

Phase: Refinement

Re-rooting the Dutch food system – from more to better

We present a holistic, bottom-up food system vision for the Netherlands that is essential for a healthy and regenerative food future.

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Lead Applicant Organization Name

Wageningen University & Research

Lead Applicant Organization Type

Other

If part of a multi-stakeholder entity (i.e. team), provide the names of other organizations and types of stakeholders collaborating with you.

The food system connects many stakeholders involved in the production, processing and consumption of food. Developing a food system vision requires a transdisciplinary approach involving a wide range of stakeholders and scientists. This application, therefore, is a co-production between representatives from three recently established farmers organisations (Toekomstboeren, Caring Farmers, de Nieuwe Boerenfamilie), the Food Transition Coalition, environmental NGOs The Foundation for Nature and Environment and the Centre for Agriculture and Environment, and research institutions the Netherlands Environmental Assessment Agency and Wageningen University and Research. We hope to invest our prize in the three farmers organizations to support them in their transition towards regenerative farming.

Website of Legally Registered Entity

www.wur.nl

How long have you / your team been working on this Vision?

Under 1 year

Lead Applicant: In what city or town are you located?

Wageningen

Lead Applicant: In what country are you located?

The Netherlands

Your Selected Place: what's the name of the Place you're developing a Vision for?

The Netherlands, a country in Europe with a total area of 41,543 km².

What country is your selected Place located in?

The Netherlands

Describe your relationship to the place you've selected.

We are all born and live in the Netherlands, and care deeply about the future of our food system. We actively participate in the current heated debate regarding the future of the Dutch food system, which is characterised by polarisation, farmer's protests, societal distrust and governmental failure. This has resulted in short-term solutions that inevitably create long-term sustainability problems. We believe that this debate needs to be opened up and inspired by a holistic vision of the best future for our food system, our lives and those of our children and beyond. Such a holistic vision of our food system is rooted in current seeds of transformation towards a healthy and regenerative food system.

Describe the People and Place: Provide information that would be helpful for an outsider who has never been there and may have no context about this Place to better understand the area.

The Netherlands is a flat, small and densely populated country in Northwest Europe. With its temperate maritime climate influenced by the North Sea and Atlantic Ocean and its rivers, it is like a city in a fertile river delta. This agro-ecological location in combination with a unique governance structure and trading mentality made this tiny country today's number two global exporter of food. More than half of the nation's land area is currently used for agriculture and horticulture, with Dutch farmers being admired worldwide for their high productivity per ha of land, labour and capital. We are famous for our potatoes, tomatoes, flowers, vegetable seeds, pork and Gouda Cheese. Our farmers have joined forces in cooperatives through which they collectively purchase and trade, increasing their structural power and resilience. They strongly benefited from the successful collaboration of education, extension and research facilitated by the government. These two examples illustrate the potential to tackle challenges via collaboration and dialogue.

Dutch cuisine is traditionally simple and straightforward: bread and toppings for breakfast and lunch, meat, potatoes and seasonal vegetables for dinner. Today, however, people increasingly eat dishes from all over the world and buy more processed and convenience foods. Most food is bought in supermarkets and accounts for just 11% of income spend.

Seen from the air, the Netherlands resembles a unique fragmented patchwork with intensively cultivated fields embedded in areas with bustling cities and suburbs. With 41,543 km², it is home to 17.4 million people, 3.9 million cattle, 12.4 million pigs and 105 million chickens - the highest animal density in Europe. This combination of high human and animal densities with intensive farming makes the Netherlands an example of a food system region with major environmental and societal challenges. Recent studies have shown that the country has exceeded its share in the planetary boundaries in terms of nitrogen, phosphorus, greenhouse gas emissions and material use.

Citizens increasingly question the way crops are cultivated, farm animals are kept, and regions outside the Netherlands are affected through the major imports of feed/food and exports of food. They are concerned about the local and global environmental impact of the food system, loss of biodiversity, limited viability of farms, and social issues like animal welfare, odour nuisance, and human health risks. Debates about the way we produce our animal-source food seem to be increasing in countries, like the

Netherlands, where animal farming is no longer part of the average consumer's daily life and keeping and killing of animals are, to a large extent, out of the public eye. We believe that the current way of producing and consuming food in the Netherlands is no longer viable, and needs to be changed.

What is the approximate size of your Place, in square kilometers? (New question, not required)

41543

What is the estimated population (current 2020) in your Place?

17400000

Challenges: Describe the current (2020) and the future (2050) challenges that your food system faces.

In 2017, National Geographic published an article about the Netherlands entitled 'This Tiny Country Feeds the World'. Two years later, the shadow side of this success became painfully clear when the Dutch Council of State dismissed the country's nitrogen policy for failing to reduce nitrogen deposition in nature areas and causing biodiversity losses. Since this report in May 2019, some 18,000 plans for building new houses and roads along with various industrial and farm activities that may cause additional emissions have been blocked. This has led to fierce and polarised debates about the way forward for the country. Decreasing the number of farm animals as a way to reduce nitrogen emissions, for example, is a highly contested issue. The crisis exemplifies how high-income countries have lost their sensitivity to the carrying capacity of their environment, and hence to their roots in producing food with nature.

The current food system is responsible for the majority of biodiversity loss in the Netherlands, releases about a quarter of all human-induced greenhouse gases, and causes water pollution. It uses more than half of the land and a significant amount of land further afield due to feed and food imports. Moreover, about 40% of Dutch arable land is used for the production of feed for farm animals. No matter how efficiently animal products are produced, using arable land for feed production is less efficient than using it to produce plant products for direct human consumption.

The way farm animals are kept is also increasingly under discussion. Society is concerned about farm animal welfare, farm sizes, odour nuisance and human health risks. At the same time, farmers are increasingly struggling to comply with constantly changing policies and finding ways to earn an income. The viability of farms and rural communities is also affected by power imbalances within food systems.

The current average eating pattern in the Netherlands is unhealthy and unsustainable. Only 16% of adults consume the daily recommended amount of fruit and vegetables, and an excessive amount of red and processed meat is consumed. About half of all adults are overweight, and unhealthy food is responsible for 8% of disease costs. Most of the food consumed is imported and about 125 kg of edible food is wasted per person per year. This consumption pattern has an enormous impact outside the Netherlands both environmentally and socially.

As is the case in the rest of the world, the population of the Netherlands is expected to increase in the years ahead. To ensure long-term food provisioning while respecting planetary boundaries, we need to change our food system and start focusing on producing healthy food with and by nature. While this contemporary challenge is increasingly recognised, a holistic vision and policy for a future healthy and regenerative food system is lacking. We aim to fill this gap by presenting our bottom-up food system vision for the Netherlands.

Address the Challenges: Describe how your Vision will address the challenges described in the previous question.

This transformation is dependent on having new initiatives as the seeds for change. In this section we present four such initiatives that already exist and are inspiring us to contribute to a healthy and regenerative food system. They are being developed by members of our team and demonstrate the feasibility of the radical changes needed to address current challenges in our food system (see above).

By 2050, our first farmer cultivates vegetables and plants for direct human consumption. As intercropping has higher yields than sole crops and reduces the spread of diseases and pests, multiple crops are grown on the same field. No pesticides and herbicides are used, with pests being controlled biologically. Robots are deployed for weeding and harvesting, drones for precision fertilisation. Such large-scale, high-tech organic farms can effectively produce food while safeguarding our planet.

The production and consumption of plant food also produces by-products that are inedible for humans. Our second farmer keeps 24,000 hens in an animal-friendly way that are only fed with by-products like bakery waste and rapeseed meal. In recycling by-products, these hens contribute to human food supply without using additional resources. By 2050, such circular farms will be located in a landscape full of characteristic elements such as hedge rows. Tourists will enjoy cycling through the fields, visiting these farms and learning about where their food comes from.

The third farmer is located along the IJssel river. This extensive farm has dual purpose cows and is situated in a nature conservation area. Income comes from combining milk and cheese production with flood prevention and nature conservation. To protect against floods, the government pays the farmer to graze cows on the river floodplains to enable flooding in case of high water. This also helps conserve the beautiful landscape, which is accessible for people to hike and enjoy nature. Together with the cows, the farmer produces food while conserving nature, and in doing so exemplifies the role ruminants have in a healthy and regenerative food system. In parallel, some dairy farms on peat soils earn an income by directly selling milk and cheese products to the cities in their surroundings, and contributing to conservation of peat landscapes.

Farming communities are also found around urban areas. One such community – our fourth initiative – is located near Eindhoven. It consists of 200 families that have become stakeholders in a farm and employed a farmer to take care of their food production. Farmers and citizens jointly decide which crops to grow and which animals to keep, and the production risks involved are shared. Some families even live around the farm and share electric cars and guest rooms. Adults and children in these communities are more aware of how food is produced, waste less, eat healthier and are conscious consumers.

High Level Vision: With these challenges addressed, now provide a high level description of how the Place and the lives of its People will be different than they are now.

We envision an inclusive food system in the Netherlands that is rooted in nature and society. By 2050, we have replaced the wasteful, linear model of our current food system with a circular one. A circular food system safeguards natural resources, prioritises plant biomass for human consumption, prevents losses and wastes, and recycles unavoidable losses and waste into the food system. To ensure that we do not collectively overshoot our environmental ceilings and that no human or animal falls short on life essentials, politicians have defined holistic and long-term environmental ceilings and social foundations for our food system. We have adopted technology that strengthens circular principles and ensures the social fundament. Because our boundaries are clearly defined, we know the safe-and-just operating space within which farmers can produce. To ensure farmers no longer have to compete with cheap food imports that have not been produced according to our social values, a form of market protection is established at EU level. To reduce the externalities associated with feed and food imports, we no longer import raw agricultural products, just final food products. We also balance our food imports and exports in terms of nutrients and carbon. Food production and consumption has become more localised, a development supported by the introduction of local currencies and green investment programmes. Last but not least, having recognised that we need to stop focusing on economic growth, we have adopted a

richer range of indicators to express what has value to our society and planet, the so-called National Societal Product.

Citizens eat significantly more plant and less animal products; their diet is healthier and more sustainable. They have re-established dinner evenings with neighbours, friends, community members and family. These developments have contributed to citizens becoming conscious consumers, aware of how food is produced and prioritising quality over quantity.

Full Vision: How do you describe your Vision for a regenerative and nourishing food future for your Place and People for 2050?

An inclusive food system may be locally rooted but it cannot be restricted to national borders. The system must operate in an international market and policy framework, with the EU being key. By 2050, all Dutch citizens know and agree that we need to operate within the boundaries of our planet.

To protect our environment and stay within the carrying capacity of the planet, we have replaced our wasteful, linear model with a circular that (1) uses practices and technologies that safeguard natural resources, regenerating healthy soils, clean water and air, and biological diversity; (2) prioritises plant biomass for direct human consumption, and (3) prevents losses and wastes in the food system, and if unavoidable, recycles them back into the food system, with a healthy soil as a first priority.

With a healthy soil as the backbone of our food system, we only apply regenerative crop cultivation practices to conserve the soil and preserve biodiversity. To protect valuable life forms in the soil or above (e.g. pollinators), pesticides and herbicides are no longer used. Instead, we combine smart intercropping in time and space (strip cultivation and agro-forestry) and biological pest control to manage pest and diseases.

By 2050, we no longer use fertile arable land to produce feed crops for animals. Although this boosted the production of animal-source food in the past, this system is now considered unethical as it competes with the production of plant biomass for direct human consumption. Plant biomass, therefore, is used by humans first. The production and consumption of plant-source foods, however, results in a number of by-products, such as crop residues, co-products from industrial food processing, food losses and waste, and human excreta. Our first priority should be to prevent losses and wastes. If by-products cannot be prevented, eaten by humans, or are not needed to restore or conserve soil fertility, they are given to animals (including fish or insects), who can convert them into valuable food, and manure. Ruminants, furthermore, can create additional value from grasslands by converting grass resources into valuable food, manure and other ecosystem services, such as flood prevention or nature conservation. In 2050, therefore, the number of farm animals, and hence the production and consumption of animal-source food, is dependent on the amount of available human inedible by-products and grass resources. In addition to land, humans also get food from fresh and saltwater bodies. By 2050, we harvest and consume products from these natural waters, each in proportion to its natural productivity, a concept known as balanced harvesting. Along the Dutch shores, we furthermore cultivate and harvest shellfish (e.g. mussels and clams), which recycle inevitable nutrients losses lost from agriculture.

To ensure that we do not collectively overshoot our environmental ceilings, and that no human or animal falls short on life essentials (e.g. safe food, labour conditions, wellbeing), politicians in the Netherlands have defined together with their EU colleagues holistic and long-term national environmental ceilings for all human activities, including agriculture, and social foundations for our food system. Social foundations include essential rights for human and animal wellbeing, such as standards for food safety, labour conditions or the right for farm animals to express their species-specific behaviour. Once we have defined our environmental and social boundaries, we also know our safe-and-just operating space. Our farmers produce within this operating space, using farm practices that are environmentally sound and respect the welfare of animals. This might require incentives to 'get the prices right', for instance by

introducing taxes on the use of finite natural resources and CO₂-emissions. To ensure farmers no longer have to compete with cheap imports of products that have not been produced according to our values and social standards, a form of market protection has been established at the EU level.

The above clearly shows the need for a holistic approach to policy development. By 2050, therefore, we will have a Ministry of Food and Health that includes food production, food consumption and healthy lifestyles.

Technology is used to strengthen regenerative principles and ensure the social fundament. The starting point is that it should serve these values and not become a goal in itself. By combining drone-recorded images of crop fields with soil-scans, farmers are better able to target crop growth with nutrient requirements. These technologies enable them to grow crops in a way that minimises nutrient losses. They also use small-scale robots to monitor, weed and harvest their multiple crops on the field. Intercropping is the new standard, which has been shown to utilize soil nutrients more effectively and have higher yields than sole crops, while at the same time reducing the spread of diseases and pests. By 2050, we also use blockchain technology to create hyper-transparency in the food chain. To ensure a credible and trustworthy food system, consumers can access information about how farmers have produced their food. Using barcodes and videos, they can consult information and learn more about the way food in supermarkets or in their food boxes is produced. Open farm days are also still organised to experience food production in real life. This transparency along the entire food chain fosters environmentally sound, animal-friendly, safe and fair practices, and, in combination with life-long education (from primary school onwards), has shaped citizens into conscious consumers.

In terms of economy the Netherlands is well known for its international trade. By 2050, the country has taken its responsibility for the environmental and societal impact that it causes through the imports of (raw) agricultural products, shifting to a policy of mainly importing final food products, e.g. chocolate bars instead of raw cacao. This allows the added value of the processing of raw food ingredients to stay in the countries of origin. The Netherlands does still export food products, but the nutrients and biomass are now in balance with those in imported food products. As a result, food production and consumption has become more localised, a development supported by local currencies and/or green investment programmes. We also have come to realise that focusing on economic growth no longer serves our planet and our people. Neoliberal 'free' markets have been turned into inclusive markets which contribute to the realisation of public values. We have adopted a richer range of indicators to express what has value to our society and planet. An example is the National Societal Product, which reflects the contribution of our food system and ecosystem services to society.

To stimulate a good health and diet, a healthier balance of plant and animal-based proteins is the standard. This transition is facilitated by a higher VAT on animal compared to plant-source food. By 2050, most citizens in the Netherlands consume about 70% of their proteins from plant and 30% from animal products. Others prefer not to consume any animal products for ethical reasons and have adopted a vegan lifestyle. Eating a moderate amount of animal products ensures both a healthier and a more sustainable diet. This healthier diet is enjoyed together at the dinner table as people have re-established the tradition of eating together. This time of reflection and good conversations has brought pleasure and a renewed appreciation for food. Convenience has made place for preparing and enjoying good quality food together – from more to better. The fact that people eat together with neighbours, friends, community members and family contributes to healthier food consumption and more active lifestyles.

Culture has also been re-rooted by 2050. Citizens are now more involved in food production, more aware of how their food is produced, and celebrate the diversity of regional products. Society has prioritised the production, consumption and fair distribution of high-quality food over quantity. Citizens also participate in food policy councils to collectively decide about local food environments. A National Food Assembly advises Parliament about policy changes that may further foster the food system's sustainability and health outcomes.

Various forms of farming communities ensure that consumers and producers collaboratively shape the way their food is produced and establish forms of food democracy. Some citizens join community-

supported agriculture, buying a share in a farm and receiving a share of the harvest in return. This type of farming also allows them to spend time at that farm with family and friends. Together these communities share the risks involved in the production of food (due to weather conditions, diseases and pests) so that these are no longer solely for the producer. The experience of people in these farming communities has contributed to a respect for the lives of people, animals and the planet (including materials), which is ensured through universal rights adopted in the social foundation. Excessive consumption and waste of food and materials has been transformed into a conscious consumption. Moreover, material goods that are consumed now have passports to allow materials to be replaced when needed, or reused for other purposes. Similarly, farm buildings and machinery have become modular, allowing for flexibility and reuse. There is no longer a need to mine valuable resources such as metals.

We, authors and stakeholders of the Dutch food system, believe that our vision is based on viable, feasible and desirable strategies to re-root the Dutch food system. By connecting our roots – being the soil and our tradition in collaboration – we believe that together we can address our urgent challenges and achieve a healthy and regenerative food system in the Netherlands.

How did you hear about the Food System Vision Prize?

Email

Describe how your Vision developed over the course of the Refinement Phase.

Our team was very excited to be selected as a pre-finalist. We conducted individual in-depth interviews and futurecasting, brainstorming and reflection sessions, all carried out online due to COVID-19. Our emphasis was on deepening our initial vision and ambitions for the six themes. The first phase had focused on our dream for 2050, and this was followed up by thinking about the feasibility and the methods. In this second phase we involved a much wider range of stakeholders from the entire food system and learned more about the wide diversity of food systems initiatives. There was lots of interest in our vision, in no small part due to the COVID-19 pandemic and the many fissures in our current food system it has laid bare. The crisis is also a catalyst that accelerates the implementation of ideas for change originating in our food community and demonstrates the need for radical moves to address the challenges in our food system.

Please provide the names of all organizations you meaningfully partnered with to develop this latest version of your Vision (they contributed at least 10 hours of time to the Vision development during the Refinement Phase).

The food system brings together many stakeholders involved in the production, processing and consumption of food. Developing a food system vision requires a transdisciplinary approach that involves a wide range of stakeholders. This version of our vision is a co-production between representatives from three recently established farmers' organisations (Caring Farmers, de Nieuwe Boerenfamilie (initiated by Food Hub) and Toekomstboeren), several environmental non-governmental organisations (including the Foundation for Nature & Environment and the Centre for Agriculture & Environment), the Dutch Association of Biodynamic Agriculture, and scientists from natural and social sciences groups at Wageningen University & Research (see Food Vision Team; section 3). We also discussed different versions of our food vision with members of our extended food community (see Our Supporting Food Community; section 3).

Describe the specific steps you took during the Refinement phase to include different stakeholders to develop your Vision, including a description (age, profile, and total number) of the stakeholders engaged, and how you engaged with each.

We are continuously inspired by the wide diversity of food system initiatives in our home country of the Netherlands, which range from bottom-up farmers' networks and collaborations between citizens and producers to new policy initiatives. These initiatives enable change and show that it is possible. We are pleased to have the unique opportunity of working with these pioneers and feel honoured to call them members of our team and community. The COVID-19 crisis has also boosted the interest in food and further sparked the creativity of our community.

Farmers are the starting point of a food system, which is why our community included 3 recently established farmers' organisations (Caring Farmers, de Nieuwe Boerenfamilie, Toekomstboeren) from the outset. Together, they represent about 800 farmers and future farmers from all sectors, ages and regions in the Netherlands. During the Refinement Phase, 7 farmers actively involved in these organisations helped develop our vision and shared their ideas and challenges. As our vision is rooted in nature our team also included environmental NGOs (the Foundation for Nature & Environment and the Centre for Agriculture & Environment), Dutch Association of Biodynamic Agriculture as well as scientists from Wageningen University & Research (Best University in Agriculture and Forestry, QS World University Rankings 2020) from the very beginning (details in Food Vision Team).

A transformative food community needs not just innovative farmers but innovative stakeholders across the food system. To enlarge our community and discuss our vision with a much wider range of stakeholders, we approached chefs, policy makers, NGOs, food innovators, food processors, financial institutes and retailers to participate in our community. A summary of their reasons to support our food vision can be found in the attachment Our Supporting Food Community.

What signals and trends did you draw from to inform your Vision? Please provide data or examples that back up each signal or trend.

In our futurecasting workshops, we first invited our team members to write a headline for a 2050 edition of a fictional newspaper called The Dutch Times (see attachment). These headlines covered a wide range of sustainability issues, including environmental ('We are waste-free'), health-related ('Eradication of type 2 diabetes') and economic issues ('Rise in the National Societal Product'). We discussed these headlines with each other and with external experts and deduced signals & trends to underpin our vision.

The concept of circular agriculture is a promising way to ensure a sustainable food future. It is based on a set of principles that can help safeguard our environment (see Environment). The Dutch government was among the first to adopt this concept in its national agricultural policy, and has the ambition to become a global leader in circular agriculture by 2030 (1). This goal has inspired many new initiatives in which food actors work together to make a circular food system a reality. A fine example is the Delta Plan for Biodiversity Recovery, in which farmers' organisations, food supply chain partners, researchers, nature & environmental organisations, and a bank joined forces to reverse biodiversity loss in the Netherlands (2).

A related trend is the increasing interest in sustainable food consumption. Sales of food with a sustainability label are increasing every year in the Netherlands and now represent 11% market share (3). There are many initiatives inciting people to eat more plant-based foods (e.g. Vegetarian Butcher (4)), prevent waste (e.g. Too Good To Go (5)), reduce waste in the food chain (e.g. Verspillingsfabriek (6); Kromkommer (7)) or repurpose lost food as animal feed (Kipster (8)). We also see an increasing interest in locally sourced food for perceived reasons of quality, freshness, transparency, support for the local economy and less transport.

The COVID-19 crisis has enhanced interest in local food and brought farmers closer to consumers, among other things through initiatives such as the national campaign #SupportYourLocals (9). It has helped us remember what is essential in life – such as food – and reminded us of the importance of creativity and collective action in tackling challenges – all elements that are also crucial in a food system transformation. It also renewed discussions about excessive consumption and travel.

Finally, the pandemic has clearly demonstrated that our food system is not isolated from the world and is highly dependent on inputs from other industries. A move towards a circular food system is only possible within the wider context of a circular economy and society, and dependent on the way we value products and services. Although there is no single blueprint on how to move towards a circular economy, concepts like a 'national societal product' (instead of GDP), true pricing and a redirection of EU subsidies towards circular farming are all currently being considered in the Netherlands.

Describe a "Day in the Life" of a key food system actor within your food system in 2050 (e.g., farmer, chef, supply chain actor, food policy actor, etc.).

Our vision is largely based on radical and inspiring initiatives that are being developed by our team members. We have included a video showing two examples: the revolutionary laying hen farm Kipster (8) and the Herenboeren community of prosumers (10) (Day in the Life video).

Each and every day, the operators of Kipster take care of 24,000 hens in a single building with a PV roof. The housing system is designed to allow hens to express their species-specific behaviour and feel comfortable. Hens are fed only with leftovers from the food processing industry such as bakery waste. Upcycling these leftovers makes a contribution to human food supply without using additional resources. Ruud Zanders, co-founder of Kipster, devotes his days to arranging agreements with retail and catering companies to sustainably market their eggs. He stays in continuous contact with scientists and other food stakeholders to further improve the concept. Ruud and his team also welcome outsiders to visit the farm and learn more about sustainable egg production. These visitors learn about a revolutionary farm that is genuinely unique in the world.

The inspiring Herenboerderij community of prosumers near Boxtel consists of 200 families. They paid a one-off fee of 2000 euros to become stakeholders and subsequently employed a farmer to take care of their food production. This farmer and the prosumer families jointly decide which crops to grow and what animals to keep, and share annual costs and risks as well as all produce. Their natural agroecosystem is the building block of their food system, and they have learned to eat what it provides. They can see on a daily basis how their food is produced, and therefore waste less, eat healthier and are conscious prosumers. They all continuously contribute to improving the complexity of the ecosystem to make it more robust and resilient. This community is a clear example of a healthy and regenerative food system.

Environment | How will your food system of 2050 adapt to climate change and remain resilient?

Our food system connects some of the most pressing environmental challenges of our times. It releases about a quarter of all human-induced greenhouse gases, is responsible for a third of global terrestrial acidification, and causes the majority of global eutrophication, deforestation and biodiversity loss (11,12). It is also extremely resource intensive. One of the main causes of these environmental effects is that our current food system is based on a linear extract-produce-consume-discard model which is unsustainable in the long term, especially in the face of a growing and wealthier world population demanding more food (13).

To protect the environment and stay within the carrying capacity of the planet, this wasteful model needs to become a circular one by 2050. Our own concept of a circular food system has its roots in systems thinking and looks beyond carbon and climate change (14). It is based on the following principles: using

practices and technologies that safeguard natural resources and regenerate healthy soils, clean water & air, and biological diversity; prioritising plant biomass for direct human consumption; and preventing losses and waste in the food system – and, if unavoidable, recycling them back into the food system, with healthy soil as a first priority.

Healthy soil is the backbone of our food system, which foresees only regenerative crop cultivation practices so as to preserve biodiversity and soil quality. No pesticides or herbicides are used, protecting valuable lifeforms in and on the soil. Instead, we combine smart intercropping in time and space with robust crops and biological pest control so as to manage pests and diseases. Recent literature shows that intercropping systems have about 20% higher yields on average than sole crops thanks to higher growth rates, fewer weeds, pests & diseases, and a more effective use of resources (15). By 2050, robots will facilitate the full-scale application of intercropping.

By 2050, we will no longer use fertile arable land to produce feed crops for animals. Although this approach boosted the production of animal-based food in the past, it will soon be considered unethical as it competes with the production of plant biomass for direct human consumption. Plant biomass will be the primary source of food for humans. The production and consumption of plant-based foods still results in a number of by-products, such as crop residues, co-products from industrial food processing, food losses and waste, and human excreta. Our first priority is to limit the impact of these by-products. If they cannot be eliminated, transformed into human food, or used to restore or conserve soil fertility, they can be given to farm animals (including farmed fish or insects), who can convert them into valuable food and manure (14). By converting these by-products, animals recycle nutrients back into the food system that otherwise would be lost for food production. Ruminants can create nutritional value from grasslands by converting grass resources into valuable food (16). However, we acknowledge that not all biomass from grassland can be considered available for ruminant production. Use of grassland by ruminants precludes alternative uses such as rewilding or agroforestry, which may be preferable in terms of biodiversity and climate change. In 2050, therefore, some Dutch grasslands will be transformed into forest to sequester carbon and combat climate change while the rest remains herb-rich grassland, grazed mainly by dairy cattle.

In 2050, farm animals are fed only with human-inedible and unavoidable by-products and grass resources. The number of farm animals, and hence the production and consumption of animal-based food, therefore, will be dependent on the availability of these resources and the carrying capacity of our ecosystems. Initial estimates show that this route can provide up to one third of the daily protein needs of an average global citizen (17). Moderating the amount of protein we eat and making sure it originates in effective animal production will both save arable land and significantly reduce nitrogen & phosphorus losses and greenhouse gas emissions.

By 2050, we will harvest and consume products from natural waters across all tropic levels and in proportion to their natural productivity. Along Dutch shores, we will, furthermore, establish integrated multi-trophic aquaculture systems (with combined cultivation of seaweeds, mussels, worms and crabs, among others), which will recycle nutrients inevitably lost from agricultural land.

Our food vision intentionally includes functional biodiversity at multiple scales (diversity in soil life, plant and animal species, farming systems and landscapes) in order to provide a wide variety of ecosystem services (e.g. nutrient cycling, water buffering, carbon storage, provision of biodiversity). This will enhance the resilience of our food system to shocks and stresses (e.g. climate and pests).

Diets | How will your food system of 2050 address malnutrition in all its forms (undernutrition, micronutrient deficiency, metabolic disease) for the people living there?

We need a menu of change to ensure a healthy and sustainable diet for all Dutch consumers, suppress non-communicable diseases such as type-2 diabetes, and prevent micronutrient deficiencies. COVID-19 is obviously having a major impact on the elderly and people with comorbidities, but we are all facing

challenges. This unprecedented outbreak is reinforcing the importance of everyone in society being able to maintain a wholesome lifestyle, and that certainly includes access to a varied and balanced diet.

Long before the pandemic, our vision was stressing the need for Dutch citizens to shift to an improved balance of plant and animal-based proteins, balancing good health with a good diet. Our circularity principles recommend that, by 2050, most citizens in the Netherlands can consume about two thirds of their proteins from plants and one third from animal products. Diets including moderate amounts of animal products and a limited amount of red meat are both healthier and more sustainable (11). We will also have halved our consumption of empty calories (e.g. snacks and soft drinks) and highly processed food products.

Others prefer not to consume any animal products for ethical reasons and have adopted a vegan lifestyle. To ensure nutrient adequacy, especially for nutrients primarily available in animal sources (e.g. vitamin B12, vitamin D, omega-3 fatty acids, calcium, iron and zinc), they must plan their diets appropriately and use supplements or fortified foods when needed.

To realise this shift to a healthier and more sustainable diet, we must change our consumption behaviour and especially our food environment. Literature has shown that diet interventions that seek to alter the 'choice environment' tend to be more effective than those that target 'internal motivations' (18). By 2050, therefore, sustainable food will be appealing, normal and easy (19). Consumers will know that plant-based foods are delicious and affordable, making them attractive. A higher rate of value-added tax (VAT) on animal-based foods than on plant-based ones will encourage consumers to buy relatively more plant products. Animal products will come to constitute a smaller but highly appreciated part of our meal.

Delicious vegan and vegetarian foods will be the normal default in supermarkets, restaurants, catered events and school & university canteens. We will widely promote simple and achievable rules of thumb on how to eat in a healthy and sustainable way, making it easy to make the right food choices, as reflected by mottos such as 'Meat on Mondays', 'Red Meat is a Treat', 'Fish on Fridays', 'Fruits Frequently', or 'Beans not Beef'. People will be supported in more sustainable planning and cooking through delicious recipes that happen to be circular & sustainable being made freely available online and in supermarkets, and being applied by prominent chefs and influencers online.

By 2050, consumers will be able to decide to use a 'healthy and sustainable filter' on their shopping apps, and even opt into personalised tips and recommended substitutions. These apps and bespoke tips, developed by the Netherlands Nutrition Centre, will also provide easy advice on how to avoid the consumption of snacks and empty calories. The consumption of unhealthy foods will also be reduced through a prohibition on advertising for these products. Moreover, food education will become part of the curriculum in all schools, supporting conscious consumption and developing awareness of the impact of food on people's health.

By changing our food environment, we will move toward a healthier and more sustainable diet. We will aim to re-establish the tradition of gathering around the dinner table, providing a time spent in reflection and good conversation, and bringing renewed pleasure in and appreciation for food. If people eat together with neighbours, friends, community members and family, they will also eat healthier food and lead more active lifestyles (20). By preparing healthy, sustainable and convenient food at home, and enjoying quality meals together, people will move from eating more to eating better.

Economics | Where and what will the jobs be that support living wages in your future food system of 2050, and how will these jobs impact gender equality?

An article in the September 2017 issue of National Geographic entitled 'This Tiny Country Feeds the World' described how the Netherlands became the world's second largest exporter of agricultural products (21). By 2050, all stakeholders in the Dutch food system will have taken their responsibility for the flipside of this success – its environmental and societal impact on the Netherlands, Europe and (even more so) outside Europe.

The Netherlands will have committed to a policy of importing mainly final food products, such as chocolate bars instead of raw cacao. This will allow the value added by the processing of raw food ingredients, and the associated jobs, to stay in the countries of origin. Moreover, the export and import of food products will be in balance in terms of nutrients and biomass, and focused mainly on north-western Europe. As a result, food production and consumption will have become more localised, a development supported by local currencies and/or green investment programmes.

The Netherlands' main export product in the future will be knowledge, not food. The majority of Dutch farms will produce food for local consumers, with a minority growing food for other parts of north-western Europe. In addition to producing food, Dutch farmers will be the stewards of rural land. In other words, farming activities will be different from today, but the total number of farms and hence jobs in the agricultural sector (farmers and associated industry) will be roughly similar (there were 53,233 farms in the Netherlands in 2019).

By 2050, moreover, we will have defined the environmental ceilings and social foundations of the country and the food system. This will ensure that our food is produced in a sustainable way that is based on healthy and regenerative farm practices, a wide range of farming styles, and under conditions that are fair to farm workers, animals and the local community. This, however, will also increase production costs and require government interventions to reduce competition with products not made in similarly sustainable conditions. These interventions will have to ensure that consumers have access to healthy and sustainable food while farmers and other food actors receive a fair income.

The income of farmworkers will therefore come not only from selling food but also from payments for other ecosystem services such as nature preservation, landscape conservation, carbon sequestration or flood prevention. Consumers and governments will pay farmers to regenerate and maintain ecosystem services, turning farmers and farmworkers into stewards of the land while making farming more socially and economically rewarding. This shift will result in sustainable farm incomes and opportunities for small and medium-sized farmers, family farmers and farmworkers.

To ease access to land for a new generation of farmers and reduce speculation in fertile agricultural land, the Dutch government will encourage organisations (such as nature conservation organisations) to buy land (by compensating for the difference in land costs between agricultural land, natural land and urban areas) and to provide long-term land lease to farmers at realistic market prices. This change in land ownership will make it easier for a new generation of farmers to start regenerative farming activities without necessitating huge investments to buy land.

To guarantee sustainable farm incomes and opportunities for various sizes of farms and their workers, we need large, structural changes, not only in our food system but in our entire economy. An increasing number of people today question whether economic growth as measured by gross domestic product (GDP) should remain the basic measure of our economy (22,23).

Two main arguments are given for moving away from a focus on economic growth. Firstly, given the earth's finite resources, we cannot increase economic growth and associated material consumption indefinitely without eventually causing catastrophic changes to the ecosystem (24). The second argument is based on the observation that once people's basic needs are met (with sufficient food, drink, housing, clothing, etc.), additional financial resources do not appear to generate greater happiness. Instead, people value things like personal relationships, a healthy life, a safe community or a secure job (25).

By 2050, therefore, today's 'free' markets will have turned into inclusive markets that contribute to the realisation of public goods such as fresh air, clean water, healthy soil and a diversity of species and landscapes. By 2050, we will have adopted a richer range of indicators to express what is valuable to our society and planet. An example is 'national societal product', which reflects the contribution of food system and ecosystem services to society more fully than GDP. This clearly shows that moving our food system from providing higher quantity to better quality is beneficial for people, animals and the planet overall.

Culture | How will your 2050 food system ensure that the cultural, spiritual and community traditions and/or practices in your Place flourish?

Cultural values will have clearly evolved by 2050. Food will have gone from being primarily considered as a commodity to being seen as the essence of life, with quality and sustainability as crucial elements. Citizens will have become more involved in food production, more aware of where their food comes from, and celebrate the diversity of regional and seasonal products. Society will have prioritised the production, consumption and fair distribution of quality over quantity in food.

The revaluation of food in society will have occurred through a combination of increased awareness about the impact of food on our health via food education in schools (see Diets), the success of Dutch circular cuisine, new forms of community-driven food initiatives and policy incentives (see Policy). Moreover, food-related events such as farmer markets, festivals and open days by food businesses will help people come together and get to know each other.

Food will serve as a leverage point for a renewed sense of community, boosting inclusiveness, cultural interactions and integration, while combatting loneliness. This renewed sense of community will also mean that people look after each other more. Individuals who cannot participate in the labour market due to disabilities or other reasons will not be forgotten. Social jobs on farms and in food processing and retail will allow people with disadvantages to explore and develop their talents. The food system will provide opportunities for people to bridge social and cultural divides, and reduce social inequalities.

After the successful launch of the Low Food movement in 2019 (26), Dutch cuisine will by 2050 have been rebranded as 'Lowlands Cuisine' and have won an international reputation for circular cooking. Our circular chefs will use locally sourced products such as mussels, herring and seaweed from the North Sea, dairy and meat products from rich Dutch grasslands, high-quality potatoes and grains from the province of Flevoland, delicious fruits from the Betuwe region, and sea kale and beetroots from saline agriculture near our shores. Dutch chefs will have reinvented many traditional recipes by replacing animal-based with plant-based products and utilising all parts of the plants and animals consumed (zero-waste and nose-to-tail cooking). At the same time, the cultural diversity of our country will be celebrated and Syrian, Ethiopian and Moroccan dishes will have become hugely popular, making Dutch cuisine a genuine melting pot.

By 2050, citizens will play a more active role in shaping their local environments in relation to energy and healthcare as well as food. They will have developed new ways of organising themselves and established several forms of food democracy (27), for example by participating in food councils to collectively decide on local food policy and stimulate food-related initiatives (28). These emerging initiatives will be complemented by new forms of ownership of food supply chains. The dichotomy between producers and consumers will be overcome and citizens will become shareholders, actively co-deciding on the future of food production (see also Policy).

Different kinds of farming communities will ensure that consumers and producers jointly shape the way their food is produced. Some citizens will join community-supported agriculture, buying a share in a farm and receiving a portion of the harvest in return. This type of farming will also allow them to spend time at the farm with family and friends. Together these communities will share the risks involved in the production of food (due to weather conditions, diseases and pests) so that they no longer solely affect the producer.

As our community is re-rooted and reconnected to our food system, either through participation in farming communities or simply by being aware of how food is produced, consumers will become more conscious. Excessive consumption and waste of food and materials will have evolved into conscious consumption. Waste that cannot be avoided will be separated through smart systems to facilitate its reuse and ensure the highest societal value. This consciousness will result in a greater respect for people, animals and the planet (including materials). This will also be ensured through our social foundation (see Policy) with which we guarantee that the health and wellbeing of humans and animals are assured.

Having recognised how many materials have been wasted and the serious environmental consequences (e.g. plastic soup and pollution), people will avoid the production of non-essential material goods. Moreover, material goods that are consumed will have passports to allow components to be replaced when needed or reused for other purposes (29). Similarly, farm buildings and machinery will have become modular, allowing for flexibility and reuse. There will no longer be a need to mine valuable resources such as metals.

Technology | What technological advances are needed to transform your food system into one that meets your goals and embodies the values of your Vision in 2050?

No human technology can fully replace natural processes that have been perfected by nature over millions of years in delivering key services to sustain life on Earth. Instead, we aim to work with nature and use technology to strengthen organic and regenerative principles. Technology can also help us to strengthen the values of our social foundation, such as transparency in the food chain. The starting point is that these techniques should serve specific values and not become goals in themselves.

There are various ways in which technology can strengthen our organic and regenerative principles. By combining drone-recorded images of crop fields with soil scans, for example, farmers will be better able to target crop growth with nutrient requirements. These technologies will enable them to grow crops in a way that minimises nutrient losses to air, water and soil. They will also use small-scale robots to monitor, weed and harvest their multiple crops in the field. Intercropping, which has been shown to utilise soil nutrients more effectively and have higher yields than sole crops while reducing the spread of diseases and pests, will be the new standard.

By 2050, we will also use technology for processes such as safely recovering and applying nutrients from urine (e.g. ammonia stripping, struvite precipitation) (30) and faeces (e.g. biological decomposition), and for effective reuse of water in households and farms. Farmers and other people involved with food will, moreover, use technology to underpin the resource use and emissions associated with their production practices, allowing for result-driven instead of means-driven solutions and governance.

Finally, we will have developed the technology to encourage people to eat more plant-based foods, including plant-based substitutes for meat, milk and eggs. To safeguard nutritional adequacy, these plant-based substitutes will be partly fortified with substances such as vitamins B12 and D, calcium and iron. To this end, we will have invested in technologies to derive from algae, yeasts and bacteria these essential nutrients that normally originate in animals.

Next, we will adapt technology more widely to strengthen our social foundations. These foundations include essential rights for human and animal wellbeing, such as standards for food safety, labour protections or the possibility for farm animals to express species-specific behaviour. Sensors will, for instance, be used to monitor the health and behaviour of individual farm animals so as to improve their wellbeing.

By 2050, we will use blockchain technology to enable absolute transparency in the food chain as an essential value of our social foundations. To ensure a credible and trustworthy food system, consumers will always be able to access the details of how their food has been produced using barcodes, apps and videos. Open farm days will also still be organised to let people experience food production in real life. This transparency throughout the food chain will foster environmentally sound, animal-friendly, safe and fair practices, and, in combination with lifelong education from primary school onwards, shape citizens into conscious consumers.

We will develop software to help these conscious consumers eat in a wholesome way, for instance by producing shopping apps with a 'healthy and sustainable' filter that includes an opt-in to personalised tips and recommended substitutions. Such apps and personalised tips will also provide easy tips to avoid the consumption of snacks and empty calories.

As interest in biobased materials booms in the 2020s, we will realise that merely replacing fossil-fuel-based production of products and materials with biobased alternatives would still strain the planet's capacity and threaten our natural resources. Moreover, there will be an increasing risk that the production of bioenergy and biobased materials competes with food production (31). For this reason, we will also invest in modular product design and in making products more durable & easier to repair, upgrade or remanufacture (32,33). This will result in a wide set of new competencies and business models for circular product design. Craftmanship will become more prominent in our society again, and the ability to repair products will become a skill celebrated in the many repair cafes that will be established around the Netherlands.

Policy | What types of policies are needed to enable your future food system?

Governing the food system towards the future we envision requires action on behalf of a broad range of stakeholders, such as farmers, the food industry, retailers, financial organisations and consumers. Market and civil society initiatives are key to realising the transformation needed. That said, the recent financial shocks, climate crisis and the COVID-19 situation have shown that the reliance on markets promoted by laissez-faire economics is insufficient to counter our most pressing challenges. Instead of seeing free markets as an end in themselves, governments should ensure markets contribute more to collective goals and public goods.

To avoid collectively placing too large a strain on the environment, or deprive humans and animals of essentials like safe food, decent labour conditions or physical wellbeing, Dutch politicians will join forces with their EU colleagues to define holistic and long-term national and regional environmental ceilings for all human activities, including agriculture, and social foundations for our food system. Social foundations will include essential rights for humans (food access & safety; fair working conditions) and animals (possibility to express species-specific behaviour). Together, these environmental and social food system boundaries define a safe-and-just operating space where human, animal and planetary well-being are assured (22). Knowing this space and the associated long-term policy goals will provide clarity to food actors and enable informed choices and meaningful investments.

Transitioning towards this safe-and-just operating space will require existing incoherencies between government policies to be overcome. The Dutch government will adopt an explicit and elaborate national food strategy to align all sectoral policy efforts. Local government will also play a key role in shaping local food environments, stimulating innovative practices, strengthening food democracy and organising educational activities. Cross-border challenges will be tackled at EU and global levels, and established institutions transformed to allow for more effective and inclusive decision-making.

While market and civil society initiatives will play a crucial role in this food system transition, there will still be need for certain government interventions. By 2050, regulations will be in place to set fair prices. The Dutch government will have introduced financial incentives to encourage the consumption of healthy foods and discourage unhealthy and non-sustainable foods. There will be a price on finite resources and emissions (e.g. phosphate rock or CO₂) in the food system, incentivising producers to invest in sustainability innovations. In addition, VAT on unhealthy products, such as those containing high amounts of salt, sugar and fat, will have been increased, while taxes on fruits and vegetables are lowered. The government will ban advertisements for snacks, soft drinks and other foods and drinks containing empty calories.

Dutch politicians will have worked with their EU colleagues in the spirit of a 'Green Recovery' (34) and the Farm to Fork strategy (35) to reform the EU's Common Agricultural Policy from a system that subsidises the status quo through hectare-based subsidies to one that rewards farmers for producing public goods and ecosystem services, such as biodiversity conservation, landscape restoration, carbon sequestration or flood prevention. The EU will also have developed a Common Food Policy, which will include a pan-European label for healthy and sustainable food, a research programme on food, and stricter legislation on animal welfare, particularly the cross-border transportation of livestock. To ensure

a level playing field, the EU will only allow imports of food products that comply with its own, high sustainability standards. This will ensure that farmers no longer compete with imports of products which fall short of our values and social standards.

The COVID-19 outbreak has made clear the serious effect of the increased dependency on food trade developed over recent decades (36) in terms of food shortages (37) and a wasteful overabundance of food products (38). The EU will have set up a major investment fund to help countries address the dependency on food trade (need for food imports as well as reliance on food exports).

Apart from these interventions, the government will have encouraged citizens to become more active in shaping their local food environments and participate in local food councils. By 2050, therefore, food production and consumption will have become more democratic. A National Food Assembly will give policy advice to further foster the sustainability and health outcomes of the food system.

There is clearly a need for a holistic approach to food policy development, and recent reports have acknowledged as much (39,40). By 2050, we will therefore have a Ministry of Food and Health that covers food production, food consumption and healthy lifestyles.

Describe how these 6 Themes connect with and influence one another in your food system.

Food systems are comprehensive by nature, shaping our bodies, minds, landscapes, policies, trade, technologies and climate. We have a vision of an inclusive food system rooted in nature and society (see visual Our Systems Approach). To protect the environment, we have replaced the wasteful linear model of our current food system with a circular one rooted in soil and natural waters, and dependent on context-specific agro-ecological conditions.

These agro-ecological conditions also originally shaped the diet of different countries and regions. While this connection to the seasons and regional contexts is less apparent in today's globalised food system, our vision leverages on the way that food is still strongly connected to the culture, identity and traditions of the Netherlands. Every region of the country has its own specialties and ways of producing, processing and consuming food.

Food obviously plays a central role in our health too so our system promotes healthy options, respects the environment, is consistent with food cultures and safeguards the needs of people and animals. Moving the food system towards this future requires action by many food stakeholders as well as more active policy and economic incentives and new technologies.

Citizens' diets will become healthier and more sustainable as a result of a menu of changes, including altered food environments, food education and the banning of adverts for empty-calorie foods. There will also be a return to dinner get-togethers with neighbours, friends, community members and family. These developments will help citizens become conscious consumers, aware of how food is produced and prioritising quality over quantity.

Politicians will define holistic and long-term environmental ceilings and social foundations for our food system to ensure we do not collectively overshoot environmental ceilings and that all basic needs of humans and animals are met. Short and longer-term economic incentives will have been introduced to help achieve these goals and we will also have adopted technology that strengthens our roots in nature and society. With boundaries now clearly defined, we know the safe-and-just operating space within which farmers can produce.

To ensure farmers don't have to compete with food imports that are not produced according to our social values, we will establish a form of market protection at the EU level. To reduce the externalities associated with feed and food imports, we will import final food products, not raw agricultural products. Imports and exports will be balanced in terms of nutrients and carbon. Food production and consumption

will be more localised, seasonal and focused on health, taste and quality. Having recognised the need to stop focusing on economic growth, we have adopted a richer range of indicators to express what has value to our society and planet, the so-called national societal product.

Describe any trade-offs you may have to make within your system to attain your Vision by 2050.

Our food system connects to a wide range of themes. Changes in one aspect of the food system may have an effect elsewhere and these can be either positive (synergy) or negative (trade-off). Although our vision aims to create as many synergies as possible, we acknowledge that trade-offs will occur. Chief among these is that moving towards more regenerative farming practices may have an adverse effect on the production volume and trade position of the Dutch food sector.

As farm animals raised under the circularity paradigm will only be fed unavoidable and inedible by-products and grass resources, their numbers and productivity may decrease. We expect a reduction in the number of pigs and poultry, while the number of cattle should remain the same. There will still be a reduction in the national milk volume, however, as cows will be fed with by-products and grass resources alone. A full-scale application of intercropping will, however, ensure that yields per hectare will remain similar to current yields. The majority of farms will produce for the local market, while a minority grows food for north-western Europe. We will only import finished food products – chocolate bars instead of cacao, for instance – and the import and export of food will be balanced.

These developments will affect our position as the world's second largest exporter of food products. They will also stimulate other countries to increase their self-sufficiency and export economy (e.g. fair-trade chocolate and coffee) and result in a more regionalised food system that is less dependent and vulnerable to shocks. Although the economic impact of reduced food imports and exports may be substantial, we see this as the only option to sustainably provide food and other life-supporting ecosystem services.

We believe that the various policy interventions proposed will allow us to develop a system in which food producers are paid fair wages and society is provided with a wide variety of ecosystem services that are essential for the resilience of food systems, as well as food. This will generate new jobs on farms and in industry that can compensate for the jobs lost in export-oriented food-processing industries. At the same time, we will strongly encourage a shift in the way our economy currently values ecosystem services and a move towards an economy in which the full societal value of goods and services is recognised.

As our goal is to stimulate a healthier diet, we propose measures that can help set prices which accurately reflect the environmental and social impact of these products. This can result in higher prices for products with relatively high externalities, such as coffee, chocolate and animal products. We however want to make sure that everyone in the Netherlands has similar opportunities in terms of access to healthy and sustainable food, and if those food products become slightly more expensive, low-income families will be supported to ensure healthy and sustainable lifestyles.

3 Years | Describe 3 key milestones that you would need to achieve within the next three years for your Vision to be on track?

The three main milestones for the short term are to accelerate momentum, stimulate conscious consumption and define the safe-and-just operating space.

A wide variety of food system stakeholders have contributed to this vision. While some have opposing views on certain issues, all agree that change is needed (see Our Supporting Food Community). Taking part in this competition generated momentum to collectively develop an inspiring vision that addresses the flaws in the current food system. The COVID-19 crisis has been a further catalyst, accelerating the implementation of new initiatives (41-43), and showing how change is possible. We are thrilled to share

this refined vision with the world, and, if awarded a prize, look forward to working together and organising activities to turn our vision into reality.

We see an urgent need to stimulate conscious consumption. A key starting point is making healthy and sustainable food appealing, normal and easy. Within the next decade all public institutions should provide a variety of delicious vegan/vegetarian foods in their canteens and advertisements for unhealthy foods should be banned. We recognise that some decisions may not be popular at first, but they are nonetheless essential to create awareness about the impact of food on our bodies, society and planet.

The Dutch food system is in need of a clear long-term food vision. The best short-term solution is a long-term policy (44). This long-term policy should start by clearly defining the environmental ceiling and social foundations of the Dutch food system. Together, these boundaries will define the safe-and-just operating space, providing clarity to food stakeholders and enabling informed decisions and investments that support human, animal and planetary wellbeing. This space will be a key component of the national food strategy to which all food actors must commit and that will define specific goals and indicators for 2030 and 2050.

10 Years | What progress will you need to make—by 2030—that would set your Vision up to become a reality by 2050?

Translating our vision into reality will require certain specific goals to be reached by 2030 (see The Dutch Times). The environmental ceiling and social foundations will be defined by 2023, committing all food stakeholders to a broad set of environmental and social goals and indicators. Goals to reach by 2030 include, among others:

- Greenhouse gas emissions lowered by 70% compared to 1990;
- Food waste reduction decreased by 50% compared to 2020;
- Local food from short supply chains (<100 km) has a market share of 50%.
- Diets of farm animals include 50% more local, unavoidable by-products that are inedible to humans and grass resources than in 2020;
- Half or our arable land is cultivated based on regenerative practices, e.g. intercropping, permaculture of agroforestry.
- Farm workers and other workers in the food sectors have a fair income and good living conditions
- Universal rights for animals are recognised in the social foundations, ensuring that all animals are physically comfortable, healthy and able to express their species-specific behaviour
- Farmhouses and other buildings have green rooftops or solar panels.

By 2030, progress in transforming the food system will be made on these specific indicators, as well as a wide range of societal initiatives and policy incentives. A key milestone will be the introduction of food education in all schools by 2025. Local food councils will be active in nearly all municipalities to provide food advice and support local food initiatives.

If awarded the \$200,000 prize what would you do with it?

We would invest our prize in initiating and fostering new seeds of transformative change, especially those developed by farmers as they are the starting point of the food system. We would like to share their enthusiasm, creativity, persistence and ambitions for changing the food system with Dutch citizens, the daily consumers of our food. To realise this, we envision a series of online videos, a documentary, or an exhibition in which these initiatives are shared with a variety of food stakeholders, from schoolchildren to

musicians and artists, who are challenged to interact with and think about the future of our food system. We also envision real-life pilots and local meetings to build and share embodied knowledge, skills and craftsmanship among farmers and other food stakeholders. This will be essential if we are to overcome barriers and identify incentives to plant the seeds of practical change.

To this end, we will establish a Caring Food Community Foundation to connect all those that care about the food system. This community will start as a continuation of our current Food Vision Team and members of our Supporting Food Community and welcomes all other inspiring people seeking for transformative change and who, with the above-mentioned initiatives, aim to continuously develop and inspire others to change. Collaborative initiatives to change the food system and to better connect food actors (such as producers and consumers) will be able to submit their ideas for change to this foundation. The board of the Caring Food Community Foundation will consist of one representative from each farmer's organisation, a representative from an NGO and a scientist from Wageningen University & Research.

If you are chosen as a Top Visionary, The Rockefeller Foundation would like to share your Vision widely with a global audience. What would you like the world to learn from your Vision for 2050?

Building a healthy and regenerative food system requires a radical change in the way our food is produced, processed, prepared and consumed. The COVID-19 crisis has made clear that we have to build on our collective knowledge and power to realise this grand food systems transformation. Eating well within our planetary boundaries will require deep partnerships across disciplines and beyond academic boundaries. This vision presents the collective and integrative set of changes needed to re-root the Dutch food system and reorient it from more to better.

The changes we suggest are based on seeds for change existing within our Caring Food community, demonstrating their feasibility. They vary from regenerative and animal-friendly farming practices (intercropping, saline agriculture, integrated multitrophic aquaculture, feeding farm animals only leftovers) and healthy eating patterns (Meat on Mondays, Fish on Fridays, Beans not Beef, Fruit Frequently) to effective policy measures (veggie food as the default in governmental buildings, long-term environmental ceilings for the food system) and a supportive food and economic environment (national societal product, payments for land stewardship). All the elements needed to make this vision a reality for the Netherlands are available. And if we have the chance to put them into action, we believe it can help establish a roadmap for a far larger, even global, application.

Please share a visual that communicates the structure and operation of your food system in 2050. Describe the visual.

This visual presents all elements of our vision. To explore these you can simply click on the images. The title directs you to our full application online. Meet our team and explore the newspaper with stories of our re-rooted food system. Join in and feel the enthusiasm of our Supporting Food Community. Learn more about the importance of a systems approach in our first video and visual. Read our full vision and enjoy visuals of our foodscapes. Meet two inspiring initiatives in our second video.

Written by Imke De Boer and Evelien de Olde