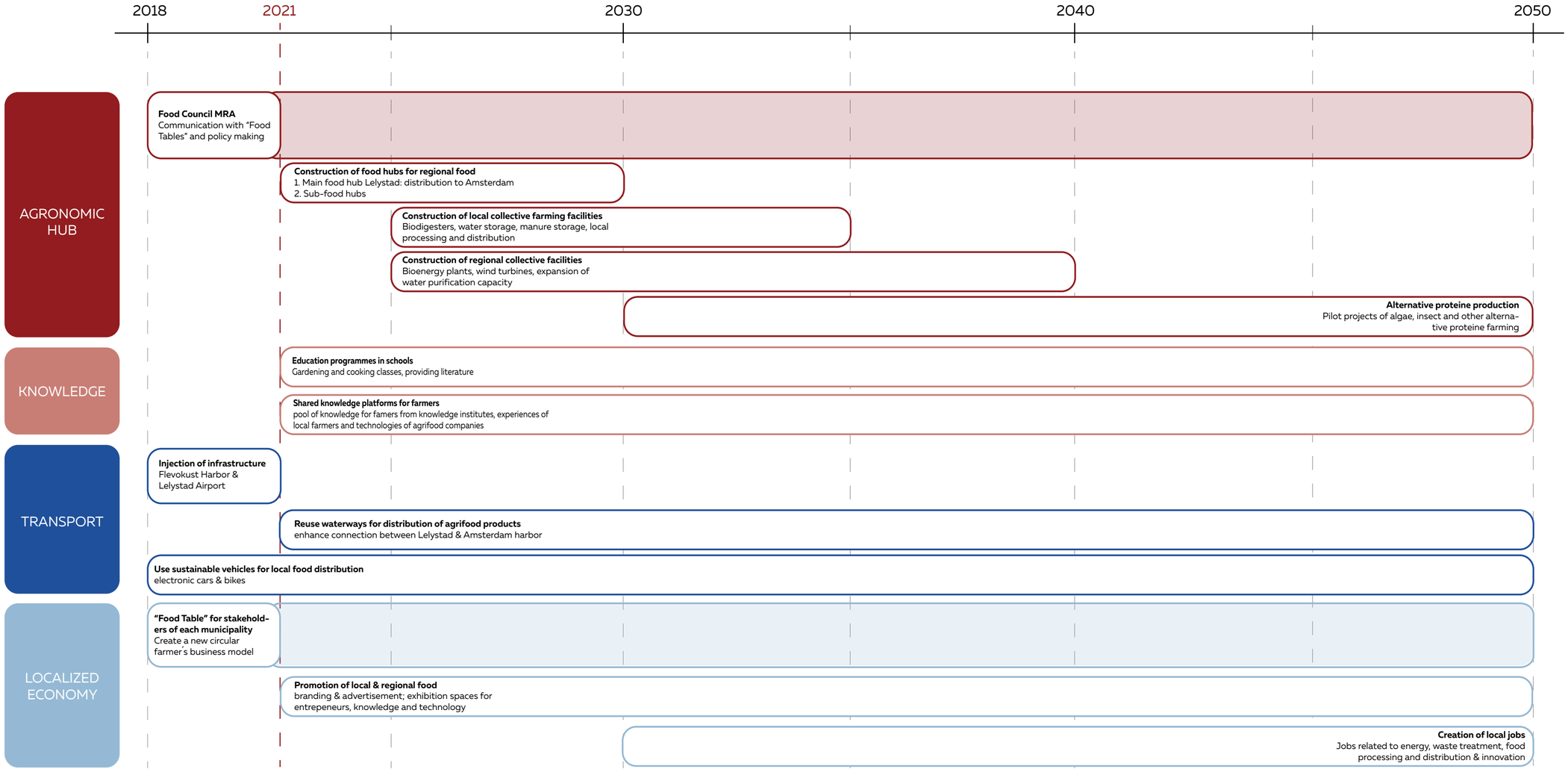
cannabis production

seed cultivation

The proposed landuse model for the agricultural production land plots in the AMA includes an additional 12% of circular and innovative farming, and also 2% of cash crops in order to make the changes feasible. The so called cash crops open up the opportunity to the farmer to have a small, but high efficient stake in the global market next to the localized food production. One example is the the cultivation of cannabis in greenhouses. Hemp products, such as textiles, tea and proteins, but also its medical and leisure purpose, can bring high revenues for the producer. The second option would be the cultivation of seeds, which also allows export stakes in the national and global market.
Depending on the conditions of the different regions, the pilot projects vary. Whereas paludicuture will be introduced in the sinking peatlands of Zaanstad region, alternative protein production, mainly on-ground, is suggested for Flevoland and Haarlemmermeer.

ROAD MAP

Before main actions of the strategy towards a regional agrifood system can start, the "Food Tables" (Voedseltafel) of municipalities have three years to decide on a tailor made business model for their region. The so called food tables consist of different stakeholders of the area connected to food production, processing, distribution, energy, water and waste, and will select representatives for the "Food Council" of the AMA. The food council discusses about policies and higher decisions.
From 2021 actions crom different sub-categories such as the agronomic food hub, knowledge, transport and localized economy can start. The food tabels and food council of the MRA will still be existent and meet regularly and be responsible for supervision, innovation and communication (Van de Wier, 2018).



PROPOSED POLICY OUTLOOK

FUNDING

- CAP174, 39 reformation-A special package of incentives and subsidies should be provided in a fair percentage to the farm lands that incorporate circular production practices and contribute for local and global marketing of the food produced.
- Market value of the food produced in the agronomic hub should cater to the fluctuation of consumer demands and the amount of food production.
- Transit of mass produced food products should only be facilitated by non-fossil fuel based large capacity transport network in the region.
- heavy tax duties should be imposed if mass capacity transit is unsustainable.

AGRICULTURE

- Promotion of protein rich food production and innovative farming techniques on the farm to increase the nutrient capacity of the soil with recommendation from the knowledge sector.
- Food production should be facilitated with technical and climate assistance from the knowledge and innovation sector to strengthen the position of the producers in the food chain.
- Promotion of specific year-round food production on the farm to increase productivity and ecological integrity of the crop in ecosystem of the AMA region with recommendation from the knowledge sector.
- 5% percentage of the land under farming will be reserved for ecological purposes, as per greening scheme. In addition, part percentage of the land collaboratively should be used for crop diversification practices and circular economy projects.

LIVESTOCK

- Certain percentage of the land under livestock farming should be reserved for restoration by paulidiculture and soil decontamination method.
- Tradable manure rights under Manure directives of the CAP policy should be specified according to scale of land and amount of CO2 emissions

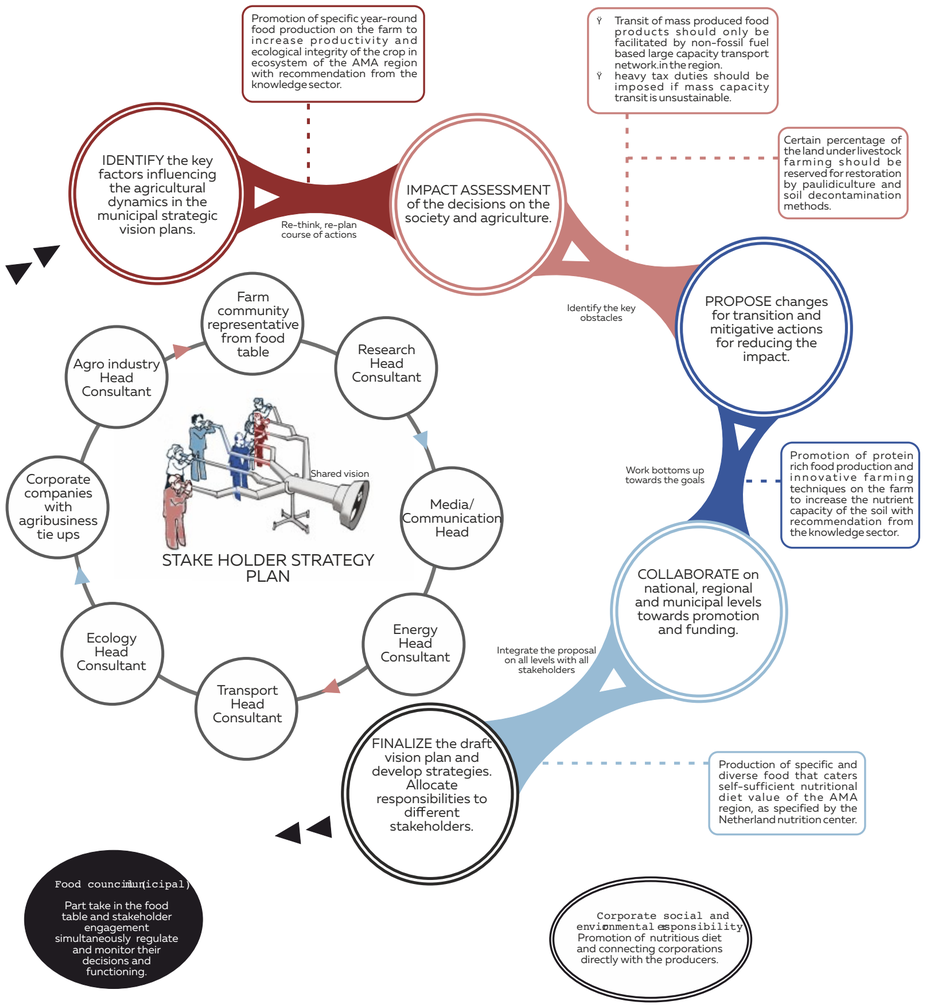
NUTRITION

- Consumption of alternative proteins should be undertaken with standards set by the Netherland nutrition center.
- Production of specific and diverse food that caters self-sufficient nutritional diet value of the AMA region, as specified by the Netherland nutrition center.
- Funding under corporate social responsibility should be allocated for "The Corporate Diet" of the company and should be paid directly to the producer and the distributor.

PROMOTION

- Food hubs should circulate and promote indigenously produced food products and services that fosters employment and economy for the community and the region.
- Execution of the CAP for the school scheme with the provision of the Union aid should be excessively monitored and promoted to promote healthy consumption practices from childhood.
- Promotion of 'farm to fork' like initiatives should be incorporated as a part of the "The Corporate Diet" program to promote healthy consumption practices in the corporate areas.

STAKEHOLDER ENGAGEMENT - REGIONAL



Engagement strategy

Formation of the food council

Selection of the senior representatives from the respective departments of agro-industry, research, energy consultants, ecology experts, transport and regional official.

Influence regional flows

Decisions and advises from collaborating agencies that affect the agribusiness on regional, municipal and local levels. Propose strategies and steps for mitigation.

Influence agribusiness

Regulate the import and export of the food ecologically and manage the resources in an optimum way.

Policy changes

Address the critical influence of the CAP policy in the agricultural sector and propose for a national food policy that benefits all actors equally in a supply chain.

KEY DEVELOPMENT STRATEGY: FLEVOLAND

TURN-KEY PROJECT

In this chapter the project will apply the development strategy in a more specific way. It makes clear what the spatial consequences are for the landscape and zooms in on the newly created communities. It is also a suggestion of what a local circular economy could look like.

- Updating Flevoland
- Current situation
- Local vision
- Regional circularity
- Business model - local
- Stake holders analysis - local
- Stake holders engagement - local
- Stake holders engagement - community
- Zoom in - farm community

UPDATING FLEVOLAND

THE PLANNING AND POLICY RENAISSANCE OF FLEVOLAND

The so-called 'Ijsselmeerpolders' have a long planning history that already dates back to 1848, when after the successful inpoldering of the Haarlemmermeer, the Zuiderzee got in the picture. Two events were necessary to convince the then liberal political landscape to vote for the inpoldering. First there was a food shortage during the first world war, which proved the vulnerability of the Netherlands in terms of food security. In combination with continuously rising population numbers, an expansion of the agriculture areal was deemed necessary. The second factor that influenced decision making was the flood of 1916. This proved the vulnerability of the dykes around the Zuiderzee (Haartsen, 2009: 27).

In 1918 the decision was made to execute the plans for the 'Zuiderzeewerken'. When planning the Flevopolder, the agricultural parcels could be planned in ideal sizes according to the mechanical standards, preferred business management, costs of landscaping and the land use of the time realised. Because of the absence of historical landscape structures, planners made straight block structures that were of big scale and rational. The post-war mechanisation made big parcels possible that were on average between 30-45 hectares with the biggest even comprising 60 hectares (Haartsen, 2009: 29).

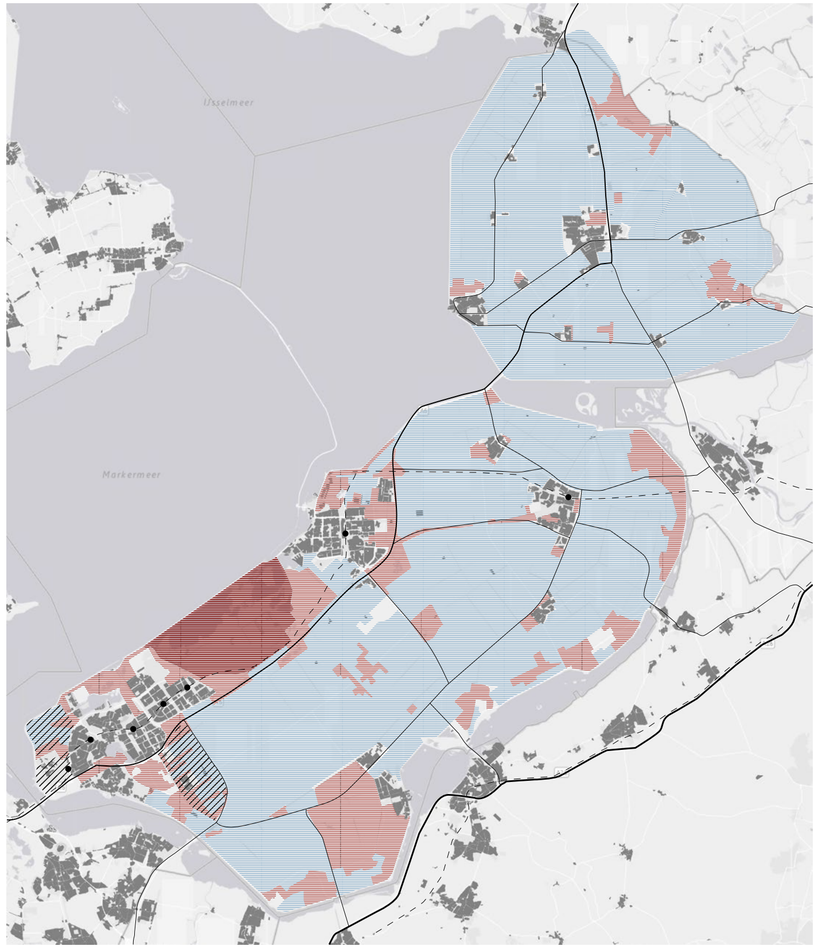
The rational planning according to a strict grid meant that planners thought they could create the society. Willem Drees, the prime minister of the time, and other people saw the Ijsselmeerpolders as the example of the makeable society. They expected that the settlers would leave all tradition behind, and create new land and a new society. The government had a very strict policy in the beginning that chose the settlers based on religion, social class and education. They also chose where these new settlers would come to live and work (Nieuw Land, 2009). Eventually the cities Almere and Lelystad started to grow and the government lost their influence on who lived where and did what.

Concluding, the Flevopolders are historically very planned and guided by strict policy. However, this policy has not been updated throughout the years, which lead to land consolidation and new typologies of agricultural companies. In this project we want to update the strict policies of the Flevopolders to a new 21st century form, which sets the direction towards a socially, environmentally and economic sustainable future for the Flevopolders. Planning instruments like prescribed uses of land guide the farmer towards circularity, while policies regarding cash crops and alternative forms of proteins create new opportunities. In this sense the Flevopolders will experience a renaissance, again to its roots.

Source: imgur

CURRENT SITUATION

URBAN & AGRICULTURE



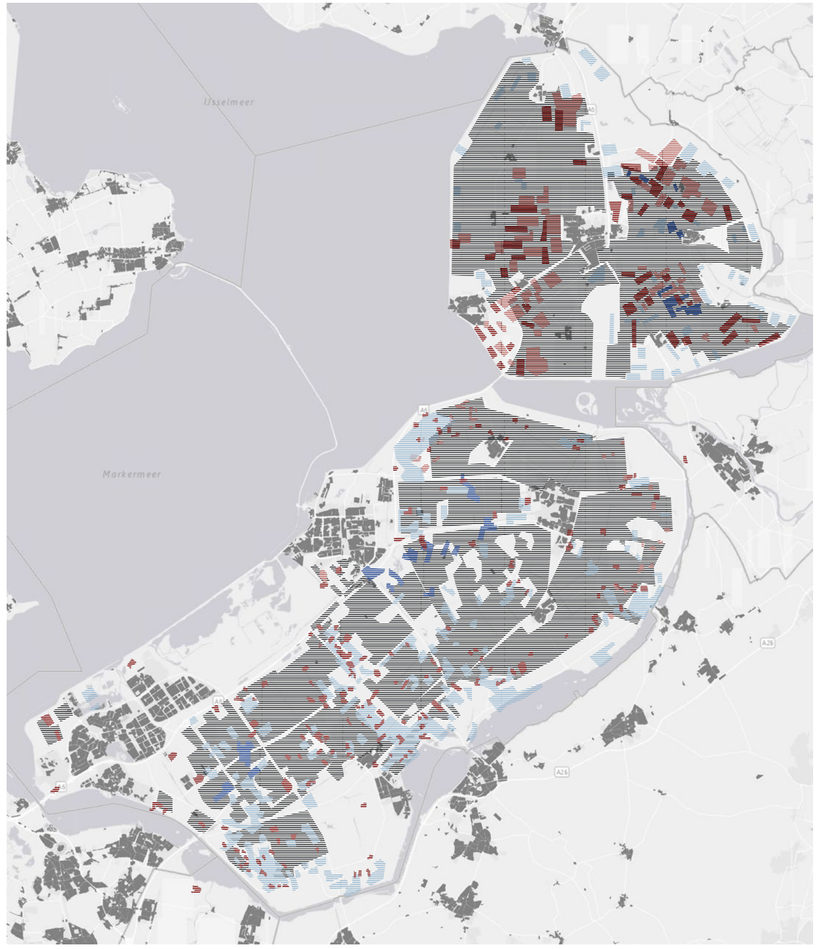
Urban area
Agriculture area
Future construction
Forest & open terrain
Protected area

0 2 4 8

N

CURRENT SITUATION

AGRICULTURE LAND USE



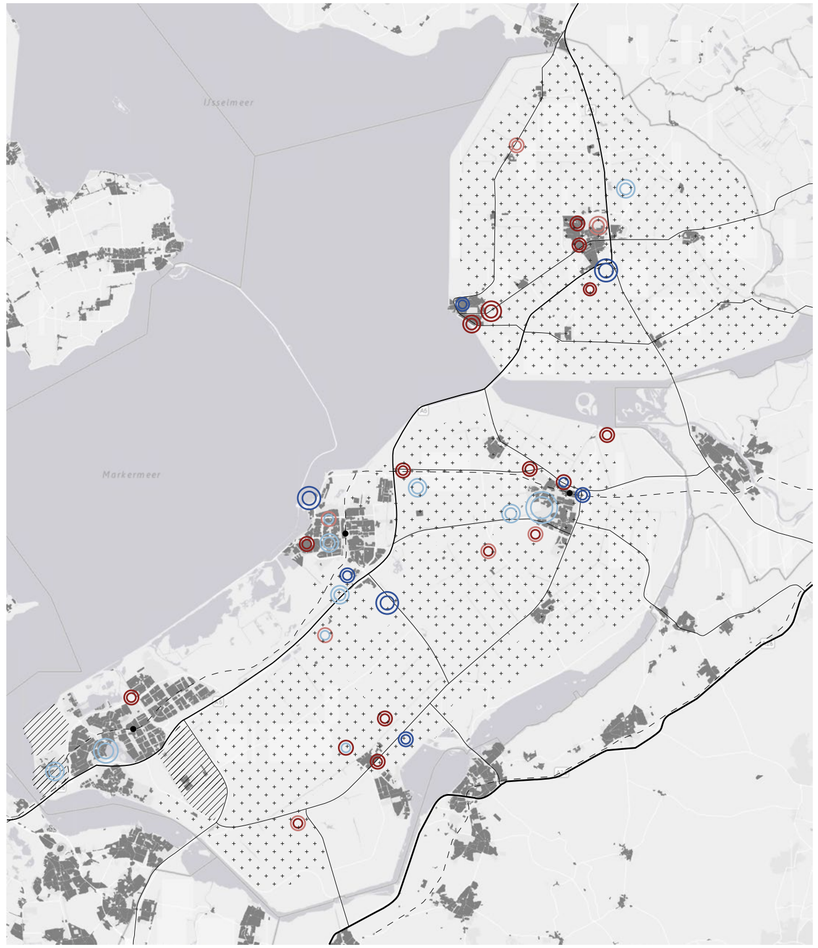
Mais
Vegetables
Grassland
Fruits
Arable crops

0 2 4 8

N

CURRENT SITUATION

EXISITING FOOD RELATED PROJECT AND ONGOING MOVEMENTS



NATIONAL SCALE

FoodChains 4 EU
Interreg Europe

European Union

food hub

REGIONAL SCALE

?

LOCAL SCALE

Voedselbedrijf Flevoland

Flevo FieldLab

The Feeding City

Actieplan Bodem & Water

FAC
Flevolands Agrarisch Collectief

- Logistics
- Processing
- Production
- Knowledge institution

0 2 4 8

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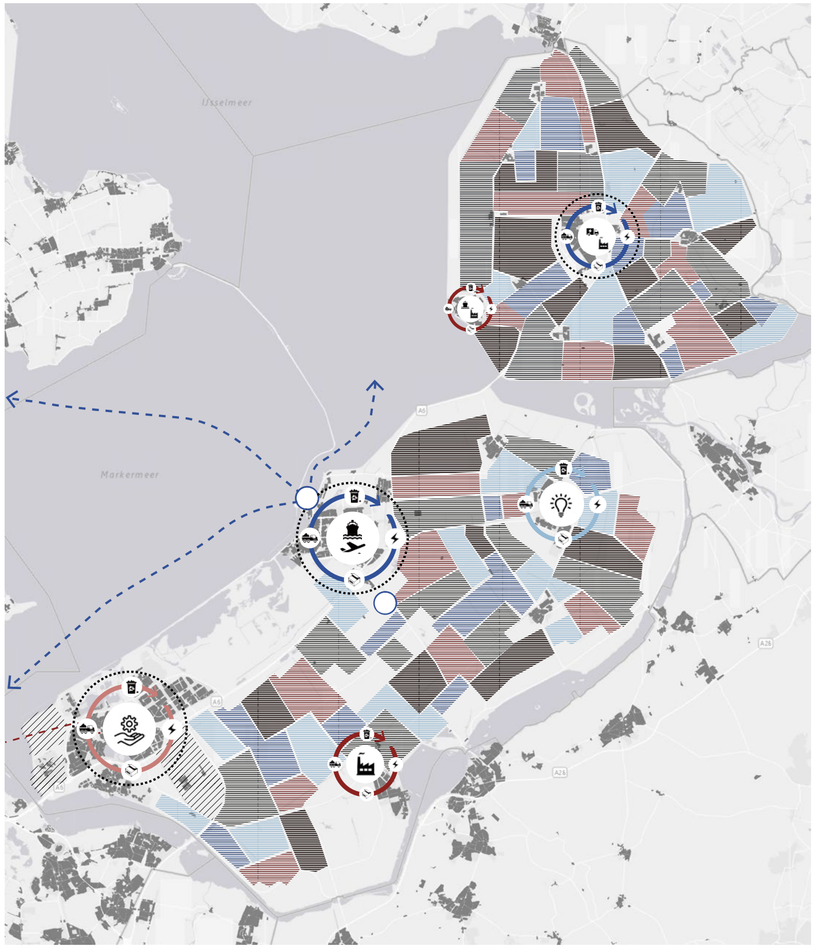
LOCAL VISION

VISION MAP



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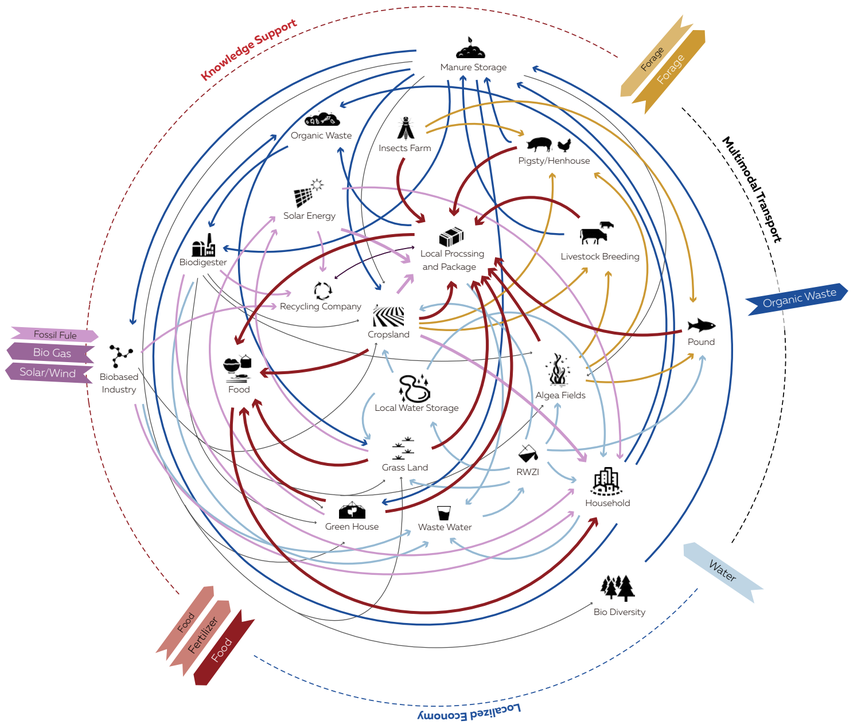
The vision for Flevoland enhances the existing water and rail transport ways for agrifood distribution. With the projected "Flevokust harbor" a more sustainable way of transport will be made feasible in a close future.

Another important part is the diversification of croplands in order to adjust the production by meeting local demand and additionally re-nutrish the fertile soil. Thirdly food hubs will be introduced in all bigger settlements. The main food hub will be in Lelystad for further re-distribution towards Amsterdam and the sub-food hubs in Almere, Dronten, Zeewolde and Emmeloord give farmers the opportunity to enter bigger markets by cooperative power. Thereby every city will enhance their strengthes in the current agrifood system and have a specific function in Flevoland to make it work in a cooperative and circular way. Lelystad´s main function will be distribution due to the proximity to the harbor and airport, Almere´s main focus will be food services due to the connectivity to Amsterdam and the growing population. Whereas smaller cities, Urk and Zeewolde, will be specifiy in food processing and supplies due to the existing accumulation of companies. Dronten will expand their already existing role as an agrifood knowledge city with the AERES University, and provide innovation for the whole region.

REGIONAL CIRCULARITY

SYNERGY DIAGRAM



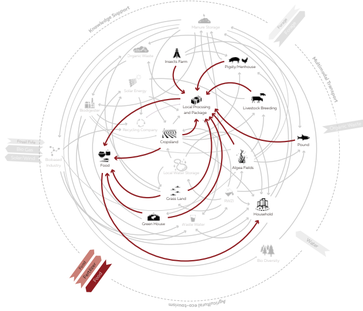
In the key development strategy, we want to achieve the Flevol- and regional circularity, which requires different flow synergies are all integrated in the new agrifood system.

In the new synergy model, we create different typologies that can be used in the food production area according to the vision. we considered energy, water, organic, fodder and CO2 flows and figure out how they connect to each other by these spacial typologies and different elements.

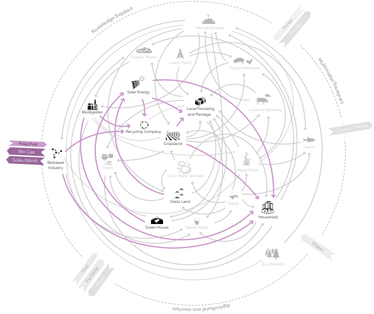
Further more, we choose energy flow, water flow and organic flow to set the regional facilities in the Flevoland area, which is very essential part in this new agrifood system.

REGIONAL CIRCULARITY

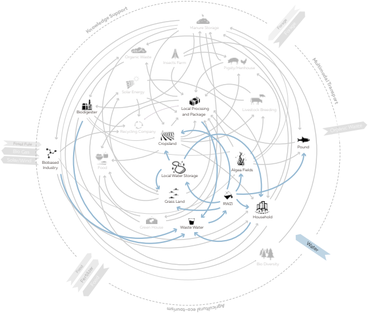
SYNERGY DIAGRAM



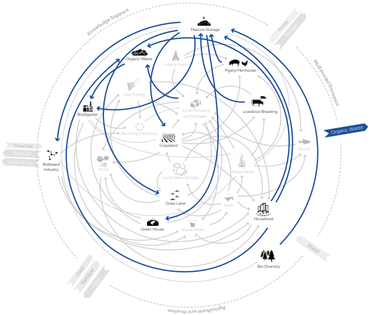
Food Flow



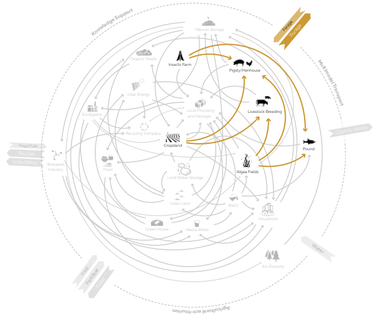
Energy synergy



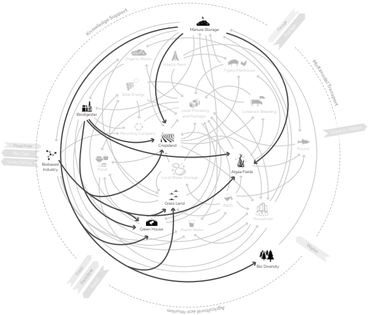
Water synergy



Organic synergy



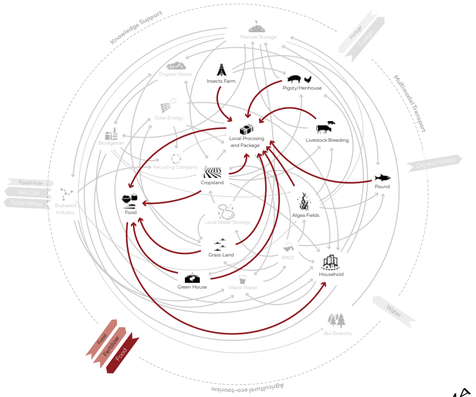
Fodder synergy

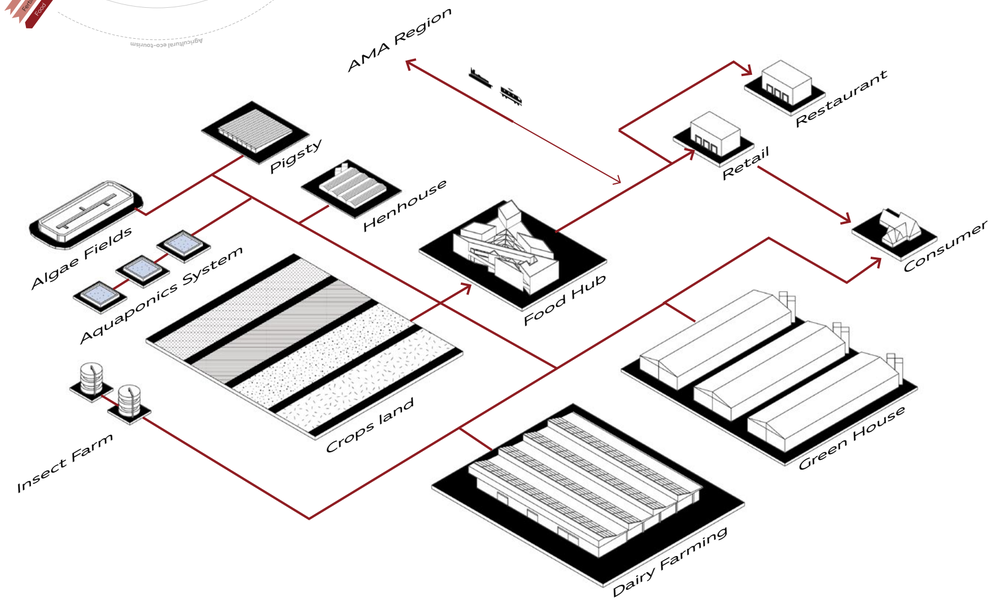


CO2 circulation synergy

REGIONAL CIRCULARITY

FOOD FLOW



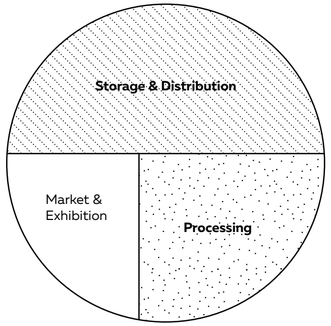


REGIONAL CIRCULARITY

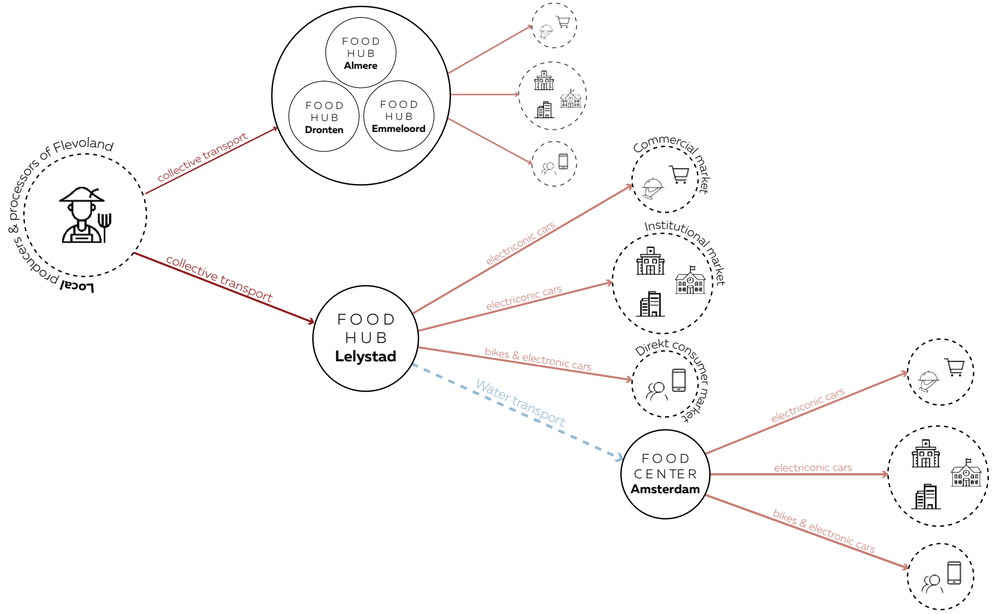
FOOD HUB SYSTEM

The local produced and processed food of Flevoland's farmers, which is not sold on farmers markets or direct on-farm sales, is distributed according demand to the nearest food hub for regional food. Every food hub fulfills various functions. By combining distribution and processing facilities the food chain will be shortend, and by providing a market hall with an integrated exhibition space for enterpreneurs the consumption of local produced food will be promoted.

The transport has to correspond sustainable conditions and is therefore organized in a collective way in the farming communities. The sub-food hubs in Dronten, Emmeloord and Almere are connected to the commercial retail market, the institutional market, such as schools and hospitals, and via online applications the direkt consumer market. The main food hub in Lelystad has additionally the function of a re-distributor to the Food Center Amsterdam due to the proximity of the projected agrifood harbor "Flevokust" and Lelystad airport. In this case the existing waterway route will be enhanced.

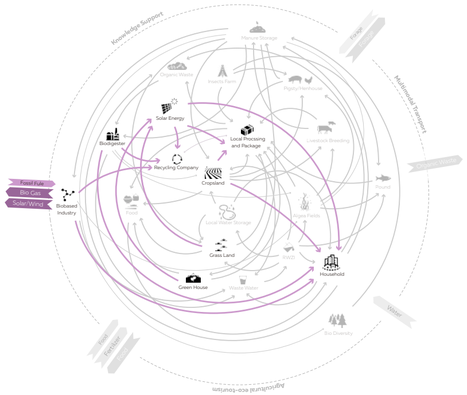


Funtions of regional food hubs



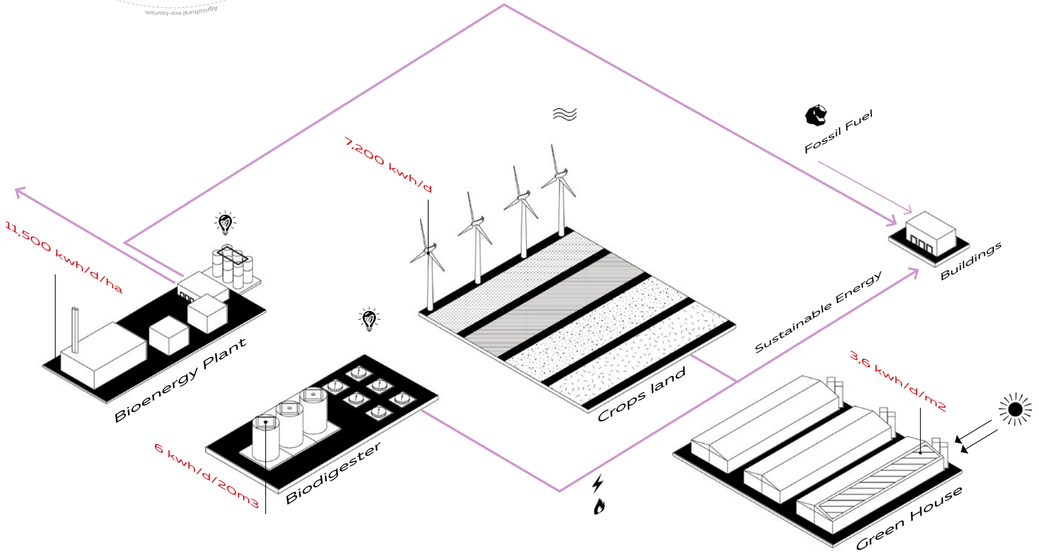
REGIONAL CIRCULARITY

ENERGY SYNERGY



In the energy synergy, we propose bioenergy plants in the urban area as the regional energy facilities. The biodigesters, windmills and solar panels in the green houses are proposed in the farm land to realize the circulation in the local scale and in the new arifood sector.

Plus the existing two bio plants, we add 5 new plants in Almere, Dronton and Emmeloord.



REGIONAL CIRCULARITY

ENERGY SYNERGY

Energy demand (agriculture sector)
6,500,000 kwh/d

Energy output
Regional bioenergy
92,000 kwh/d
Local sustainable energy
3,600,000 kwh/d
3,160,000 kwh/d
24,000 kwh/d

BIOCEL
1 ha
11,500 kwh/d

ZAW
1,5 ha
17,250 kwh/d

Newly bulit
1,5 ha
17,250 kwh/d

Newly bulit
1 ha
11,500 kwh/d

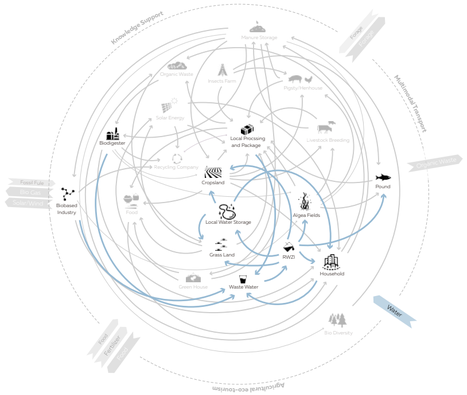
Newly bulit
1 ha
11,500 kwh/d

Newly bulit
2 ha
23,000 kwh/d

Electricity grid
Farm community

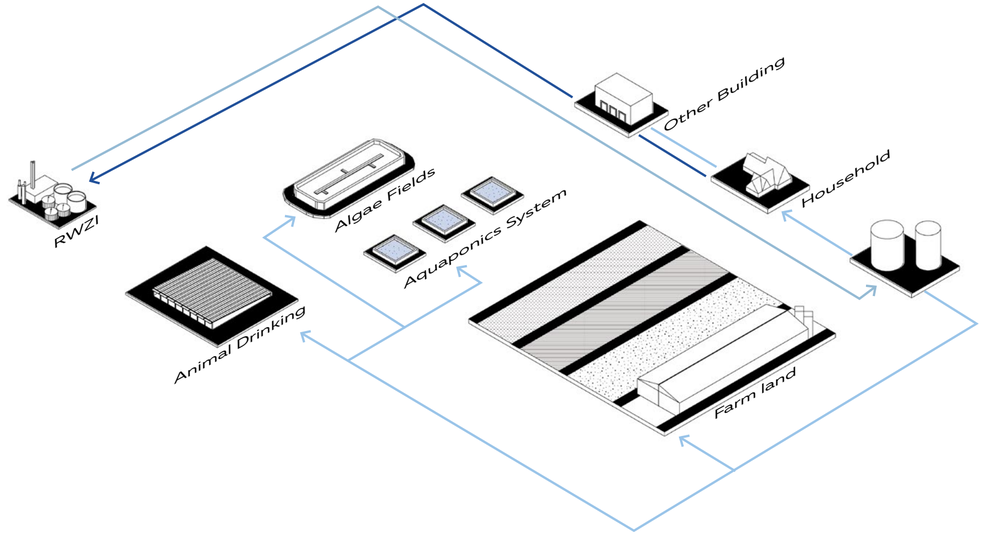
REGIONAL CIRCULARITY

WATER SYNERGY



In the water synergy, local water storages for the agrifood usage are proposed to work together with the existing regional water purification station and make the water flow circular in the local level. After the purification, pour water can be conveyed through the waterpipe and reuse locally insted of discharge into canal.

According to the population growth and the water usage in the arifood sector, the RWZI in Almere, Dronton and Tollebeek are being upgraded.

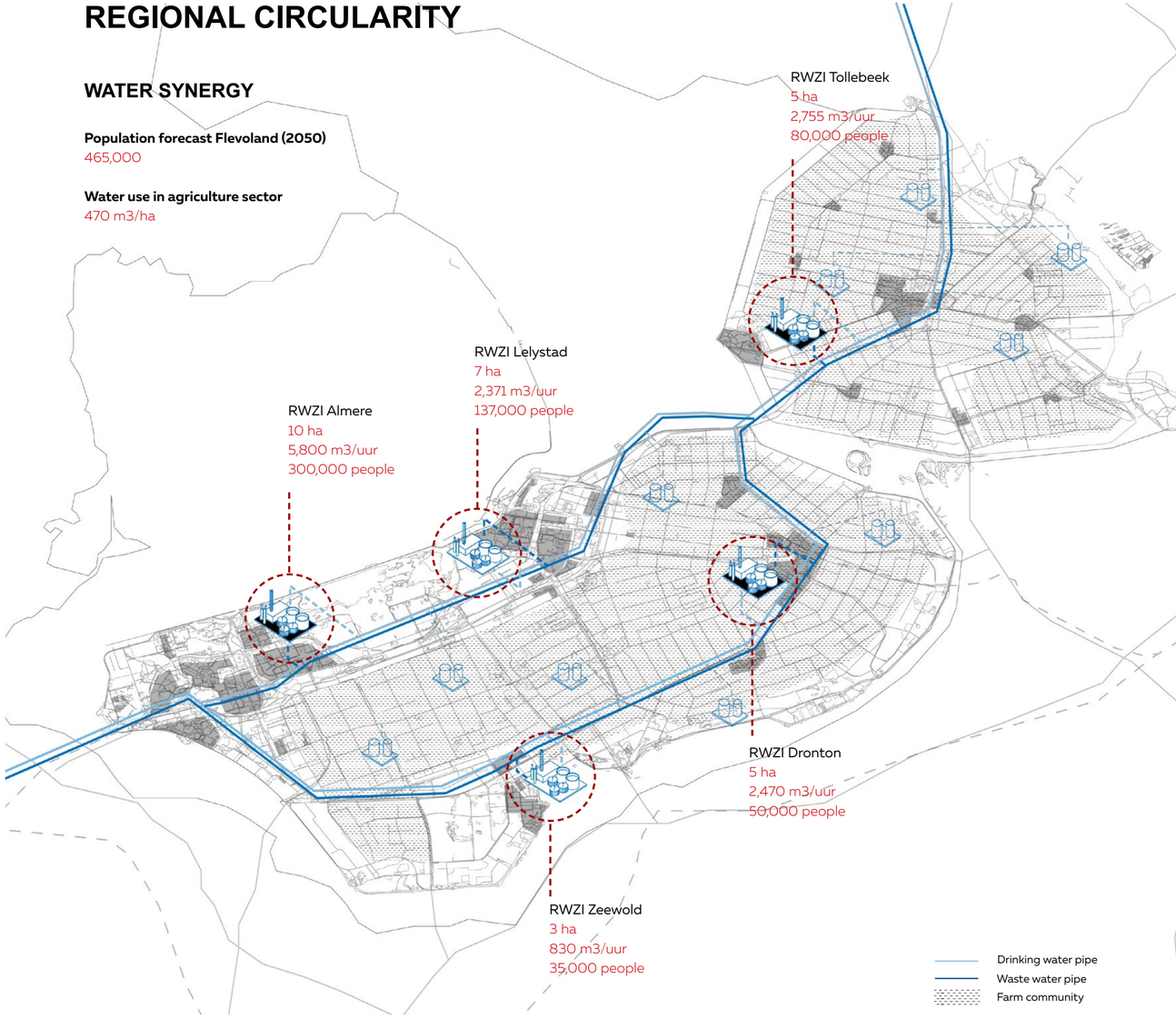


REGIONAL CIRCULARITY

WATER SYNERGY

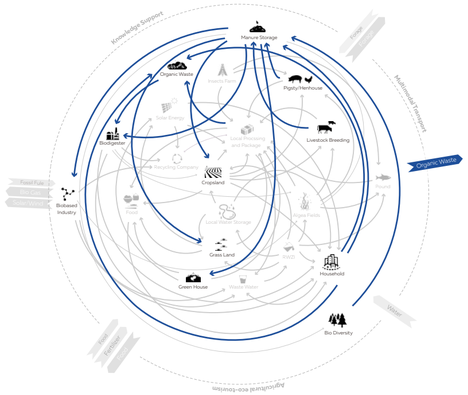
Population forecast Flevoland (2050)
465,000

Water use in agriculture sector
470 m3/ha



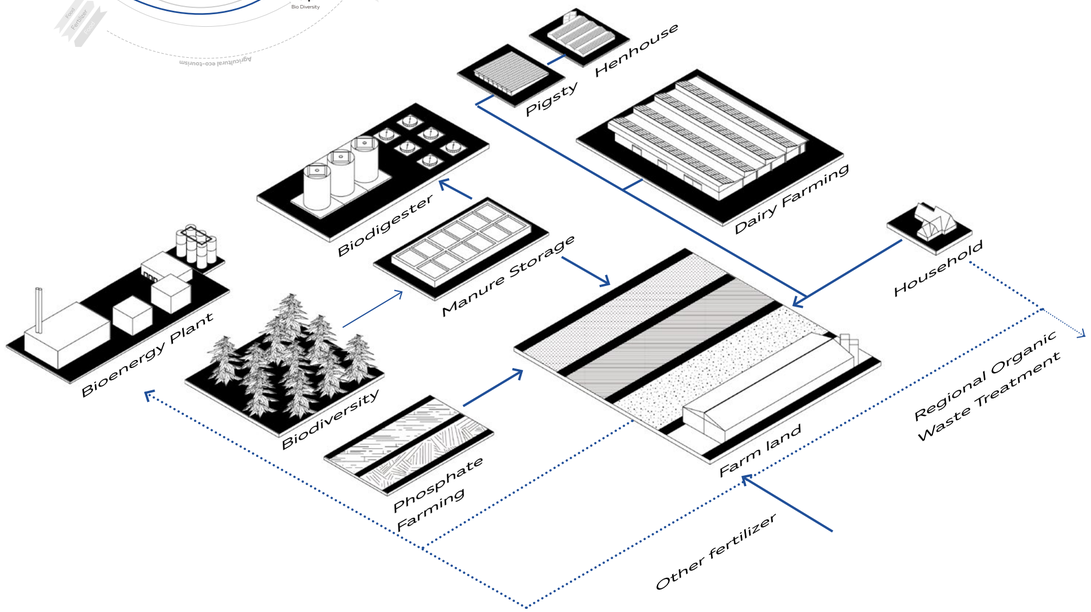
REGIONAL CIRCULARITY

ORGANIC SYNERGY



In organic synergy, bioenergy plant in the regional scale and manure storage in the local scale are proposed to make the organic waste circular. Moreover, phosphate farming and manure storage are work together to make the fertilizer self sufficient.

Because Flevoland is main production area for bioenergy, so the bioenergy plant in this area also serve for other regions in the whole AMA area.

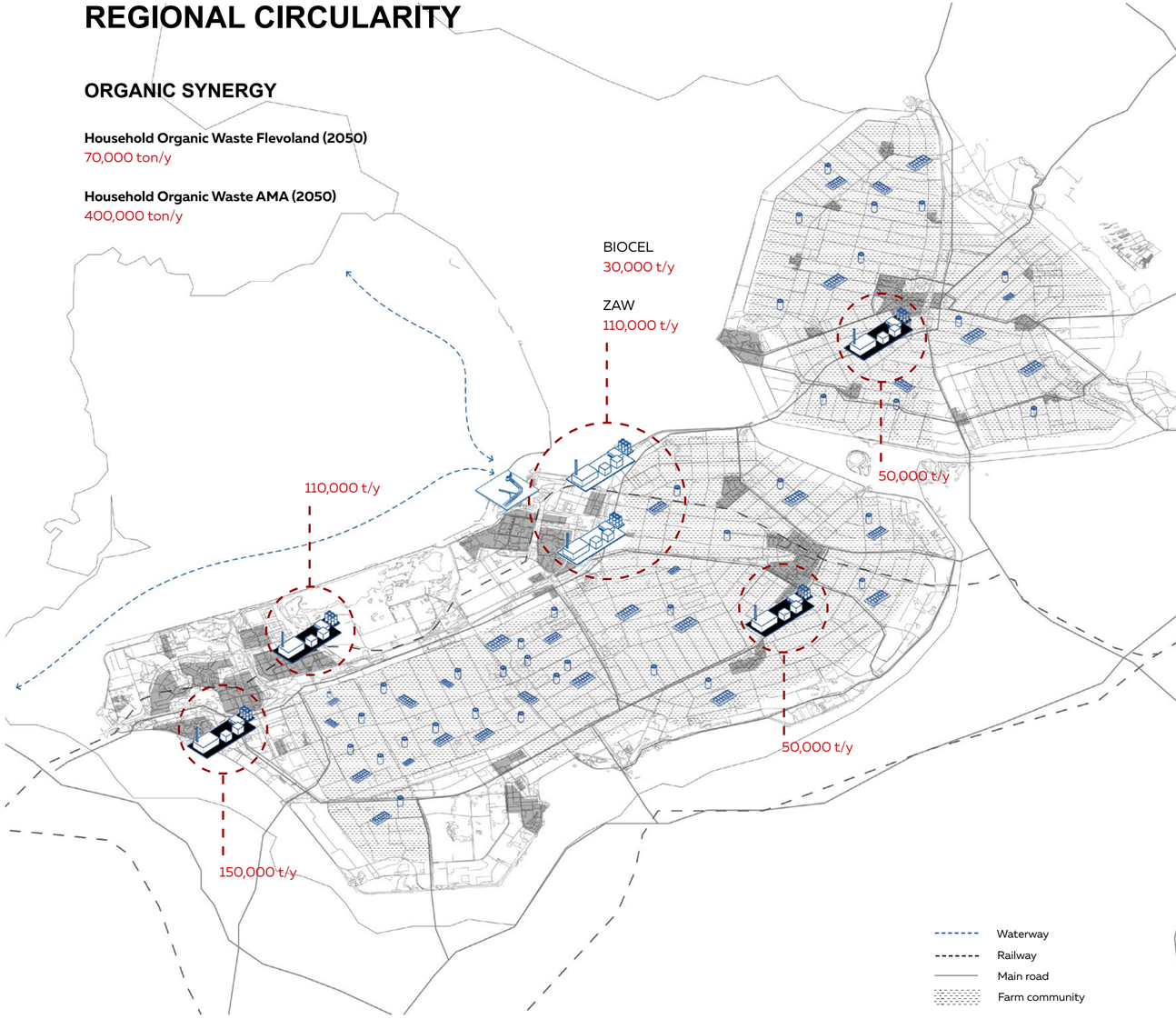


REGIONAL CIRCULARITY

ORGANIC SYNERGY

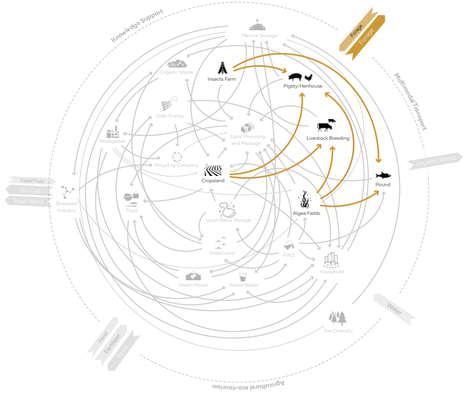
Household Organic Waste Flevoland (2050)
70,000 ton/y

Household Organic Waste AMA (2050)
400,000 ton/y



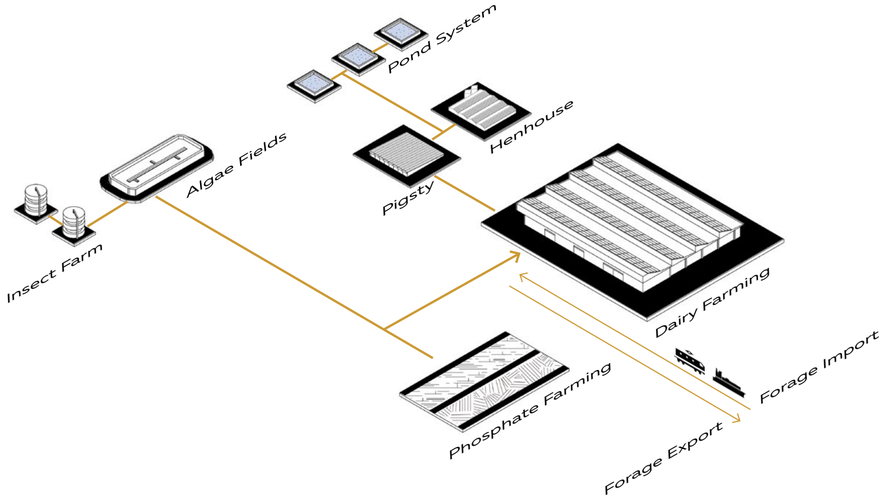
REGIONAL CIRCULARITY

FODDER SYNERGY



Besides energy, water and organic synergy, the fodder flow can also be circular within the farmland.

Instead of the exisiting dependency on fodder import, the proposed food system can realize the animal fooder self sufficient.

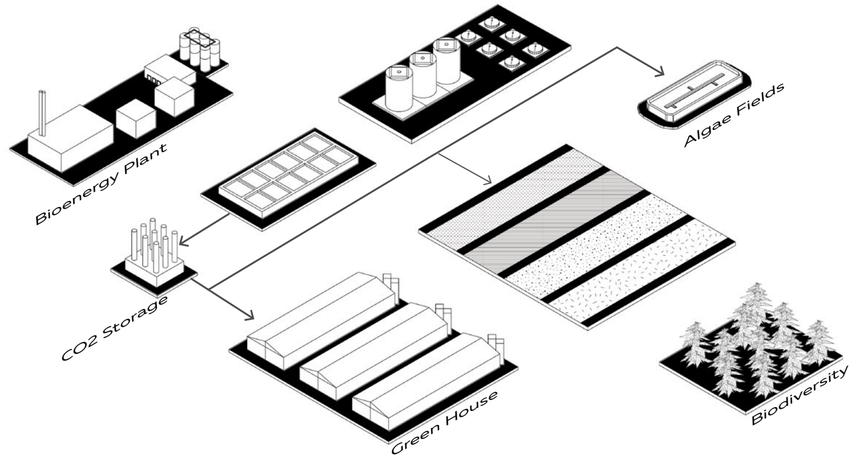


REGIONAL CIRCULARITY

CO2 CIRCULATION SYNERGY

By using CO2 storage and CO2 pipeline, the CO2 that collected form main roads and bioenergy plants can be conveyed to the green houses and algae fields.

The CO2 storage station is proposed to be together with regional bioenergy plants.

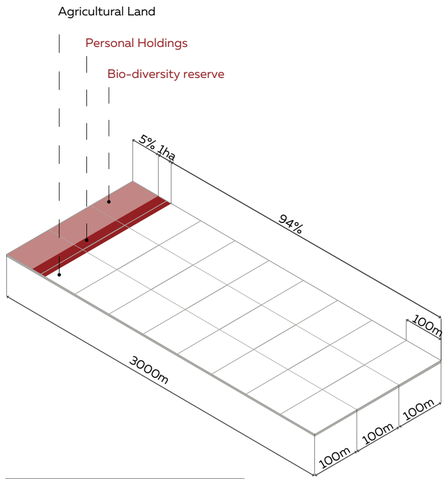


BUSINESS MODEL - LOCAL

EXISTING POLICY AND SITE CONDITIONS

Observations show that due to recent reclamation the condition and structure of agriculture land in 'Flevoland' is because of the influence of historic polder structure and policy influence of the government. Conclusively an average agricultural plot size of 30 ha is observed in the 'Flevoland'.

According to 'Common agricultural policy', under direct payment and greening scheme 5% of the agricultural plot is reserved as biodiversity and 1 ha of the land is used for personal holdings and the left over land is used extensively for agricultural production.



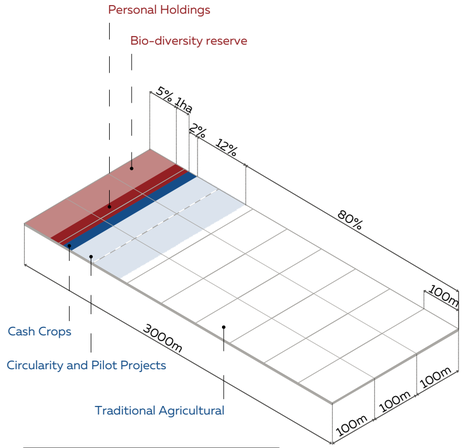
Current Context

PROPOSED POLICY AND SITE CONSIDERATIONS

Considering the existing policies and site conditions for the business model, an average plot size of 30 ha is taken into consideration according to the requirement and collaboration potential of the community.According to the strategic development plan, hash cultivation as cash crops for medicinal purposes is proposed, which generates capital for the initial investment of the proposal.

12% plot of land is proposed for community collaboration projects consisting of;
-energy generation and supply,
-waste recycle and manure cultivation,
-experimental farming for protein production

80% plot of land is kept for traditional agriculture crop as well as livestock production for local economy based on;
-multitechniques of crop rotation and diversification
-knowledge institution and farmers collaboration.



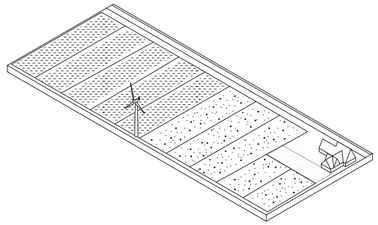
Projected Context

BUSINESS MODEL - LOCAL

A NEW ECONOMY FOR THE AGRIFOOD SECTOR

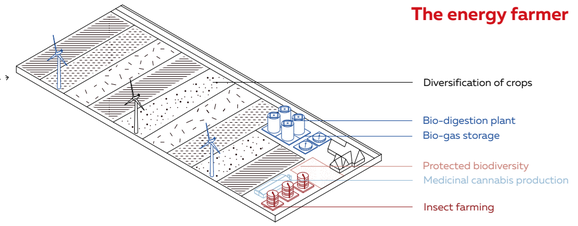
The current farmer

Focus on primary production & export orientated monoculture

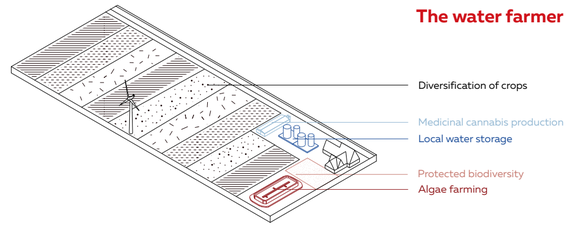


original average lot on Flevopolder: **30 ha**
(Rijksdienst voor IJsselmeerPolders after reclamation)

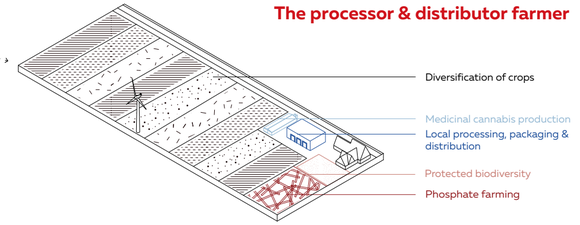
The energy farmer



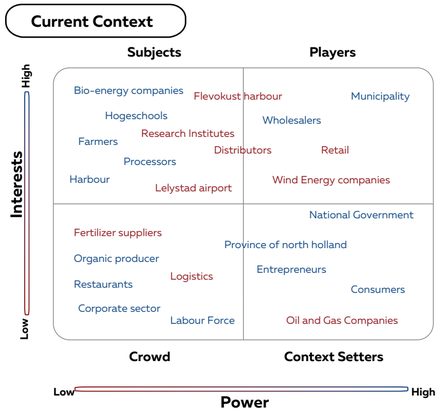
The water farmer

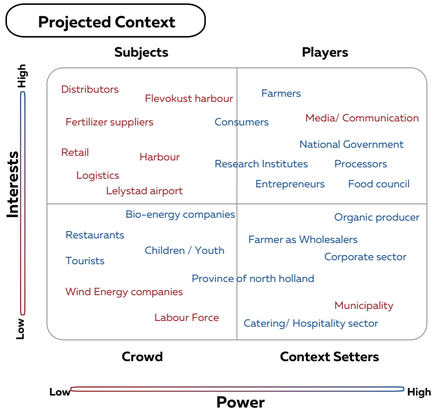


The processor & distributor farmer



STAKE HOLDERS ANALYSIS - LOCAL





Producers

Cropland farmer
Animal rearers
Labourers
Fertilizer & manure producers

Farmer community producers
Cash crop producer
Protein farming workers

Energy Producers

Wind energy producers
Bio energy producers
Solar energy workers

Manufacturers

Farmer community processors
Packaging & Branding

Bio energy
- Biocel
- ZAW

Wind power
- Noordoostpolder
- Princess Alexia
- Rachel Carson

Solar power
- Delta Ohm
- Vermeer
- EKO

Knowledge workers

AERES Hogeschool / MBO
AERES VMBO
Schothorst feed research BV
Warmonderhof
ACCRES research center (WU)

Distributors & Logistics

Siligro
Deen
Vomar
Lidl
Jumbo
Alber Heijn
Plus

Food Hub Almere
Food Hub Lelystad
Food Hub Dronten
Food Center Amsterdam
Farmers Market
Lelystad Airport
Flevokust Harbor

Governance

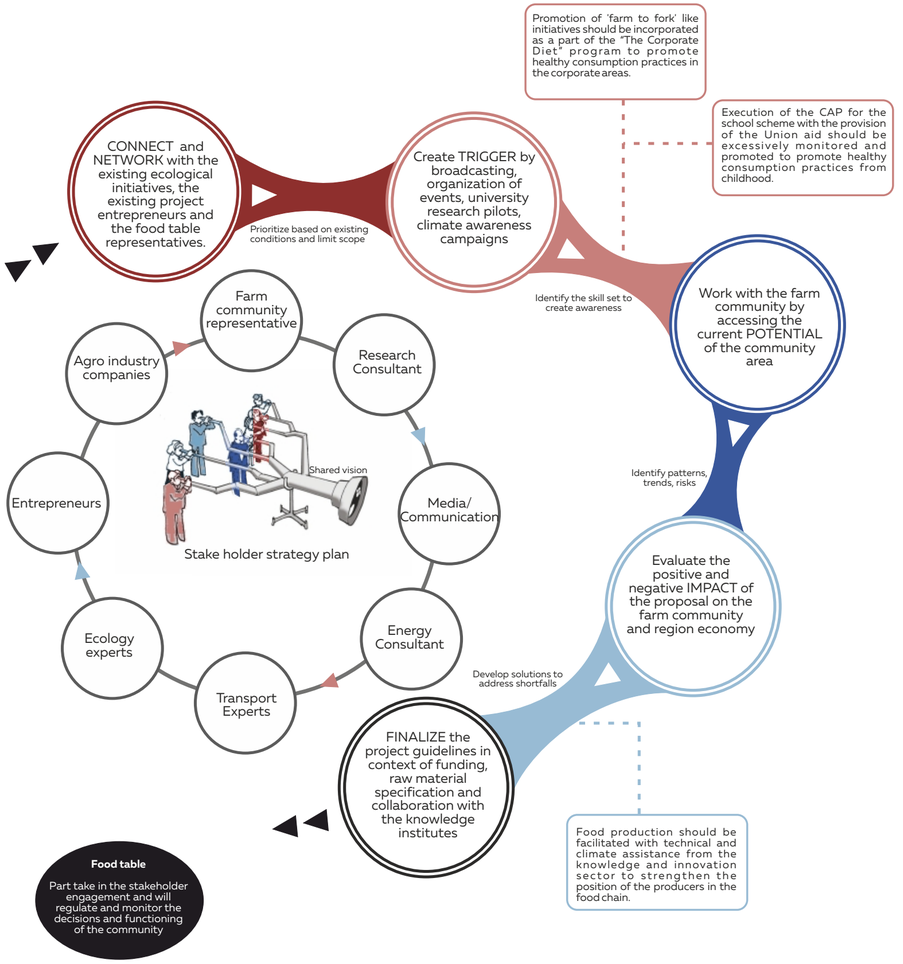
Metropolitan Region Amsterdam
Province of Flevoland

FOOD TABLE (municipal)
FARMER COMMUNITY
RABOBANK

Other players

Catering and Hospitality
Restaurants
Tourism sector

STAKEHOLDER ENGAGEMENT - LOCAL



Engagement strategy

Formation of the food table

Selection of the representatives from the respective departments of agro-industry, research, energy consultants, ecology experts, transport consultants municipal official.

Community formation

Collaboration of the farm plots based on 3KM radius for a sustainable transport system (considering the Flevoland land farm plot structure)

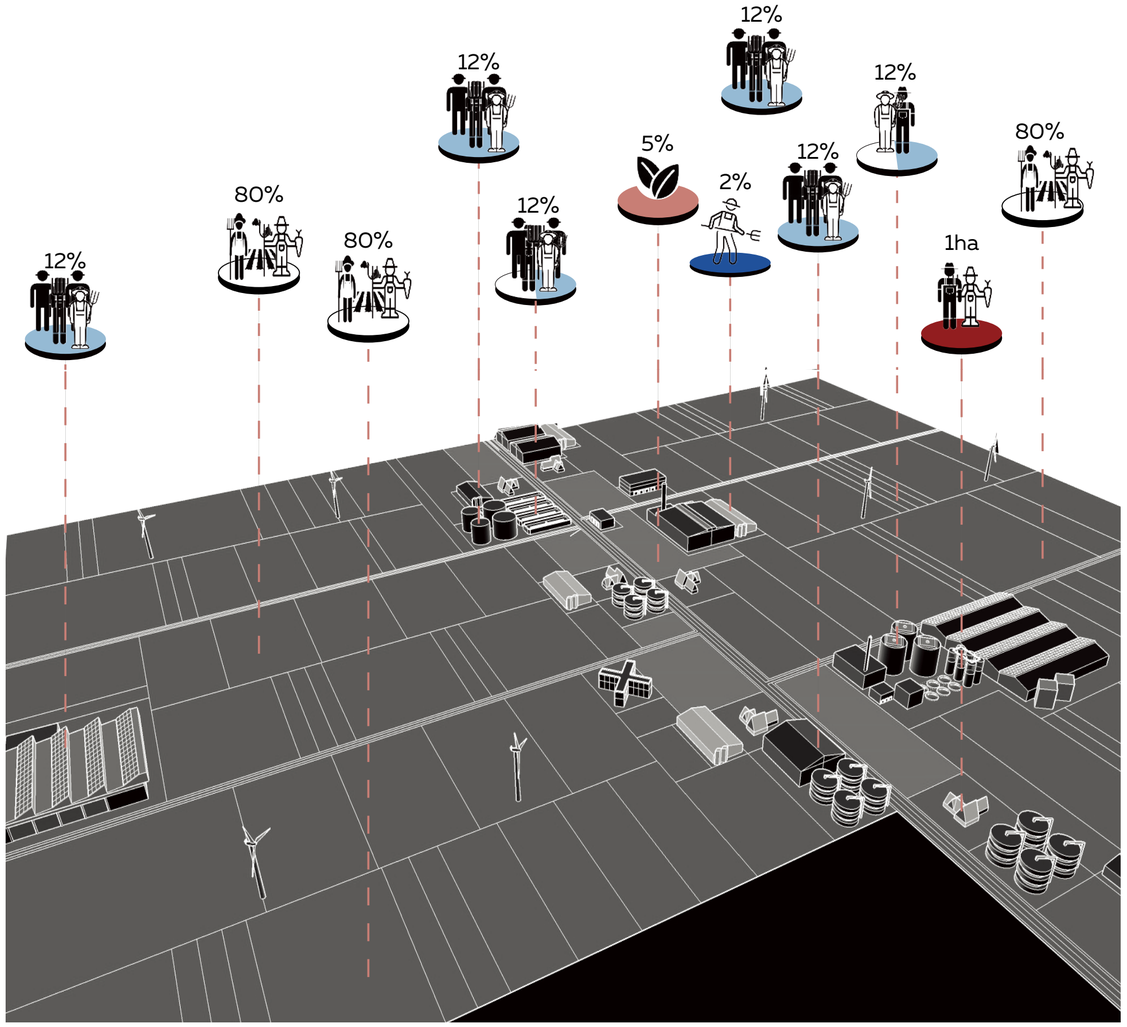
Community land assessment

Classification of the existing plot of farm land into project requirement for cash crop, circularity projects and protein farming.

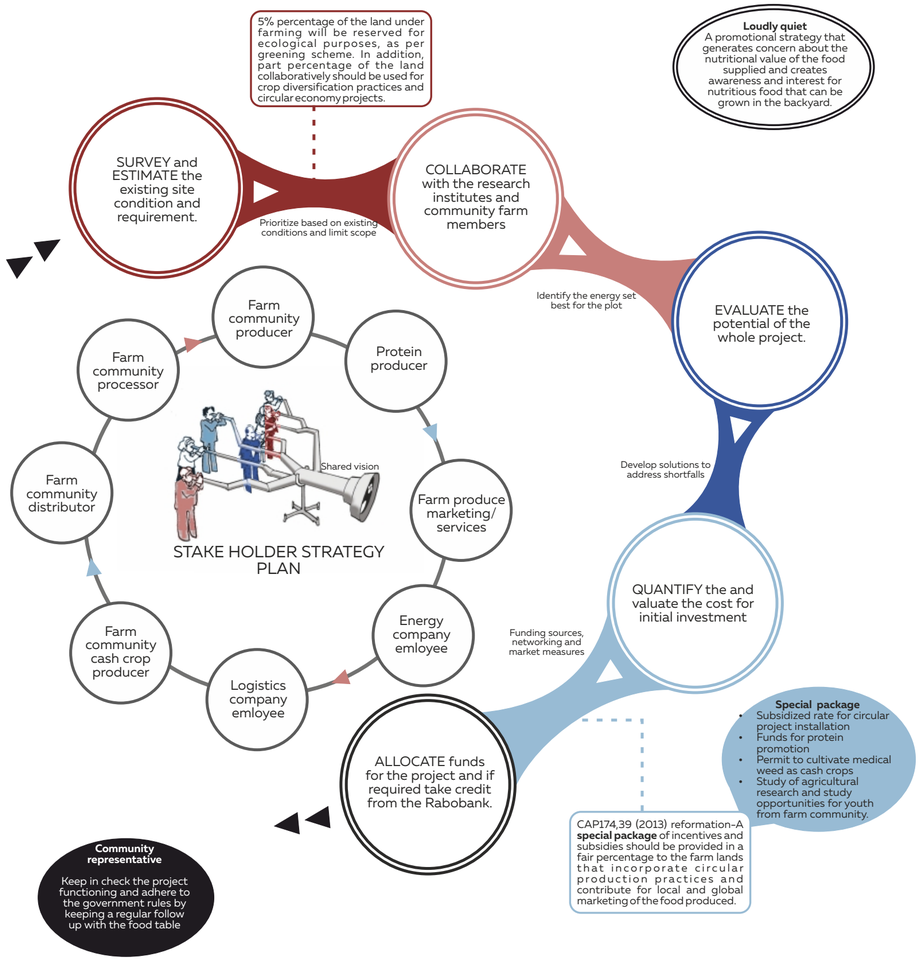
Project permission

Grant for the development of the project from the food council for implementation. Allocation of land for FOOD HUBS.

STAKEHOLDER ENGAGEMENT - COMMUNITY



STAKEHOLDER ENGAGEMENT - COMMUNITY



Engagement strategy

Farm community formation

Consisting of producers with adjacent plots recognized as small medium and large size. Representative of the farm community will be chosen on a rotational basis.

Collaboration with research institutes other stakeholders

Advice from the agricultural research institutes and other experts for assessing the site best for the circular and protein production projects

Equitable distribution of funds

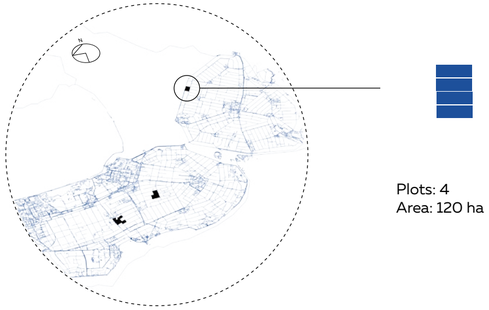
Funds allocated to be decided based on the phasing plan of the project.

Planning project phasing on plots

Depending on the optimal requirement of certain project needs.
Plan formulation based on availability of resources and time period.

ZOOM IN - FARM COMMUNITY

SMALL SCALE



Plots: 4
Area: 120 ha

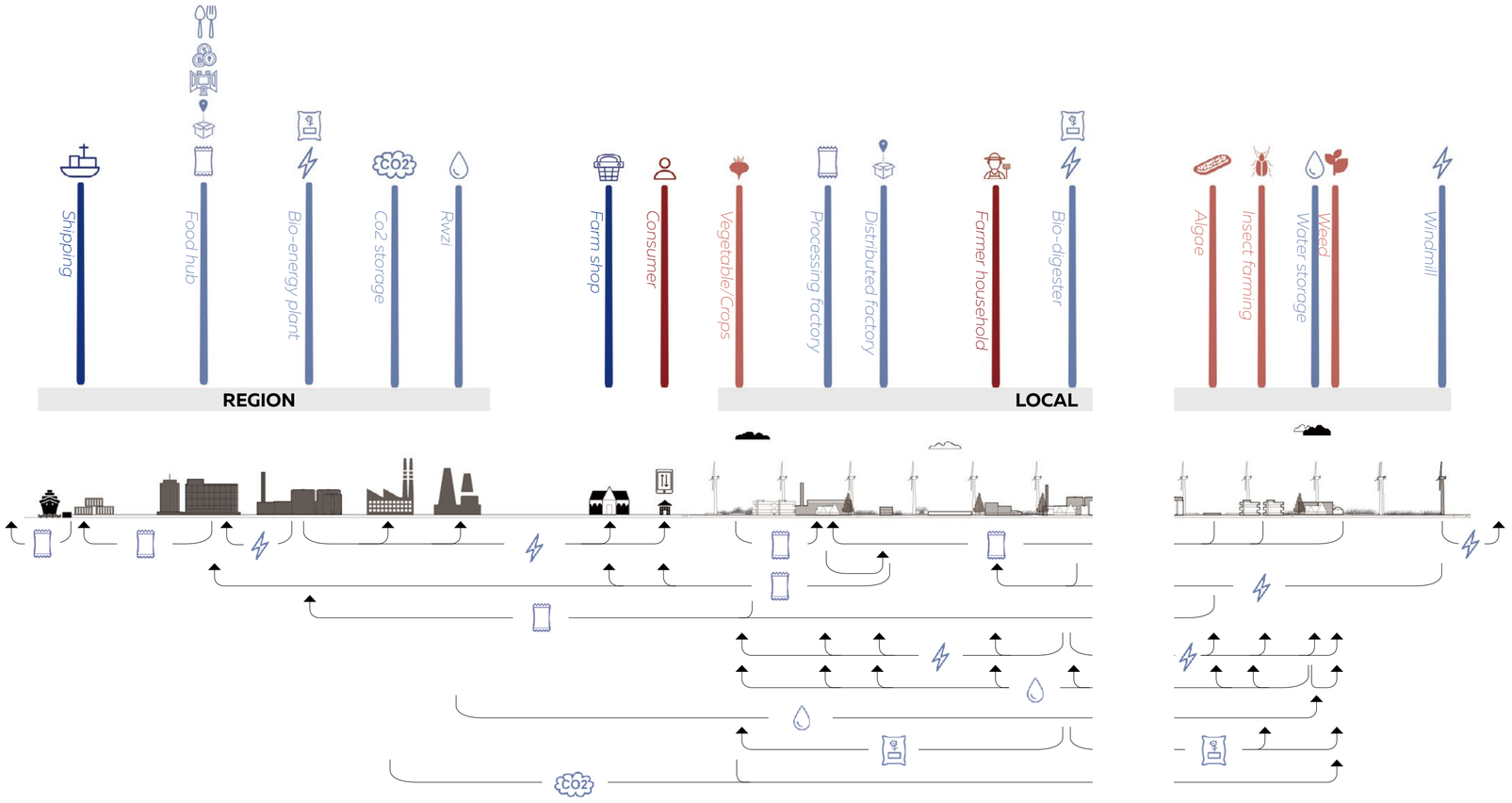
The small scale farm community has four plots and each plot undertake one compulsory component according to the community principle - energy produce, water storage, local processing or local distribution.

Because this site is very close to the IJsselmeer lake, so fresh water farming for alternative protein (algae farming) is also proposed.

The community shared facilities are working together to create the circularity in a local scale and they also connect to the regional facilities to transfer energy, water and waste.

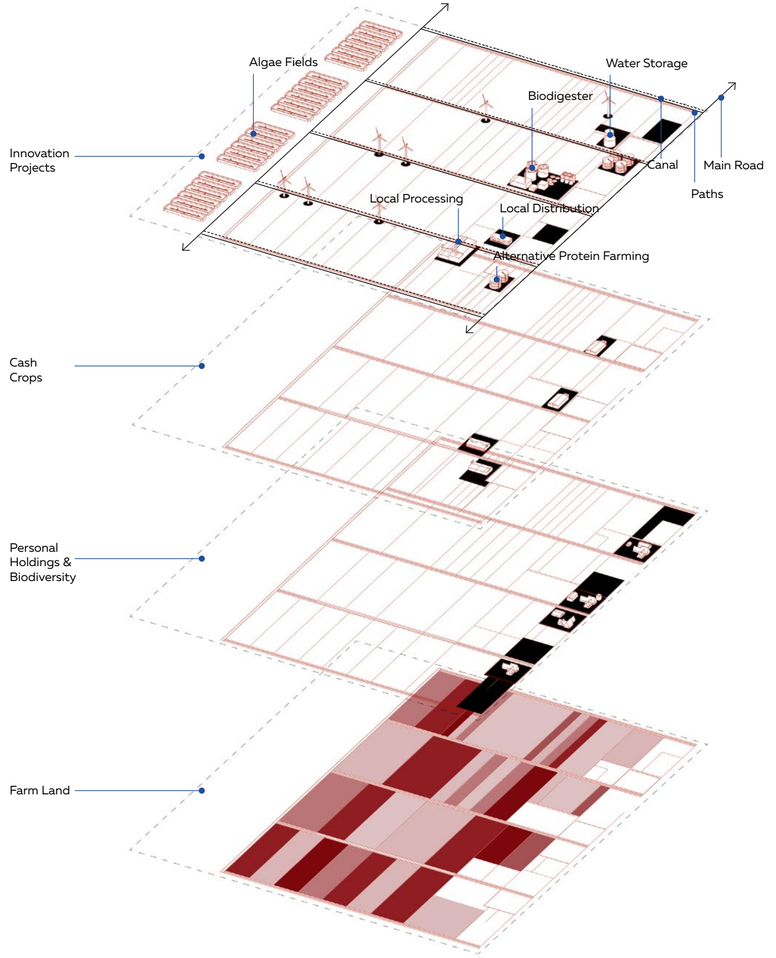
ZOOM IN - FARM COMMUNITY

SMALL SCALE - SECTION



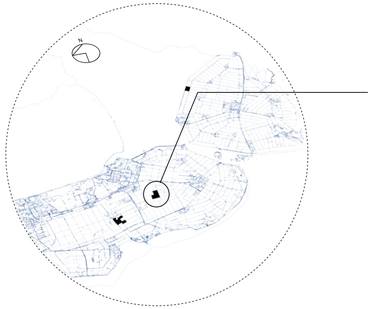
ZOOM IN - FARM COMMUNITY

SMALL SCALE - COMPONENT



ZOOM IN - FARM COMMUNITY

MIDDLE SCALE



Plots: 6
Area: 313 ha

In the middle scale, besides the compulsory components, some optional can also be considered.

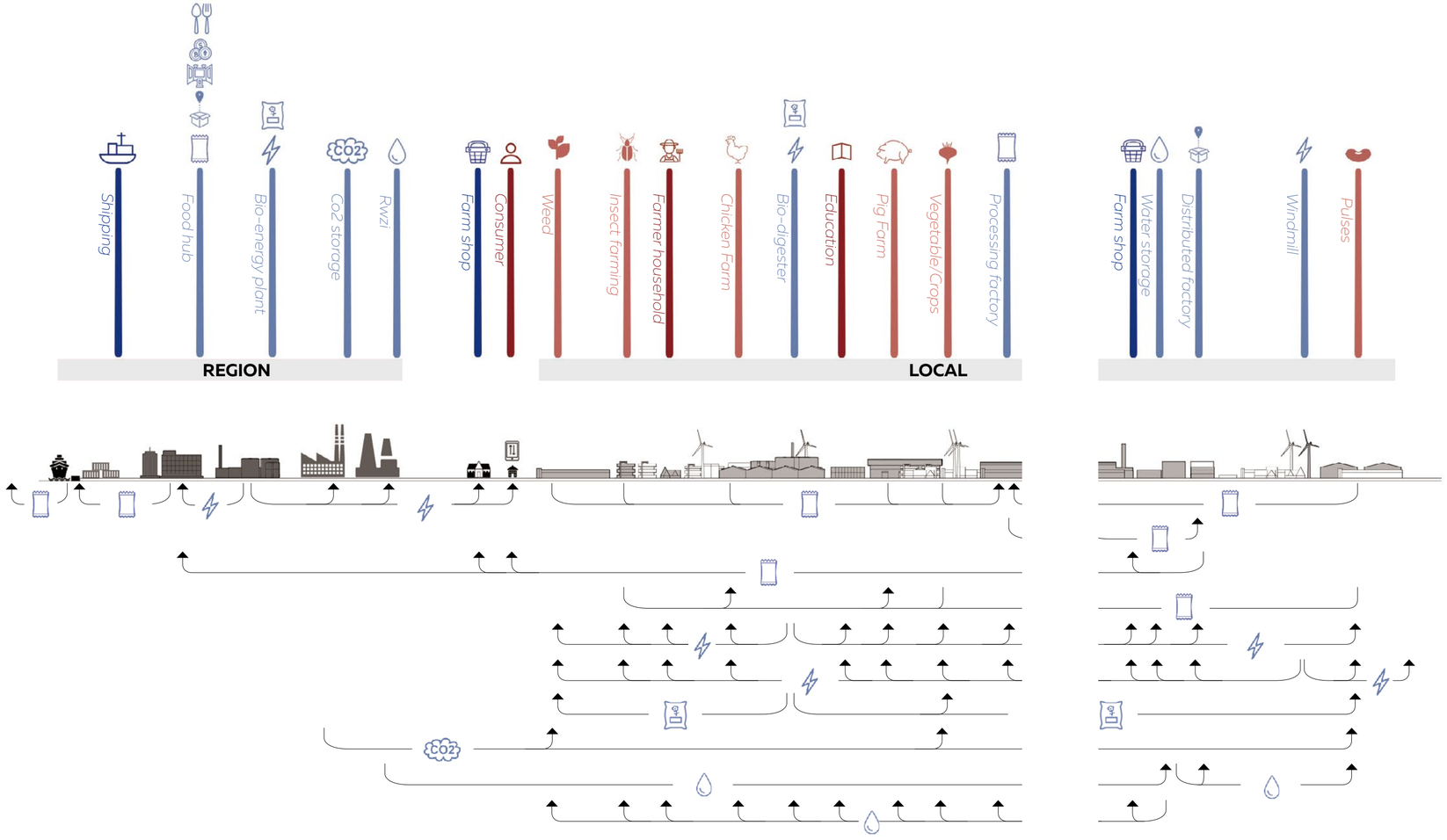
In this case, one farmer create a knowledge institution that integrate technology into agriculture.

Knowledge institution can provide agricultural training, new technology Introduction and application, helps the farmers and other people get more knowledge of agriculture and food.

The institution is also a monitoring station for the precision agriculture.

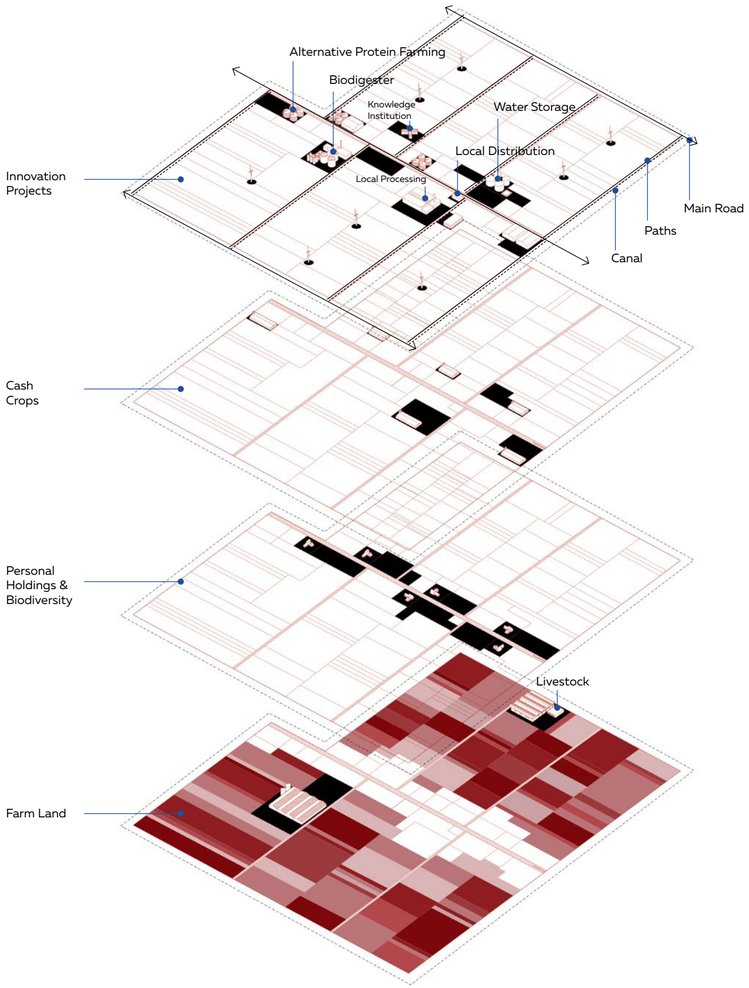
ZOOM IN - FARM COMMUNITY

MIDDLE SCALE - SECTION



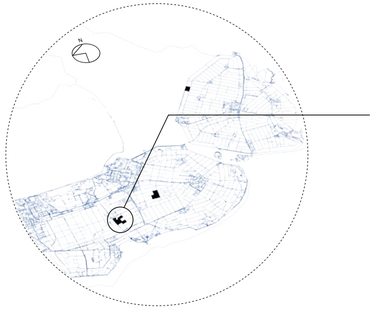
ZOOM IN - FARM COMMUNITY

MIDDLE SCALE - COMPONENT



ZOOM IN - FARM COMMUNITY

LARGE SCALE



Plots: 6
Area: 511 ha

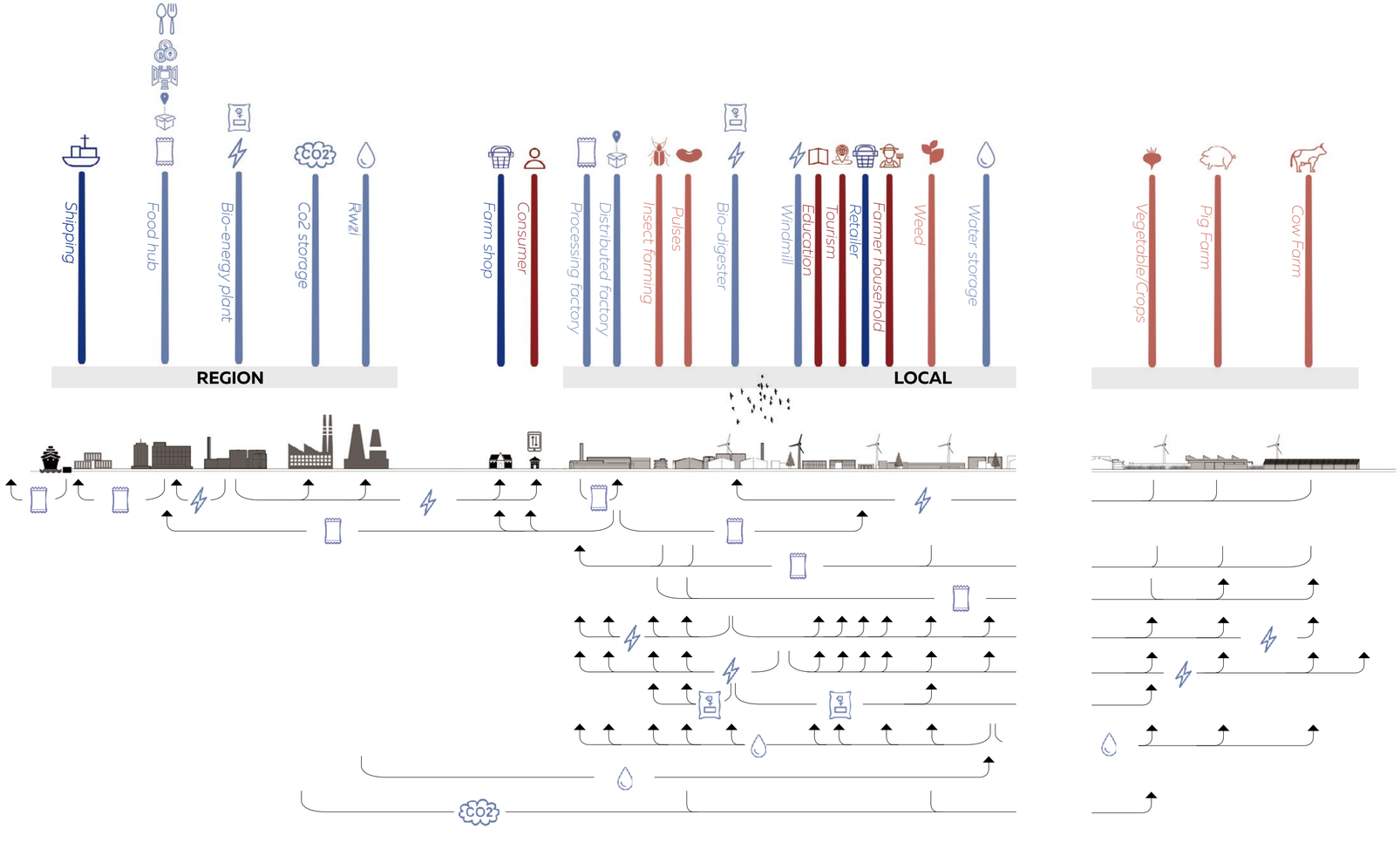
The large scale community lies beside the main road to the Lelystad and Almere, which is quite accessible by the residents in these cities.

In the north and west direction of this community, there is a natural area which can be regarded as the urban outskirts attractions.

So in this case, we propose a tourist center as a innovation project in the community, and create an urban suburb agricultural landscape that integrate experiencing, leisure and sightseeing for short trips for the urban residents.

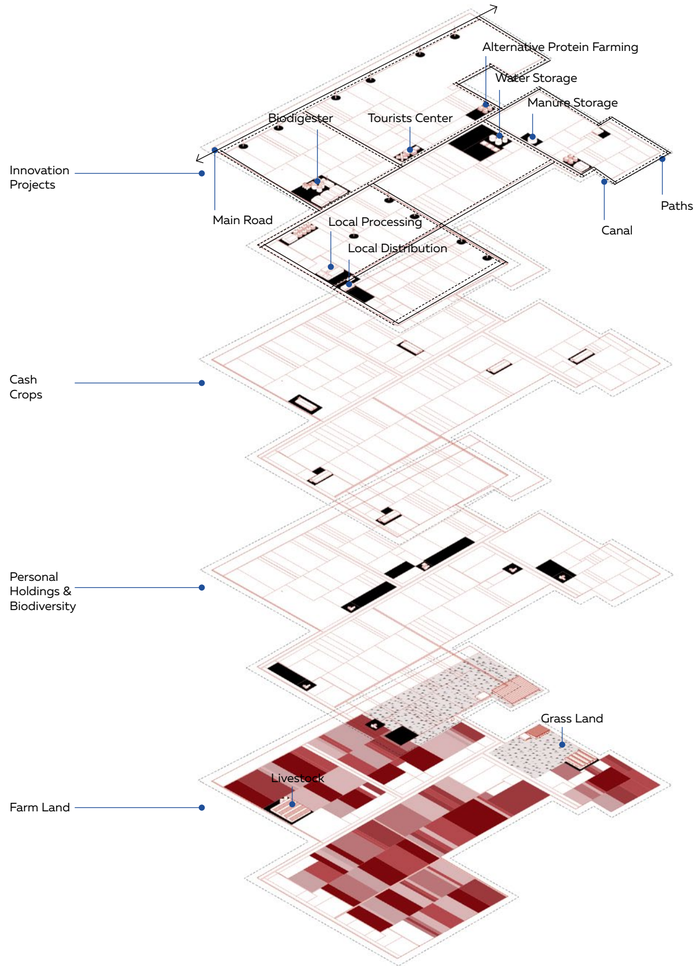
ZOOM IN - FARM COMMUNITY

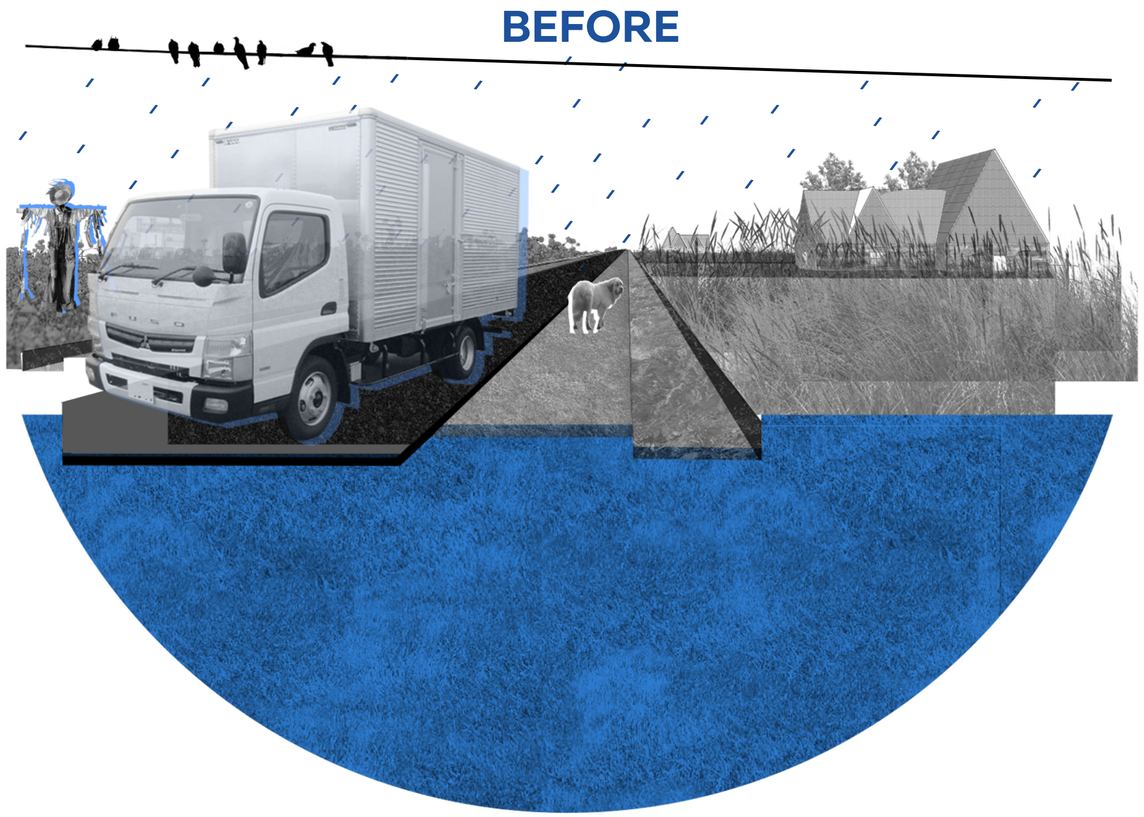
LARGE SCALE - SECTION



ZOOM IN - FARM COMMUNITY

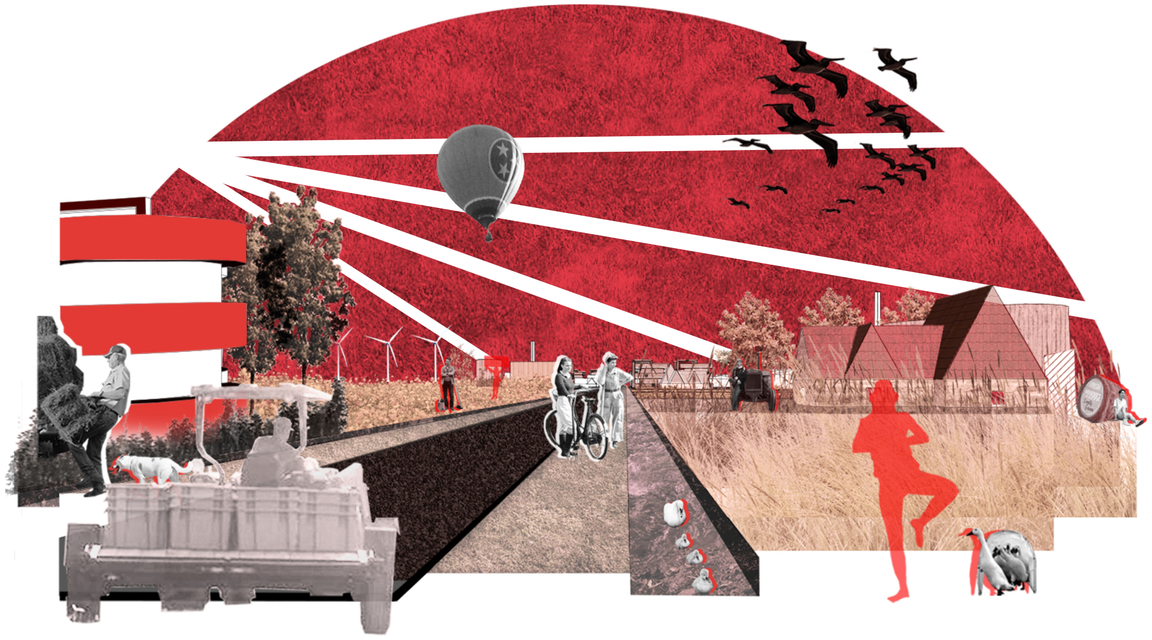
LARGE SCALE - COMPONENT





ZOOM IN - FARM COMMUNITY

IMPRESSION - PROPOSAL



AFTER

CONCLUSION & REFLECTION

CLOSING THE LOOP

In this last chapter the report concludes with the scientific and societal relevance, the ethical consideration and suggestions of further research. After this a reflection is added to reflect on the circular economy and the project as a whole.

- Scientific relevance
- Societal relevance
- Ethical relevance
- Reflection on circular economy
- Group reflection
- Self reflection

SCIENTIFIC RELEVANCE

THE SCIENTIFIC RELEVANCE OF THE AGRONOMIC RENAISSANCE

Regarding the scientific relevance of the project ' the agronomic renaissance: towards a socially fairer and circular agrifood system in the AMA', the project can be seen as a catalyst for further scientific research into the topics assessed. The project gives a framework in which further scientific research can strengthen the vision and strategy.

The main proposal the project makes is a reformation of the agrifood sector into a more local and circular form, which ultimately contributes directly to social, environmental and economical sustainability. The main theoretical concepts used in the proposal are the concepts of borrowed size or twin cities, the circular economy, localised food networks, socio-spatial polarization and the knowledge economy. These main concepts have already been thoroughly researched through time. Based on these numerous researches the vision and strategy of the project were conducted.

The project handles the concept of borrowed size or 'twin cities' by introducing a more regional approach to the food sector. By assigning multiple cores in the AMA that work together as twin cities: food logistics, production and food services can each grow in a specialized place. In the project, Almere and Lelystad work together in regards of food logistics (Lelystad) and services (Almere). Productive regional polders around these cities produce and process the food. This local food network in Flevopolder functioning according to the borrowed size principle has to however be part of a bigger borrowed size principle, comprising of multiple facets like infrastructure and other sectors. This stretching of the borrowed size concept is necessary according to the paper by E. Meijer 'stretching the concept of borrowed size' (Meijers, Burger 2015). Further scientific research is therefore needed to make sure the borrowed size concept will work at its full potential in the Flevopolder. The scientific relevance of including this theory is to make the theory work in not only a regional, but also in a local scale with a very explicit and measurable application.

The circular economy is the foundation of the project. Every decision taken is carefully assessed in the context of the circular economy theory. By for example linking the flows of fertilizer production and agricultural land-use in peatlands to paludiculture and azolla production for use as fertilizer, the project makes sure that local potentials get a regional synergy. Other concepts of the circular economy like re-using waste flows and extracting nutrients from used resources also play a big role in the project. The scientific relevance of making use of circular economy in the food sector is that the food sector actually touches upon all facets of the circular economy. It is connected to waste, nutrients, water, heat and energy. A successful circular system in the food sector can contribute largely to success in other flows. By using the theoretical concept in a regional planning project, the circular economy also becomes spatially explicit, which contributes to the actual realisation of the circular economy. However, due to the novelty of the circular economy in the Dutch food sector, there are a lot of uncertainties. Quantities of circular potentials are hard to estimate and literature about the circular economy that is specific and explicit about the food sector is still scarce. An opportunity to strengthen the project would be to do more in-depth scientific research towards the topic of the circular economy in the food sector.

Localizing food networks is a hot topic in the current worldwide food policy organisations like the FAO and the EU. Countries like Finland, Australia and Canada are already going towards a more food centred policy instead of an agriculture policy. In these policies there is more room for local production-consumption initiatives. The Netherlands is also exploring the possibilities of a localized food network in a comprehensive report of the Dutch Scientific Council of Government Decisions. In this report called 'naar een voedselbeleid / towards a food policy' (WRR, 2014) the council interviewed important stakeholders in the food sector and researchers/ policymakers in the practice. The conclusion of this report stated that the Dutch food sector should move to a more locally centered food policy that comprises ecology, sustainability, reduces food miles and is healthy. In that regard the project follows up on the findings of the scientific council. Therefore, the project is scientifically relevant. It proposes a strategy that implements a big part of the scientific council's conclusions. In that way the project helps to start the "much needed reform" (WRR, 2014) in the food sector. The report also stated that the food policy of the Netherlands has historically been implicit. With the project this policy becomes explicit.
Also "Flevocampus", a temporary pilot project on the Flevopolder initiated by the Interreg project "FoodChains4EU" by the European Union started in 2017 and will last until 2021. The aim is to improve the implementation of regional policies that stimulate the delivery of innovation to create sustainable food chains.

Socio-spatial polarization is the most important spatial inequality that the project tries to tackle. Socio-spatial polarization is caused by the increasing land values in the AMA. Because these rising prices can't be afforded by the lower and middle educated people they have to move out from example Amsterdam towards the edges of the AMA like Almere or even Lelystad. As a result these lower social classes start to polarize in the cities furthest away from Amsterdam. Because the areas mostly have less infrastructure connections and less job opportunities than Amsterdam, the work/living distances increase for these classes. The project tries to tackle this spatial inequality by creating jobs in the locality. The localised and circular food system creates low to middle educated jobs and in that way contributes to the tackling of the negative sides of socio-spatial polarization. In a broader future perspective the introduction of a regionalized food system can also prepare explicitly these areas to adapt towards a knowledge-based economy in time.

Special attention in the project is given to the farming of alternative proteins. This could contribute to a societal and scientific debate about the replacement of meat in our diet. It also investigates new options of dealing with land subsidence and emissions by peatlands while being economically viable and less dependent on agriculture subsidies.

As a last theoretical and scientific concept the knowledge economy plays a significant role in the project. The project proposes to create an extensive spatial knowledge structure in the form of schools and institutions of different levels acting together to enhance a localised circular food system. The knowledge economy because of its current big role in the AMA supports the transition and promotes the creation of jobs. It is also an answer to the continuous trend of robotisation and the diminishing of jobs in the food sector. In that way the knowledge economy becomes a relevant scientific theory that the project tries to look at in an unconventional way.

Concluding, the scientific relevance of the project is multifaceted. While there is still a lot of the projects and policies unclear in scientific terms, the project promotes a framework in which new scientific studies can strengthen the implementation. Both implicit and explicit. Implicit because of the experimental integration of different scientific theories working together and explicit because of the specific involvement of the knowledge economy as part of the strategy.

SOCIETAL RELEVANCE

THE SOCIETAL RELEVANCE OF THE AGRONOMIC RENAISSANCE

The societal relevance of the project is closely related to the theoretical concepts of socio-spatial polarization and the knowledge economy. The societal relevance in a broader sense can be measured using the sustainable development goals of UN Habitat.

Socio-spatial polarization is, as described in the theoretical framework and the scientific relevance chapter, the polarization of economically weaker social groups towards the edges of the AMA region because of an increase in land value in the central region of the AMA. The knowledge economy is the focus of a national or regional economy on a knowledge production by high-educated people and high-tech research facilities. This knowledge economy is centred around the city of Amsterdam and mostly attracts high educated inhabitants. This causes land value prices to rise which result in socio-spatial polarization.

The project tries to counter the negative effects of socio-spatial polarization by creating jobs in the low to middle educated levels in the food sector. This creates a socially fairer region where job opportunities are not only available for high educated people. To realize these jobs the project localizes parts of the food sector. Localization is reached through explicit policy on EU and national scale.

Public goods that are being created are access to healthy food, ecological protection, localized jobs for low to middle educated people, sustainably responsible production and consumption of food, improved connections, developments in weaker areas, more positive image of the agricultural sector and the empowering of farmers against big multinational companies.

The UN habitat sustainable development goals involved in the project are no poverty (1), good health and well-being (3), quality education (4), affordable and clean energy (7), decent work and economic growth (8), industry, innovation and infrastructure (9), reduced inequalities (10), sustainable cities and communities (11), responsible consumption and production (12), climate action (13) and life on land (15).

No poverty is included because the creation of jobs for the weaker social classes creates opportunities for them to climb out of poverty. Good health and well-being is achieved by the promotion and production of healthy local food in a diet that also includes alternative proteins. Quality education is reached by the strengthening of the knowledge economy throughout the levels. From low to middle to high education facilities closely related to local activities. Affordable and clean energy is being created by investing in biodiesel and other forms of biological resources. Decent work is provided by the creation of jobs in the local environment. Industry, innovation and infrastructure are improved to cater to the new localised food economy and innovative knowledge sector. Reduced inequalities are reached in the project by spreading job opportunities throughout the region and making sure lower social classes have access to knowledge. Responsible consumption and production is realised by creating a new circular localised economy that works together with the local ecology and specific local specifications. The consumption is local which reduces food miles and contributes to a sustainable healthy diet. Climate action is taken by reducing emissions and reusing resources. Life on land is protected and has a more prominent position in decision making about economic agricultural activity.

ETHICAL CONSIDERATION

THE ETHICAL JUSTICE OF THE AGRONOMIC RENAISSANCE

The project 'the agronomic renaissance' has two moral pillars at the base of the project. Analysis showed that socio-spatial polarization in the AMA was getting disproportional forms. The rising of land prices in Amsterdam, caused by its enormous high society pull factors like the knowledge economy and high services, resulted in a diaspora of the lower to middle educated inhabitants. These groups were being forced to the edges of the AMA region. Away from job opportunities and facilities.

At the other hand the concentration in the food sector of five big supermarket offices diminished the power of the farmer in the AMA region. While the scale of agrifood production companies grew, the amount of companies and the amount of jobs in this sector went down dramatically over the years.

These two trends were deemed undesirable in the further development of both the food sector and the regional planning of the AMA. With the two challenges in mind the problem statement and the project was formulated.

While the concept of an urbanism project is often ethically noble, the reality is more grey. The project found a way to link the socio-spatial polarization with the concentration of the food sector. It promotes a localisation of the food sector which creates jobs for those groups that moved to the edge of the AMA region. However, this meant that jobs in the current concentrated system were moved towards the edges of the region. While most of the employees in the processing and distribution centres were themselves living at the edges of the region, redistributing the system of distribution has ethical consequences. What makes a worker living in these more local communities have more right on a job nearby than for example a worker living near Amsterdam that now has less job opportunities? The answer the project found was 'proportionality'. Analysis showed that the distribution and processing was so concentrated in Amsterdam that taking parts of the sector to other areas is deemed ethically acceptable.

The agronomic renaissance is however controversial. It implies big institutional changes in the way the society perceives food. It is about changing systems and closing circles. Equalising prosperity and opportunities in a region which has a functional monocentricity. These changes take time and are planned for the long-term. This is necessary to provide the political and societal change needed. For example, the current political landscape in the Netherlands is quite liberal and right. In order for most of the proposed policies to pass, economic incentives have to be carefully created and considered. Big institutional changes are however needed to be able to keep the current prosperity and at the same time deal with climate change and sustainability.

The purpose of the project is to serve as a direction. To show stakeholders a sustainable alternative to the current global food system. It is a framework which is still to be filled in but tries to be as social, environmental and economical conscience as possible.

REFLECTION ON CIRCULAR ECONOMY

THE DIFFERENT CIRCLES WE CLOSE IN THE DIFFERENT SCALES

The circular economy in the project 'the Agronomic Renaissance' is embedded in the very core of it. Renaissance means rebirth, also a re-valuation of a passed time (which is linear) or culture. For a part, a circular economy is the constant re-adding value to products at the end of their traditional -linear- lifespan. The products are essentially re-valued, in that sense the connection with a renaissance in the literal sense of the word is clear.

However, this project is about more than only the circular economy. The circular economy is used as a tool to reach other social, environmental and economic goals. Like Geissdoerfer et al. state in their paper 'the circular economy: towards a new sustainability paradigm', the circular economy is a condition for a sustainable society and their relation is beneficial (Geissdoerfer et al., 2016: 767). Following this reasoning, the circular economy should not be a goal of itself, it should be a tool to reach other societal goals.

With the project, we tried to close the loops by looking at what was necessary in the food sector and the societal reality of the AMA. Through research we discovered that, while the circular economy is not the main answer to these challenges, the circular economy does play a facilitating role for change. According to us, because circularity is deemed necessary for a sustainable society, the transition to this circularity has to be used for multiple challenges.

In the project we closed the loops by reforming the food sector to a more local one, which makes profound use of circular flows in its production, processing and consummation. With the paludiculture solution for peatlands, we introduced a new way of usage of peatlands. Alternative protein sources like azolla and duckweed will most likely eventually be allowed for human consumption. Another application of paludiculture is the production of natural fertilizers which subtracts nitrogen from the air and also captures phosphor from polluted grounds. By syncing the paludiculture in the Zaanstreek with the Flevoland agricultural production grounds we create a synergy that mutually benefits from one another.

In the social dimension we tried to counter the bad effects of socio-spatial polarization by introducing opportunities in the locality of those affected. Low to middle educated social groups can profit from the created job opportunities in the reformed circular agricultural sector, while also get an opportunity to better their food lifestyles towards a healthier and more ecological form.

The water, waste, energy, food, organic, fodder and CO2 circulation loops synergies are closed locally, on farmer's businesses. This means that re-extracted products can immediately be re-used in the farmer's business or the direct locality. This is what circular economy means for us, a local closure of loops and products that can be re-introduced without making a lot of miles in a centralised system.

What we stumbled upon during our research about meat consumption, is that the current average diet of the Dutchman contains way too much meat. The meat industry has a big environmental footprint that has to be considered when proposing a more sustainable agricultural system. While the trend in meat consumption is already going down, bigger steps will have to be taken to really make an impact. We proposed alternative protein sources to be an institutional new activity for farmers. We substituted meat production on peatlands by the aforementioned paludiculture. This gives farmers a viable business opportunity while meat production can go down. The change in diet of customers will not be easy to achieve, however we think that by introducing alternative protein sources over the long time can make this change happen.

What we found hard to achieve, was the full closure of flows in a circular economy. In some fields we lacked the serious expertise to even make educated guesses. However, we tried to come as close to full circularity as we could. Concluding, the circularity in the project 'the agronomic renaissance' has multiple purposes and facets, but always directed towards a sustainable society.

GROUP REFLECTION

REFLECTING ON THE TOTAL PROJECT ' THE AGRONOMIC RENAISSANCE'

When reflecting as a group on the entire project, we found it hard to grasp the circular economy as the ultimate solution to sustainability. Encouraged by our tutors, we first looked in a broader sense to the region by doing a broad regional planning analysis. From this analysis we concluded that socio-spatial polarization was becoming a serious issue in the Amsterdam Metropolitan Area. This regional planning analysis influenced our project towards another direction. Instead of just connecting flows and synergies of a circular economy, we wanted to solve social and spatial issues with it. Our stance towards our role as planners and designers therefore became more normative. In that sense, one could state that our approach to the challenges is very politically left, striving to more equality between societal groups by means of projects and policies.

The food sector is becoming a harsh sector to farmers. Due to food scandals the sector is seen as treacherous. The power is unfairly distributed due to strong institutional imbalances. These institutional imbalances are hard to change, that is why a reform is deemed necessary by us. But who are we? Planners and designers that are not part of the enormous revenues made in the business, that do not know anything about farming, that analyse the sector top-down. Maybe we are not part of the sector and we do not know how the sector in its entirety works, but we do know that there are imbalances that eventually will be unsustainable in terms of social, environmental and economic development. It is our role as planners to give a perspective to the sector which accounts for the societal challenges in a fairer sense.

But as mentioned in the ethical consideration of the project: urbanism projects are often ethically noble and normative, however the implementation mostly is a more grey area. And this grey area is where we had to make choices between economy/ equality, knowledge and services or manufacturing and farming. Questions like 'how can we reform the food sector without serious economic effects?' were hard to answer and we feel like there are still numerous uncertainties in our eventual implementation. But what we think is strong about the project is that it shows a new indigenous way to organise the food sector, while staying at the forefront of innovation and being economically viable.

Another consideration is the balance between job opportunities for the high educated workers and middle to low educated workers in the contemporary economy. Is there a place for middle to low educated workers in the knowledge economy? Will job opportunities still exist in the future or will the technology resulting from the knowledge economy completely swallow the employment chances for less-than-high educated people? Is there a limit to the knowledge economy and is that limit to be reached soon? Fundamental questions that are uncertain. This project tries to give perspective by implementing a long term strategy that, in our opinion, can lead to a more balanced sustainable society in the future.

Nonetheless, more literature and empirical research is needed to be able to really implement the project ' the agronomic renaissance'. We are thoroughly aware of that. We consider this project as a framework and not as a blueprint, but do think a framework has to be strict in order to make sure implementation is achieved.

SEBASTIEN REININK

The planning tradition in my country is, as thoroughly assessed in the 'debating strategic planning' lectures, very much embedded in its DNA. The Netherlands is the most planned country in the world and is famous for its key principle: 'polderen'. We like to settle planning challenges by involving everyone and then meet in the middle (to state it exaggerated). Therefore, for me, it is clear why we engage in strategic spatial planning. It formed my home country and brought identity to the landscape. Planning protected heritage landscapes, minimalised urban sprawl in green areas like the green heart and created a super functional and liveable country. By thinking ahead, challenges like population growth, traffic jams and overcrowding of inner-cities can be managed.

However, I am very much aware that planning can also bring about failure. Because planning is typically about a long stretch of time and in the future, trends and mechanics can change over time. A good example of this in our project, is the planning of the Flevoland polders. The original idea was to plan 6 villages in the polder where agricultural land workers could live with their families and go to their work efficiently. However, because of the progress in mechanisation of agricultural processes, less workers were needed. This led to the scrapping of 3 of the 6 villages. A blueprint plan is therefore not the right way for long term planning. It has to be adaptive, while at the same time give perspective. Planning should be seen as a framework in which developments can take place, while these developments together eventually lead to a positive future perspective.

Another precondition of planning is a well elaborated roadmap. Because of the lack thereof in the planning of Lelystad, the train wasn't realised until the 1980's, which led to the isolation of inhabitants and a lack of economic developments in Lelystad. A poorly thought-out roadmap can therefore ruin the planning ideas. However, one should also be wary about roadmapping too explicit. Delays can affect other aspects in a roadmap and it can be hard to convince stakeholders when the steps are too explicit.

Stakeholder participation for me is key for the success of a project. Involving the right actors at the right times can make the project. What I found hard was to convince stakeholders with an economic power to cater to societal goals. During the project there were times where societal goals were deemed more important than direct economic prosperity. Long term planning can then be the key to change institutionalised power positions gradually into another system. An important role plays the government in this development. Good governance is also a precondition for planning, as societal values should be protected by this government.

Concluding, the strengths of the project were in the long term gradual planning and the integration of multiple normative goals into one comprehensive development strategy. The weaknesses were the many uncertainties in the strategy. Because of the innovative nature of the project, not much is certain and the project is dependent on legislation changes and the willingness of stakeholders to embrace unconventional new business models. This might be a weak basis for change, it is however important to give a perspective that can guide the sector to a new paradigm.

GABRIELA WALDHER

For our proposal "The Agronomic Renaissance" I engaged a strategic spatial planning approach, because nowadays situation in the AMA lacks on a regional planning structure in the agrifood system. The current globalized and export oriented agronomy is already confronted with small bottom-up initiatives fighting for a more local and sustainable agrifood system. There is a growing demand and market for these products, but big international companies are still dominating and restraining the farmers and local processors. In order to facilitate the ongoing small and fragmented movements we provide a regional framework (not a blueprint) to give the power back to the producer. Strategic spatial planning is used mainly as a tool for shaping attention and raising awareness of the government, private companies, producers and consumers, that there is an alternative market and a way out in a collaborative way.

The main value of our strategic spatial development is to give a voice to less powerful stakeholders, such as producers and consumers, but also the environment and society. Nowadays mono-cultural crop cultivation in Flevoland and also the extensive grasslands in Zaanstad region do not respect natural and environmental conditions and consequences. The project aims to change current agricultural production and power patterns, but also giving a voice to the environment and can thereby prepare for an uncertain future in terms of climate change and the current globalized market.
Like the by Vincent Nadin showed graffiti of London Docklands says "community need before private greed" we respond to this projected power shift by introducing circular farming communities, in which certain parts of the producer´s land has to be given away for a collective use. This approach tries to create a balance and transition between the actual capitalistic land use pattern and our more left proposed shared vision. A challenge I was facing during the design process, is to define this new business model without converting it into a communistic strategy and also respect individual freedom. How can we define how much sharing and possess is feasible in our society?

I detected various preconditions for the "The Agronomic Renaissance" in the AMA. For example, the projected switch of the national government from an agricultural towards a food policy, the injection of decentralized logistic infrastructure in Flevoland, existing initiatives of local producers and a growing demand for regional products among the Dutch population. By using the key principles of strategic spatial planning of a wider impact by introducing the circular economy, local waste, water and energy loops can be closed easily. Another important principle is the proposed proportionality of power and of course visioning a sustainable future.
For the proposed power switch, the project needs high stakeholder involvement in a multi-level, and multi-scalar approach. In the first three years the Food Tables of the municipalities and the Food Council of the AMA, which are including stakeholders from the public, private and civic sector, have to decide on site specific business models. After that these committees serve for innovation and communication, while supervising the balance of power. Also by introducing the circular farming communities, collaboration and self-management between the farmers is needed, which is on the top of the participation pyramid according to Arnstein (1969).

Conclusively the main challenges I faced during this quarter were:
-Is this shift of power even possible? And who are we as planners to change that?
-What´s the overall effect on the entire region of our proposal given the fact, that the food system is a relatively small part of the economy of the AMA?
-How can we define how much sharing and possess is feasible in our society?
-How can we design with the uncertainties of our future work situation considering the ongoing digitalization and automation?

LIU CHANG

In my point of view, planning is always risky and complicated because everything you do is uncertain and you can never find out all of the evidence which is also changing frequently over time. But I still engage in strategic spatial planning, it is not because I'm confident enough to complete a perfect plan, it is because people need some platform and opportunity to express their thoughts and appeal. Strategic spatial planning is a good platform that can involve different stakeholders and provide the opportunity to critically review the existing systems, and also provide possibilities for improvements. Such as our project, the current concentrated agrifood system faces lots of threaten that need to be discussed in the planning process.

In this case, I use large quantities of evidence-based analysis to make our project as feasible as possible. For example, we propose the deconcentrate agrifood system because we notice the precondition that there are already ongoing actions about local processing and distribute and there are also many policies from different scale to support this movement. Also considering wider impacts, I want to integrate as much as other elements within 'The Agronomic Renaissance' such as self-sufficient energy, waste reuse, water purification and social segregation.

However, the main barriers that I come across also come from the above two aspects. First of all, as I mentioned in the beginning, it is impossible to find all the evidence and current statistics. Specifically, when I try to define the size of farm community, I drop into dilemma because there is always not enough evidence to define it. And if we want to regulate the certain size, it becomes quite top-down planning and violate the principle of participation and democratic decision-making. But if we don't define it, we lost the main concept of the project because we cannot prove the 'farm community' can be created. Secondly, when I try to consider different elements in food system and integrate them, I find it may be another kind of isolation. Because I only focus on the connection of different flows within agrifood system. For example, in the project I only consider to fulfill the energy self-sufficient and water circulation in agriculture sector, but I don't consider much about how this proposal would influence other sectors like industry and household.

Stakeholders participation is also a challenge in this project. Because we want to deconcentrate the current system, the opponents are always companies with high power and high interest. What we are proposing is multi-level engagement strategy. In order to tackle these barriers, we want to provide a platform for public sector, private sector and civil society to communicate and collaborate. Also we introduce a new business model both in regional and local scale to balance the power within different sectors.

To conclude, this project focuses on the rights and balance between different stakeholders and try to integrate different flows and create the circularity in a local scale and influence the whole region to some extent. In my opinion, we try to consider multiple aspects to make this solution more feasible and realistic. However there are still many uncertain parts relate to the barriers. We don't know if the principle of farm community and different food hubs are another kind of 'concentration', we also don't know what kind of jobs and how much of the jobs we can create by this 'Renaissance' to tackle the social segregation. But precisely because of these uncertainties, we have the opportunity to constantly explore, adjust and reflect on our planning.

Strategic spatial planning is the game of uncertainty.

MENG WANTING

When reviewing the whole design process of our project, I found that actually I had the predestined relationship with our food topic 'Agronomic Renaissance'. I came from Guangdong Province, which celebrates itself as China's food mecca. Besides, in my province, there also have the Guangzhou Metropolitan Area. Although the elementary situation such as the history, culture, size, population, etc. are different, the challenge they face are more or less the same: to make the transition towards a circular economy. To make the circular economy happen, social, environmental and economic challenges have to be integrated in the transition. For the reason why, I engaged a strategic spatial planning approach, I think having only the targets are not clear, precious and efficient enough to help the region or city to achieve the goals. We need to publish the actions, practices and policies which strongly connected with the space, activities, timelines, stakeholders and etc. in different scales, and that is exactly the core of strategic spatial planning.

In our project, I suppose the key principle in the strategic spatial planning we use is Sustainability. When we talk about 'Agronomic Renaissance', we use the circular economy as a tool to establish normative change in the case of the imbalanced agrifood sector. The development strategy of the project provides a framework for a future circular economy in a fairer agrifood sector. The framework encompasses localising the food network and creating a local circularity in the flows of energy, water, heat, fodder, CO2 circulation and organic material. At the same time, the deconcentration can help to create jobs for the low and middle educated people to decrease social segregation.

In our road map, in the first three years of the project, the AMA should first set up the Food Council and hold the Food Table for the all the stakeholders such as the farmers, retailers, different scales of municipalities, investors, planners, etc. Based on the policies and business model made by the planners, adjusting them and putting up some new ideas or different opinions. There is no doubt that, the participation of different stakeholders can help to balance much better the interest in the plan. At the same time, the different perspective of various stakeholders will make the practice of plan more comprehensive. However, the participation also brings the disadvantages, like, inefficient, unfair, compromise. From my point of view, it is still necessary to encourage the participation of diverse stakeholders, but we can control the timeline of the total decision-making time (like three years). Besides, scale the different food table and voting for the representatives to go on the larger scales decision-making.

Conclusion: During the exploring and studying process, I suppose our project can improve from these three aspects.
1. About the size of the community: in our project, we set the standard of one unit simply as no less than 4 stakeholders and the length of the whole unit less than 3KM. Actually our consideration is about the food miles and circularity economic, but the reality of the farmland is much more complex, our standard is too general.
2. How to distribute the fees of the circularity part we also do not give out our advice.
3. Some public constructions (such as windmills) need to occupy the farmlands, how to compensate or make a deal with the stakeholders?
4. About the new economic part, we can also add the agritourism as the supplemental income of the slack season in the farm.

SELF REFLECTION

GAYATRI MUJUMDAR

Planning plays an integral part to reach a desired goal. Throughout history planning has been at the core of any administrable expansion. Different ways of planning demonstrate, the diversity of planning as a tool; how inclusive is it, on what governance levels is it imposed, on what levels are the stakeholders participating? It is also quint essential to understand the regional dynamics with respect to spatial planning. In the case of this project "The agronomic renaissance" the brief was focused on the task of integrating circular economy into regional planning of the AMA region. As a group with holistic mix of international and Dutch students, our group focused foremost on understanding the dynamics of the AMA region. Result was a comprehensive and detailed understanding of the region and the impact of multi scales of governance on the socio-spatial, economic and environmental aspects that comprise and form the AMA region.

Strategic Spatial Planning as I have understood is a necessary and constructive tool to address the problems of the region with a series of actions and plans that are symbolic of activities that need to be taken in a defined time frame to manage and create scope for other activities while involving the stakeholder participation from the outset. Major factors like population rise, globalization and the climate change have alarmed the political bodies of resource scarcity and resulted in rethinking about the dynamics of the food produced through intensive farming methods that are creating global warming and contaminating the soil simultaneously depleting of its essential non-replenishable nutrients. Food is the driver for the economy of the Netherland since its inception and has been the basis for all the other business developments. Our proposal tackles this precise situation taking into full consideration the effects of the food flows on the economy and the biodiversity while simultaneously tackling the socio spatial divide that has been created because of the concentration of power upheld by a few. Through the planning strategy a careful and cognitive business model is developed that provides room for all stakeholder engagement in an explicit way and on multilevel wherein current policy, funding schemes, innovative projects are assessed and evaluated based on their approach towards environmental and socio-spatial implications within a timeframe. Furthermore, a detailed course of actions or strategies are proposed for convenient transition from its current state to a more sustainable and equitable direction, so that the local potentials also get the benefits of the regional synergies.

The economy is in transition and with the strategic spatial planning as a dynamic tool to mediate this change due to its contingency aspect, the proposal provides a series of possibilities that if addressed and executed on the multi governance levels can take us further closer to become a sustainable society. With placemaking strategy at the core of our developmental plan and going bottoms-up, the project capitalizes on the potentials of the land while simultaneously catering explicitly and indigenously to the community needs while being in check of its impact on the biodiversity and empowerment of the producers without hampering the economic capacity of the country. Rather the proposal, particularly addresses the dynamics of the food sector in the AMA region and even with the transition towards a circular economy how it can still capture on to its concurrent status in the economy bracket by being local and sustainable.

Conclusively there are still very many questions that need to be addressed and researched upon regarding the role of all the other stakeholders and how the proposal can then modify and adapt to the requirements of them. Simultaneously it still remains a question of great debate as to how strategic planning can be made more coherent and adaptive in a developing country with multiple multi stakeholders when now climate change and globalization are stated to be at its peak?

APPENDIX

GLOSSARY OF ITEMS

ACTION CHART

Sub-topic	Goals	Strategy	Actions	Stakeholders	Existing Policy	Proposed Policy	Localization	Timeframe
AGRONOMIC HUB	Production according to local demand	Diversification of agricultural production	- introducing paludiculture on peatlands - produce food that can be grown for a self sufficient and healthy diet in the AMA - produce food that can be grown seasonably and sustainable in the Dutch climate - Forms of year-round production- nutrient increase- crop rotation practice	-Farmers -Consumers - Suppliers of Fertilizer	-Reformation in CAP policy part-rural development programme Manure directives-tradable manure rights -Reformation in CAP policy part-Research and innovation -Reformation in EU promotional policy -Reformation in CAP part-69, 70, 71, 72	-Certain percentage of the land under livestock farming should be reserved for restoration by paludiculture and soil decontamination methods -Tradable manure rights under Manure directives of the CAP policy should be specified according to scale of land and amount of CO2 emissions -Production of specific and diverse food that caters self sufficient nutritional diet value of the AMA region -Promotion of specific year-roundfood production on the farm to increase productivity and ecological integrity of the crop in ecosystem of the AMA region with recommendation from the knowledge sector. -Promotion of protein rich food production and innovative farming techniques on the farm to increase the nutrient capacity of the soil with recommendation from the knowledge sector.		2020-2050
	Healthy food diet	Enable residents to make healthy food choices	- decrease dairy and meat consumption - follow the standards set by Netherland nutrition centre foundation - alternative forms of protein production like Azolla or Algae etc - Seasonable vegetables and fruits diet - Celebrate the taste of local foods and the diversity of cuisines - Communitate how food choices support sustainability	- Netherland nutrition centre foundation - Ministry of agriculture, nature and food quality - Municipality of Almere, Lelystad, Amsterdam - EU agriculture committee - EU health committee - Dutch average consumer - local producers & processors	-Reformation in EU promotional policy-livestock management and rearing -Reformation in CAP policy part-market measures -Reformation in CAP policy part-food, feed, animal, plant safety -Reformation in EU agriculture product quality policy -Controlling and responding to dependencies of import and export -FOOD POLICY (National and regional)	-Market value of the food produced in the agronomic hub should cater to the fluctuation of consumer demands and the amount of food production. -Consumption of alternative proteins should be undertaken with standards set by the Netherland nutrition centre.	all	2020-2040
	Circularity	Introduction of a new economy in the agricultural sector	- organize circularity in small farmer communities - localize energy production by using bio-digestion plants in farmer communities - localize water storages in farmer communities - shared manure storages in farmer communities for natural fertilizer production - collaboratively organized distribution of agricultural products - localized and collaborative processing of raw agrigulctural products	- Farmers - renewable energy companies - Waterschap - Zuiderzeeland (Water purification company Flevoland) - municipality	-Reformation in the CAP policy part-174, 39 -Reformation in CAP policy part-direct payment to farmers-greening scheme --Reformation in CAP policy part-rural development programme Manure, nitrates and water directives -Reformation in CAP policy part-food, feed, animal, plant safety -Reformation in EU agriculture product quality policy	-5% percentage of the land under farming will be reserved for ecological purposes, as per greening scheme. In addition part percentage of the land collaboratively should be used for crop diversification practices and circular economy projects. -CAP174, 39 reformation-A **special package** of incentives and subsidies should be provided in a fair percentage to the farm lands that incorporate circular production practices and contribute for local and global marketing of the food produced.	Flevoland as a pilot project, but the idea is to expand to other agricultural production lands	2030-2040
AGRONOMIC HUB/KNOWLEDGE	Ecological food system	-Protect biodiversity -Reduce waste in the food system -Facilitate adoption of environmentally sustainable practices	- Use paludiculture to produce fertilizers/phosphorus and decrease land consolidation/CO2 emmissions of peatland - RE-use foodwaste in short circle processing for animal feeding, compost, biomass, and low income families - Combine natural remediation and agricultural production - Use as much natural pesticides as possible	-Farmers -Municipality -National government -EU -NVWA	-Reformation in the CAP policy part-174 -Reformation in CAP policy part-rural development programme Manure directives-tradable manure rights -Reformation in CAP policy part-direct payment to farmers-greening scheme	-Certain percentage of the land under livestock farming should be reserved for restoration by paludiculture and soil decontamination methods. -CAP174, 39 reformation-A **special package** of incentives and subsidies should be provided in a fair percentage to the farm lands that incorporate circular production practices and contribute for local and global marketing of the food produced.		2030-2045
KNOWLEDGE	Accesibility of agrifood knowledge for everyone	Interconnecting network of knowledge food hubs (Wageningen, Amsterdam, Almere, Dronten, Seed Valley)	- Create & provide internet platforms with knowledge for farmers in order to facilitate adaption towards knowledge economy - Enhance food literacy and skills in school (ex. school gardening project)	- Wageningen University - AERES Hogeschool Almere & Dronten - Seed Valley - Amsterdam University - Municipalities & Provinces	-Reformation in CAP policy part-Research and innovation -Upcoming food policy NL-innovation and recommendation from knowledge institutes -Reformation in CAP policy part-school schemes	-Food production should be facilitated with technical and climate assistance from the knowledge and innovation sector to strengthen the position of the producers in the food chain. -Execution of the CAP for the school scheme with the provision of the Union aid should be excessively monitored and promoted to promote healthy consumption practises from childhood. -Funding under corporate social responsibility should be allocated for "The Corporate Diet" of the company and should be paid directly to the producer and the distributor.		2020-2050
TRANSPORT CONNECTION	Short food chain	-Deconcentration, localising processing and distribution -Increase direct marketing opportunities for local foods	- empower farmers by increasing their responsibilities in the food chain - localising the processing and distribution to farmer's businesses - creating food HUBs in Almere&Lelystad, Zaanstad and Aalsmeer - offering local alternatives to consumers - local farmers produce animal feeding (no more import)	-Farmers -Distribution Company -Wholesalers -Retailers -AEB -Food Council MRA	-Reform in Common agricultural policy part 172 -EPI- AGRI programme -Reformation in CAP policy part-direct payment-greening scheme -Upcoming innovation policy in the FOOD policy in NL	-Food production should be facilitated with technical and climate assistance from the knowledge and innovation sector to strengthen the position of the producers in the food chain. -5% percentage of the land under farming will be reserved for ecological purposes, as per greening scheme. In addition part percentage of the land collaboratively should be used for crop diversification practices and circular economy projects. -Promotion of specific year-roundfood production on the farm to increase productivity and ecological integrity of the crop in ecosystem of the AMA region with recommendation from the knowledge sector. -CAP174, 39 reformation-A **special package** of incentives and subsidies should be provided in a fair percentage to the farm lands that incorporate circular production practices and contribute for local and global marketing of the food produced. -Food hubs should circulate and promote indigeneously produced food products and services that fosters employment and economy for the community and the region.		2020-2040
	Sustainable transport & logistics	enhance relation between Port & Airport (Lelystad - Amsterdam)	- Food distribution hubs for regional food in Lelystad and Amsterdam (Food center) in direct connection to harbor - Use waterway between Flevokust and Amsterdam harbor for food transportation between the food hubs - Use electronic vehicles in a collective way for regional & local food distribution Use bicycles for local food distribution in a collective way	- Foodlogica (Start up for bicycle distribution in Amsterdam) - Food Center Amsterdam -Distribution Company -Airport -Port	---	-Transit of mass produced food products should only be facilitated by non fossil fuel based large capacity transport network in the region. - heavy tax duties should be imposed if mass capacity transit is unsustainable.		2020-2025
LOCALISED ECONOMY	Socio-economic sustainability	decrease negative effects of socio-spatial polarisation	- strengthen local economies in Flevopolder by deconcentrating of the current food processing and distribution industry in Amsterdam - create local jobs in Almere & Lelystad - Invest in a new generation of food producers	-Municipality Almere, Lelystad and Amsterdam -Low-educated people	-Reformation in CAP policy part-direct payment, rural development programme	-Promotion of specific year-roundfood production on the farm to increase productivity and ecological integrity of the crop in ecosystem of the AMA region with recommendation from the knowledge sector.		2035-2050
	Rebranding the agrifood sector	-Agrotourism -Agroeducation -Labeling -Advertisement	-Handing out the Good Food Bags Toolkit to support child care staff and others to distribute low-cost fruit and vegetable bags to young children and families. -Setting up the Open Day for parents to visit the school gardens, at the same time to promote the local argofood. -Intensify efforts in local label promotion and establish a good brand image -Organic certification of producers and processors -According to the Local food recipes, during the food packing process, farmers can pack all the ingredients together, so that even at home, people can cook the "flavour of the region!" themselves. -For the cooperation restaurants, listing locally grown ingredients. -Putting advertisements on Internet, billboard, TV, magazines and so on. -Exhibition	-Farmers -Schools - Dutch average consumer - local producers & processors - EU agriculture committee -Tourism committee/ institution	-Reformation in CAP policy part-school scheme -Reformation in EU promotional policy -Reformation in EU agriculture product quality policy -Upcoming food policy NL-innovation and recommendation from knowledge institutes	-Execution of the CAP for the school scheme with the provision of the Union aid should be excessively monitored and promoted to promote healthy consumption practises from childhood. -Funding under corporate social responsibility should be allocated for "The Corporate Diet" of the company and should be paid directly to the producer and the distributor. -Promotion of specific year-roundfood production on the farm to increase productivity and ecological integrity of the crop in ecosystem of the AMA region with recommendation from the knowledge sector. -Execution of the CAP for the school scheme with the provision of the Union aid should be excessively monitored and promoted to promote healthy consumption practises from childhood.	-the agrotourism or promotion of the bussiness model becomes a sample for other countries and researchers to come and understand the model in spatial context.	2030-2050

COMMUNITY SIZE CALCULATION

Bio Digester

Considering calculations reference from Garcia, 2005

On232Ha of land in agriculture(72 ha arable crop land, 160 arable feed land, 100 cows as livestock), amount of wate generated is 10,641 kg/day and size of the digestor is 456cubic meter. Digestate of 9550kg/day and biogas of 1091kg/day or 351KW energy is produced daily after 40 days of retention time.

Therefore for 30 ha of agricultural land, size of biodigestor required is 60cubic meter producing an energy of 50KW and digestate(fertilizer) of 1235kg/d with an retention time of 40 days.

Estimated percentage land required for biodigester, fertilizer storage, biogas, waste storage is 0.4% of 30ha

Wind Energy

Considering calculations reference ("NREL: Power Technologies Energy Data Book - Wind Farm Area Calculator," n.d.)

A wind turbine requires 0.10ha of land to generate 1000KW depending on the local conditions with the turbines being places 5 to 10 turbines apart.

Estimated percentage land required for 1 windmill is 0.3% of 30 ha with additional area required for access.

Water storage

Considering reference from ("Agricultural census in the Netherlands - Statistics Explained," n.d.)

Average annual water requirement for agriculture in 2010 was 258cubic meter per hectare. Therefore water requirement for 30 ha, if irrigated every 5 days is 106cubic meter. So area requirement for a cylindricak water storage tank is 53square meter.

Estimated percentage land required for water storage tank is 0.4% of 30ha

Protein production, Processing, Distribution

Considering reference of the land use under persona holdings equal area was reserved for the production of protein and processing, distribution.

Therefore estimated percentage land required for protein, processing and distribution is 8% of the 30 ha

Protein production, Processing, Distribution

Considering reference of the land use under persona holdings equal area was reserved for the production of cash crop-medical cannibis..

Therefore estimated percentage land required for cannibis is 2% of the 30 ha

STATISTICS

ECONOMY & JOBS

Municipalities	Population 2016	surface land (ha)	Population density (inhabitans/km2)	Labour force 2016	Labor force rate (Labour force/Population)	Companies 2016	By sector						Jobs 2015	Jobs in Agribusiness 2014	Working population 2015	Difference	
							Agriculture, forestry & fishing	Industry & Energy	Trade & Catering	Transport & ITC	Business services	Culture, Recreation and other					
Amsterdam	833.624	24.877	5042	603.640	0,72	112.520	105	7.875	20.075	14.555	38.105	21.925	579.500	5.795	426.000	153.500	136%
Almere	198.145	12.924	1533	81.030	0,41	14.840	90	2.000	3.365	1.965	4.385	1.945	64.600	4.845	98.000	- 33.400	-34%
Haarlem	158.140	3.209	5422	65.360	0,41	15.740	25	2.150	3.065	1.470	5.240	2.450	62.900	4.718	81.000	- 18.100	-22%
Zaanstad	152.466	8.324	2064	60.410	0,40	11.575	95	2.630	2.485	1.070	2.805	1.465	53.800	6.725	74.000	- 20.200	-27%
Haarlemmermeer	144.518	1.547	811	129.370	0,90	14.765	355	2.090	3.365	1.705	4.070	1.420	150.600	3.765	75.000	75.600	101%
Amstelveen	88.602	4.408	2150	49.320	0,56	7.455	85	580	1.480	790	2.630	885	41.800	3.135	42.000	- 200	0%
Hilversum	87.830	4.635	1926	46.090	0,52	9.695	15	1.250	1.685	1.275	3.260	1.290	48.300	3.623	43.000	5.300	12%
Purmereend	79.889	2.456	3444	26.500	0,33	5.240	5	905	1.290	525	1.305	720	24.200	1.815	39.000	- 14.800	-38%
Lelystad	76.792	76.545	333	36.250	0,47	5.990	160	970	1.480	605	1.550	745	31.000	2.325	36.000	- 5.000	-14%
Velsen	67.448	6.305	1506	33.520	0,50	5.155	35	1.095	1.115	385	1.355	625	31.000	2.325	34.000	- 3.000	-9%
Gooise Meren	56.696	7.522	1363	21.020	0,37	7.350	40	750	1.270	650	2.805	805	20.100	1.508	26.000	- 5.900	-23%
Huizen	41.373	2.332	2618	13.040	0,32	4.050	20	650	750	355	1.245	490	13.500	1.013	20.000	- 6.500	-33%
Beverwijk	40.318	2.009	2202	17.680	0,44	3.535	25	645	1.210	250	700	395	19.600	1.470	20.000	- 400	-2%
Heemskerk	39.299	3.167	1444	9.110	0,23	2.500	80	435	600	180	605	315	9.300	1.163	19.000	- 9.700	-51%
Edam-Volendam	35.465	2.478	652	15.110	0,43	3.870	95	1.350	740	150	675	370	10.900	1.635	15.000	- 4.100	-27%
Castricum	34.604	6.037	699	10.340	0,30	2.970	90	510	570	225	780	390	8.100	1.013	17.000	- 8.900	-52%
Aalsmeer	31.299	3.229	1555	14.730	0,47	3.360	135	450	905	265	800	355	16.600	5.810	16.600	-	0%
Uithorn	29.181	1.942	1601	13.230	0,45	2.575	130	370	560	220	675	295	11.700	4.095	15.000	- 3.300	-22%
Diemen	26.840	1.404	2238	17.370	0,65	2.305	5	300	456	305	685	310	18.000	450	14.000	4.000	29%
Heemstede	26.766	964	2916	8.210	0,31	2.770	10	240	530	180	1.100	265	7.100	533	12.000	- 4.900	-41%
Wijdemeren	23.275	7.636	489	8.010	0,34	3.155	80	515	600	250	910	385	6.400	480	11.000	- 4.600	-42%
Bloemendaal	22.296	4.518	561	5.900	0,26	2.565	10	175	380	135	1.070	260	4.700	353	10.000	- 5.300	-53%
Weesp	18.572	2.416	815	8.770	0,47	2.020	40	300	430	195	590	240	9.600	720	9.000	600	7%
Waterland	17.304	11.566	332	4.530	0,26	1.725	105	255	295	140	490	245	3.200	560	9.000	- 5.800	-64%
Zandvoort	16.792	4.397	523	5.280	0,31	1.810	-	245	495	125	480	255	4.200	315	8.000	- 3.800	-48%
Wormerland	15.664	4.518	406	4.750	0,30	1.320	70	315	200	90	325	160	3.700	463	8.000	- 4.300	-54%
Ouder-Amstel	13.411	2.578	557	13.520	1,01	1.795	45	185	340	245	560	180	9.400	705	6.000	3.400	57%
Uitgeest	13.360	2.229	697	3.710	0,28	1.045	30	240	200	65	290	120	3.200	400	7.000	- 3.800	-54%
Landsmeer	11.126												1.800	225	5.000	- 3.200	-64%
Laren(NH.)	10.956	1.241	883	4.600	0,42	1.770	5	140	335	115	640	170	4.800	360	4.000	800	20%
Blaricum	9.622	1.556	863	3.470	0,36	1.245	10	125	190	85	450	150	2.900	218	4.000	- 1.100	-28%
Oostzaan	9.504	1.608	824	3.290	0,35	840	15	160	170	85	200	95	2.600	910	5.000	- 2.400	-48%
Beemster	8.958	7.207	127	3.610	0,40	1.070	180	180	170	70	240	115	3.000	1.050	4.000	- 1.000	-25%
Haarlemmerliede en Spaarnwoude	5.578	2119	290	2.020	0,36	650	15	115	120	60	165	90	2.100	53	3.000	- 900	-30%
													1.284.200	64.568			
														5,03%			

Sources:
Labour force & Companies: https://www.lisa.nl/data/gratis-data/overzicht-lisa-data-per-gemeente
population, sectors and km2: http://www.cbsinuwbuurt.nl/

STATISTICS

FOOD PRODUCTION IN FLEVOLAND

	Total Agr. Surface (are)	Land for potatoes (are)	Potatoes production (tons)	Land for vegetables (are)	Land for beet (are)	Beet production (tons)	Land for onion (are)	Onion production (tons)	Land for legume (are)	Legume production (to
Almere	73.661,00	18.679,00	10.329,49	23.402,00	12.568,00	13.359,78	9.246,90	5.696,09	0	0
Dronten	1.755.623,00	456.401,00	252.389,75	491.967,00	288.062,00	306.209,91	240.419,38	148.098,34	291	10,19
Lelystad	632.288,00	158.985,00	87.918,71	178.469,00	108.483,00	115.317,43	87.845,54	54.112,86	0	0
Zeewolde	986.849,00	260.319,00	143.956,41	248.180,00	187.475,00	199.285,93	120.209,69	74.049,17	772	27,02
Noordoostpolder	2.731.037,00	1.005.991,00	1.510.263,46	819.268,00	405.712,00	431.271,86			314	10,99
urk	20.091,00	7.190,00	11.110,32	4.436,00	4.112,00	4.371,06			0	0
Flevoland	6.199.549,00	1.907.565,00	1.865.711,62	1.765.722,00	1.006.412,00	1.069.815,96	457.721,52	569.609,00	1.377,00	48,2
tons/are			0,553			1,063		0,616		0,035
Netherland	50.914.706,00	16.267.142,00	8.589.050,98	6.046.784,00	8.535.204,00	7.920.669,31	2.610.034,11	1.453.789,00	306.279,00	10.719,77

	Land for cereals (are)	Land for wheat (are)	Wheat production (tons)	Land for maize (are)	Maize production (tons)	Industrial plants (are)	Other (are)
Almere	18.084,00	12.400,00	1.227,60	3.411,00	1.916,98	501	0
Dronten	483.640,00	316.200,00	31.303,80	86.980,50	48.883,04	18.625,00	1.566,00
Lelystad	169.669,00	111.600,00	11.048,40	30.699,00	17.252,84	7.917,00	3.646,00
Zeewolde	281.609,00	186.000,00	18.414,00	51.165,00	28.754,73	3.820,00	955
Noordoostpolder	457.316,00						1.057,00
urk	4.228,00						0
Flevoland	1.414.546,00		61.993,80			30.863,00	7.224,00
tons/are			0,099		0,562		
Netherland	16.407.763,00		1.054.818,00		9.956.048,00	1.239.624,00	

	Horticulture open land (are)	Fruits (are)	Bulbs and tubers (are)	Floriculture crops (are)	Horticulture vegetables (are)	Nurseries (are)
Almere	10.995,00	0	3.893,00	246	6.225,00	631
Dronten	155.457,00	50.256,00	33.965,00	596	49.645,00	20.995,00
Lelystad	66.107,00	66	5.615,00	49	60.262,00	115
Zeewolde	124.152,00	19.626,00	42.856,00	0	39.686,00	21.984,00
Noordoostpolder	377.582,00	49.059,00	269.155,00		43.141,00	11.338,00
urk	581	19.626,00	581		0	0
Flevoland						
Netherland	9.352.427,00	2.046.297,00	2.667.592,00	310.839,00	2.631.681,00	1.696.018,00

	Horticulture under glass (m2)	Floriculture crops (m2)	Nurseries (m2)	Horticulture vegetables (
Almere	239.623,00	215.663,00	0	23.960,00
Dronten	27.790,00	18.000,00	4.990,00	4.800,00
Lelystad	300	0	0	300
Zeewolde	0	0	0	0
Noordoostpolder	2.735.711,00	1.095.981,00	49.300,00	1.590.430,00
urk	0	0	0	0
Flevoland				
Netherland	90.794.934,00	35.918.902,00	4.009.369,00	49.919.170,00

	Grassland (are)	Cattle	Sheep	Goats	Horses	pigs	chickens
Almere	33.394,00	1780	49	0	75	0	0
Dronten	382.617,00	17702	1370	53	248	4526	703919
Lelystad	224.082,00	7945	226	3249	199	6961	459625
Zeewolde	475.038,00	25802	579	777	332	12400	284108
Noordoostpolder	427.500,00	18787	8987	4006	270	24547	505309
urk	7.148,00	362	4	0	2	0	701510
Flevoland	1.549.779,00	72378	11215	8085	1126	48434	2654471
Netherland	96.295.505,00	4096110	798833	532872	85574	12400699	105184440

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