LiVFE transition

to a healthy agriculture sector with
livestock as an integral part of life

Liv/fe Transition

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Key words: *South-Holland, circular agriculture, value change, transitions, diet, technical, attitude, stakeholders*

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Liv/fe Transition

This report proposes a new way of examining the economical features and interlinked processes that shaped and operate the livestock sub sector in South Holland, and its participation within the larger economy of the region and the whole of the Netherlands, recognizing systemic trends and suggesting meaningful interventions aimed at improving the specific situation of actors within that industry as well as adding new and meaningful entities into the South Holland space, to the benefit of all.

The report was created by five Master students attending the Urbanism track at TU Delft, and is the culmination of two interlinked courses:
R&D Studio: Spatial Strategies for the global Metropolis
Research and Design Methodology for Urbanism

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Finally we would like to thank the subjects of our interview process: Josephine Schuurman from Urgenda Caringfarmers, Bastiaan de Jong, our consumer who wouldn't want to be named and Anne Roebroeck from Frieslandcampina.

Thank you all in your assistance.

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Content
Liv/fe Transition

Abstract

By 2050, South-Holland will transform into a transition based urbanity with value change at its core. Currently, consumers are disconnected from where their food is produced, leading to a high environmental impact, unhealthy choices and social injustice to the farmers' work.

The proposed strategy of change for the region would see South Holland shift away from being an export based business of livestock farming, lowering and limiting production to local needs, while changing the attitude of farming, and reshaping it as a spatial part of everyday life, freely accessible to the region's citizens. In order to do that a strategy of transitions is chosen, recognizing three core spatial movements based on the three pillars of sustainability; diet transition, attitude transition and technical transition.

Diet Transition - changes in food consumption would also affect the spatial landscape upon which food is produced.

Attitude Transition - raising awareness toward how meat and dairy is produced would affect the cities where consumption takes place and how the different actors are treated.

Technical Transition - would help change the Dutch industrial sites from an exporter of goods to an exporter of knowledge while supplying it with clean energy, creating a better South Holland while benefiting other countries.

In the vision, it is recognized that these movements have spatial manifestations in the form of rings, with their points of overlap being ideal to the beginning of change, as they are where new sustainable relations would be most meaningful. These zones are where the transition of attitude, diet and technology will happen for the circular agriculture in South-Holland. A toolkit of 21 typologies is created with a focus on these transitions while keeping a pleasant environment. The new vision will lead to a circular economy in the livestock sector of South-Holland with sustainable relations between producers and consumers.

key words: South-Holland, circular agriculture, value change, transitions, diet, technical, attitude, stakeholders

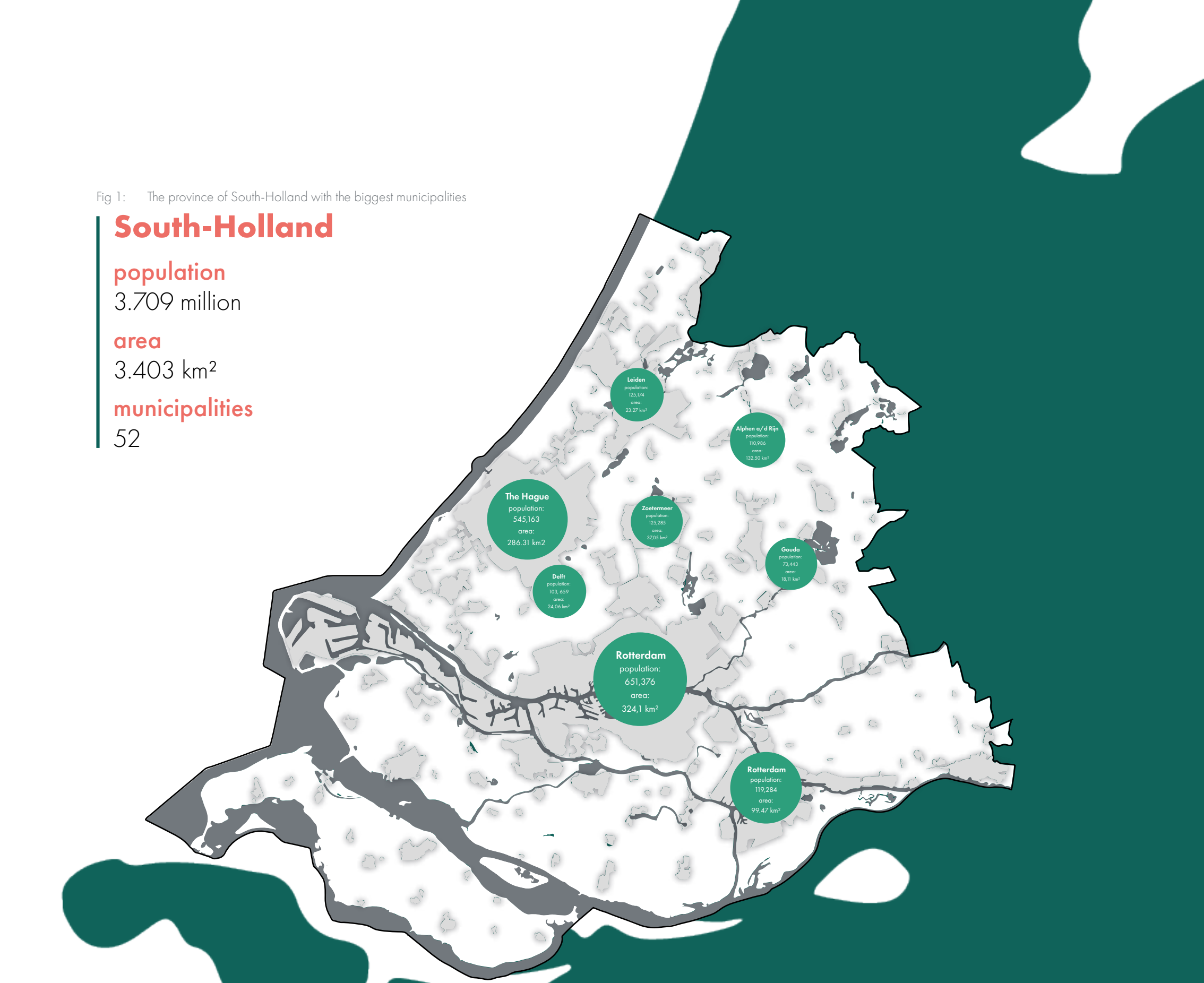
Fig 1: The province of South-Holland with the biggest municipalities

South-Holland

population
3.709 million

area
3.403 km²

municipalities
52



INTRODUCTION

to South-Holland and the project

in this chapter

Liv/fe Transition

Introduction

The world is at a critical point of action. The current markets and uses of land and material are no longer sustainable and there is a need for change (European Commision, 2019). As one of the biggest economic motors in the Netherlands, South-Holland is an important part-taker in the transition towards a more sustainable circular economy (Drift, 2018). Liv/fe Transition is a response to the circular tasks that are ahead for the province.

South-Holland is an accommodator of many different industries and interests that are in need for change towards circularity. The chemical industry in the port of Rotterdam, the building sector that is connected with the growing need for urban expansion and the agri-food sector, represented in horticulture in Westland and in livestock farming in the Eastern flanks of the province. These sectors are all draining natural resources and materials, having potential for becoming circular (Drift, 2018).

Liv/fe Transition focuses on the agri-food sector. A sector that has been getting a lot of attention in the media in 2019 and 2020. Environmental concerns about nitrogen in the soil, caused changes in policies and for national politicians to claim that the livestock had to be reduced to half its size (Winterman, 2019). These policy changes and claims affected farmers and livestock farmers especially and led to audible discontent in the form of protests (van Rooijen, 2019).

Halving the livestock population seems to be deemed the only solution towards a sustainable agri-food sector. However, is this actually the case? Or can livestock be a valuable tool for circularity? There is evidence that other scenarios concerning livestock might also play towards the goals that have been set (Lesschen et al, 2020). In this report the idea of using livestock as an integral way towards a more sustainable circular South-Holland will be explored.

The landscape of South-Holland is ever changing. These rural areas have been characterizing Holland for decades (see figure 2). It symbolises the Netherlands as agricultural land, where food production and consumption go hand in hand. With a growing urban population, the pressure on rural areas is increasing. Moreover, the export of agricultural products is big, disconnecting local production and consumption. The rural areas are no longer seen as part of daily life, but as land for the farmers (Munters, 1989).

With our design we aim to bring food producers and consumers closer together, all the while closing loops in the food system. Consumption will be approached through a proposal of diet change and techniques for attitude change towards food and its production, concerning livestock. Production will link to the transition in diets by cultivation methods and new typologies, while closing loops in the production process by connecting the energy sector. As a tool for change, transition in space will be used. Both at the cores of urban, rural and industrial areas as in the areas of overlap, where exchange will take place. For these transitions, value change will be at the core. Because the issues proposed before are emotionally loaded, this project will be approached with care, taking into account the delicateness of change for the stakeholders. We believe that with proper design, policies and stakeholder engagement it is possible to influence value change of the food system.

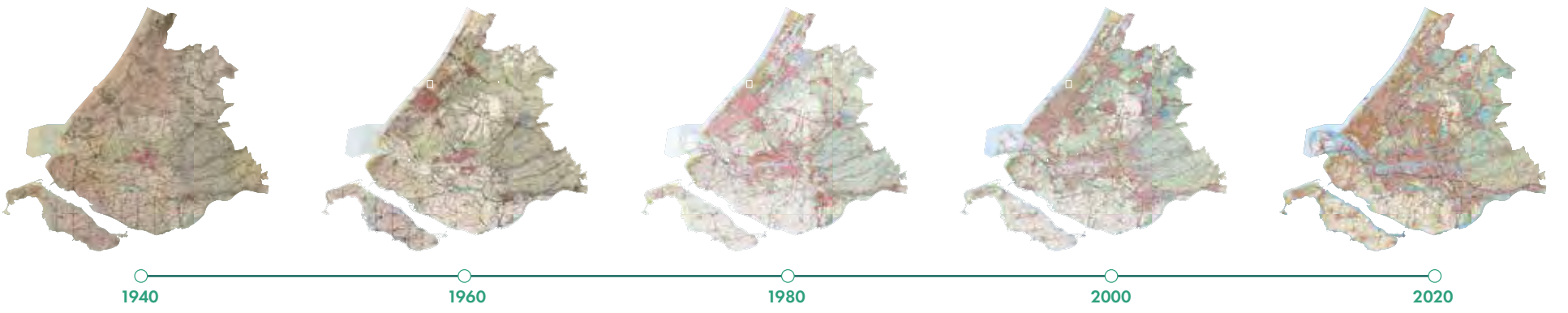


Fig 2: Change of the landscape of South-Holland over time (own illustration made with the use of topotijdreis.nl)

Fig 3: Midden-Delfland and Rotterdam (van Gaalen, 2015)

Problem Statement

Focus of the project

South-Holland is the most densely populated province in the Netherlands, with approximately 3,7 million inhabitants on 2900km² land. Almost a quarter of the province is urbanised, with this number still growing (CBS, 2019). These urbanised areas are surrounded by hinterlands of agriculture, of which livestock farming takes up approximately a quarter of the province's surface. The agricultural sector of South-Holland produces 1.459.140 tons of animal products for consumption each year (Drift, 2018). A considerable amount of this production is used for export. The suitable soil conditions for production and the favourable position of the port of Rotterdam in the European river delta makes it possible for the Netherlands to be one of the biggest exporters of agricultural products in the world (CBS, 2020).

The two forces of agriculture and urbanization collide by the demand on land, pollution and reuse of waste. As urbanised areas keep expanding, the claim on land becomes bigger. This discussion is fuelled by the issue of environmental sustainability. The Dutch livestock sector is under much criticism recently, due to the current manner of utilization of land by livestock farming, which is exhausting the quality of both air and soil, being wasteful in land, water and energy (Drift, 2018). This utilization is then also criticized for being wasteful for the wrong reasons, as a lot of the production is not used locally, but is exported (Smit, 2020).

Food producers, however, argue that they are misunderstood and are already making big steps to become sustainable. This argument comes from the fact that Dutch farmers are part of the global top five most sustainable food systems (Béné et al, 2019). Despite this achievement, food production is still largely criticized, which causes a feeling of injustice. The discontent of food producers is showcased by the farmer protest in 2019 and 2020 (van Rooijen, 2019) and as is also discussed in one of the interviews later in this report.

The discussion of claim of land is intrinsically connected to the modern segregation between urban areas and its hinterlands, where a predominantly urban population is ignorant of the realities of livestock farming due to the physical and conceptual disconnect that exists.This disconnect characterized by value imbalance, causes emotional conflicts to be present that influence the actions taken towards sustainability. The segregation between urban and rural life, between producer and consumer, therefore risks hampering real progression towards sustainability.

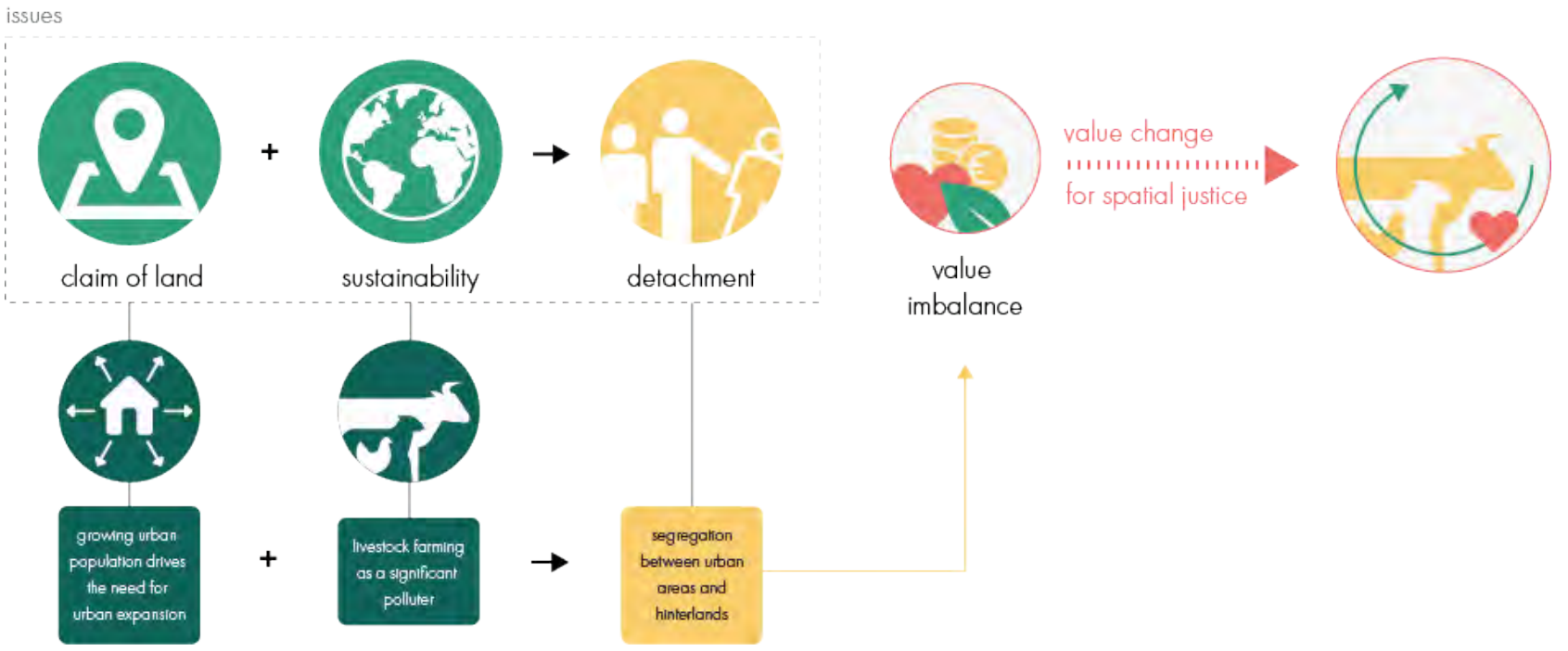


Fig 4:
Schematic diagram of the problem statement.

Fig 5: Picture of farmer protests in 2019 (ANP, 2019), modified for own use

Research Question

Focus of the project

How can the circular economy m
How can a circular economy be

How can the movement towards a **circular econon**
play a key role in achieving **sustainable relations**

How can sustainable relations be defined?
What are the main challenges in the current rel
What kind of transformations are needed to ac

What are the current trends in the livestock sector?
How does the livestock sector relate to other sectors?
How is the circular economy model reflected in the livestock sector in South-Holland?

odel be defined?
accomplished?

my in the **livestock sector** of South-Holland

s between **producers and consumers**?

ations in the agri-food system?
chieve more sustainable relations?

What is produced in South-Holland?
What is consumed in South-Holland?
How do prorudction and consumption relate to each other?

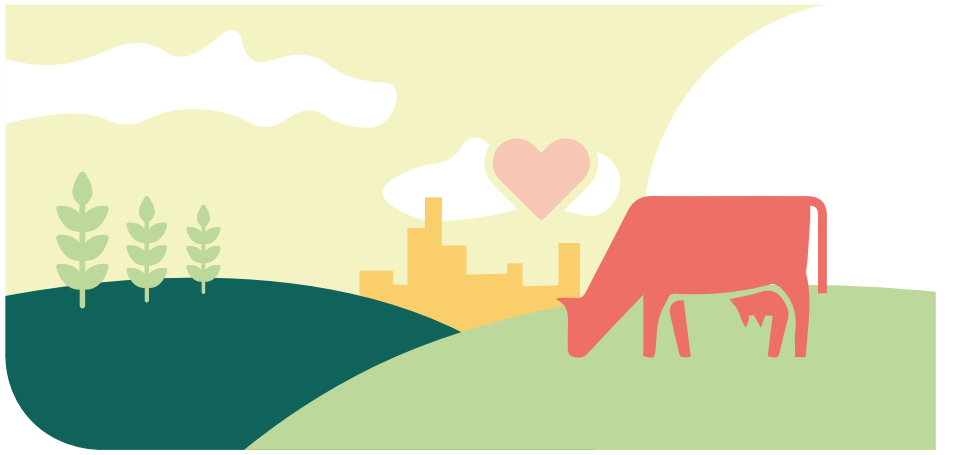
Objectives and Goals

project values

In this project some positions were taken on, which led to clearly defined goals. These goals will be what is going to be fundamental to the vision and strategy of Liv/fe Transition.

Boost the local economy

Livestock as part of a valuable agri-food system



Increased awareness between food producer and consumer

Allowing natural conditions to flourish

Fig 6: Illustration of the goals of Liv/fe Transition

These four goals are part of one main goal which is:

VALUE CHANGE **seeing, experiencing and using livestock as a valuable part of a recognized sustainable circular food system.**

These goals are related to both the EU Green Deal and the Sustainable Development Goals (SDGs) from the UN.

The European Green Deal

The European Union has the ambition to be the first climate-neutral continent in the world (European Commission, 2019). As part of this ambition the European Green Deal was formed in 2019, in which the Netherlands has taken part. The Green Deal's biggest goal is for the EU to become climate neutral and circular by 2050. The deal is built as a growth strategy concerning policy initiatives.

Modernity, resource-efficiency and a competitive economy are the basis of the three main goals (European Commision, 2019):

- there are no net emissions of greenhouse gases by 2050
- economic growth is decoupled from resource use
- no person and no place is left behind

The notion of justice is taken into account by the last goal. Change is built upon the idea that it is just and that inequality of burdens and profits is minimised.

The deal is divided into nine policy areas, which each have more specific goals (European Commission, 2019). Not all policy areas are directly related to this project. The policy areas that are most relevant to this project are:

- Biodiversity
- From Farm to Fork
- Sustainable Agriculture
- Clean Energy
- Sustainable Industry
- Eliminating pollution
- Climate Action

The Sustainable Development Goals

The Sustainable Development Goals (from now on SDGs), are part of the 2030 Agenda for Sustainable Development, which was adopted by all UN Member States in 2015 (United Nations Department of Economic and Social Affairs, 2015).

The SDGs are a model for both peace and prosperity for people and the planet, building upon the three pillars of sustainability: social, environmental and economic.

In total, there are 17 goals. While this project will touch upon many of these goals, some can be seen as most relevant and significant to Liv/fe Transition. These are illustrated in the icons below.

(UN, 2015)

Fig 7: Supermarket shelves (ANP, 2018)

Theoretical framework
conceptualisation

Liv/fe Transition is constructed under the influence of a few theories and concepts. In this chapter these will be explained to give a basic understanding of Liv/fe Transition as a project.

Circular economy

The main message of the brief of the province of South-Holland (PZH) for this project was that it should concern the circular economy. Therefore, the circular economy is a leading concept for Liv/fe Transition. The concept of the circular economy has many definitions, but in this report we will define the model as follows: the circular economy is an economy that is in balance with the environment, using materials to compliment sustainability in all the three pillars- environmental, economic and social (Drift, 2018). Planet, profit and people are at the core of the circular economy. Materials are no longer used only once and distributed in a more honest and efficiënt manner (Drift, 2018). Complexity is also one of the main features of the circular economy, meaning that human society and culture remain through human activities, and that biodiversity is at high value.

Complexity also means that there are many different stakeholders that have interests. These stakeholders vary from the independent citizen to multi-nationals and governance. All these stakeholders have different motivations for moving, or not moving, towards circularity (Drift, 2018). This makes the transition towards the circular economy a complicated task.

Transition theory and Kotter's 8 step model

As explained in the problem statement, a transition in the agri-food sector is needed. Complex transitions, such as the transition described in this report, can be explained and formed by the Transition theory of Rotmans, Brugge and Loorbach (2005). This theory builds upon the idea that transitions are both multi-phased and multi-level. The multi-phased concept works in four consecutive phases:1) the pre-development phase, when the status-quo is changed, 2) the take-off phase, when the structural changes are getting of to a good start, 3) the acceleration phase, when change is felt and finally, 4) the stabilisation phase, when a new equilibrium is reached (Rotmans et al, 2005).

That transitions of complex systems are multi-level, results in the notion that steering from one level of interest/power causes conflict. It is important that stakeholders from all power-levels are represented for a smooth transition. On top of that flexibility in the transition process is another priority, as a complex process brings along many externalities. Flexible goals can evolve better when there are setbacks or windfalls (Rotmans et al, 2005). Most important of all, periods of imbalance are when the transition of complex systems can happen. This means that for the agri-food system, the time of transition is now, when chaos is felt fundamental change can take place.

As an addition to the transition theory of Rotman et al, we use Kotter's 8 step model for change. This model builds upon the idea that there are different phases that each have a different feeling and speed of transformation. The model is often used to explain the reforming of values and culture. While mostly designed for corporate culture, the model is also appropriate for application to other complex systems (Kotter,2012). In the strategy chapter the model will be used to give structure when engaging stakeholders.

Value

At the core of Liv/fe Transition is value change and creation. To understand what is meant with this, first the concept of value will be defined. The theory of value creation for sustainability (Freudenreich et al, 2019) will be used. Values through this theory are things that are held to be deserved, of importance, of worth or useful. Value, therefore, is more than just a monetary expression, but can also be environmental and social. Value can be translated onto different scales, on societal level and on personal levels. Change in value can be characterized by the following questions: 1) What value is changed?, 2) How is value created?, 3) With whom is value created?, and 4) For whom is value created?. The what and how can be linked to a joint purpose. With whom and for whom can be described by relationships. Forming new relationships will result in an exchange of different values, which can result in change. Stakeholders can have a combination of values: social, economic or environmental. It is important that all stakeholders are recipients of value (Freudenreich et al, 2019). In this project the joint purpose can be described as sustainable development towards circularity, taking into account that all three pillars of sustainability are represented.

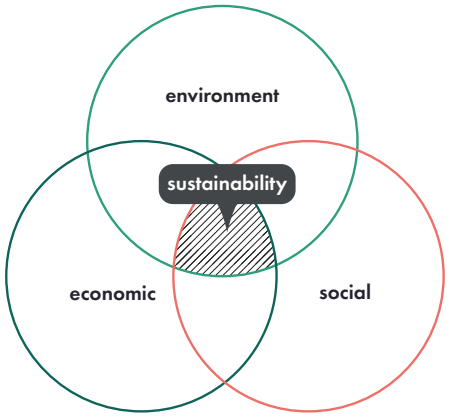


Fig 8:
pillars for
sustainabillity

Justice

As a lot of injustice is being felt throughout the agri-food system, it is of importance to explore this concept. Justice in this report will be used in the form of social justice and spatial justice. The definition of justice itself about fair treatment can be drawn from different philosophies, such as libertarian, utilitarian and egalitarian and can be promoted from different standpoints. This notion itself makes it very difficult to define, as fair treatment seems to be subjective (Connelly & Bradley, 2004). Taking on one philosophy of justice, automatically causes injustice to the other forms of justice. Because of this problem, scholars have tried to resolve this by building a theory that embraces the right to difference.

Either way it is inevitable to situate ourselves when talking about justice - sides have to be taken (Connelly & Bradley, 2004). This will also be the case in this report. Some stakeholders have to give up more than others, however it is important that this is not totally unbalanced and that we are aware of this imbalance.

Social justice takes the notion of justice from an individual standpoint to society, concerning larger groups and adding in the element of distribution (Connelly & Bradley, 2004).

Spatial justice uses the definition of social justice and links this to spatial and geographic notions of justice. It involves a fair and equal allocation of socially beneficial resources and opportunities to use them in space, recognizes that spatially or specific geography of (in)justice are formed by social processes and requires city dwellers to be able to take part in all processes that establish urban space in an open and equitable manner (Soja, 2009). Spatial segregation and injustice increases when space becomes a product. With the issue of urban expansion and the right to land this is the case in South-Holland. When planning for spatial justice equality, diversity and democracy have to be kept in mind (Fainstein, 2009).

Sustainable agriculture

The food-system is heavily reliant on the agricultural sector: this sector makes sure that there is a supply of food. In the agricultural sector there are currently 5 major trends in Europe, which may influence land use: 1) productivity increase, 2} change in the nature of agricultural production technologies, 3) broadening of the objectives of agriculture and land use, 4) increased chain thinking in primary production, and 5) stronger connection between food and health (WUR, 2009). What is traditionally seen as agriculture is fastly changing and new typologies of agriculture arise. This is all related to the demand for sustainability and circularity: a more efficient and biodiverse agricultural model. The Netherlands wants to have prominent role when it comes to sustainable agriculture. For this, the concept of circular agriculture was introduced (LNV, 2019).

In this model of agriculture, horticulture, crop farming and livestock farming in the first place use materials from their respective chains, be it on national, regional or local scale. Remains from the agricultural sector then become re-used or processed into new products. The soil is at the core of circular agriculture. The minerals and water that is retracted by humans should come back to the soil to ensure it's quality. Good soil quality is dependent on the soil types and the types of cultivation used. There are many pilot programs in which new cultivation methods are explored (LNV, 2019). These will later be explored in this report.

To give more meaning to agriculture the idea of agriculture as a public good could also be explored. There is a tremendous increase in the interest in public goods such as landscape, recreational facilities and some elements of nature, which are spin-offs of agricultural land use. The tendency to pay farmers for the contribution to such public goods is increasing in Europe. Multifunctional agriculture is more and more accepted and it is widely accepted as a goal of the renewed common agricultural policy (WUR, 2009).

Consumer behaviour and sustainable consumption

An important part of the food-system are the consumers. In the supply and demand chain, the consumer determines the demand, for example the demand for sustainable food. Even though there is a small rising demand for more sustainable food, the share in the market is still limited. Consumers are not always familiar with the added value of such products, are not willing or able to pay a higher price without experiencing a direct positive or because there is not enough visibility of such products in stores (WUR, 2009). Consumers make choices based on a few 'inputs'. In figure 9 these inputs are shown. To change routine behaviour of consumers it is important that people are made aware of alternatives, are motivated for behavioural change, have intention for change and feel like changing behaviour is possible, making it accessible (WUR, 2009). These notions can be turned into strategies for consumer behaviour change. Awareness has been proven to change attitudes and preferences. In the marketplace there is a task to give chain parties tasks that lead to the lessening of food waste and consumer choices that are sustainable.

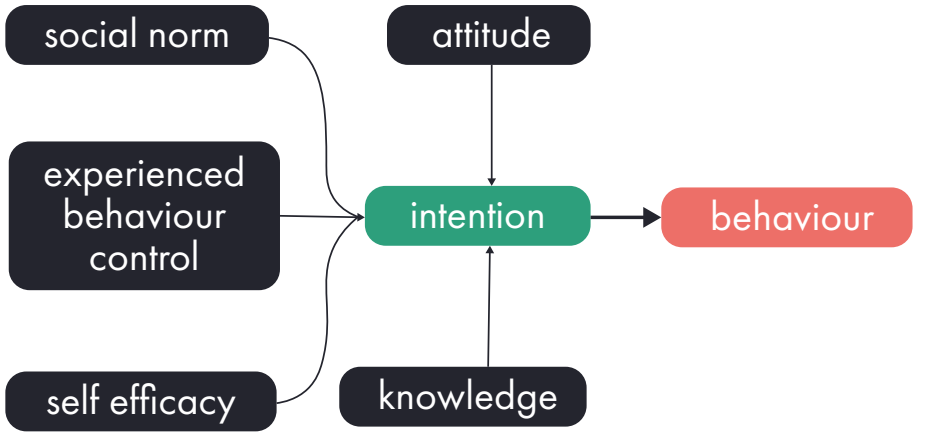


Fig 9: Diagram of what influences consumer behaviour

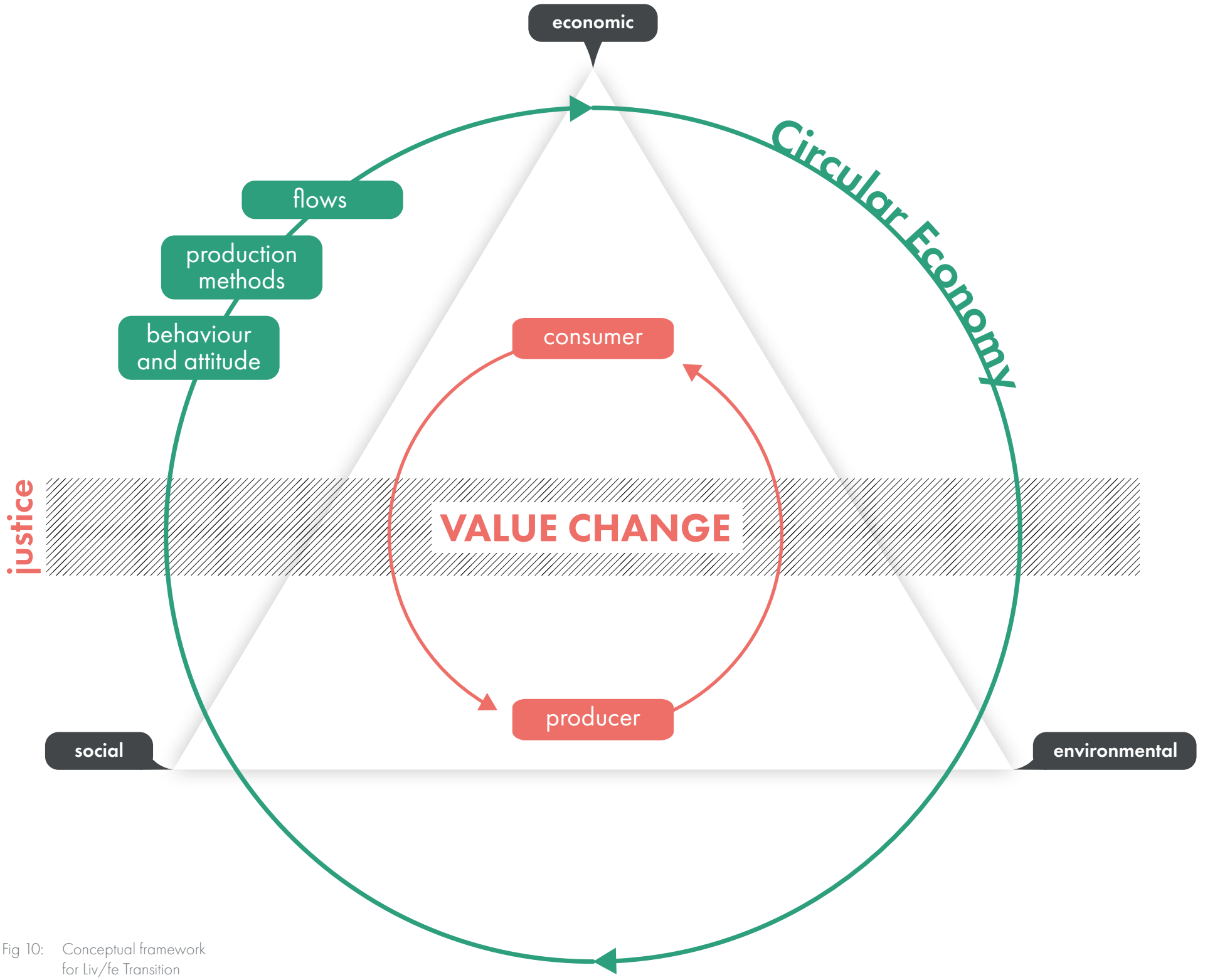


Fig 10: Conceptual framework for Liv/fe Transition

Conceptual framework

Above you see the conceptualisation of Liv/fe Transition. The concept and theories described in this chapter shape this project. The basic idea of the conceptual framework is that at the core of this project sits value and value change. Value change is used in connection to the relation between the consumer and producer, as was introduced in the research question.

Value change between producer and consumer happens by the use of the circular economy. Both the circular economy and value change are based upon the three pillars of sustainability: social, environmental and economic. Throughout this project we want to achieve justice, both spatial and social.

Methodology

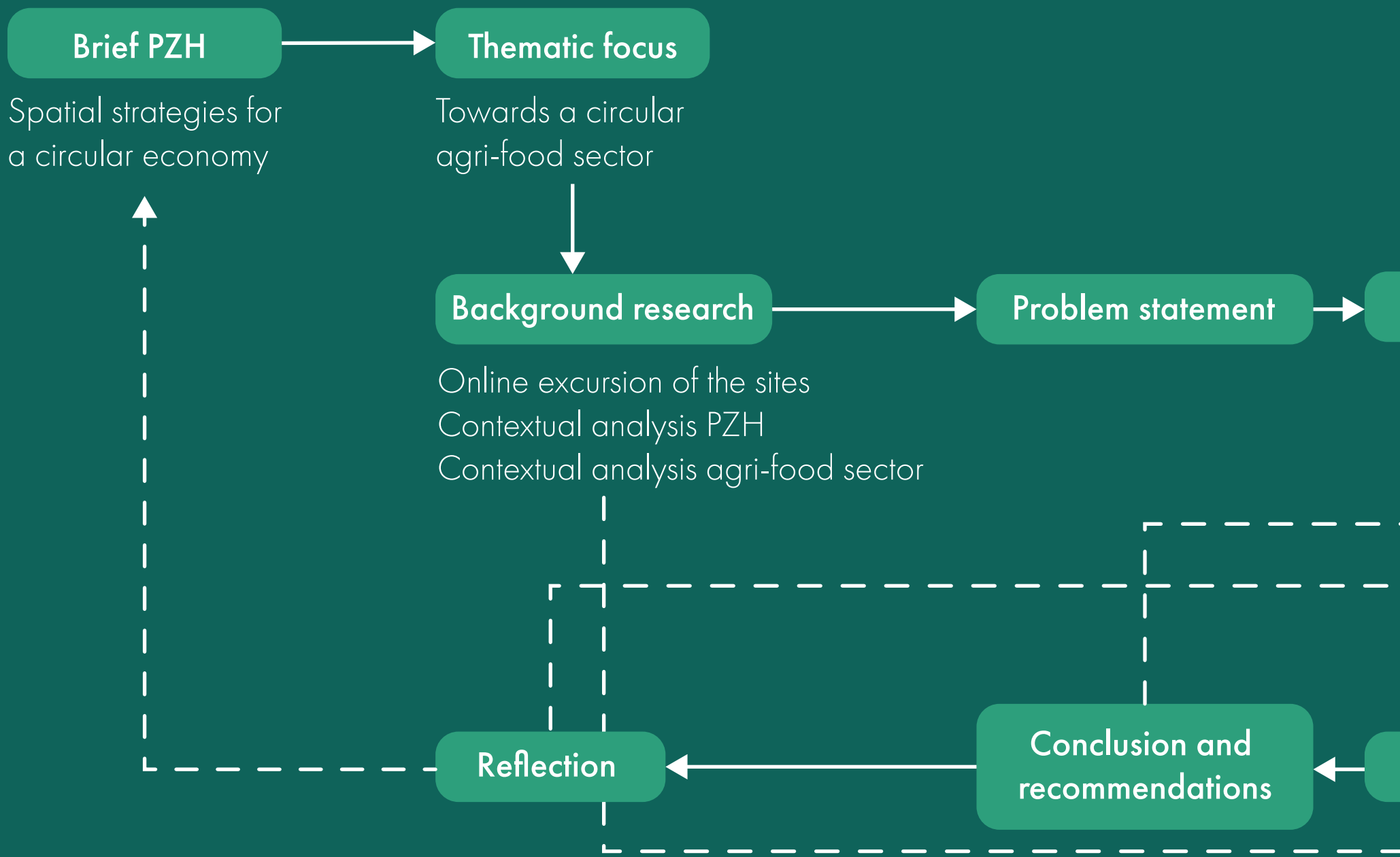


Fig X: Schematic view of the methodology of Liv/fe Transition

Research question

Theoretical Framework

Circular Economy
Circular Agriculture
Consumer behaviour
Value change

defintion value
Kottter's 8 steps to change

Thematic analysis agri-food systems South-Holand

Livestock sector
Energy transition
Diet and landuse

Synergy analysis

Potentialilties and bottlenecks

Objectives and goals

Vision 2050

Diet transition
Technical transition
Attitude transition

Strategy

Definition of goals
Stakeholder engagement
General timeline
Typology of interventions
Strategic projects

Assesment

Interviews

GETTING TO KNOW SOUTH-HOLLAND

analysis and diagnosis of the province and the systems within it

in this chapter

Top layer limitations

territorial conditions

Infrastructure, greenery and water are the most important visible layers of this region. The infrastructure reveals the densely populated province. The port of Rotterdam shows the crucial presence of water and the nature areas assure a pleasant living environment.

Water and greenery

Back in the days, water has played an important role in South Holland. And it still does. The province consists of 1/6 of water. The province supervises water safety and at the same time keeps an eye on the interests of nature, recreation, the economy, housing and employment. There must be sufficient drinking water of good quality. Agriculture and horticulture need sufficient irrigation water and besides that water is indispensable for nature. Good waterways - including bridges and locks - are necessary, both for transport and for leisure (Ministerie van Infrastructuur en Waterstaat, 2020). Furthermore, the port of Rotterdam is the biggest harbour in Europe and therefore water is essential.

Climate change triggers challenges: more often rain, rising sea level and longer periods of droughts. Sometimes the result is that there is suddenly too much water. Also, a shortage of clean, freshwater is an increasingly common problem. The province is responding to this together with the water boards. Parties such as municipalities, central governments and landowners need to work together and slow down subsidence.

South Holland is the most urbanized region in the Netherlands, besides that it consists of nature parks and national landscapes. The tree's traditional landscapes are peat, rivers and coast. The fourth is also called 'the urban landscape' (Graaf de, 2018). The province of South Holland wants to strengthen nature so that more recreation can take place. More nature means a better quality of life and a climate-proof province. South Holland wants to focus more on sustainable agriculture, increasing biodiversity and making the urban landscape greener and richer in water (Landschap, 2021).

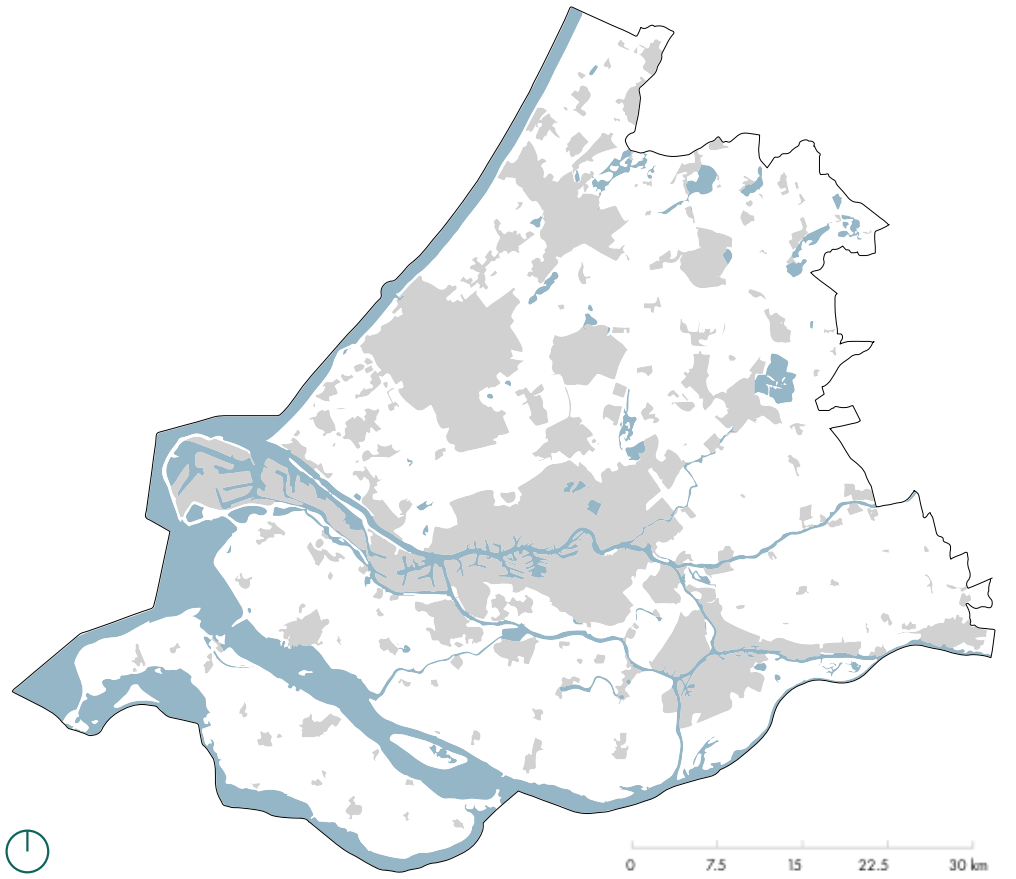


Fig 11: Water in South-Holland
(Adapted form Arcgis, 2020)

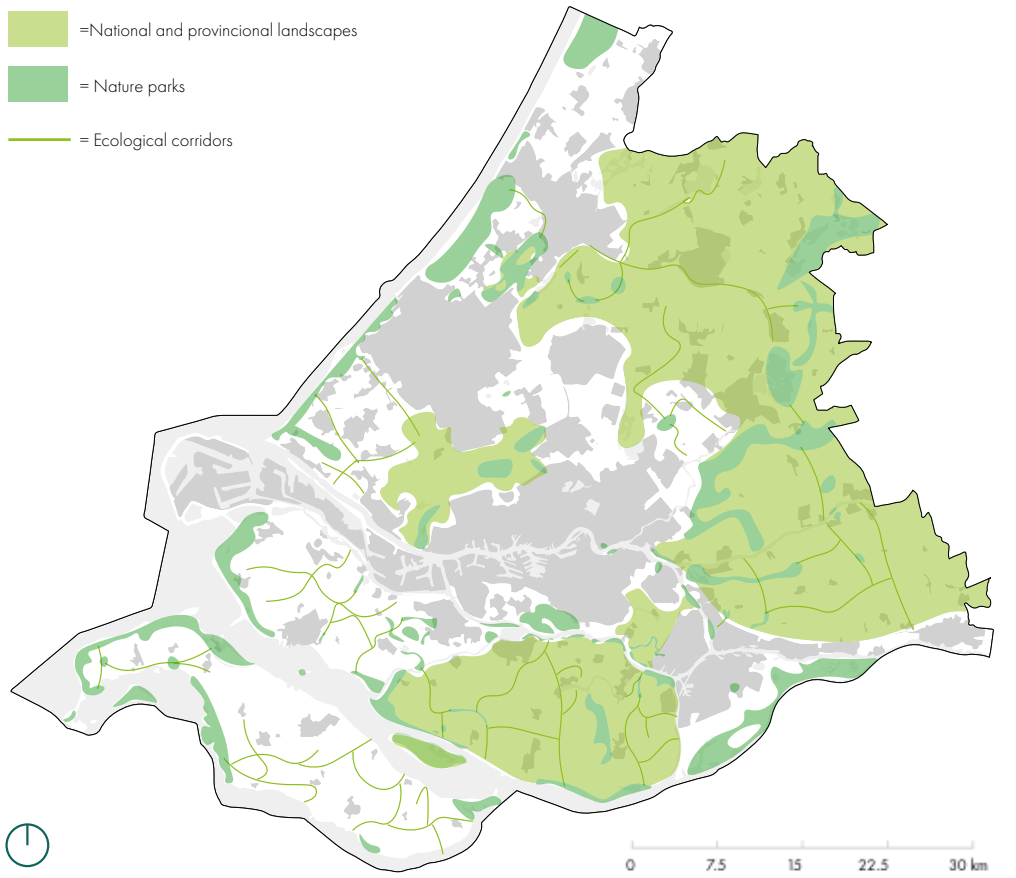


Fig 12: Green structures in South-Holland
(Adapted form Arcgis, 2020)

Infrastructure

As South-Holland is the most densely populated province a good and efficient infrastructural transport system is needed to bring all the people from one place to another. As seen in figure 13 South-Holland has a highly complex infrastructure system that consists of both car-orientated infrastructure as well as public transport.

Another important infrastructure for South-Holland has to be the port of Rotterdam, from which goods for not only the Netherlands, but also Europe come in and are exported (Drift, 2018).

The sheer amount and the quality of the infrastructure of roads, rails, inland waterways, sea and underground pipes allow for a good establishment environment and are one of the reasons for the large economic activity in the area. The efficiency of the infrastructure system gives South-Holland the opportunity to become the circular hotspot of Northwest Europe.

The conditions of infrastructure allow opportunities for the following aspects:
- Realizing system change from fossil fuels to climate-neutral and emission-free energy carriers
- Making South Holland the accommodation of a circular system
- Optimizing logistics, which means no more empty transport, smart placement for distribution centres and open data sharing. Using all modes of transport infrastructure.

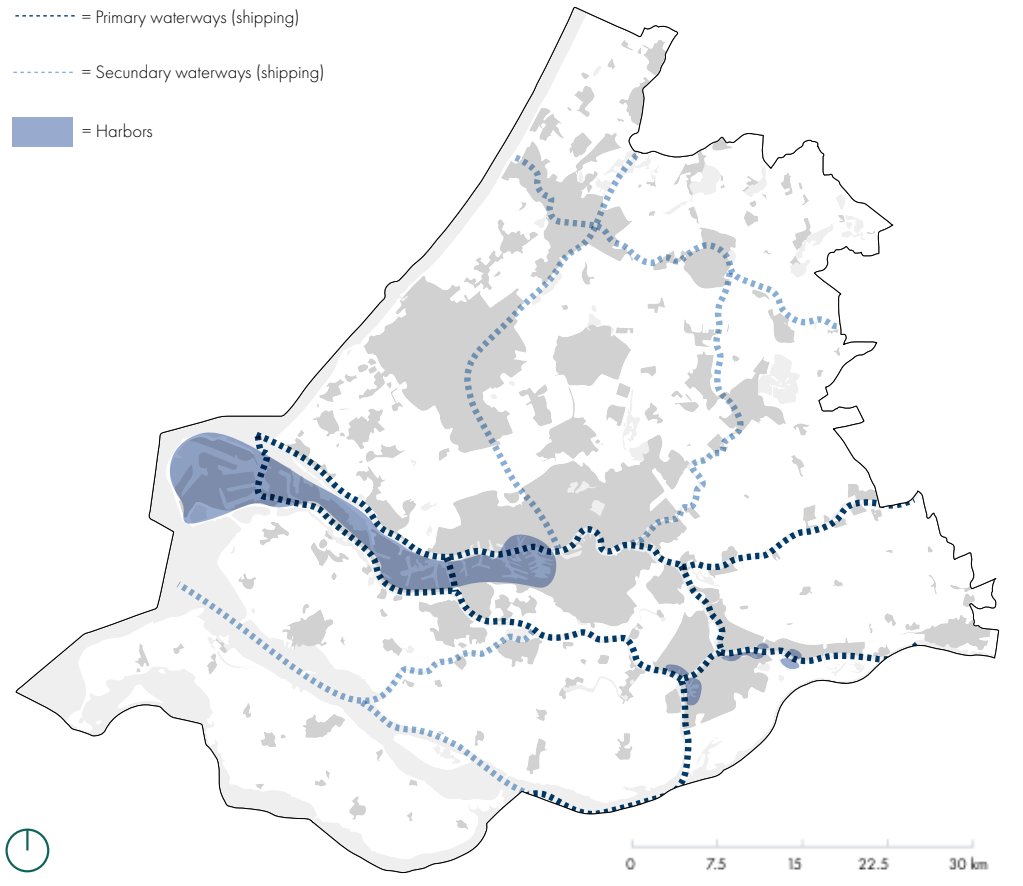


Fig 14: Waterways infrastructure in South-Holland (Adapted form Arcgis, 2020)

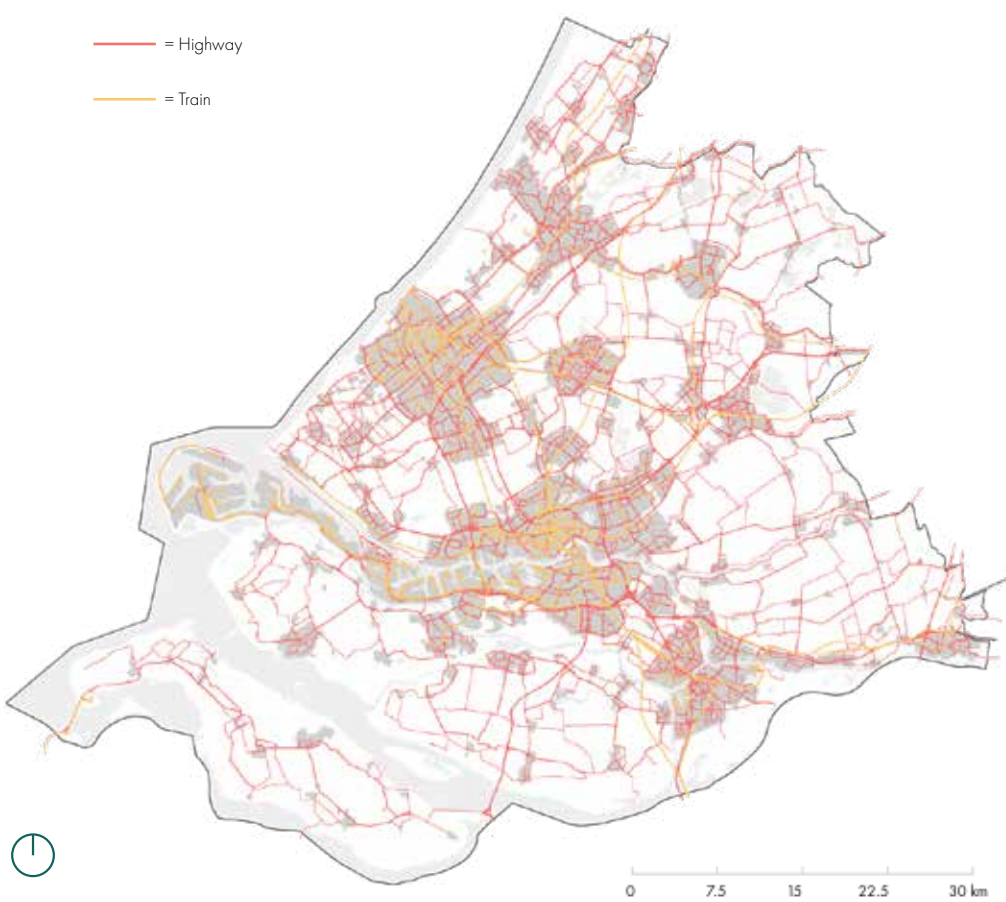


Fig 13: Car and train infrastructure in South-Holland (Adapted form Arcgis, 2020)

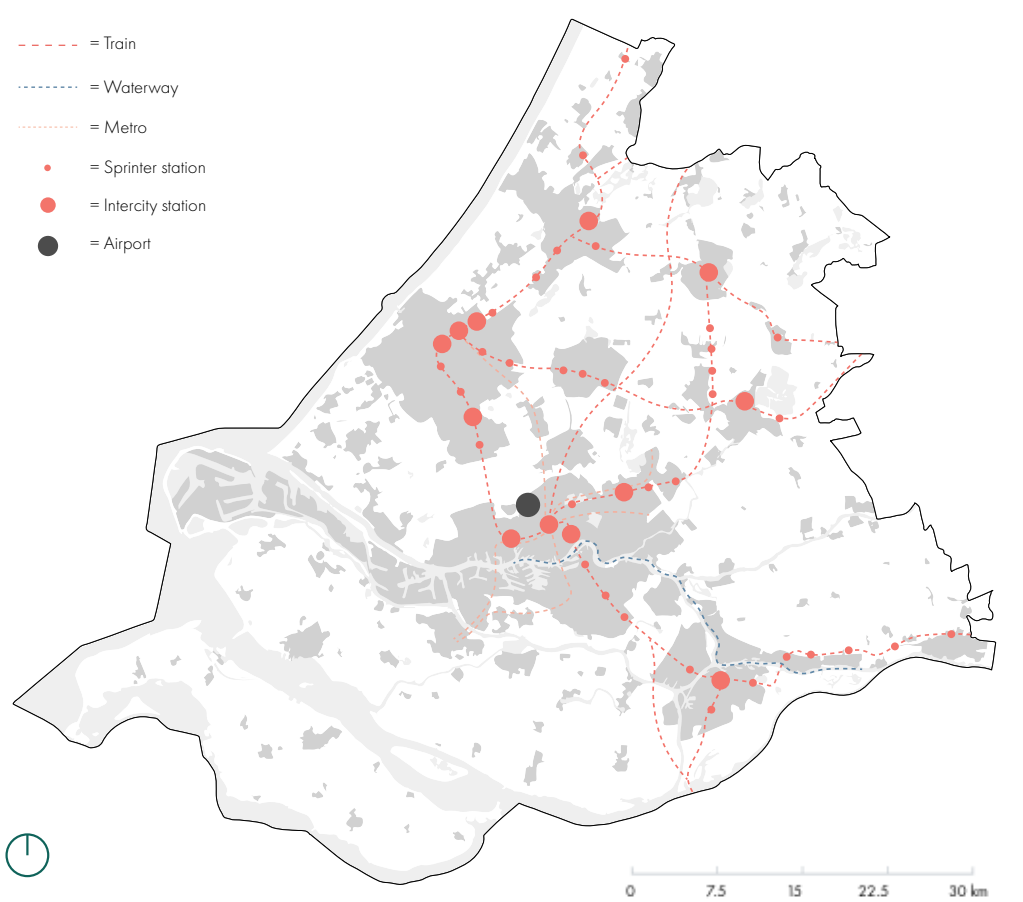


Fig 15: Public transport in South-Holland (Adapted form Arcgis, 2020)

Underlying limitations

territorial conditions

Different soil types provide different possibilities in agriculture. Soil types also differ in quality which can cause limitations for farmers or for the availability of freshwater. Subsidence can affect soil quality and even leads to unusable land. Many factors play a role in this and that is why it is extremely important to take good care of the land.

Soil types

The most common soil types in the Netherlands are peat, river clay, sea clay, sand and loss. In South-Holland, there are six different soil types: peat, sea clay, river clay, plaggen humic topsoil (dikke eerdgrond), calcareous soil and chalk poor soil. The different types of soil are important to know for soil fertility. Soil fertility is an ecosystem service that is widely used in agriculture on a daily basis. Soil fertility is important for good water regulation, diseases and pest control, purification and the capture of carbon dioxide. If there is good soil fertility, less tillage is required to grow crops. Fertile soil can thus save money and time while still producing a good harvest. Human intervention often disrupts the soil, these interventions require additional actions and money to make soil fertility more productive or to restore it. The most common soil types in South-Holland are peat and clay (see figure 17). Peat is the most fertile type of soil because peat consists of plant residues and is formed in a swamp. Sea clay contains less organic matter than river clay but generally more lime from shellfish. Sea clay mixed with sand is also fertile soil for agriculture.

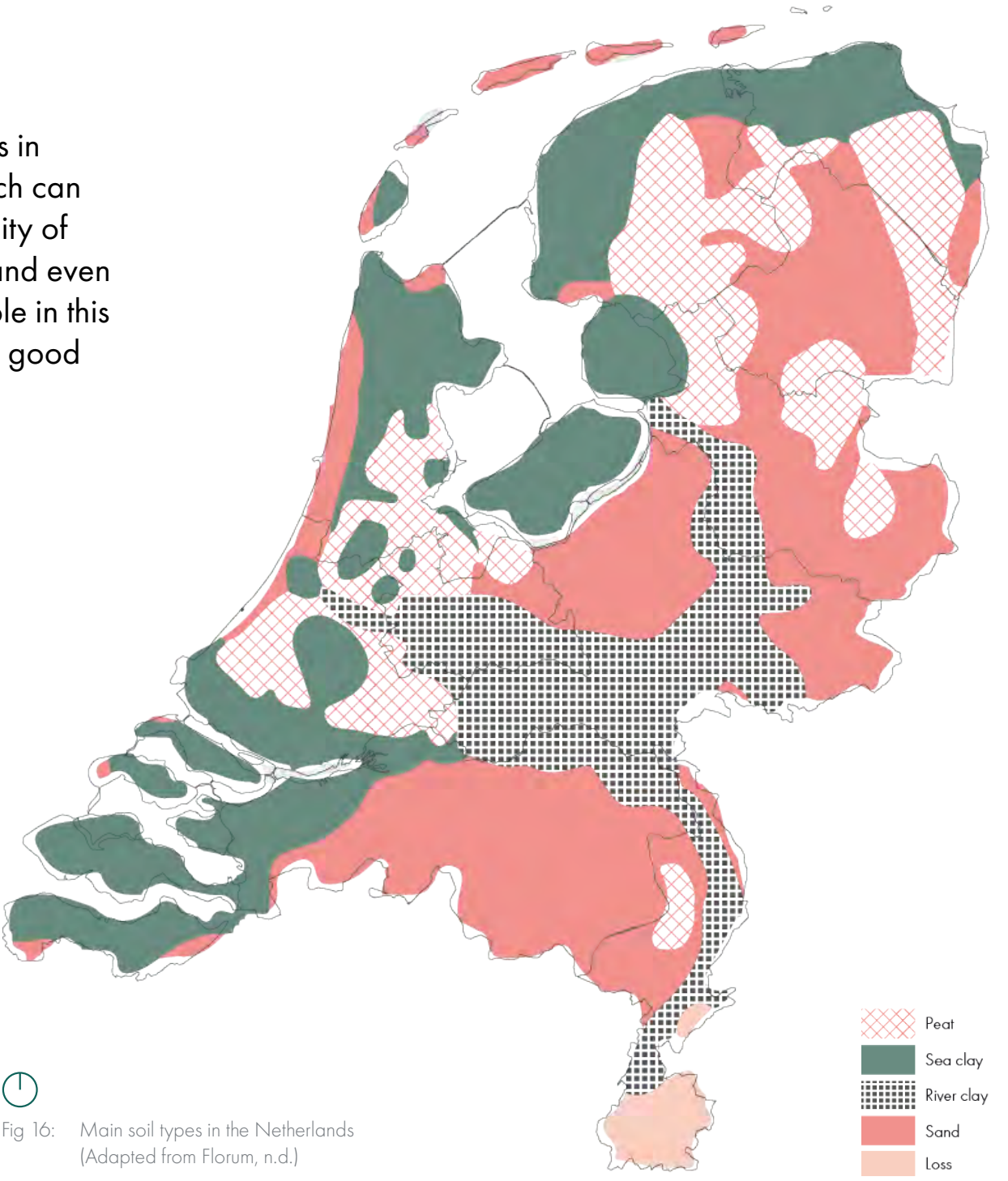


Fig 16: Main soil types in the Netherlands (Adapted from Florum, n.d.)

Soil quality

Different soil quality is caused by different elements in the ground. Soil pollution usually involves volatile aromatic hydrocarbons. These are volatile chlorinated hydrocarbons, oil, heavy metals, dioxins, asbestos, pesticides or certain inorganic compounds such as cyanides (Vegter, 1995). The southern peat landscape part of South-Holland has a clay layer, which makes the ground of better quality. In soil with high clay content, less organic matter will be broken down. As a result, less CO2 is released and therefore less peat is digested. Clay in peat areas offers a solution to soil subsidence. Clay may also increase the soil quality and bearing strength capacity of peat plots, which provides benefits for dairy farming. Clay is a valuable raw material that continuously flows into the Netherlands. A lot of clay comes in from Europe via the rivers, this stream will not be exhausted. Together with local clay sources, it will be enough for a large part of the peat meadows area (Deru, 2018). The idea of bringing clay to the peat landscape gives the opportunities to implement more dairy farming in the south.

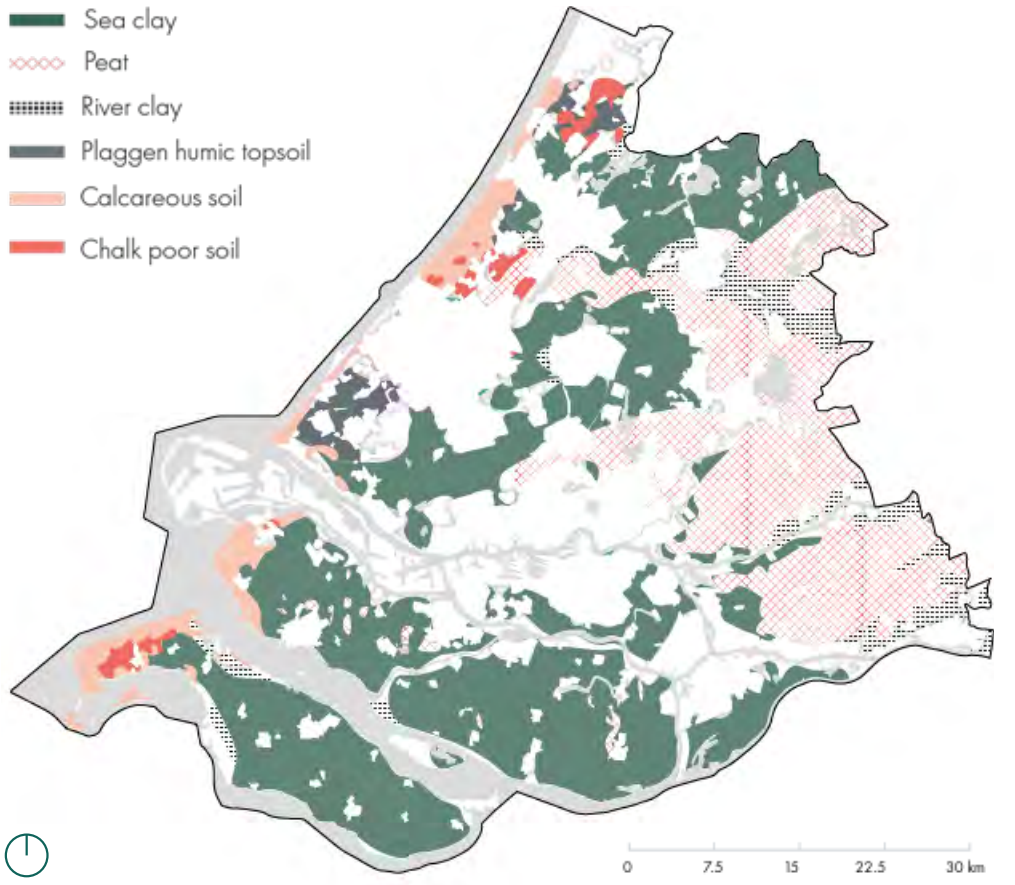


Fig 17: Soil types in South-Holland (Adapted from ArcGis, 2020)

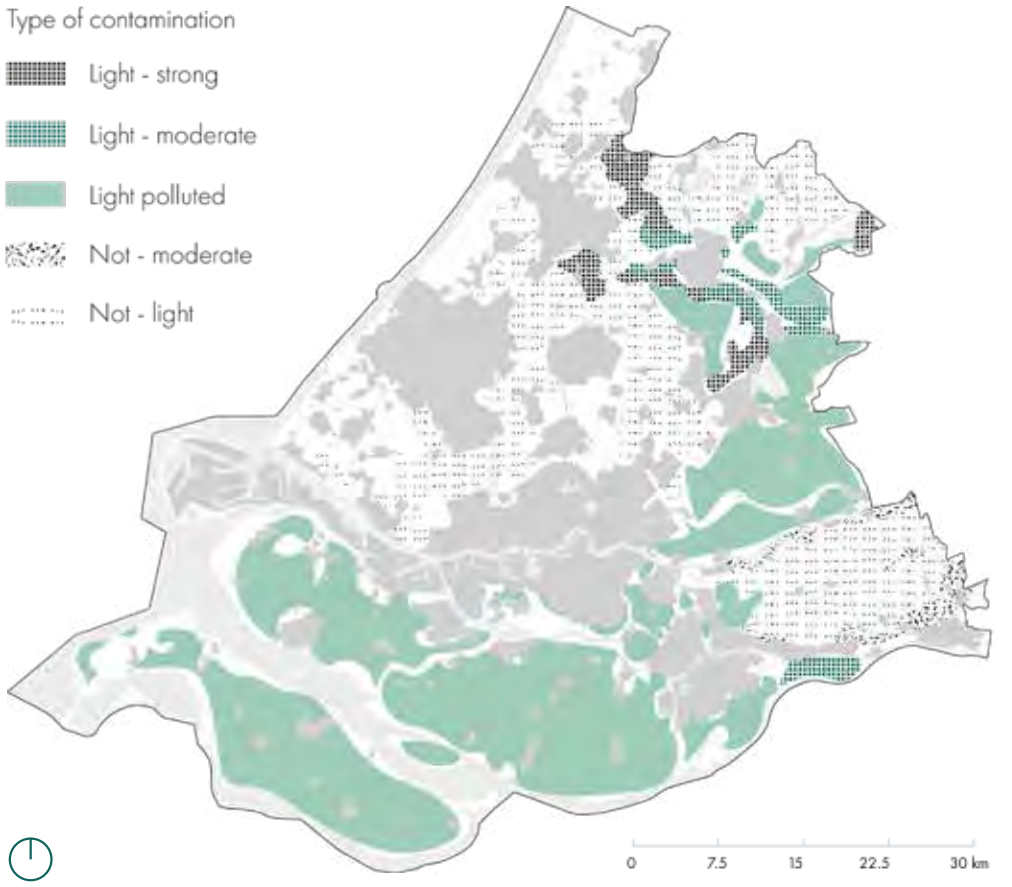


Fig 18: Soil quality overground in South-Holland (Adapted from ArcGis, 2020)

Subsidence

Less than 78 percent of the surface of the province of South-Holland consists of soft soils (Tromp & Korff, 2008). The subsidence map shows which areas are (highly) susceptible to subsidence. Areas, where the continuous peat/ clay deck is more than five meters thick, are considered as soft soils.

Peat oxidation also accelerates soil subsidence. In the Netherlands, the groundwater level is controlled in the different types of land use. For example, cows sink into the peat if the soil is too wet. However, this water level control has resulted in the lowering of the dry peat soil. This is due to sedimentation of the soil and oxidation of organic matter. Land subsidence and groundwater level and up in a vicious circle: the soil is subsiding, the water level must be lowered, the soil subsides etc. (Signaleringskaarten Bodem en Ondergrond, 2021). In figure 19 it is shown that the most subsidence takes place in the north-east of South-Holland. This big problem of subsidence is a limitation of the land but can be seen as an opportunity to improve.

The area with the most subsidence is also the area where the subsoil is most sensitive to setting, in other words: the subsidence of the ground level. The soil composition and the use of space are decisive for this. The extraction of groundwater increases the chance of settlement. The carrying capacity of sand is known as solid, of clay as sensitive and of peat as weak (Tromp & Korff, 2008). If peatland drainage continues, there will be hardly any peat left in a hundred or two hundred years. Low lying polder, which suffers from salinization, will then arise. At a later stage, the land can locally become unusable because the quality of the soil deteriorates and many agricultural crops can not withstand brackish water (Erkens et al., 2018).

South-Holland uses fresh water from the major rivers for agriculture, drinking water and industry. Fresh water is therefore important for the regional economy. It is not self-evident that water of the right quality ends up in the right place at the right time. Climate change, rising sea levels and land subsidence increase the risk of shortage of fresh water. During summer the risk of prolonged droughts increases, the supply of river therefore decreases. At the same time, the intensity of peak showers increases. Climate change translates into greater variation in the discharge of the river (van Lanen, 2016). The risk of salinization is related to water shortages. At low river discharges, the salt water is allowed to flow further inland which is a threat to freshwater. Important measures to make the fresh water supply more robust are improving supply routes for fresh water, the retention of fresh rainwater and the reuse of wastewater.

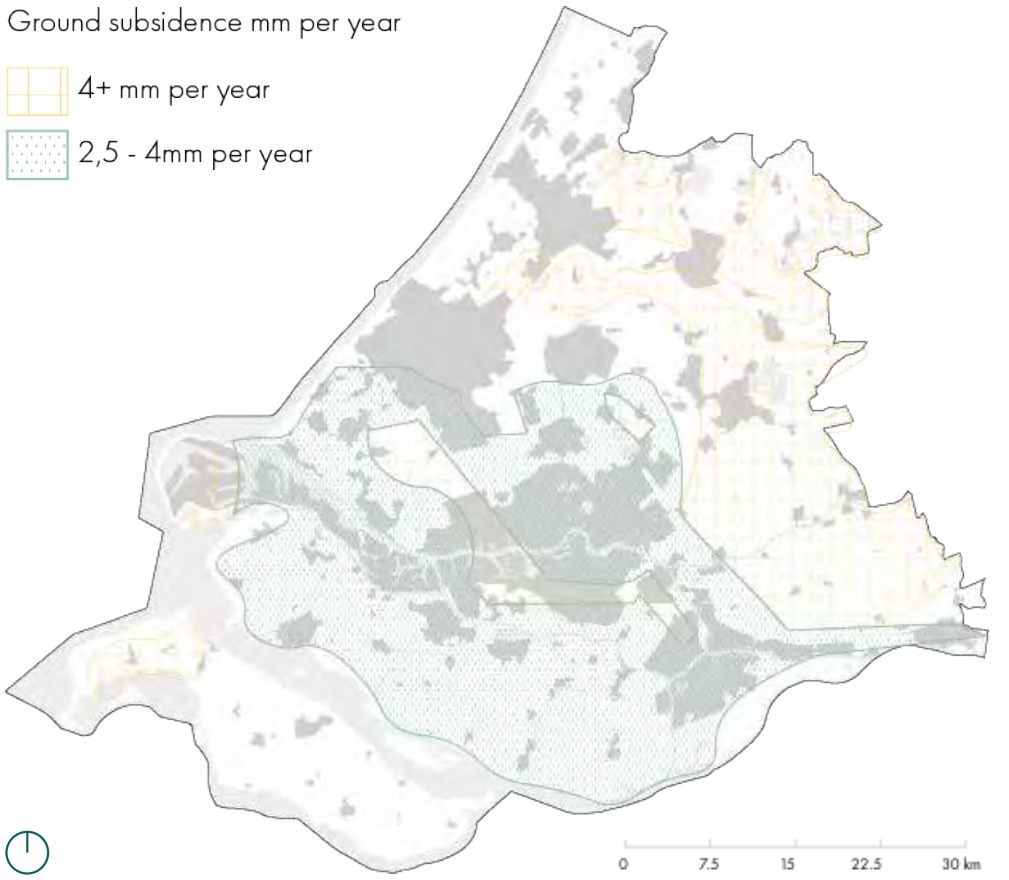


Fig 19: Level of subsidence in South-Holland (Adapted from ArcGis, 2020)

Fig 20: Clustering peat meadow areas (As van, 2020)

Nitrogen emissions

In figure 22 it can be seen that South-Holland seems to be doing relatively well with the nitrogen values. Nevertheless, nitrogen emissions should decrease. In South-Holland, 21 Natura 2000 areas are located, wholly or partly within the provincial boundaries. Twelve of these areas are nitrogen sensitive, for example, because they are located close to an active road or because there are many agricultural companies in the area. Farms will therefore have to close or relocated to reduce nitrogen emissions around these nature reserves.

It is good to bear in mind that the nitrogen problem is very complicated. Due to the excess of manure, nitrogen, especially in the form of nitrate, leaches into groundwater and surface water. The options for structurally reducing nitrogen (especially ammonia) emissions in livestock farming are:

- Spraying with water leads to a significant (35%) reduction in stable emissions.
- New stable systems that do not produce slurry (floating manure)
- Other types of floors and extraction in stables
- Diluting manure with water
- Leaving cows in the pasture for longer
- Spreading manure at the right moment (during lower temperatures and lower wind speed)

Nitrogen is now seen as a problem, nevertheless, it is an essential building block for living on earth (Bol, 2021).

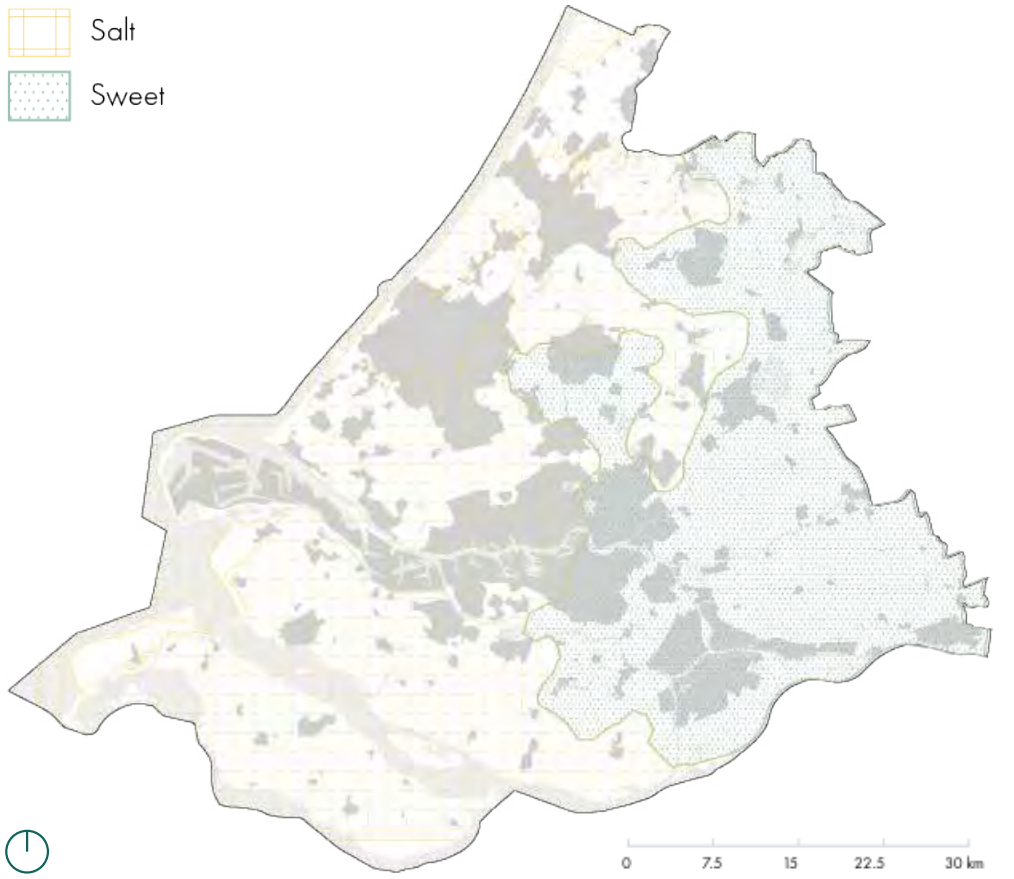


Fig 21: Fresh and salt water in South-Holland (Adapted from ArcGis, 2020)

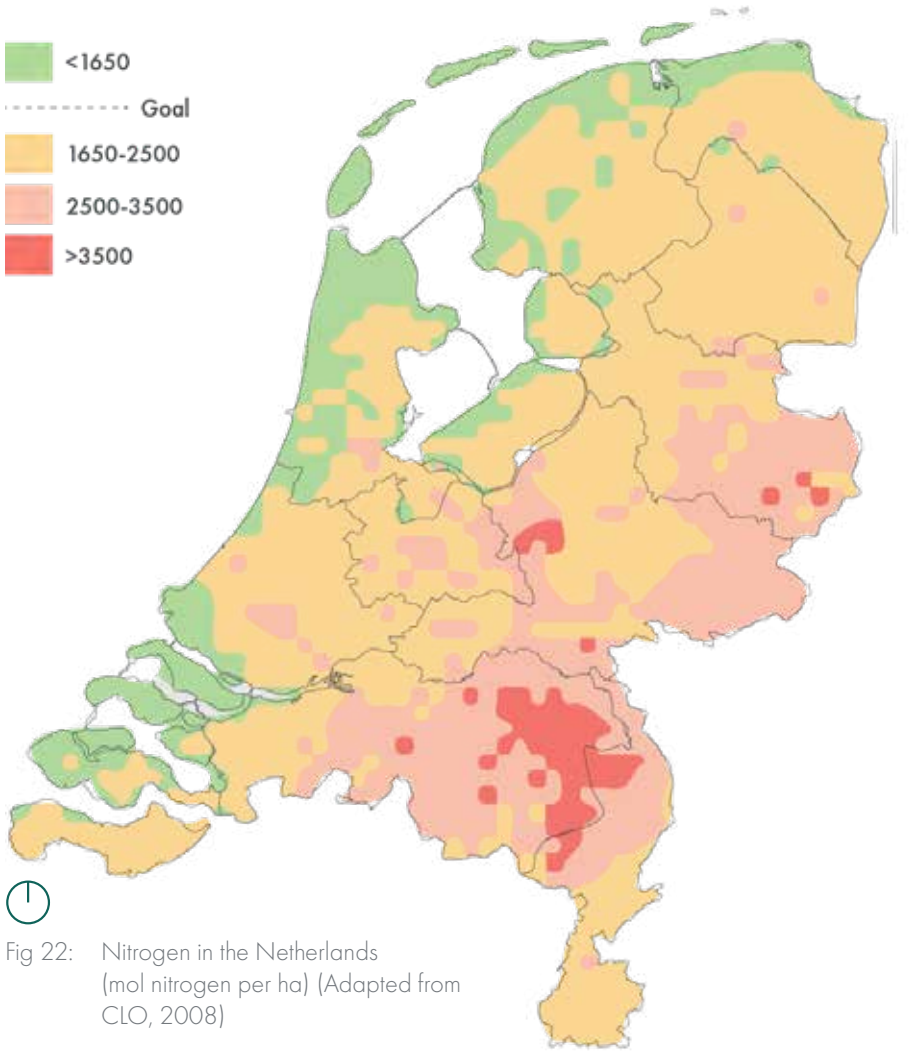


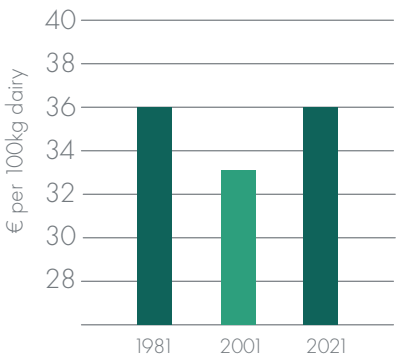
Fig 22: Nitrogen in the Netherlands (mol nitrogen per ha) (Adapted from CLO, 2008)

Agriculture in South-Holland

agri-food production in PZH

Agriculture is not a huge part of the modern NL economy. Even though the Netherlands is the second-largest food exporter in the world the agriculture sector is only 1.4% of our economy. However agriculture provides safe and healthy food, it is the big carrier of nature and landscape and thus largely determines the quality of the living environment. The importance of agriculture in South-Holland will be explored on the following pages.

The economic importance of intensive livestock farming is fairly marginal: the sector (including suppliers, processing, business services) contributed 1.3 percent to the gross domestic product (GDP) in 2009, according to the Central Planning Bureau (CBS, 2021). In 2019, the share of value-added of agriculture in GDP was 1,4%. Dutch agriculture produces more output with less land and labour, which shows how efficient Dutch agriculture is (Feng, 1998). An expanding number of individuals today question whether financial development as estimated by gross domestic product (GDP) ought to stay the fundamental proportion of our economy. Reevaluating financial development will obviously have suggestions at the costs paid to farmers for their items, and thus food costs and the portion of pay we spend on food. For individuals just as the planet, in any case, such forfeits may be made. While Resources are one-directional, farmers are expected to invest to make the system more circular, but the investment power is weak so there isn't much financial incentive, this is why the farmers struggle while the product prices stay low. More investments for sustainability expected, but the profit model does not sustain this, as is shown by the price for dairy over the last decades, which stayed virtually the same (see figure 23).

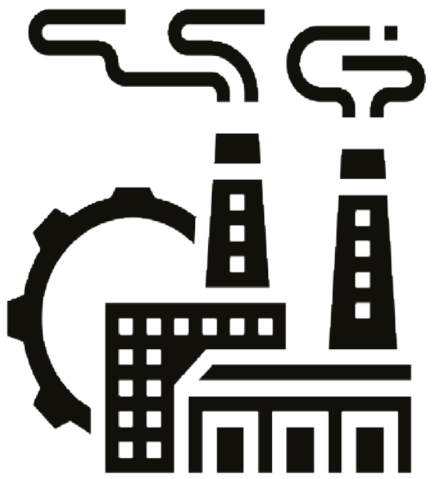


left:
Fig 23: Dairy prices over the last decades (Adapted from Melkveebedrijf, 2020)

right:
Fig 24: Contribution sectors to the GDP of the Netherlands (CBS, 2021)

Agriculture

1,4%

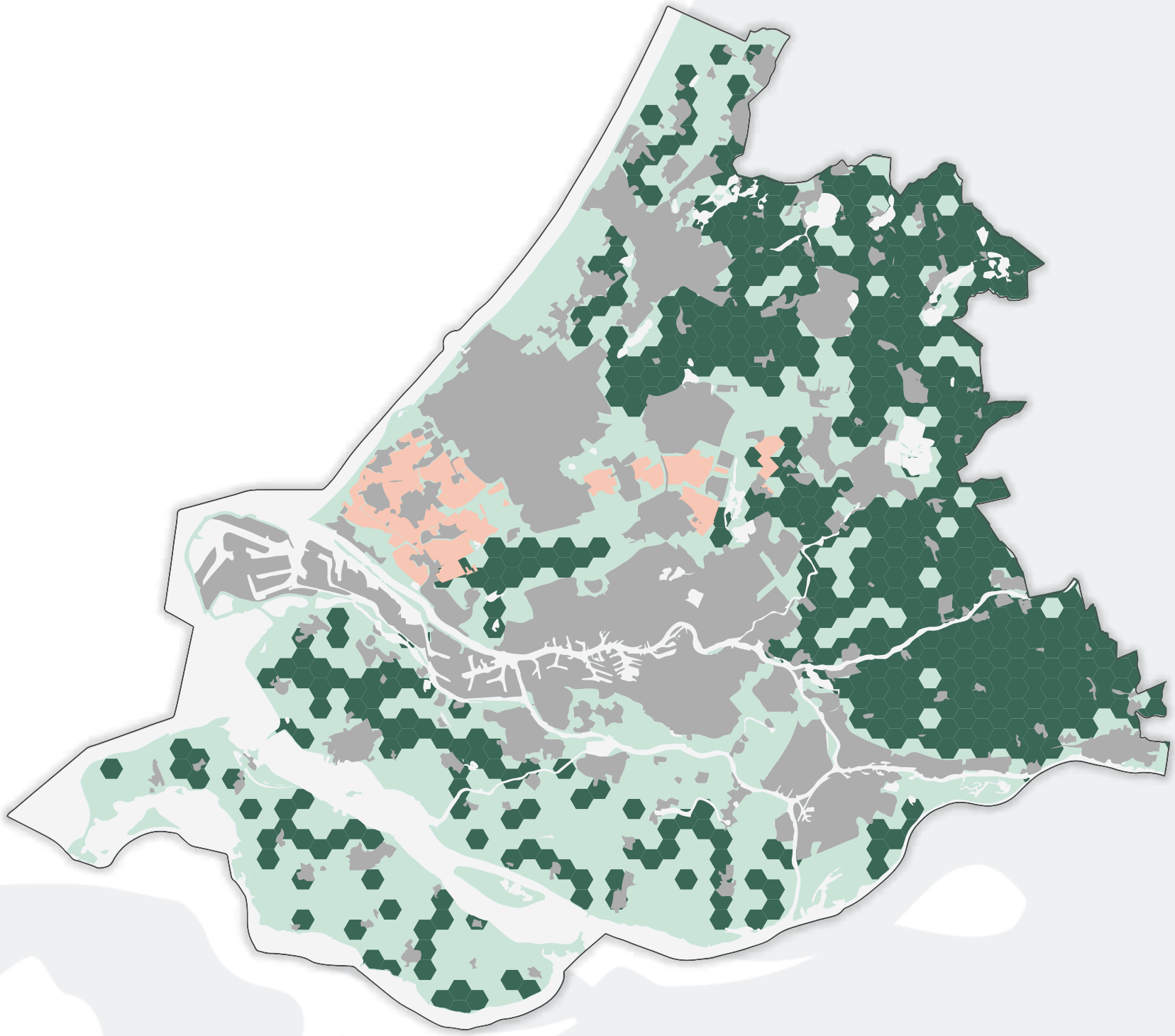


Industrial

17,9%

Services

70,4%



Urban/Built Environment	820km²	24%	
Water Bodies	605km²	18%	
Livestock	890km²	26%	
Agriculture	960km²	28%	
Horticulture	140km²	4%	

Fig 25: Land use in South-Holland

Import and export

The Netherlands produces far more food products than is needed for itself. Anyone who might think that almost every country produces more for economic reasons is wrong. Only a limited number of countries are overproducing in addition to the Netherlands. Well-known examples are the United States of America and France. Both countries are therefore experiencing similar scandals in the field of livestock farming and the meat processing industry (Stoop, 2021). Furthermore, 70-80% of Dutch animal production is exported, while 63 percent of Dutch meat consumption is imported (Vergeer et al., 2020). This high production for export is so demanding in resources that the whole system is unbalanced. Energy and water supplies are one-directional and not circular yet, with sectors not giving back.

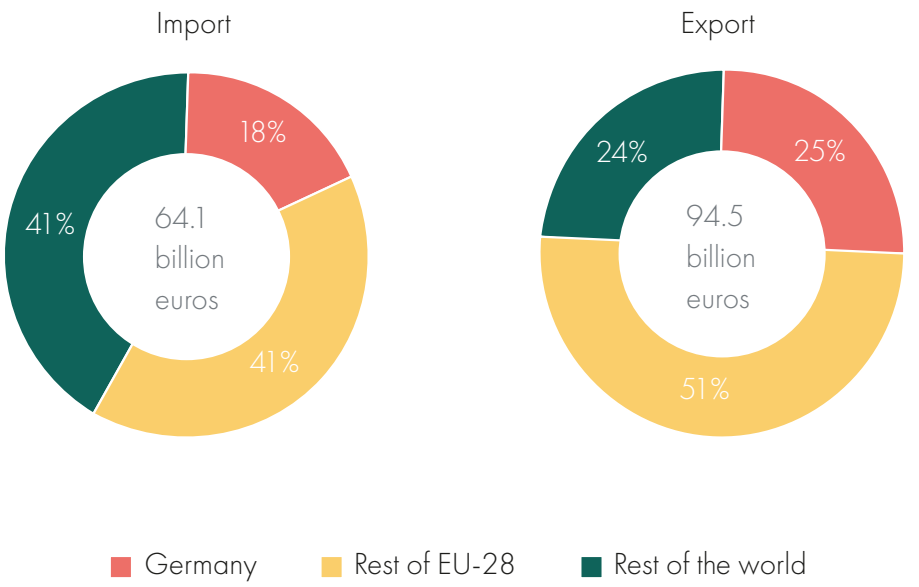


Fig 26: Dutch Import and export of agricultural goods in 2019 per region (Adapted from WUR, 2020)

Link to other sectors

The livestock sub-sector is closely linked with other key industries. Primary agriculture is closely intertwined with other parts of the economy. On the one hand, agriculture production is hardly possible without the supply of goods and services such as animal feed, fertilizers, energy and business services (see figure 27). Raw agricultural products require processing in the food industry and the use of trading and distribution activities to get them to primary agriculture or the processing industry. The whole of direct and indirect activities related to agriculture can be seen as a coherent chain (Afrian et al., 2020). The Dutch agricultural industry is worldwide famous, thanks to our high-quality production techniques, innovation and high level of knowledge of the sector. Many companies in the Netherlands are related to further agricultural production processing. Agricultural policy concerns not only food production but also consumption.

South-Holland is the most densely populated province and it has an unbalanced distribution of population. This is because a large part of the land is occupied by agriculture even though it is such a small part of the economy. As can be seen in figure 27 the whole urban environment is surrounded by agriculture, livestock and horticulture. Agriculture provides a lot of employment and agriculture is an expression of culture: eating together is an important social activity that defines part of our identity. 68 percent of the Dutch surface is used for agriculture, this means the layout of the space in which we live, work and recreate is largely determined by agriculture. Multiple actors suffer in the current system, farmers need to comply with new environmental regulations constantly. They lose money which leads to protests, they feel like they are done an injustice. High production does not give ideal circumstances for the animals and besides that consumers are disconnected from their food and its production. This disconnect can also be seen in the demands of space. Due to an increasingly urban population, the housing demand increases in the Randstad, pressuring the productive farmland.

Society argues on the one hand increasingly higher requirements for the production of our food, for example in the areas of the environment, nature, landscape, animal welfare and food quality. Food consumption is often driven by the pursuit of high quality, quality at increasingly lower prices. The consumer has a direct influence on agriculture through politics and their wallets (Jacobs et al., 2008). Our landscape is both formed and threatened by agriculture. A new position for the cities could be, not only serving the city but also the surrounding areas (the port and the countryside).

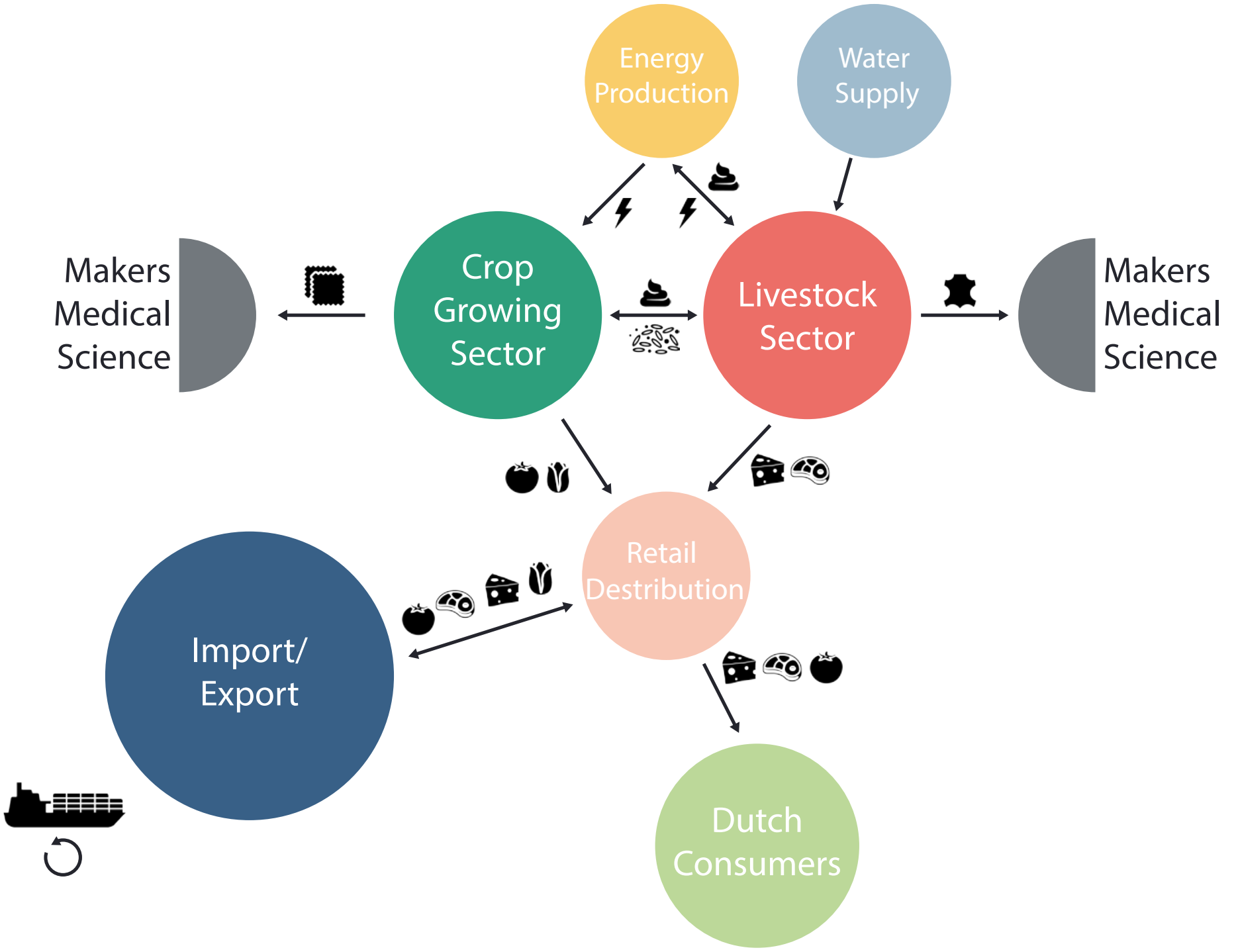


Fig 27: Role of agricultural sub-sectos in South-Holland

Agriculture and the relation to space

agri-food production in PZH

Agriculture is the largest user of space in the Netherlands and has been the most important image definer of the Dutch landscape for centuries. From cows in a pasture in the peat meadow areas to the extensive fields in the peatland and sea clay areas. From tulip fields in the coastal region to the greenhouse horticulture in Westland. In this chapter agriculture and the relation to space will be explored.

Current food production

Livestock

The current livestock farming sector tries to run as much and produces as cheaply as possible. Meat, dairy and egg production is one of the main causes of environmental problems such as climate change, soil erosion, water pollution and loss of biodiversity. According to the Food and Agriculture Organization of the United Nations (FAO), 14.5 percent of greenhouse gas emissions are caused by livestock farming. Even though livestock farming is still facing social and ecological limits and biodiversity is under great pressure, dairy farming is the largest land user, the sector is crucial for the Netherlands (PBL,2018). To make livestock farming more sustainable, farmers need to produce as little waste as possible (crop residues, food residues, process waste, manure, compost) and reusing everything as much as possible; growing more for their own use or buying from local farmers.

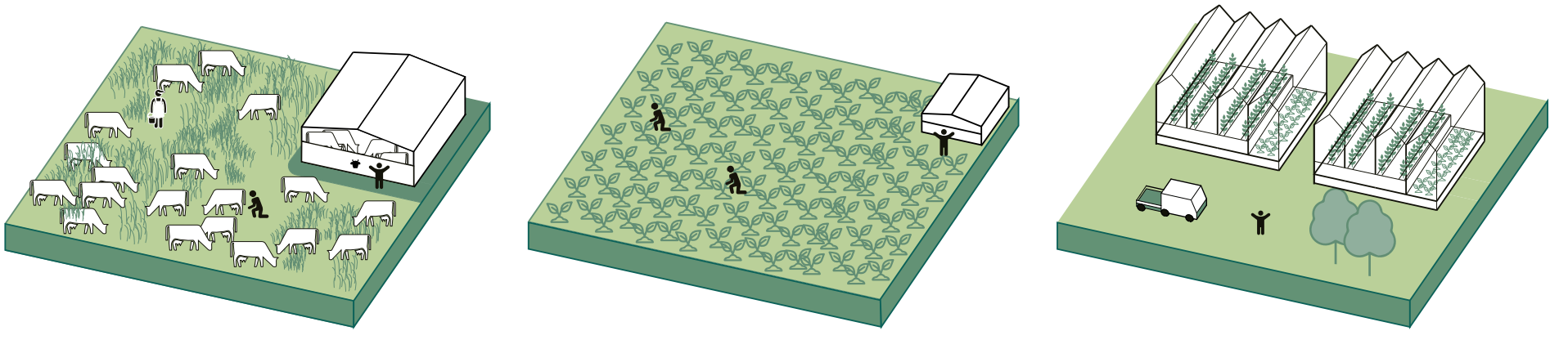
Arable farming

Arable land or agriculture is the set of economic activities in which the land is used for the production of crops for human use. Arable farming is mainly carried out in clay areas, it is for example not suitable in peat landscape. Agriculture faces many problems such as the loss of biodiversity, polluting of soil and water, erosion etc. At the moment there is much room for improvement within agriculture when it comes to circularity and sustainability. Intensive agriculture cannot continue like this and while there need to be fed an additional 2 billion people. Things that definitely should change are the use of pesticides, production for the region (shortening the chains), less waste, more healthy soils, clean water and even more (Schuurbiers et al., 2018).

Horticulture

In contrast to normal agriculture, greenhouse horticulture doesn't affect the biodiversity or the quality of the soil. On the other hand, it needs a lot of energy. Most energy is currently obtained from fossil fuels, which leads to CO2 emissions. However, greenhouses are producing an enormous amount of crops in a very efficient way. They are using incredible techniques which aren't as well known or applied in the rest of the world. This knowledge and technology could be really helpful for striving for a sustainable future but also to help other countries with their food production.

Fig 28: From left to right: livestock farming, arable farming and horticulture illustrated in a simple diagram



Future Cultivation methods

Multifunctional greenhouses

Multifunctional greenhouses are systems that are not only aimed at crop production but also, for example, fish farming which is called aquaponics. Aquaponics is a system in which the growth of fish is combined with the growth of plants. The goal is to create an ecosystem that can keep itself in a stable balance. The fish in the system need to be fed to grow, creating waste products in the water. The next step is to purify these waste products from the water. The water is pumped from the fish tanks into the plants. This not only ensures that the waste products are transported to the plants, but also for sufficient oxygen absorption of the water which is essential for the fish (Rakocy, 2012).

Besides, insects can be used as an enemy against unwanted insects. A natural enemy can be found for a lot of different crop types. The most important thing is that the right numbers of control agents are deployed on time at the right time.

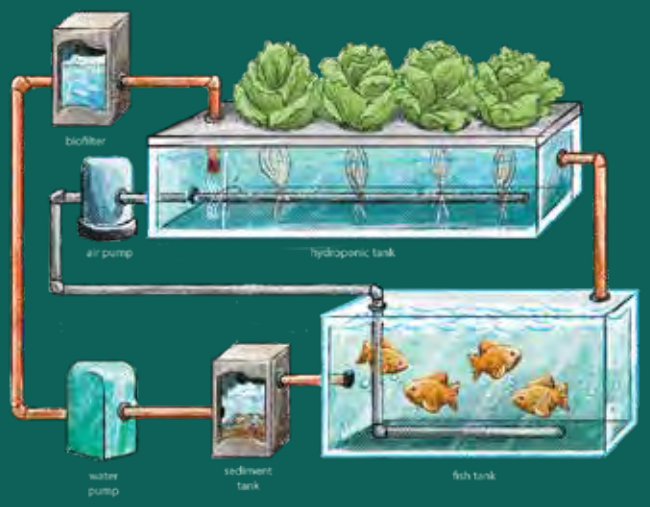


Fig 29: Aquaponics in combination with crops (Souders & McDowell, 2019)

Besides the expression 'multifunctional greenhouses', there is multifunctional agriculture which is a collective term for entrepreneurs who provide services to society in addition to their agricultural production. This can be, for example, care farming, farm education, a farm shop, agricultural childcare, agricultural nature management or agrotourism. The relationship between the farm and citizens is central to all these services.

Strip Cultivation

The alarming decline in biodiversity and increase in extreme weather make the need for resilient production systems urgent. Strip cultivation is one of the solutions for increasing biodiversity. Large contiguous areas with one kind of crop make the system vulnerable. Only one pest or fungus needs to land on the crops and in no time the whole plot will be affected. No natural enemy can survive on such a large plot. There is too little alternative food and there are no opportunities to hide. The cultivation method will provide more biodiversity within a plot. This will provide the beneficial organisms with sufficient food and shelter throughout the year. This results in more difficulty for beneficial organisms to cause damage to the crops.

In this way, a resilient agricultural system will be created. As soon as the system is disrupted, a new equilibrium is quickly established. Without endangering agricultural production and without the growers having to intervene because the system can absorb the changes itself. The land will fight diseases and pests before they can cause damage to the crops (WUR, 2021).

Fig 30: Strip cultivation (Van Apeldoorn, 2021)

Agroforestry

The term agroforestry is used for a cultivation system in which trees or shrubs are deliberately combined with young crops or grassland and livestock farming. An example of agroforestry is the combination of fruit or nut trees with arable crops, but many other combinations are possible. Agroforestry offers great opportunities for the development of more resilient, efficient and robust plant production systems with benefits for the environment, society and ecosystem. Some things are left unknown like the best spatial design, which crop combinations work optimally and how crops management can be carried out at competitive labour costs (Luske, 2016).

Fig 31: Agroforestry (Agroforestry for Poultry Systems in the Netherlands, 2017)

Future Cultivation methods

Animal decisions

A striking trend is that animals are given more and more freedom to make their own choices. Meeting the needs of an animal, without frustrating them. This can be done, for example by setting up a barn in such a way that there are different climatic zones. In this way, the animal can choose to seek warmth or a cool place. By letting animals decide for themselves when they eat or what kind of food they want, or by leaving animals only out when they want to (Böke, 2011). A good example of such technology, which is already being used, is the milking robot. With the help of this device, cows can decide for themselves when to be milked and how often. Thanks to a chip in a collar, they can open a gate to a separate room. Here, the milking robot looks for the udders of the cow, cleans them and attaches pistons to milk the cow (John et al., 2016).

Fig 32: Mobile milking robots (Veeteelt, 2012)

Grassland

The circularity of the local agricultural system can be improved by putting grass in the right places to cultivate. Arable farming can be done in suitable, drier soils, grassland in less suitable wet soils where peat is preserved and animal feed is grown. The arable farmer and the livestock farmer can cooperate to keep the nutrients locally in the system (manure from livestock farmer for arable land), or possibly through land exchange.

When using certain types of grassland, emission of greenhouse gas will be reduced. Furthermore:

- Land subsidence will be less
- More efficient use of nutrients
- Improvement of biodiversity
- More stable income and an improvement of futureproof
- The attractiveness of the landscape strengthens

An example of a very efficient grass type is the miscanthus. The miscanthus offers opportunities because of it is tolerance, wide application options and the sustainable character of the crop. For arable farmers, the stable and labour-extensive Miscanthus offers an opportunity for a sustainable revenue model in addition to the traditional rotary cultivation. Miscanthus can also offer opportunities on arable land of lesser quality. Furthermore, Miscanthus leads to higher yields and low input and it is easy to cultivate.

More Solutions to keep improving certain fields:

- Water level compartmentalization: Raising the water level results in a reduction in CO2 emissions, water must be available for this. Different land use will arise because arable farming needs low groundwater for optimal production and with compartmentalization, the water level will increase locally
- Wet cultivation (relatively new, farmers must be introduced to the crops). Only usable for crops that can grow in areas with high water levels
- Infiltrationdrains increases the water level. When the peat is wet, it leads to less digestion through oxidation. The higher the water level realized by the draw the lower the peat oxidation, but current intensive agriculture won't be possible anyone
- Incorporate peat and cover with mineral material, a requirement for this is that the peat comes to lie below the groundwater level. It will increase crop production but doesn't have a big influence on reducing CO2 emissions.
- Grassland, converting arable land to grassland also offers lower CO2 emission. Would fit well within the soil-bound nat

Fig 33: Miscanthus (Miscanthus * giganteus, n.d.)

Fig 34: Picture of landscape in South-Holland (own picture)

Flows in the agri-food sector

agri-food production in PZH

The agricultural sector is part of a system (see figure 35), in the coming chapters these systems will be explored according to the relations that are being made in terms of flows and stakholder relations.

Although south holland is already taking some actions towards circularity, there is still much potential to be identified with the current system. Especially when considering the various types of food production within the region, most densely populated areas with a large amount of food consumption, intensive energy consumption in greenhouses and the biobased manufacturing sector in progress, potentials to integrate the linear flows in a circular network should be well considered.

Livestock Farming

Livestock farming takes up large areas in South-Holland. Most of them are dairy farming, which also has a close link with the dairy processing industry, including the production of drinking milk cheese and fresh milk products (Nederlandse Zuivel Organisatie, 2015). However, current Dutch dairy products are highly export-dominant , 65% of which are consumed outside the Netherlands (Dutch Dairy at a glance,2021). This shows potential to lower the negative impacts of livestock farming by cutting down the export quantity.

The distribution of these products is currently highly anonymous. Within the whole province, there are only dairy plants from only three brands: Danone/Nutricia, FrieslandCampina and Vreugdenhil (ZuivelNL, 2019). The products have to travel through the bulk tank on the trucks, being packaged uniformly and distributed in supermarkets before finally reaching the consumers. This hinders the understanding between consumers and dairy farmers.

On the other hand,the current highly industrialized distribution network also leads to people's less attachment to foods. With easy access to dairy food with cheap prices, Dutch consumers nowadays are also wasting much dairy products. Dutch people wastes 5.1kg dairy products on average per person per year. Every year waste dairy drink via the sewer comes to 240 million litres in the whole country (Dooren, 2019). This number should raise our attention to stop wasting.

In terms of energy consumption and carbon emissions,a series of policies and regulations have been made to reduce the negative impact

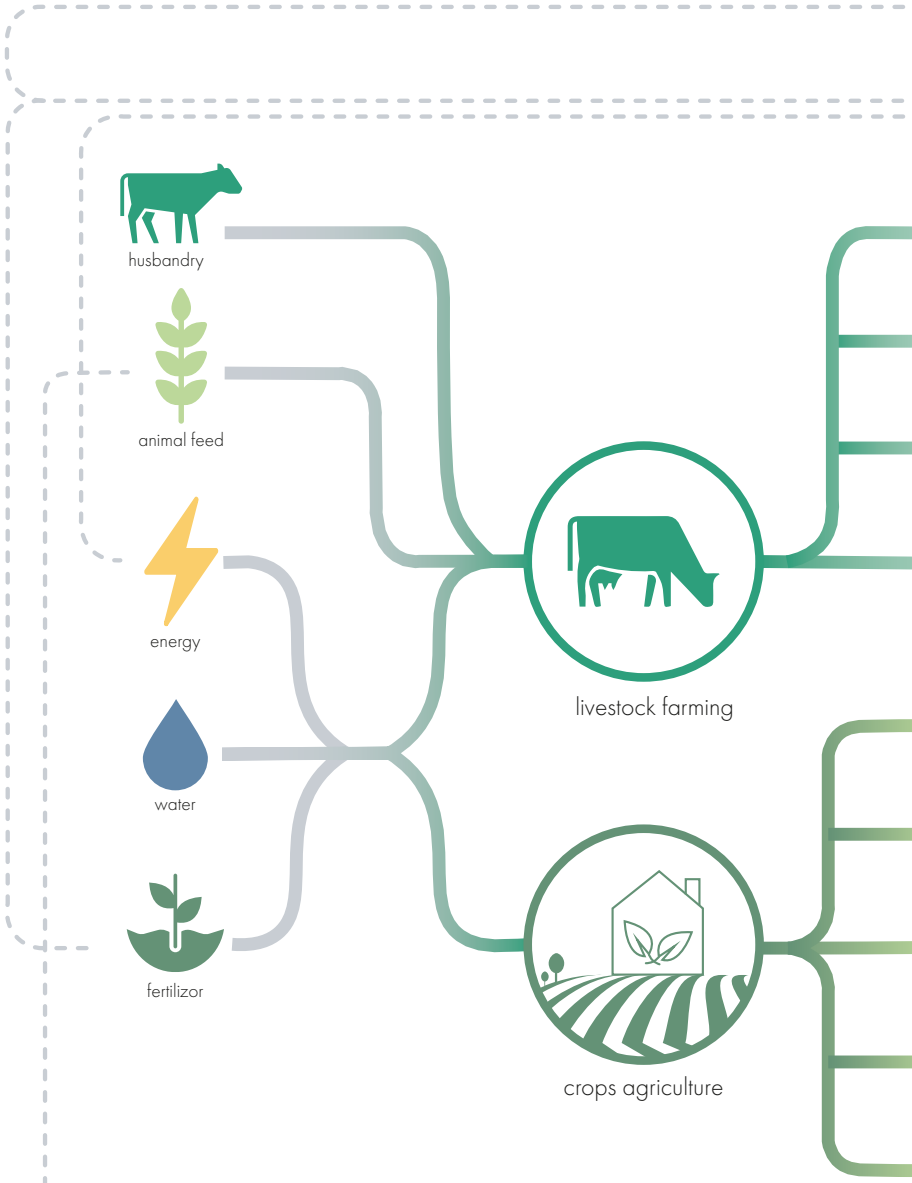
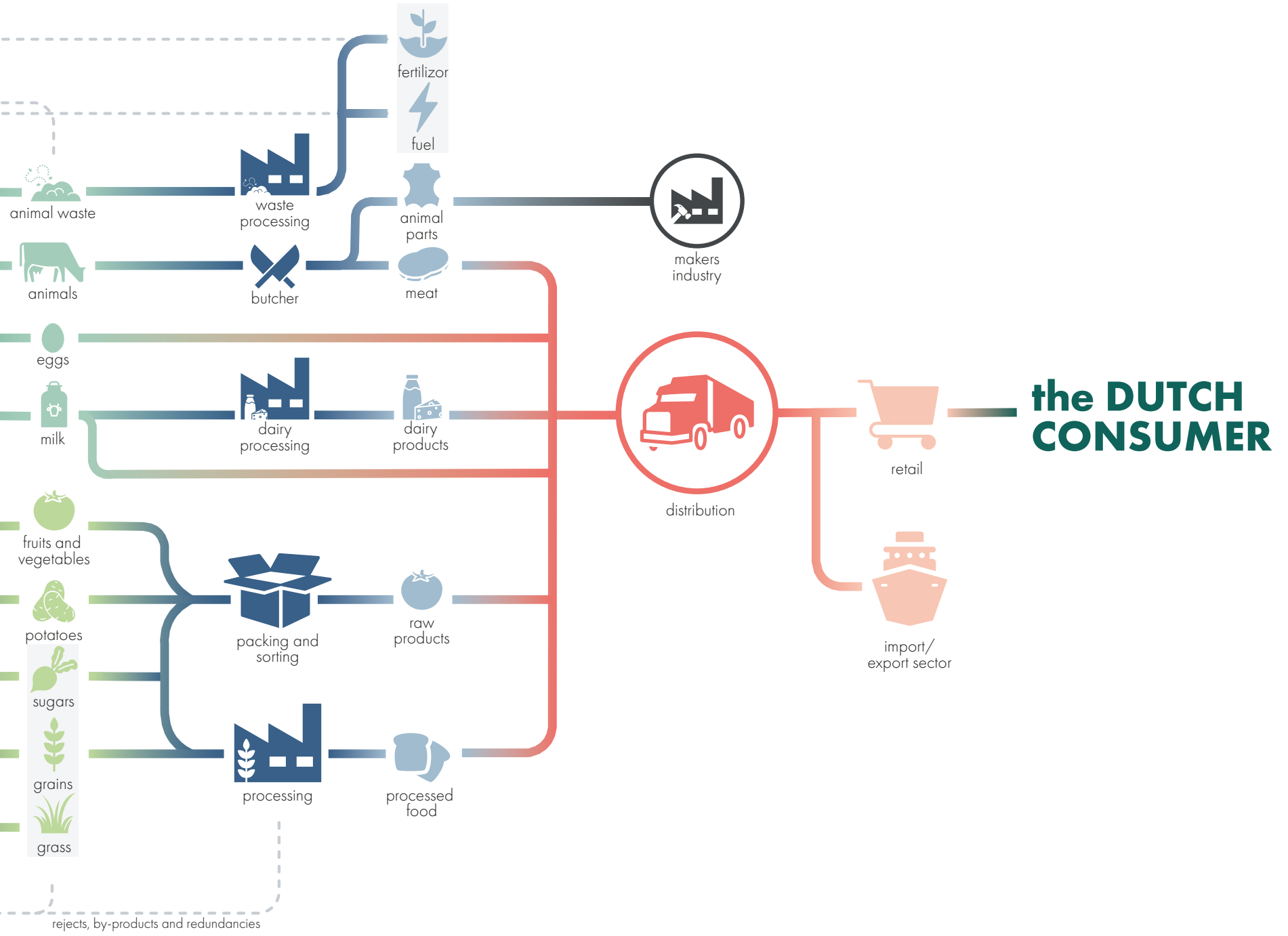


Fig 35: Flow diagram of the agricultural sector in relation to other sectors

from manure production, CO2 emissions and nutrition surplus in the past decades. The achievement can be seen through the Increasing replacement of synthetic fertilizer by nitrogen and phosphate from animal manure and general decreases in nitrate levels in shallow groundwater in agricultural land (Sonnema & WUR, 2019). Meanwhile, Farmers are also paying attention to energy consumption, with 62% of dairy farms utilizing the natural heat from milk, 31% of them using solar panels on the farm (Nederlandse Zuivel Organisatie, 2015).

However, the effort towards circularity within only the livestock farming sector has its limitations. For example, the fodder for livestock farming is still largely rely on import, with only 11.6% of the raw material for animal fodder originating from The Netherland (Flipsen, 2019). In addition, the manure of cows is hardly recycled to other sectors due to the cost and limitation of transport without exhausting its benefits in biomass production (Sonnema & WUR, 2019). Hence, there is still much potential



to stimulate cooperation between both arable farmers and biomass energy producers with the livestock farmers.

Crops Agriculture

Crop production in South Holland consists of greenhouse production and open-field production, which mainly produce crops such as potatoes, various vegetables and fruits. The current consumption is likewise highly export-oriented, but the consumers also rely on food import. This is partly due to the fact that people are not consuming local food nowadays. Moreover, food waste in vegetables and fruits are not as intensive as in dairy sectors though, there is still large potential to reuse the unavoidable waste such as peels and stalks (Dooren, 2019).

Among all the crop farming areas, greenhouse production is considered much more effective compared to other traditional open field farming land. However, it actually contributes to 73% of the emissions in the whole agri-food sector in south holland. It also consumes 48 PJ of natural gas every year, which equates to 1.2 million households use (Drift & Metabolic, 2018).

Currently, this is already CO_2 capture projects on the port of Rotterdam, connecting the waste CO_2 gas together with the greenhouses to meet the increasing needs of CO_2 as fertilizers in the horticulture sector. However, this does not change the fact of the heavy fossil-fuel reliance in current energy sectors. Hence, more effort should be made in clean energy production and waste recycling, especially to consider the potential of a cooperation with biofuel and biobased material production to reach a full circularity.

Spatial distribution of sectors

agri-food production in PZH

Since we have already analyzed the current agri-food system and its potentials to improve the flows, it is necessary to look into the current spatial distribution of each element and further develop our findings.

Food production

Current food production mainly happens in the rural area. The livestock farming mostly locates in the north-eastern part, which generally accords with the peat soil condition. The open field productions agglomerate in the south part, while some of them are also juxtaposed with livestock farming land. Greenhouses production locates more close to the urbanized area, occupying large areas between cities in Randstad. Most of them are monofunctional greenhouse zones, showing little mixture of land use patterns with other types of agriculture.

Food Processing

Most dairy production plants are close to the livestock farming space in rural areas, while meat and fats processing scatter in peripheries of large cities. Meanwhile, some of the fat production distributes along the port area, showing a feature of export-oriented business.

Food distribution

Majority of the food is distributed from rural areas through large logistic centres along the highway on the city peripheries before they arrive at the city. The retail clusters pop up in the densely populated urban area, showing an imbalanced pattern of food selling in rural areas and inner city space.

Manufacture

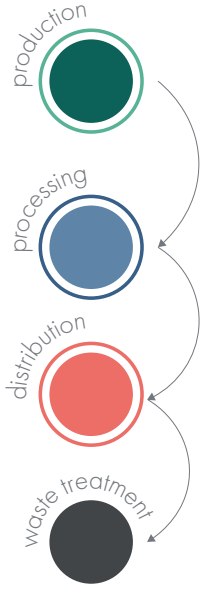
Currently, clusters of organic based chemical production industries could be identified on the port of Rotterdam. But at the same time, there are still many factories focusing on the petroleum industry.

Waste treatment

The waste treatment sectors distribute largely in the city periphery. Some of them show proximity with fodder and fertilizer production factories, so there are chances to make the circularity between them happen. Meanwhile, there is already a pipeline to stimulate the reuse of CO2 from the port to the greenhouses area. Hence, it is wise to fulfill its potential.

Energy sector

Large cities like the Hague and Rotterdam are already turning to clean energy in the heating system by either switching to geothermal energy or industrial residual heat. However, there is still large potential for small cities with food production areas nearby to transit towards biomass energy.



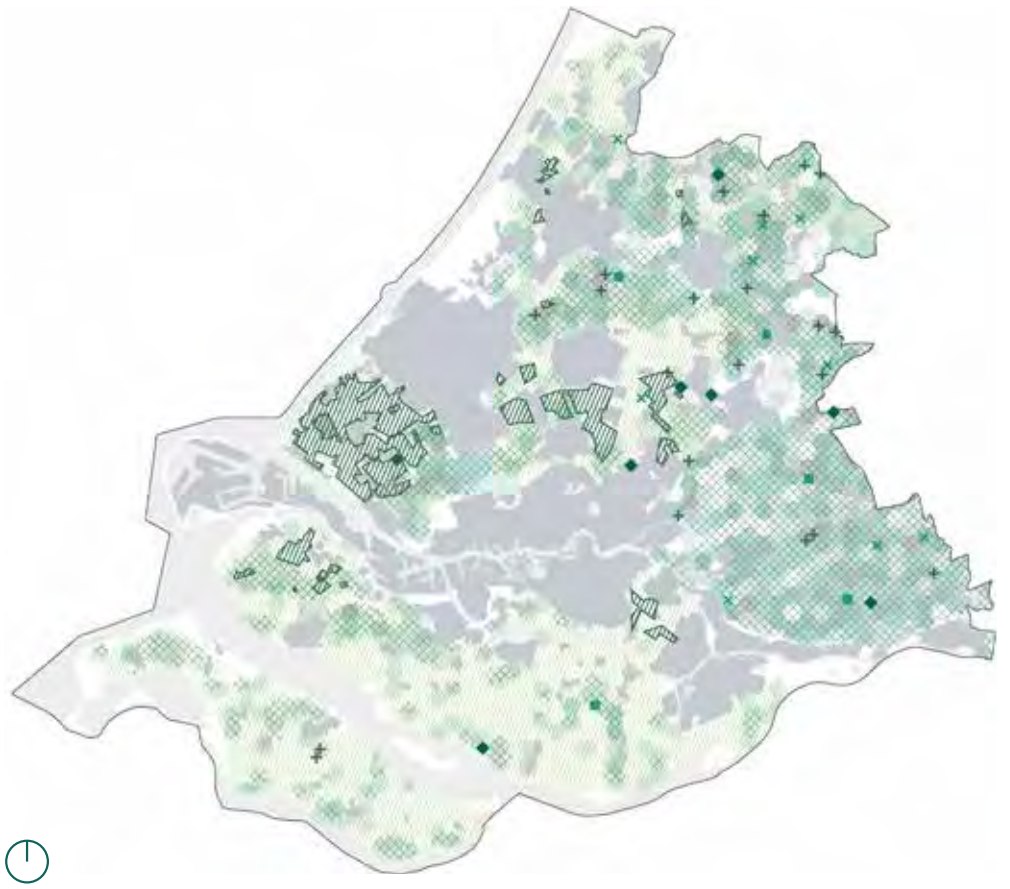


Fig 36: Food primary production map
(Adapted from LISA data, 2019)

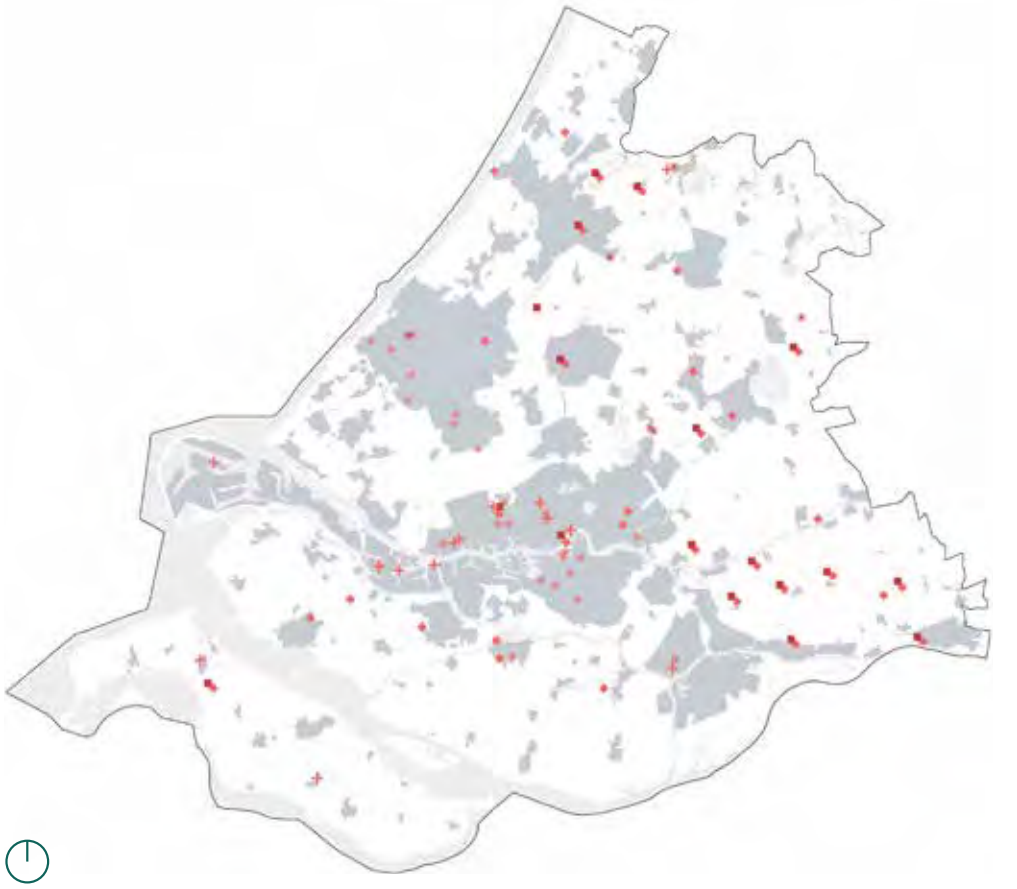


Fig 37: Food processing map
(Adapted from LISA data, 2019)

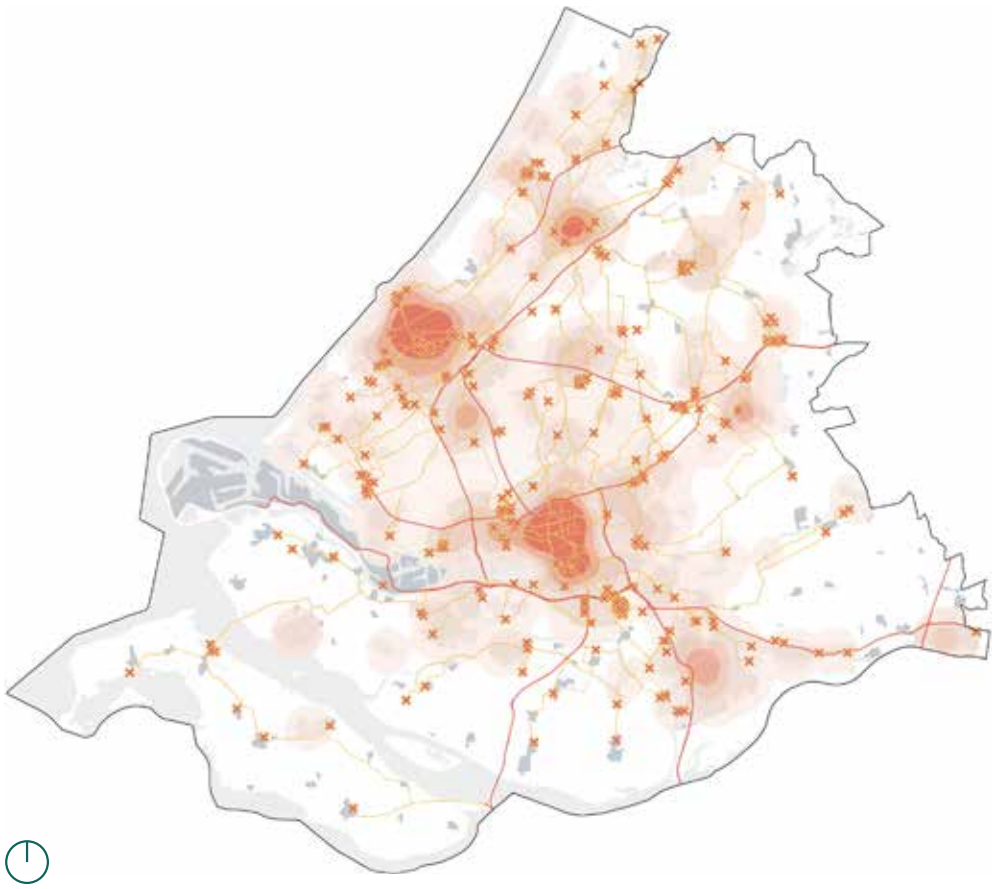


Fig 38: Food distribution map
(Adapted from LISA data, 2019)

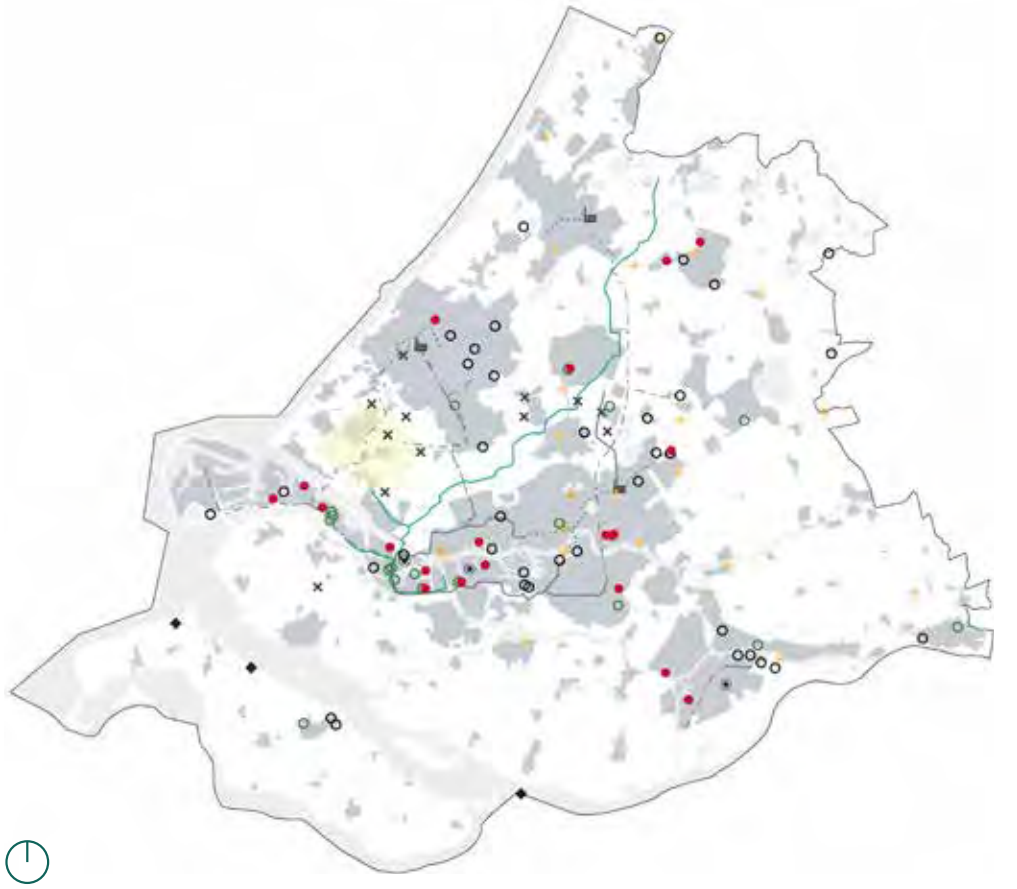


Fig 39: Energy production and waste treatment map
(Adapted from LISA data, 2019)

Flows in PZH

agri-food production in PZH

As spatial distribution features of different elements to do with agri-food sector have already been identified, the diagnosis of the main problems of current flows could be summarized as follows:

Imbalance

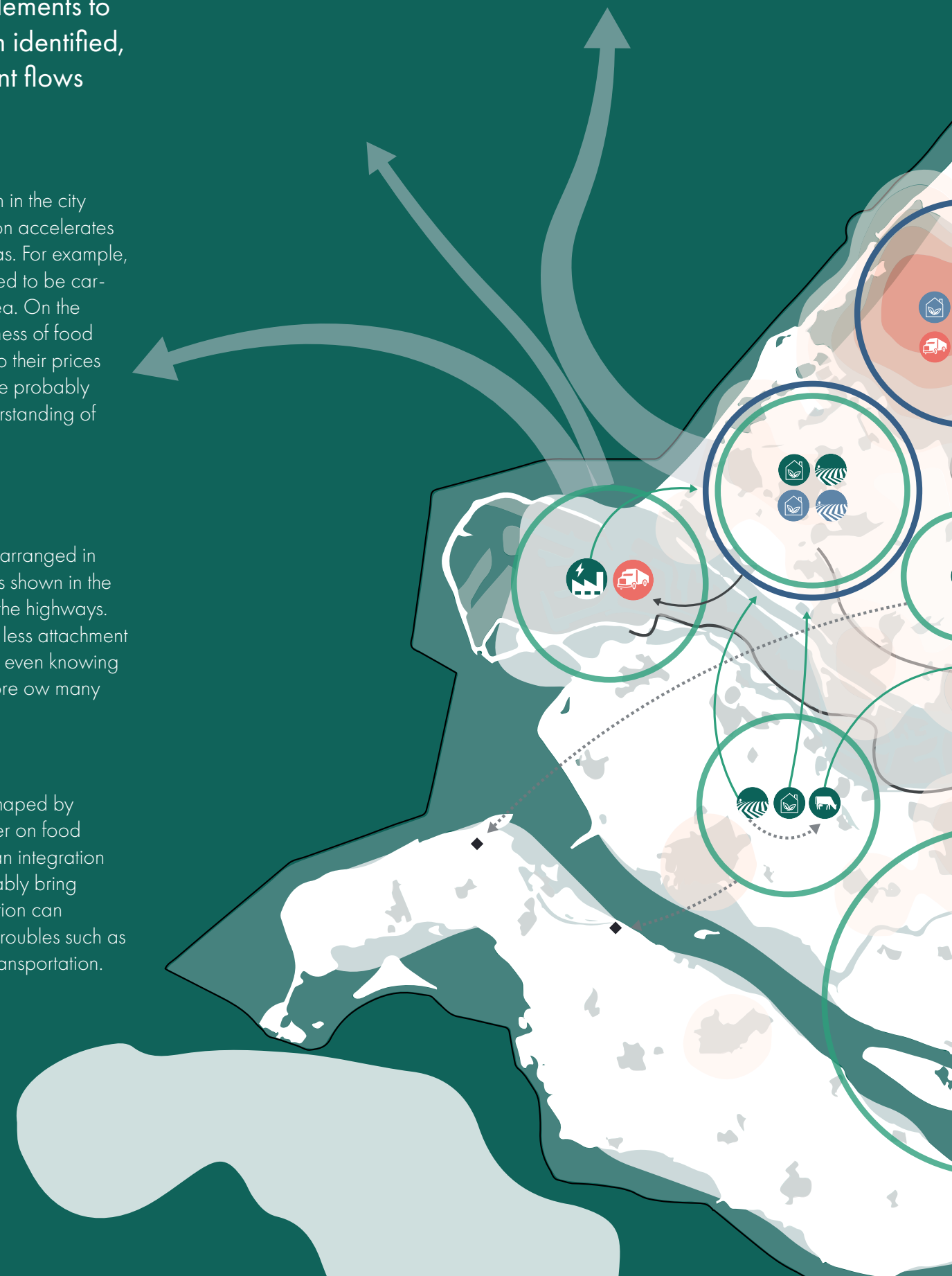
With food production mostly in rural area, food consumption in the city center, food distribution in the city periphery, this phenomenon accelerates the imbalanced distribution of spatial quality in different areas. For example, most of neighborhoods faraway from city centre are designed to be car-oriented and have less facilities compared to downtown area. On the other hand, people living in the city centre have little awareness of food production and distribution, choosing food only according to their prices instead of sustainability. Hence, this kind of spatial imbalance probably leads to an injustice situation and thus intensifies the misunderstanding of producers and consumers.

Invisibility

Most of the elements within the chains are invisible, and are arranged in monofunctional territories separately. Meanwhile, most flows shown in the maps are hardly noticeable by people, only happening on the highways. All of these account for the fact that people nowadays have less attachment to foods. People take it for granted to consume food without even knowing where it is produced or simply do not have curiosity to explore ow many miles they have covered before they come into your fridge.

Segregation

For the sake of efficiency, most of the current territories are shaped by a monofunctional zoning plan. A certain district focuses either on food production or manufacture or logistics, without considering an integration between them. These highly specialized clusters could probably bring temporary economic advantages; however, such specialization can intensify the segregation between different sectors, causing troubles such as resources wasting, knowledge exclusive and unnecessary transportation. And this hurts sustainability in the long run.



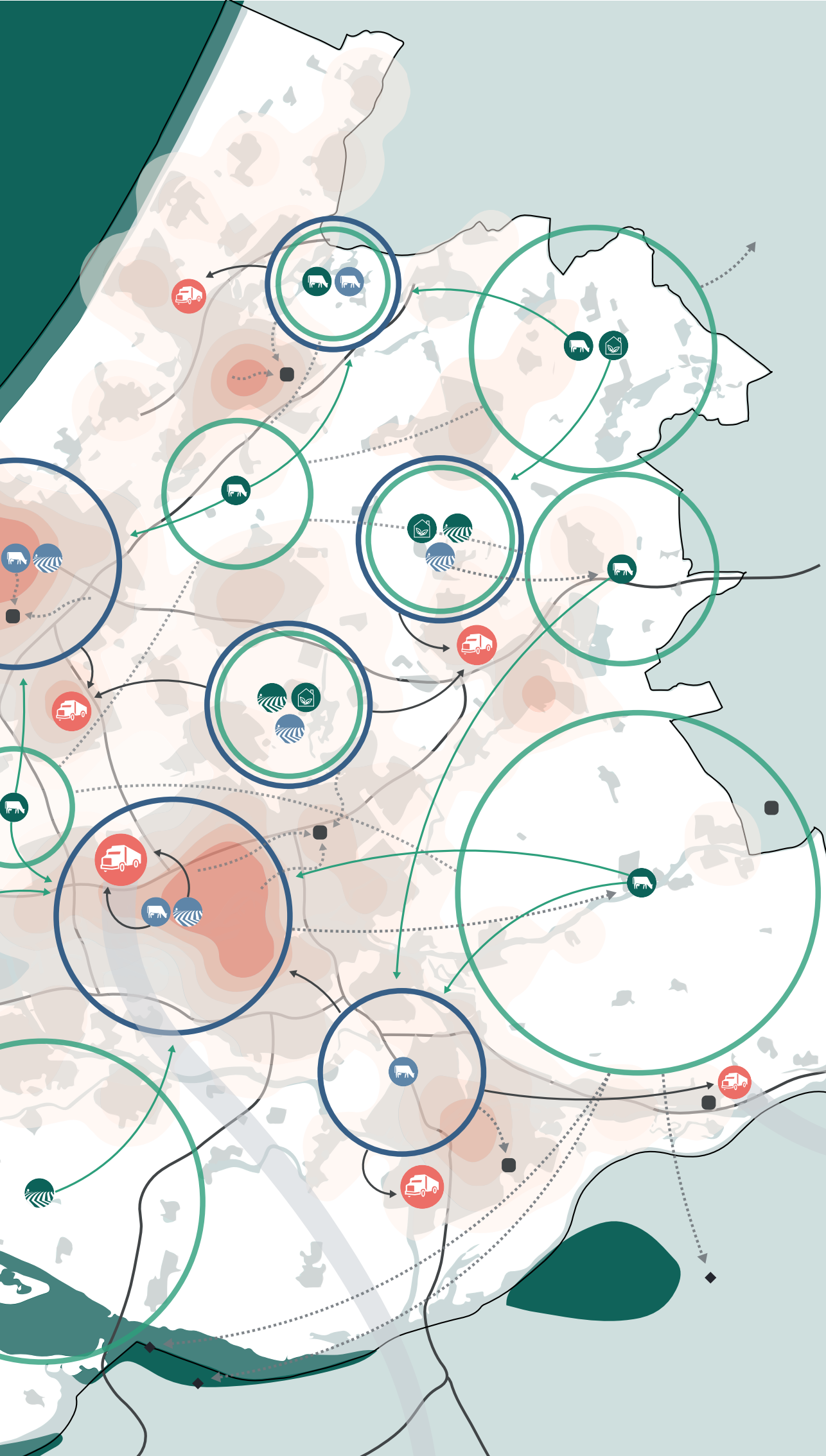


Fig 39: Spatial represenation of the flows that are connected with the agri-food sector in South-Holland

Linking flows to opportunities

agri-food production in PZH

In the previous chapter, current flows have been explored. The importance of both inter-sector and intra-sector has been explained for the sake of circularity on a bigger scale.

Firstly, there will be new agroforestry farming to bridge the current monofunctional livestock farming and crops agriculture. The symbiosis of animals and plants could already contribute part of the circular chain.

Moreover, with cooperation between different food production sectors and the potential of linking food production and consumption more closely, more nutrition will be recycled as fertilizers and livestock fodders will also no longer rely largely on import. More local animal fodder will come from the plant-based waste and residual food from local consumption. The nutrition from manure of livestock farming could also be recycled into crop growing.

It is also wise to keep in mind that manure from livestock farming not only contains nutrients such as N, P and K, but also contains other valuable ingredients that can be used in the bio-based industry (Wageningen UR Livestock Research, 2019). Hence, the potential of co-production of energy, fuels, and other biobased chemicals together with fertilizer from waste in agriculture sectors should also be highlighted, which bring the possibility of further circularity in energy and other industrial sectors.

Last but not least, more direct sales should be considered to avoid unnecessary packaging with the distribution process, and meanwhile create more awareness. Urban farming could also be seen as a good way to directly link food consumption and production.

As a result, there is an urgency of an overall transition which touches nearly every aspect of the current food chain.

All of the parties on the chain need to take action together.

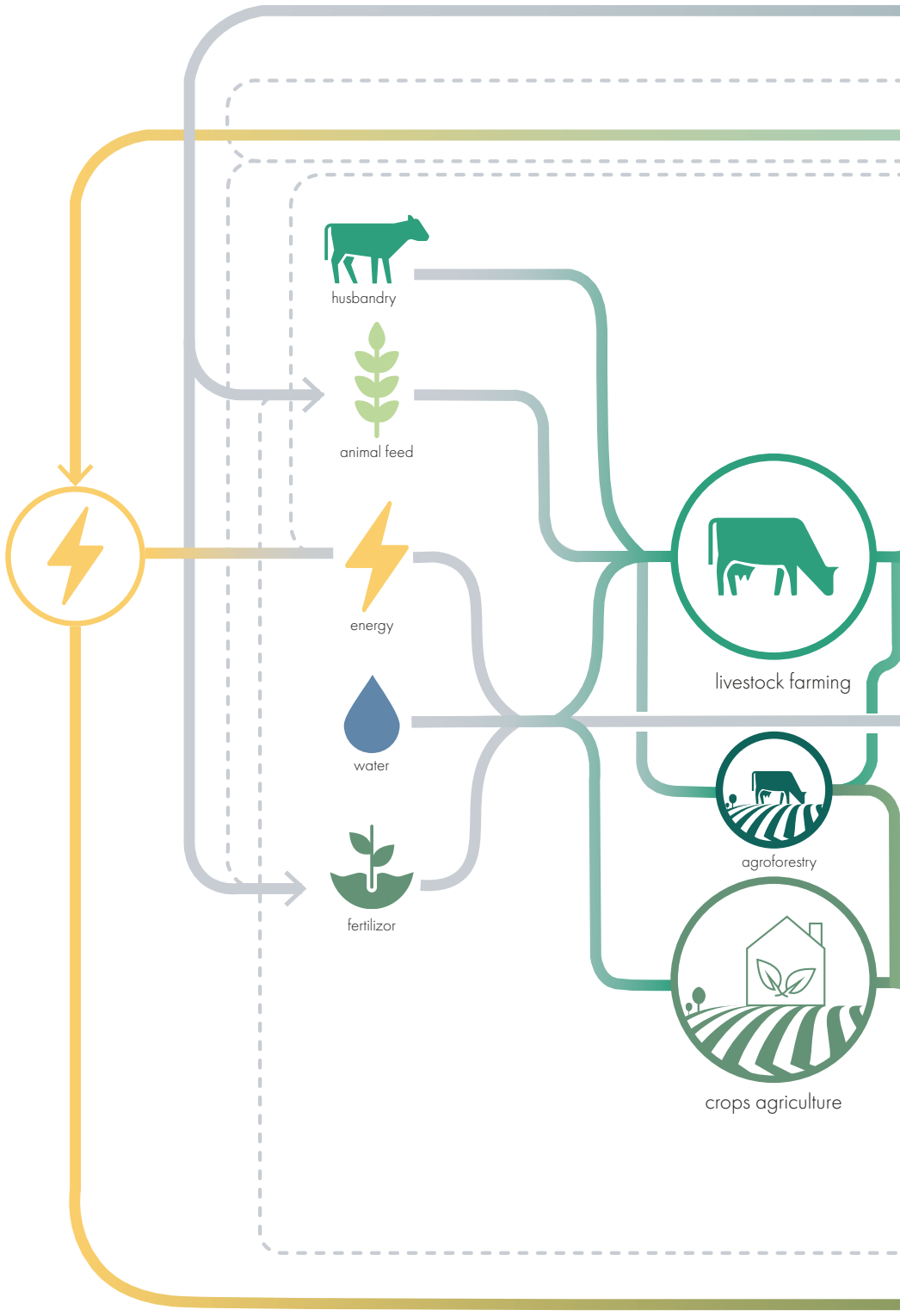
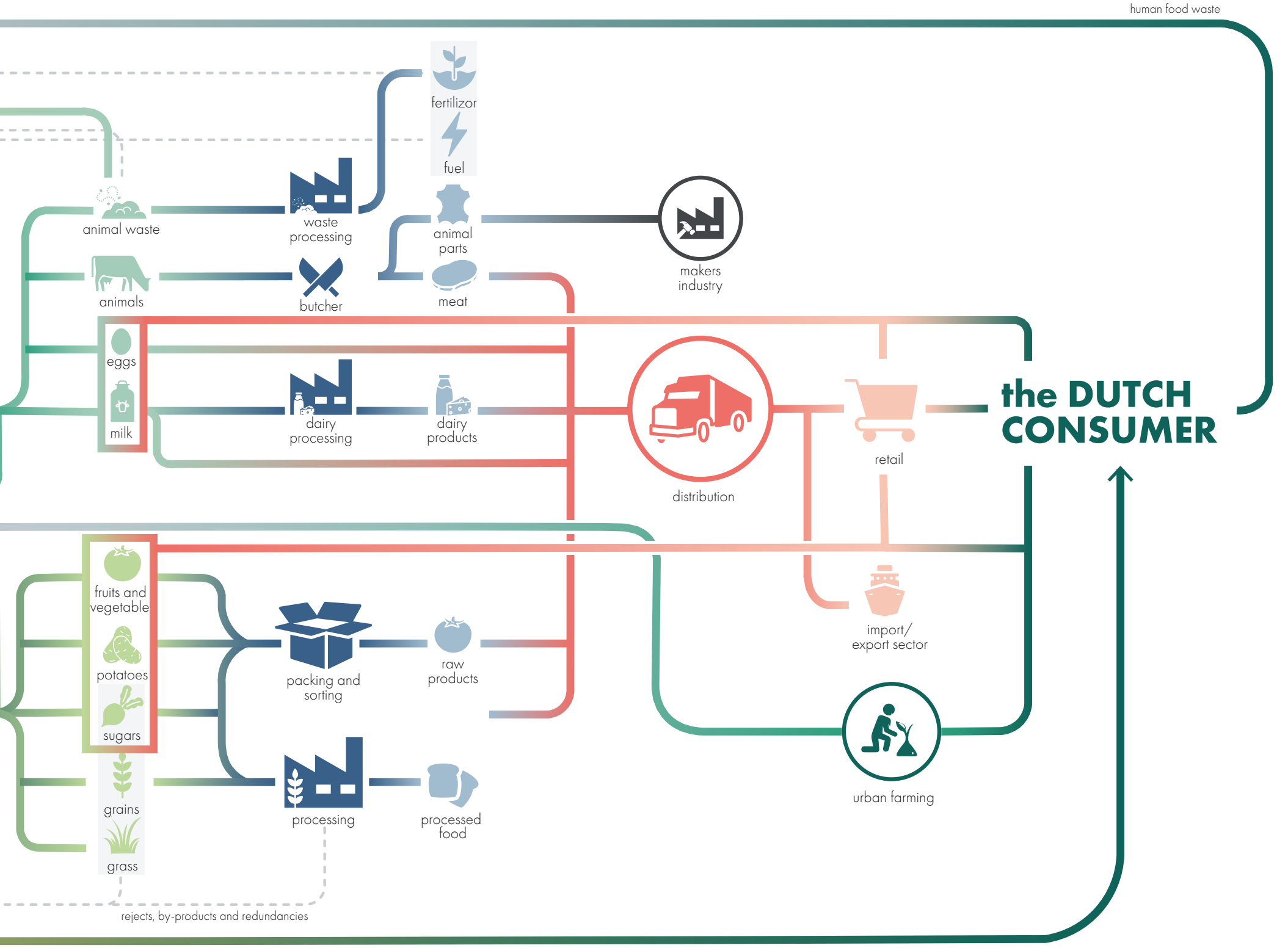


Fig 40: Possibilities for circularity, a new flow diagram


human food waste
fertilizor
fuel
animal waste
waste processing
animal parts
makers industry
animals
butcher
meat
eggs
milk
dairy processing
dairy products
distribution
retail
the DUTCH CONSUMER
import/ export sector
fruits and vegetable
potatoes
sugars
grains
grass
packing and sorting
raw products
processing
processed food
urban farming
rejects, by-products and redundancies

Stakeholder analysis

agri-food production in PZH

In order to understand what goes on in the current agri-food system, it is useful to analyse who is involved. What are their drivers, interests and powers? How do these stakeholders work together or cause conflict?

First the stakeholder will be categorized into different groups, to get a basic understanding of what kind of stakeholders are involved and what their main goals are. These stakeholders are then positioned into an interest-power matrix that is based upon the issue of a more local and circular agri-food system. From there it will be clear who has the power and interest for change and who needs to be empowered, made interested or informed.

Governance

In the Netherlands and Europe a lot of change is driven under the influence of governance. Under the notion of governance we understand the groups that are involved in the manner or action of governing a state or region. This can also be indicated by governmental institutions (Williamson, 1999). Because power is often related to areas, the stakeholders in this category can be sorted by scale. These institutions work according to political, economic and social values (Williamson, 1999) and can be defined as societal stakeholders (Freudenreich, 2019). They represent needs in society and the natural environment by acting as intermediaries for both popular and marginalized groups. The value provided is a stable operation environment for society in the form of regulations and social norms (Freudenreich, 2019). In the power-interest matrix it becomes visible that governance has a lot of power and a lot of interest in the described change. Typically governance is a proponent of sustainability. Policies describe visions on sustainable agri-culture, e.g. the EU policy 'Farm to Fork' (European Commission, 2021) and the national strategy "Landbouw, natuur en voedsel: waardevol en verbonden" (LNV, 2019). For governance it is important to make sure that they use their power to empower or make other stakeholders interested.

Food production

The food production sector consists of a few key stakeholders. Not all stakeholders are mentioned in the list, this is because of the scope of this project, which focuses mostly on the connection between producer and consumer. Overall, the food production sector has or should have a lot of interest in change: they will feel the direct consequences and pressures that come with it. Their position towards the change differs, farmers generally are divided on the topic. The interviews that were conducted for this project show that there is willingness for change, however there are also opponents throughout the farmers (see figure 43). The milk cooperatives and food companies typically are opponents of true change, even though they advertise differently. This was described by Josephine Schuurmans of Urgenda Farmers (see appendix). In this power-interest matrix animals are also named as a stakeholder. By doing this it is proposed that animals need to be empowered. This stakeholder will not be mentioned in the engagement strategy, but the notion of animal welfare is introduced this way.

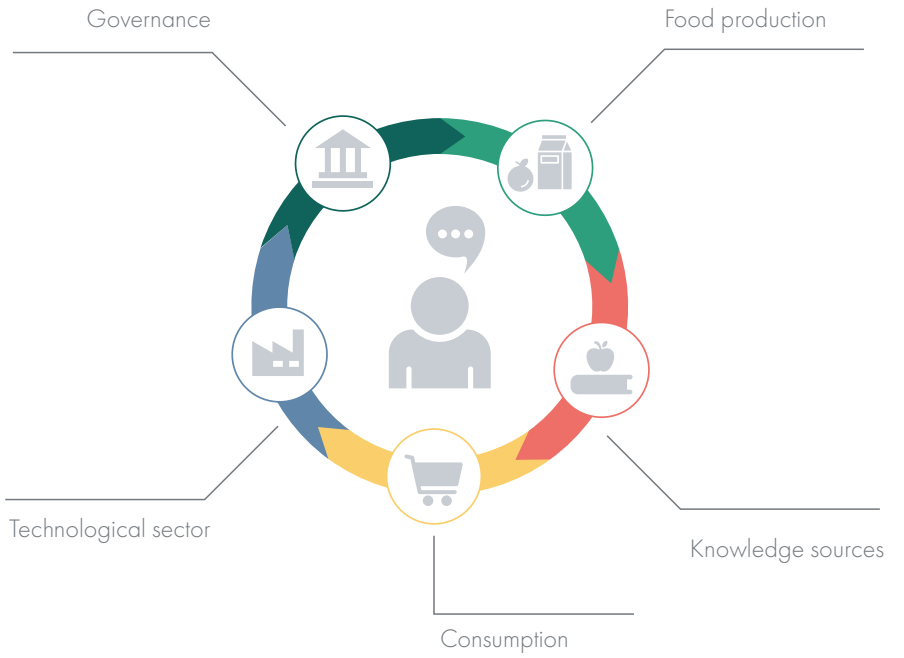


Fig 41: Stakeholder groups in Liv/fe Transition

Knowledge sources

Important in any complex change, are the knowledge sources. These are the stakeholders that make sure that everyone gets the correct information, which consequently leads to innovation and therefore change. Their main driver is therefore not economic, but societal. Knowledge sources can be divided into the ones who do and spread research, the ones who teach the practitioners the practical knowledge and the media that has a messenger role and spreads relevant information throughout a broad audience. Research is typically a proponent of change, continuously looking for new innovation. It can be argued that practical learning is a proponent, as it gets its information from research, but they often don't take a strong position themselves. The media is very powerful in influencing the public opinion, but is not necessarily a proponent. The media therefore is a very delicate stakeholder and should be made interested in representing the proposed change.

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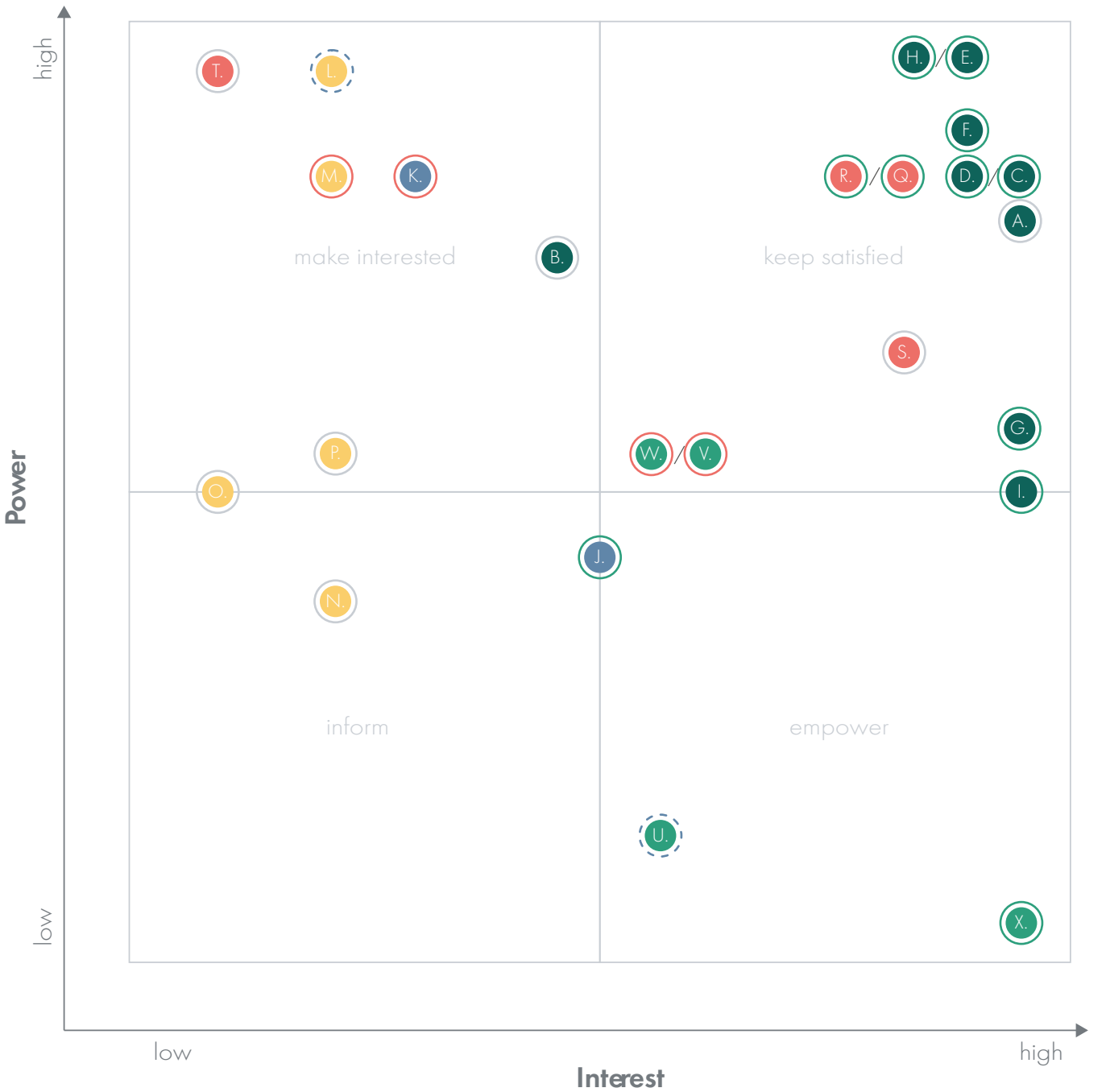


Governance

Local:
A. Municipalities
B. Port of Rotterdam

Regional:
C. Province South-Holland
D. Hoogheemraadschap/Waterboard

National:
E. National Government
F. Rijkswaterstaat
G. Staatsbosbeheer

International:
H. EU
I. FAO (UN)

Technological sector

J. Waste treatment
K. Energy companies

Consumption

L. Consumers
M. Supermarkets
N. Retail distribution

Private development
O. Tourist companies
P. Private developers

Knowledge sources

Research:
Q. Universities:
1. Wageningen (farming/food)
2. Delft (water/energy)
3. Erasmus (economy)
R. Research institutes:
1. Voedingscentrum (nutritition)
2. IHE (water research)
3. BVOR (organic waste(
4. Agrifirm (fodder and fertilzation)

Practical learning:
S. HBO-institutes/MBO-institutes

Media
T. Traditional and digital media

Food production

U. Farmers
- livestock farmers
- horticulture farmers
- crop farmers
V. Food companies
W. Milk cooperatives/companies
X. Animals

Fig 42 Power-interest matrix concerning change to a more local and sustainable agri-food system

Proponents
Opponents
Fence-sitters
All of the above

Consumption

The opposite part of the food production sector is the consumption sector. The consumption sector has however been defined in a broader context. Tourism and private developers have been taken into account in this sub-group, as they provide forms of consumption of space. The stakeholders in this group overall have little interest in change. They are not necessary opponents, but are not yet actively involved in the thought process of sustainable agri-food production. Supermarkets can be thought of as opponents, as they decide the prices of the products and these are continuously kept low, making change in the production sector difficult. These low prices are of course driven by the demand of the consumer, which makes them powerful in change.

Technological sector

As explained in the previous chapters, there are possibilities in connecting the food production sector and consumption with the technological sector. Under this concept we include waste treatments and the energy companies. Waste treatment companies have interest in change that leads to more efficiency. Energy companies however, are typically not eager for changing their production methods, as it requires huge investments.

Synergies and conflicts

All these stakeholders not only have separate interests, but also have relations with each other. These relations can be economic, social or environmental. In figure 44 the current relations are shown. Some of these relations are not necessarily good or bad, these are indicated as neutral. The most important conflicts and synergies are emphasised. These are the synergies and conflicts that could make or break change.

Synergies

A lot of the synergies that happen are intersectoral. As explained before, the food production sector already is working on being circular and succeeding in a lot of aspects. This is done not alone, but with the help of research and practical learning. Inside the consumption sector there is also synergy between the consumer and the supermarkets. The supermarkets provide what the consumers demand, which is low prices on food. The food companies and milk cooperatives have a strong relation with the distribution, realising efficiency.

Conflicts

The current conflicts are mostly in relation to the farmers. These conflicts are related to governance, which is a result of an discontinuous strategy plan resulting in change which has had no time to create support. A conflict can also be seen between the farmers and private development. This conflict is a consequence of the claim of land due to urban expansion. Because of the low prices that are demanded a conflict arises between the consumption sector and the farmers. This conflict is also strengthened by the involvement of the media, which often polarises the consumption from the production.

Potentials

With the use of the information that the previous chapters provided we can also organise potential relations that could either be an opportunity or a bottleneck.

There is a lot of potential in improving the relation between consumer and producers. In improving this relation, the media could play a significant role. There could be synergy between farmers, consumers and the media. Supermarkets however, also play a role in this improvement as they have a very direct relation with consumers. The willingness of supermarkets to improve their relationships with farmers could be a bottleneck in this change.

The relation between governance and farmers also has potential for improvement. Involving the farmers into the formulation of a strategy could cause synergy. This relation however, is very damaged and requires a delicate understanding of what is at stake. The knowledge sources could be the mediator between these stakeholders.

A new synergy between the technological sector and the consumption and food production sector could also emerge. Linking both consumer waste and waste from food production with energy could create new and improved relations.

Fig 43: Quote from interview with farmer

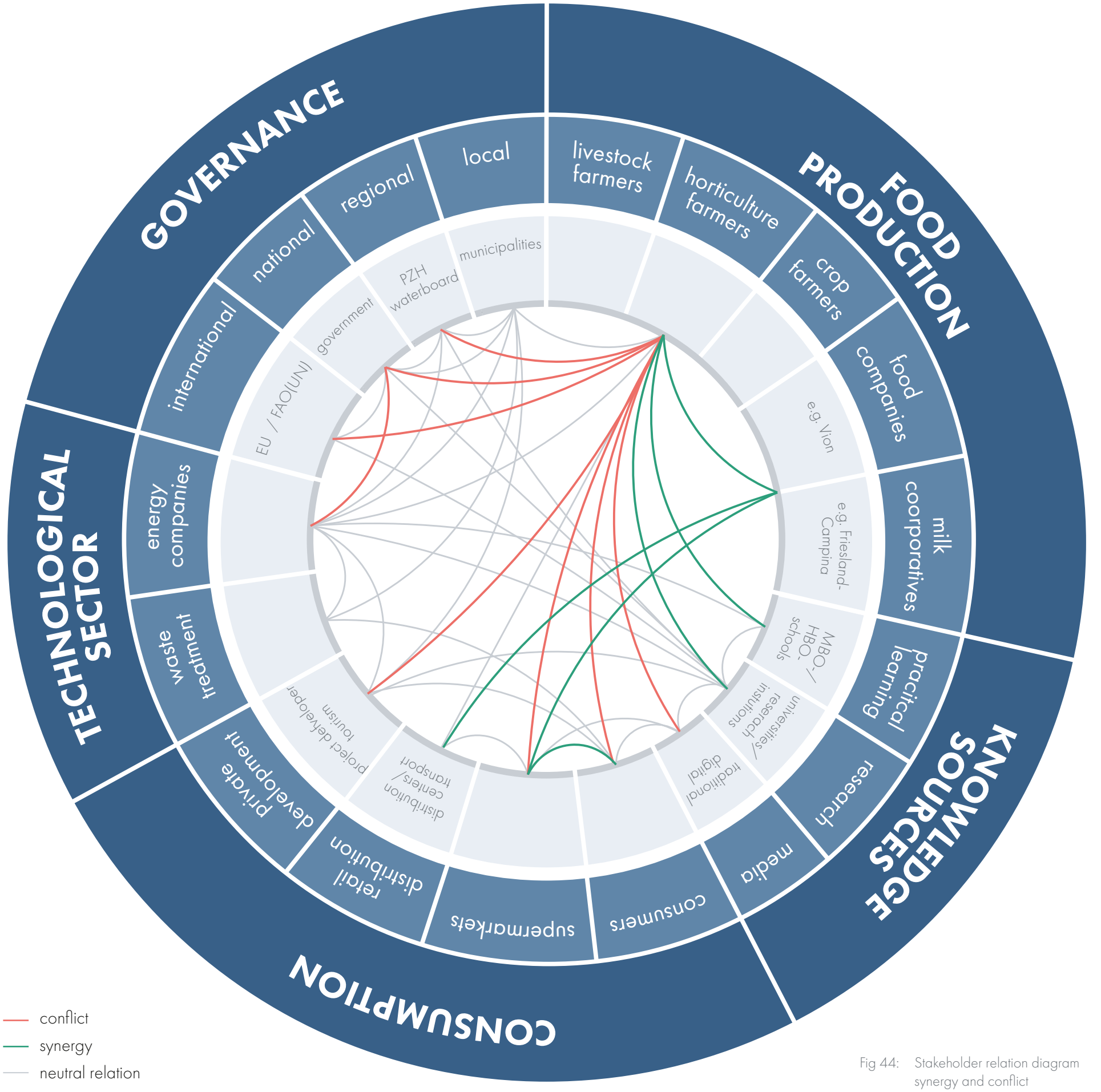


Fig 44: Stakeholder relation diagram synergy and conflict

National perspective
consumption in PZH

Before now the supply element of the agri-food sector has been explored. On the following pages demand will be explored by analysing diets and what this means for landuse.

Within the Netherlands there is a clear division of core production areas for different kinds of agriculture. The map shows areas with highest production and in turn highest economic importance (figure 47). South-Holland has a high concentration of floriculture and fruit & vegetables production happening in the greenhouses. About the same area is used for both of these types of cultivation in Westland (figure 46). The value of floriculture is however higher than any of the other cultivation methods (LNV, 2004). Moreover the vegetables grown in the greenhouses are very much a monoculture of tomatoes, bell peppers and cucumbers (figure 45).

The east of South-Holland is primarily used for dairy farming. This core area however is shared with the province of Utrecht and it is by far not the only core area since most of the Netherlands specializes in dairy farming (LNV, 2004).

In the current situation South-Holland is dependent on food from the other side of the country with corresponding transportation emissions. Meat is mostly produced in the south-east of the Netherlands and not locally. There is also some cropland with grains in southern South-Holland, but it is of a relatively small size compared to other areas in the Netherlands as a whole.

Fig 45: Production of vegetables in Dutch greenhouses in 2018 (Adapted from LEI Wageningen UR, 2009)

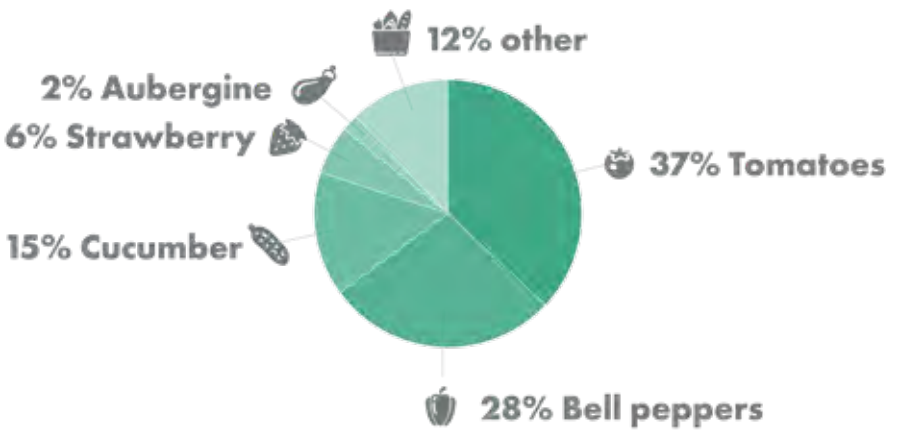
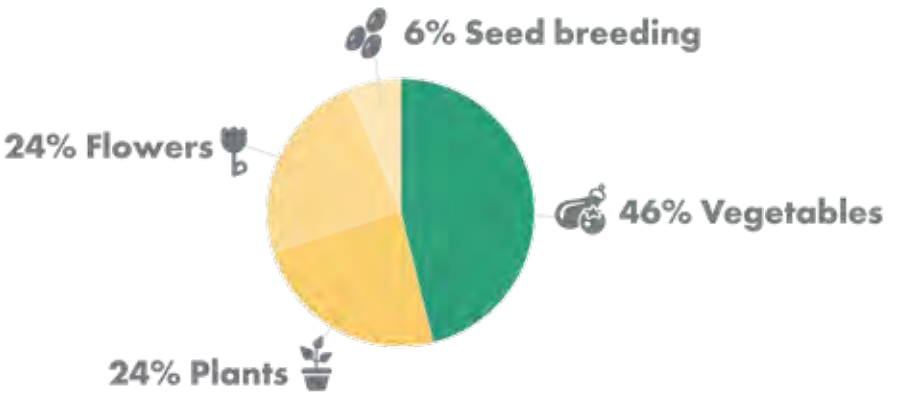


Fig 46: Production in Westlands greenhouses in 2018 (Adapted from LEI Wageninge UR, 2009)



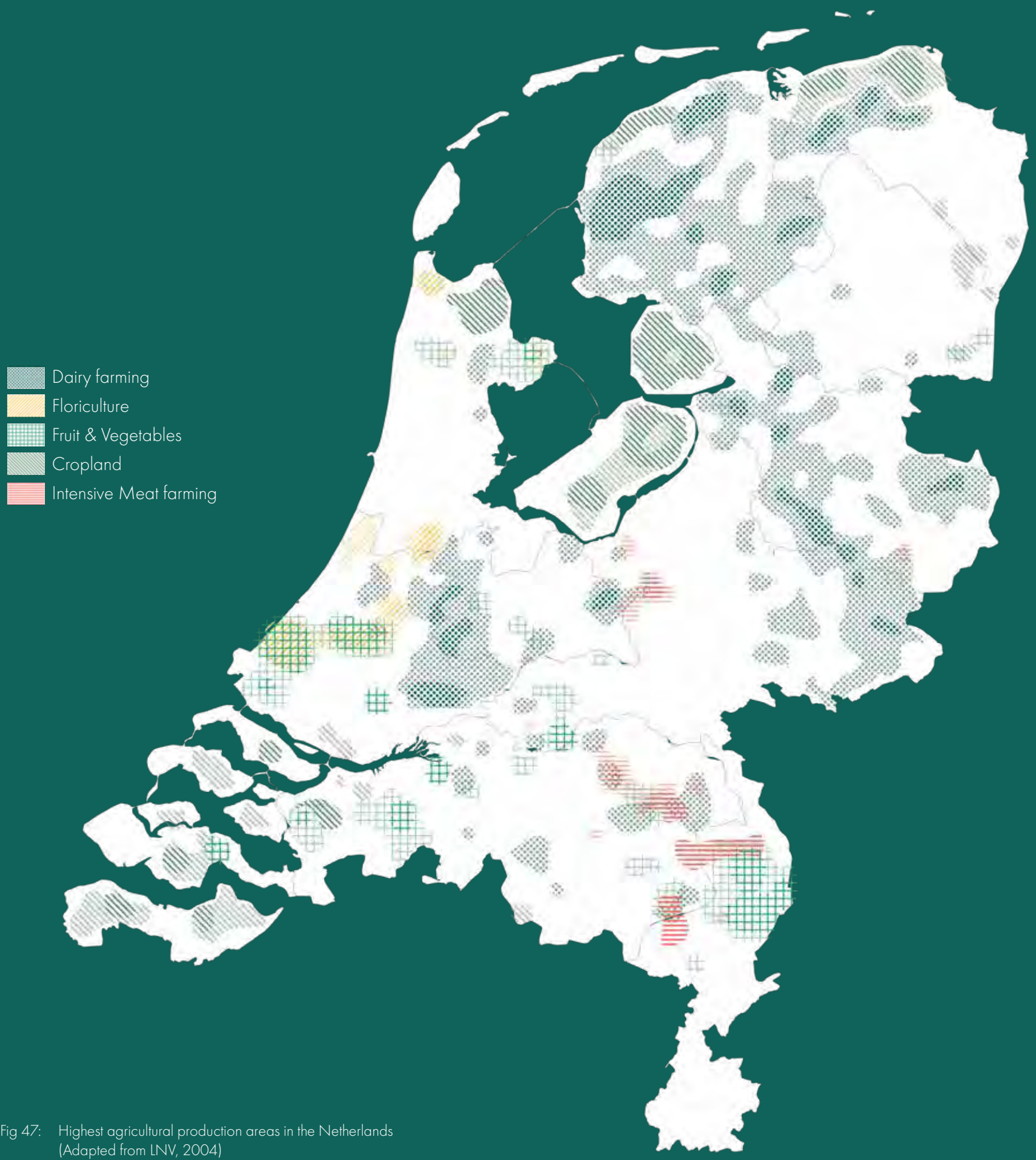


Fig 47: Highest agricultural production areas in the Netherlands (Adapted from LNV, 2004)

Diet and landuse

diet

If the Dutch diet is translated into spatial claims, then together the 3.6 million people living in South-Holland consume about three times the amount of agricultural space that is available to them (CBS, 2021). This means that South-Holland cannot become self-sufficient with the current eating habits. The main perpetrators are meat consumption with 76,7% and dairy consumption at 11% of the total space (figure 48). A healthy diet that gives every inhabitant the nutrients they need would drastically diminish the consumed space to 60% of the current diet. The healthy diet has been designed to get all the recommended nutrients within the values set by The Netherlands Nutrition center (Voedingscentrum, 2021). Meat and dairy will be consumed less, while fruits, vegetables and legumes become a more important source of nutrients. However, this still doesn't match the amount of agricultural space available in South-Holland. A vegan diet would actually require more space to produce than a healthy diet considering it is harder to acquire all the nutrients without animal products as well as meat and dairy substitutes requiring almost the same space as the products they are replacing (Wiskerke & Verhoeven, 2018). The inclusion of nutrient-efficient insects would be the key to lowering the space needed for food production, while dairy stays a large part of the daily consumption, fruits and vegetables need to be consumed more and a small amount of meat can still be farmed.

Fig 48: Production area for average Dutch Diet (Adapted from Wiskerke & Verhoeven, 2018, pp. 228)

Fig 49: Production area for average Healthy Diet (Adapted from Wiskerke & Verhoeven, 2018, pp. 228)

Fig 50: Production area for average Healthy Diet with Insects (Adapted from Wiskerke & Verhoeven, 2018, pp. 228)

Fig 51: Production area for average Healthy Vegan Diet (Adapted from Wiskerke & Verhoeven, 2018, ppp. 230)

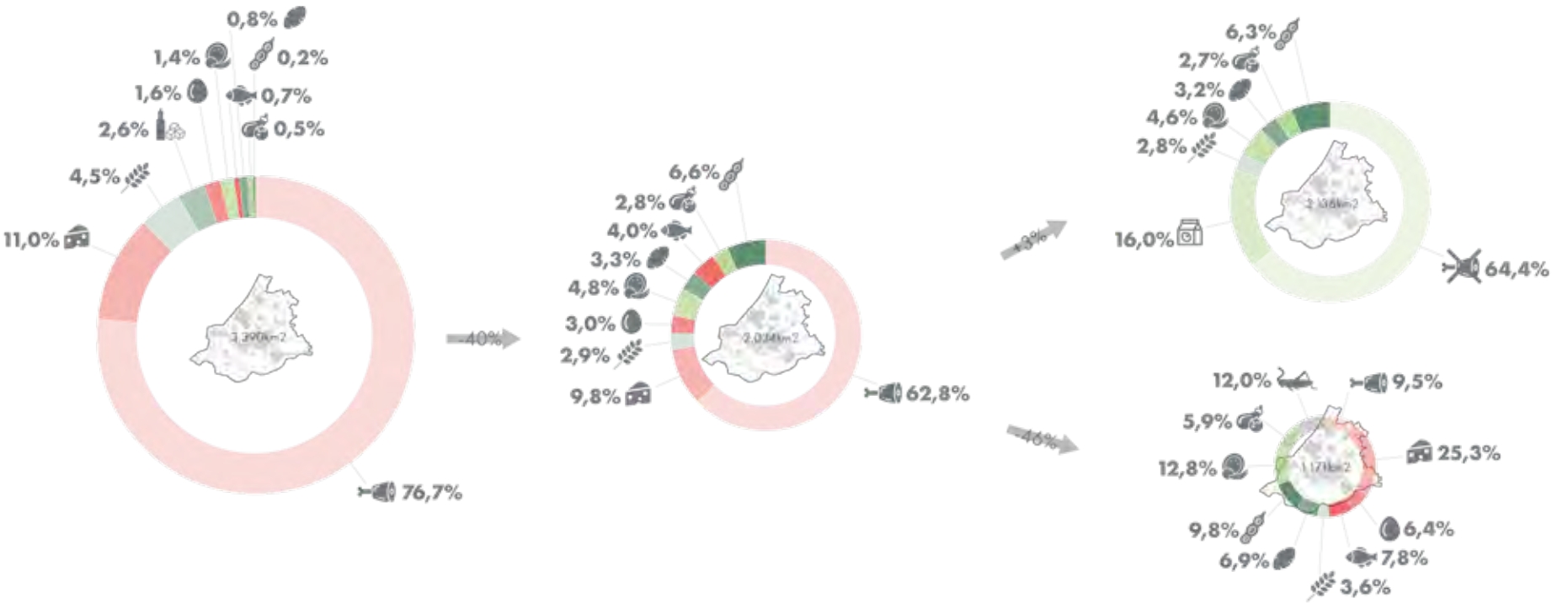


Fig 52: Landuse for the production of livestock products (own picture)

influence on import and export

The Netherlands does not produce enough grains for consumption. Moreover the grain that is produced is not fit for human consumption and is used as fodder (LEI Wageningen UR, 2011). For the new diet Dutch people need to eat less grains and fodder needs to be produced locally as well, so production needs go up with local grains fit for human consumption.

The fish that is caught by Dutch boats are almost fully exported and exotic fish species are imported (LEI Wageningen UR, 2011). This is a value that needs to change when eating locally. Consumption however will go up in the new diet and production will need to keep up to have a high provision. Fish farming on land and in fresh water is a solution (Wiskerke & Verhoeven, 2018).

Dairy consumption will go down and production with it to make up for other increases in production considering the Netherlands already has a high provision.
Imports are mainly due to other regional European cheeses like parmesan, goats cheese and feta (LEI Wageningen UR, 2011). Theoretically these could be produced within the Netherlands if the dairy production were to be diversified with sheep and goats.

The Netherlands is a world leader in vegetable yield with a very high provision, the production however is very much a monoculture with specializations focusing on tomatoes, bell peppers and cucumbers is the greenhouses (LEI Wageningen UR, 2009). again the keyword is diversification. Consumption will take away from the large export to lower import, but production needs to go up for certain greens that are not grown locally yet.

All Meat consumption and production will go down in the new diet to make room for crops, however calf meat is the exception and is barely consumed while it is a byproduct from the dairy industry (LEI Wageningen UR, 2011). Moreover beef can become a byproduct from milk production as well (RTL Nieuws, 2019). For meat in general there's a high import and export due to not all cuts being eaten in the Netherlands. This is once again a value that can change.

Fruits have a low provision rate due to the need for the import of exotic fruits. Local apples and pears can be consumed more instead or exotic species can be grown in greenhouses like avocado for example (Mulders, 2018).

Consumption of potatoes goes up as well, but there is so much provision that the production can make room for other crops.

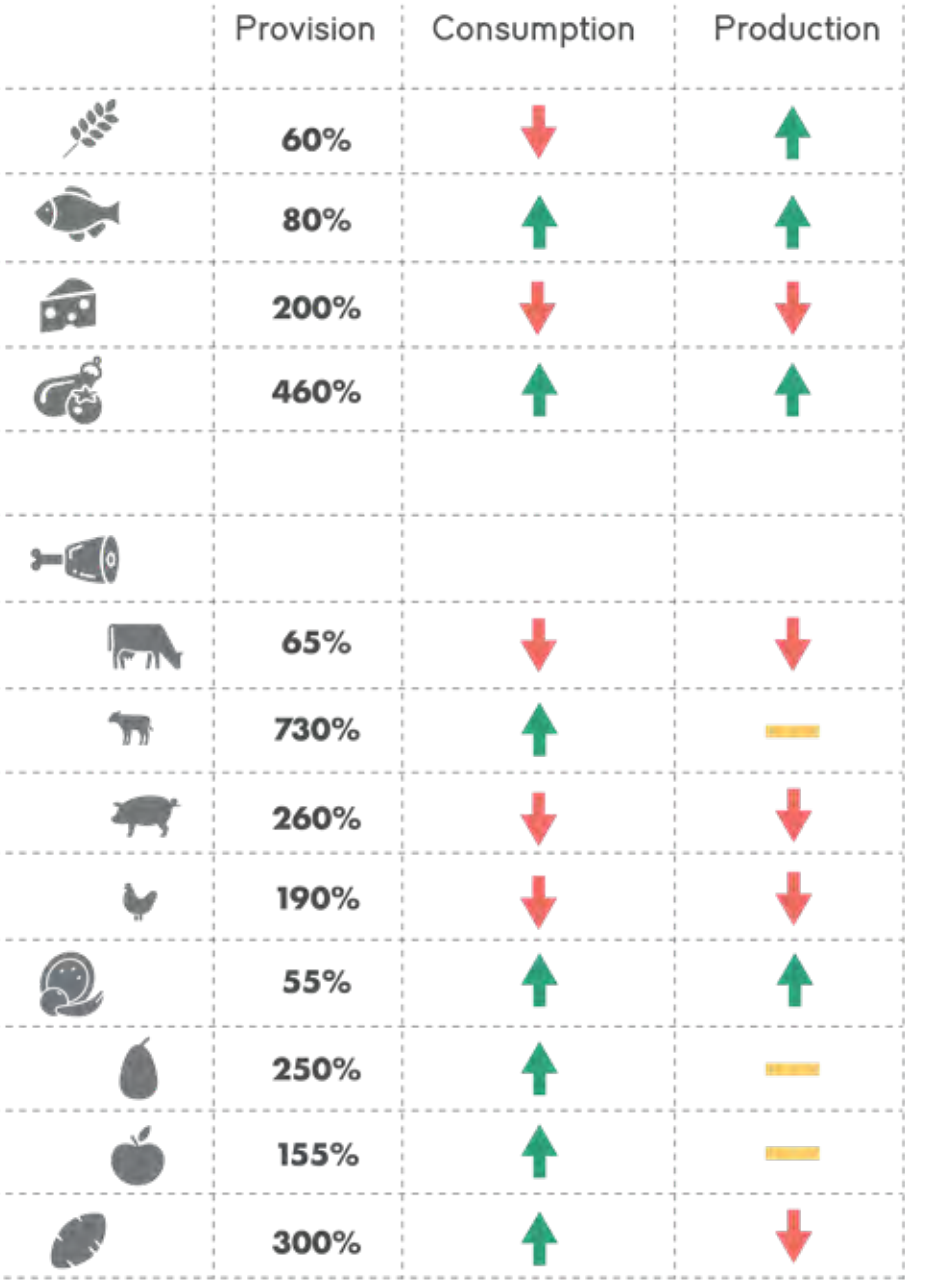
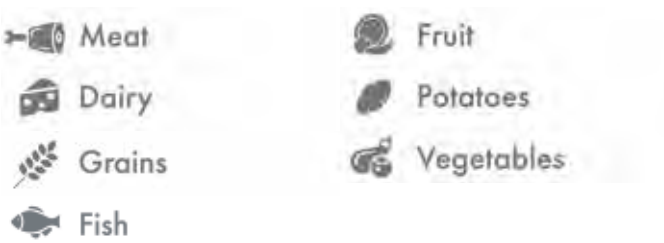


Fig 53: Provision rate of Dutch production with diet change in South-Holland (Adapted from LEI Wageningen UR, 2011)



surplus

Eating local food will however affect the export of the Netherlands greatly. When looking at the national perspective regions will have different strategies. South-Holland happens to have sufficient agricultural land to feed its population while other regions might have insufficient or an abundance to feed their inhabitants. Like the provision rate showed, the Netherlands overall can be completely self-sufficient with a few tweaks and still have a large export (RTL Nieuws, 2019). This surplus allows for export to other countries that might not have this luxury to increase spatial justice and fair allocation of resources. Products like tea, coffee or chocolate that cannot be produced in South-Holland can still be traded. This approaches the Lancet diet of a 20/80 division between import and local production (FutureFood Zuid-Holland, 2019). This diet is highly sustainable but won't have all the necessary nutrients perfectly (van Dooren, 2021), but the sustainable concept of locality can still be understood from it.

It must be said that a large part of import is immediately exported after processing (LEI Wageningen UR, 2011). South-Holland can also export with the new diet if the meat consumption is completely replaced by insects that take about a tenth of the space. Moreover there's a trend of multifunctionality in farming or greenhouses with fish or urban farming (van der Heijden, 2008). The Netherlands can also be expected to keep innovating in agricultural efficiency to deliver even higher yields (Viviano, 2017). Altogether the export of South-Holland will go down, but definitely not disappear.

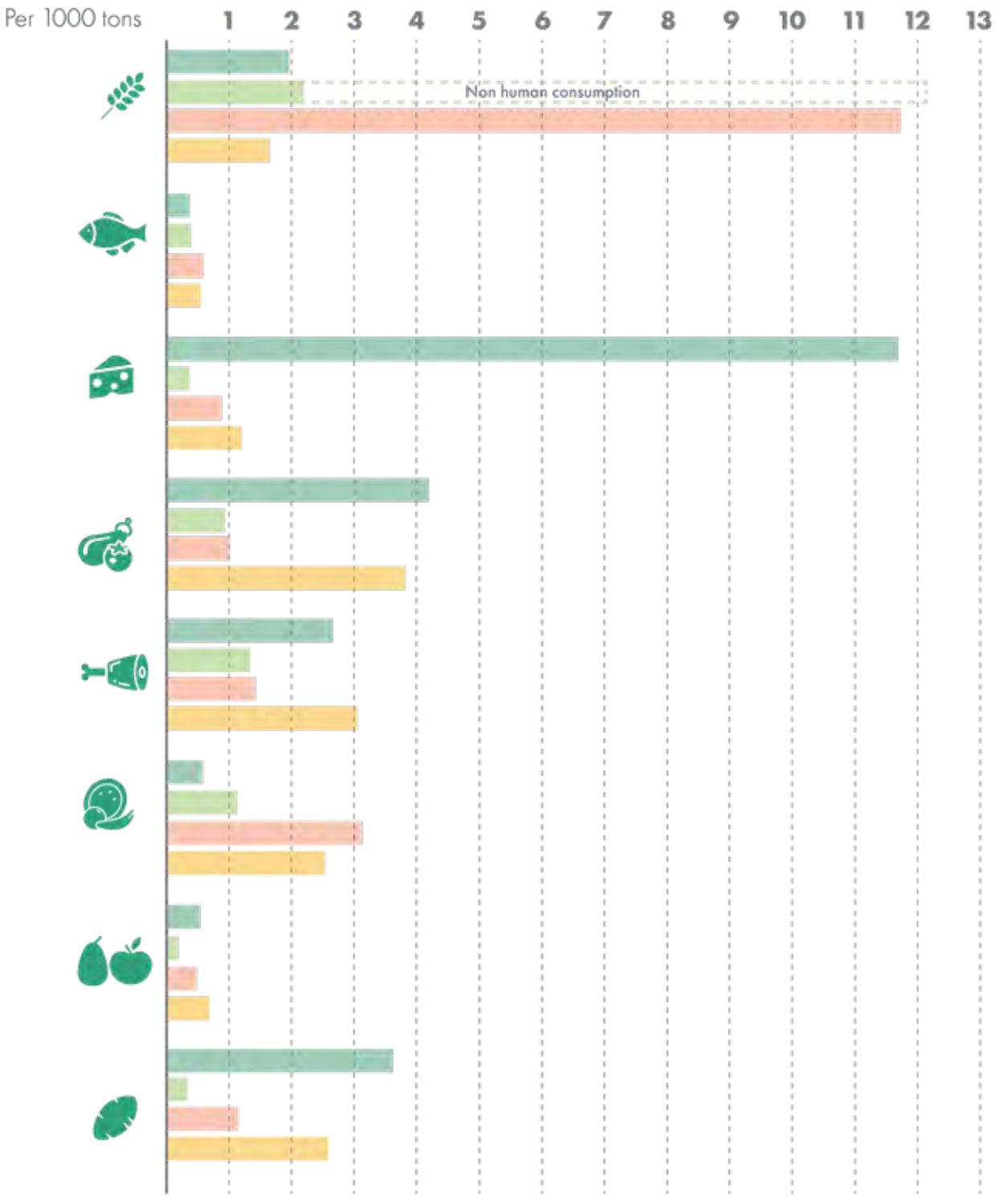
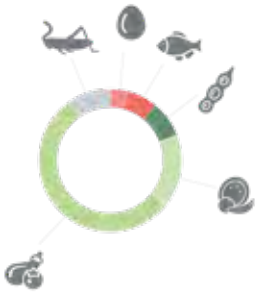
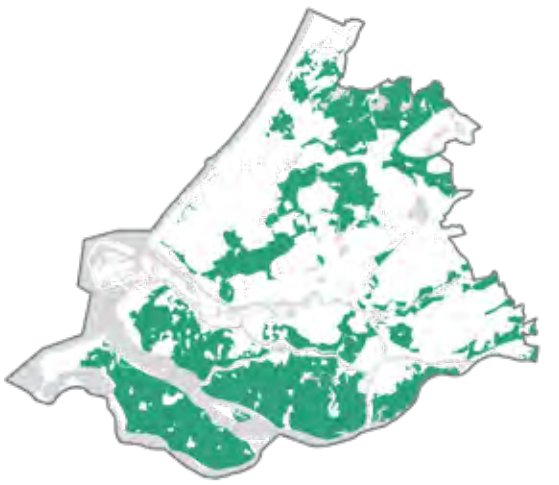


Fig 54: Production, consumption, import and export of food in the Netherlands (Adapted from LEI Wageningen UR, 2011)

Greenhouses (6%)



Clay (66%)



Peat (29%)

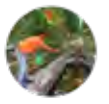
Multifunctional greenhouses

Green beans

Avocado
Vanilla
Papaya
Grapes

Broad beans
Green beans

Multistorey production



Strip cultivation

Kidneybeans

Oats
Barley
Rye

Potatoes & tubers

Agroforestry

Free range eggs

Free range chicken

Free range pork

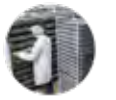
Walnuts & Hazelnuts

Goat milk farming

Sheep milk farming

Pastures

Insect farming (indoors)



Meat farming

Milk farming

Beef byproduct

Calf byproduct

Cattail (fodder)

Aquaculture

Leafy greens

Wild rice

Duckweed (fodder)

Cranberry

Fish farming

Clay
Peat
Greenhouses

new landscape

If all most crops were to be grown locally and by new sustainable cultivation methods for the soil types, the landscape will also change drastically. An overview is given of the possible new crops that could diversify local production to minimize import (figure 55).

Greenhouses can become more multifunctional and multistorey with waste products being fed to fish or insects (van der Heijden, 2008). Tests have also been successful with tropical crops like avocado, papaya and vanilla that are now imported from all over the world (van Noort, 2018). Crops like grapes were also cultivated in the greenhouses before the specialization to tomatoes (Velden, 2010).

Another example is that nut production can take place with free range chickens in agroforestry. Most hazelnuts come from Turkey but can actually thrive here as well and give more biodiversity (Ministerie van Landbouw, Natuurbeheer en Voedselkwaliteit, 2020). This means adding trees to what are currently pastures or croplands in clay soil.

Strip cultivation can solve the grain deficiency with high quality rye, oats and barley instead of the wheat that is grown for fodder right now (RTL Nieuws, 2019). This won't change the overall look of the croplands in clay soil, but will change areas that are now used for pastures.

The peat pastures can experience more biodiversity by growing endemic species like cattail and duckweed for fodder on site. (NOS, 2016)

Rice and cranberries can grow in wet peat soil to diversify the dairy production with grains and fruit. Moreover floating aquaculture with leafy greens like lettuce in combination with fish can create a stable crop yield in the area, while also combating subsidence and increasing biodiversity (Wiskerke & Verhoeven, 2018). The peat areas will have the option to become more aquatic to battle the subsidence that comes with lowering the water level. The areas can look more natural with endemic reed, but also advanced with floating structures and even red seas of cranberries.

These crops can create a new local balance so all inhabitants can acquire all food types readily and are divided efficiently and fairly over the landscape. Visually the cultural landscape will change to a new image for the Netherlands.

Fig 55: Left: Proposal new production according to soil conditions

health and willingness

Diet has already made a journey throughout the recent decades. Within 50 years people have started consuming 252% more meat and 350% more cheese, while less potatoes and vegetables were consumed (Statistics Netherlands, 2012). This has however resulted in a less healthy diet that leads to more cases of obesity and other diet related diseases.

Between 2001 and 2011 obesity among the Dutch population doubled. Moreover barely anybody meets the recommended amount of vegetables per day. With only 2% of young adults coming close to meeting the guideline (Statistics Netherlands, 2012). Less specialist shops have been replaced by supermarkets for convenience and in return has given rise to disconnected choices (Statistics Netherlands, 2012).

Creating a favourable food environment allows people to choose a better diet and in turn creates better quality of life. Healthy diets are for example part of the cancer prevention program in the EU (European Commission, 2021). The current food environment doesn't ensure that the healthiest option is the easiest one. Dutch citizens need to be educated about the healthy diet in school, but also constantly be confronted with clear information, unified certifications and visible nutrition information in order to make better decisions in supermarkets. People increasingly want to learn where their food comes from and crave less processed and local food. Regions need to set criteria for food in supermarkets, schools, hospitals and other public institutions (European Commission, 2021). Tax incentives can help this process to make a healthy diet affordable for everyone and also prevent environmental externalities. The government can take more catalyzing action to get large companies to change their supply and educate consumers about their choices. Large businesses can convince consumers of their sustainable products (WUR, 2009). The routine behaviour of consumers needs to be broken, but people still need to feel that they are the ones making the choice, the perfect diet should not be forced upon them. Moreover not everyone can have the same diet due to dietary restrictions, so there still needs to be room for alternative products.

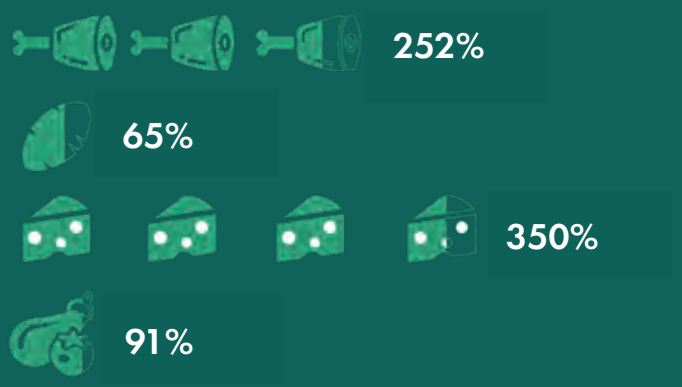


Fig 56: Diet change in the Netherlands from 1950-2000 (CBS, 2012)

SWOT
getting to know South-Holland

The SWOT-analysis is based on our anaylsis from the previous pages. SWOT stands for Strengths, Weaknesses, Opportunities and Threats. The opportunities and threats concern developments, events and influences in the circular economy that the province of South Holland has to deal with. The SWOT analysis is made to get a good overwiew of the current problems and the possible solutions that can be implemented in the future. As can be seen in the SWOT analysis there are a lot of weaknessess and treats, however there are also a lot of strenghts and opportunities which is give many ideas for the vision. The solutions are elaborated in more detail in the vision which will be explained in the next chapter.

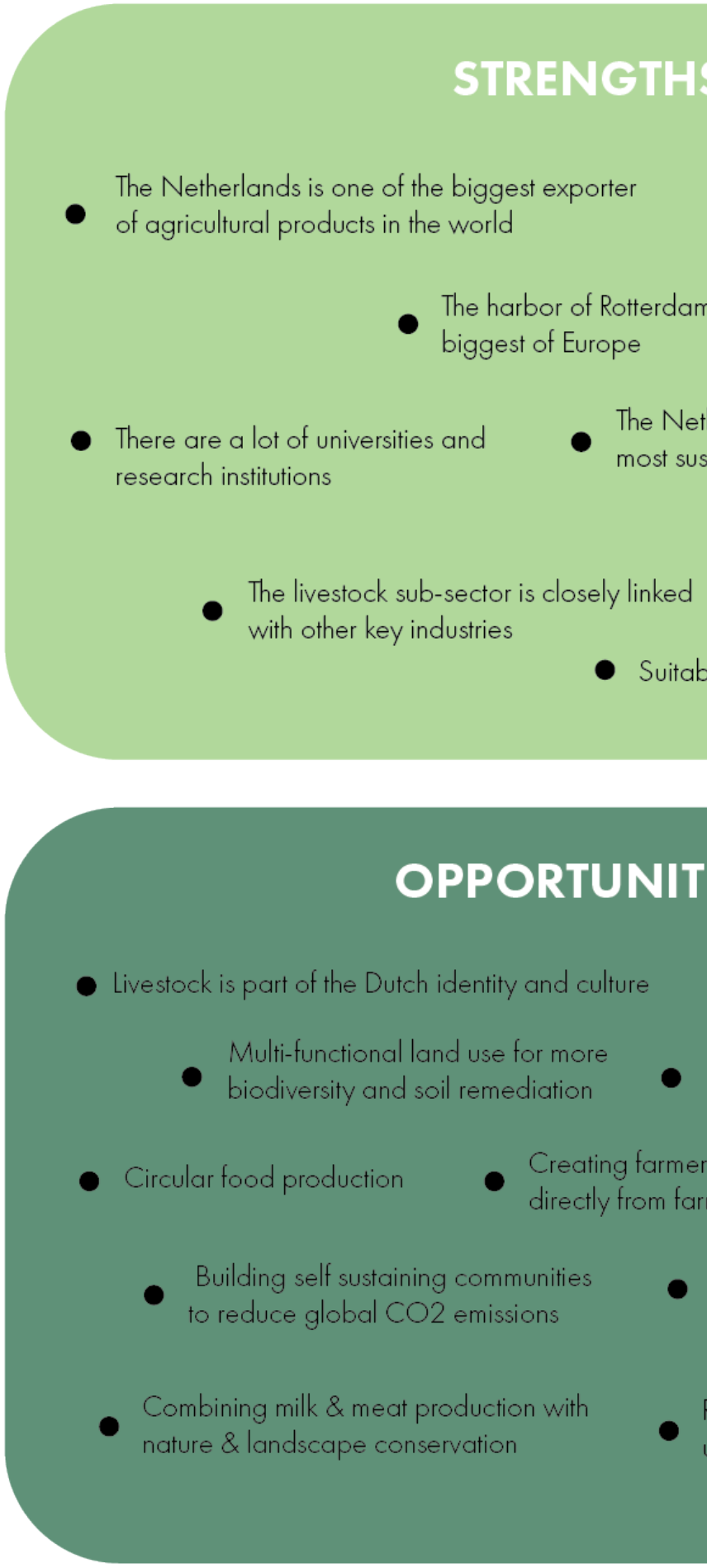


Fig 57: SWOT analysis

S

- Farmers are trying to become more sustainable

n is the

herlands is already one the
tainable producers of food

le soil conditions for production

WEAKNESSES

- There isn't enough education about the origins of or food
- Segregation between producers and consumers
- Agriculture is only 1,4% of our economy
- Investment power is weak so farmers struggle when the product prices stay low
- A lot of injustice is being felt throughout the agri-food system
- Farmers are angry and feeling misunderstood
- Low investment power for new innovations
- Consumers are not always willing or able to pay a higher price for sustainable food

IES

- Making consumers aware of sustainable food choices

Strong local economies

markets to sell food
mer to consumer

Clearly defined environmental
boundaries

Reusing waste for animal feed and
using their manure as fertilizer

THREATS

- The high production for export is so demanding in resources that the whole system is unbalanced
- Biodiversity is declining
- The livestock sector is a big polluter
- The quality of soil and air is decreasing
- Urbanised areas keep expanding
- Livestock farming takes up approximately a quarter of the province's surface
- Most people do not have a varied diet
- The Average person in south Holland consumes a lot more farmland than is available

LIV/FE TRANSITION

the vision for change described

in this chapter

Vision statement and goals

Transition rings

Points of transition

Liv/fe Transition (vision map)

Liv/fe Transition
vision

by 2050, South Holland could transform into a transition based landscape with value exchange at its core, integrating three of its most dominant spatial features -urbanism, agriculture and technology, weaving them into an innovative and complex mesh of mixed experiences, functions and interactions.

The proposed strategy of change for the region, would see South Holland's agriculture apparatus shift away from being an export based business, lowering and limiting production to local needs, while changing the attitude of farming by connecting the countryside with urban populations, reshaping it as a spatial part of everyday life, freely accessible to all of the region's citizens, while also better connecting both urban and countryside with the area's infrastructural dimension. These three disparate entities would now co exist in a close and integral way, replacing mutual interference and competition with cooperation and benefit to each other.

Such a change has the potential to not only bring back practical circularity to the region of South Holland, but also may serve to reconnect its people to its agriculture, one of the Netherlands most prominent cultural elements, while also serving as a marker of change that could be replicated in concept and technique throughout the rest of the Netherlands and perhaps even internationally.

Vision specific goals

The project's primary goal is essentially to eliminate the negative effects of the food production chain in a way that would also add new spatial qualities to the region of South Holland.
As the system currently stands, deficiencies occur all along the chain, affecting all parties involved, be it producers suffering from an unfavorable economy, consumer's health being damaged by over-exposure to meat and dairy, and animals - both livestock and wild, are dealing with a constantly declining environment and poor living conditions.

Due to the livestock sub sector integral participation in many important industries and aspects of life in the netherlands, that cannot simply

be replaced, the systems already in place have to be reimagined rather than just flatly substituted or removed.

If the previous chapters demonstrated an understanding as to what are the specific elements within food production that need to be repaired or improved, and the following chapters will delve into the nature of the proposed solutions, then the vision's role is to be the nexus point where problem transforms into solution, and change finds its certain shape in accordance to whatever value judgment and priorities are deemed good and correct for the situation.

ast

present

future

Energy Producer

Landscape Preserver

Culture Defender

Waste Processor/Fertilizer Producer

Added Value for livestock farming

Fig 58: Proposal of the vision with vision specific goals

Transition rings
vision

In this chapter South-Holland will be decomposed to expose the focus areas of the vision.

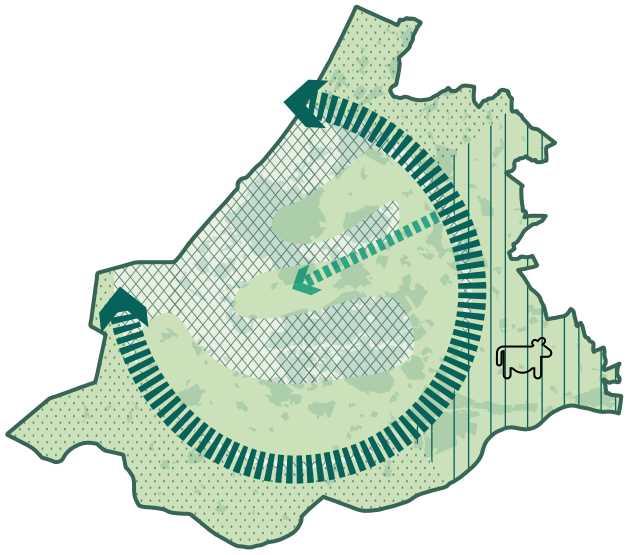
The transition rings
The basis of the project's vision is in re-examining the practical realities of the livestock sub sector, converting spatial features and systemic interactions into the abstract core values (or rather reasons) that determined the industry's shape, and through that new lense arriving at an informed approach for a solution.
In order to do that, the whole chain of livestock production was broken down to its components and then defined by each element's role within three essential systems that, broadly speaking, would define any production chain - producer, supplier and consumer.

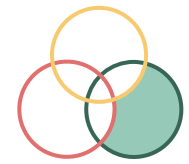
Diet
The livestock food production system's extensive use of space and its effects on the environment are a byproduct of the consumption habits of its products by the target populations, both domestic and internationally due to export. Limiting export while changing local consumption habits would dramatically affect the amount of land used for agriculture and its uses.

Awareness
The urban space, containing millions of livestock consumers in vast dense cities are disconnected from most of the province's space and are unaware of its ongoings and its effects over everybody's world. Drawing them out into the countryside with diverse attractions would raise great awareness to the different aspects and realities of the agriculture system while adding a valuable new dimension to the South Holland space, accessible to all.

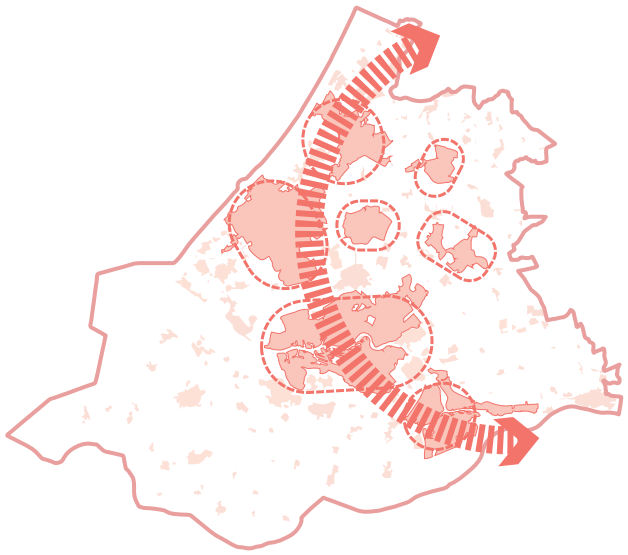
Technical
The infrastructural and technological dimensions are arteries, veins and brain of the dutch food production apparatus, often forgotten, but critical overall to the functioning of society at large. Drawing closer connections to the agriculture sector, such as the use of bio fuels in energy production, or harnessing greenhouses byproducts in CO^2 production would greatly contribute to a more circular system.

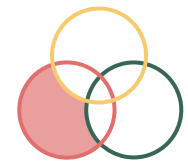
Reattaching these value systems at its points of overlap, once translated back into its spatial manifestations, also reveals the locations correct for change, and what nature that change would have at every point.



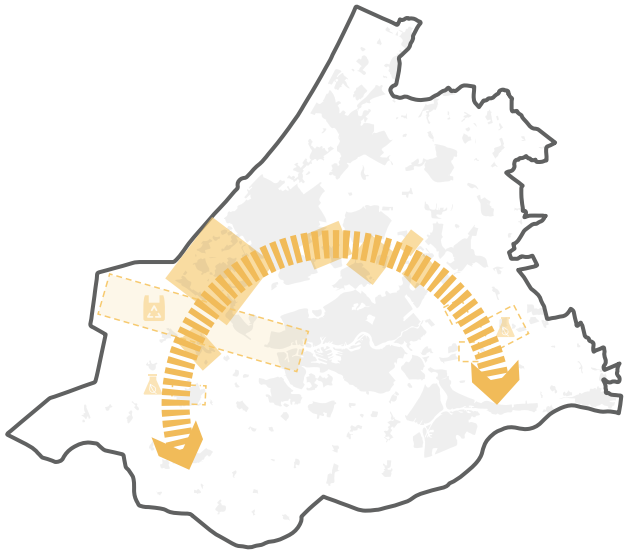


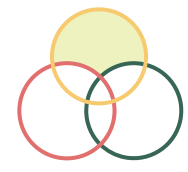
Environmental





Social

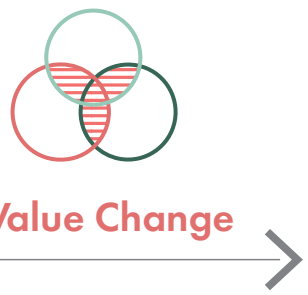




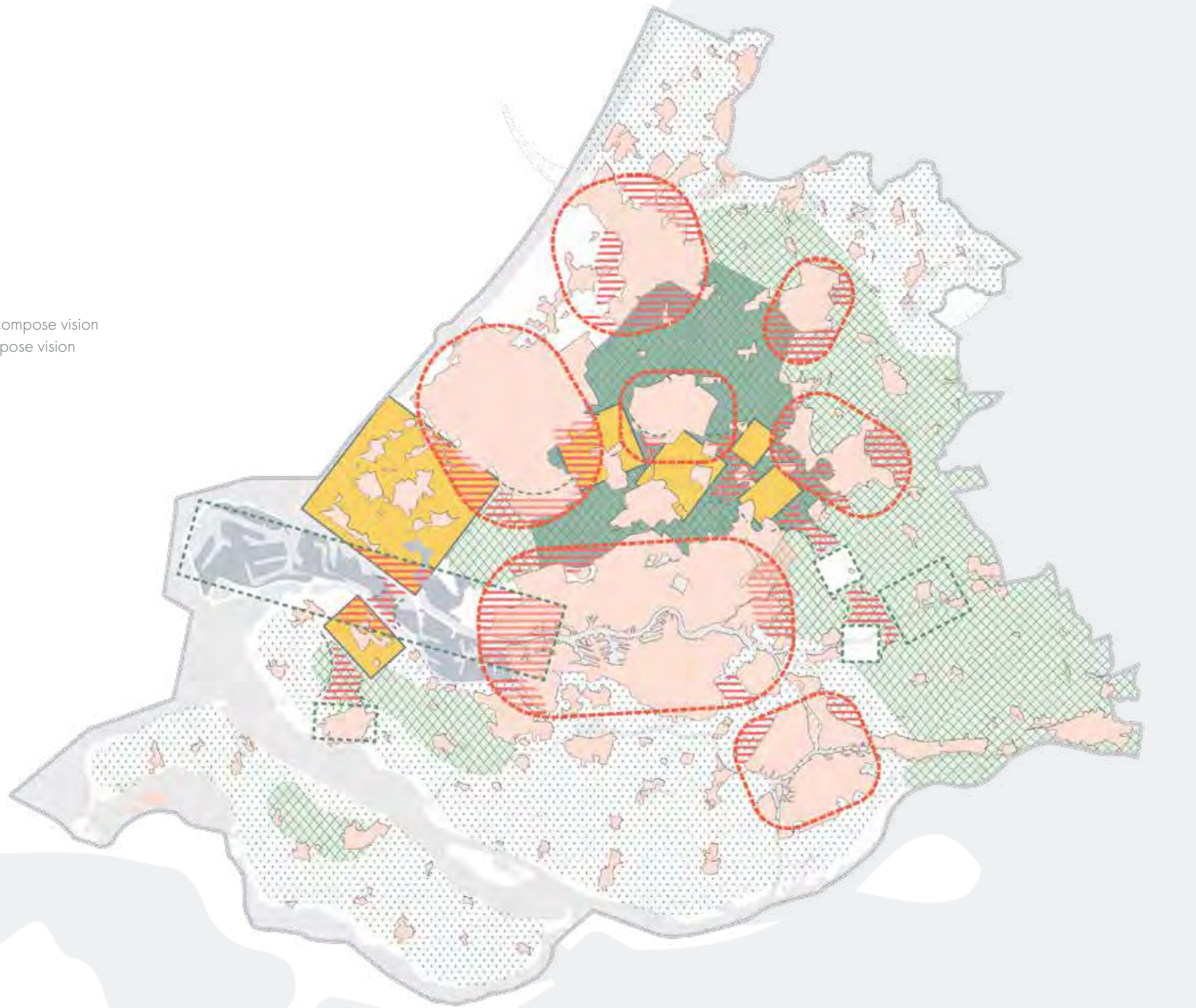
Economic

0 7.5 15 22.5 30 km

Fig 59: left: decompose vision
right: expose vision



Value Change



Transition Zones
Transition Park

Diet Transition Ring
Livestock Farming
Fields

AttitudeTransition Ring
Main Cities
Urbanized Areas

Energy Transition Ring
Horticulture
Harbor

Points of transition

vision

The points of overlap are the crux of the project, the places where two ingredients are mixed, creating a new compound that retains the practical functions of each system while also creating value change by their connection, influencing both the local to the points of interaction, while forming an array that affects the whole region of South Holland.

The significance of these overlaps is in the soft transitions they enable between what was once inaccessible and disparate territories. By unifying them into singular spaces, they become the domain of all, allowing spatial ownership and participation for anybody and everybody.

The transitions points are generators of programmatic change, and this is where the actual value changes occur, in incorporating a public park into what was once a fenced off field, or in turning a technical distribution center into a farmers market. Dozens of such changes in close proximity, equally belonging to either system that inspired it, while creating a third new entity. Done this way, they make participation by all parties active in all the elements in space. City dwellers would have an emotional attachment to livestock growing if part of their free time is spent within a "cattle park", while technical institutions have a closer relationship with livestock production if it is fueled by its by-products, generated in close proximity.

Fig 60: section connecting different landscapes

Fig 61: synergy between the transitions

CITY

Transition

Multifunctional agriculture

Connections within the port

The Rotterdam port is by far one of the most meaningful technical instillations in the world, a gygantic maritime hub that is a conduit between the whole of western europe and the atlantic ocean. Large parts of it are currently dedicated to the oil industry and its byproducts. Part of the project's vision is the assumption that in the future oil would lose its prominence, and with it, its role within the port. And so, the port is envisioned as a space that could readilly incorporate new technological functions that would correspond with both the city and the nearby Westland region with its greenhouses.

Fig 62: the renewed port

Connections within the urban setting

Urban spaces could incorporate more agricultural functions from the hinterlands both in terms of distribution of products (for example - farmers markets or milk delivery), but more meaningfully could allow crop growing into the city, with agricultural community gardens and parks or rooftop greenhouses.
However, it could also further participate in the technical-technological aspect of the system, with universities and research centers taking a more active part withing the system.

Fig 63: the renewed urban setting

Connections within the rural areas

The Agriculture spaces could incorporate into their space a great many functions from both the urban and technical realms, also due to the vast space it holds. Fields and orchards can become agricultural parks, Farmsteads locations of agritourism, centers of research and education could arise. The space and overall proximity to meaningful urban centers could also enable the incorporation of residentials spaces that would co-exist with the agricultural environment.

Fig 64: the renewed rural areas

Liv/fe Transition
vision

The vision map is a culmination of the ideas and approaches defined up to this point.

Foremost, it is where an exact definition of the transition points is made, their character and possible functions, and their interactions with the spaces it attaches. At these transition points exchanges take place: the exchange of agriculture and urbanity, the exchange of urbanity and technical innovation and the exchange of agriculture and technical innovation. These exchanges are closely linked to the three transitions of diet, attitude and technical matters. This is where consumers and producers are linked through the use of interventions. The three transitions start with the activators in the cores of urbanity, technical zones and rural areas. The activators lead to creators of different sectors that come together at places of exchange. These places are where value change truly happens

In addition, extra effort and attention were given to adding to the vision several new notions, that although do not dominate the project's thinking, would give it additional spatial dimensions:

- Defining an intensive center as an agricultural park landscape between the major urban centers that would serve to connect them, creating an intensive core and a more open outskirts for the province.

- Thinking of connection points that are external to the province, whether in neighboring provinces or in the port connection to the ocean. Even though local production is a key value, thinking through all the scales is inevitable and sometimes makes the systems more efficient.

All together, a cohesive and clear vision for the space took shape, with a straightforward approach as to how to exact change both locally at each point and also within the larger context of the province.

Fig 65: vision map for Liv/fe Transtion

HOW DO WE TRANSITION?

Liv/fe Transition strategy

in this chapter

Phases and goals
Stakeholder engagement
Timline of Liv/fe Transition
Typology of interventions
Strategic projects

Phases and goals

strategy

The vision that was explained in the previous chapter is not something that can be achieved overnight. A general phasing timeline for Liv/fe Transition has been set up to show how the transition zones as described in the vision could come into being.

Fig 66: Principles and guidelines that shape Liv/fe Transition

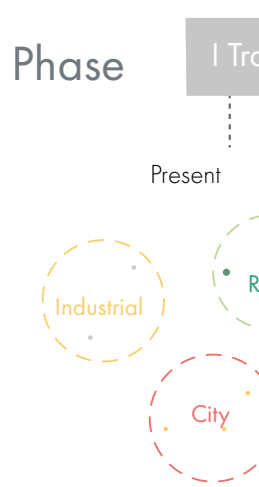


Fig 67: Phasing of Liv/fe Transition, related to spatial change

Current Situation:
Monofunctional
and segregation

Ideally, the segregation between different territories will gradually be removed by fostering new circular clusters both within and between different territories. These new clusters not only allows different functions to cooperate in a circular way, but also will be equipped with public functions to build a bridge between consumers and producers. Hence, the 'transition zone' not only offer a new landscape between city and rural area, but also have a social-economical meaning behind it.

However, the complexity behind the idea of 'Transition Zone' also brings more challenges. In order to make it happens, there are not only various trans-scale spatial interventions to consider, in each 'Transition Ring', but also non spatial interventions (see figure 66).

Meanwhile, this process also requires negotiation and cooperations between different stakeholders, which will be further explored in chapter 4.2.

Principles and guidelines

PRINCIPLES

GUIDELINES

Attitude Transition

Diet Transition

Technical Transition

Spatial

FUNCTIONAL EXPANSION

DENSIFY WIT

New housing with access to facilities

In spite of the increasing housing demands in South Holland, the monofunctional city sprawling should be avoided. In stead, new residential area will be equipped with facilities,especially with access to fresh local foods or urban farming functions to create the attachment to food.

Open of the Logi

In order to shorten the e chain and meanwhile c the suburban neighbour logistic zones in city per densified with functions public spaces and hous to bring more awarenes and producers.

Hybrid Soil type, Hybrid Functions

The soil type differs a lot across south holland province. In addition to adopting different farming mode accroding to different soil condition,other functions such as agriculture research centres could be considered where different soil types meet, in order to support the innovation of cultivation methods.

Multifunctional Far

In both open field and certain extents of multifu be considered to use th Meanwhile, methods su livestock farming with a and greenhouses, will c ity within food producti

Biobased Innovation Clusters

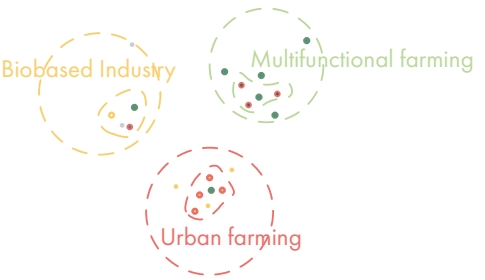
More biobased manufacture industries should be supported by both investment from government and knowledge from reserach institutions. In order to accelerate this transition, business incubator, innovation hub and sharing workshop should be consider in existing industrial zone to appeal to more small and medium-sized companies and foster the agglomerations.

Greenhouse ought

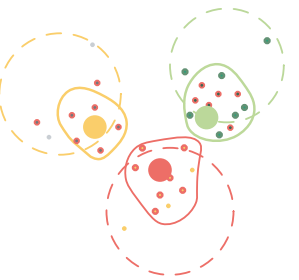
To address the problem consumption in greenho current greenhouses sho industrial functions and treatment facilites. In this dioxide, residual energy tion and waste treatmen be reused in greenhous

ansition Testing and Preparation | II Demonstration and Growth | III Merging and Synergy | New Value

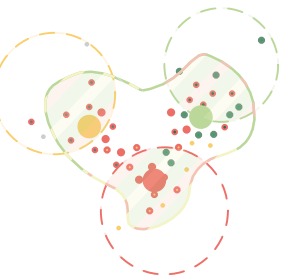
2025 | 2030 | 2040 | 2050



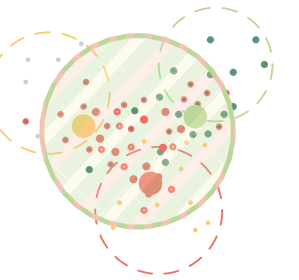
Preparation:
Foster New Hybrid
Function Agglomeration



Demonstration:
Core Area with
Public Functions

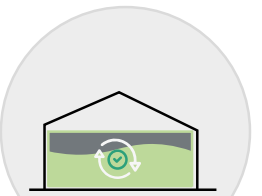


Growth:
Multifunctional Territory
between different sectors



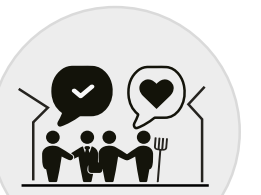
Transition Zone:
Dynamic and Heterogeneous
Territory to remove the boundary

TH FUNCTION



UPDATE

CHAIN IMPROVEMENT



MINDSET CHANGE

Non Spatial

stic Zone

existing food distribution
reate more facilities for
rhood, some of the current
riphery should be
as farmers markets with
sing programmes in order
ss between consumers

Visibility of Food Productions

Food Production Area or food processing zone will be more open to public, with agrotourism activities or education functions. With transparent facades of food processing buildings and food agrotourism district close to infrastructure,people can easily notice the production of food while walking or travelling.

Local food As Priority

More neighbourhoods can have more close relationship with farmers nearby, where residents could buy foods in farmers stands, order food directly from local farmers or hiring local farmers for neighbourhood co-farming.

Attitude Change through media

Both digital media and traditional media ought to shoulders their responsibility for advertising local foods, new farmers markets or reporting new food events. In this way, the ideas of attachment to food could reach more people.

ming

green houses area,
unctional farming should
e space more efficiently.
uch as combining
groforestry or fishing
also facilitate the circular-
on sectors.

Be Friends of animals and ecosystem

New cultivation methods should be adopted to reduce the negative environmental impacts and help protect the biodiversity. At the same time, the welfare of livestocks should be protected as much as possible by providing enough open air green spaces.

On-site consumption

Both greenhouses or open field area could encourage more on-site consumption by gastronomy activities, picnics, camping or other types of recreation, which allows the direct reuse of food waste to fodders or fertilizers.

Knowledge accessible to everyone

Universities or Institutions will promote more agriculture education programs to facilitate the transition. Meanwhile, there will be more knowledge popularization in agrifood sectors to help citizens understand food production and the impacts of their diet.

to be GREEN

s of intensive energy
ouses production, the
ould be combined with
be equipped with waste
s way, the carbon
y from industrial produc-
nt sectors could directly
ses.

Petrol Landscape into green production

With the old fossil-fuel industry gradually phasing out, the current large areas of petrol landscape along the port area will be either renovated with biobased production and innovation functions or remediated back into natural area.

Bring Waste Back to Value

Most of the waste from food production could upcycled in other sectors. By upcycling the manure of cows into biogas, plant based material into biofuel or other biobased raw materials, these links could contributes to the large-scale production of biobased new materials and clean energy.

Exporter of Biobased technology

Instead of being a food importer and exporter, south holland should transit its role into a biobased knowledge exporter in the future to reduce the unnecessary carbon emission of goods transportation. By seeking more global partners, more and more region in the world could also make their transition towards a green future.

Stakeholder engagement
strategy

Another aspect that's integral for the succes of Liv/fe Transition is the commitment of the stakeholders to the cause.Getting stakeholders to be engaged is one of the more difficult tasks in project development. In this chapter the opportunities and bottlenecks of stakeholder engagement will be addressed.

First, a stakeholder analysis was done in which the possible synergy and conflicts are shown. As the project concerns different sectors the analysis has been divided up into the three transition types we introduced in the vision chapter: the diet transition, the technical transition and the attitude transition. Each stakeholder ring brings different values to light.

Diet Transition

When it comes to the diet transition, the food production sector is fully activated and should be involved into the process. There is a lot of potential of inter-sectoral collaboration, but also the consumption sector could play a big role in both food consumption as experience consumption. Most important of all is that change in this sector really advances due to education and research and could spread their message through media.

Possible bottlenecks for transition in this sector could come from governance. In the interview with the famer it was indicated that quick changes in rules and policy actually could potentially harm the innovation of farms. In order for this project to be succesful the way governance is used should therefore be carefully considered. We do recognize that national politics are difficult to move, but we believe a continuous governance plan is essential for this project. Another possible bottleneck could come from the farmers and the food companies/milk coorporatives. Especially the milk coorporatives are powerfull in deciding what products are delivered to the consumers and therefore what should be produced. If they don't recognize the urgency of change this could be fatal for real progression.

Technical Transition

There is a lot of potential in synergy between the technical sector and farmers. This synergy could be supported and accelerated by the support of both practical knowledge and research knowledge.

Critical for this change is however the allignment of interests of governance and energy companies. Both are very big players and have a lot to win and lose by change in the sector. National politics are very much leading in what energy solution will be invested in and are very dynamic. If in national politics the energy solution is not deemed interesting, this could be fatal for the realisation of the technical transition.

Attitude Transition

Most of the attitude transition is related to consumption. The change in which citizens look at food and it's production is a product of the information that is perceived. This information partly comes from knowledge sources, such as universities, but also very important is the media.

The media influences the way people perceive the world and could therefore be both part of the synergy and the conflict. Incentives from government could be vital to the chance of success of change, as they can influence the big parttakers in the industry, such as supermarkets, but also food companies and milk coorporatives. These parttakers have a lot of influence over what is advertised towards the consumer.

Fig 68: Quotes from interviews
top: Urgenda about the role of milk coorporatives
bottom: farmer about regulations

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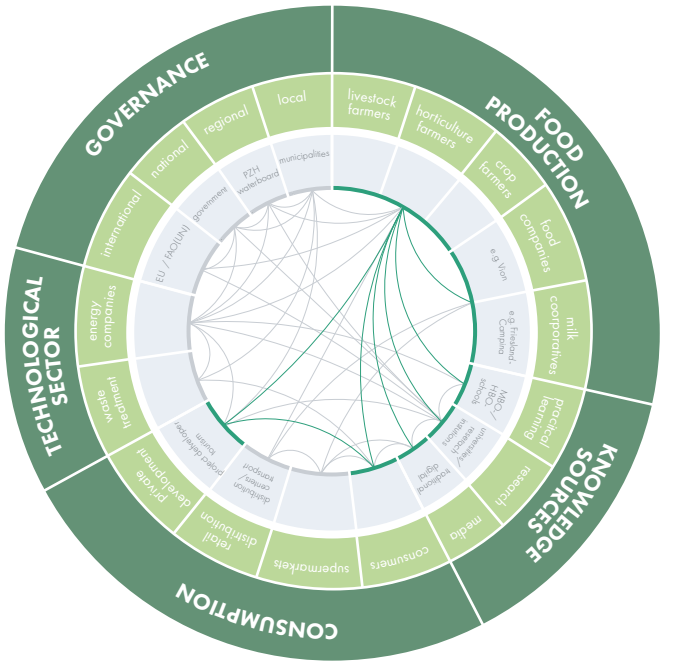
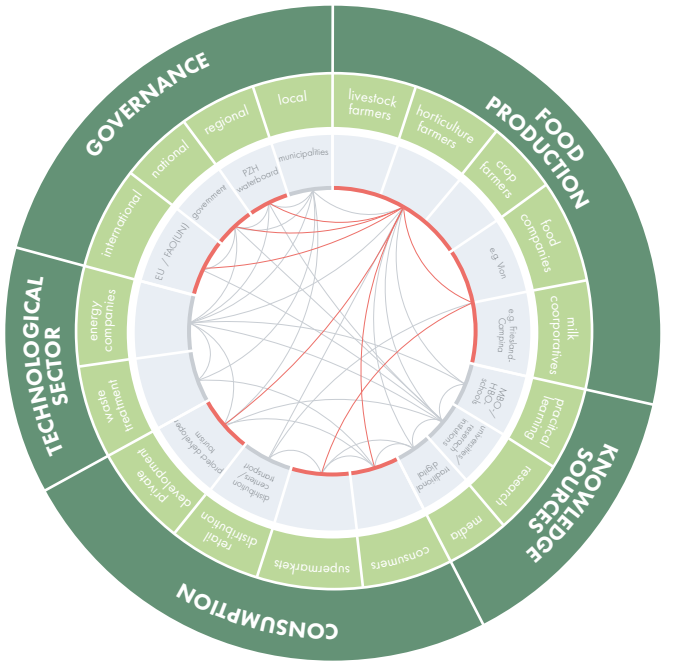
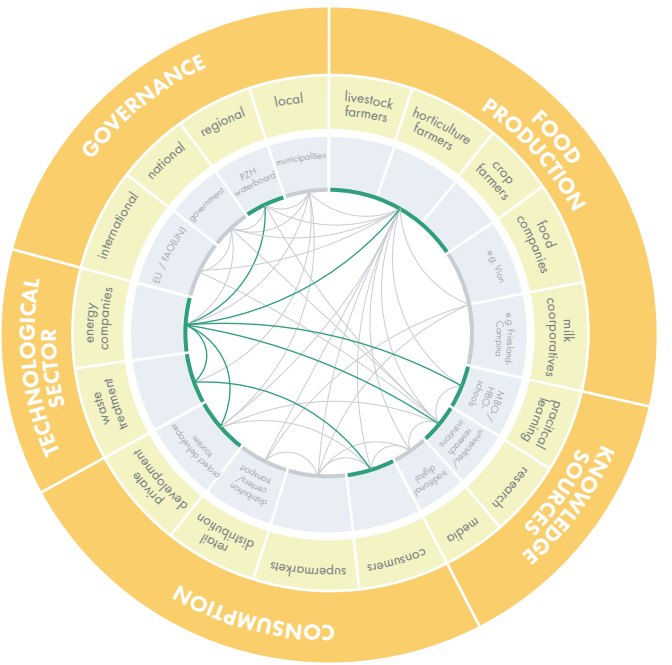
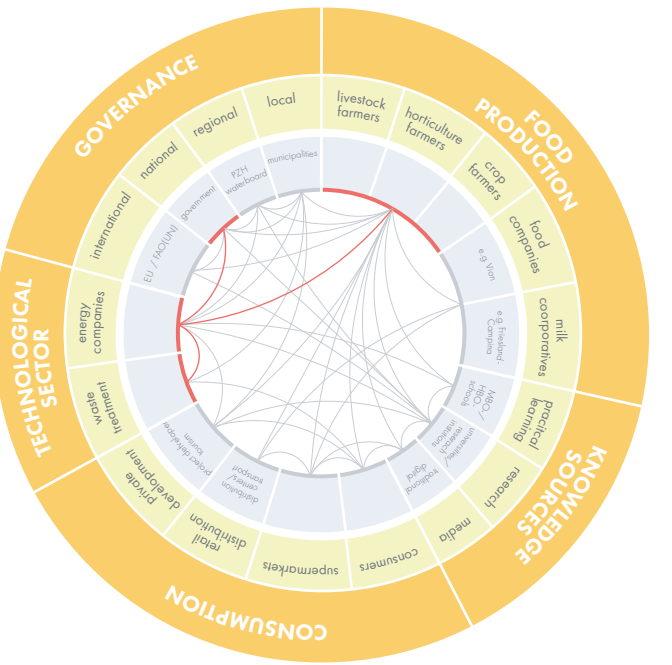
Diet Transition





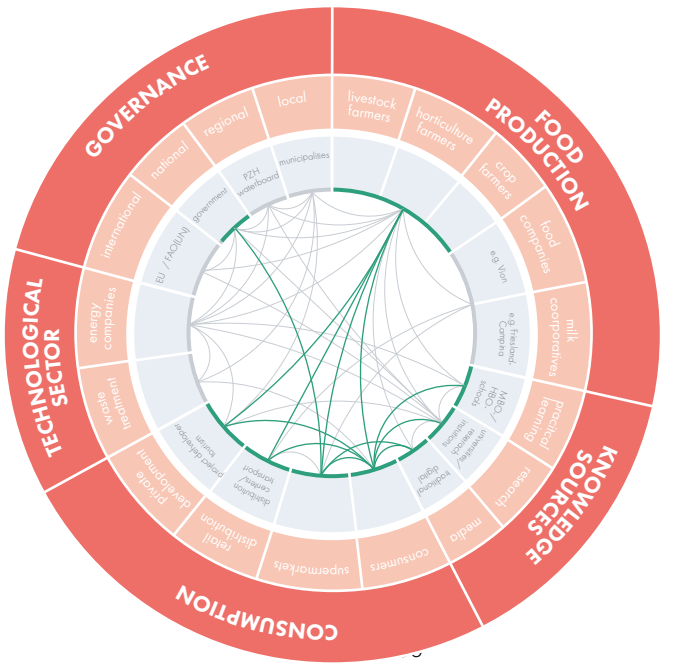
Technical Transition





conflict
synergy
neutral/inactive relation

Attitude Transition



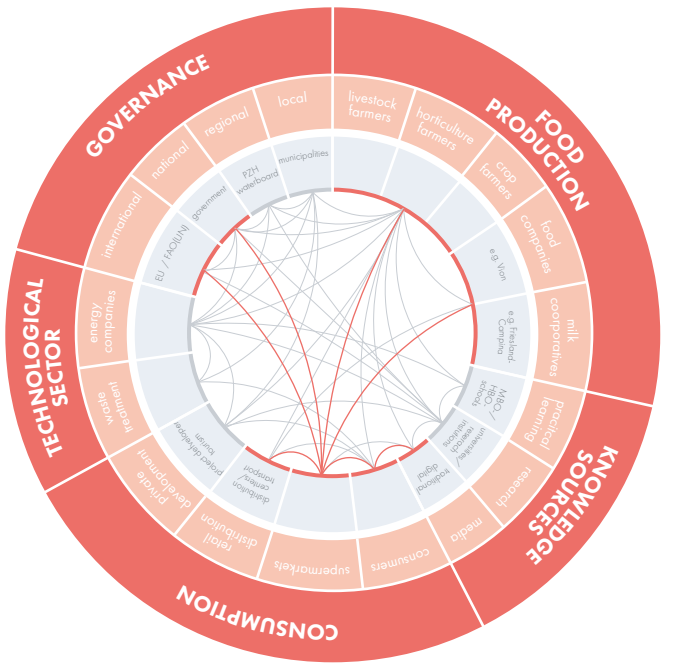


Fig 69: Synergy and conflicts between key stakeholders per type of transition.

Stakeholder engagement

strategy

As a model to show how value change can happen in relation to the stakeholders, we use Kotter's 8 steps for change.

Shortly summarised Kotter's 8 steps mean the following: the steps of creation to enlisting are to move existing culture from passive to active. The steps from enable to sustain are to bring about change. The last step institute is about making the new culture institutionalised culture. The 8 steps for change are not necessarily to be used as a chronological step by step plan to go about change. It can be considered a rough guideline on the things that need to be touched upon to make change sustainable and the steps can be revisited when it is considered necessary. On page 86 a scheme can be found in which Kotter's steps are related to this project. On these pages they will be explained according to the steps.

Create

The first step of creation (of awareness) is very critical and if this step fails, it is likely the other steps will not have enough support to be fulfilled. This requires high effort from knowledge sharers, such as the media and research bodies, as we know people's values and choices that are made based on that are formed by among others, knowledge.

Build and form

We want to make sure that no stakeholder is left behind, as also explained in the Green Deal (European Commission, 2019). According to Kotter, coalitions need to be formed to make sure everyone is heard. In these coalitions a range of skills come together to form a vision of change that everyone can get behind and that touches upon not only environmental, but also social and economic issues. In figure 72 we show the coalitions that we believe need to be formed for each transition. These are built upon the analysis done on the previous pages and the knowledge we obtained from the interviews. In all the coalitions knowledge is a leading factor. With knowledge obtained through research future choices can be made and accounted for. The government takes on different roles in the coalitions. The government should not be leading in the vision forming, but have a mostly facilitating role.

Enlist

An important next step is to communicate the vision to all the members of the coalition, governmental structures and other interested parties. This communication can be done by dialogue and collaboration, but also media plays an important role in conveying the vision. New typologies might also be introduced that help with conveying the message.

Enable, Generate and Sustain

In order for change to be actually made, obstacles have to be removed. These obstacles are mosty related to policies, rules and money. Sometimes the policies and rules that are in place actually hamper progression. When the vision is proposed, governmental structures should take a close look whether their policies and laws are obstacles.

The interviews showed that in the food production sector, but also in the consumption sector money plays a role, because of the investment power and the profit margins that need to be made (see figure 71). While subsidies are an option when thinking about removing obstacles concerning investment power, it makes companies and farmers very dependent on governmental structures. In the interview it is stated that: ''*The government should take more measures but in the end, you should run your own business.*''. Another study showed that farmers do need the subsidies, but also wish to be sovereign, that their choices for change are not dependent on debt or subsidies (LNV, 2019). A way to enable financially is to think of new income models that give more sovereignity to (farmer) entrepeneurs. A model that could be incorporated is the tourism model, which not only helps with brining in money, but also in creating transparancy (LNV, 2019). Another way to bring in revenue is to work with reward programs. An example is the CO2-capture reward program. A program that is already used for other sectors, but is quite new for the agricultural sector. The new revenue itself is a short-term win for the stakeholders and helps generating the change. Especially the reward programs are interesting as a short term win, as it not only brings in money, but also shows appreciation. A part of the project is that there needs to be a cut in the amount of farms. With the often missing successor in mind, farmers that want to retire can be bought out with the help of a compensation. For the change to be sustained, change needs to be continuously monitored, dialogue need to be kept going inside and outside of the coalitions, so goals can be keeping set.

Fig 70: Kotter's 8 steps for change

2.

3.

''It is especially important that you sustain your company, otherwise, you will not be able to make an impact.''

- FrieslandCampina

''We cannot keep up with all developments, because that is not feasible from a price point of view.''

- Farmer

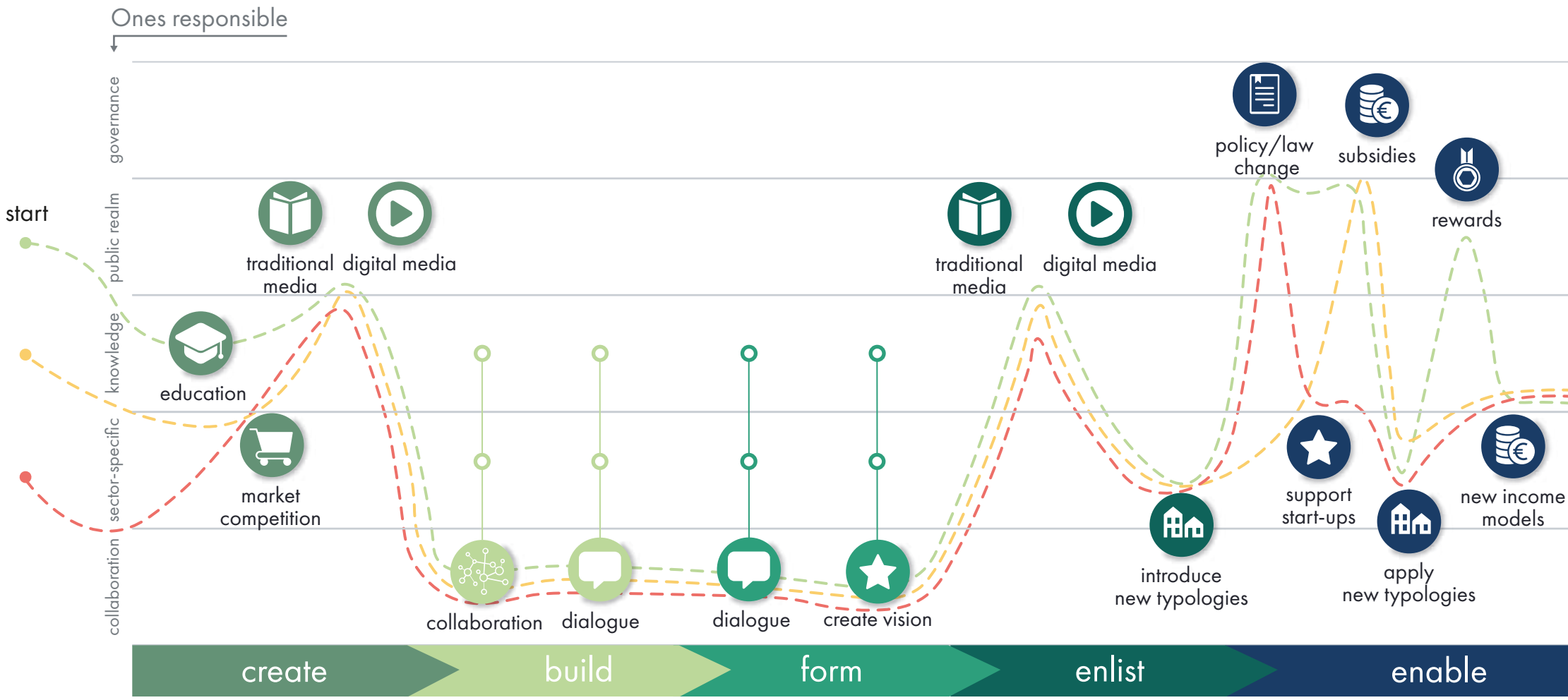
''I don't always buy organic food because, it is really hard to pay this expensive food for the whole family.''

- Consumer

1.

Fig 71: Quotes from interview FrieslandCampina, farmer and consumer

Fig 72: Coalititons formed to guide change.
1. Attitude Transition
2. Diet Transition
3. Technological Transition



DIET TRANSITION

farmers food companies milk coorporatives knowledge institutions universities HBO-/MBO-schools media	+ government as accommodator of the collaboration, not active part-taker - media * farmers in the form of representatives	+ media and advertising + EU + PZH + municipalities	+ tourism companies + energy companies + makers industry

TECHNOLOGICAL TRANSITION

energy companies waste treatment companies farmers port of Rotterdam knowledge institutions universities HBO-/MBO-schools media	+ government as accommodator of the collaboration, not active part-taker - media	+ media and advertising + EU + PZH + municipalities	+ tourism companies

ATTITUDE TRANSITION

supermarkets food distribution consumers knowledge institutions universities HBO-/MBO-schools media	+ government as accommodator of the collaboration, not active part-taker + farmers - media * consumers in the form of representatives	+ media and advertising + EU + PZH + municipalities	+ tourism companies + private developers

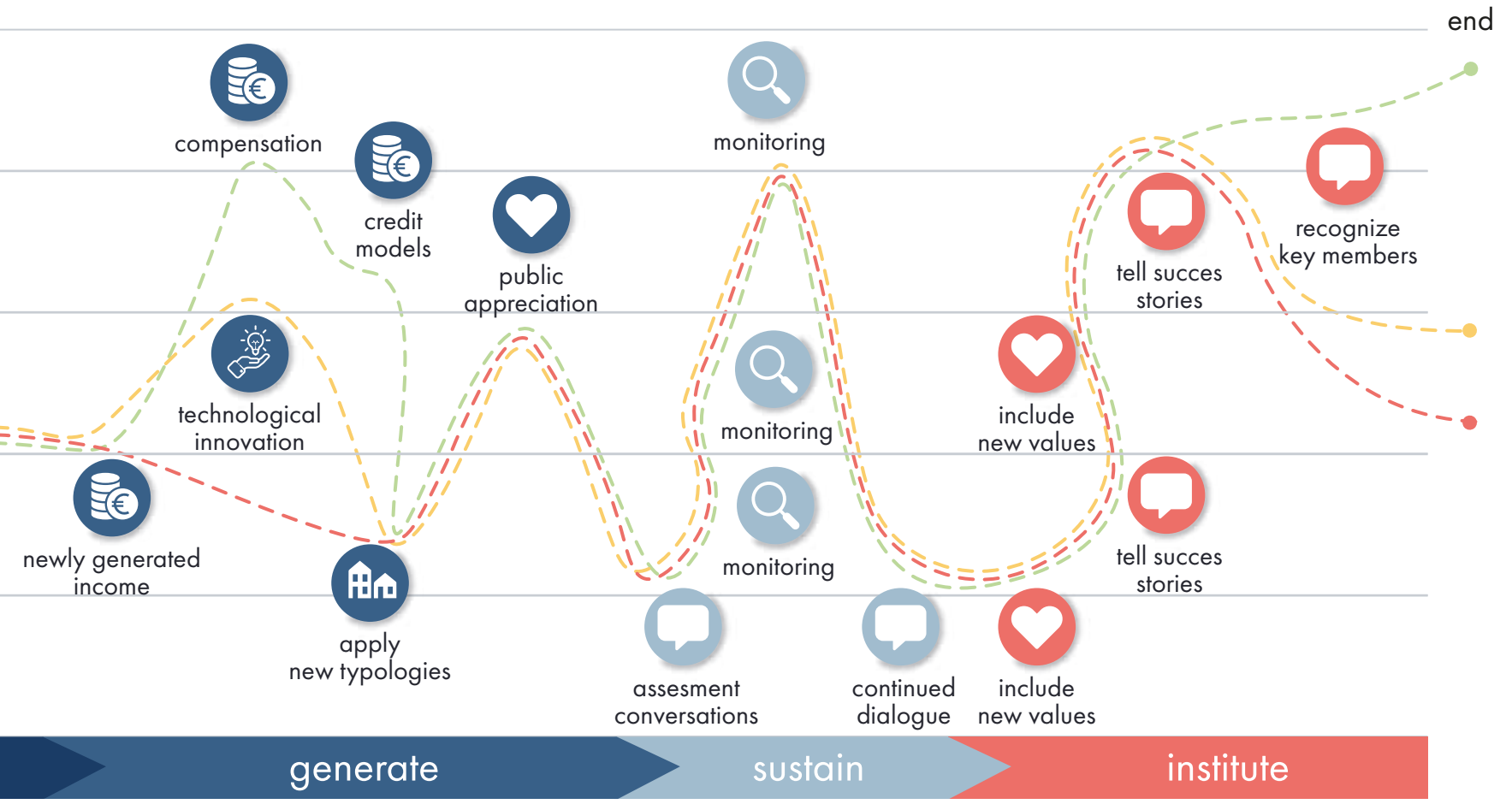


Fig 73: Stakeholder engagement process

Instute

The final step of this 8-step model is instute. This step is about anchorin changes in sector culture. This step is deeply based on the passing down of values onto a new generation by the use of succes stories and education and showing the current generation the wins of the change.

disclaimer: this is not a chronological timeline. It's a step guideline that can be affected by external forces, which could tamper with the chronological process. Therefore it should be considered that sometimes you have to go back in this model to achieve the change that is desired.

Steps relevant for change

- Diet Transition
- Technical Transition
- Attitude Transition

Typology of interventions

strategy

In order to achieve the change that is set out in the vision and the phasing, a series of new typologies are introduced with the use of interentions

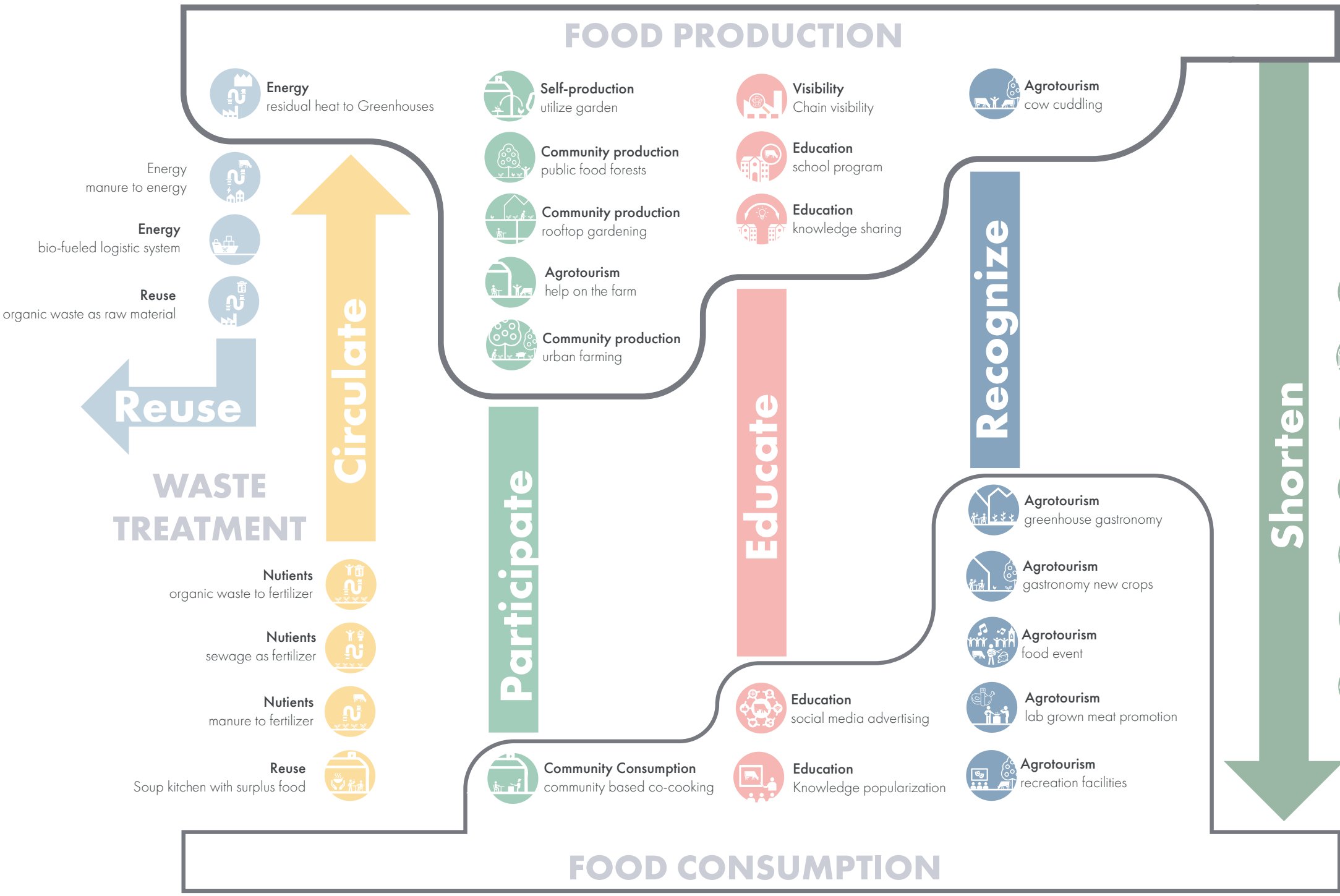


Fig 74: Interventions Liv/fe Transition

The goal of Liv/fe Transition is to link consumers and producers in new circular ways while also creating awareness for value change. In order to generate this transition to a circular future we compiled six categories of interventions from our research:

Reuse flows outside the food chain

Circulate flows within the food chain

Participate in the food chain

Educate about the food chain

Recognize the food chain

Shorten the food chain

These are the ways to link consumers and producers and ultimately create food awareness. The links create awareness in different stages of the chain and are composed of a plethora of interventions (figure 74).

Shortening the chain can happen through more direct sales where intermediaries are excluded (Darolt et al., 2016, p.7). This can happen outside the farm online via a website (Schilling, 2020), through farmers markets or on the farm by roadside sales self harvesting on the farmers plot. This will also break the private character of the countryside. The chain can also be shortened by collectives like community-supported agriculture in which the farmer basically works and produces for the people that support them financially or consumer cooperatives that bring local food into their neighborhood (Opitz et al., 2017, p. 183).

Recognizing the food chain can happen through agrotourism like cow cuddling, gastronomy, food events or other types of recreation and will make people see how and where their food is produced. Diversifying the farmers activities can bring in more money alongside farming while luring people to make more direct sales (Darolt & Constanty, 2008).

Educating consumers and producers on the environmental impact of food through school programs or events can help create more awareness, as well as making the chain more visible so people can learn. Even social media advertising or other new digital flows of imformation are ways of creating awareness (Van Wagenberg, 2012).

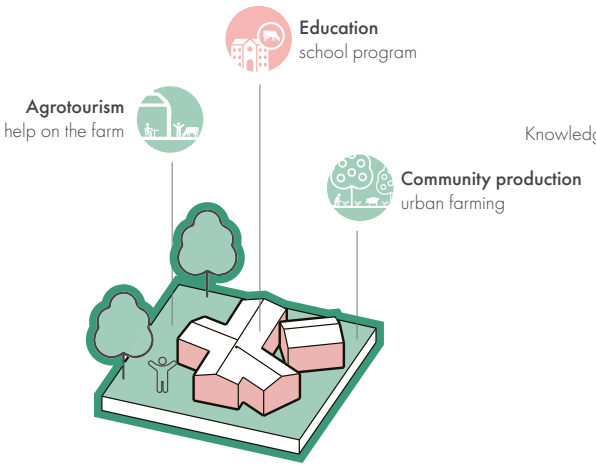
Another way to create awareness is to have consumers **participate** in the food production by helping the farmers out as their holiday or by doing part of the production themselves so people know what goes into production. Urban farming given its limited food production has a high social mission (Dimitri et al., 2016, p. 603).

Most flows in the livestock sector can **circulate** back by creating fertilizer and out of date supermarket food can be used for soup kitchens and feed less fortunate people. Other streams can be **reused** as raw material or energy not only for the livestock sector but outside it as well.

Typology of interventions

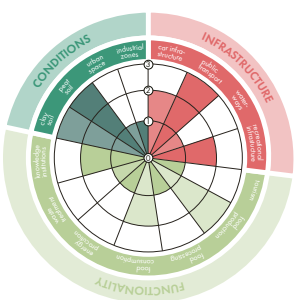
strategy

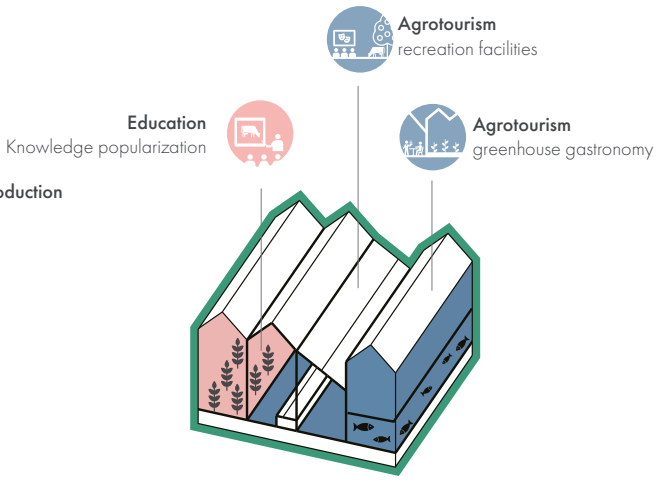
By combining the interventions with a location in the chain there's a possibility to create spatial typologies to readily implement. All typologies are scored on a chart of what site they would fit in. This chart uses the categories Infrastructure, functionality and conditions to determine this. The strategic projects will also be researched within these categories to show their potential so the typologies can be implemented on site. The typologies are sorted by transition ring and a map will show where they could create or activate transition.



Farming school test site

Practical school incorporating farming into the curriculum.





Market isle greenhouses

Public greenhouses to learn about new crops and taste them directly.

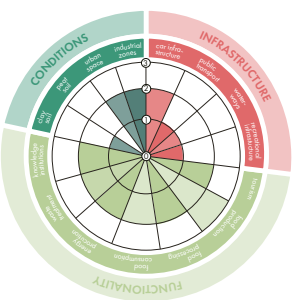
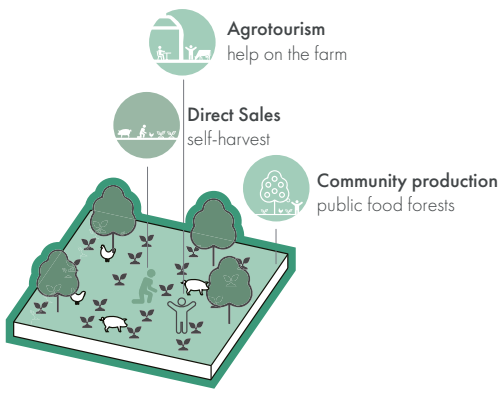
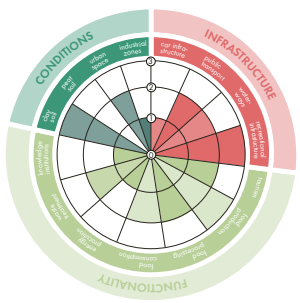


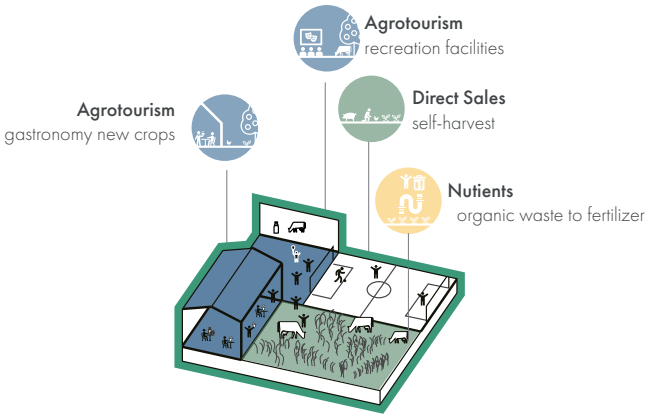
Fig 79: Typologies related to the diet transition



Foodforest

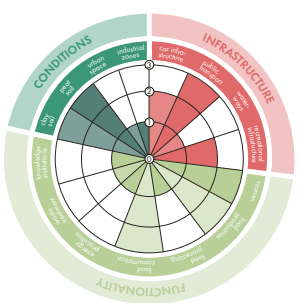
Food forest open to the public to pick their own food and help on site.

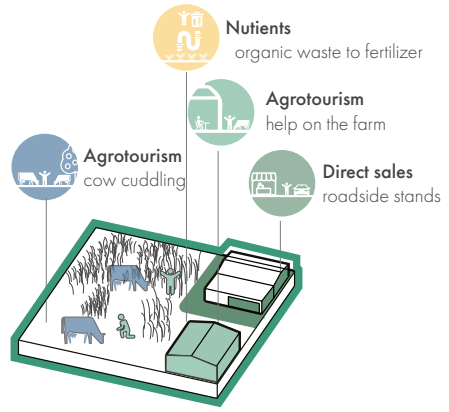




Farm recreation

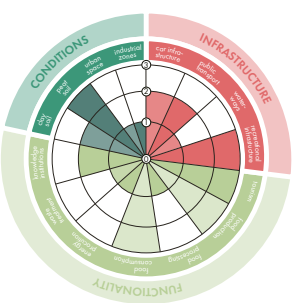
Diverse program for people at the location where food is produced.





Farm hotel

Activities on the farm as options for a holiday.



Diet Transition

Key Guideline

Hybrid Soil type, Hybrid Functions

Multifunctional Farming

Be Friends of animals and ecosystem

On-site consumption

Knowledge accessible to everyone

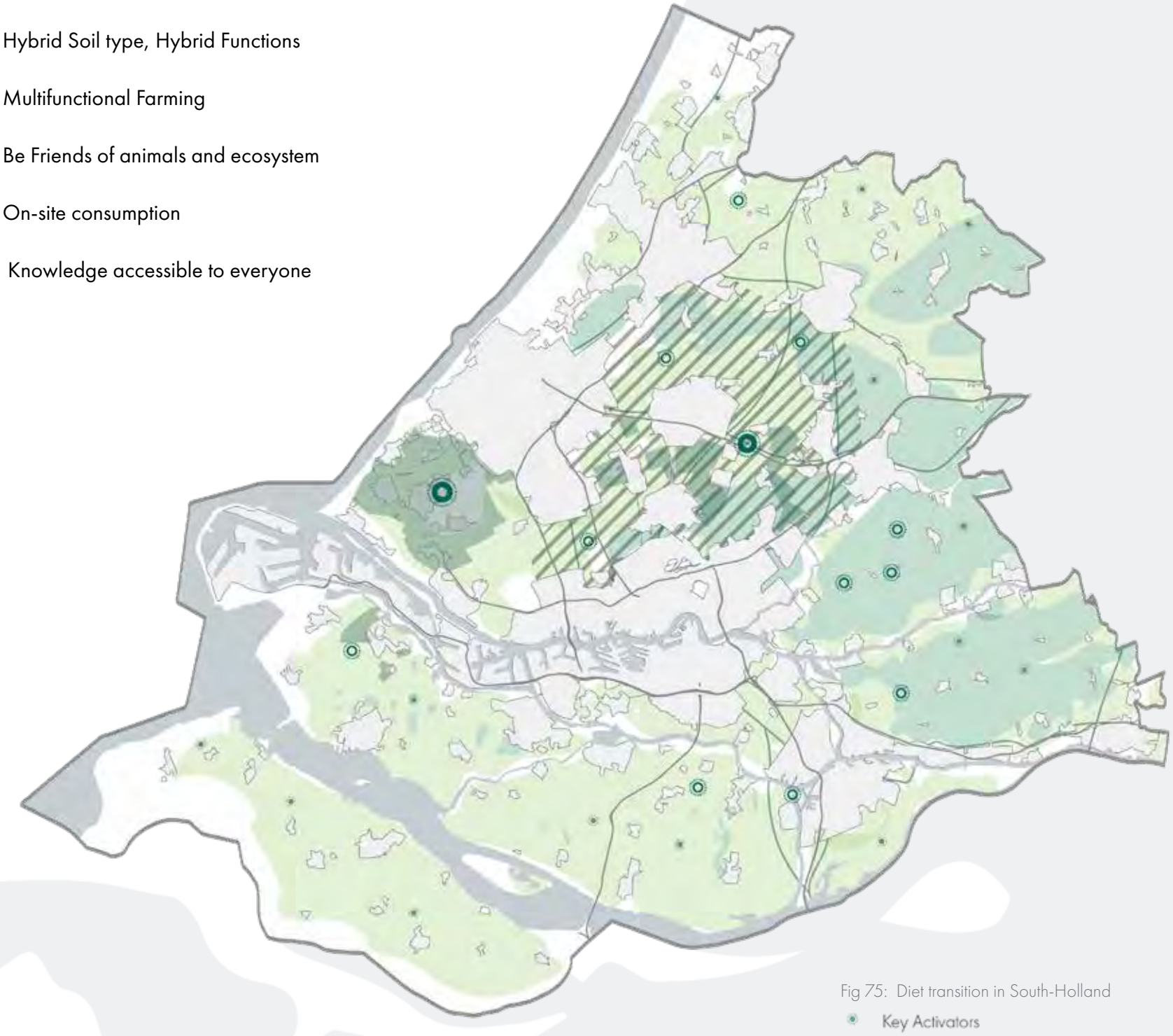
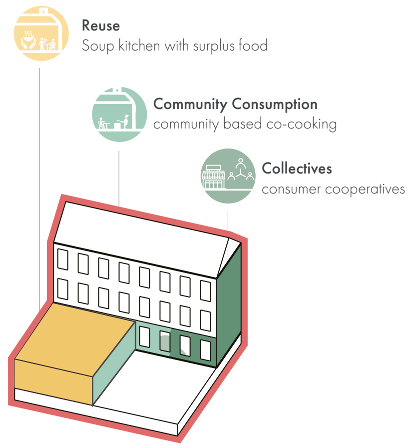
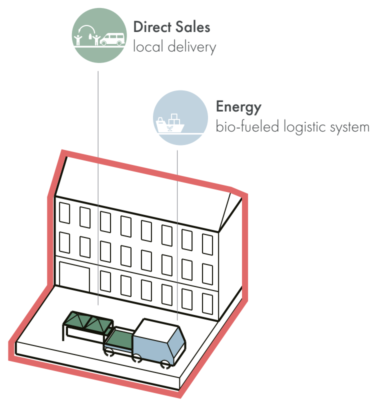


Fig 75: Diet transition in South-Holland



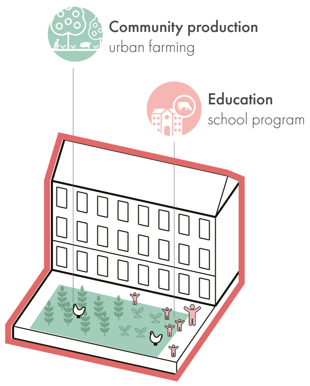
Co-Cooking Neighbourhood

Bringing local food into the neighborhood and minimizing the waste.



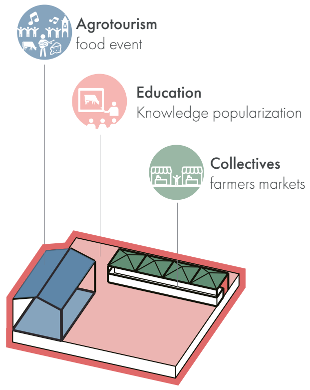
Driving market

Moving market bringing local food into neighborhoods.



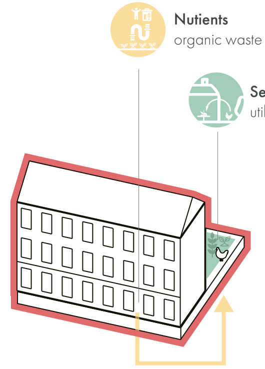
Community Garden

Growing your own food and learning for social cohesion.



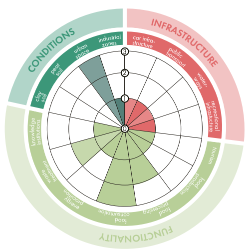
Festival/ Event Square

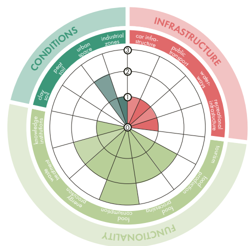
Event location to learn about, eat and buy local food.

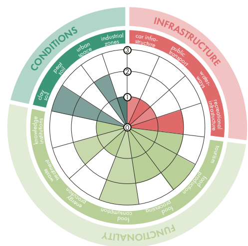


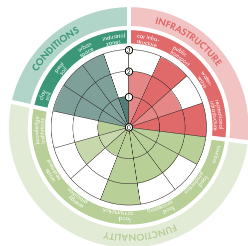
Private Garden

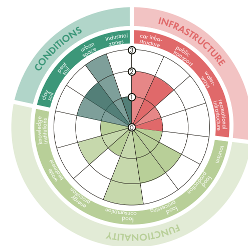
Stimulate using ones own garden for gr food.

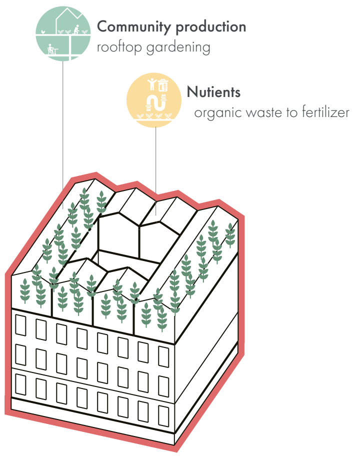






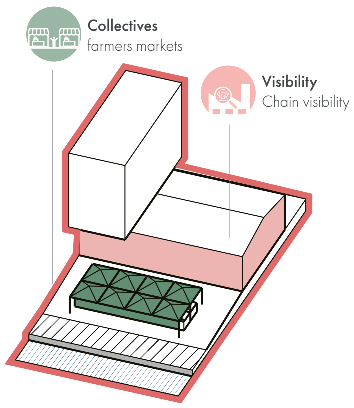






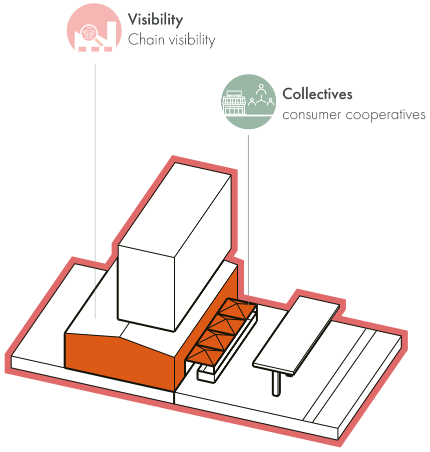
Housing with Rooftop Greenhouse

Multifunctional landuse with housing and production on the roof.



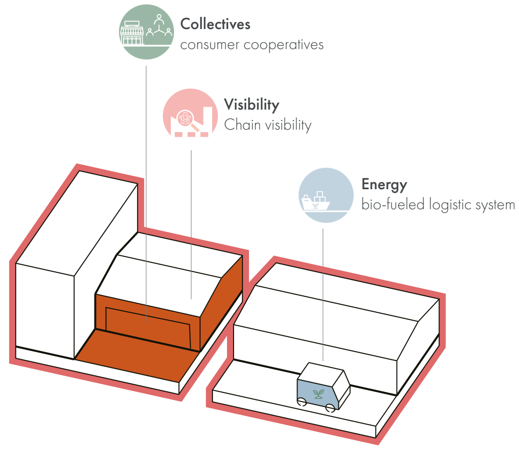
Waterfront distribution

Using waterways as distribution and selling point with densification.



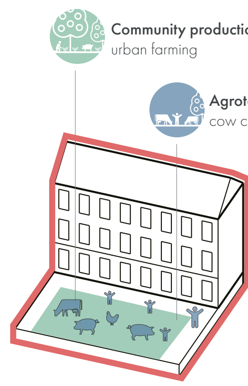
Transit oriented development near distribution

Selling and distributing with densification at transit knodes.



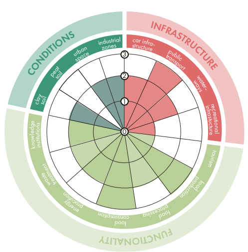
New Housing at highway distribution

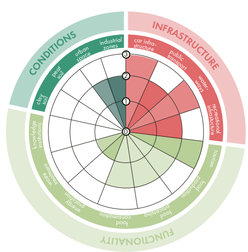
Selling and distributing with densification near highways.

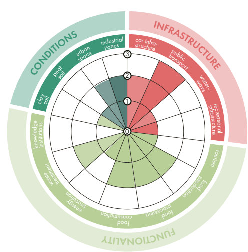


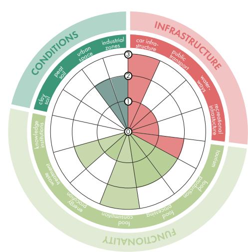
Petting zoo

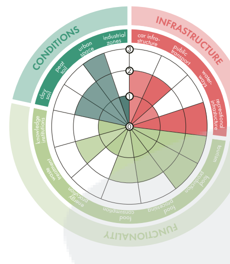
Connecting with animals and livestoc production.











Attitude Transition

Key Guideline

New housing with access to facilities

Open of the Logistic Zone

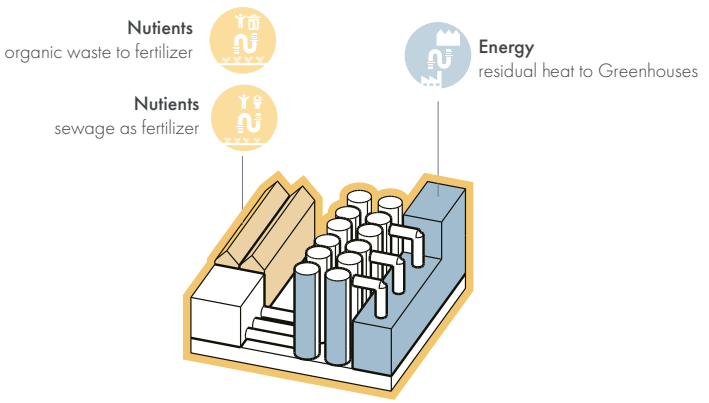
Visibility of Food Productions

Local food As Priority

0 7.5 15 22.5 30 km

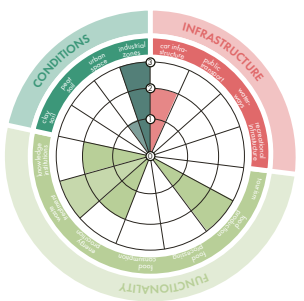
Fig 81: Typologies related to the Attitude Transition

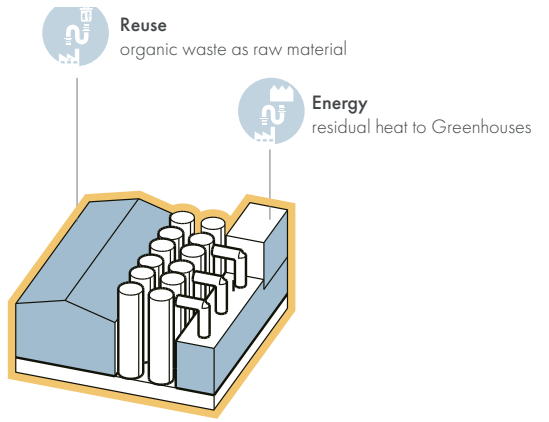
Fig 76: Attitude Transition in South-Holland



Greenhouses Recycling

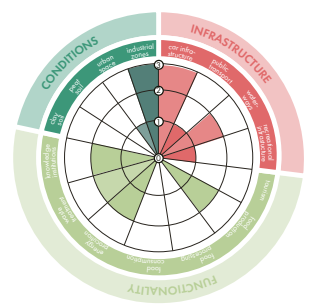
Recycling waste from the cities and energy from the factories in the greenhouses.

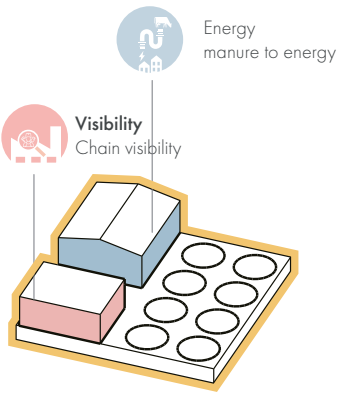




Biobased Industry

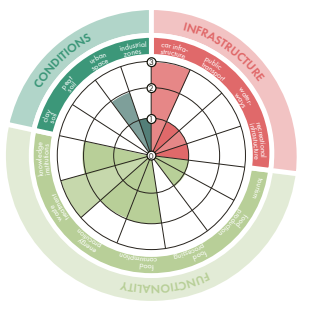
Supplying the factories with organic waste as raw materials.

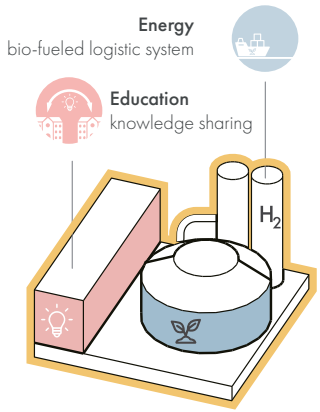




Waste & sewage treatment

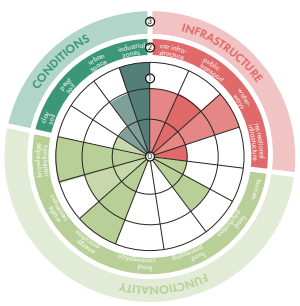
Showing where peoples waste goes in the chain.

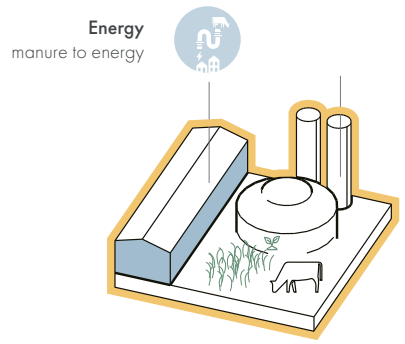




Energy innovation centre

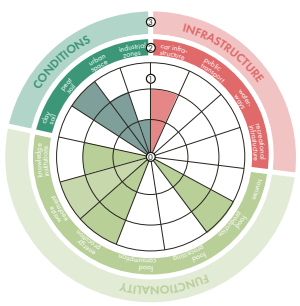
A centre for people to learn about biofuel and research its properties.

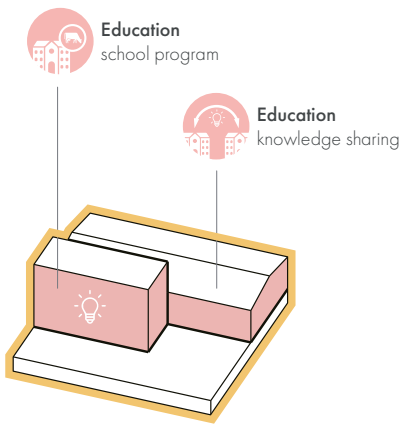




Green Energy Station

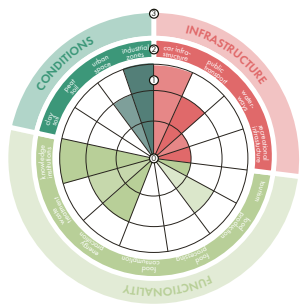
Production of clean energy from manure on site of the farm.





Biobase Start-up Centre

Business incubator and school for a transition to biobased materials.



Technical Transition

Key Guideline

Biobased Innovation Clusters

Greenhouse ought to be GREEN

Petrol Landscape into green production

Bring Waste Back to Value

Exporter of Biobased technology

0 7.5 15 22.5 30 km

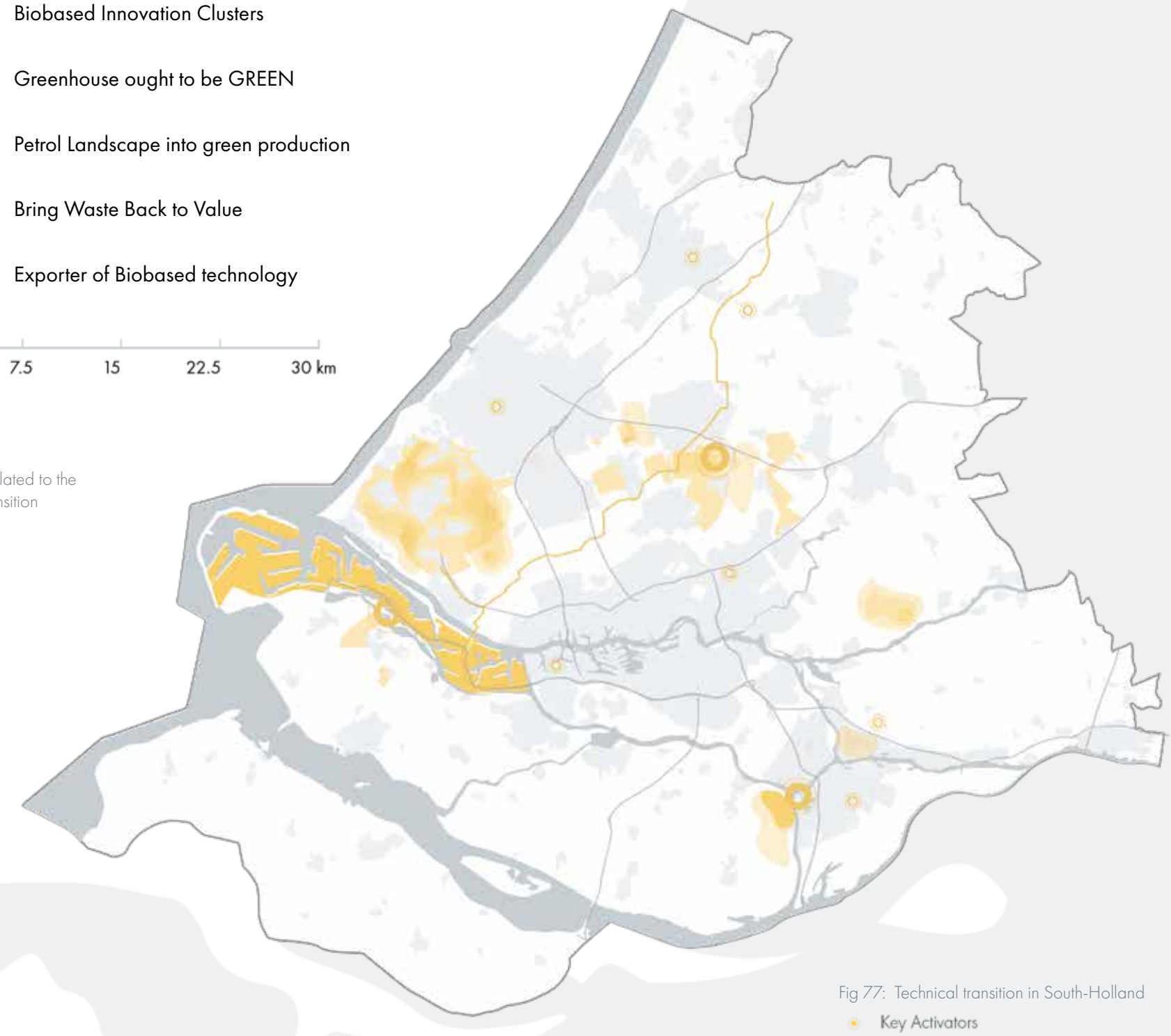


Fig 77: Technical transition in South-Holland

Fig 81: Typologies related to the Technical Transition

Renewed flows in PZH

strategy

Most of the territorial changes happen in the final stage, which makes it When the transition zones are put into place and the chain starts to behave differently, a new spatial flow system will arise in South-Holland that will create a new balance in the food chain.

Clustering and diversification

The chain is shortened and less miles are wasted between parts of the chain by streamlining the flows (see figure 84). To shorten the chain the current clusters will turn from monofunctional to multifunctional composed of different stages within the chain. For example urban areas do not just consume but also produce with urban farming. Moreover processing happens near the production areas as well. Food is also consumed near the farms where it is visible to the public and people have the possibility to grow more attached to their food (see figure 83)

New connections

Local production is diversified with new cultivation methods to account for the new healthy diet. The export flow will become smaller since the majority of the farms serve the inhabitants of South Holland.
The transition zones will function as new clusters of distribution and processing of food, the connecter between the production areas and consumption within cities. These links allow people to connect to where their food is produced and make more educated decisions (see figure 83).
New flows for specific kinds of waste are implemented to use as new raw material back into the chain.

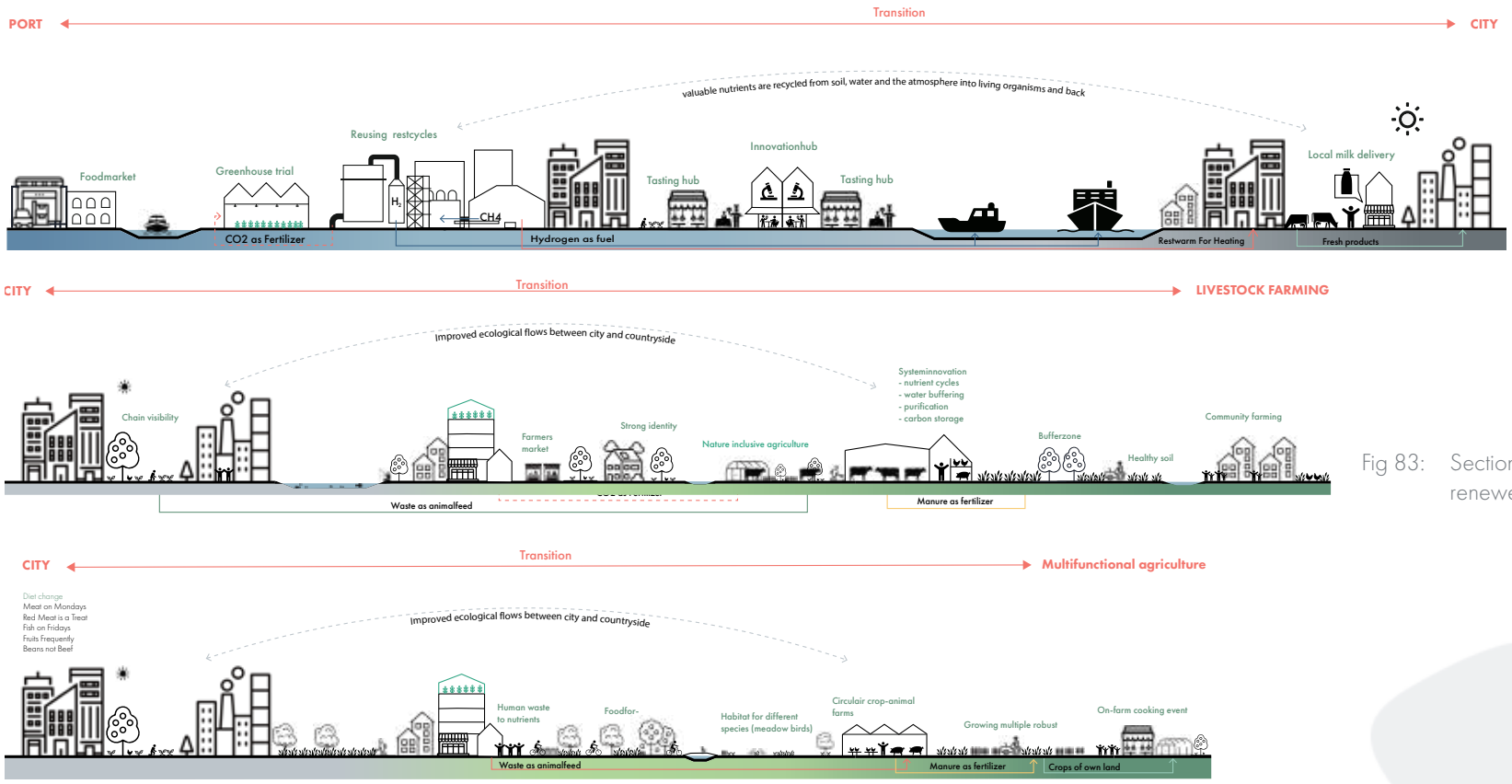


Fig 83: Sections explaining renewed flows

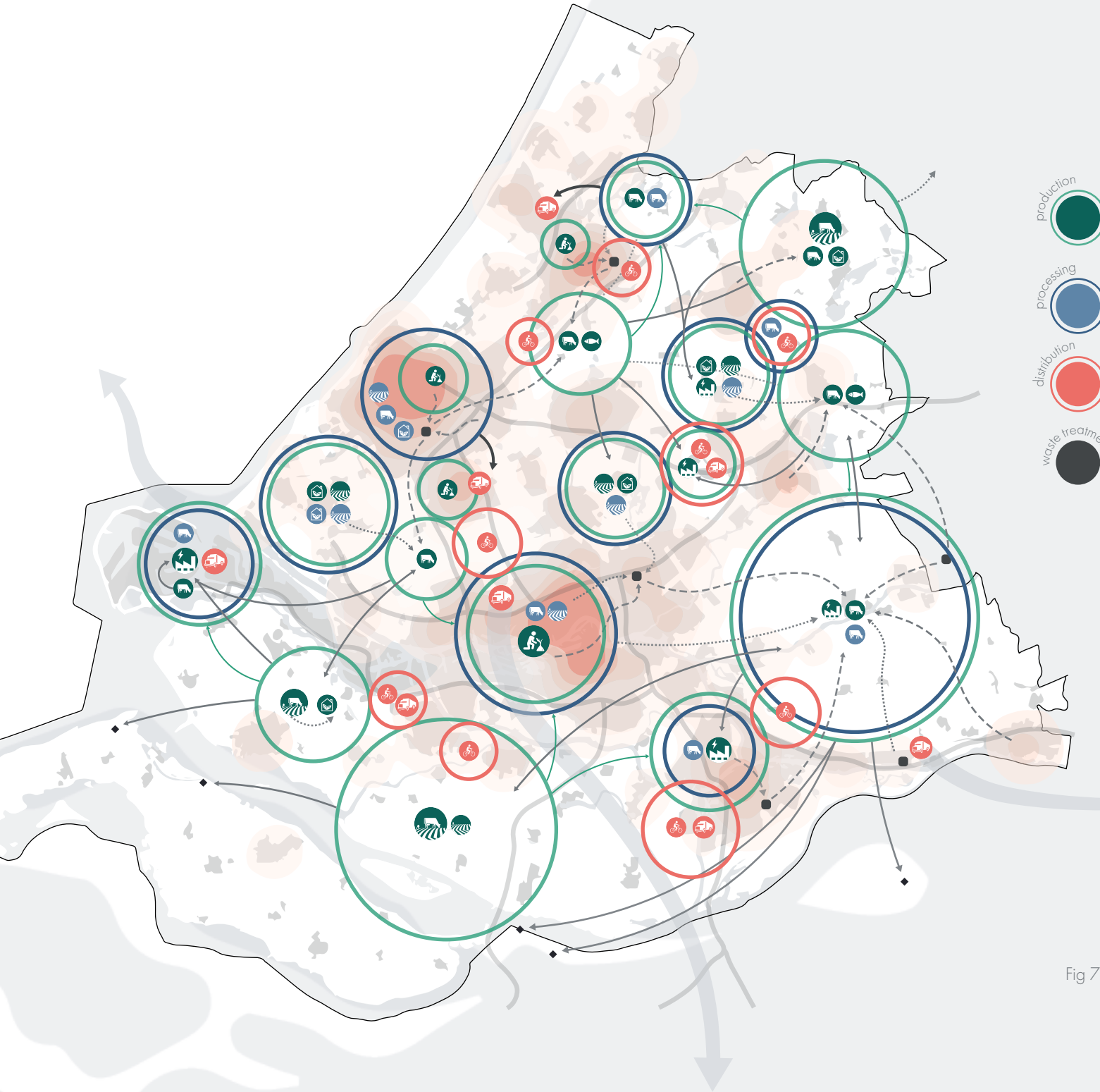


Fig 78: Renewed flows showed in the spatial context of South-Holland

Timeline of Liv/fe Transition

strategy

The previous chapters clarified the multiple intervention possibilities together with bottlenecks for transition through perspectives of different stakeholders. According to these, a more detailed timeline is made to align different stakeholders with joint purpose, facilitate the transition zone and at the same time generate new value.

The timeline could be divided into three stages. The first one will be a testing stage for each transition ring to test their new ideas, identifying their own limitations and speeding up through research and innovation. Different subsidies and rewards should be well considered to guide more stakeholders to take actions. In the second stage, the demonstration and growth stage, more cooperation between the three transition rings are made through the launching of different demonstration programs. These demonstration programs work as a showcase not only to appeal more participants in the transition, but also give continuous support to innovation projects, start-ups of business and further cooperation between different sectors. In this way, a more sustainable profit model can be gradually established to make sure the whole system thrives. In the final stage, more mixing territories will come into being with new circular clusters. This is where the three rings could merge spatially and functions together in a circular way. New values can hence be shaped both through the proximity in territory and close cooperation between different people.

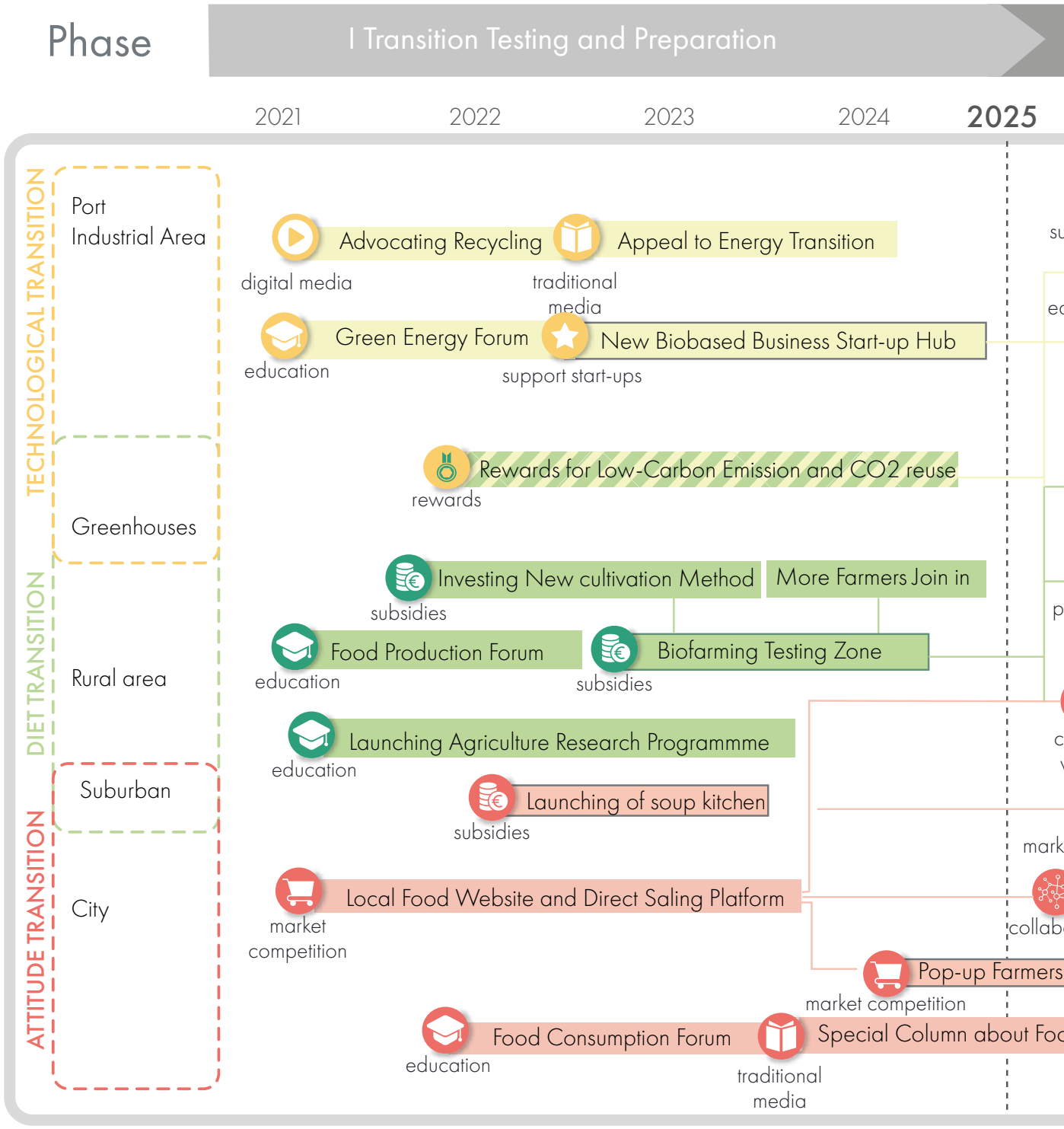
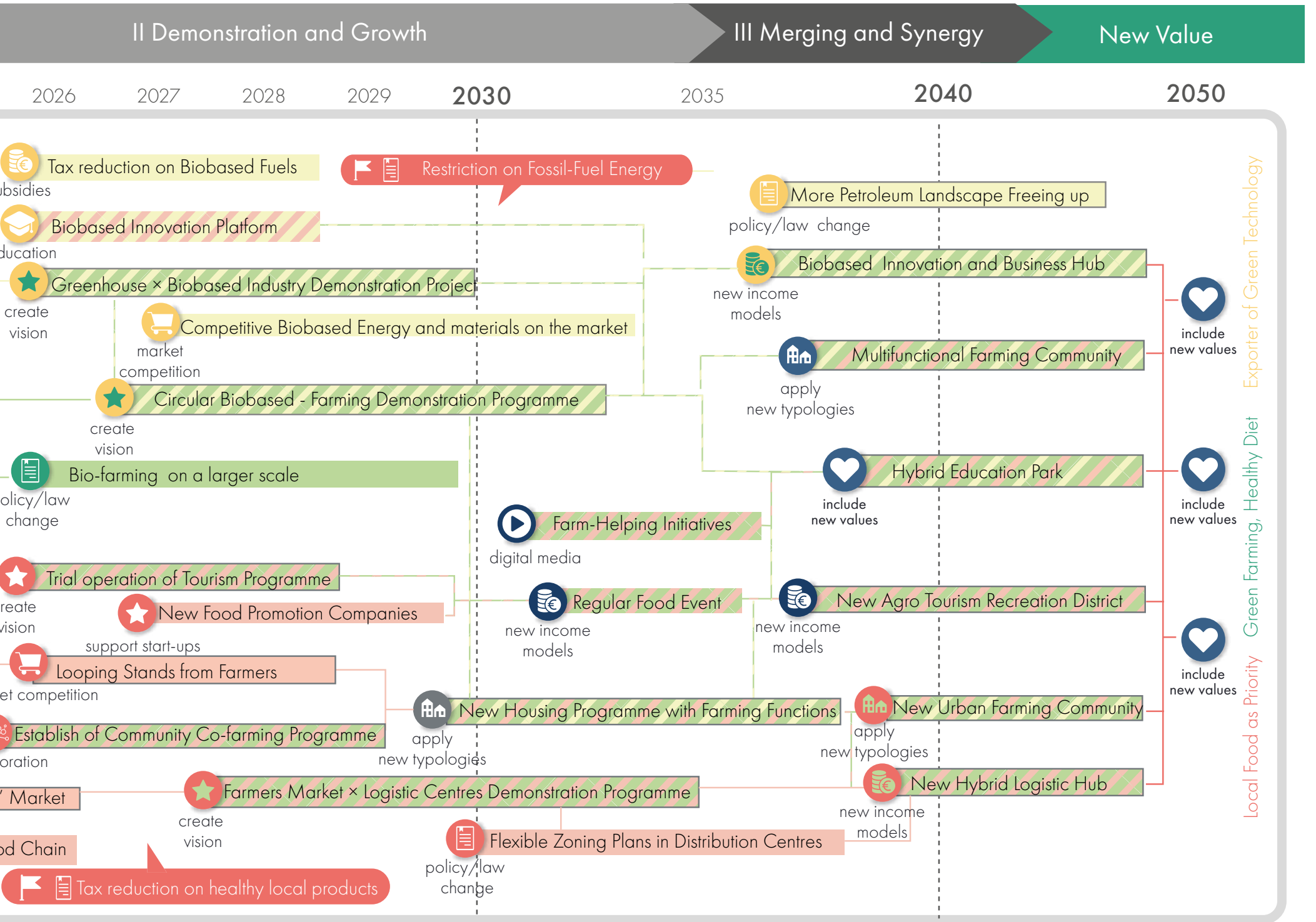


Fig 90: General timeline for Liv/fe Transition


II Demonstration and Growth
III Merging and Synergy
New Value
2026
2027
2028
2029
2030
2035
2040
2050
Tax reduction on Biobased Fuels
Restriction on Fossil-Fuel Energy
More Petroleum Landscape Freeing up
policy/law change
Biobased Innovation Platform
Biobased Innovation and Business Hub
new income models
Greenhouse × Biobased Industry Demonstration Project
create vision
Competitive Biobased Energy and materials on the market
market competition
include new values
Multifunctional Farming Community
apply new typologies
Circular Biobased - Farming Demonstration Programme
create vision
Bio-farming on a larger scale
policy/law change
Hybrid Education Park
include new values
include new values
Farm-Helping Initiatives
digital media
Trial operation of Tourism Programme
New Food Promotion Companies
support start-ups
Regular Food Event
new income models
New Agro Tourism Recreation District
new income models
include new values
Looping Stands from Farmers
New Housing Programme with Farming Functions
apply new typologies
New Urban Farming Community
apply new typologies
Establish of Community Co-farming Programme
Farmers Market × Logistic Centres Demonstration Programme
create vision
New Hybrid Logistic Hub
new income models
Flexible Zoning Plans in Distribution Centres
policy/law change
Tax reduction on healthy local products
Exporter of Green Technology
Green Farming, Healthy Diet
Local Food as Priority

Phase I: Transition and preparation

strategy

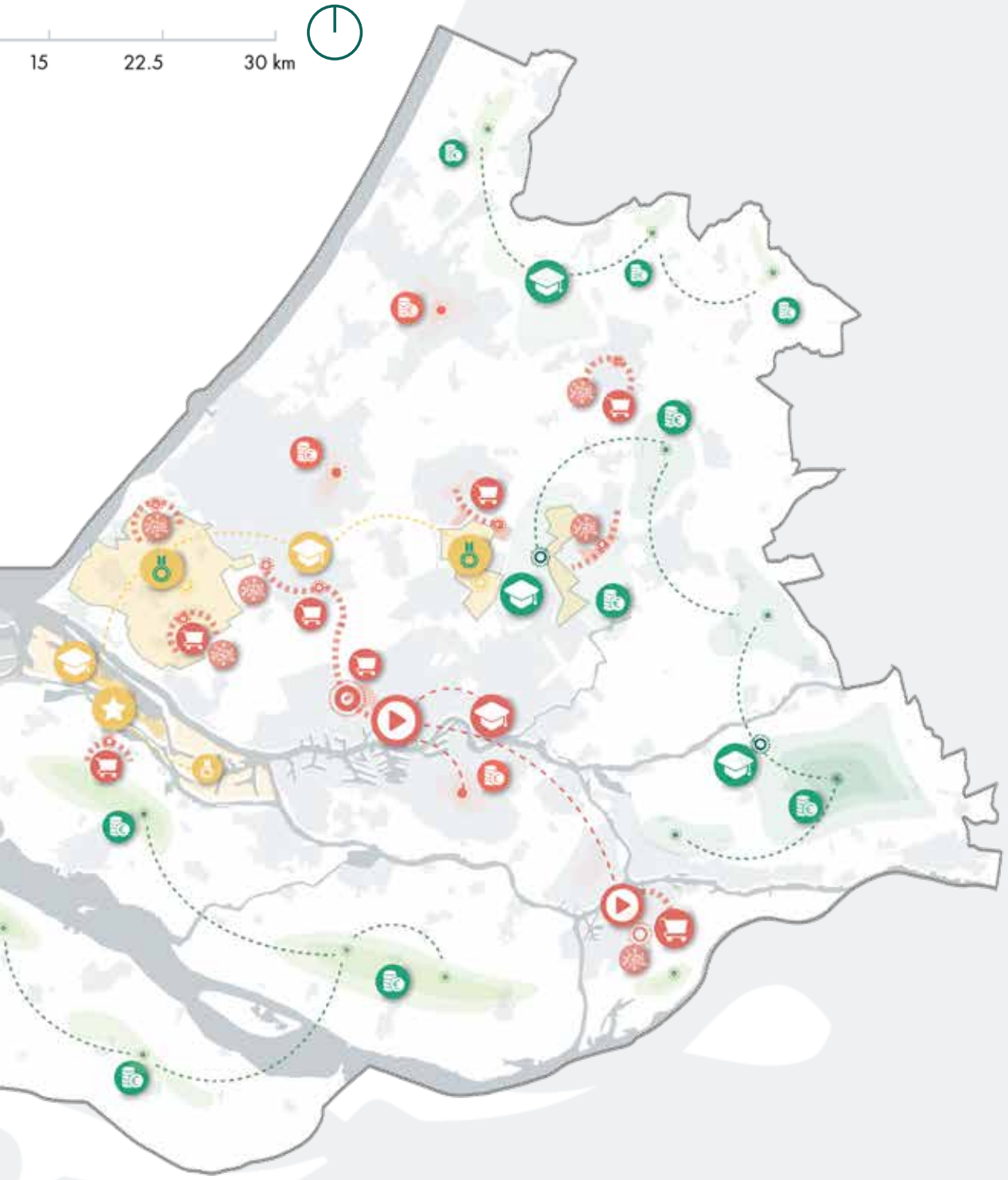
Time span: 2021-2025

In the first stage, urgency should be created through media and forums to appeal to a joint effort from everyone. Platforms will be launched to help negotiation and cooperation between different stakeholders within each transition ring.

In the diet transition ring, platforms for linking related knowledge institutions and current farmers should be established to share new cultivation methods and encourage the cultivation according to a new diet. With the test zones led by knowledge institutions, new cultivation methods will be first adopted in some of the farming areas and then gradually spread out in larger rural areas. Meanwhile, this whole process of change is supported by a series of policies to make sure there are no potential losers in the process.

In the technical transition ring, the existing biobased business cluster on the port area will be supported as a biobased start-up hub, which stimulates the sharing of knowledge sharing and foster the testing and implementation of latest innovations. So more small or medium-sized companies could thrive. This platform together with certain rewards could also help the current fossil-fuel companies on the port to take their step to transit. Meanwhile, emissions in the greenhouses should also be reduced through implementation of new technology. Major greenhouses areas in Westland, Lansingerland and Zuidplas shall take the lead under the guidance of knowledge institutions and supported by the government rewards.

Most of the interventions in attitude transition in this stage is about facilitating direct selling. Platforms to promote local foods could be established. This new way of food selling should try to reach more consumers through advertising on digital media, and meanwhile encourage more farmers to join in. In some rural neighborhoods which are already located close to food production sites, farmers can also arrange local delivery or pick-up points in cooperation with the local community. In larger cities like Rotterdam, special pop-up markets could be arranged on a weekly basis, with the support of a direct sale platform, so people could see farmers 'stands in urban areas. In addition to food selling, some soup kitchens will also be launched with subsidies from the government to avoid large amounts of food waste.



Potential Agroforestry Cultivation Zone

Potential Livestock Bio-Farming Zone

New Cultivation Method Research Institution

New Cultivation Knowledge Sharing FLows

Potential Activators in Diet Transition Ring

Greenhouses with New Farming Technology

Rewards for Decarbonization

Biobased Business Start-up Hub

Biobased Energy and Material Research

New Biobased Innovation Sharing Flows

Direct local Food Sale

Potential for Poping-up Farmers' Market

Cooperation between residents and local farmers

Soup-Kitchen programme

Management Knowledge Flows and Media Stream

Fig 91: Phase I: Transition and preparation

Phase II: Demonstration and growth

strategy

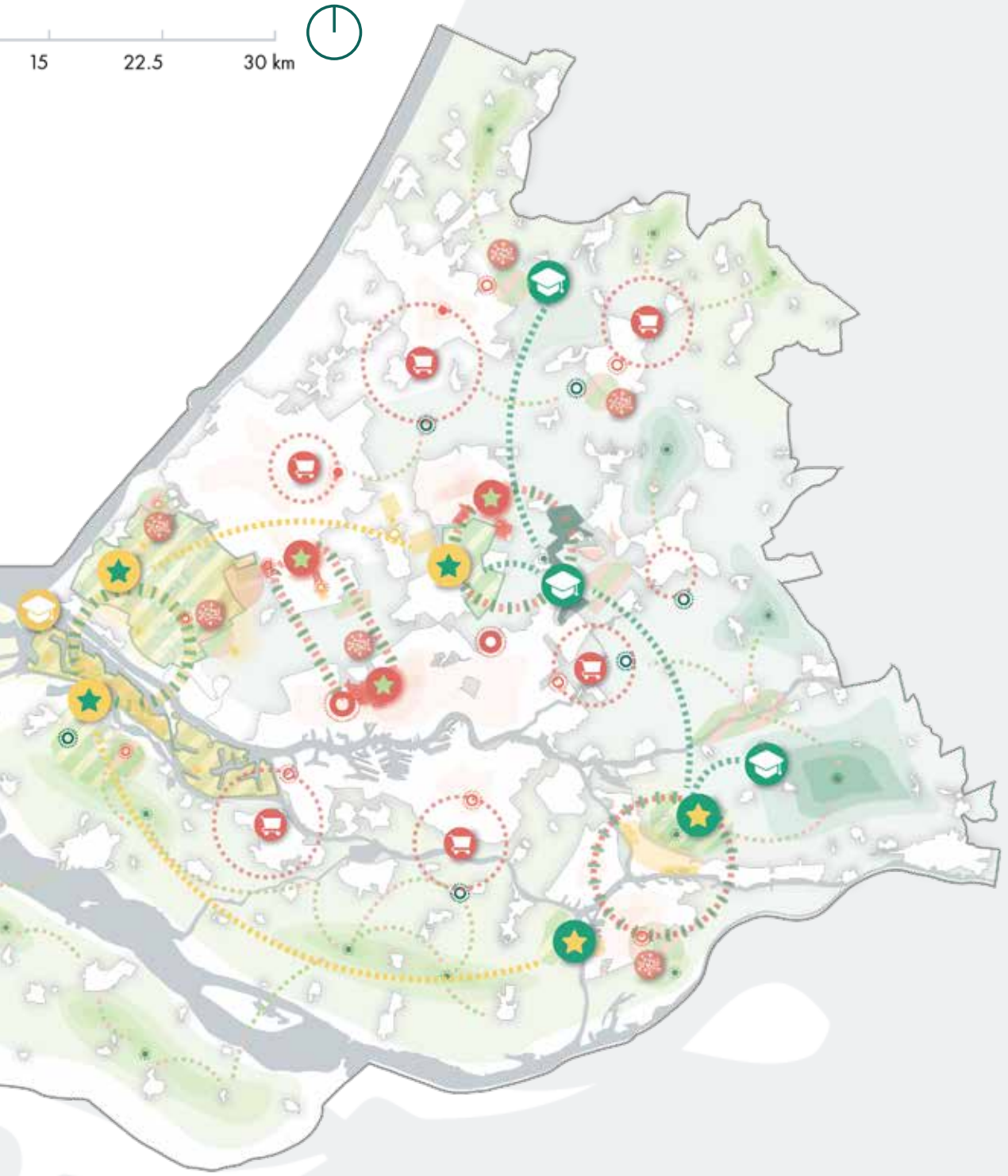
Time span: 2025-2030

The second stage is more about establishing demonstration zones for the transition. It is not only zones for innovation sharing and new business promotion, but also works as a vivid showcase, and hence avoid certain conflicts when people show things truly happen.

In this stage, some of the landscape would have already been changed according to the new diet and soil conditions. Hence the most important issue becomes closing the chain of food distribution and waste treatment, where more trans-sector cooperation will happen across different transition rings in order to reach more circularity.

Firstly, there continues to be more cooperation between diet transition ring and attitude transition ring. With more areas in the whole province having local direct sales services, more community co-farming programmes could happen in small cities, so more residents could work together with local farmers or in their community farmland. Meanwhile, several agro-tourism routes could be tested, to help citizens to get to know about the new landscape in rural areas. Also, in this stage, several logistic areas should work together with local farmers as demonstration zones to include more direct sale functions according to the new food distribution chain. This test will also work as an example to stimulate an overall change of the policy to support further flexible zoning plans in distribution centres, and prepare for the change in next stage.

For the cooperation between diet transition ring and energy transition ring, the port of Rotterdam will shoulder the responsibility of being a biobased knowledge output. From the port to the northern part, a demonstration zone to link between greenhouse industry and biobased industry will first take place between the port and Westland and then expand to Lansingerland and Zuidplas. To the south of the port, a new demonstration zone will also work cooperatively with the new agroforestry area and stimulate the upcycle of waste into bio based raw materials. The agriculture platform (which is established in the previous stage) will also play a key role in stimulating the research about waste treatment to make more use of both livestock manure and plant-based waste. Potential waste to energy demonstration project will happen in the northern part of Dordrecht, linking livestock farming and energy production by the Dordrecht inland port. All of these demonstration projects could make sure the cooperation between the agri-food sector and biobased industry goes smoothly and thrive, which enables the appearance of stable supply of new biobased energy and large amounts of biobased materials on the market by the end of this stage. With this change, it would be more reasonable to enact more strict restrictions on the use of fossil-fuel energy, and also pave the way of freeing up more current petroleum landscapes and rezoning them into other different uses in the final stage.



More Local Food consumption

New Agroforestry Landscape

New Bio-livestock Farming Landscape

Agriculture Research Institution

Agriculture Knowledge Sharing Flows

Greenhouse × Biobased Industry Demonstration Project

Circular Biobased - Farming Demonstration Programme

Distribution Centre × Farmers Market Demonstration Project

New Biobased Innovation Sharing Flows

Biobased Energy and Material Research

Direct Cooperation Between Residents and Farmers

Potential for Direct Local Food Sale Chain

Community Co-farming Programme

Trial operation of Tourism Programme District

Biobased Energy and Material Innovation Hub District

Activators in Diet Transition Ring

Potential Activators in Technical Transition Ring

Fig 92: Phase II: Demonstration and growth

Phase III: Merging and synergy

strategy

Time span: 2030-2050

Most of the territorial changes happen in the final stage, which makes it actually much longer than the previous two stages. With interventions from the previous two stages, people in different sectors could already see some of the achievement of the transition. So, there might be more municipalities, investors, start-ups, education and tourism companies to join in this stage.

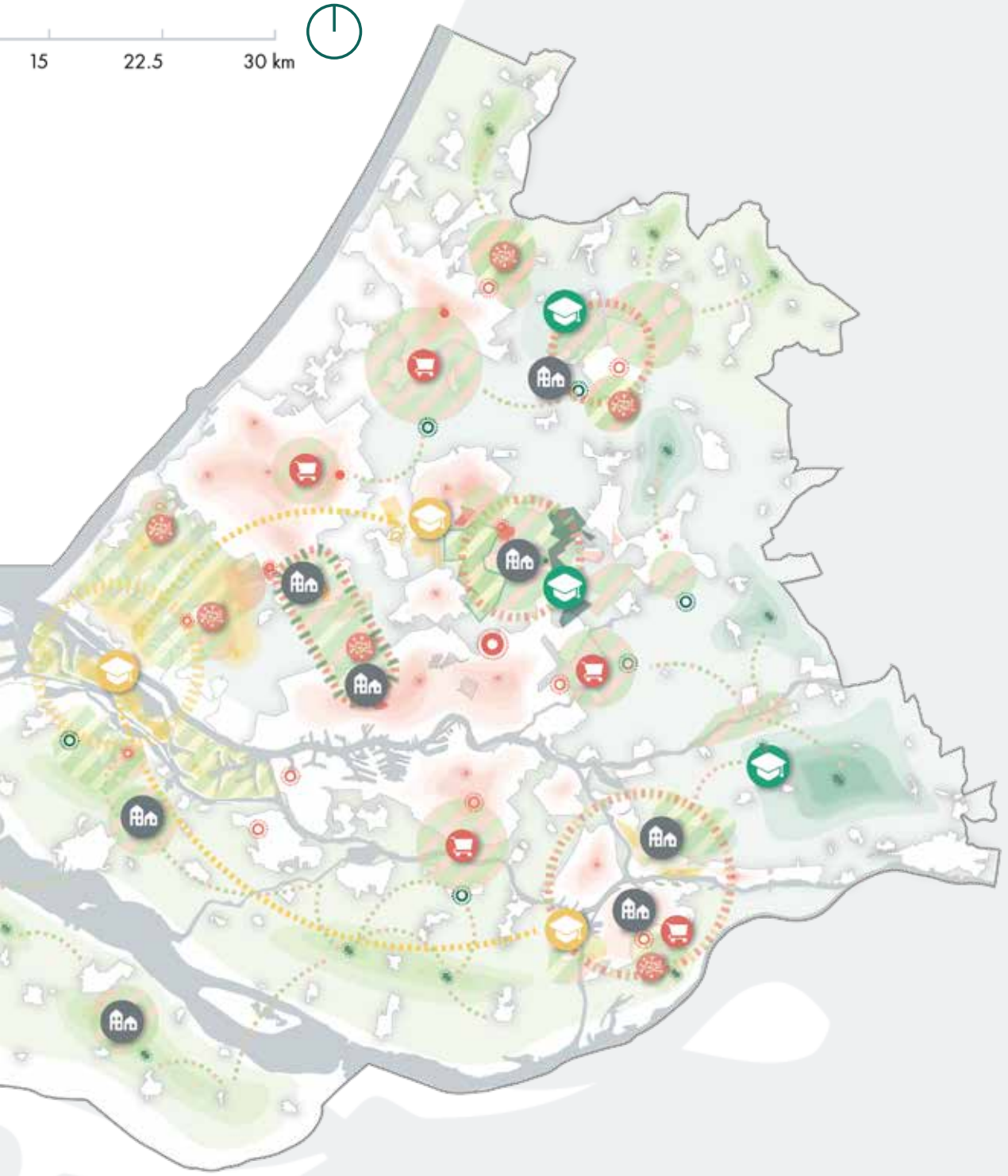
The key idea for the first ten year of this stage would be the sustaining of the demonstration projects into a new landscape through adding more new public programmes.

More education or recreation functions would come into the existing circular farming demonstration area. With more recreational infrastructure built to support the trial agroforestry tourism route, these routes will finally be embedded with local sight-seeing tour routes and work as education or recreation parks.

At the same time, large cities could expand with new housing programmes with urban farming functions. More previous food logistic districts will open up and become densified with not only direct sales but also other public facilities and residential functions. Small cities having cooperated with local farmers in the previous two stages will grow with more multifunctional farming districts with local distribution, consumption facilities to support this new lifestyle.

The biobased innovation hub and agriculture institution in this stage will not only keep working on innovation, but also would focus on technology exporting, education programme and knowledge popularization and searching for global partners and hence should also consider to have a more public facilities and open spatial quality.

If things go on well, in the final ten years, the new transition zones will thrive in more areas inside the whole province. A new value will finally come into being and different territory will not only merge together geographically but also functions tightly together.



Change of Petroleum Landscape

General Change of Food Consumption Pattern

New Agroforestry Landscape

New Bio-livestock Farming Landscape

Agriculture Research Institution

Biobased Energy and Material Innovation Hub

Agriculture Knowledge Sharing Flows

Biobased Innovation Sharing Flows

Biobased Innovation and Business Hub

Multifunctional Farming Community

Hybrid Education Park

New Agro Tourism Recreation District

Urban Farming District /New Hybrid Logistic Hub

Smart Densification or Expansion through New typologies

Activators in Diet Transition Ring

More Activators in Technical Transition Ring

Potential Activators in Attitude Transition Ring

Fig 93: Phase III: Merging and synergy

Strategic projects

strategy

Three strategic projects were chosen from the vision map to design with the typologies and interventions and make them location specific. All three have a clear identity and different kinds of transition zones where all the rings coincide (figure x).

Dordrecht: Urban Agriculture

The city of Dordrecht is bordered by two transitions with agricultural land of different cultivation methods and soil conditions. The transition rings cross within the city and the port area.

Zuidplas: Direct Distribution

Zuidplas is a highly agricultural and greenhouse orientated area with high production surrounded by cities. The area possesses a great transport network for distribution and lies within all three rings.

Delft-Rotterdam: Cultural identity

Inbetween Delft and Rotterdam an agricultural landscape is bordered by two transitions with the city. In this rural landscape the three transition rings cross. The cultural identity of this location will change greatly with the influence of the cities which makes it a great location for creation of awareness.

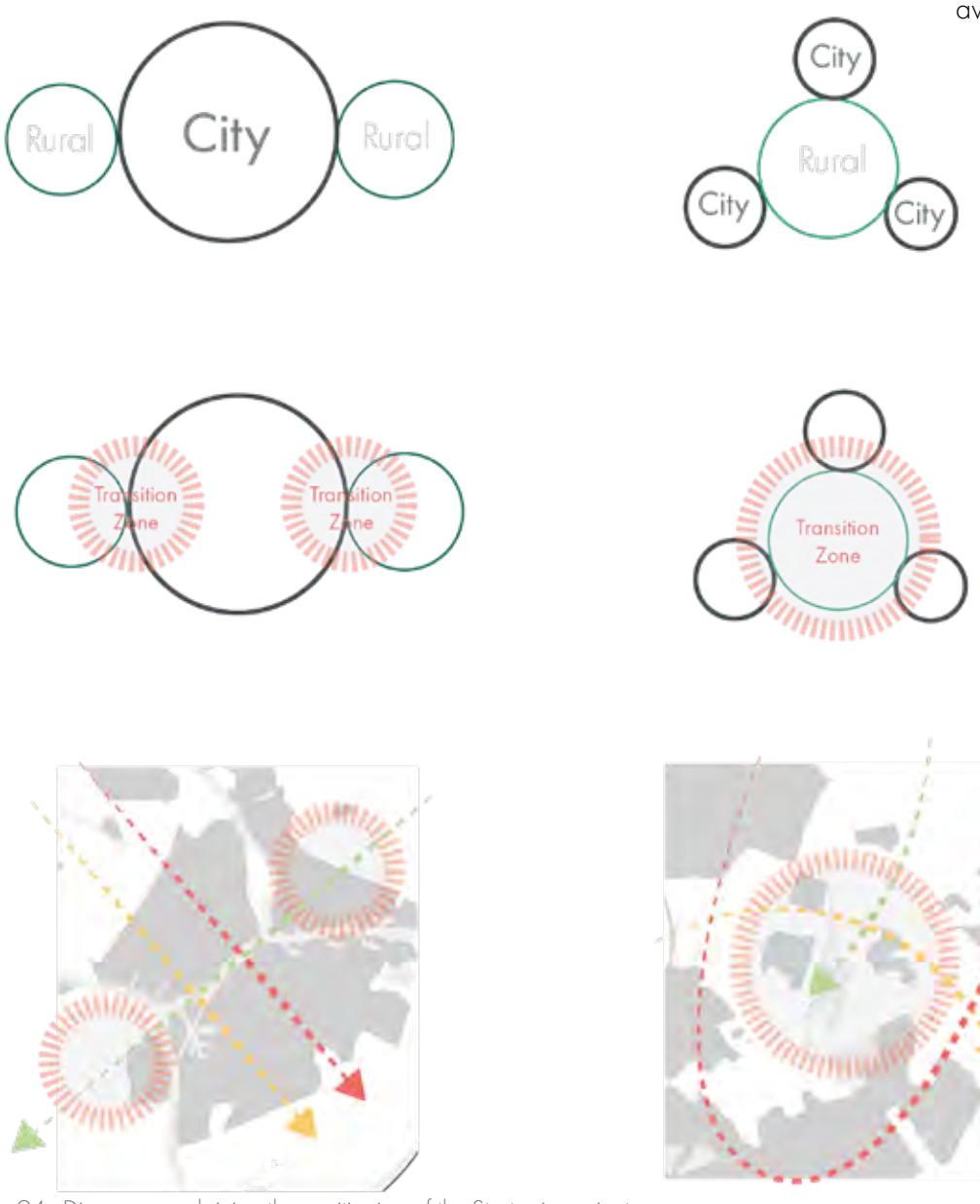


Fig 94: Diagrams explaining the positioning of the Strategic projects

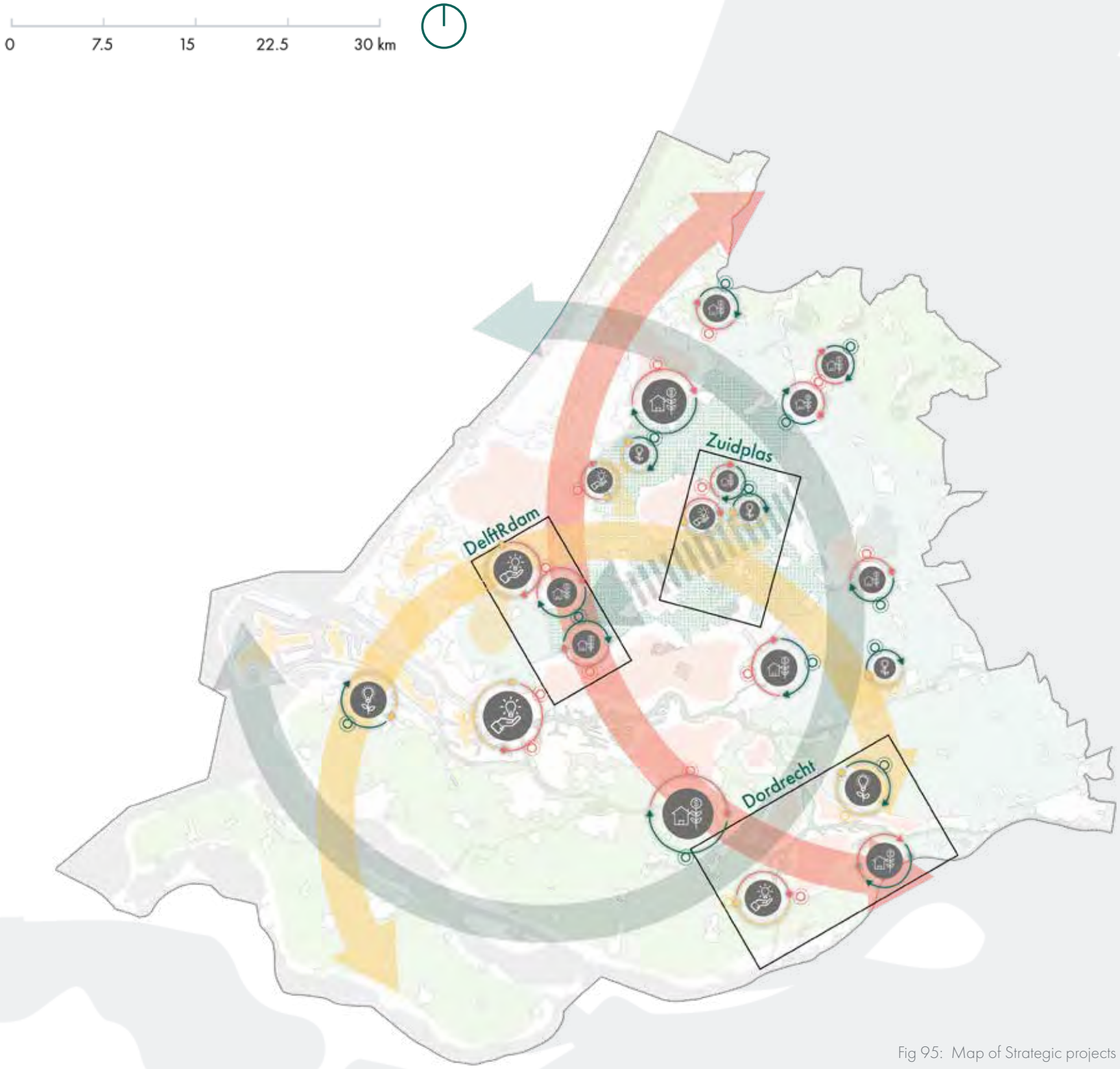
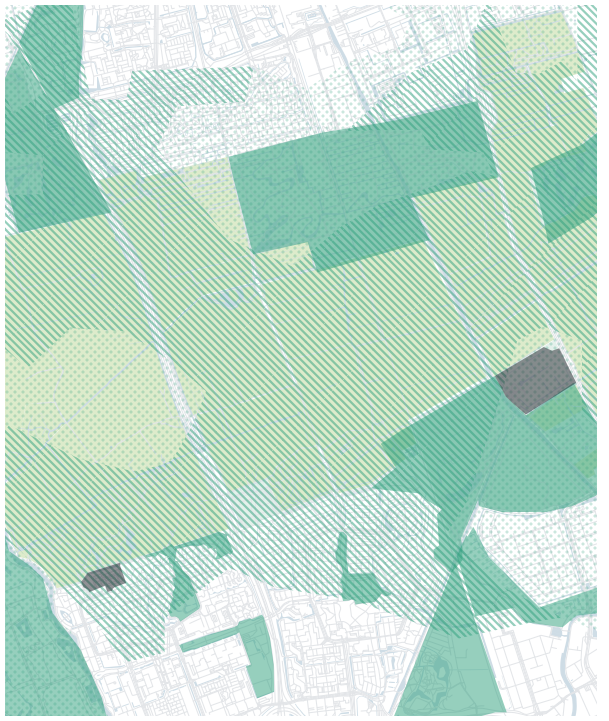


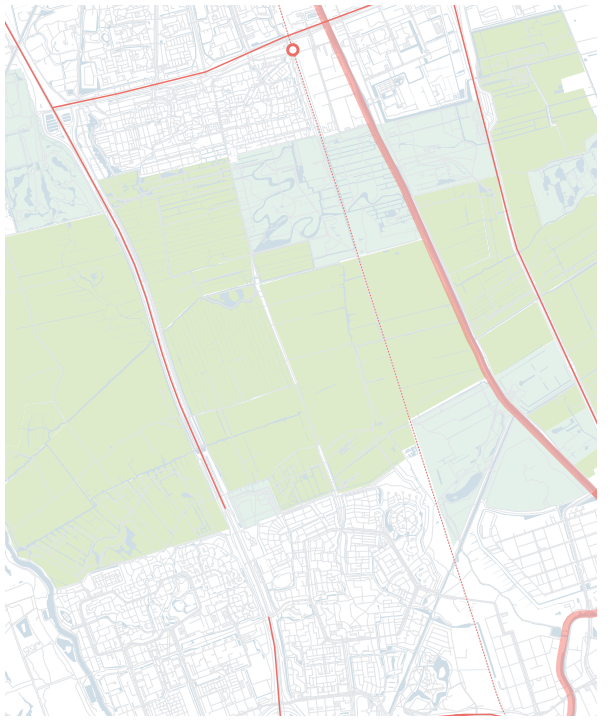
Fig 95: Map of Strategic projects

Delft-Rotterdam

strategic project

The space between Delft and Schiedam is known as Schipluiden, and it is an open area approx. 3.5 km wide and 14 km wide with an overall area close to 80 square kilometers, (although the area of focus is only 3.8 km long). This open land mass is situated betweenDen Haag and Delft to the North, Rotterdam to the South, and Westland to the West and Berkel to the east.





The current conditions

Most of the area is farm oriented, but it also contains (or at least borders) many nationally important entities such as Rotterdam's sea and air ports, TU Delft, as well as Westlands horticulture complex.
The area is preserved for agricultural and recreational uses, and urban expansion into this territory is not permitted.

Figures 96-98 show the current conditions, infrastructure and functionalities of the area of focus. The area is hedged between two major highways - the A4 connecting Rotterdam to Den Haag and Amsterdam and the A13 connecting Rotterdam to Delft and Den Haag. Between them two other major pathways run parallel - the heavy railway line and the river Schie. Most of the soil is Peat based, and used for grass growing and raising of livestock. The major cities that border the region are some of the densest in the Netherlands and are affluent with supermarkets, distribution and processing centers, serving large population masses.
availability of food due to the presence of supermarkets and distribution centres however there is not much food production.

From left to right

Fig 96: Soil conditions
Fig 97: Infrastructure
Fig 98: Functionality

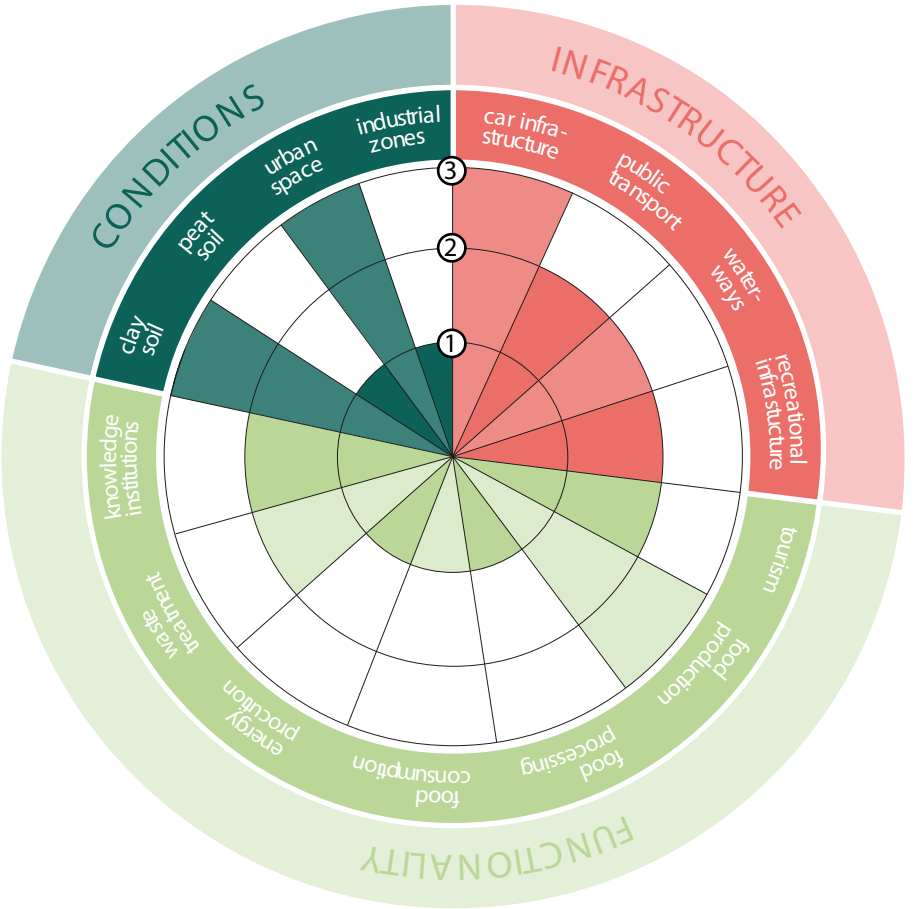


Fig 99: Conclusion tool current situation

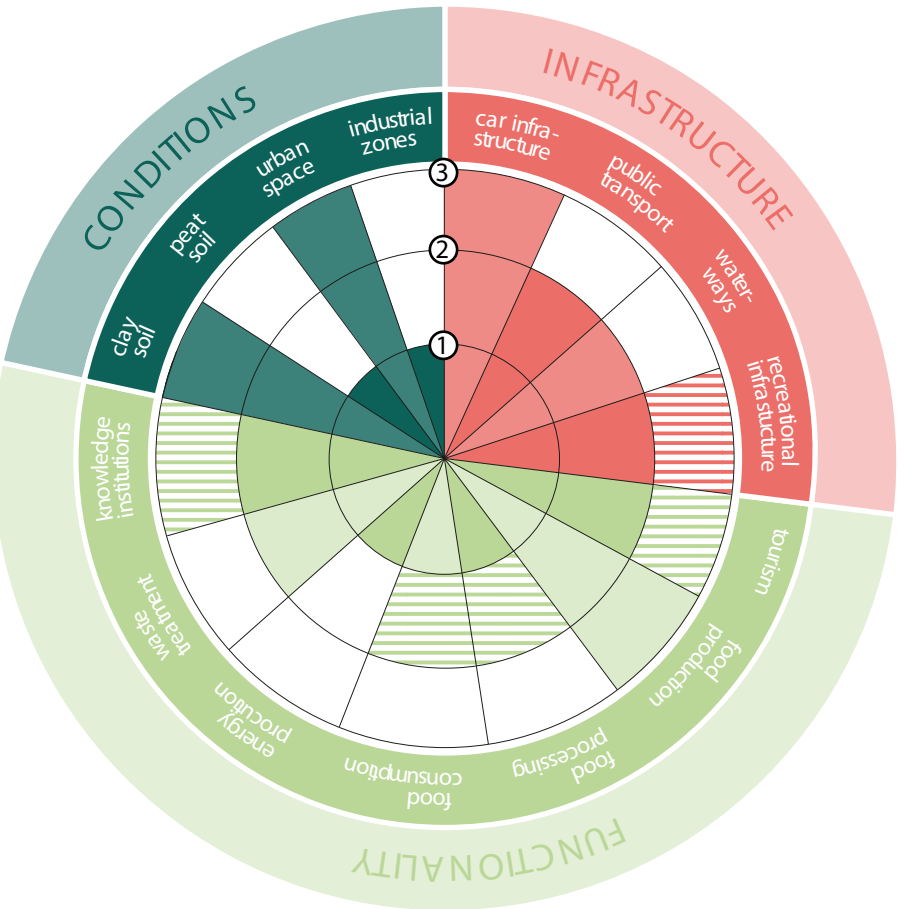


Fig 100: Places for opportunity

① few/almost none
② some/moderate
③ a lot/high

Space for opportunity

Given the combination of ample amounts of empty agricultural spaces and the close proximity to large population centers numbering in the millions, a transition between urbanity and agriculture would be the most correct for the situation.

Outside the cities in both directions are already vast intensive parks in good condition that are currently not directly linked with each other. The space between them could be intensified and that connection could be made, unifying a string of isolated spaces into one continuous motion running west to south.

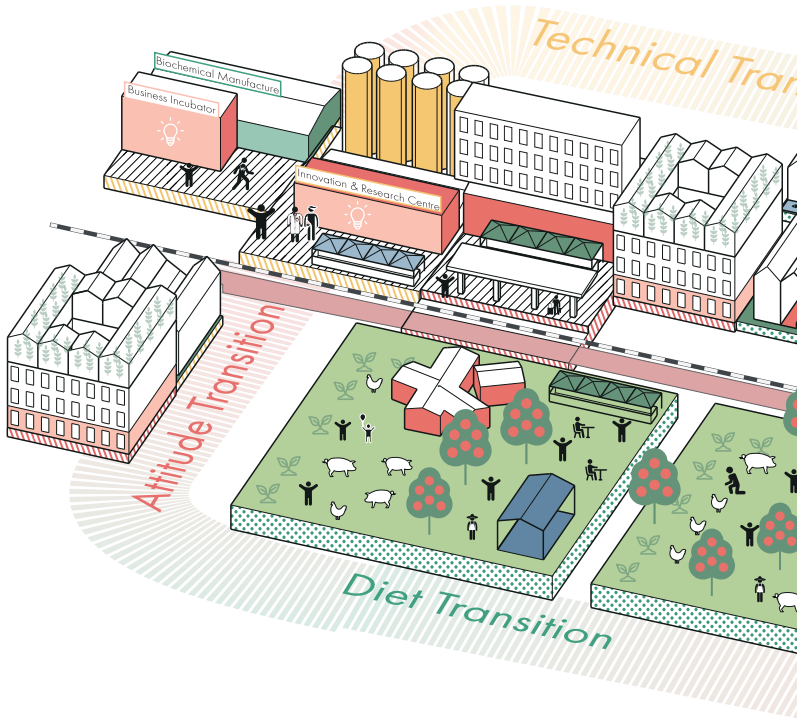
These spaces, however, do not intersect, and so a meaningful central area in between them would serve to connect the whole outskirt system, as well as the two urban megacities attached to them.

The ability to attract close to two million people living in close proximity lends this area an important opportunity to create a transition of awareness that would bring the urban people of the Randstad closer to the manufacturing realities that help feed them.
programs based on education and agri-tourism would be most appropriate in order to achieve that.

Delft-Rotterdam

strategic project

In the strategy chapter, a series of new typologies together with conclusion tools for each have already been made. Here in the strategic project, after identifying the potential for each specific location,a ‘circular system pattern’ is made for them . They are to show how the typologies proposed in the previous chapter can be put together and work in a more circular way through the six categories of interventions according to the contexts each specific strategic project.



Medium-Sized City—Rural Area—Peripheral of Large Cities

The system pattern deals with corridor area between two cities, which shows how urban territory could be merged with rural area in a gentle way without occupying greenspaces extensively and reaching a synergy in functions through circular flows.

With the rural area changing into agroforestry and equipped with more agrotourism functions. There will be more opportunities for on-site food consumption, which helps the circularity in the food chain.

Multifunctional industrial areas in the city periphery will be densified with new housing with urban farming functions. In this way, more citizens can take part in the food production process. Part of the food waste from neighbourhood could be directly recycled in the urban farming spaces.

Meanwhile, the current logistic centres for food distribution will be hybrid with more public space and wholesale markets, which also offers more accessible facilities for the suburban neighbourhood. More industrial companies will head for biobased-manufacture and rely more on clean energy. Household organic waste from urban areas will also be collected and upcycled in the manufacture or agri-food sector.

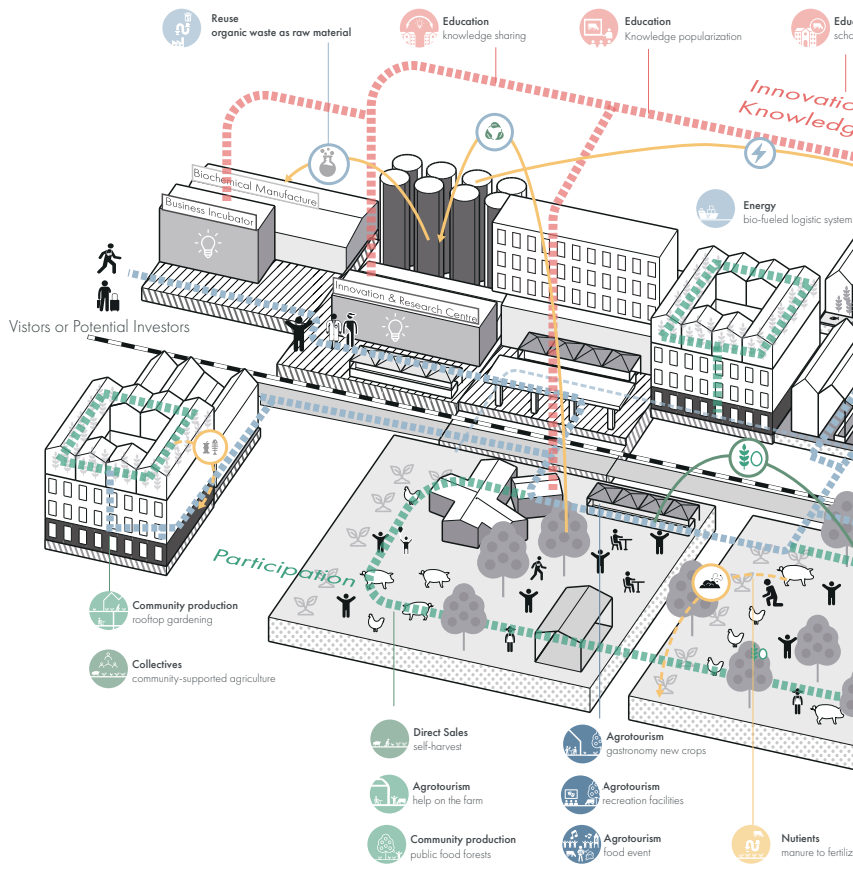
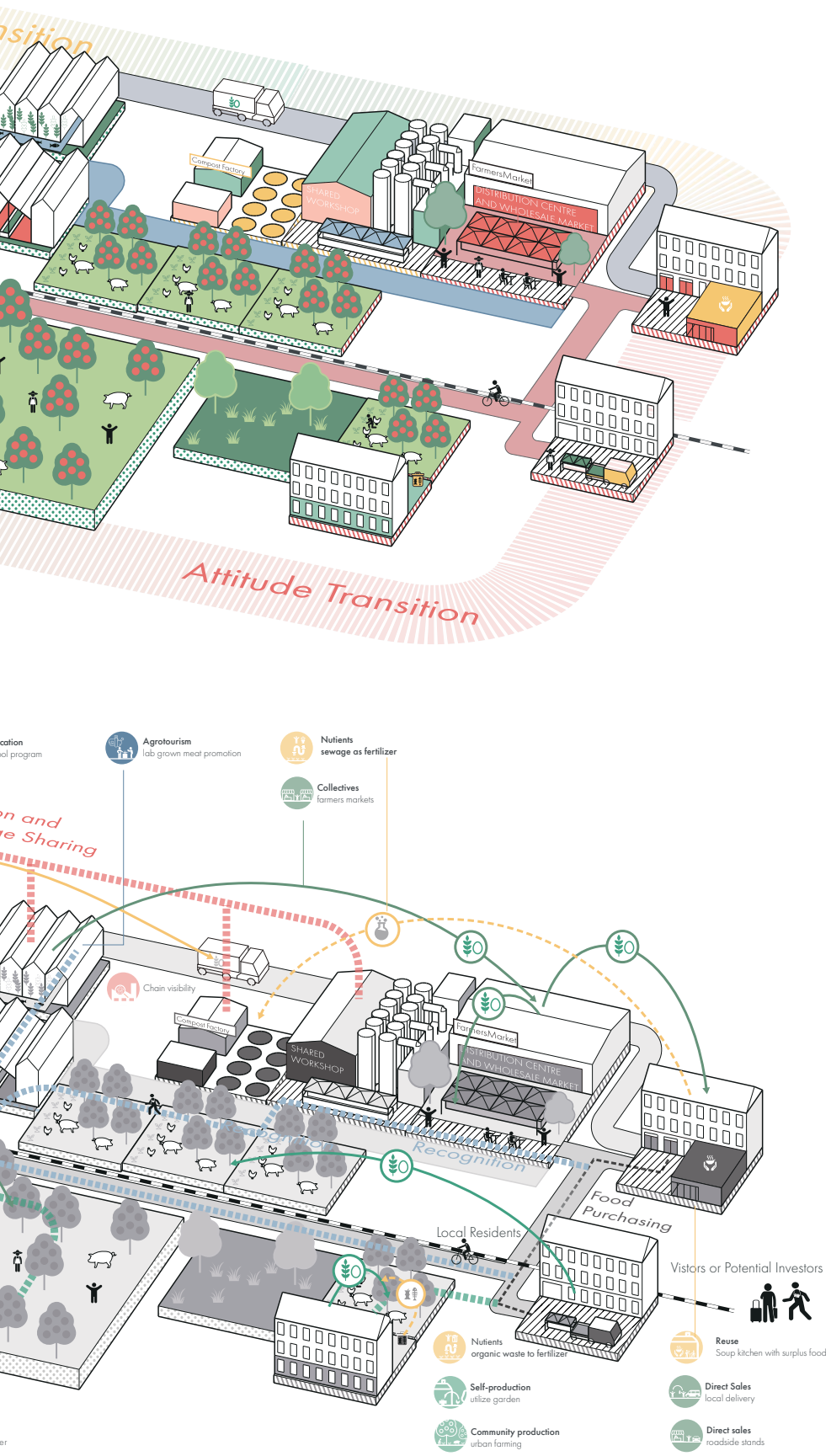


Fig 101: Cicrular system pattern Greenhouses - Small Towns - Rural Area - Pe



eripheral of Large Cities1

Fig. 102: Picture Midden-Delfland (Het Vlakoverpad Eindigt Aan de Schieweg, 2020)

Delft-Rotterdam

strategic project

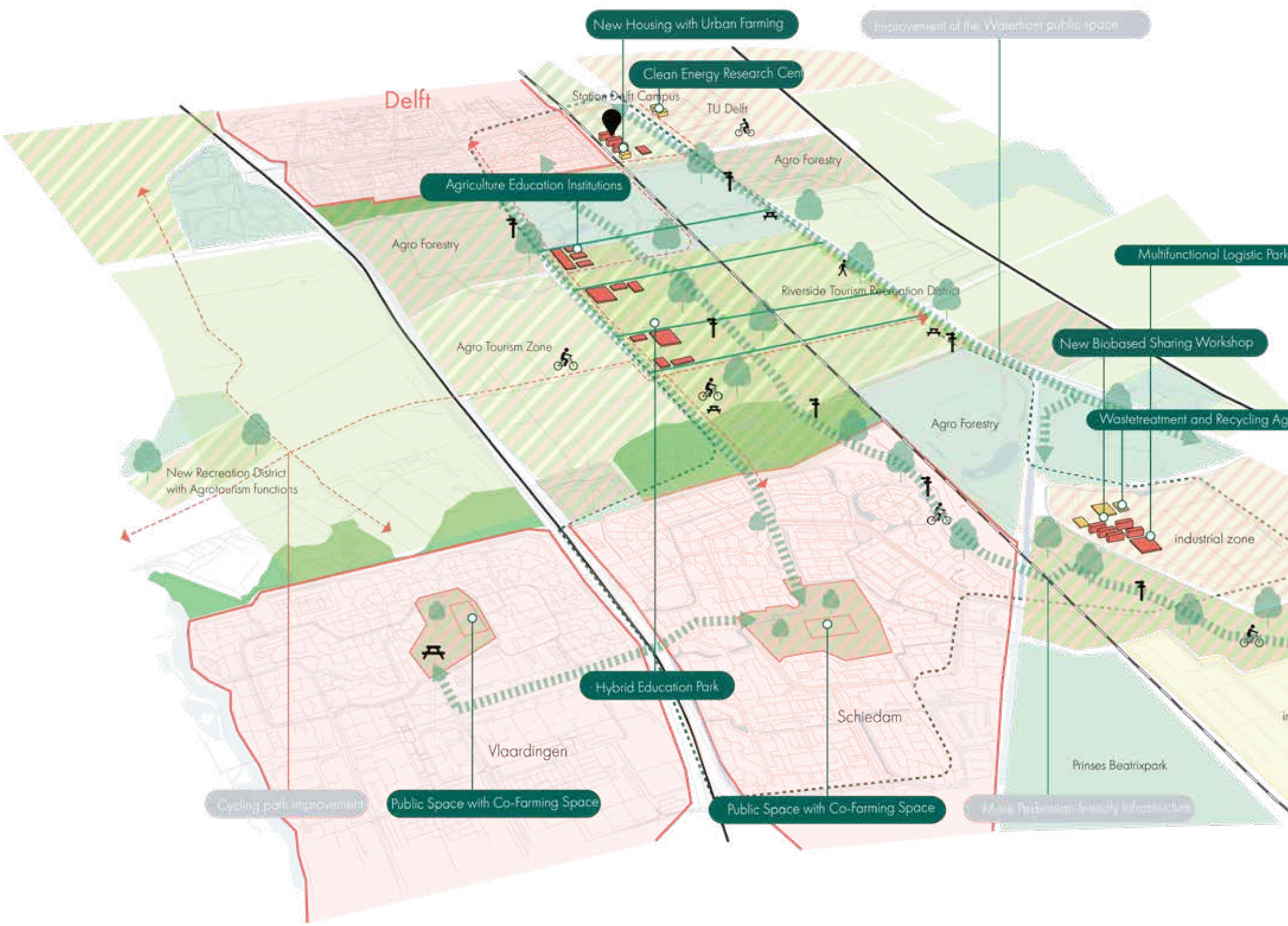


Fig 103: Design interventions Delft-Rotterdam

Design interventions

The project of Delft-Rotterdam corridor will mainly focus on the attitude transition ring. The key transition zone of the design concentrates on improving the connectivity between the two cities while at the same time avoiding the over urban sprawling situation. The city on both sides will grow in a compact pattern. Around the Delft Campus station, new housing will be added along with the urban farming functions, which also closely cooperate with the knowledge institution from TU Delft to have more students and researchers in the transition. In the periphery of Rotterdam, industrial areas will become densified by including new housing, biobased workshop, waste treatment agency and multifunctional logistic parks to change the current monofunctional situation.

At the same time, with the rural territory transit into new landscape according to the diet transition strategies, the new agriculture zone will interwoven with the existing green park. More recreation functions and infrastructure can be added to support the agrotourism route in order to bring people from cities to the rural area and get to know more about the food production. Also, functions such as agriculture education institutions will be cooperating with local HBO or MBO to provide more agriculture education programmes according to the latest cultivation methods. In this way, the in-between area will become a hybrid education park to create awareness.

Delft-Rotterdam

strategic project

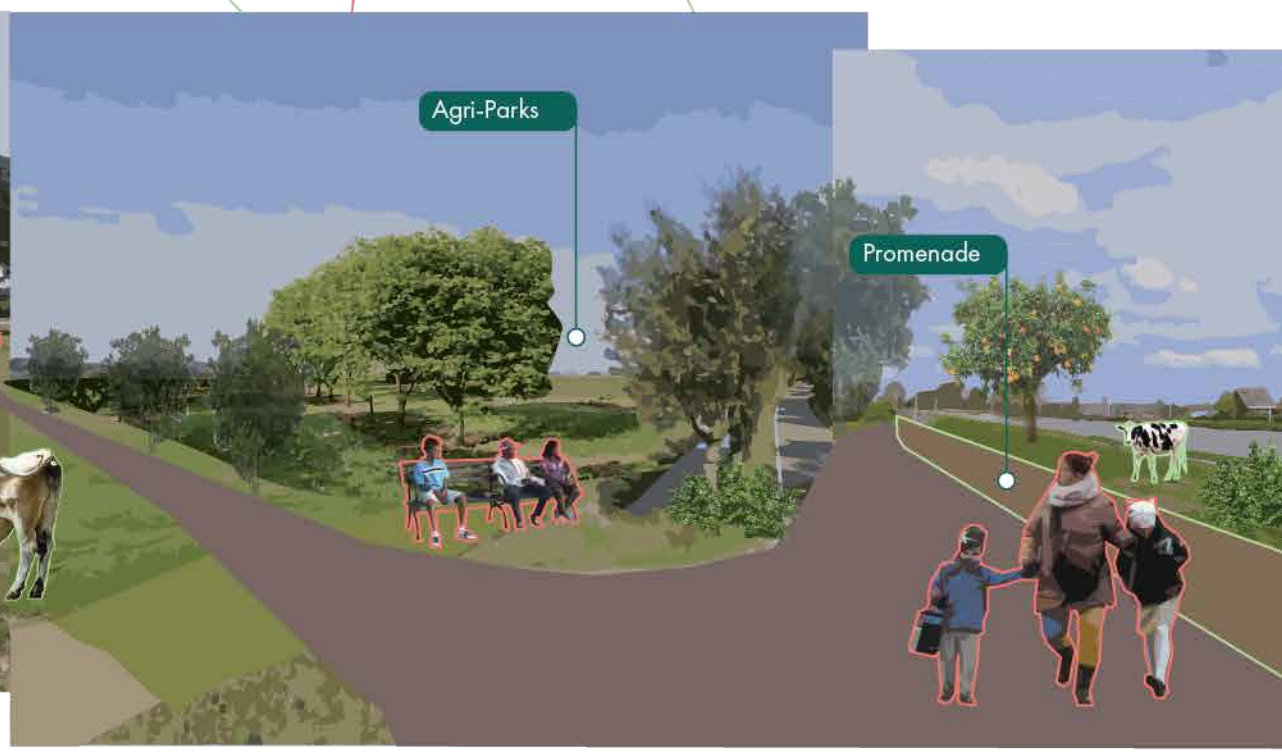
current situation
Zoutveenseweg

transition phase
Zoutveenseweg

current situation
Willemoordseweg

current situat
the River S

farmers work together with tourism companies to
integrate agrotourism into their everyday function
consumers interacting with food



Farmers open dedicate space as public good
Municipalities and tourism companies provide advertising

Fig 104: Impression Delft-Rotterdam

tion
chie

current situation
Schiedam Outskirts

transition phase
Schiedam Outskirts

current situation
Urban Supermarket

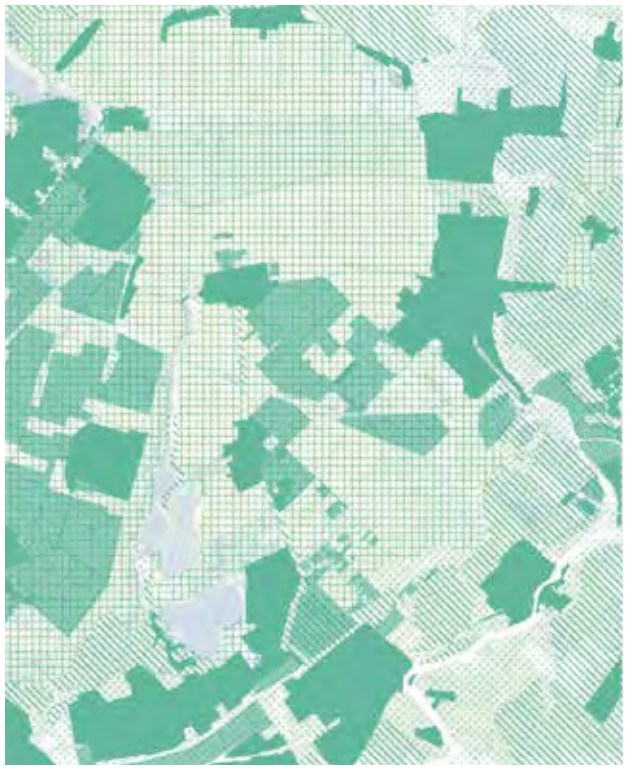
private developers and municipalities work together
to create new forms of urban agricultural spaces,
such as food parks or rooftop greenhouses

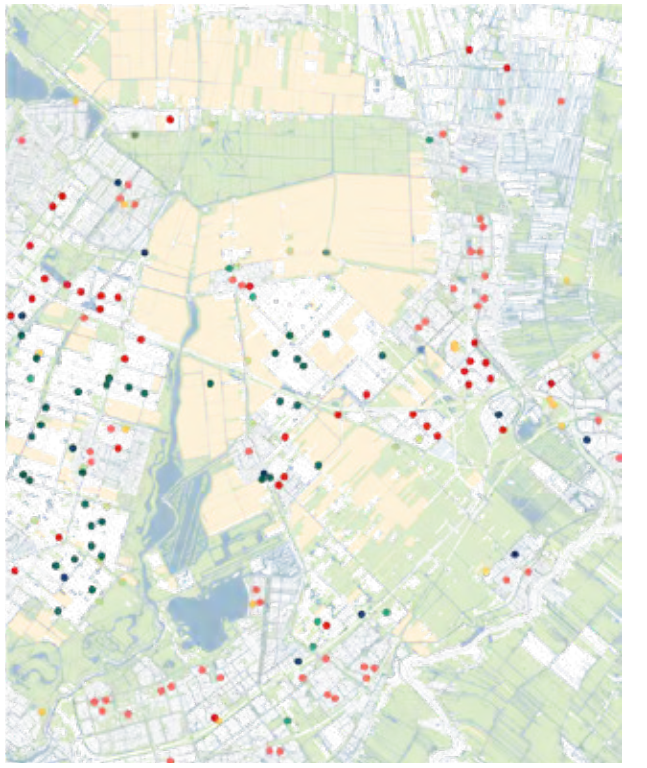
Urban food retailers, such as supermarkets strengthen awareness
to food production in the public space

Zuidplaspolder

strategic project

Zuidplas is a municipality in the province of South Holland. The Zuidplas municipality has a total surface area of 6,4 ha whereof 5,8 ha land and 0,6 ha water. In the municipality of Zuidplas there are 17.847 households and the municipality has 4 residences, 4 districts and 53 neighbourhoods. The average gross annual income for the residents of Zuidplas is 2800, which is just above the average income of Zuid Holland (Informatie gemeente Zuidplas, 2021).





The current conditions

Figures 105-107 show the current conditions of soil, infrastructure and functionalities of the Zuidplas. The Zuidplas consists of cropland or grassland. There are a lot of distribution centres, supermarkets and waste collectors. The Residential areas are surrounded by supermarkets, which is the place where most consumption takes place. Distribution can be found along the highway in industrial greenhouse areas and waste treatment takes place on the edges of the region. Furthermore, there can be found two intercity stations on the edges and highways direct through the areas. The important water routes divide the different cultivation types. The condition map represents the different soil types. It is visible that Zuidplas consist mostly of peat and clay-peat and the greenhouses are built on clay soil.

From left to right

Fig 105: Soil conditions
Fig 106: Infrastructure
Fig 107: Functionality

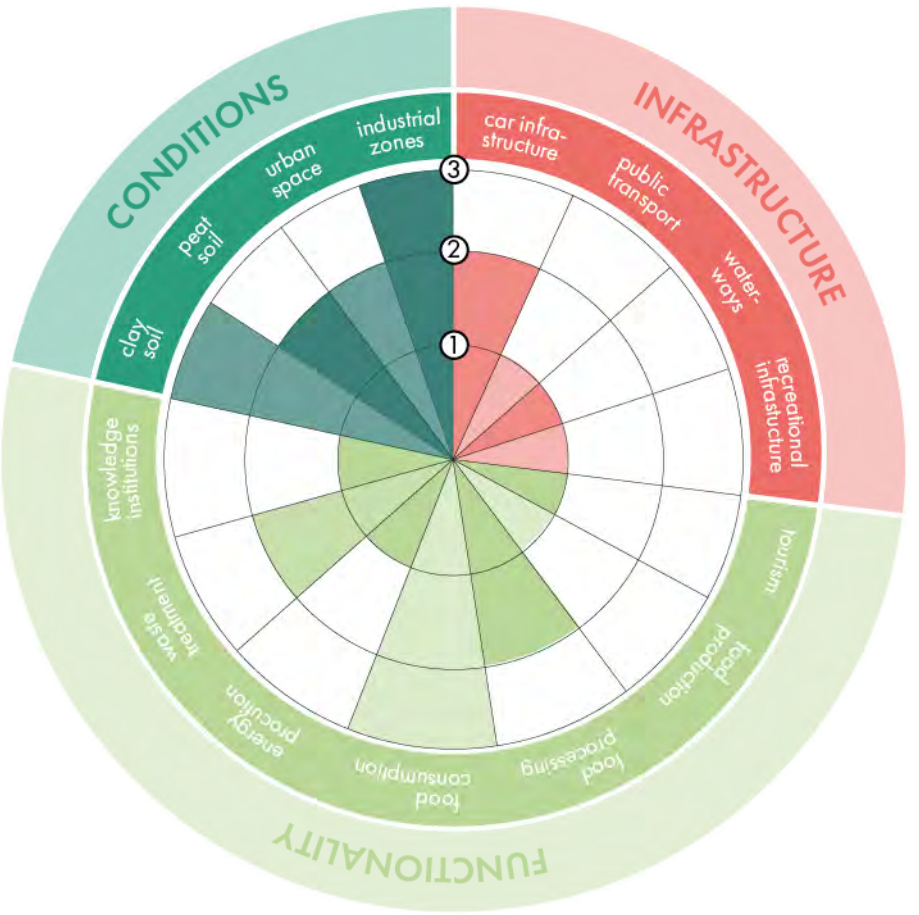


Fig 108: Conclusion tool current situation

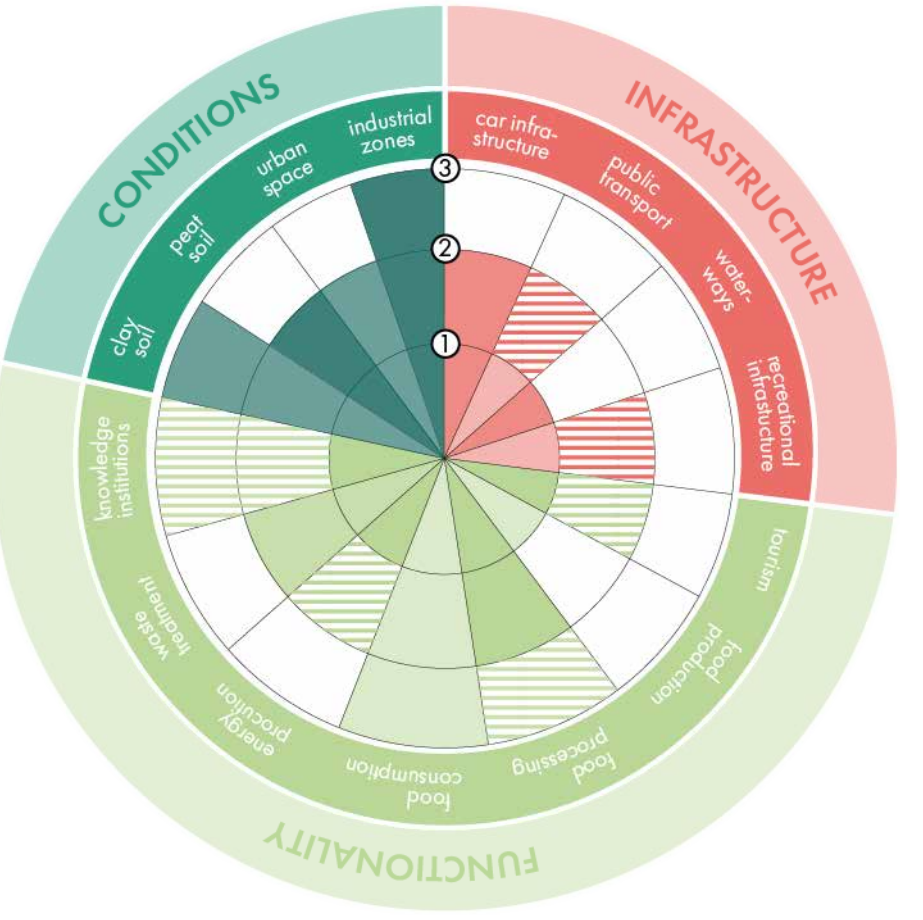


Fig 109: Places for opportunity

① few/almost none
② some/moderate
③ a lot/high

Space for opportunity

In Zuidplas there is space for interesting opportunities, especially for the diet transition and the technical transition. At the moment the area is mostly used for growing crops in greenhouses and at the same time, it is the place from where food and products are being distributed. However, although there are large areas of greenhouses and open fields, it does not fulfil the task of linking local people with local food production together.
Because of the fact that the greenhouses are surrounded by several small neighbourhoods, it also provides a connection that needs to be strengthened. Areas like Bleiswijk, Groeneweg and Lansinghage should be more integrated into the food production system through enhancing citizen's engagement in the local food production process and thus would contribute to diet transition of local people. At the same time, the Eendragt Polder in the middle zone offers a large green space which also shows potentials to add agrotourism functions around it. The recreation area and production area become an ensemble in this way.

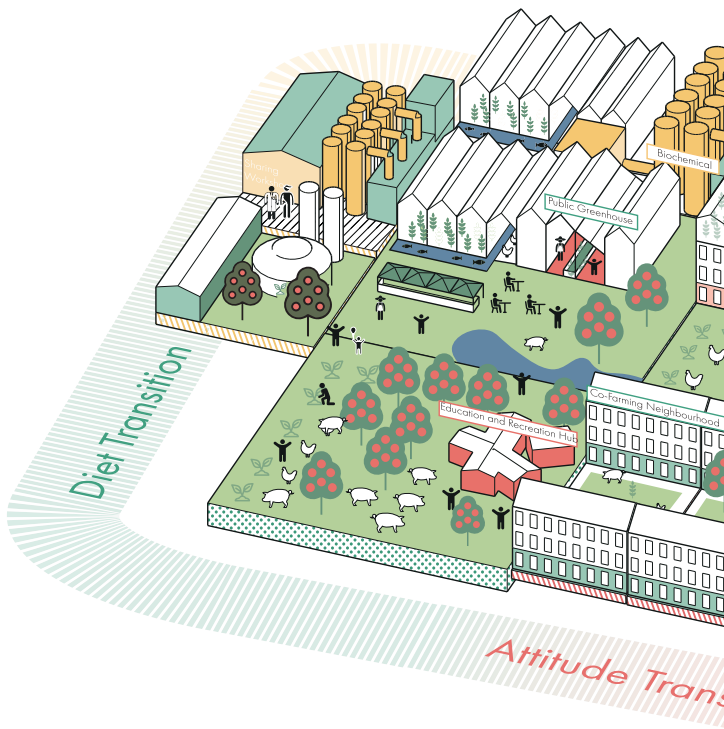
Meanwhile, the threat of intensive energy use in greenhouses production should be addressed through more connections with clean energy and cross-disciplinary knowledge institutions. Different institutions from both the agri-food sector and biobased manufacture and energy sector should also work together on this to stimulate the technical transition in this region.

On the other hand, there is the opportunity to renovate the logistic clusters and industrial areas along the highway to stimulate a better connection between cities and rural areas. Right now there are already good industrial conditions. However, this could be improved by clustering recycling and distribution in a more effective way. The monofunctional industrial areas in this region should be enhanced into more compact multifunctional areas to help the connection between rural and larger cities, which also avoid the excessive urban sprawling and reduce the interruptions to the pleasant environment of the rural inhabitants.

Zuidplaspolder

strategic project

In the strategy chapter, a series of new typologies together with conclusion tools for each have already been made. Here in the strategic project, after identifying the potential for each specific location,a ‘circular system pattern’ is made for them . They are to show how the typologies proposed in the previous chapter can be put together and work in a more circular way through the six categories of interventions according to the contexts each specific strategic project.



Greenhouses—Small Towns—Rural Area—Peripheral of Large Cities

After identifying the current situation and potential for the Zuidplaspolder area, a circular system pattern is designed to link greenhouse areas and the surrounding open field and residential areas. Accounting for the large territory of the existing horticulture system in the whole province, this system pattern is also considered to be transferable to other similar small towns with greenhouses.

This system primarily stimulates the cooperation between new biobased sectors and existing horticulture systems. On one hand, organic waste from the agriculture sector could be upcycled. On the other hand, the residual heat and extra CO2 could be collected and used in the greenhouses. Additionally, another key idea is to link local residents and horticulturists closely by establishing a new co-farming neighbourhood. So people from the surrounding area could not buy food directly from the local logistic centres, but also later on join in different activities such as helping the farmers on a regular basis or harvest in person.

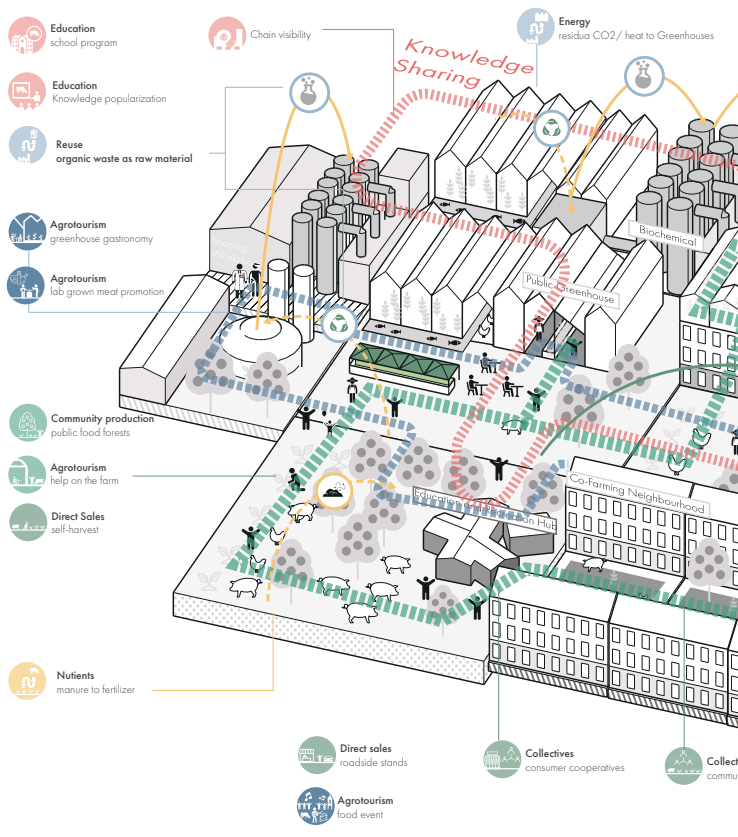
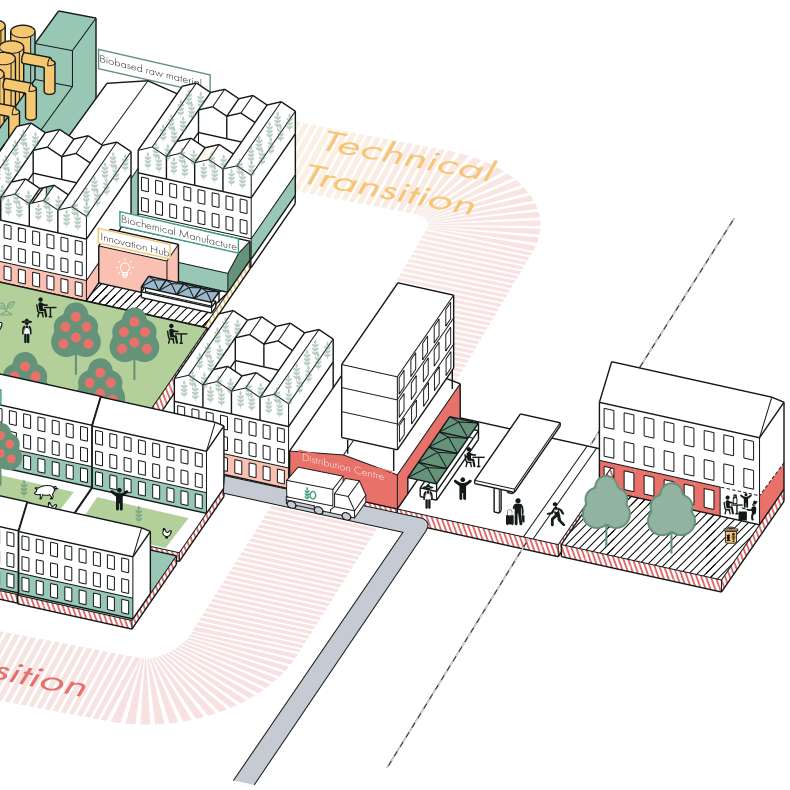
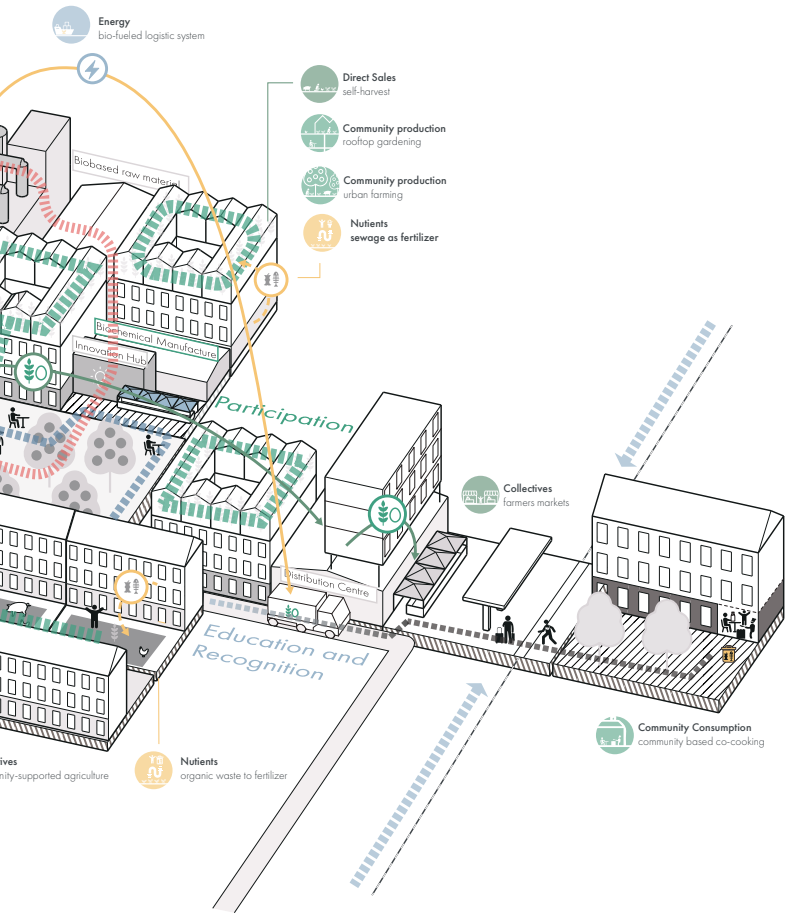


Fig 110: Cicrular system pattern Greenhouses - Small Towns - Rural Area - Pe



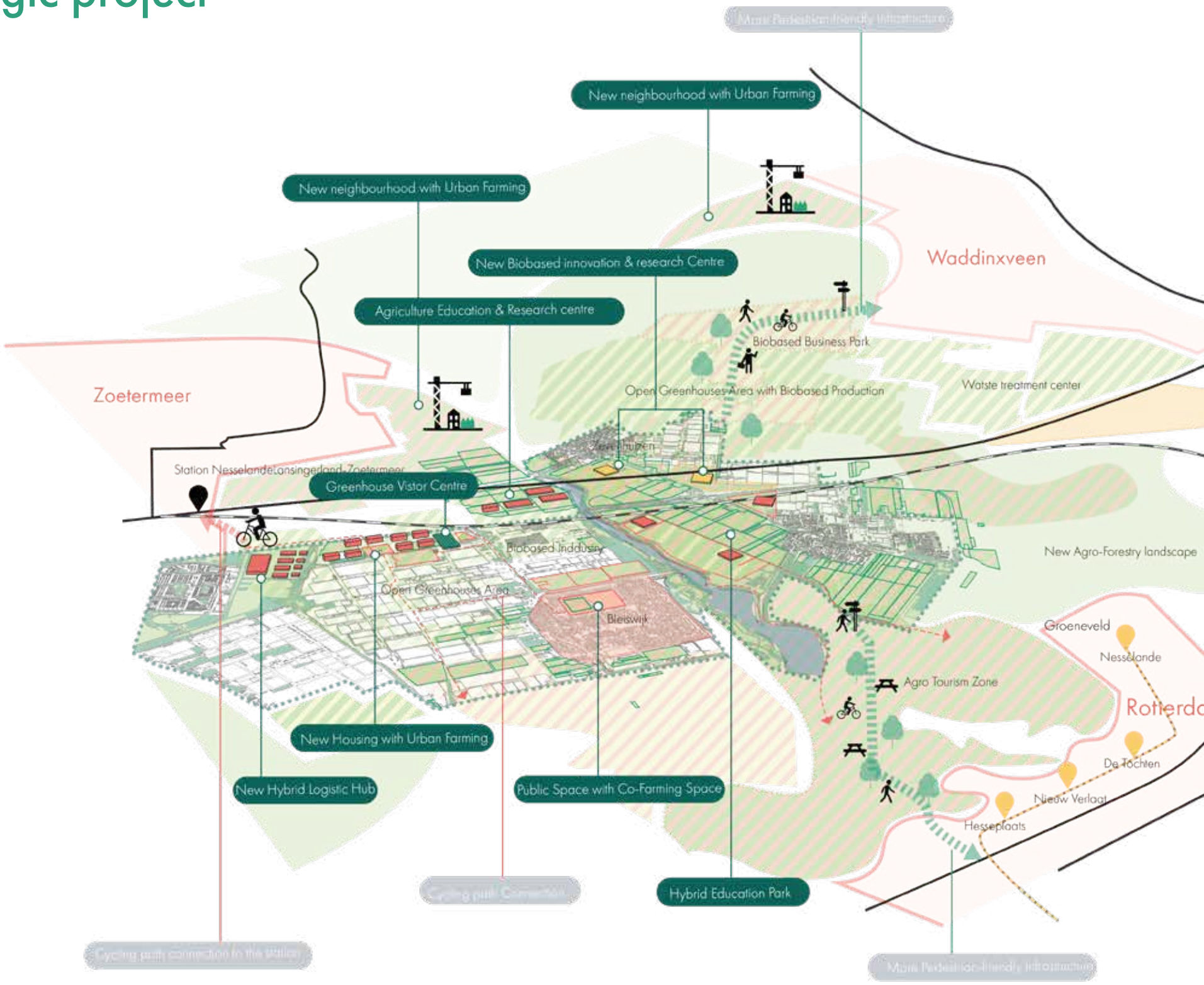


eripheral of Large Cities

Fig 111: Zuidplaspolder ([[Dorpen in de Zuidplaspolder]], n.d.)

Zuidplaspolder

strategic project



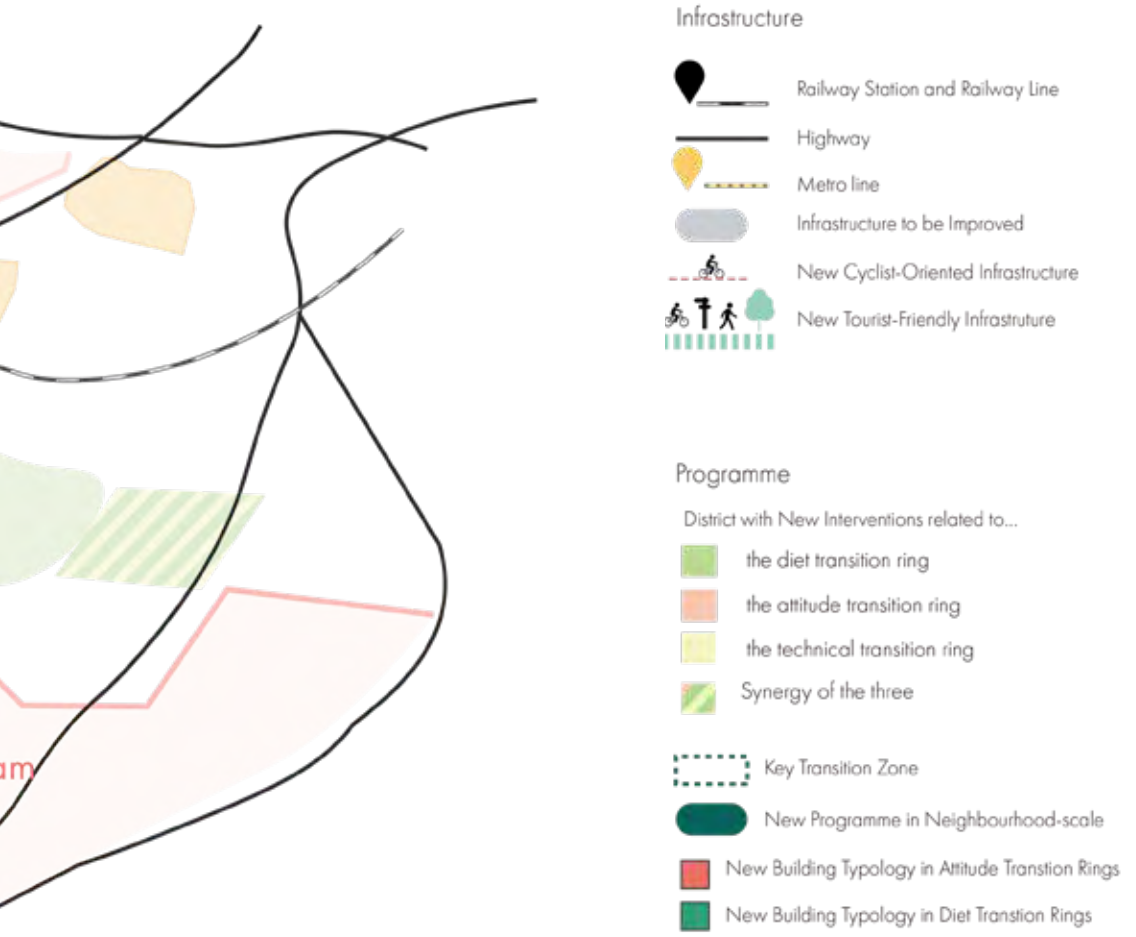


Fig 112: Design interventions Zuidplaspolder

Design interventions

In the project map on the left, the main focus is on the greenhouses area around Bleiswijk as a key transition zone to show how the circulatory system pattern works according to real context. But meanwhile, the way of linking this zone together with Zoetermeer, Waddinxveen and Rotterdam through different types of infrastructure is also taken into account.

Within the key transition zone, there will be a new research centre for both agriculture research and biobased innovations. This helps the cross-disciplinary knowledge sharing between these two sectors and thus supports the surrounding agriculture practice and biobased manufacture. On the western part of the waterway, new public space and co-farming space will be added in Bleiswijk, together with the new cycling network through the surrounding greenhouses area. This helps to interweave the town and horticulture area together, which also road-stands and direct sales from farmers.In addition, new housing with urban farming and new hybrid logistic hub will be established around the previous industrial area next to the intercity public transport station Lansingerland-Zoetermeer. With this change, the city will expand in a more sustainable way and citizens could also rely more on public transport and transit towards a healthy diet and commuting pattern.

Meanwhile, more educational and recreational functions will be added in the open field area on the existing open field area around Zevenhuizen, which could later on be linked with waddinxveen through biobased business park and with Rotterdam with agrotourism route.So the territory could gradually be merged together and encourage the mutual understanding between consumers and producers.

Zuidplaspolder
strategic project


Current situation's
Logistic Centre Zoetermeer


Pop-up Market

transition phase's
Logistic Centre Zoetermeer


current situation's
Greenhouses in Bleiswijk


current situation's
Logistic Centre Bleiswijk

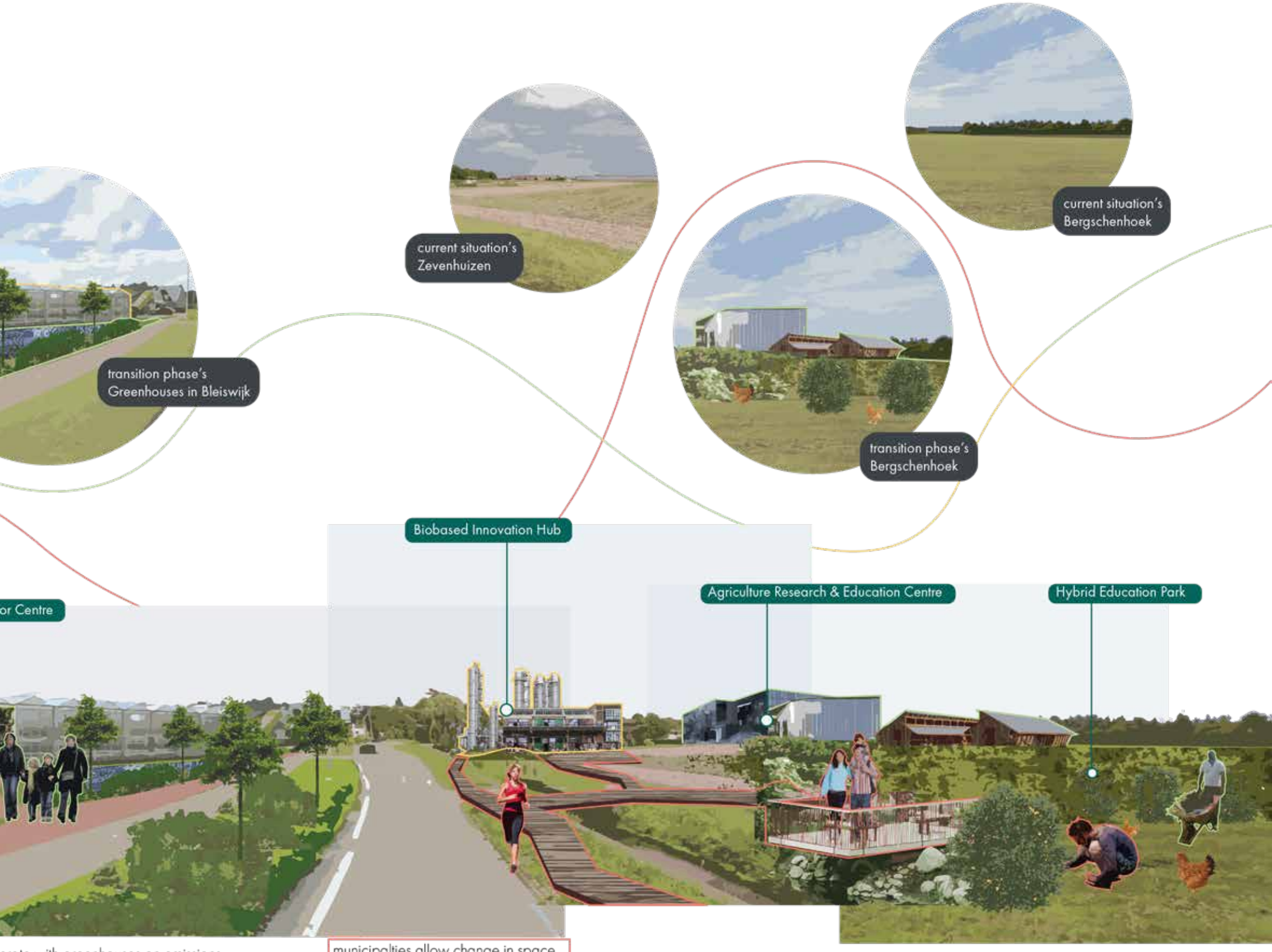

Farmers' Market

Hybrid Distribution Centre


Greenhouse Visit

Flexible Zoning Policy For Logistic District
Farmers and wholesale companies work together
Consumers get easier access to local food
People buying food directly from farmers

Energy companies coop
Greenhouses open to pu
Farmers and tourism com
Consumers interacting wi



erate with greenhouses on emissions
blic
panies work together
th food

municipalties allow change in space
farmers turn to new cultivation method
agriculture research centre contributes to knowledge sharing and education
new tourism infrastructure PZH and municipality
farmers have close interaction with new biobased industry
consumers helping on the field

Fig 113: Impression Zuidplaspolder

Dordrecht

strategic project

The municipality of Dordrecht has a total surface area of 9,9 ha of which 7,8 ha is land and 2,1 ha is water. Dordrecht has 55.014 households and consists of 1 residence, 13 districts and 129 neighbourhoods (Informatie gemeente Dordrecht, 2021). The average gross annual income for the residents of Dordrecht is €25.100, which is below the average income of South-Holland (Informatie gemeente Dordrecht, 2021).

From top to bottom

Fig 114: Soil conditions
Fig 115: Infrastructure
Fig 116 Functionality

The current conditions

Figures 114-116 show the current conditions of the soil, infrastructure and functionalities of Dordrecht. Dordrecht consists mostly of agricultural land and grass fields. There a lot of supermarkets around the city centre. In the northeast are mainly livestock farms. In the southwest are the crop farmers. The waste collectors and the waste processors can be found around the river. Besides the livestock and crop farmers, the industrial sector plays also a very important role in Dordrecht. The industrial zones are a very present part of the environment but are not interwoven with the urban and the countryside.

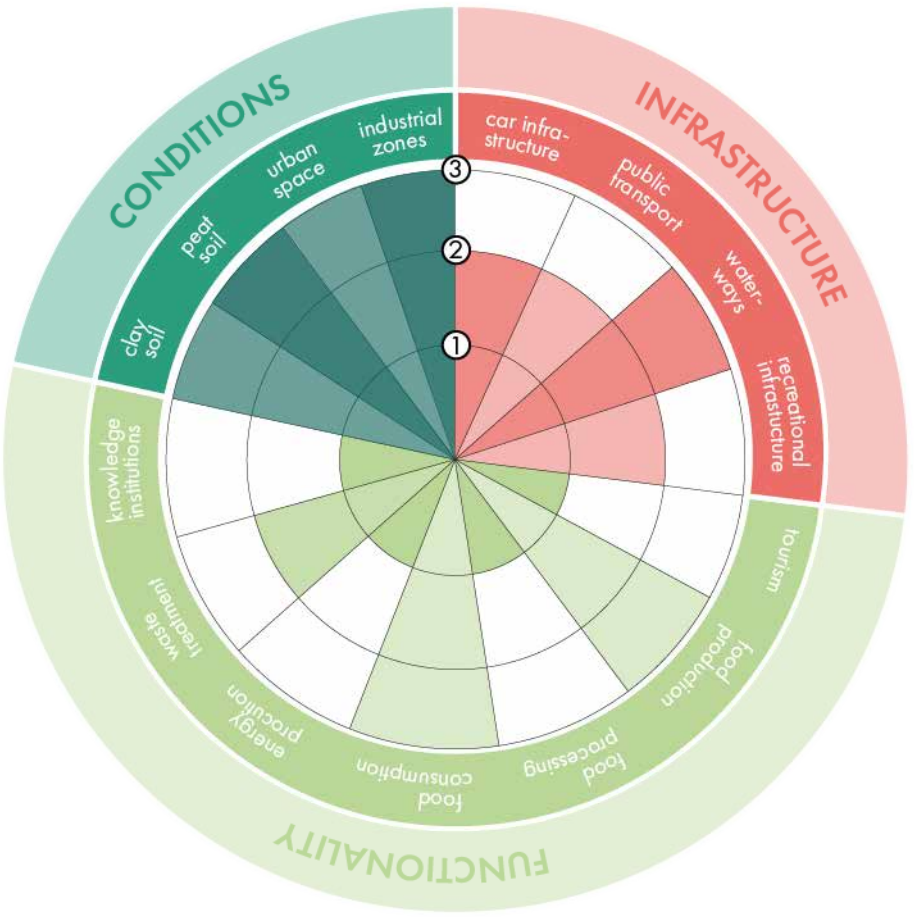


Fig 117: Conclusion tool current situation

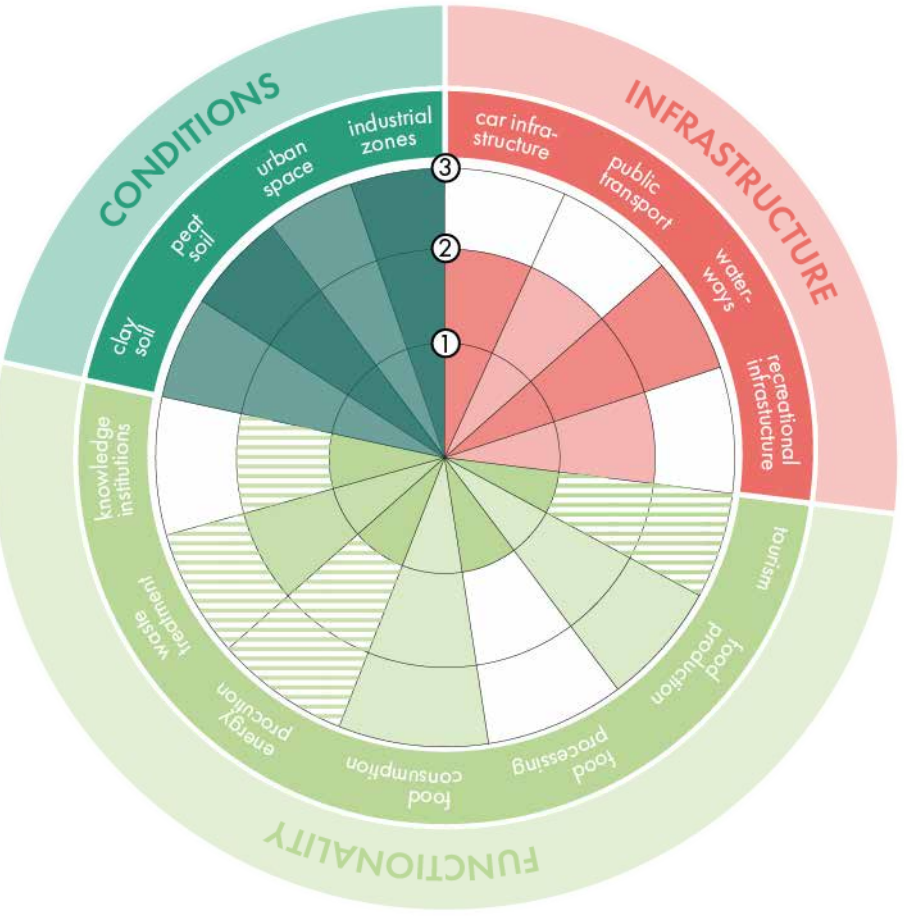


Fig 118: Places for opportunity

① few/almost none
② some/moderate
③ a lot/high

Space for opportunity

As we already mentioned in the current condition analysis, Dordrecht is a historical city with good waterway connection with the Dordrecht inland seaport. Meanwhile, it neighbours the large scale of dairy farming territory on the north, while also has close connection with the clay landscape on the south.With these plenty functions within city and on the port, and various soil type conditions in the rural areas around, Dordrecht has much potentials to develop through three transition rings.

Firstly, Dordrecht will work with agriculture institutions to stimulate different farming types on both sides to transit towards new cultivation methods, so a certain amount of agriculture education and research function should be considered in the city. Also, the proximity to different types of farming to the urban area gives it much potential to arrange more direct sales and community based co-farming. In the technical transition ring, With well-developed infrastructure of both waterway and land transportation, seeing various landscape across the city through new agrotourism routes bring opportunities to the tourism business, which can be in the long run included into the local regular sightseeing route if the connectivity of cycling paths through different area could be strengthened. This could not only impact the diet and attitude for local residents, but also create value change for tourists from outside this area.

In addition, the port of Dordrecht could also play an important role in technical transition. Due to the fact that there are not so many bio based companies on the port of Dordrecht compared to the port of Rotterdam currently, it is wise to firstly launch start-up and innovation hubs on biomass and biobased material and gradually make the transition.It should be wise to keep in mind that this process needs close cooperation and knowledge sharing with more than just the port of Rotterdam, but also with the agriculture innovation sector and local farmers to upcycle different types of organic waste from nearby farming areas into value.

Dordrecht

strategic project

In the strategy chapter, a series of new typologies together with conclusion tools for each have already been made. Here in the strategic project, after identifying the potential for each specific location,a ‘circular system pattern’ is made for them . They are to show how the typologies proposed in the previous chapter can be put together and work in a more circular way through the six categories of interventions according to the contexts each specific strategic project.

Dairy farming—Port—Medium-Sized City

This circular system mainly focuses on how livestock farming connects with energy and meanwhile how dairy products reach the consumers in a more direct way.

On one hand, dairy farmers work with energy sectors on the port. The manure of the dairy cow will be gathered and recycled into a biomass production plant nearby. After the methane production, the residual part with phosphorus and potassium will be further utilized in fertilizer production manufacture, which also cooperates with the sewage treatment sector. On the other hand, dairy farmers could change into a new circular profit-model through recreation functions on their dairy farmland, where food consumption and production can be directly linked and local people can regain their attachment to dairy farming. Dairy farmers can also cooperate with local food delivery websites or nearby communities to arrange regular delivery of dairy products to build a close relationship with residents in the city.

Meanwhile, there will be soup kitchens in the city centre area to reduce food waste. For the logistic center near the port area, there can be improvement in public space quality and also more space sharing with functions as wholesale markets, so citizens can buy food directly from farmers and meanwhile reduce carbon footprint by reducing the overall logistic transport distance for dairy products.

Agroforestry—Port—Medium-Sized City

The current open field space will change into agroforestry according to the diet transition intervention strategies, which already bring in much circularity for the system.

Meanwhile, the added value from the agroforestry should be explored through new education centres and agroforestry routes, which allows both tourists and local residents to participate in food production. More residents might thus help more on the farmland and engage in community co-farming, which also helps close the chain.

Moreover, in this system, biobased innovation hubs could closely work together with local agroforestry farmers to deeply explore the potential from the different types of organic waste and also help the old port industry to make the technical transition.

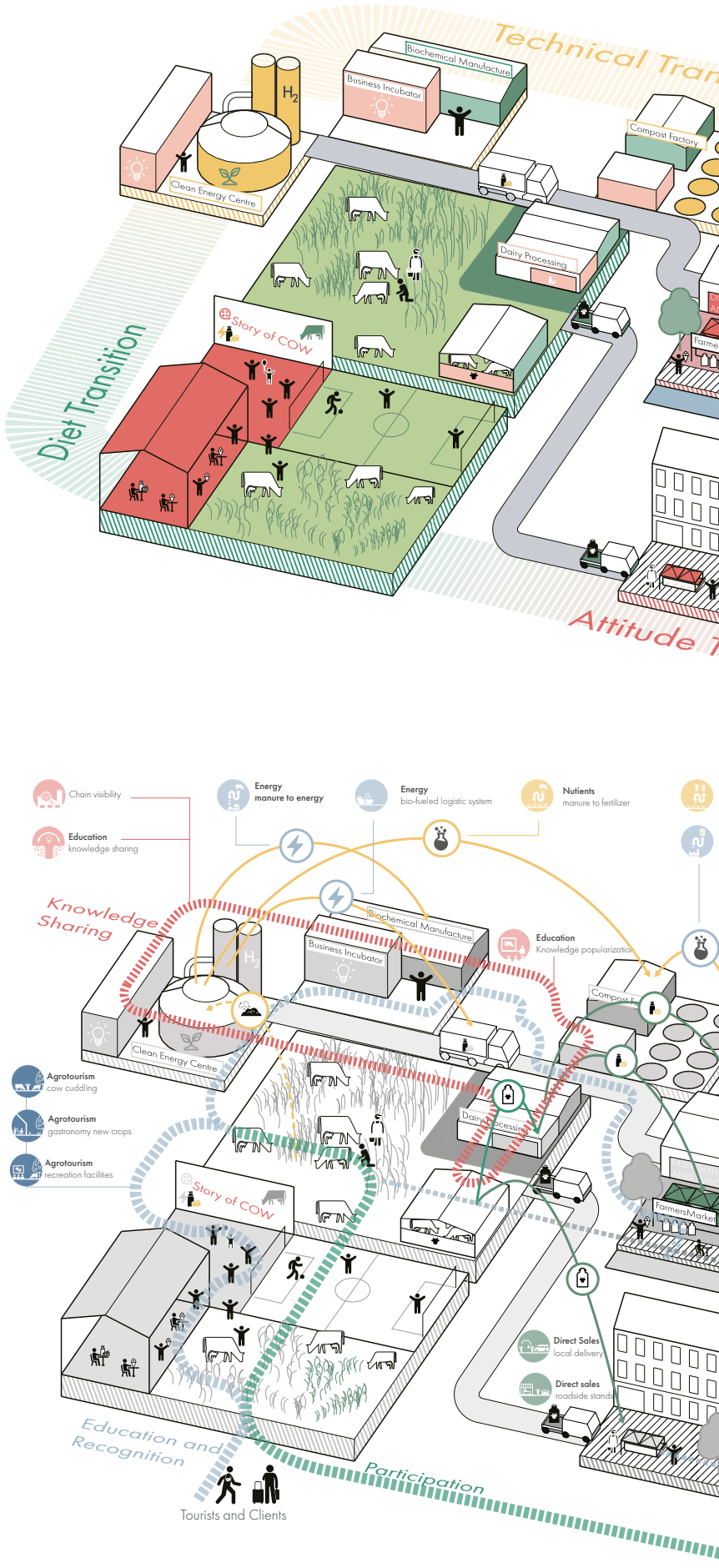


Fig 119: Cicrular system pattern Dairy farming - port - medium sized city

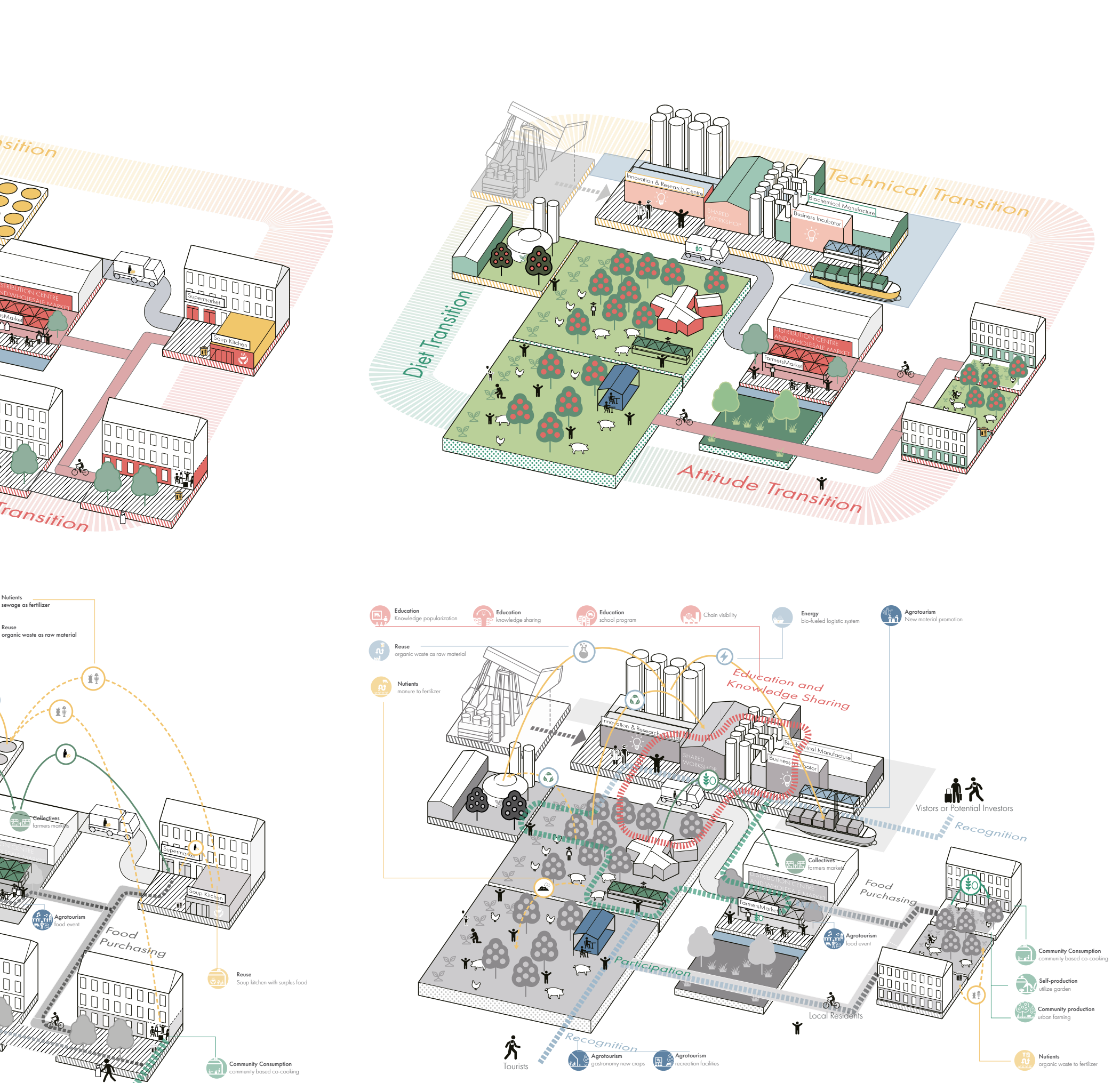
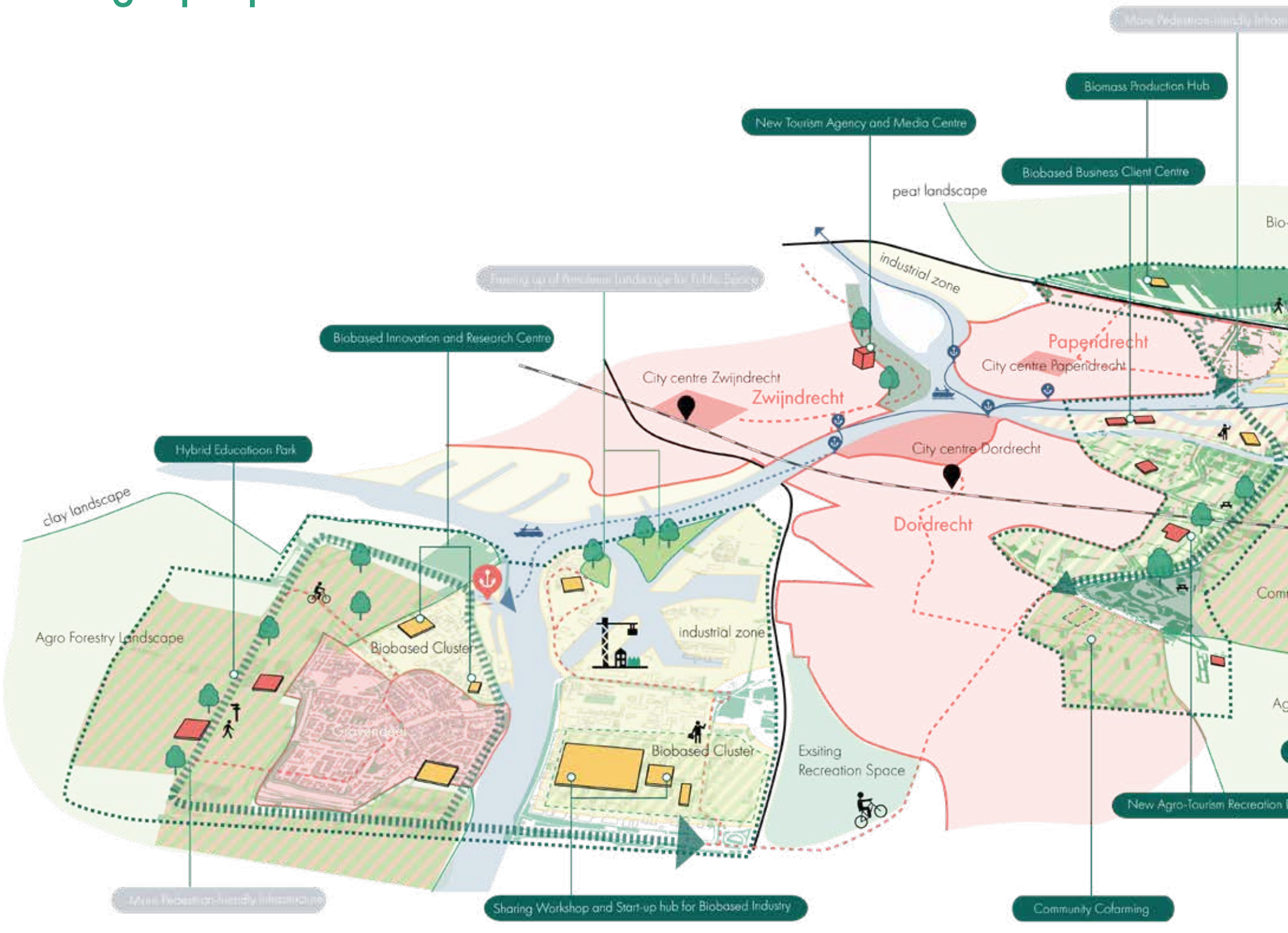


Fig 120: Circular system pattern Agroforestry - port - medium sized city

Dordrecht

strategic project



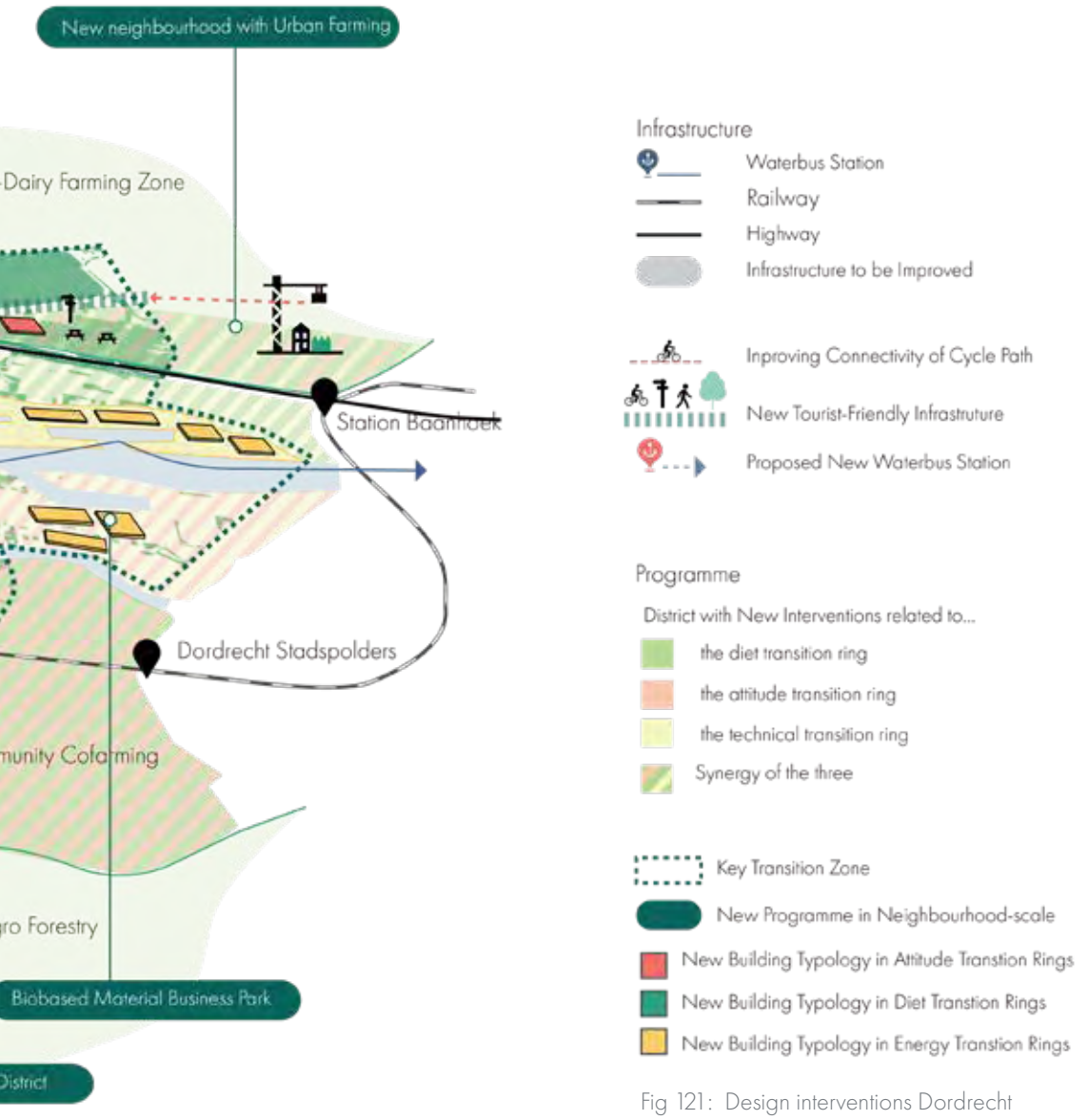


Fig 121: Design interventions Dordrecht

Design interventions

In the project map on the left, we show how the circulatory system pattern of transition zones mentioned previously can be implemented in the real context. The two 'key intervention zones' are the potential area to implement the circular patterns in the previous page.

In general, urban areas will be more interwoven with nearby rural areas through the green belt of new agrotourism recreational districts, new densifications of co-farming neighbourhoods, and different kinds of public facilities and new programmes in the city outskirt.

These key transition zones will also go through the biobased business park districts around the port area. There will be public functions like client centres, living labs for innovations or sharing workshops for start-ups, and thus the whole business park could be more open to the public. This improvement could support the port area and manufacturing sector to speed up the technical transition and at the same time help to create the awareness of the energy transition in the whole city.

Furthermore, more infrastructure will be improved according to the need for an agrotourism route to make sure the connectivity between different zones is friendly enough for cyclists and pedestrians. In this way, farmers, livestocks, researchers, tourists, potential investors together with local residents in Dordrecht could not only see but also make the transition happen jointly.

Dordrecht
strategic project

municipalties allow change in space
farmers turn to new cultivation method
new tourism infrastructure PZH and municipality
farmers and tourism companies work together
consumers interacting with food

research institutions suppo
energy companies turn to
farmers have close intera

ase
drecht

current situation
Dordrecht

current situation
Alblasserwaard

transition phase
Alblasserwaard

Bio-mass

Community farming

Livestock recreation

ort close-by
biomass
ction with energy companies

municipalties designate space
consumers interacting with food

municipalties allow change in space
farmers turn to new cultivation method
new tourism infrastructure PZH and municipality
farmers and tourism companies work together
consumers interacting with food

Fig 122: Impression Dordrecht

CONCLUDING LIV/FE TRANSITION

looking back on the project and goals

in this chapter

Phases and goals
Stakeholder engagement
Timline of Liv/fe Transition
Typology of interventions
Strategic projects

Assesment
Liv/fe Transition

In this portion we reflect on the SDGs that are most relevant to Liv/fe transition and how these goals are achieved. There are the six most important goals that coincide with our vision but nearly all are in some way aided by other elements, considering our design is highly social.

2. Zero Hunger
We ensure local food security can be achieved without dependency on international or even the national elements. We also combat food waste in soup kitchens as part of a reuse strategy.

3. Good health and well-being
A healthy diet with all the necessary nutrition and minimal spatial impact is introduced. The engagement of people in the agricultural chain creates a healthy living environment.

4. Quality education
One of the main goals is allowing equitable access to education about food and agriculture while promoting a sustainable diet and cultivation methods. Education engages people in agricultural production as a key point in their curriculum.

6. Clean water and sanitation
The design secures access to water by reducing subsidence and creating more space for aquaculture.

7. Affordable and clean energy
Livestock is seen as a vital part in the energy transition. Residual heat flows are reused and hydrogen is extracted from manure. There's also more financial incentive for farmers to become more sustainable when the food is bought by local citizens.

8. Decent work and economic growth
The diversification of agricultural areas brings more revenue to farmers and the functional expansion of the city gives opportunities for local growth and small businesses. Farming will have a higher added value and a more stable income when food is sourced locally.

9. Industry innovation and infrastructure
We foster innovation by allocating places for research and implementation. The technical transition allows circular industrialization in the agri-food sector.

10. Reduced inequalities
The injustice to farmers caused by the disconnect between producers and consumers is improved greatly by giving them social and economical value.

11. Sustainable cities and communities
The transition zone creates resilient communities in both a social and ecological way, while Introducing new typologies of buildings and public space that connect people to part of the chain in circular ways.

12. Responsible consumption and production
By engaging and educating people about food consumption and production, attachment to food can be created, aimed at encouraging more responsible and sustainable choices. The food chain will become circular by connecting flows from consumption back to production.

13. Climate action
Lowering greenhouse gases emissions in the livestock, horticulture and energy sectors by connecting them in new circular ways. We are reducing emissions by shortening the chain and buying food locally by replacing the high export import ratios.

14. life below water
Biodiversity underwater will rise in the cultivation areas where aquaculture farms regional fish and endemic species are grown for fodder.

15. life on land
Sustainable cultivation methods halt land degradation and help soil recovery. For example, agroforestry protects biodiversity by farming in an ecological way.

17. partnerships for the goals
The role of South-Holland changes from the export instead of goods to that of knowledge, forming new coalitions locally instead of internationally so no stakeholder in the agricultural chain is left behind.

Conclusion

Liv/fe Transition

The South Holland agri-food sector covers half of the province's surface. This shows that the sector is an important driver of prosperity and innovation in the region, but at the same time it produces vast negative environmental externalities like polluted soil, subsidence and green gas emissions. Inputs such as soy, fertilizer, antibiotics, and pesticides generate a variety of serious ecological disturbance. In alignment with a dedicated national agenda, the province of South Holland, therefore, seeks for the agri-food sector's transition towards a more circular system. This circular economy is in balance with the environment, using materials to complement sustainability in all three pillars- environmental, economic and social. This can be accomplished by sustainable development towards circularity, taking into account that all three pillars of sustainability are represented.

Achieving this circular economy, sustainable relationships are needed which result in cooperation for the longer term. Forming new relationships will result in an exchange of different values, which can result in change. The main challenge in the current relations in the agri-food systems are the separate interests. The relationship between consumer and producers should be improved, but also the relation between governance and farmers. Besides, it is very important to create a new synergy between the technological sector and the consumption and food production sector. Proper design, policies and stakeholder engagement influence value change of the food system.

The livestock sub-sector is closely linked with other key industries. Primary agriculture is closely intertwined with other parts of the economy. Agriculture production is hardly possible without the supply of goods and services, processing and distribution. The Dutch livestock sector has been under a lot of criticism recently, due to the current manner of utilization of land by livestock farming, which is exhausting the quality of both air and soil, being wasteful in the land, water and energy. The sector will become more circular when reusing raw material, using energy from livestock, creating fertilizer out of waste streams, creating agroforestry instead of monoculture and more.

In South-Holland, there is dairy farming, floriculture, fruit & vegetables and croplands. Right now, the people who live in South-Holland consume about three times the amount of agricultural space that is available for them. The three food categories which are eaten the most are grains, meat and fruit. This needs to switch to a healthy diet that gives every inhabitant the nutrients they would need. To switch to this diet the relation between consumption and production needs to be improved, because they are strongly related to each other in supply and demand.

The goal of Liv/fe Transition is to link consumers and producers in new circular ways while also creating awareness for value change. To achieve this the new sustainable chain of livestock production needs three transitions: the diet transition, the attitude transition and the technical transition. Allowing natural conditions to flourish, making livestock part of a valuable agri-food system, boost the local economy, increase awareness between food producers and consumers will all lead to value change we are seeing, experiencing and using livestock as a valuable part of a recognized sustainable circular food system is the key point.

Discussion
Liv/fe Transition

In a project that is about transforming values into practicalities, ethical questions intrinsically come attached to both the presupposed assumptions we made in deciding on these values, as well as in the course of action chosen in order to achieve these values, and the consequences attached to the actions taken in order to achieve them.
Even supposedly "good" or "correct" aspects of intervention, such as ecological sustainability or circularity come with their own downsides, positively affecting some participants in space, while damaging others.

Given such a complex reality, the best ethical guidelines for making correct decisions were deemed to be simplistic ones, asking ourselves at every decision what would help the most and hurt the least, what is preventable and what is inevitable.
One of the key decisions of the project - limiting the production of livestock products to local consumption, while also drastically limiting international exportation, was also processed through that prism, and deemed to be an action that would harm the few who are currently benefiting from exporting goods overseas, while it would aid everybody else living in South Holland in having a healthier environment and greater freedom of space.

That decision however, would not simply cause the elimination of the pollution generated by livestock production completely, but would instead likely push it elsewhere, into another region of the world where its people have less agency over their spaces and practices, compared to the progressive and socialistic state in the Netherlands.
And so, the straightforward solution of championing for the common people of South Holland,improving their diet and expanding their agency over its space, may cause other people in weaker political settings to lose their agency and damage their environment concurringly.

What was learned from dealing with a space this size, contextualized with such a complex and intricate angle such as a region's economics, is the butterfly effects that are intrinsic with making such large scale movement towards change in space, as it is attached in a complex tangle of interlinked elements that would all be transformed as well.
And so, it is important for the planner to understand that in the act of redesigning one element of the chain, is in actuality a redesign of the whole chain as well.

Intentions that are superficially "good" are in fact subjective and relative to our own standpoint and way of viewing things, but are not absolute or universal. In all cases, someone wins out and someone else loses, and every change brings about an end of something else, which matters to someone, somewhere.
Our ethical conclusion is not only in the viability of circularity, or in the importance of ecology, but rather in the subjectivity of a vision to enact change, and in the great responsibility and care that should be taken when aspiring to translate that vision into consequential action.

Recommendations
Liv/fe Transition

Although our examination of the agricultural sector touched upon its connection to other meaningful sectors such as the makers industries and the medicinal one, both heavily reliant on plants and livestock by products, we did not sufficiently explored what role they might have in establishing better connections between agriculture and infrastructure, and perhaps they could also contribute something meaningful within the new shared spaces we propose.
Also, these industries might be affected both positively and negatively from drastic changes in production scale, and we have not presented answers as to that effect within this project.

We predicted and proposed a diet change that would create shifts within the production of food, but questions of scale and time arise out of this notion.

How fast and how extensively would people take to that change? would all layers of society adopt it as heartily? and if not, will it be another social marker charged with geo-social or even political implications if, for example, Netherland born populations fully adopt the change, while more traditional or religious sectors reject it?

Such a change would mean a better situation to the average livestock farmer, but also a smaller amount of farmers overall. With a downsizing to livestock production, what would happen with the remaining farmers and farmsteads? would they switch over to plant based production? or perhaps other changes are also possible in both space and in the lives of these farmers?

As stated in the ethical text, with the limitation on export of livestock based food abroad, would there be an adverse effect on other people in other countries? or could this project be a marker that is replicable in other situations in other places, vastly different then the Netherlands?

Ofcourse, a change so vast and complex cannot be fully explored and fleshed out in several weeks of university work, and not all questions can be answered.

A process such as this would typically require many years of work and vast arrays of various experts and stakeholders all voicing their opinions and needs, participating in building an intricate picture of how best to exact change in a sensitive and accurate way that would accommodate as many as possible, rather than focusing on an approach to a solution so fast. However, we found value in creating a vision and approach from an analysis that was open minded, and truly based on the processes that we recognized while working, rather than holding on to a preconceived notion, trying to prove it.

Our recommendation, and takeaway from this project is to approach decision making with that attitude. For anyone intrigued by the idea of bringing disparate systems together, be it in South Holland or elsewhere, we recommend to strive towards as broad an outlook as possible, work hard in understanding all elements in play and all perspectives of the various stakeholders in participation and recognize the trends and interactions that connect them all together. From this answers and directions of action reveal themselves, and acts of connection can be more effective and meaningful and responsible.

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APPENDIX

in this chapter

Individual reflections

Interviews

Individual reflections

Liv/fe Transition

Jannine de Jong - 4672801

In the proposal of Liv/fe transition an attempt was made to turn an environmental and societal problem into an urban assignment. The issue of the livestock sector actually hits home for me personally: I was raised on a farm, but feel more connected to urban life. However, the focus that was chosen for Liv/fe Transition was one that for the whole group felt like something that was close to their heart, all having a relation to food. We used this personal connection to move forward in the project by assessing the things we know about the agri-food sector, using legitimate sources, but also by exploring aspects that we were uncertain with. Doing this we uncovered that consumption and production can be linked closely together.
The question that I tried to answer in this project with the group was: How do the stakeholders relate to each other and how can they be engaged? As there is a close personal connection to livestock farmers, the intensity in which stakeholders react to change is familiar. The theory of Kotter's 8 step change was a useful tool in understanding that complex changes should be handled with care. South-Holland has the unique position to include the 3 cores of the discredition of livestock farming: the farmers, a high intensity of consumers and governance. Understanding the way in which stakeholders can and should be engaged is helpful in any possible future scenario, whether it be Liv/fe Transition or a completely different one.
Creating understanding, awareness and a feeling of appreciation can be done through media, but can also be effective and more personal through interactions in space. Space can therefore be a tool for value creation.
The approach of this is very interesting, but also very complex. The human reaction to interventions can not always be predicted and that's probably what is most difficult about our proposal.
While there is a big focus on the welfare of the farmers and the livestock, the consumer is also a big part of the project. The consumer makes choices not only based on what the supermarket says is best for them, but also on what they can afford. This part of the project has not reached its full potential. There is a big dependency on what governance decides to do. It can be seen as a crucial part of this project, because both farmer and consumer sometimes simply don't have the money to do the things that would be needed to achieve the goals of Liv/fe Transition. The political advancements of the coming years will tell what is possible. Will there be a reduction on the taxes of healthy foods? Will there be rewards towards farmers that move towards sustainability goals? This is a big task of governance and what makes this project in a way uncertain. However, if there is a political awakening, which is already being proposed by the EU Green Deal, there is a lot of hope for the future and for South-Holland.

Ohad Shapiro

Prior to attending this course I did not view agriculture as a meaningful part of modern life, mainly due to its very low percentage of participation in developed economies, but also due to its low participation in modern culture and urban life. Humans became urbanised and "modern", focused on exciting social and technological developments that are consistently changing the human landscape, that is already very different from that of my childhood. Food is represented to us as products at the end of a chain, a wedge of cheese rather than the cow that originated it.
How cattle are raised or a tomato grown seemed inconsequential in comparison to the great technological and social changes of the last 30 years.Dealing with agriculture felt like dealing with an anachronistic relic of times when 95 percent of humanity lived in rural areas and spent their time on earth creating the production of food, something that would be unimaginable nowadays even in the most underdeveloped parts of the world.

However, delving deep into the workings of the food production sector gave me a new realization of its importance in influencing the way spaces and landscapes are shaped and how they function, that perhaps is not so immediately apparent, but is crucial nonetheless.
That connection is happening on two intertwined levels - both physical and conceptual, with vast parts of the Earth's lands being dedicated to the production and transportation of food, while the conceptual forces of economy shaping and transforming it, for example, driving Nederlandians to dedicate land and farmers for the production of food consumed by consumers in distant places such as Germany, France and even China.

Another meaningful thing I learned was the interconnectedness of all these various components of society that are directly affected in each sub sector of the economy. The livestock industry does not impact just farmers and distributors, but rather everyone in the South holland are stakeholders one way or another, and their lives are also impacted by the realities and practices of this seemingly remote industry.
And thus, affecting change in one link in the economical and societal chain drags the rest of the links with it, meaning that there is no such thing as a truly localized intervention. at least not when it is done on this scale.

Perhaps it can be simply stated that the bigger the scale of change, the gentler and more accurate it ought to be.

That there are three systems in space as we defined them in the project was a meaningful realization, and I feel that it is a fairly accurate one. Regions do work in a trinity that unites the people inhabiting it, the infrastructure that drive them and the food that powers them, and trying to create a better synergy between them is a correct aspiration that can be achieved in many ways at the same time, and should always be pursued in the future.

Individual reflections

Liv/fe Transition

Carmen Jansen op de Haar -4482034

I learned many different things this quarter, by attending this course. Especially about working in a group of five persons via zoom and with group members of different nationalities. I really enjoy doing group work because you can spar about ideas together. However, I have noticed that this can be quite difficult via zoom due to the different interests of everyone. I felt very comfortable from the start with the subject of circular economy and in particular the agricultural sector. I felt curious about the new ideas we would come up with to make the current agri-food sector more sustainable.

The most interesting parts of the project for me were doing the interviews with different stakeholders and thinking of new sustainable implementations in de food system. I found out that the system is very complicated, even more than I thought. Every different part of the chain is linked with a new subject, which faces new problems. This makes the project really large and that was something I found very hard. At some point, I was lost in the information and didn't know how to continue. That was where my groupmates jumped in and helped me to get on track again, I really appreciated that.

Furthermore, I previously expected that the project would relate a little bit more to the technical aspect. Instead of this, we had to think of different strategies which could reach our vision. I never really dived into strategy thinking, so this was a part that was new for me. During the course, I think we could use a little more help sometimes, especially because it's hard to get everything together through zoom.

I think our project really shows which typologies, innovations and transitions should be implemented in specific places to reach a sustainable livestock sector in South Holland. With value chance as the main goal, because if not all the stakeholders are willing to contribute change is difficult to reach.

Max Corbeek - 4570561

This quarter was a new experience for me as we worked in a large group online. We couldn't sit together but learned quickly that we could keep each other company online without the camera on and by having regular check in moments. The incorporation of the design in the methodology course allowed for a great way to reflect on it regularly and keep group work going smoothly.

Personally I hope this exploration drives South-Holland to actual change. The province is paying close attention to these reports and they will know that transition is possible. Many things are easier said than done, but it can inspire actual legislation. Local food is a goal of South-Holland and we built further upon it as an exploration of the spatial implications.

My personal interest lied with the transition to a healthy diet. It was complicated to find a solution and create a healthy locally sourced diet. New types of cultivation, crops, demand and soil conditions come into play. The part I learned the most from was to see how we can actually drive people to make better decisions in this healthy food environment. Translating the different kinds of consumer engagement was exciting and led to actual typologies that people understand. I feel like we touched upon nearly every side of value change we could and was within our time. The financial and economic implications of our design need to be further researched upon to fully solidify the vision.

In group projects I tend to be a little on the background and zoom actually made it harder to have my voice heard, but we made it official to ask every person what they thought of important decisions, which is a great thing to take away. Our group also had some trouble with discussion getting heated, but we handled these miscommunications hands on and it ultimately helped cooperation. Online classes made it tough to stay engaged and these troubling times reflect on people's work and emotions. I think we can be very proud of the product we delivered since it's a sign of perseverance.

Jiaqi Wang - 5216540

Before the study of this quarter, I am accustomed to understanding regional planning from a more urban-centred perspective. The large area of the rural territories are often seen as ‘blank’ or ‘empty’ territory that could be easily occupied at any moments at the sake of urban decentralization.
However, through the lens of the circular economy, the agri-food sector, which generally bases in rural area, actually has great opportunities to make joint effort with other sectors to close the chain for the region. This makes me understand the region in a more systematic way. And also, I became to realize that the current Fordism-style of production in agriculture sector, the anonymous logistic and distribution system is in fact blinding citizens’ from agri-food sectors and thus causing less attachment to food and meanwhile raise various conflicts between the consumers and producers. In order to reach a sustainability in general, it should be kept in mind that the three pillars of sustainable development should be taken in to equal account. Especially, the social aspect should be highlighted simultaneously with the technology and economic aspects. This lead us to address the research question through the ‘value change’ in the society.
Through our project ‘liv/fe transition’, we not merely focus on the crop farming, but also take the livestock farming as a focus, which is already embedded in the cultural identity and history for the South-holland province. Hence the key idea of the vision is transition through both time and space in order to regain the culture identity and attachment to food. Meanwhile, we also recalibrate and justify the important role that livestock farming could play in both ecosystem(animals as part of the ecosystem) and economic system (potential to link with energy sector and biobased raw material). In this way, the sustainability could be reached in a more justified way.
The concept of transition zone is partly inspired by the ‘transition zone’ concept from booklet’ Foundries of the Future’(Hill, Adrian V. 2020) to establish mixed land use areas between industrial zone and urban area, which is in our project further developed into the idea of a transition between different territories through the a new circular clusters. The transition also need different stakeholders to act together, which push us to think how the transition zone come into being through the timeline. This finally brings us to the three transition rings to engaging different stakeholders and make the transition zone truly happen and create the new value.
Through the project, we tried to reach the social justice aspect through the public facilites, and tried to touch upon the gentrification problems but still not fully developed which might still be research into in the future.

Hill, Adrian V (ed.). (2020) Foundries of the Future: a Guide to 21st Century Cities of Making. With contributions by: Ben Croxford, Teresa Domenech, Birgit Hausleitner, Adrian Vickery Hill, Han Meyer, Alexandre Orban, Víctor Muñoz Sanz, Fabio Vanin and Josie Warden. Delft. TU Delft Open, 2020.

Appendix
Interview 'consumer'

Name: Unonymous
Date: 26-03-2021

Would you call yourself a conscious (aware) consumer and why?

Yes, I've been buying food from organic stores my whole life long. During my life, I never ate much meat. I never gave myself a title, but actually, I am a flexitarian. I have been consciously engaged all during my whole life. I always looked at the packaging to see what is exactly in their. For example yoga drink, when I found out all the different substances I stopped giving it to my kids ? At one point it came out that there are E numbers in many products, so I tried to look at the products which had less E numbers.

I don't always buy organic food because it is really hard to pay for this expensive food for the whole family. Free college (vrije hoge school) made me aware of biological products and biological life. In my family right now it's hard to feed my son and husband only vegetarian products because they really want meat. I've been trying to raise awareness for him for 30 years, little by little I start seeing a difference.

I also have been a member of Odin for 4 years, then you contribute to organic farmers. They ask if you want points, you pay extra for that and part of it goes to the organic farmers. I also buy very bad products such as avocados, I know they are not good for the environment. I am very inconsistent, at the moment I buy a lot from Lidl because it is too expensive to buy everything from the Biological supermarket. Free college was very extreme, anthroposophic biological and dynamic. There we got organic food, but it was so extreme that I sometimes became a bit anti. I don't want to not be allowed to do things, I will not let myself be forced into what to do. I want to do my bit, but in my own way. We also drive an electric car and we have solar panels.

How do you make environmentally conscious choices? Are there certain choices where you think less or more about the environment?

I make conscious choices when talking about products made of animals, always organic eggs and organic meat. I rather prefer a nice piece of meat to dirty chunks for 4 days. My choices are especially conscious when you look at meat. I have plenty of vegetarian products. I don't like to raise my kids with the idea "we don't eat meat". My husband is a huge carnivore and that is difficult to change. I do realize that dairy products are not always good either. There is an interaction between price and offer. When buying vegetables, I try to look at the things that grow in season and that grow in the Netherlands. I also try to buy everything fresh and not in pre-cut packages.

When we are with other people who are not engaged in making conscious choices, I am not going to force them, I think the relationship with my friends and family is more important than these kinds of choices.

Because I have three children, everything has become much more expensive and I cannot base all my choices on sustainability. Living on my own was a lot easier and cheaper because I had to buy food only for myself.

How would you describe sustainability?

Thinking about the planet, being aware of our world. That you choose your footprint in society in such a way that you are not a burden. That you make conscious decisions regarding to meat and therefore your total footprint.

Which advice would you give to other people about living sustainably?

Making conscious choices is the most important, but I don't want to change people. I find it very difficult to think of how we can make people more aware of their choices. Hooking up on something that appeals to those people. Like people with children, you can tell them we need to live more sustainably in order to leave a good world for our children.

I find it difficult that in my circle of friends people are not at all concerned with making conscious choices and do not want to be helped with this. Some of my friends have quite a bit of money and therefore certainly use it and fly all over the world and only buy new stuff. If I let you know that it is okay if a holiday is cancelled because it is also good not to fly once, they do not want to know about it.

Appendix

Interview Urgenda &Caringfarmers

Name: Josephine Schuurman
Date: 25-03-2021

Circularity
Nature-inclusive agriculture refers to closing loops within agriculture. This concerns not using artificial fertilizers, no pesticides, no-tillage (no ploughing), animal welfare, biodiversity. Caringfarmers represent many different aspects of sustainability, but not all companies are 100% sustainable. If you join Caringfamers, it is the intention that you work with the different aspects mentioned above.

Most people who have already joined Carinfamers are engaged in nature-inclusive agriculture. For example, they already have a better life quality mark, solar panels, etc. Most Caringfarmers are frontrunners in sustainability, so they are already doing really well compared to other companies. Some farmers are the model farmers and other farmers are open to change. The idea is that Caringfarmers is a group where people can learn from each other through farmer meetings, webinars and a Whatsapp group to ask questions. In principle, anyone can join Caringfarmers as long as you can agree with the goals that Caringfarmers want to achieve. Caringfarmers has also created an election commercial to advise farmers which party to vote for to achieve nature-inclusive farming.

They are currently setting up an advice desk for certain questions, for example, questions about money. When they get a question, they link someone to that question who knows a lot about it.

Loans
The Rabobank provides many loans to farmers, they do not provide many loans for people who want to make their farm organic. That is very annoying because farmers want to do better and dare to do it and then the bank does not want to provide them with a loan. While there are so many farmers who show that it is possible. Caringfarmes tries to write many opinion articles to show that things can be done differently and where the money should go.

Awareness
Caringfarmers is currently not trying to reach people who are not concerned with sustainability. There are plenty of farmers who already do their bit and those are the people who have to join Carinfarmers, which is the main target group of Caringfarmers. At the moment, they are the leaders of nature-inclusive agriculture that are part of the association. Other organizations do try to recruit people who are completely unaware. At Caringfarmers, the goal at the moment is not to reach all farmers, but rather those farmers who are already a little bit aware.

Biodiversity
- Measures that can be taken to increase biodiversity are:
- Placing hedges or hedges
- Herb-rich grassland (1001 hectares) https://1001ha.nl/
- Strip cultivation (alternating crops)
- Soil recovery
- No chemical fertilizer
- No pesticides

Manure mixed with urine is injected into the land and that causes bad grass qualities such as dry grass. People think this manure with urine is a good product because it attracts a lot of birds. However, those birds (gulls) are attracted because of the dead animals in the manure. If birds eat all these little animals it is also not good for biodiversity. There are sometimes farmers who honestly think that they are doing great, but if you compare them with the front runners, they could improve a lot. Caringfarmers do not actively remove farmers from the association, but they do notice that farmers themselves leave if they do not have the same vision. Caringfarmers released an election guide where a Party for the Animals, Groenlinks, CU or D66 are the parties that you should vote for as farmers. There is also a lot going on on Twitter concerning caring for farmers.

Shortening the chain
Quite a few farmers have farm shops or deliver packages or deliver products directly to consumers. Some farmers are not yet involved in this at all, but they would like to do so in the future. It is not efficient for everyone to sell directly to the customer. Caringfarmers do not necessarily have a vision about this, they bring farmers together so that they can help each other with this. ''We are not at that moment at the moment, it does not have to be efficient yet because right now it is still about awareness''. For example, a milk machine in the city can create awareness among the residents, in this way it becomes much more visible how products are produced. People will be much more aware of the value of a product. Officially you can only sell raw milk in your yard.

The idea of the Caringfarmers is that more farmers are needed, which means more farmers and smaller companies. The smaller companies with alternative revenue models are the target group that joins caring farmers. Josephine agrees that in the end, you have the most impact if you also know how to get the big unsustainable companies on the right track. At the moment it is still too early for the non-sustainable companies to join Caringfarmers because your message would change because of that. The organization "for farmers", on the other hand, uses a much broader **scope, including farmers for whom**

sustainability is completely new. They do have a more defined area, namely Friesland and Groningen. The frontrunners of Caringfarmers and the intensive companies are still too far apart at this moment.

Ruud Zanders was a large-scale chicken farmer, but at one point it went very badly financially and then Ruud founded 'Kipster' and now Ruud is working on the "vegan egg". He has also become vegan himself, so this example simply shows that it is possible.

Much of the plant food is fed to livestock or exported. When farmers produce as much vegetables as possible, it's easier with many farmers. Preferably the farms are as varied as possible.

Changing diet
Quite a few farmers have farm shops or deliver packages or deliver products directly to consumers. Some farmers are not yet involved in this at all, but they would like to do so in the future. It is not efficient for everyone to sell directly to the customer. Caringfarmers do not necessarily have a vision about this, they bring farmers together so that they can help each other with this. ''We are not at that moment at the moment, it does not have to be efficient yet because right now it is still about awareness''. For example, a milk machine in the city can create awareness among the residents, in this way it becomes much more visible how products are produced. People will be much more aware of the value There is a very large group of caring consumers connected with Caringfarmers that are engagement partners. They want to focus on consumers who are already aware and who want to make that group bigger and bigger. In transition theory, Jan Rotmans tries to divide society into groups. The front runners (the front part), the large group that comes behind it (want to change but don't know-how, then you have the middle part, the rear runners and the people who are completely stuck. By telling their stories they hope to reach more people, so they do not try to reach the group that is completely behind.

What can we do to create awareness:
- Bringing out stories of people who show how it can be done in the most sustainable way
- Vegan cowboys, making milk from grass
- Congresses
- Meetings
- Set up a consultancy that knows everything about the legal and financial picture
- Writing opinion articles
- Guided tours

FrieslandCampina organizes open farm days, but they tell a different story than what Caringfarmers would tell. That is why Caringfarmers wants to organize their farm days to be able to tell the best stories. There is very little knowledge among consumers about soil deterioration and the use of pesticides.

Government
Awareness among farmers and consumers by issuing voting advice. In the hope that the seed will also be planted with those neighbours who, for example, have voted CDA for a long time. Think about what you are voting for, it has to be in line with how you run your business.

Ultimately, the intention is to enter into a dialogue with the politicians to tell them what is really needed and what changes need to take place. At the moment, this is mainly done through the media, also mainly responding to agricultural news.

Caringfarmers does not say that all the products should be vegan. Of course, this would be perfect but at the moment it is more important to look at how you can make the best possible contribution to sustainability. FrieslandCampina thinks it is not possible to switch to vegan products. Their entire revenue model is to produce as much milk as possible as cheap as possible. People themselves do not see all the possibilities that are already there. Frieslandcampina is not innovative enough, they are not daring enough. Sure there is a risk involved. Even if they can take small steps, they will immediately make a lot of impact.

1001 hectare
'1001 hectare' is a Campaign of Urgenda, which does reach all farmers. This campaign gives you a 50% discount on herb grass, which promotes biodiversity. Farmers can therefore get a super good deal to contribute to biodiversity. This herb grass consists of all different herbs and plants that will grow in between the grass. The money behind this comes from provinces because they have to invest money in sustainable projects. Another problem is often that farmers cannot find or reach certain organizations or investments, which makes such a project very useful.

Appendix
Interview farmer

Name: Bastiaan de Jong
Date: 22-03-2021

South Holland farm
- Dairy farm, 140 to 150 dairy cows
- Smaller livestock 70
- Total of 220

This farm is slightly above average in size, but this farm is owned by 2 families so it basically boils down to having an average size business. It is a company that has been in the family for a long time. All milk goes to Friesland Campina.

Sustainability
They are working on sustainability and are trying to close as many cycles as possible, which often also costs less. They grow nearly only grass in the region, so they try to get as much milk from the grass as possible. The cows do not only eat grass, but they also eat by-products from the food industry, or the residual flows. Only giving the cows grass can sometimes be a bit tricky because the grass is not always of the same quality. The quality of the grass can change enormously in one week, for example, due to drought or a lot of rain. You will eventually also notice this in the quality of the milk: the amount, percentage of fat and percentage of protein. The milk is collected every 3 days and then you immediately have an indication of the quality and whether the cows are healthy. If extra food has to be purchased, they try to use residual waste as much as possible, but that does not always work.

Note: It is often said that farmers feed soy to cows, but that is not true in this case! The waste product from soy is fed.

Another important step towards a more sustainable environment is to reduce the use of electricity. For a few years now, they have been generating electricity on their farm with solar panels. They also try to use as little gas as possible. The milk coolers require an enormous amount of electricity, but before the milk enters the coolers, they already cool it with water. In this way, less electricity is ultimately needed.

Government
At the moment there is not one specific thing they would like to make more sustainable. They mainly try to keep an eye on current developments and are constantly innovating. They cannot keep up with all developments, because that is not feasible from a price point of view. According to Bastiaan, the government already has quite a few schemes with tax benefits or tax deductions, which he looks at when investing in certain innovations. He thinks that the government should take more measures but in the end, you should run your own business. Ultimately, you have to be able to do the business yourself and you don't just want to be helped with everything.

There are certainly farmers who do not care about sustainability, but most farmers think about it and try to contribute. It is mainly about what is important for your own company. Everyone makes their own choices within their company, you can talk to other farmers about potential sustainable interventions, but in the end, you cannot oblige anyone. Previously, farmers in the area still talked a lot with each other, but that contact has decreased due to corona. There are certain associations where you as a farmer can join and they also organize open days on certain farms so that you can look together and see how certain processes are arranged on other farms. These associations also distribute newsletters with new ideas that you could apply to your farm.

- LTO (national association)
- Different regions have their own associations

The government must ensure that the rules do not change quickly, because a farm cannot respond quickly enough. Often the rules that change so quickly are also rules that just don't make sense. Bastiaans farm is an extensive farm, lots of land, harvesting your own feed, using fertilizer yourself. With many rules, intensive farms, which have many cows and little land, are actually rewarded. You want as many extensive farms as possible, but because of this regulation farmers make their farms more intensive again.

Biodiversity
It would be possible to keep cows in the woods, especially because the cows are in the barn in the winter. On the other hand, there must be food for the cows and with a forest, this is very laborious, because where do you get all the grass from? Cows cannot completely switch to feed from residual flows, as a cow has to ruminate to stay healthy and that is only possible with grass. It's possible to let your cows walk in the forest, as long as there is enough grass to keep healthy cows. Suppose you would put a tree here and there in the pasture, then that would not be beneficial for the cows. During the warm days, they all want to stand on that one shady spot of that tree to cool off. All cows get too close together, causing them to overheat. During really warm days, the cows are therefore also brought inside. In the barn, they have shade, fresh water and food.

Changing diet
In the Netherlands it is not really possible to grow soy, you would have to import soy, which is also not conducive to CO2 emissions. It would be a lot easier if prices go up, but that's what the government should start with. This way everyone can continue with this at the same time, if 1 farmer starts with this, he would be destroyed. The government has already arranged a certain

bonus if you meet certain aspects, for example only using green energy

Campina organises open farm days. They have researched these days and found that often the same people go to these days and that are often the people who are already aware of the products they eat and buy. While of course, you want to reach people who are not yet aware of this.
- How can we reach those people? No answer to

Shortening chains
It is not allowed to sell raw milk, you have to heat it first. There is a company called "Elkemelk" where each cow is milked separately in a robot and each cow's milk is individually packaged. At the moment the company is doing reasonably well and their products are been sold throughout the Netherlands, but it costs a lot of money. In addition, you can take a farm tap, where the customers can tap their own milk on the farm. However, Bastiaans farm is too far outside the built-up area, so people find it too much trouble to come. You could also place such a machine in the city, but because it is raw milk, you cannot put too much milk in the machine. You would have to regularly refill milk and when the farm is 20 km away, this becomes very laborious again.

The farm of Bastiaan eventually ended up at Campina through acquisitions. First, they were at a cooperative in the area, which was taken over by another company and that company eventually by Friesland Campina. Different types of milk flows must be kept separate, so they can not be transported in the same tank. When demand is highest, that's where the milk goes.

Bastiaan would love to sell his own products, he also looked into the possibilities. However, the farm is just too far away from the city, which makes it not very feasible.

Appendix
Interview FrieslandCampina

Name: Anne Roebroeck
Date: 23-03-2021

Circularity
Step by step we look at what can be done better, what can be reused. How waste streams can be reused so that the entire process is circular. All waste flows are reused. This leaves the cheese flow with 'whey', which whey concentrate is made from and this is used for baby food. The cream that remains from the cheese production goes to a cream factory and all flows are thus branched off further. The residual flow that does not contain enough nutritional value for people goes back to the farmers as animal feed. The cows do not only need residual waste for food, they also have to eat grass to stay healthy. It must also be checked how much concentration the cow can have physically. So it cannot be made 100% circular, there is not enough output to be input again.

Sustainability
Campina helps farmers with investments in sustainability, in which there are 3 options. For example, they can build wind turbines for which they receive an investment from Campina and have to pay back slowly. A second option is the solar panels, cow sheds often have enough space to install solar panels. A third option is a eutrophication machine, where the manure ends up in a fermentation vessel and is converted into biogas. In the Netherlands, farmers generate just as much energy as they use. Not all farmers are self-sufficient, but the total energy yield of the farmers who participate is the same as the energy demand of all farmers in total.

Not all farmers participate in these sustainable projects. The smaller the farmer, the less payable it is and therefore does not yield enough returns. For example, a biogas machine is extremely expensive and actually only possible for larger farmers because it can only be really profitable for them. The Netherlands are already very sustainable compared to other companies, Campina is now trying to implement these sustainable projects in other countries.

Investments from Campina are only for farmers who are members of the cooperative. The head office of sustainability is in Amersfoort, where they make business cases about the various options.
- How big is the farmer?
- What is the return on the investment?
- Does it make sense to invest?

There is an active approach to get farmers to participate in sustainable measures, but there are no sanctions if they do not want to contribute to this.

Improvement processes
The dairy industry is a very polluting process, as there are 1.5 million cows in the Netherlands that are responsible for 60% of ammonia emissions. We work very hard to increase the yield of a cow, if 1 cow produces better and more, then you need fewer cows. In the Netherlands, cows already produce twice as much milk than in Africa. They already receive the perfect nutrition and care to produce as much milk as possible, it is not known whether the cow has such high production. The question is mainly:
- How can you make more product from less milk?

1 kilo of cheese contains 10 L of milk, not everyone is aware of this, but that is of course not sustainable. The vegetarian butcher is trying to produce cow's milk from grass. They try to imitate the cow in a bioreactor in order to produce natural milk. You can also make oat milk from oats, rice milk from rice, so you should actually be able to make cow's milk from grass. The difficult thing about this is that cows have special enzymes that initiate this process. At the moment, Campina is already working on vegetarian rennets, which is the way to make cheese thick. Originally rennet comes from the stomach of calves, so calves are killed for that. Only the female cows produce milk, so the males have to go to the slaughterhouse.

- Vegetarian butcher is a big opponent of Friesland Campina

Changing diet
FrieslandCampina's structure makes it difficult to switch to more vegan products. The management of the company is actually a council because the company is owned by the cooperative and this cooperative consists of 16.000 farmers in the Netherlands. This means that Frieslandcampina is owned by the farmers and they do not benefit from producing vegan milk since they own cows themselves. The farmers therefore also approve the plans and budget. Campina would like to participate, but it is difficult to make a real switch to a different diet. Often these companies are family businesses that have existed for decades, this is not going to change overnight. Campina will not soon want to contribute to promoting a different diet, which therefore contains fewer dairy products and more vegan products.

Shortening chains
In principle, FrieslandCampina wants a fair price for the farmer and they currently pay a relatively large amount of money for milk. This is also because Campina produces super efficiently, while the price increases enormously if you start producing locally. If the farmer starts to produce products himself, this will be enormously labour-intensive because of the so small-scale. For example, Campina uses a robot for making cheese, which is extremely expensive but ultimately works efficiently when it comes to a huge number of products. If farmers buy certain equipment and machines themselves,

your product will eventually become more expensive. The tricky thing about shortening the chain is that it will become much more expensive and not just a little bit, a lot more expensive.

Creating awareness

You can try to create more awareness, but in the end it will remain a game between consciousness and money. On the one hand, you want to make people more aware of what the effect of cheese has on the environment but then you will sell less cheese. Most people are eager to contribute to the environment, but not at the expense of money. For example, green energy is an investment that ultimately only yields money. While awareness comes at the expense of sales, this is difficult to ask from companies such as Campina. The government should tackle this, for example, by imposing excise duties on certain products. If the government starts this, the rules immediately apply to everyone, so that small farmer can also participate.

Campina has a lot of responsibility because they have a lot of impact. The responsibility lies with people themselves, but especially with the parties that can really do something about it. It would be good if the largest 3 parties would sit down together to come up with a plan for the market. If you sit with the 3 largest dairy parties, then you have 95% of all parties. It is especially important that you sustain your company, otherwise, you will not be able to make an impact.