The Vision summarized:

We envision the Dutch sustainable future food system as a *mosaic* of sub-systems (5 scenarios), each surrounding their own value orientation and communities of people connected to them. People have access to a large variety of foods according to their (cultural) preferences, of largely plant-based diets from regenerative, nature-inclusive, circular agricultural production systems. Farmers are highly valued for their important role in sustainable management of natural resources and they receive a transparent and fair price for their products and ecosystem services. Knowledge and agrifood technologies form the core of the important Dutch international position. Food (and nature) education is integrated at all education levels.

In 2050, through and the inspiration and entrepreneurship of a multitude of innovative transdisciplinary coalitions, supported by visionary leadership of our national policy and the EU, and a sound (applied) scientific basis, our economy has transformed from a production paradigm with (linear) profit maximization as driver, to an economy that has health and wellbeing of people, animals and the planet central, with circularity, diversity and value-maximization as driver.
The Vision

The Netherlands is a small country, but big in agrifood: the Dutch food, agriculture and horticulture sector is innovative, export-oriented with high value-added along the food chain. We have a history of over 120 years in cooperative entrepreneurship in agrifood. Continuous (technological) innovation lead to our country having one of the highest productivity levels in the world. In 2020 the Netherlands is the second largest exporter of agrifood products worldwide, second only to the United States (which has 270 times its landmass).

However, with productivity and economic growth being the primary focus, public and environmental health have been ignored. We are now seeing that half our population is overweight or obese, we have a nitrogen crisis related to intensive animal production resulting in nature degradation and biodiversity loss; and we have a big environmental footprint outside of our country. For a number of agricultural sectors, the societal costs of our food system (that include social and ecological costs) outweigh the economic benefits.

In response, Transition Coalition Food (TcV) – a coalition of approx. 200 frontrunners working on different aspects of food system transformation (e.g. regenerative agriculture, short supply chains, true cost accounting, preventive health) – and HAS professorship Future Food Systems – a research group focused on food system transformation as integral topic – came together to develop this Vision. Through a process of stakeholder engagement, up to 60 people with different backgrounds (agriculture, food, health, economy, nature) came together in three separate sessions to share perspectives on what a sustainable food system is, and what these stakeholders prefer to see in the future food system without compromising on the good values like our food security and food safety. Under guidance of the Professorship Future Food Systems we used back casting as methodology to come up with preferable food futures and transition paths to these futures. The 5 resulting future scenarios presented in this vision are the output of this inspiring process (figure 1).
Each scenario reflects a ‘preferred future’ by stakeholders of the Dutch food system. This means that these scenarios are value laden, each with their own set of core values which sometimes conflict with the core values of other scenarios. As such, the baseline of the vision is: ‘no one size fits all’. All 5 scenarios presented could happen, and there is sufficient data to show that they will or are already happening; for example, by the frontrunners that belong to the TcV network. The Dutch food system is a mosaic of different food sub-systems matching the ‘multicolor’ needs and backgrounds of the Dutch people and culture. Such a proposal matches (Dutch) research results that there are multiple perspectives on what a sustainable food system is and how it can be reached (PBL, 2018). The Vision recognizes that human and natural systems are inextricably intertwined, the different scenarios however exhibit this relationship in slightly different ways (conceptually and physically). The Vision also identifies several common values (explained in the next section) that need to be further activated in order to transform our food systems to ‘net positive’ for human and planetary health.
To match the scale of implementation of the mosaic and to further connect to people and organisations already active with (aspects of) the future food scenarios, we focus on local/regional leadership in cities and in provinces. **Local community solidarity** is a core value across the whole Vision, which we see as an increasing trend in Dutch culture also as a response to COVID-19 (#supportyourlocals), especially in cities. This allows us to plot the food system mosaic in a landscape approach like puzzle pieces in the socio-economic and environmental landscape in the Netherlands. The construction of these landscapes – both conceptually now, and practically before 2050 – is achieved by matching (food) culture and engaging and enabling different stakeholders from different disciplines and backgrounds to be part of the change, in fact, to be change leaders. The 2050 Dutch citizen can choose which food sub-system(s) they want to inhabit according to their (economic) situation, lifestyle, beliefs and preferences.

![Figure 2: The two layers of our landscape approach.](image)

Our landscape approach is a method to evaluate the co-existence of the five scenarios making up the Vision in physical space. The approach asks us to think about the regional and local existence of food systems that make up the greater Dutch Food System 2050. We do this by constructing two landscape layers: 1. **Biophysical**, 2. **Socio-economic**.

1. On the **biophysical** layer we assess the feasibility of the scenarios according to the demands of the local environment and ecology, addressing topics such as soil type, biodiversity, water access. Doing so allows us to map out the areas that are most resource effective (read: not intensive) to produce on. For example, it does not make sense to place the high-tech bulk production scenario in the Dutch dunes because it requires heavy resource inputs (particularly water) to maintain.

2. On the **socio-economic layer** we assess the social dimensions – such as demographics, population density, culture and values – alongside the economic dimensions – such import/export needs and job access. For example, a food community is more suited to an area with lower population density and individuals inclined to spend more time in nature; whereas high-tech vertical farming is more suited to urban areas, where there is a higher food demand and less people willing to work in agriculture.

By using these landscape layers, we can additionally plot the four production-oriented scenarios as mosaic tiles on the Dutch landscape. We envision the last scenario – Personalised Food and Healthcare – as a transparent layer across the Netherlands to support healthy diets and lifestyles for the whole population. A rendering of what the scenarios could look like in the 2050 Dutch landscape, city and kitchen is shown on the Vision platform (under visuals).
Commonalities in the scenarios
As mentioned, The Dutch food system is a mosaic of sub-systems made up of 5 scenarios, each with their own value orientation. However, there are some core values that are central to all scenarios in the ‘no one size fits all’ Vision. We found these differing values by plotting the scenarios onto the System Thinking Iceberg, a tool to identify what are the (1) key events, (2) patterns of behavior, (3) underlying system structure and (4) paradigms/mental models (figure 3). Figure 4 shows how we plotted a reflection on all 5 scenarios (in Dutch because the participatory sessions were conducted the food system actor’s native language). This framework is also important for us to identify how to leverage transition towards these scenarios. The deeper down the iceberg an intervention is placed, the more effective the intervention is. Addressing mental models is the most effective, hence our focus on ‘value-orientations’.

Figure 3: Systems Thinking Iceberg. Retrieved from: https://blog.methodkit.com/the-iceberg-of-how-889e87fb5394

Figure 4: Reflection on the five future scenarios for the Dutch Food Mosaic from the group work.
The basis of the system is that it is **ecologically sustainable**, working in collaboration (not exploitation) with the environment. Humans and nature cannot be separated from one another and the systems work in synchronicity. This means that production and consumption follows the principles of circularity – closing all resource loops – and functioning within the ecological boundaries. We use the biophysical layer of the landscape approach to ensure this. Within the scenarios there are two streams to achieve this:

1. **Regenerative agriculture.** This applies to the scenario ‘food communities’ and ‘ecologically intensive’, where the means of production is in line with ecosystem services, emphasising diversity and working in line with ‘Nature’s Guiding Principles’ (a set of principles developed for sustainable food systems inspired by principal processes in nature).

2. **High-tech.** This applies to the scenario ‘high-tech’ and ‘circularity’. The means of production are oriented towards bulk, and thus highly technological and decoupled from nature. This applies to larger scale greenhouse farms in the countryside or innovative farming in cities – such as vertical farming and aquaponics – to meet the demands of an urban population while minimizing the transport distance. NB at present vertical farming only produces high value (vegetable) crops so most likely this system will still be combined with open field regenerative agriculture for production of e.g. carbohydrates and plant proteins.

**Solidarity** for our community must be priority number one. Whether that community is global or local. We already see that community spirit strengthened by Covid-19 (e.g. #supportyourlocals). One of the important aspects of a future food system, according to our participants and team, is that it connects consumers and producers (and makes links between sectors like food and health) and contributes to solidarity and peace.

Our international trade position of produce is a trade-off in some scenarios, and we recognize in others international trade is crucial; for example, to maintain our international urban food culture, simply eating citrus fruit, or having that morning cup of coffee! To compensate for reducing food exports, export is primarily oriented towards **knowledge and technology export**. Export of food products is minimalized to trade of products, to ensure that nutrient cycles retain closed at different levels of scale. We want to exchange and learn from other in the global community and share our knowledge of either best practices in regenerative agriculture, closing nutrient cycles, or technology in our greenhouse systems.

Paradigm shifting from profit maximization to **value maximization**. Externalities are accounted for by methods such as True Cost Accounting (where environmental and social impacts of production are placed directly alongside economic impacts, and included in the product price) and organisations pledge to act in the best interest of all stakeholders – public and private – and the environment.

Primarily **plant-based diets**. We do not rule out the consumption of meat, as to close nutrient cycles there is a role for animals to play in our upcycling nutrients (for example grazing grasslands). That said, the evidence clearly indicates that – for human and environmental health – meat consumption (in the Netherlands) must be drastically reduced to at least one-third of the current consumption (EAT-Lancet). We strive for 80% plant-based consumption.

High levels of **food literacy** and **transparency**. Individuals know what they are eating and know what impact this has on their wellbeing and on social and ecological values. This is either through knowledge of produce, or through transparent communication of data on products and production processes. Food education at all school levels, in addition, adds to the emergence of a new generation
of food literate people. To ensure the market doesn’t fall back into its old ways, True Cost Accounting (a tool to include externalities into pricing) is implemented across the entire supply chain.

The above are all aspect of the food system. But food systems are not about systems, they are about people. In order to achieve our Vision, and so many initiatives already happen by the members of TcV, we need to strengthen cooperation between disciplines, and learn from the experiences and entrepreneurship in practice. New coalitions will need to be build, bottom up, around specific themes or landscape approaches.

Polarization in the scenarios

The TcV foresight study produced 5 scenarios that work towards the same goals but are based on different preferences of food system actors. They all have slightly differing core values, which are sometimes at odds with one another. We found these core values by conducting the same exercise as in the previous section (Appendix 1 for the results). It is for this reason that we do not aim to combine the scenarios into one coherent future food system, but instead recognize their multiplicity and diversity across the Vision.

The two main streams of production – regenerative agriculture (ecosystem services at the core of production processes) and high-tech (decoupling from nature) – can be used to outline the main differences. They are not compatible in the same physical locality and trickle down as polarization across the six Vision Prize themes (table 1). However, we will need both sides of the spectrum to co-exist to cater to 1. A diversity of wishes and preferences present amongst the Dutch and 2. To maintain a connection with the international community. They cannot co-exist within the same physical locality on the biophysical and socio-economic landscape but can co-exist within the Dutch Food Mosaic.

These polarizations are not complete but give a taster of how the two streams differ only on the production aspect. An elaborated explanation can be found in the theme questions on the Vision Prize platform across all activities in the food system.

<table>
<thead>
<tr>
<th>Theme</th>
<th>Polarization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environment</td>
<td>Regenerative agriculture High-tech</td>
</tr>
<tr>
<td>Diets</td>
<td>'Pure' foods Ultra-processed health foods</td>
</tr>
<tr>
<td>Economics</td>
<td>Farm-level jobs Automation Local supply (small-scale production / short chains)</td>
</tr>
<tr>
<td></td>
<td>Bulk production / longer chains</td>
</tr>
<tr>
<td>Culture</td>
<td>More suitable to rural communities Suitable to urban communities</td>
</tr>
<tr>
<td></td>
<td>Return to Dutch cuisine (based on Dutch produce) International cuisine</td>
</tr>
<tr>
<td></td>
<td>Cooking to build social connection Emancipation from cooking</td>
</tr>
<tr>
<td>Technology</td>
<td>Technology always a means to the end: a healthy, sustainable food system.</td>
</tr>
<tr>
<td>Policy</td>
<td>Regionally oriented (city/regional scale) National/internationally oriented</td>
</tr>
</tbody>
</table>
Leveraging a transition towards the Dutch Food Mosaic

In the scenarios there is a heavy emphasis on ‘value-orientations’, this is because aiming to transition a food system through a paradigm shift is the most effective form of intervention, as shown by the Systems Thinking Iceberg.

Rather than working top-down to focus on the events that should appear in 2050 and deduce further what the associated patterns, structures, and mental models are, we start from the bottom – focusing on core values – and extrapolate the associated structures and patterns necessary to perpetuate these values throughout the Dutch food system. We then use these to speculate what events occur in the Dutch food system 2050; we outline these in the question ‘A Day in the Life’.

To map the structures, patterns of behaviors, and events across the entirety of the food system we bring in the Food System Approach by van Berkum et al. (2018) (figure 5). This framework gave us the structure to identify how our scenarios manifest across all the food system activities. The answers in the Theme questions on the Vision Prize platform are structures according to the five key activities in the Food Systems Approach: 1. Production, 2. Storage, transport, and trade, 3. Processing, 4. Retail, 5. Consumption. These activities are supported by the enabling environment, food environment, business services, consumer characteristics and influenced by several socio-economic and environmental drivers. We use this model to also outline the interlinkages between the themes.

Stakeholder engagement

Obviously, we can’t change the food system all by ourselves, we need the help of everyone in the food system to work together in order to really make a change. This is one of our strengths as we work with a large representation of the TcV. The five scenarios that from the basis of our Vision were created through a process of participatory sessions (with approx. 60 food system stakeholders on personal title) between April-Dec 2019. In December 2019 a plenary discussion with TcV and its members (approx. 200, aged 21-60) was held to further refine these scenarios and set-out transition
paths towards the different scenarios. All the information gained from these sessions informs the basis of the Vision presented here.

To further raise awareness on our Vision and engage a younger demographic of agrifood system stakeholders the research Group Future Food Systems engages students at HAS in graduation projects on different aspects of food system transition. These include projects on New Business Models for transition, developing frameworks such as ‘Nature’s Guiding Principles’ and testing the five scenarios against the perspectives of our future game changers (through online focus groups, and a survey with Dutch students across the Netherlands). Quantification of the scenarios is still work in progress.

Several activities and themes, and two of the scenarios are already being taken up by different food system actors, to advance the agenda and accelerate the transition. We are very happy with this as it shows that our vision is in fact feasible. Most notably are the work of Sandra van Kampen on ‘food community scenario’ which inspired her to start to work with community-supported agriculture (CSA Nederland) and short chain initiatives (e.g. Herenboeren) to build a new Dutch coalition, and the formation of the ‘Boerenraad’, a group of innovative farmers bundling their powers to improve (agroecological, circular) farming practices in the Netherlands.

Practical implementation and stakeholder engagement are intricately intertwined. We need more stakeholders to work together, form coalitions and eventually institutionalize innovations to radically transform the food system.

With the group we discovered two drivers for stakeholders to engage with the Vision:

1. Doom-thinking: This is fear induced, reactive behavior to the idea that if we do nothing, disaster will strike.
2. Inspiration: The entrepreneurs that take a leap of faith to try something new in order to take ownership of the transition!

We try as much as possible to engage inspirational leadership to activate the pioneers of the Food System Mosaic and encourage them to build a following.

Feasibility
There are two dimensions to feasibility in our Vision. Firstly, the implementation of our Dutch Food System Mosaic isn’t possible without the help of the food system stakeholders. This is why it was so important for us to build these scenarios from the preferences of the TcV members, shared in the participatory sessions in April-December 2019. It is the power behind the TcV and the diverse inclusion of its members that makes our Vision feasible. We see this in several steps that are already being taken now in the Netherlands by TcV members and partners, and HAS alumni:

1. Herenboeren: an example of a food community with six functioning farms already in 2020 across the Netherlands. This is closely related to other short-chain and Community Supported Agriculture initiatives. They are cooperating with the initiative following from our vision to upscale ‘food communities’.
2. Boerenraad: a group of innovative farmers (e.g. Federatie agroecologische boeren) , working on regenerative, agroecological practices in specific regions in the Netherlands, connecting to share best practices and form a strong coalition that can be influential on innovation agenda’s and lobby.
3. True cost accounting team: a cooperation between a number of businesses, an NGO and universities to further harmonize the methodologies with international sustainability standards, and implement it in a number of pilots (both supply chain-related and companies)
4. **#supportyourlocals**: hashtag gaining momentum since COVID-19 hit the Netherlands. On the website [www.supportyourlocalsnl.nl](http://www.supportyourlocalsnl.nl) an overview of all the local consumers can be found.

5. **Agrilution**: an in-kitchen LED-light herb/veggie growing unit with app to keep you up to date on the progress of your plants. One of the first of a plethora of kitchen appliances for personalized food.

It is these initiatives – and many more – that we found our belief in that the Dutch Food System is not only preferable to the food system stakeholders, but feasible. These pioneers will activate a following as explained in the previous section (Stakeholder Engagement).

Secondly, our landscape approach is a way to ensure the right scenario is met to the right socio-economic and biophysical landscape. We introduced some data on the Vision Prize platform, such as demographics and ageing population in addition to outlining the suitability of vertical farming in urban areas where land is scarce. Feasible and realistic implementation of our scenarios will be achieved by conducting mappings of the Dutch landscape(s) and matching the scenarios accordingly.

**Practical implementation**

The implementation of our Food System Mosaic is outlined by our key milestones for 3 and 10 years on the Vision Prize platform. In sum, they contribute towards two main pillars, focusing on reaching a paradigm shift in the Dutch population and Dutch food system:

There are two important aspects that form the pillars of the refinement phase and beyond to guide the Dutch population towards a paradigm shift towards the core values across the Vision:

1. **Further stakeholder involvement and community building around transition.** This is achieved through:
   a. First strengthening the TcV as a bottom-up movement, and then retiring (after 10 years) when our Vision has become part of the new paradigm.
   b. TcV work with specific stakeholder groups around transition themes. An example is the community forming of sustainable farmers (‘Boerenraad’)
   c. Lobbying for aspects of the Vision at national and EU level.
   d. Engaging students at HAS to become change-leaders through our ‘Rockefeller programme’ called *New leadership for food system transformation*.

2. **Strengthening the (applied) knowledge base in systems dynamics and transition processes.** This is achieved by:
   a. Further quantifying the scenarios with synergies and trade-offs (this is work in progress by our students, but results come later in June ’20)
   b. Development of new frameworks and business models, e.g. in graduation projects with our students at HAS and frontrunners in professional practice.
   c. Integrating the (food) Systems approach with economic activities and policy.
   d. Engaging actors in True Cost Accounting to harmonize the methodology and move towards mandatory implementation.
   e. Innovating the medical curriculum to focus on preventative healthcare, and the role of focus (particularly with an emphasis on plant-based proteins and lifestyles).

Should we be selected as finalists, we strive to strengthen these two pillars further.
To conclude...
The Dutch Food Mosaic as a future food system Vision was developed in a long and inspiring process with inputs of expertise, experiences and dreams of many partners (approx. 100 people in total) from businesses, NGOs, government and universities, ranging from 21 years of age (our students) to 75 (our nestor farmer). It is an integral and inclusive Vision that justifies all the different perspectives that exist parallel. The individual aspects were often supported by additional research projects (like the leverage points study) that formed building blocks for this vision. Many of the participants are already working on aspects of this vision, in short supply chains, in plant-based proteins, in connecting consumers to local food communities. We are thrilled that two of our scenarios and several themes of our vision are taken further by new coalitions that are engaged and entrepreneurial to implement it. It is important to dream about a perfect future, but even more inspiring when it actually starts happening! Our dream is to accelerate our movement and engage the young professionals to spearhead the transition to the Dutch Food Mosaic.

We are very grateful for all the encouragement and inspiration (e.g. webinars) from the Food System Vision Prize organizing team and hope to be able to continue working with the international community of food system changers!
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- Herenboeren https://www.herenboeren.nl/
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- #supportyourlocals www.supportyourlocalsnl.nl
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- Bachelor Food Innovation https://www.hasuniversity.nl/study-programmes/food-innovation-den-bosch
- EU GreenDeal (Farm-to-Fork) https://ec.europa.eu/food/farm2fork_en
- Floating Farm Rotterdam https://floatingfarm.nl/
Appendix 1: Systems Thinking Iceberg per scenario
4. High-tech Voedselbouwstenen

EVENTS
Observable behaviours; what has happened

PATTERNS OF BEHAVIOUR
The trends, or what has been happening over time

UNDERLYING SYSTEMATIC STRUCTURE
What are the factors (under-ground factors) contributing to these patterns?

MENTAL MODEL
What is our thinking, our mental map about these underlying forces? How do we think systems and support sustainable action?

5. Ecologisch Intensief

EVENTS
Observable behaviours; what has happened

PATTERNS OF BEHAVIOUR
The trends, or what has been happening over time

UNDERLYING SYSTEMATIC STRUCTURE
What are the structural forces at play contributing to these patterns?

MENTAL MODEL
How do we think systems and support sustainable action?