Norwegian Centres of Expertise
NCE Culinology

Drastic changes for the food industry

Radical scenarios 2020

Contents

Drastic changes for the food industry. **Radical scenarios 2020.**

Summary

This project presents the *food industry's* input as to how the industry might look in the year 2020, taking a radical perspective and based on lines of development that one can see today. A series of representatives from the foods industry (industrial, restaurant and public sector) took part in the project over the course of five workshops, where an open innovation methodology was used to develop thoughts and ideas into scenarios for the food industry in 2020. The project was carried out in the spring and autumn of 2010 as part of the NCE Culinology initiative.

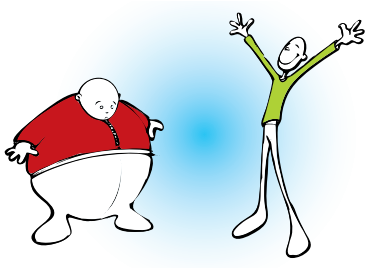
Radical scenarios

The food industry has long been focused on trends as a tool to understand consumer preferences and demands. Trends point only a few years into the future and do not account for radical changes that can arise, such as financial crises and environmental catastrophes that can have a powerful affect on the food industry. Radical scenarios must bridge this gap; they are not the opposite of trends, but shall perform the same function as trends while going much deeper. They help expand the mental horizon and provide increased clarity of how the food industry might manoeuver in the future and what consequences this might entail for today›s strategic investments. The scenarios will invite discussion and spark reflection in another way than trends do.

In the project three radical scenarios were developed: 1) Health: a personal responsibility, 2) Shortage of raw materials, and 3) Climate change. Each scenario addresses the consequences for the food industry should the scenarios actually unfold. Elements of all three scenarios were finally assessed in terms of probability and importance.

Health: a personal responsibility

The first scenario, *Health: a personal responsibility* assumes challenges associated with the obesity epidemic, the aging population, and a significant increase in disability benefits and lifestyle diseases. This scenario focuses extensively on the connection between food and health and the expanded awareness of the effects that food has on health. The state takes control with increased fees for unhealthy foods and stresses healthy institutional foods. Food is seen in relation to psychological health. Consumers can get an overview of their complete health profile, not only in connection to diet but also as it relates to heredity, sleep, psychological condition and exercise, and they will have diets and nutritional supplements tailored to fit individual needs. This scenario includes a counter-trend of groups that would prefer to live in an unhealthy fashion and oppose what they view as excessive state involvement.



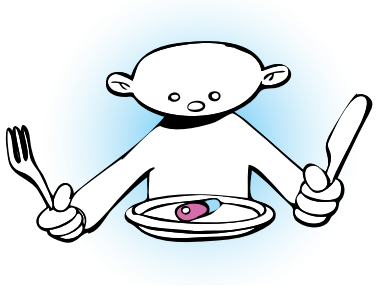
In this scenario IT is integrated into food products so that the consumers can gain information in the health effects, degree of freshness and origin of the product. The consumers can obtain virtual guidance on both purchase and preparation of meals. There will an increased purchasing of food specially adapted for different users and automatic dispensers will be able to prepare more according to need. Interest groups, such as the older generation, strong in resources, will organise and influence the food industry. Marketing will increasingly take place through social media. Shop logistics will change; unhealthy products such as sweets will receive more modest exposure and nutritional snacks will be more available. Prepared meals will be largely fresh, with more delicate processing than today.

Shortage of raw materials

The second scenario, *shortage of raw materials*, assumes continued population growth, climate changes, global pandemics, financial crises and an increase in wars and conflicts throughout the world, resulting in reduced crops. There will be greater poverty and hunger globally, with an increasing lack of protein and water in particular. In Norway there will be a drop in affluence as a much greater part of household budgets will be spent on food, and the prices of raw materials will increase dramatically. There will be an increase struggle for resources and export of certain raw materials will be prohibited in some countries. Norway will see a dramatically increased demand for self-sufficiency combined with increased immigration. There will be a high

"The representatives from the food industry expect that the prices of raw materials will rise within 2020, taking a higher percentage of the housing budget in Norway than today."

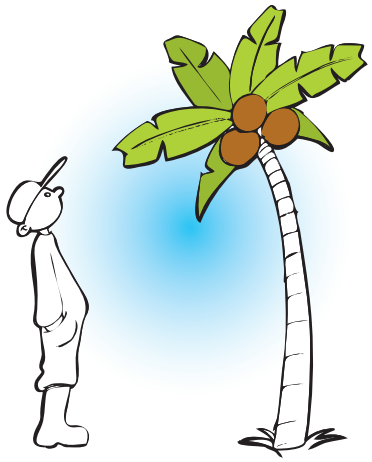
degree of activity in the research and development of new technology to mitigate the shortage of raw materials. We will see an increased usage of land and new farming in Norway, where small farms are used in combination with a growth in artificial growing of food in buildings and on building roofs. There will be increasing local production and home production in private residences and increased harvesting from nature. The sea will be used as a food source to a much greater degree, with investment made in aquaculture parks and fish farms.



There will be many pilot projects involving genetically modified foods to produce both optimal, rapid yields and high durability. There will be a high level of focus placed on optimal usage of raw materials. New products based on remainder materials will be developed, and technologies and logistics will be developed in the value chain to allow for the greatest possible shelf life. There will be restrictions and quotas on certain food types in order to ensure that there will be food of the proper type and in the proper quantity for the Norwegian population; this will entail, among other things, small portions of luxury food. IT will allow ready access to information on protein content and daily requirements, price curves, shelf life and optimal preparation. There will be both intelligent waste systems that provide waste management feedback and intelligent pricing where the prices drop the closer one gets to expiration date.

Climate change

The third scenario, *climate change*, assumes that we experience clear and documented climate changes, increased population growth and a scarcity of food and energy. A series of binding international agreements addressing regulations and directives on food production have been established. There will be requirements on optimal usage of arable land and local production of food, as this exerts a lower impact on the environment. There are energy quotas and food quotas on certain products. The concept of "polluter pays" is introduced. It will be expensive to pollute, and all companies and private individuals will have to practice environmental accounting. There will be higher fees placed on waste, minimisation of energy consumption



and closer cooperation along the value chain. There will be more open personal information from the data inspectorate, especially in areas concerning lifestyle and environmental impact.

In this scenario, there will be stringent requirements on documentation on environment and traceability. There will be a few powerful food chains on the market that claim more and more control over the entire value chain. As a counter-reaction, there will be a growth of "islands" of organic gardens. There will be a significant investment made in environmentally-friendly packaging. There will be local, small refining facilities with sales points where raw materials are refined and packaged into semi-manufactured goods and completed food products. In general, less time will be spent on purchase and preparation of meals in private household. IT will be integrated into food solutions so that consumers can easily access available information on CO_2 balance and other details. There will be points of sales that are hybrids of today's restaurants and shops. There will be a reduction in the consumption of red meat and cow's milk, which will be replaced by vegetable-based products. There will be expanded use of video conferencing technology in meal contexts. One can sit and eat a meal together with family and friends or connect to dining locations from elsewhere in the world.

Assessment of the scenarios

Elements from all the three scenarios were assessed in terms of probability and importance for the Norwegian food industry. A total number of 47

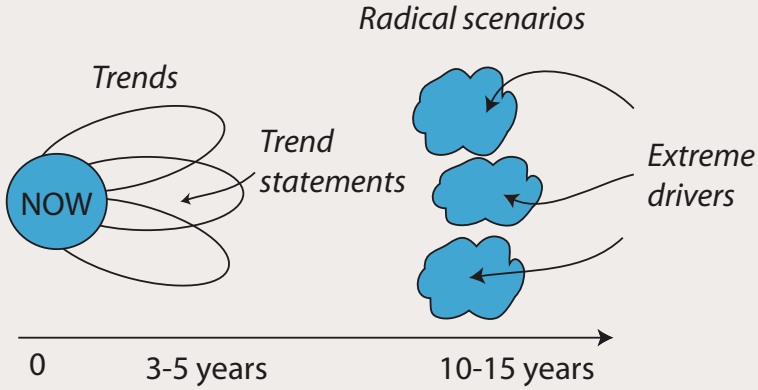
representatives from the food industry view most of the elements as probable to happen, but mostly in a less extreme way. They expect that there will be more focus on the connection between food and health, more environmental focus and increased prices on raw materials. This is maybe not surprising, since it was the food industry itself that developed the elements in the scenarios. The three directions in the scenarios also fit well with the concerns in the Food 2030 Strategy from the British government.

When looking at specific elements in the scenarios the following can be summarised: The majority of the representatives have the opinion that there will be a drop in the consumption of red meat and an increase in consumption of seafood, white meat and vegetables. The prices of raw materials will rise within 2020, taking a higher percentage of the housing budget in Norway than today. Seafood will be a more important source of food in 2020. There will be more focus and requirements in terms of optimal usage of raw materials, new storage and conservation methods and requirements for more environmental friendly packaging and sustainable products. Personal health will be an increasingly important advantage when applying for work and the representatives expect elevated fees on unhealthy food in 2020. There will be more interest groups with special needs like diabetes and overweight connecting on the web. These groups will have available more specially adapted and designed diets than today. Products with documented positive health effects will have a larger marked share. There will be more institutional food and public meals with nutritional requirements in eldercare facilities, kindergartens, schools and hospitals alike. IT technology will be used more extensively in food purchasing situations. In a simple and rapid way, consumers can get access to information and recommendations.

With the radical scenarios described and visualised, combined with an assessment by the food industry concerning what is most probable to occur, this document will hopefully help the industry to make right strategic choices for the future.

Project background

Drastic changes for the food industry. **Radical scenarios 2020.**



This is the report for the project *Radical food scenarios 2020,* which was carried out during the spring and autumn 2010 as part of NCE Culinology's initiative. A series of representatives from the Norwegian food industry participated in the project through five workshops in which thoughts and ideas were developed for scenarios in the food industry in Norway in 2020. Their input became the foundation for the results. This project can therefore be described as the *food industry's input* as to how the industry might look in the year 2020.

In the project three radical scenarios were developed based on lines of development that one can see today. No one can say with absolute certainty how reality will look in 2020, but one has the greatest chance of accuracy when drawing on the lines of development that one can see today, those that might have major consequences for the future, such as population growth, the obesity epidemic, etc.

Three radical scenarios are presented in the report: 1) *Health: a personal responsibility*, 2) *Shortage of raw materials* and 3) *Climate change*. These scenarios are presented with text and sketches, where one addresses the conditions of the scenario, framework conditions and the solutions they entail and how business will be conducted in these scenarios. Each scenario illuminates the consequences for the food industry should this scenario unfold in reality. The question posed is: What does the food industry have to do today in strategic terms in order to confront these scenarios? Finally, different elements of the three scenarios were analysed and evaluated by 47 representatives from the Norwegian food industry, in terms of probability and importance. Through this process "a best guess" was outlined for how the Norwegian food industry could look like in 2020.

PROJECT OBJECTIVES

The primary objective of this project was to develop three concrete and radical future food-related scenarios, illustrated with sketches, text and narratives that in the next round could be adopted by companies in NCE's business group for strategic thinking and planning. They should help expand the mental horizon and provide increased clarity as to where the food industry can manoeuver in the future and what consequences this entails for strategic investments today. The scenarios must *invite discussion* and *spur reflection* in a way that trends cannot. The evaluation of different elements of the scenarios in terms of probability and importance should finally help to give "a best guess" for how the Norwegian food Industry could look like in 2020.

TRENDS AND RADICAL SCENARIOS

When the aim is to develop new food concepts, it is important to recognise consumer preferences and what one believes consumers will demand in the years to come. There has therefore been a high level of interest in trends within the food industry. There are a number of trend analysis agencies in Norway, Denmark, the Netherlands, England and the United States from which the Norwegian food industry draws its impulses, and when the food industry assembles for conferences, there are usually one or more presentations on consumer demands and future trends. Trends are connected to both what consumers are taken with and what their preferences are either now or in the near future. Over the last few years, for example, consumers have been taken with "convenience"; cooking and eating food has to be a quick and painless undertaking. This is a megatrend that the research agencies believe will run for several years into the future.

The limitation with trends is that they are connected to currents among consumers that are already in place today. Agencies will point out that "this trend will grow", which is a question of incremental changes over time. Trends are useful for incremental innovation, but less so for radical innovation. Trends are not far from fashions, as there is talk of what is "in" or "out". Is Nordic food "in" right now? Is local food the "in" thing? Are Sushi and Asian cuisine "out"? In working with trends, one does not address the radical shifts that can occur, those that will change society more fundamentally – including the food industry. Trends do not account for radical changes such as the financial crisis, September 11, swine flu, wars, ecological catastrophes, etc. Trends are useful tools, but at the same time it may be wise to take a somewhat more elevated perspective and look at

[1] Helse- og omsorgsdepartementet: Handlingsplan for et bedre kosthold i befolkningen (2007-2011). http://www.helsedirektoratet.no/publikasjoner/handlingsplaner/oppskrift_for_et_sunnere_kosthold_69337
[2] NTP Food for life: Norsk Strategisk forskningsagenda for næringsmiddelindustrien. http://www.f4l.no/web/f4l.nsf/wti/FoU-strategi!OpenDocument
[3] Stortingsmeldingen om innovasjon: Et nyskapende og bærekraftig Norge. Stortingsmelding Nr. 7, 2008-2009.

what will happen if radical changes take place in society. Radical scenarios make for such an approach; they are not the opposite of trends, but rather expand trend-related work.

In the oil- and energy industry, and in the automotive industry, there has been a major interest in radical scenarios over the last many years. By making systematic use of scenarios in their organisation, Shell, the only oil company in the world, managed to be prepared for the oil crisis in 1973. Shell positioned itself and came out of the crisis stronger. In the food industry there has been little focus on radical scenarios; there has seldom been much attention paid to extended time horizons or radical shifts. NCE Culinology works with a 10-year time perspective, where the aim is to help develop innovative food products and solutions for the Norwegian and European market. There is also major interest among NCE's partners when it comes to trends and an understanding of consumer demands in the future. Several partners also showed interest in radical scenarios, as this was something new and supplementary in relation to trends, and it was an approach that had been little examined by the food industry.

Using radical scenarios as tools

Radical scenarios lead one to think further into the future than when observing trends- typically 10-20 years forward in time. As a foundation in the scenario work for this project, extreme drivers are used for a radical future, whereas when working with trends one talks in terms of trend statements. *Extreme drivers* are drivers that result in a more radical change in society.

When developing these drivers, it is natural to begin with currents in time that can result in radical changes over time, such as population explosion, the aging population, and so on. One assumes a bird's eye view. The chance of encountering a radical scenario is much lower than for trends, as they are out in the future. In order to hit the target area, one seldom works to develop only a single scenario, but rather many to cover a greater scope of possibilities. The purpose of a radical scenario is not to think exclusively of what is most probable, but rather to research different, possible directions for the future and expand our view. Just taking the scenarios to their extreme and thinking radically, can open the way for radical, new ideas and radical innovation in the long term. In the science fiction TV series Star Trek from the 1960-70's a series of product ideas where developed that many years later were turned into actual product innovations on the market once the technology was in place, such as the wireless earphone.

A main goal of the radical scenario work is to expand mental horizons, gain new insights and dare to think outside the box. It is really only when you take social elements to their extreme that you get a clear view of why society is as it is, and you can thereby arrive at increased insight into the current situation. When you are moving up in abstraction and changing the conditions and norms in society, this leads to other products and other concrete solutions in society. The products that currently exist in society today, including in a food-related context, are shaped by the norms, conditions and values on which society is built. But out of habit, most people seldom reflect upon this, and take only one step at a time. We are easily blinded, and this hinders innovative thinking. Radical scenarios become think tanks with an element of crisis, where old solutions no longer function. One is forced to find new ways of seeing the world and thinking, as there are *other conditions* and rules to *drive business* and collaboration. This is a demanding mental exercise that must be taken completely seriously, even if it is invented, in order to be able to benefit from the scenario drafting.

But the scenarios do not serve only to get people to "think outside the box". It is just as important for a radical scenario to be able to help provide a greater degree of clarity as to how society can move ahead, precisely because the scenario is based upon observed lines of development. And just because one can dare to think radical thoughts and take them seriously, it can open up fertile ground for new ideas. By involving many representatives from the food industry in the developmental work of the scenarios (see description of the project management process), one can ensure that the scenarios have relevance and address themes that the food industry itself considered important and probable in the future. The project also includes looking at the consequences for the food industry if these scenarios were actually to unfold. What types of strategic actions will the food industry have to undertake in the future? The scenarios are thereby connected to the food industry such as they stand today and how they will move in the

"A main goal of the radical scenario work is to expand mental horizons, gain new insights and dare to think outside the box."

future. Finally the elements of the scenarios were assessed and voted in terms of probability and importance by many representatives of the food industry. Many of the elements of the scenarios were assessed as realistic and will have large consequences for the industry.

Visualisation of the scenarios

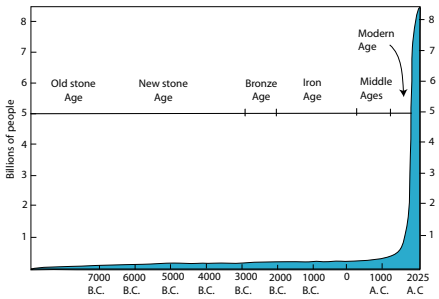
In this project it was decided to take a broad and general approach through which three different scenarios would be developed. So that the scenarios would not be too general and abstract, the scenarios were concretised as much as possible in the form of ideas and concrete sketches. The more specific you are in the scenario, the clearer the image, but also the greater probability of heading in the wrong direction. The visualisations serve to clarify and exemplify the consequences of the scenarios and an overall direction, as this can result in richer discussion. At the same time it would be a mistake to look at the ideas in isolation, as the essential element is not the concrete ideas in themselves but rather the larger directions that the scenarios identify and illustrate. These ideas are intended to serve as exemplification and not as end targets in- and of themselves.

DRIVING FACTORS FOR THE FUTURE

Before starting with the concrete development of radical scenarios, a preliminary project was carried out to get an overview of the most important trends of the period and to clarify factors that might have a major impact on social development in 10 years. The following factors, or drivers for the future, were presented to all project participants and formed the background for further stages of the work:

Food and health

This driver is built among other things on the radical development that has taken place with respect to the obesity problem over the last several years (the obesity epidemic). Forecasts have indicated that within 10-15 years, the Norwegian population might have the same obesity problems that currently exist in the USA today. There is an increasing interest in healthy diet and preventative foods and increased requirements on documentation. Where food and health are concerned, the *aging population* is also a central factor. It is expected that the elderly will constitute an increasingly large part of the population, from 15-20% in western countries to 30-40% before 2050 (World Population Prospect 2002, UN). A number of older people will have different dietary needs and greater requirements for universal



design because of reduced mobility. Finally, this driver emerges on the basis of a continuously increasing number of individuals living on disability benefits (*the disability trend*). In 20 years there has been a doubling of people living on disability benefits in Norway. The focus on the connection between health and food is growing; in the government's "action plan for better diet in the population" (2007-2011) the vision is to improve health through healthy diet.[1]

Food and environment

This driver is based on the focus on global warming that is on the forefront today, in the UN climate panel and elsewhere, and what dramatic consequences climate change may bring about for food production, oceanic acidity, weather conditions and global temperatures. According to Bernard Seguin from the UN climate panel, we will come to find out much more about the consequences and future effects on food production in a 10-year period. One factor that coincides with this is the population explosion our planet has seen over the most recent years, in which the Earth's population is steadily increasing by another billion people. The Norwegian Strategic research agenda for the food industry states: "Population growth, population composition and insufficient increase in food production, taken together with resource access will impact the future image for the food industry actors in Norway as well."[2] Another factor connected to food and environment is the explosion in the amount of waste production and its handling. In the climate report by the Norwegian Ministry of Agriculture and Food, there are expectations that the food industry will assume responsibility for reducing waste and increasing resource efficiency.[3]

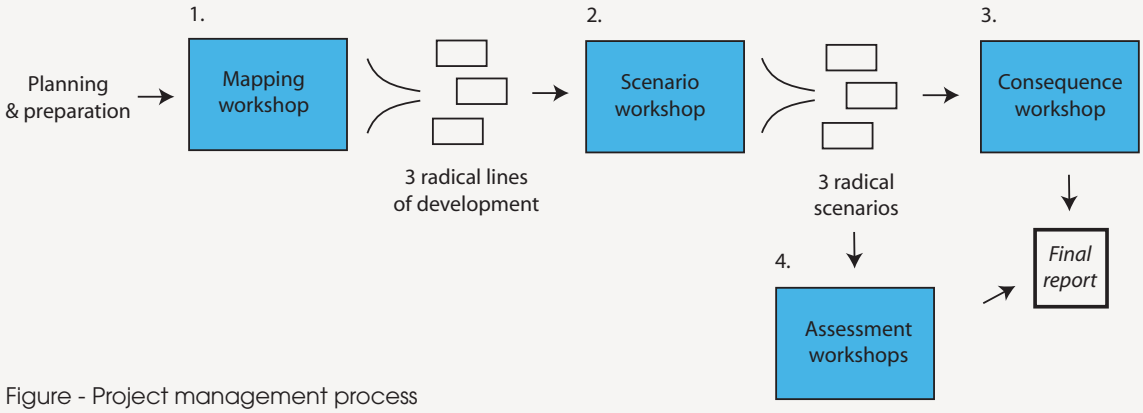


Figure - Project management process

Food service and convenience

Over the past few years there has been a major change in quantities of prepared foods, both in Norway and beyond. Fjordland, which sells prepared meals, has seen major growth over the course of many years. There is a trend in the direction of individualisation and solutions adapted to each single situation. Partly because of an increasing number of one- and two-person households there has been a trend in the direction of simplicity and time savings. There is also the possibility of buying semi-convenient products such as ready-made pizza dough, pre-made stock, waffle batter, etc., where there is the possibility of adding a final personal touch to the food. Studies show that cooking knowledge is declining. Restaurants are increasingly selling take-away products and grocery stores are starting to have dining areas so that one can have an entire meal. People eat more quickly. There are also many options for ordering food online that is then delivered straight to the home.

Trends also point in the direction of more automation and use of intelligent solutions. One can buy processed products in shops, such as sliced bread and ground coffee. In Norway and in several western countries there are some placed where one can also scan products oneself and thereby find out price and make the sales process more interactive and effective.

Meal experience

Trends have also pointed in the direction of more focus on the experience surrounding the meal, while preparation has become a social activity with open kitchen plans. Trends indicate a shift in direction from focus on individual components to the meal as a whole, where the experience is connected not only to eating, but also to purchasing, preparation and handling of waste. The meal experience is not only associated with the sensation of taste, but also to the olfactory experience, setting and sequence of events surrounding the meal and social elements. When it comes to raw materials it is a matter of increasing the experience of quality and maintaining this quality throughout the entire shelf life.

Innovation

One trend over time has been the focus on innovation, the notion that new products will always be coming out. Major emphasis is placed on cooperation along the value chain, between various branches and between companies and research environments. New solutions demand moving closer towards open innovation, where different branches and companies cooperate laterally. The Norwegian strategic research agenda for the food products industry [2] states that "open innovation and networking can help the Norwegian food industry implement the necessary research that will be required in the future."

These 5 main drivers/trends were presented for the first assembly of all the project participants and used as a backdrop in the development of the radical scenarios.

PROJECT MANAGEMENT PROCESS

Participants in the project

The aim of this project, in terms of process, was to have broad participation from various Norwegian companies and partners in NCE Culinology in order to provide for a solid foundation and varied input. The following representatives took part in the project through the first three workshops:

Tine, Nortura, Stabburet, Fjordland, Fatland Slakteri, I-park, Nofima, Gastronomisk Institutt, Blue Planet, Prima Jæren, Agrimarin (owned by Felleskjøpet), the county governor of Rogaland, Fjordkjøkken, Holmens, Ostehuset, Helgø Matsenter, Innovasjon Norge, University of Stavanger, Bioforsk, Måltidets Hus, Figgjo, kafé Sting and Gladmat.

For the last two assessment workshops many new representatives were included (in addition to the former ones):

Ministry of Fisheries and Coastal Affairs, Marine Harvest, Fjordland, Fatland Slakteri, McDonalds, ICA, Axellus, Kavli, Cerealia, Dolly Dimple, GOJohnsen, Stangeland Mølle, Miljøgartneriet, Norgesmøllen, Food Story, Stiftelsen Norsk Matkultur, Kulinarisk Akademi, Norwegian University of Life Sciences, Gyldendal forlag, Norwegian Hospitality Group, Ipax and Agnar Apeland.

Open innovation methodology

An open innovation methodology was utilised in the project that was previously used in other NCE projects, such as the "Norwegian Food of the

[4] Lerdahl, Erik. Using Fantasy Story Writing and Acting for Developing Product Ideas, I: Proc of EURAM 2002. http://www.ecsocman.edu.ru/images/pubs/2002/12/11/0000015646/fantasy_storywriting.pdf
[5] Lerdahl, Erik. Slagkraft. Håndbok i idéutvikling. Gyldendal Akademisk forlag, 2007.

Future" project. Basically, this entails holding a series of half-day workshops involving a number of industry partners. These workshops are facilitated and led by employing various exercises and methods to get the best possible results. These methods help the participants to start thinking outside the box, to get everyone involved and engaged, to reach a cross-connection of competence types and work in an effective and goal-oriented fashion. Between each workshop the results are processed, developed and visualised by a project group and the project leader.
The basic idea is to have a broad approach with input and ideas from different industry actors, so that the project has a good industry anchoring. At the same time it is important that not everyone takes part in the final processing, as this proves slightly ineffective. This project included five workshops with industry actors and partners: a mapping workshop, a scenario workshop, a consequence workshop and two assessment workshops, see the figure above.
The following presents the content of the various workshops step by step.

Mapping workshop

In the mapping workshop, participants were placed into groups and given the assignment of developing drafts for radical lines of development, starting from the previously mentioned drivers for the future. What type of radical development lines can the food industry anticipate? Each group made three proposals for radical lines of development based on 3-5 radical statements called extreme drivers.
An extreme driver might be as follows: "The grocery retailers control the entire value chain". The participants had to think outside the box and along radical terms to generate the extreme drivers. The methodology is therefore entirely crucial in producing radical thoughts.

A critical factor was connecting the extreme drivers so that they presented a uniform direction. The group selected the lines of development on the basis of consequence (70%) and the possibility of occurring (30%). The lines of development should be realistic but at the same time radical. After the workshop the workgroup assembled the material and three radical lines of development clearly emerged, which were then divided into multiple groups: "Health: a personal responsibility"; "Shortage of raw materials" and "Climate change". The materials from the workshop were structured by the project leader along these three lines, where the goal was to achieve clear and concise directions. The lines of development were also visualised somewhat by a designer. The three lines were also sent out to all project participants prior to the next session, the scenario workshop, for the purpose of feedback. Several participants indicated that they were able to recognise their contributions in the material.

Scenario workshop

In the scenario workshop project participants continued working with the three development directions to make concrete scenarios. Participants were divided into groups and a method was employed to construct narratives in a circle, where participants wrote over one another's stories[4,5]. To assist them, the participants were guided in a visualisation exercise with a spaceship that was coming in to land on Earth in 2020.

Participants underlined and selected insights, thoughts and ideas from stories that were the most interesting and grouped them into three areas for each scenario – 1) society/norms, 2) food purchasing- and consumption situations and 3) product ideas. After the workshop the material from the different groups was structured and compiled by the workgroup. Ideas that arose in the material were further substantiated by the project leader. Ideas were also developed to support more abstract concepts in the scenarios. The scenarios and ideas were then visualised from the basis of a dialogue between the project leader and designer.

Consequence workshop

In the consequence workshop the scenarios were presented to the participants, who again were divided into groups. After each presentation

the groups generated potential consequences for the food industry if the scenarios were actually to take place. What should the food industry do today if these scenarios are to happen within a 10-year timeframe? What strategic interventions must be made to contend with these future consequences? In order to make use of the range of competence around the tables and achieve a sound structure to the work, post-it notes were used, on which each individual made their own notes, which were then compiled on a large sheet. In this collection the participants also wrote an evaluation of the project and made proposals for new NCE projects and continuation based on this project.

Assessment workshops

The project culminated with two assessment workshops in late Fall 2010. One of them was held in Stavanger, for the food cluster in the Stavanger region and the other one in Oslo, for the food industry located there. Forty-seven representatives from the food industry took part in the two workshops. The main aim of these workshops was to assess the different elements and ideas in the three radical scenarios, in terms of probability and importance. With the aim to make the sessions effective and motivating for the participants we used an interactive voting system, where everyone voted using a wireless voting pad. Different statements, based on the three scenarios, were voted on in terms of probability: "very low probability", "low probability", "either-or", "probable" and "highly probable". In addition to the voting, the participants worked in groups pointing out the most important elements and factors for the food industry in 2020. Just like in the consequence workshop, the participants made first their own notes which were then compiled by the groups on larger sheets. The results from the workshops were analysed and the most important findings are included in this report.

Scenario 1
Health: a personal responsibility

There is increased knowledge regarding the connection between food and health. The society is faced with lifestyle diseases and a surge in the senior population. The authorities are forced to take actions. How will this change the food industry?

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Background

This scenario was based on the following significant driving factors, which will have a major influence on the future (see introduction): The obesity epidemic, the aging population, the increase in the number of people on disability benefits, and continued increase in the number of lifestyle diseases. The scenario is based on input and ideas from all the project participants during the first scenario workshop. In this scenario there will be a continued increase in the number of overweight people and this will again result in more lifestyle diseases. There will also be a surge in the senior population, as this group will constitute a major part of the population. The elderly, especially those of retirement age, are more exposed to diseases and have different functional needs than younger people, such as, for example, reduced mobility and other nutritional demands. As a prerequisite in this scenario there will also be an increase in the number of people with poor health living on disability benefits.

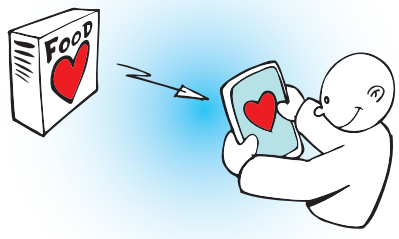
In this scenario there is sufficient food and good access to raw materials. There will be a slowdown in population growth worldwide and it is possible to produce enough food- at least for the western world. It is also assumed that there will be increased awareness, understanding and interest regarding the connection between food and health. Research and other initiatives will make it possible to have a clearer picture of what the individual needs in relation to diet and nutrition.

Health as an advantage

In this scenario there is a major focus on the connection between food and health. Health becomes a competitive advantage among consumers. There will be a class division when it comes to food choices. There will be a "food elite" with extreme awareness of diet and they will consume the food that is best for their health. In this scenario, the individual will have to pay for his or her bad habits, and those who live an unhealthy lifestyle will be the losers. "Medicinal food" will be developed, which will be available at a high price that not everyone can afford.

State control

With increased awareness of the effects of food in relation to health, combined with ever greater health problems in the general population, the state will intervene in the food industry. There will therefore be increased fees for unhealthy food. There will be more institutional food with nutritional requirements in



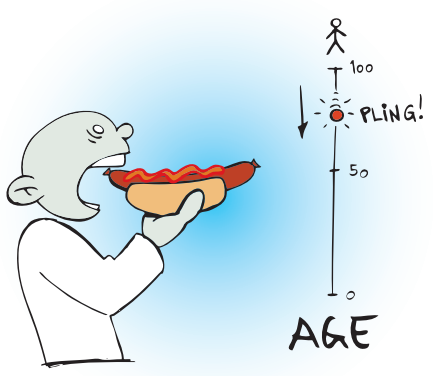
eldercare facilities, schools and hospitals alike. As nutrition will be seen as extremely important, there will be own nutrition course at school. Requirements for documentation of the health effects of food products are taking hold already in 2010. In 2020 there will be international norms for documentation associated with labelling. One can imagine a sophisticated labelling system that not only documents positive health effects, but also negative ones. There will also be a scale ranging from "has definite health effects on…" to "may have health effects on…". Degrees in labelling will go from healthy to unhealthy. The EU directive is already placing clear requirements on ingredients, labelling and what one can communicate about individual products, and the work in labelling will have advanced much farther in 2010. Positive health effects will also not only be associated with individual raw materials, but to total meals (combination of different components), how it is prepared etc. State control in relation to food and health will mean that as an anti-trend there will be the emergence of groups protesting against this control. There will be groups that would prefer to be unhealthy and who oppose too much state involvement. These people will be fed up with the focus on health, the amount of information on health, and the need for awareness around one's own choices.

Formation of knowledge about food and health

In the scenario there is a major investment into researching the connection between food and health, and this is seen in relation to heredity and the environment. The research results will be quickly communicated to consumers, and there will be an increased level of knowledge and awareness in the individual consumer with respect to health effects. This knowledge can deliver status. An increasing number of consumers have

"With an increased awareness of the connection between food, mind and body, there will be software and tools to make it possible to get an overview of one's total health profile."

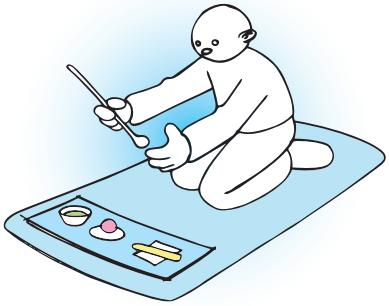
a more conscious outlook on healthy or unhealthy food choices. Research has come such a distance that consumers can make calculations



showing that regular intake of unhealthy food over a few years will present a probability for a reduction of X number of months or years of longevity. There will also be an increased focus on personal nutrition, what you personally need from your diet to maintain optimum health over time.

Psychological well-being and health

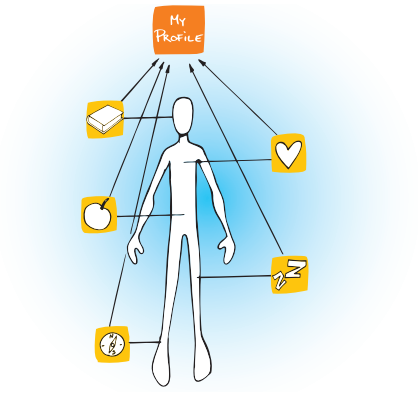
In this scenario health is not only connected to nutrition, but also to culinary enjoyment and psychological well-being. Health food goes hand in hand with culinary enjoyment; this is a documented fact. One will have an increased level of knowledge regarding the significance of having a "complete" meal for one's health. It is not only a question of what the consumer eats, but how he/she prepares and eats the meal. The consumer seeks out meaningful actions during preparation and eating. Research will then have shown that when the consumers are stressed, they have reduced nutritional absorption; there will therefore be increased focus on calm and well-being during the meal. There will be packaging solutions and meal concepts that deliver these very meaningful activities, bordering on the ceremonial.



As psychological well-being and enjoyment are considered critical factors, along with having a greater awareness of the effects of diet, society will have an increased focus on personal mastery over one's health and mind; this will come into play when making food purchase decisions. For example, consumers will have a better insight into the mind and body and consumption of unhealthy foods, such as comfort eating, cravings, and so on. There will be healthier food substitutes for foods such as chocolate, snacks and sweets on the market that can fulfil psychological requirements, and there will be a greater degree of remedies not directly connected to food that can fulfil psychological needs (such as comfort eating).

Total health profile

With an increased awareness of the connection between food, mind and body, there will be software and tools to make it possible to get an overview of one's total health profile, not only in relation to diet, but also for heredity, sleep, mental condition, and level of exercise. The consumer might need a slightly different diet, for example, to counteract insufficient sleep. The consumer might need an adaptive diet if he has a hereditary predisposition to certain conditions. If the consumer is in a period of depression, he can follow a diet that will help him regain psychological balance. Depending on the consumer's level of exercise, he will need different levels of fluid and nutritional intake. Today we have pedometers and the ability to count caloric intake. In the scenario, foods will be sold with integrated IT



(such as through simple scanning) so that the consumer can quickly find out information about calories, proteins, health effect etc. When the consumer has a better insight into his total health profile, it will be easier for him at any point to maintain a diet that corresponds to the needs of the body and mind. The consumer also has the possibility to gain access to the health profiles of other family members included in the same household.

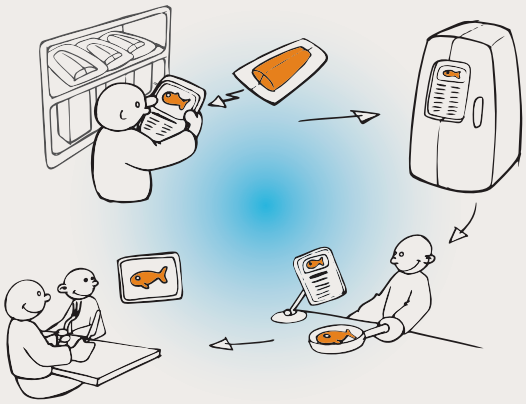
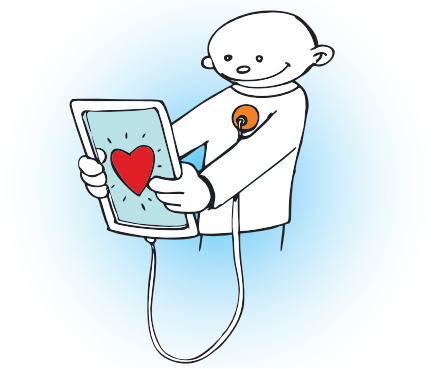


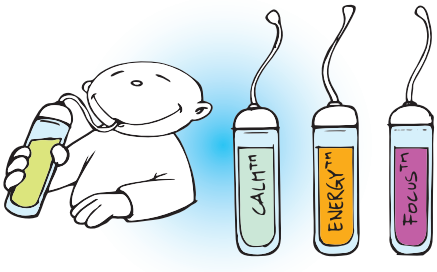
Figure – IT technology is an integrated part of the food product and packaging.

The consumer will be able to rapidly take measurements of his own health conditions as relating to stress, nutritional requirements and general conditions without having to go to the doctor.



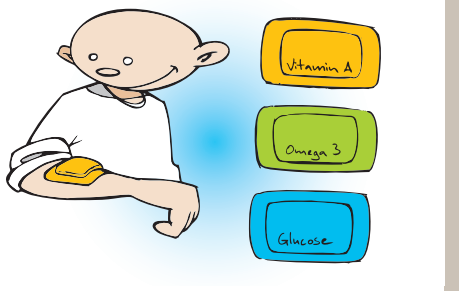
Psychedelic food and drink

Today there is already a range of various beverages that deliver energy, keep you awake (such as coffee) or help you feel calm. In 2020 there will be many products that directly affect the consumer's mental conditions, and can thereby satisfy his needs instantly. If he needs to concentrate, for example, he can take a drink. If he needs deep concentration, he can eat or drink something. The effects will be scientifically documented.



Medicinal foods

There will be an expanded selection of medicinal foods: food products that prevent and treat. By eating medicinal foods, the consumer can increase the probability of longevity, and the food can be adapted to individual needs. Instead of taking medicine in the form of tablets, the consumer will be able to eat a certain food for specific conditions or drink a certain amount of a fluid that delivers the "medicine" that he needs. One can also imagine new ways of ingesting nutrients, such as nutritional supplement patches.



With the introduction of nanotechnology there will be pilot projects with food where the consumer eats less, but nonetheless experiences a feeling of satiation.

Information Technology (IT)

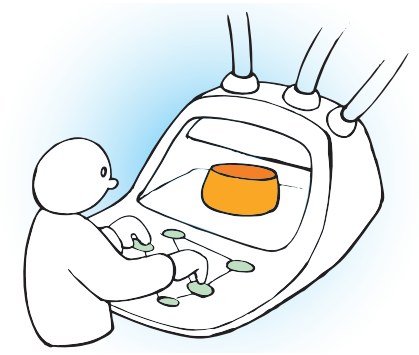
There is currently a limited scope of use of IT in association with food products. In the health scenario it will be possible to buy products where IT is an integrated part of the food product and packaging. When in a purchasing situation, the consumer can rapidly get information on the product through IT (such as from a screen), whether he is buying it online or in a store. People will gain awareness of the product's health effects, degree of freshness and origin. The price of the product will vary with the degree of freshness. One can imagine that there are sensors that can measure the freshness and quality of the product. If there is a fish- or animal based product, the consumer can find out something about how the animal was handled, what type of food it was raised on, etc. It will be possible for the consumer to find out how much he needs in relation to his own health profile. The product will be divided into portions that correspond to the recommended requirements. The consumer can receive recommendations for other raw materials that provide a nutritionally complete meal. Once the product is home in storage, such as in a refrigerator, the consumer can receive information on shelf life and expiration date. The consumer can be shown how best to prepare the product, and there will be suggested recipes. On a screen the consumer will be able to follow along with a cook who demonstrates preparation step by step. When eating, the consumer can enjoy an interactive presentation of the product's background and origin as part of the meal experience. In this scenario, one can also envision easy access to nutritionists via video conferencing technology both when shopping and when preparing. These guides can be physically located elsewhere and remain easily available for interactive dialogue about food products for both consumers and sellers.

It is, of course, difficult to say exactly and precisely how IT will be integrated into food products, but in this radical health scenario there is the anticipation that it will be to a far greater degree than just scanning at the register, such as is widely done already. IT will make it possible to ensure quality and documentation through all

segments of the value chain, which will be necessary to be able to have products with documented, positive health effects.

Interest groups and specially adapted food

In the health scenario, there will be an even greater awareness in 2020 that different age groups (children, youths, the elderly) and diseases groups (diabetes, cardiovascular, cancer) have particular needs in diet and nutrition. There will therefore be an expanded offering of specially adapted foods. Consumers will also be more able to customise their



food- and meal requirements using automatic dispensers. They can get half-manufactured goods and prepared meals with extra amounts of beneficial nutrients, absence of certain ingredients to which they are sensitive, etc. The automatic dispensers can, if desired, recognise the consumer's profile and needs. There will also be special gourmet shops for large target groups, such as for the elderly, who have strong buying power.

Interest groups for particular risk profiles will emerge, which will have the power to influence food production. In general there will be more access to product information- not only in stores, but also online, in restaurants and everywhere that the consumer can purchase, prepare or eat food. The possibility for information is combined with access to personal nutritionists.

Marketing of products, positive and negative reputations will all be shaped through increasingly interactive social media (such as Facebook) and blogs.

Shop logistics

Major changes will take place in the presentation of goods in stores. Health products will be given the most exposure. There will be express zones in shops with only fruit and vegetables and healthy ingredients. It will be

legally mandated to have only health food near the checkout counters in shops and convenience stores. When coming to the point of sale (either physical or virtual), the consumer can get a rapid overview of the health meals combined with simple access to them. Food shopping will be a much more pleasant and simple experience than it is today. Many pre-order healthy semi-manufactured goods from shops and cafeterias that they either pick up themselves or have delivered to their homes.

Healthy raw materials and products

In a society with a strong focus on health there would be a lot of natural and fresh meat with a high degree of food security. The elderly can purchase healthy and freshly prepared meals that have not been pre-processed. Technology and logistics solutions have been developed so that the consumers can

more easily purchase freshly prepared meals. Raw materials that have documented health benefits will have a higher value. New, healthy raw materials have also come onto the market. Sales of snacks with nutritious properties continue to increase. Because of health focus, there is a marked decline in red meat consumption. It is increasingly easy to purchase fish and animals that have been fed with special fodder for health benefits.

"The challenge will be to communicate a more complex message associated with health in a simple yet reliable manner."

CONSEQUENCES FOR THE HEALTH SCENARIO

What will be the consequences for the food industry if this scenario unfolds in reality? What types of actions will be necessary, and what has to be done today to handle this scenario? Here is a summary of what the participants envisioned to be the consequences in the third workshop.

Increased formation of knowledge and documentation on food and health

The scenario places major emphasis on health and with it the need to document health effects. This means that the food industry needs to invest in research that documents connections between food and health. It will be equally important to remain well updated with research being carried out and to be able to make quick use of research results and develop new products. There will be conflicts concerning who has ownership over research results, such as has been seen in the pharmaceutical industry.

There will be increased research around the entire meal, not just the individual components relating to health. There will also be research into how the meal is served and the impact of stress on nutritional absorption. There will not only be interest in the nutritional- but also the psychological effects of food and drink. The scenario will also mean that the food industry has to research and pay more attention to nutritional requirements associated with various consumer groups, especially for the growing senior population. Research needs to be ever more far-reaching and goal-oriented, as the authorities will require sound documentation and processing of applications will take time for approval.

New alliances and open innovation

The health scenario means that the food industry needs to seek closer alliances with *research environments* working in contexts between health and food, both in Norway and beyond. In addition, the food industry needs to seek out a closer connection with *health institutions*, where there is a high level of competence in health, disease and wellness.

As it is pointed out that IT will be a central factor for the food industry, there will also be a need for closer cooperation and alliances with the *IT industry*. In addition, sports teams, health clubs and *fitness centres* will be an important arena both to test and sell future health products. The Norwegian company Tine has already started on this path with the newly released YT series. The branch will also have to seek even tighter connections with authorities in order to be able to influence health directives. In order to be able to develop products of high quality and health benefit, it will also be critical to have closer and better coordination between all segments of the *value chain* – from food producers to store chains, for example. Coordination both between various actors in the value chain and between traditionally different branches will require an *open innovation methodology*. Radical innovations will take place to a lesser degree within individual companies but just as much between different companies and organizations traditionally belonging to different branches. Since the requirement for documentation will increase significantly, in turn increasing costs, the industry will increasingly have to seek cooperation with research environments and foreign industrial partners in the future.

Product development of health products

In this scenario, tomorrow's market winners will be the ones who come out with healthy products with nutritional ingredients or with documented, positive health effects. Product development will among other things entail having sound cooperation between various segments in the value chain in order to ensure quality and solid documentation. The industry will have to develop tasteful products, come out with meat alternatives or products using the right type of meats. There will be an even greater level of focus on developing healthy sweets and snacks with nutritious properties. The industry must increasingly focus on developing products for different consumer groups, especially the growing group of the elderly who have a high level of buying power. Where packaging is concerned, universal design will be a critical factor, so that people with reduced mobility and sight can still use the products. For future industrial food production, it will be necessary to develop logistics and goods transport that allows room for multiple variations without having this result in enormous cost increases. Such changes are already visible in other industries (such as the furnishings and automotive branches), where one can special-order products adapted to

the needs of the individual. In addition, the scenario means that the food industry will also have to shift focus from thinking in volume/kilos to thinking in terms of portions and units corresponding to the nutritional requirements of consumers.

Communication to consumers

Documented health effects and innovative health products are of no help if these are not effectively communicated to consumers. The challenge will then be to communicate a more complex message associated with health in a simple yet reliable manner. It will be necessary to develop packaging solutions and communication solutions that are easy to understand. Use of IT in food products will be extensive, and this is also the key to good and interactive communication, which the industry will have to develop from this point forward. Individual consumers will want access to more comprehensive descriptions of health effects, while packaging will at the same time present limited room for communication. It will therefore be important to have easy, interactive access to more in-depth product information. As part of sales income, one can look for support services, such as health services associated with use of products. As the industry develops new products, one will have to place increased focus on support services that can provide economic coverage for costly product development.

The industry will also have to become more adept at using social media (Facebook, Twitter, YouTube) in marketing to consumer groups, as this will serve as a competitive advantage.

Strategies for good media management associated with health effects will be critical factors in this scenario.

Scenario 2
Shortage of raw materials

Continued population growth, wars and conflicts and climate change lead to a global shortage of raw materials. How will this affect the Norwegian food industry?

Drastic changes for the food industry. **Radical scenarios 2020.**

Background

This scenario was based on the following significant driving factors, which will have a major influence on the future (see introduction): Continued population growth, global climate changes such as drought and lack of water in large parts of the world, as well as diseases and global pandemics. Another central factor in the scenario is also a *positive economic development for the Asia region*. The scenario was also based on an escalation in wars and conflicts throughout the world, resulting in crop reduction. Population growth requires an increase in the production of foodstuffs, but because of factors such as increased unrest and climate change, this increase cannot be achieved. This leads to a global shortage of raw materials. In addition, new financial crises could lead to a series of global bankruptcies, which would further impact production of raw materials negatively.

Poverty and hunger

As a result of this scenario, there will be greater poverty and hunger globally. There will be wider gaps globally between the rich and the poor. The prices of raw materials will rise dramatically; over 30% of the budget in Norway will then go to food, which represents nearly a tripling of current rates. Norway will experience a drop in affluence, as money used on food supersedes the purchase of "luxury services" such as leisure travel and other various service offers. There will be a global shortage of proteins and water in particular.

Struggle for resources

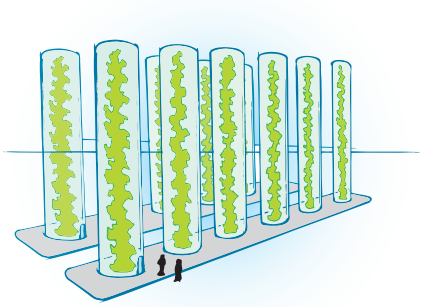
Because of a shortage of proteins and water, there will be an increasing political and commercial struggle for resources. Export of certain raw materials will be prohibited in certain countries and countries will increasingly seek to protect their resources. Armed conflicts will arise because of increased shortage of water. These conflicts result in an even greater scarcity of raw materials. At the same time, countries in Asia (China, India and others) have become even more powerful economic and political powers. Consumers in these countries demand increased quality of products and diet. Shortage of raw materials, combined with acute climate changes, will result in increased migration of populations. There will be increased immigration in Norway. Because of export restrictions from other countries, Norway experiences a significantly increased need for self-sufficiency. Production in Norway is far more costly, something which also drives the prices on raw materials up significantly.

Knowledge building

Significantly increased prices and a shortage of a number of raw materials spur a high degree of activity in research and development of new technologies to compensate for this shortage. Consumers generally have increased knowledge of food growing, and know to a greater extent what is needed to grow food and what is necessary to obtain sufficient and proper food and nutrition. Education around food growing and usage of raw materials becomes an area of investment in the educational system. Society is in constant "crisis", namely the consequences of a shortage of raw materials, and this results in a social mobilisation to solve the crisis.

Increased exploitation of land and novel agriculture

In this scenario Norway is forced to become more self-sufficient. Small farms, which had long fallowed, have been brought back into production, where new topsoil has been cultivated. Increased self-sufficiency in raw

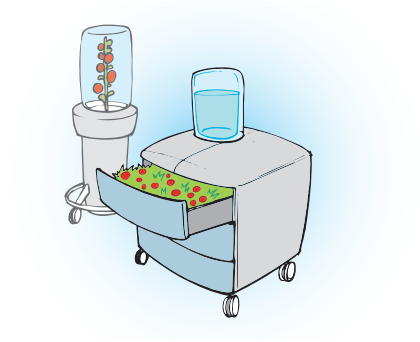


materials results in scattered settlement than today. The topsoil is used more effectively than it is today, partly through use of genetically modified plants that yield more crops. Organic farming is no longer considered sustainable, as it produces insufficient yields. At the same time, there is an increase in artificial growing of food indoors and on the roofs of buildings. Pilot buildings will undergo testing at the same time, where one can grow higher up with optimal use of solar energy.

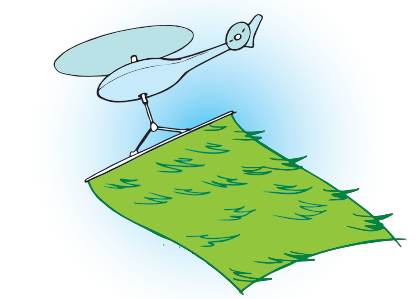
There is increasing local production and home production in private residences. It will be possible to purchase mobile units for effective artificial production at home. There will be an increased level of enthusiasm and awareness concerning local foods not requiring extensive transportation. There will be a blossoming of a harvest culture; the population will harvest far more from nature than they

"There is increasing local production and home production in private residences. It will be possible to purchase mobile units for effective artificial production at home."

do today, such as happened in Norway during the Second World War. Berries, plants, mushrooms and bivalves will be gathered from nature, along with many more fish to manage household food consumption.

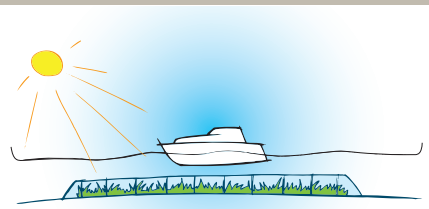


New technologies will be developed to grow food. One can envision trial pilot projects using blanketing layers laid in the mountains, for example, to grow special raw materials. These can be harvested with helicopters. New technology will enable growth of raw materials in places not used before. This can be seen as a further develop-



ment of the greenhouse, where one cultivates plants that do not grow in soil, but receive copious amounts of nutrients and light.

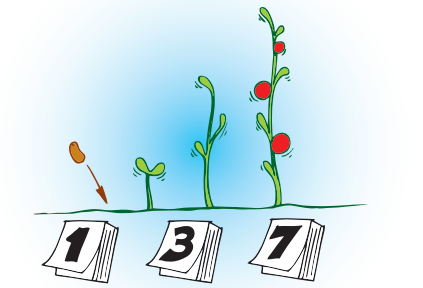
In this scenario, the sea is used as a source of food to a much greater



degree. There will be research-oriented pilot projects using aquaculture parks, where rapid-growth and nutrient-rich marine plants such as the macro-algae sea lettuce will be grown. The first pilot projects in algae production will also come to light, as algae are very fast-growing and provide sound nutrition. Technology will be developed to effectively harvest and refine algae extracts. Furthermore, it will be common to see small, local fish farms established along the entire coast, and these will supply local households.

Rapid growth of raw materials

Society will focus on growing plants and crops that grow extremely fast. There will be many pilot projects involving genetically modified foods to produce both optimal, rapid yields and high durability. Plants and raw materials producing high rates of growth, such as sea lettuce and other algae, will be areas of high investment. Root crops and vegetables will see a renaissance and will be grown more frequently as raw materials.

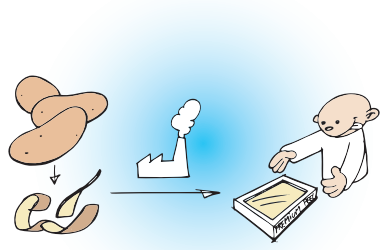


Usage of raw materials

In this scenario there will be a high level of focus placed on optimal usage of raw materials. Today, large amounts of unsorted raw materials are discarded, but in 2020 there will be a high degree of processing of unsorted raw materials for quality semi-manufactured products, while strong emphasis will also be placed on avoiding waste during processing. Raw materials will have a much higher value than today, and there will be increased focus on quality and shelf life of the products. Waste will be reduced throughout the entire value chain, for private homes included. Increased local production will result in having shorter transportation routes from production to consumption, and this shortened route will ensure less waste and increased quality and freshness of the raw materials.

Waste handling

I In this scenario, waste is given an increased value, as it will be utilised far more optimally than it is today. This will entail, in part, new products made

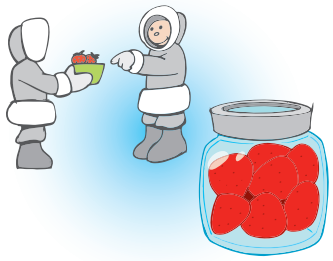


from remainder ingredients, and these products will be popular trend products. Today, for example, peels from potatoes, carrots and the like are thrown away very often, even though these have good nutritional value.

Collection of waste products for refinement will take place all along the value chain, including in the final segments. Remainder waste is used today for soil fertilisation in the best of cases, but some of these waste products can be used more effectively. In order to realise maximum utility from waste products, one might imagine more intelligent waste containers and systems, which provide feedback concerning waste management. IT can help simplify and optimise waste management significantly.

Extended shelf life

In order to reduce waste and make the most possible usage of raw materials, several new storage and conservation methods allowing for extended shelf life will be developed in this scenario. Extensive research and effort will be put into finding optimal preservation methods. The same applies to packaging solutions that allow for a long shelf life. For fresh goods, logistics will be developed that allow improved unbroken refrigeration from producer to consumer. In addition, fresh goods will be kept at the optimal temperatures and gas mixtures will be used for both shelf life and quality; for example, they can be used to keep food products close to the freezing point without having the product become frozen or damaged. As some raw materials will be lacking because of export prohibitions in other countries, there will be an increased focus on being able to eat seasonal foods all year long, or at least for longer parts of the year. This will require the best possible storage and careful preservation of raw materials.

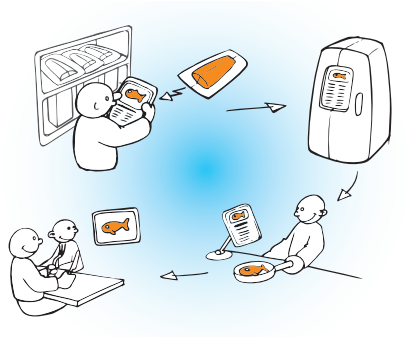


Quotas and portioning

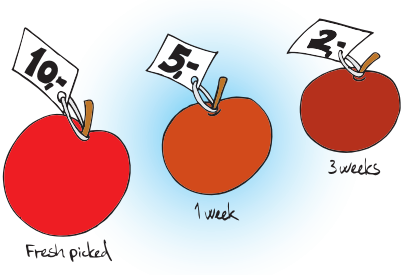
In addition to increased areal exploitation, cultivation of rapidly growing raw materials and utilisation of the raw materials, there will be a need for restrictions and quotas on certain food types in order to ensure that there will be food of the proper type and in the proper quantity for the Norwegian population. Pilot projects will arise involving automatic product dispensers for portion control that dispense the minimum amount that each individual may have; this will apply in particular to proteins, especially meat. Shops will be divided into zones for regular staple foods and luxury foods. For holidays and other special occasions consumers can enjoy small portions of luxury food. Small portion packages of expensive raw materials are sold for holidays, where focus is on experience rather than quantity. This is paralleled by today's consumption of Russian caviar, for example.

Use of information Technology (IT)

Just as in the health scenario, there will be a revolution in the use of IT within the food industry. The consumers will have easy access to information on protein content, price curve, shelf life, optimal preparation, but the content in the information will vary. When the



consumer has too little protein or has a ration for each day, it will be worthwhile for him to know what part of the total requirements a given product fulfils. Just as in the health scenario, there will be major requirements for labelling and declarations, and this is included as a part of the quotas and portioning previously described.



Intelligent packaging will be used that will be able to measure quality, and that will notify the consumer of when the raw material needs to be eaten or thrown away. There will also be

intelligent pricing that follows expiration date. As raw materials are costly, it makes sense to know how prices will change as they approach their expiration date. One can imagine that those who are better-off will buy products with a long shelf life whilst those who are less well-off will opt to buy products as they are approaching their expiration date in order to save money.

Purchasing

The need for substantial portions of the household budget to go towards food results in increased consumer tendency to buy in bulk. One can imagine multiple private households joining together to make purchases in order to get the best possible price directly from producers. Since there will be a shortage of many raw materials, it will be necessary to place such orders well in advance. Price will be a major focus, in which one constantly strives to find raw materials that deliver the greatest value for the money. Some raw materials, such as beef, for example, will become extremely expensive. In general, there will be a great increase in production and sales of vegetables, grains and vegetarian foods, as these are the most reasonable and most resource-effective to produce.

CONSEQUENCES OF THE RAW MATERIALS SHORTAGE SCENARIO

What will be the consequences for the food industry if the raw materials shortage scenario takes place? What types of actions will be necessary, and what has to be done today to handle this scenario? Here is a summary of what the participants envisioned in the third consequence workshop.

Technology and logistics for long shelf life

Investments must be made in technology and logistics that provide for the longest possible shelf life and at the same time ensure the best possible quality where either fresh foods or processed goods are concerned. This technology includes, among other things, new packaging solutions and preservation methods and new and improved warm processing technology.

An extensive amount of food is discarded in the private household, and solutions are therefore being developed to help consumers reduce waste. This includes intelligent storage utilising IT solutions and products for reduced heating of fresh goods when they are not in the refrigerator, such as insulated carrying bags. One can also envision IT solutions that will notify consumers of how quickly the food will spoil when not kept in the refrigerator.

Maintaining productive dialogue with authorities with respect to the planning of laws and regulations will prove a determining factor in the implementation of technology and logistics designed to improve and extend shelf life.

Access to raw materials and processing

As this scenarios focuses on a shortage of raw materials, it will be crucial for industry to secure long-term, economically viable supplier agreements and production capacity. This entails closer cooperation between producer and company, more intelligent logistics solutions and increased involvement throughout the entire value chain. Focus on raw materials access will also have an international dimension; food companies require a closer connection to the world's commodities markets and will require better awareness of – and access to the global raw materials market.

It is pointed out that there will be more focus on local production, home-based production and usage of local raw materials. The industry will therefore need to develop a strategy where on invests in- and adapts to processing of local production/home-based production. For example, production facilities might be developed where local producers can deliver their goods for processing, by which local identity is maintained. Even today farmers and private individuals can in some places bring in their apples and fruits and receive apple cider and fruit concentrates in return.

The scenario indicates that there will be a need for increased self-sufficiency. If this scenario does unfold in reality, the food industry will have to invest more in raw materials that can be produced in Norway- materials tied to local production. Raw materials that produce the greatest possible yields and returns should be prioritised.

"The food industry must work to communicate, in a simple manner, what a product covers in terms of daily nutritional requirements."

The food industry will have to work closely with the authorities in relation to import and export complexities and any future rationalising.

Raw materials usage

Given a shortage of raw materials, it will be crucial to focus even more on process- and product optimisation, in which waste is reduced in production and along the entire value chain and through which it will be possible to utilise bi-products from raw material refining. This image includes optimal feeding of domesticated animals. Given the understanding that waste products have now assumed increased value, meal-time nutrition must include more strategic thinking when it comes to waste management and use. Just as in the health scenario, there will be increased focus on portion control, but here for the purpose of avoiding waste whilst still covering fundamental nutritional requirements.

Investment in new raw materials

The food industry must invest more in raw materials that grow quickly and require the least possible amount of resources. It will be of interest to invest in new raw materials from the sea that grow extremely quickly, such as the microalgae sea lettuce. This may entail alliance formation between producers of new raw materials. With other raw materials prices, it may be of interest to find an effective means of harvesting raw materials that grow wild in nature. Are there "free" raw materials in nature that one can increasingly gather and utilise in the food industry? How can such raw materials be sold and brought to the consumer? One might look at cost-effective substitutes to expensive raw materials, including good sources of protein. What types of exciting processed products can one develop from new raw materials that will also correspond to the taste preferences of the consumer?

For the meat- and fish industry, this may entail investment in new animal- and fish species and raising species that grow quickly, with optimal feed consumption and the largest economic yield. In this scenario, it is forecast that meat consumption will decline. The industry may explore small portion packages of "luxury meats", meat alternatives and nutritious products containing less meat. There may also be possibilities in the development of in vitro meats.

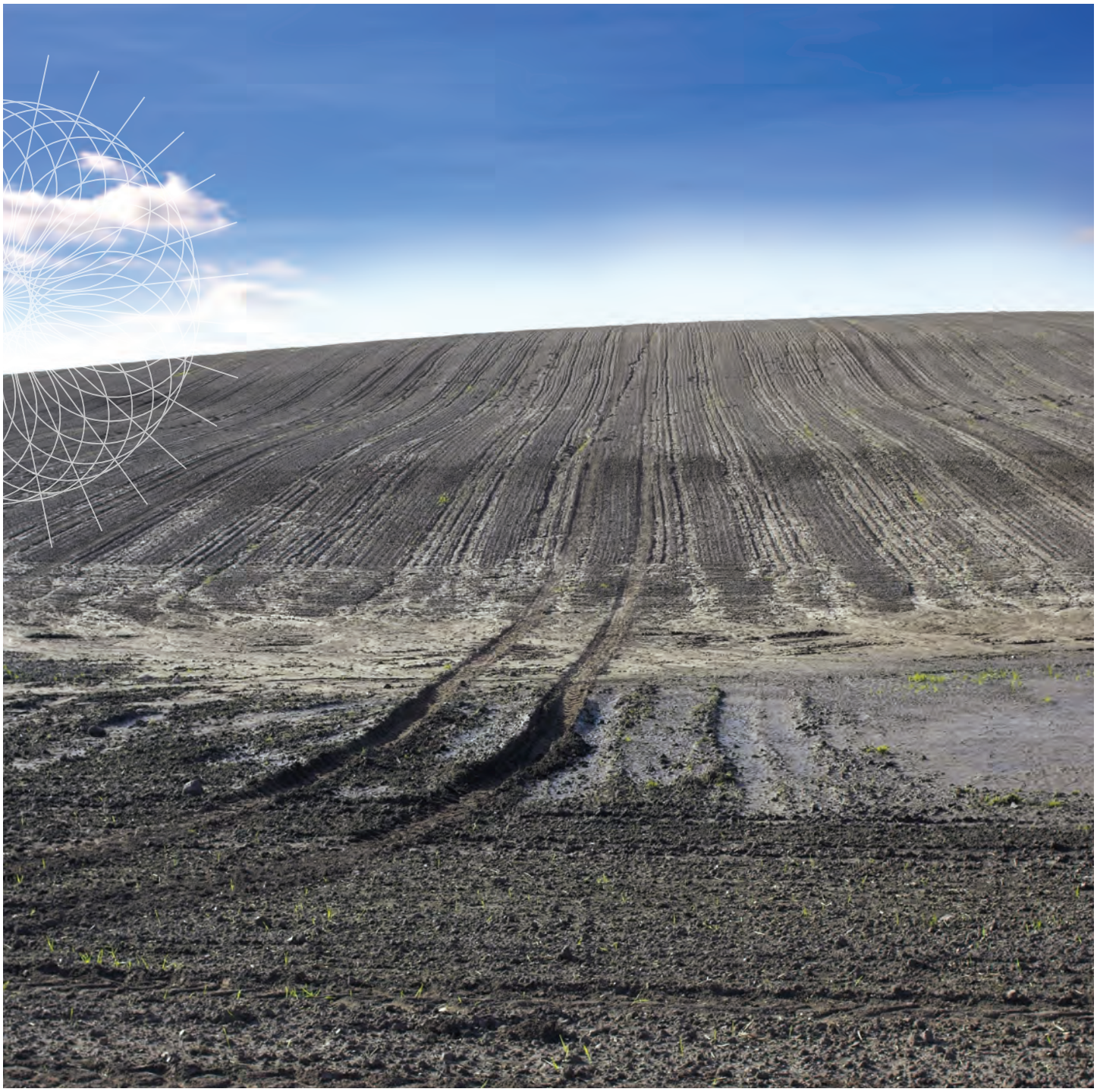
Insight into consumer patterns and demands

Higher raw materials prices will influence what raw materials consumers buy and where and how they buy them. It will be interesting to see new means of food consumption, such as sharing with "neighbours" or operating exchange centres. What types of changes in consumer patterns will we see, and what types of concepts will prevail in tomorrow's shortage of raw materials and increased raw materials prices? How will increased home production of some raw materials affect the purchase of other raw materials?

A global raw materials shortage and expensive products will make it increasingly important for consumers to get an overview of nutritive content in both raw materials and finished products. The food industry must work to communicate, in a simple manner, what a product covers in terms of daily nutritional requirements.

Scenario 3
Climate change

Several international directives on food production and consumption are enforced due to observable climate changes and sound scientific prognoses for further climate change. What are the consequences for the food industry?



Drastic changes for the food industry. **Radical scenarios 2020.**

Background

This scenario was based on the following significant driving factors, which will have a major influence on the future (see introduction):
1) *Clear and documented climate changes*
2) *Population growth*
3) *Scarcity of food and energy*

Today there is a lot of discussion focusing on climate change and the consequences it will bring. Not everyone believes that these changes are occurring. In this scenario for 2020, there will no longer be any doubt about climate changes, either among researchers or the general population. There are evident and documented climate changes that have already begun to take hold, and we have had clear, scientific prognoses for further climate change. Discussions are no longer about whether or not there are climate changes, but rather what has to be done to handle and counteract the climate changes that have already come and those that will come. In this scenario there is continued population growth, something which makes the need for a change of course all the more precarious, as a constantly increasing population results in increased environmental impacts. In this scenario there is a shortage of food and energy, but not enough to pose a serious threat yet.

Internationalisation

A series of binding international agreements have been entered to manage climate change. Policy is increasingly crafted on a global, international level, where important regulations are established and cooperation is achieved. Norway has become even more closely associated with the EU. There have been numerous international regulations and directives on food production and consumption. As part of the effort to curb climate change, energy quotas and food quotas have been imposed on certain products. The "polluter pays" concept has been introduced and taken up in practice, especially in rich industrial countries. It is costly and impossible over the long term to continue polluting, as drastic changes have taken place in the direction of a green economy.

Logistics and transport systems

More and more people live in cities as result of the demand for optimisation and minimisation of transportation. On a global scale there is less transportation and more energy-effective and intelligent transportation systems. Use of oil for transport is reduced, and new, renewable forms of energy that are locally anchored, such as solar, wind and wave power, are put into use.

There will be requirements for optimal usage of arable land, and to reduce transportation there are international requirements on local production of food, as this exerts a lesser impact on the environment. There will also be extensive focus on developing effective logistics and transport systems, with a close cooperation between different segments of the value chain.

Knowledge building

There will be significant investment in R&D focusing on logistics and environment. There will be a technological upswing throughout the entire value chain in order to minimise energy consumption and waste. There will be an increased level of awareness concerning environmental impacts among both companies and consumers. One can quickly draw up secure calculations of environmental impacts, thereby obtaining an image of the consequences associated with choices and decisions. Companies will no longer be able to fall back on any argument that they were unaware of consequences. Reputation and environmental profile will be determining factors both for companies and individuals, as both companies and individuals will have access to data on environmental impacts and need to be responsible for their actions. In order to be able to minimise climate changes, there will be more open personal information from the "data inspectorate", especially in areas pertaining to lifestyle and environmental impact.

Value chain optimisation

Climate changes will drive the need for binding cooperation throughout the entire value chain. There will be stringent requirements for documentation on environmental factors and traceability. Documentation requirements and introduction of new logistics and technology in the value chain will be costly, and there will be a need for major investments. Many companies will not be able to live up to this, and will not survive. In the market there will be a few powerful food chains that claim increasing levels of control over the entire value chain. As a counter-reaction to increasingly dominant food chains and documentation requirements, there will be a bloom of "islands" with organic gardens and garden shops

that perform the most sustainable agriculture possible, but without employing industrial or large-scale methodologies.

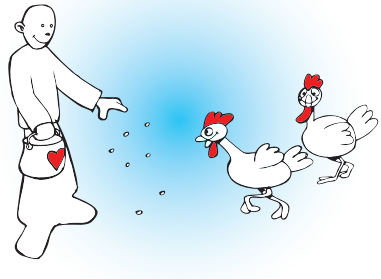
In order to achieve the best possible environmental balance sheet, there will be an increasing degree of co-location of companies, as one already can see today in the business park on Kviamarka in Rogaland, Norway, where several industry actors have assembled. Co-location allows for improved usage of raw materials and energy.

Environmental balance sheets and pricing

All companies and private individuals will have to maintain an environmental balance sheet. Being environmentally-minded becomes a normal pattern throughout all of society; failure to follow this pattern is considered abnormal. There will be elevated environmental- and waste fees; the polluter pays. Those who are compliant and able to minimise their environmental pollution will enjoy rebate incentives. Products that are not environmentally friendly will be extremely expensive and seen purely as niche products. The price of food products is based not only on the traditional production costs and desire for profits. It will also be based on a complex combination of climate cost, growth rate of raw materials, waste quantities both in production and consumption (by consumers), amount of preparation energy required and shelf life and quality of products.

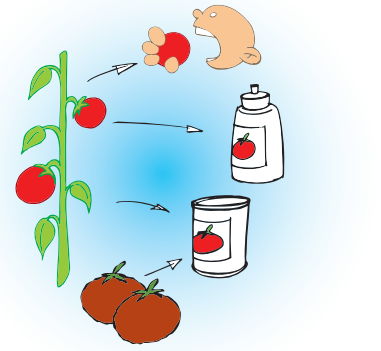
Animal welfare

There will be increased focus on animal welfare for both fish and domestic animals. It will be considered more ethical and healthier to eat "happy animals". Respect for the planet entails respect for all life on earth. There will also be an increased level of awareness when it comes to handling of plants and vegetables. Pollution is not tied only to the physical, but also to "mental pollution" – the attitudes and behaviours one shows to others and to nature.



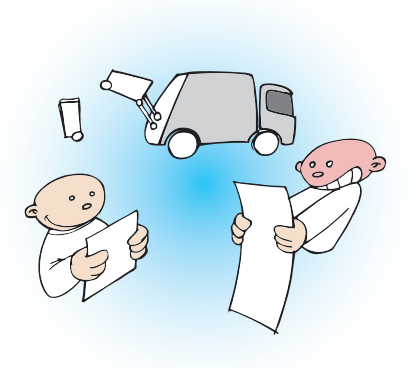
Usage of raw materials

In this scenario, where environment and energy optimisation are central concerns, major focus is placed on usage of raw materials. This is attributable not primarily to a shortage of raw materials, but rather to environmental requirements. A high level of focus in industrial processing will be placed on avoiding waste in processing. New processing technology will be developed, and raw materials that have been separated out will be used to a much greater extent than they are today. Major emphasis will be placed on quality and shelf life to avoid waste in all segments of the value chain.



Use of waste materials

In this scenario it is costly to have extensive amounts of waste, as this will result in higher fees. Requirements will make it necessary to utilise waste products to a far greater extent than today, for both remainder materials for new products and for energy in the form of bioheating. Sound logistics and technology throughout the entire value chain will allow more specialised waste sorting, which in turn allows for improved usage. Optimal usage of waste products will require intelligent waste management systems that make specialised sorting less demanding and less complicated. The entire attitude towards waste and usage of waste will undergo a change in society. Waste is no longer something that disappears at a landfill. Consumers will be directly implicated in the quantity of waste they produce and how they sort it. They will pay fees based on quantity and type of waste,

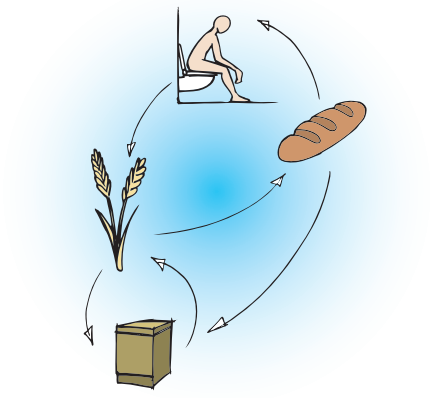


"Quota limitations on travel and constantly improved IT will also make it possible to integrate video conferencing into meal contexts"

which will in turn influence what types of food and products they purchase. Waste that is poorly sorted will be subject to additional fees. Intelligent household systems will provide instant feedback as to how much energy is used, how much waste is generated and the costs associated with both energy consumption and waste. The consumers can obtain information on what they may or may not throw out and how to best handle waste.

Micro-ecosystems

In this scenario there will be pilot projects looking at micro-ecosystems in new houses, where waste and sewerage can be used for plant nutrition. The sewer line will go through a purification process where any

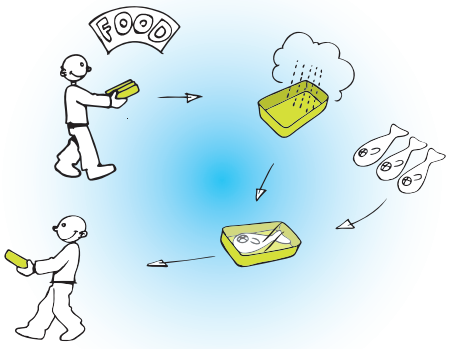


heavy metals or toxic substances (which accumulate through the food chain) are removed. The sewerage will provide food for plants, which will be further used in food production. This technology will be developed so that the production is hygienic and pleasant. People will be made more aware of the fact that they are a part of a natural ecosystem, in which human waste plays a natural role.

Ornamental plants in the household will be increasingly replaced with "utility" plants that will provide food.

Reusable packaging

Production centres and stores will bear much more responsibility for packaging waste, and they will have to pay for it. They have therefore made extensive efforts either to cut down on packaging or make it more environmentally friendly. There will be consumer demand for this type of packaging. This includes, for example, packaging that decomposes quickly. Packaging requiring minimum volume will be developed for transport.



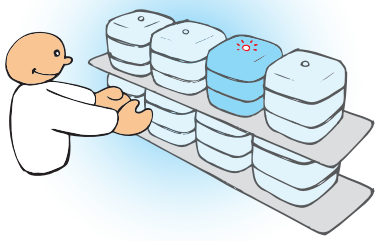
Arrangements for packaging return will also be established, where consumers can bring their packaging back to the point of sale, such as one does today with bottles. The packaging will be cleaned and sterilised at the point of sale. There will be local, small refinement facilities at points of sale, where raw materials are processed and packaged using reusable packaging. Consumers will order and purchase the portions appropriate for their household without having to pay extra.

Use of Information Technology (IT)

AJust as in the health and raw materials shortage scenarios, IT will be integrated into food and meal solutions. Consumers will receive easily available information on purchasing requirements when they are at a point of sale. Consumers can easily obtain information on CO_2 balance, waste quantity and environmental impact for the goods in question, and even become informed of their background and origin. Price in this scenario will also depend on shelf life (intelligent pricing). For fish and meats one can also get a rapid insight into animal welfare. There will be stringent requirements for labelling and declarations for environmental factors and CO_2 balance.

Prepared meals and semi-manufactured goods

From an environmental perspective it is more effective and sustainable for raw materials to be increasingly refined into semi-manufactured products and prepared meals for sale.



One will then have better logistics for utilisation of remainder materials and waste along with energy optimisation. Fish, for example, is primarily sold in filleted form where scraps are used as a remainder material.

Consumers order prepared meals and semi-manufactured goods at points of sale and cafeterias. Use of IT will make it easy to order and retrieve products. In general, less time will be spent on the purchase and preparation of meals in the private household. There will be more public meals in childcare facilities, schools and institutions. All of these meals must have a profile with the smallest possible environmental impact.

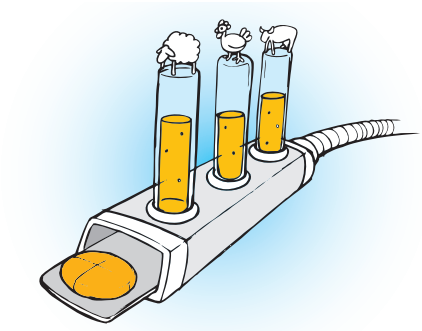
Hybrid restaurants and shops

This scenario features points of sales that are hybrids of today›s restaurants and stores. Consumers can select their own raw materials and have a complete meal cooked at the point of sale and then eat there, in an area reminiscent of a restaurant. A part of the processing of raw materials takes place automatically. Major grocery chains have therefore moved more and more into the restaurant market. As a part of their environmental initiative they have an expanded service offering with free transportation by electric bus.

In addition to the hybrids in stores and restaurants, there will be more upscale gourmet restaurants with traditional preparation and dining.

Consumption of raw materials

Based on the documented climate changes, there will be new raw materials that are tasteful and with a good environmental balance sheet. Neither red meat nor cow's milk are favourable when it comes to CO_2 emissions, and there will therefore be a reduction in the consumption of these raw materials. Cows' milk will be increasingly replaced by vegetable-based drinks with improved taste and nutritional content than today's milk substitutes. A series of vegetable-based products will be developed with meat flavouring, for example, but with a soy product base. These will partly replace red meat as a source of protein. There will also be an expansion of products made from vegetable, chicken and fish sources.



Multisensory experiences and video conferencing

Along with documented climate changes there will be initiatives to limit air traffic and travel, even if air transport has taken a step towards becoming more environmentally friendly. Limits (quotas) will be placed on the number of flights permitted. As a result, there will be increased focus on "virtual travel». This also pertains to meals. Food will become part of the total sensory experience, where sound and images are naturally included.

Quota limitations on travel and constantly improved IT will also make it possible to integrate video conferencing into meal contexts. It will be possible to sit down and eat with family and friends while conversing with them at the same time. A technological upswing will allow a virtual, holographic experience. The meal's function as a social arena is strengthened through use of video conferencing. This interplay includes not only sound and images, but also taste and aroma; several individuals can enjoy the same meals and discuss them. Individuals on their own can easily socialise with friends, family and new acquaintances. Technological development means that one is no longer so much sitting alone in front of a screen; instead, one will be able to utilise technological in social contexts. One can also connect

to bars and dining locations around the world and converse with friends or strangers. Bars and restaurant chains will use video conferencing systems to connect to other sites around the world. When eating at an Indian restaurant in Norway, one might, for example, see live images from a restaurant or site in India and exchange stories with counterparts in the remote location.

"Consumers will demand products that satisfy their conscience."

CONSEQUENCES OF THE CLIMATE CHANGE SCENARIO

What will be the consequences for the food industry if the climate change scenario unfolds in reality? What does the industry need to do from this point forward in order to respond to this scenario? Here is a summary of what the participants came up with in the consequence workshop.

Environmentally friendly packaging solutions

Major emphasis will be placed on the development of environmentally friendly packaging, whether this means packaging that is rapidly biodegradable or returnable/reusable packaging. In this scenario, environmental concern will serve as one of the actual sales criteria, and in this respect it will be important to limit packaging quantities. Some packaging currently used contains a lot of air and thereby requires more transportation than should be necessary. The consumers can look at environmental labelling and environmental balance sheets with respect to packaging in order to make the most environmentally friendly choices possible. To cut down on packaging, shops can devise solutions in which consumers bring their own containers for refills. Investments must also be made in intelligent waste management, where, for example authorities work together with store chains and producers.

Transport and logistics

This scenario indicates that the food industry needs to seek to minimise energy consumption for transport and labour, moving towards increased cooperation with other actors to achieve more effective transportation. The industry needs to work towards an optimisation of the value chain with respect to energy consumption and waste management. The industry should also think more in terms of local production with several smaller-scale production sites located in close proximity to points of sale, where products are increasingly packaged at the point of sale, especially where fresh goods are concerned. Here the food industry should look at how local production units might be cost-effective, even with increased transport fees.

New and closer alliances

The scenario points out the necessity of closer connections and cooperation between shops/points of sale and other segments of the value chain, such as farmers and producers. This will make it easier to fulfil requirements for documentation pertaining to CO_2 balance sheets, tracking and product information. It will be necessary to have knowledge of the passage of the raw materials through the entire value chain in order to be able to create reliable products with a good reputation while also minimising waste. In other words, value chain cooperation will be a prerequisite for reliable communication associated with the environment. Another consequence of this scenario is that more companies might seek physical joint location, providing an environmental gain in environmental terms while also presenting a potential for knowledge development.

Based on the forecasted expansion of hybrid shops/restaurants, store- and restaurant chains should establish closer cooperation. Alternatively, store chains should expand their knowledge of restaurant operations and prepared food service. Just as in the health- and raw materials shortage scenarios, the food industry will have to establish a closer connection- and cooperation with the IT branch when it comes to developing intelligent packaging, intelligent waste management and staging virtual experiences connected with meals. Use of IT solutions will be an essential condition to be able to communicate complex environmental documentation in a simple and reliable manner.

Consumer insight

If the climate change scenario unfolds, consumer preferences will be different from today. A personal environmental balance sheet will affect buying patterns. In addition to directives that will alter the behaviour of companies and individuals, there will also be a parallel change in consumer attitudes towards the environment. Consumers will demand products that satisfy their conscience. Animal welfare, for example, will not only be a necessity, but a central part of marketing towards consumers. There is a need for insight into consumer preferences and patterns given these changed conditions. In order to be prepared for this scenario, the food industry needs to gain deeper insight into the preferences that already exist among environmentally conscious consumers, especially among the younger generation.

Product development and usage of raw materials

Based on this scenario, the food industry should focus more on the

development of meals that are completely vegetable-based. One should look more to meat- and milk substitutes and develop new products from raw materials that cause minimal environmental impact and CO2 emissions. This may entail raw materials from the sea, such as sea lettuce, krill, fish etc. The industry can look to solutions that entail less packaging or packaging in shops and a higher degree of portion control. From an environmental perspective one can look towards product development and refinement of raw materials that entails the least possible waste in all phases. When and where it is possible to capitalise on waste and scrap in production, this should be integrated into the business plan. Today, a good part of scrap and unsorted raw materials is usually viewed as "unwanted rubbish" and not as a resource for product development and long-term service. With higher fees on waste and goals for the lowest possible CO2 emissions, this picture can be changed. Scrap from the end user will quickly end up as rubbish, but it will be reutilised in an industrial process.

Where purchase of raw materials is concerned, it will be even more important to have access to raw materials that are as sustainable as possible, with good durability and the best possible price. This entails having knowledge, control and oversight over the early segments of the value chain. The industry can also envision price differentiation in relation to shelf life and date of expiration. Finally, the scenario points to the development of products for large institutional settings (childcare facilities, schools, hospitals, homes for the elderly) that have a good environmental profile and the best possible environmental balance sheet. This might become an even more important source of income in the future, and if this scenario unfolds, the food industry will have to allocate greater resources towards product development in this area.

The food industry in 2020 – how will it be?

[2] NTP Food for life: Norsk Strategisk forskningsagenda for næringsmiddelindustrien. http://www.f4l.no/web/f4l.nsf/wti/FoU-strategi!OpenDocument
[6] Department for Environment Food and Rural Affair: Food 2030 strategy report. http://www.defra.gov.uk/foodfarm/food/strategy/

Nobody can know for sure what the future will look like. For instance there might be dramatic changes in the coming years that nobody could foresee. Nevertheless, it is important not to just make a "wild guess" about the future, but to build on factors one can see today that might have a major impact on development in ten years, such as the ageing population. In this project three scenarios were developed to cover a greater scope of possibilities. The three scenarios focused on food and health, climate change and possible shortage of raw material/food. As these three scenarios were developed in the beginning of 2010 the British government published the Food 2030 strategy Report [6]. This report also emphasised health, food production and climate change as three key challenges for the future. Former Prime Minister Gordon Brown wrote in the foreword:

"We can't carry on just as we are. We need to ***produce more food*** *without* ***damaging*** *the natural resources – air, soil, water and marine resources, biodiversity and climate – that we all depend on. We need to* ***feed more people*** *globally, many of whom want or need to eat a* ***better diet****. We need to tackle* ***increasing obesity*** *and encourage* ***healthier diets****. And we need to do all these things in light of the increasing* ***challenge of climate change*** *and while delivering continuous improvement in* ***food safety****."*

In a strategic document for the Norwegian food industry [2], these three areas are also emphasised. Health issues, food production and climate change thus seem to be three key areas of concern for the food industry in the coming years.

The food industry in 2020 will probably be formed by a mixture of elements presented in the three scenarios. In addition there will be elements that have not been proposed or thought about in this project. Some elements in the scenarios might occur more strongly than proposed while others might occur less strongly.

It is important to outline that it was the Norwegian food industry that came up with the different elements in the scenarios, through the first three workshops. In the final two assessment workshops elements of the three scenarios were assessed and voted by 47 representatives from the Norwegian food industry in terms of probability and importance, using an interactive voting system. The results from these two workshops gave a clearer and more consistent picture of what the food industry might look like in 2020. The results strengthened the assumption that the future will be a mixture of elements from all three scenarios. Here are the main results:

Change in raw material prices, production and consumption

The *shortage of raw materials scenario* emphasised higher prices for raw materials. When voting on this matter, most of the participants (85%) believe that the prices for raw materials will rise within 2020, taking a higher percentage of the housing budget in Norway than today. There are mixed opinions as to whether there will be a shortage of raw materials in Norway. If there is a shortage, the participants believe that it could be in wheat, soya, rice and clean water. Most participants (82%) believe that seafood will be a more important source of food in 2020. Two-thirds of the participants (66%) view it as probable or very probable that Norway will produce genetically modified foods. Sixty-four percent believe that there will be an increased food production in greenhouses. All these elements were emphasised in the shortage of raw materials scenario.

All of the scenarios predict a drop in the consumption of red meat. When asked through voting, most participants (80%) believe in less consumption of red meat. One third of the participants believe that the consumption will drop to 60-80%, see figure. According to the participants, the alternatives will be seafood, white meat (poultry) and vegetables that are rich in proteins, like soya. Two-thirds of the participants believe in reduced cow milk consumption. The participants do not believe in a radical change in consumption of ecological food, on average they believe in a two to five percent of ecological food consumption in 2020. This is far from the goal of the Norwegian Government of 15% of the total consumption.

Raw material usage and conservation

Both the *shortage of raw materials scenario* and the *climate change scenario* conclude with a high level of focus placed on optimal usage of raw materials. A large majority of the participants (85%) believes there will be more focus and requirements from the government in terms of optimal usage of raw materials. The participants believe that there will be less

Drastic changes for the food industry. **Radical scenarios 2020.**

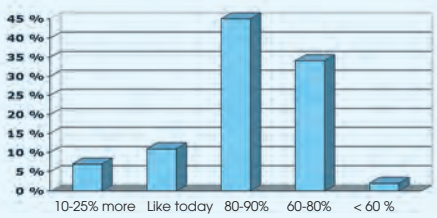


Figure - Expected change in consumption of red meat.

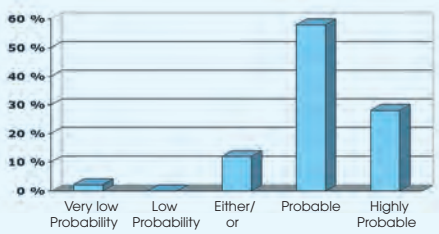


Figure – Assessed probability for elevated fees on unhealthy food in 2020.

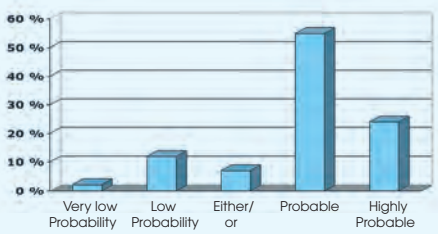


Figure - Assessed probability that there will be more public meals in kindergartens, schools and institutions in 2020.

garbage and an increased consumer knowledge in terms of handling waste and refuse. Just about all the participants (91%) believe in new storage and conservation methods allowing extended shelf life, while 67% of the participants believe IT technology and censors will help to measure immediately the quality of the food.

Environmental focus

The *climate change scenario* emphasises increased focus on environmental issues. Eighty-one percent of the participants expect that there will be more international collaboration and internationally binding agreements in relation to environmental factors and traceability. Most of the participants believe in new requirements and regulations for reusable packaging and packaging return arrangements, and 78% believe international standards will be developed for measuring environmental impact for the goods in question. Eighty-four percent of the participants expect that there will be elevated environmental fees for non-sustainable products. The environmental profile of a company will be increasingly important.

Focus on food and health

The health scenario suggests that there will be an increased focus and awareness regarding the connection between food and health. When asked, 91% of the participants believe this will be the case. They believe that the average consumer will have more awareness and knowledge about this matter. There will also be more regulations, fees and documentation associated with labelling, and 93% of the participants expect that personal health will be an increasingly important advantage when applying for work. On the other hand the participants are divided in their view when it comes to the idea that future consumers will have to pay more for the cost of sickness when it is connected to documented, unhealthy lifestyles like obesity. Some believe in this and some don't. Eighty-six percent of the participants think that it is probable or very probable that there will be elevated fees on unhealthy food in 2020.

Seventy-seven percent expect that there will be closer connections between the food industry and health institutions to develop healthy products. A large majority of the participants think that there will be more interest groups with special needs like diabetes and overweight connecting on the web and social media. Just about all the participants (98%) think that social media will be used more extensively as a marketing tool towards specific consumer groups. Ninety-one percent have the opinion that specially adapted diets and food will be developed for interest groups in 2020, where correct portions will be an issue. People over 50 years old will increasingly be trend setters in 2020, according to 55% of the participants.

Two-thirds of the participants are of the opinion that there will be a sophisticated labelling system that not only documents positive health effects, but also negative ones. Seventy percent expect that consumers rapidly can take measurements of their own health conditions while 60% think that the health focus in 2020 is not only a question of what you eat, but also how it is prepared and eaten. Most of the participants (80%) have the opinion that products with documented, positive health effects will have a larger marked share. Medicinal foods will be much more common in 2020, and according to 76% unhealthy food like snacks and sweets will be healthier with nutritious properties.

Food purchasing- and consumption situations

As suggested in the three scenarios, the participants believe in changes in future consumer consumption. Seventy-eight percent think there will be more institutional food and public meals with nutritional requirements in eldercare facilities, kindergartens, schools and hospitals alike. Two-thirds of the participants feature points of sales that are hybrids of today's restaurants and stores, and 61% believe that a larger part of the population will order weekly prepared meals and semi-manufactured goods at points of sale and cafeterias. Half of the participants (50%) have the opinion that consumers will spend less time on purchase and preparation of meals in private households, while 33% disagree with this statement.

Just about all the participants (95%) have the opinion that IT technology will be used more extensively in the food purchasing situation. In a simple and rapid way, consumers can get access to information and recommendations. According to the participants, the most important information for consumers will be nutritional content (such as allergens), shelf life and freshness, amount of added sugar, salt and fatty content. Consumers will also desire to have more information on

origin of the food and documented health effects. Finally they are expected to request more information about how to handle raw materials and prepare meals. In terms of IT technology the participants (68%) do not believe in the extensive use of video conference technology around meals and consumption situations.

Final remarks

The feedback and evaluation from the participants in the two assessment workshops fits well with most of the elements in the three radical scenarios. The participants expect that a lot of the elements in the scenarios will happen, but in some areas in a less extreme way. The majority expects, for instance, that raw material prices will rise, but not as much as proposed in the shortage of raw materials scenario. As long as there is international collaboration, normal crop harvest and limited wars and conflicts, global pandemics or radical climate changes, this is the most likely scenario by 2020. Food production is nevertheless quite sensitive. Drought in Russia, Ukraine and Kazakhstan in 2010, for instance, led rapidly to a pronounced increase in wheat prices worldwide.

When developing the scenarios, the aim was to find drivers that might result in a more radical change in society. As described in the introduction: "The purpose of a radical scenario is not to think exclusively of what is most probable, but rather to research different, possible directions for the future and expand our view." With the radical scenarios described and visualised, combined with an assessment by the food industry concerning what is most probable to occur, this document will hopefully help the industry to make right strategic choices for the future.

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