NUTRITION

CLIMATE

INNOVATION

CIRCULARITY

FOOD
2030

Future-Proofing
our Food systems
through **Research**
and **Innovation**

#FOOD2030EU

*Research and
Innovation*

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FOOD 2030

Future-Proofing our Food systems through Research and Innovation

edited by Karen Fabbri

Contents

Foreword

There is no doubt that global peace and stability is largely underpinned by our ability to feed people and provide a basis for good health. However, guaranteeing food and nutrition security in a changing world has become a huge challenge, due to the compounded effects of climate change, resource scarcity and population dynamics. Access to food is a major driver in the current migration crisis that Europe is experiencing. These developments provide a framework for action, reflected in the Commission priorities, COP 21 climate commitments and the UN Sustainable Development Goals. It also provides an opportunity for Europe to take a leadership role in transforming and future-proofing our food systems.

It was on this basis that I and the Commissioner for Agriculture Phil Hogan, during the 2015 MILAN EXPO, launched the first phase of the FOOD 2030 initiative. It set out a debate with a wide diversity of stakeholders on the role of Research and Innovation (R&I) in future-proofing our currently unsustainable food systems. The result was the publication of a baseline assessment of EU food and nutrition security R&I in 2016.

We are now entering the second phase of FOOD 2030 that will prepare the ground for the next EU R&I Framework Programme and outlook towards 2030. This publication provides a glimpse of how European R&I actually contribute to the systemic transformation of food value chains. It continues to encourage an open debate amongst stakeholders; to break down silos and engage in meaningful conversations about the future food systems we want. Furthermore, the publication clearly demonstrates the relevance of EU R&I to policy development and societal needs.

I invite readers to take part in this process, to engage in the FOOD 2030 initiative to help us build a more coherent EU R&I policy that places sustainable food systems at its heart. Hippocrates said "Let food be thy medicine and medicine be thy food". Together we can make food the new health for both humanity and the planet.

Carlos Moedas
Commissioner for Research, Science and Innovation

Introduction

Food and nutrition security (FNS) – having access to sufficient, safe and nutritious food – supports society and communities by ensuring good health, sustainable jobs and lifelong enjoyment. To ensure that future generations achieve FNS, certain global pressures, such as population growth, urbanisation, resource scarcity and climate change, must be addressed. For example, feeding an estimated global population of 9 billion by 2050 will require a near 60 % increase in food demand. At the same time, the global and growing appetite for meat and animal protein is becoming unsustainable and is leading to a further rise in greenhouse gas emissions from the sector.

The European Commission aims to tackle the FNS challenge with research and innovation (R&I) policies designed to future-proof our food systems to make them sustainable, resilient, diverse, inclusive and competitive for the benefit of society. This systemic approach, which aims to connect, scale-up and boost EU R&I, is referred to as FOOD 2030, and will provide solutions to four overarching priorities:

These priorities are being addressed through public and private investments, open science, research breakthroughs and increased global cooperation. The FOOD 2030 initiative connects the 'whole food value chain' by linking: land and sea; producers to consumers; and 'farm-to-fork to gut and back'. In doing so it focuses heavily upon on scale up, digitisation, and promoting open innovation, education and skills.

R&I for future-proofing food systems

precision farming

3D printing

processed foods

bioplastics

FOOD PRODUCTION

PROCESSING

PACKAGING

WASTE STREAMS

FOOD SYSTEMS the way food is produced and how it affects our health, wellbeing and the environment

HEALTHY PEOPLE

DISTRIBUTION

LOGISTICS
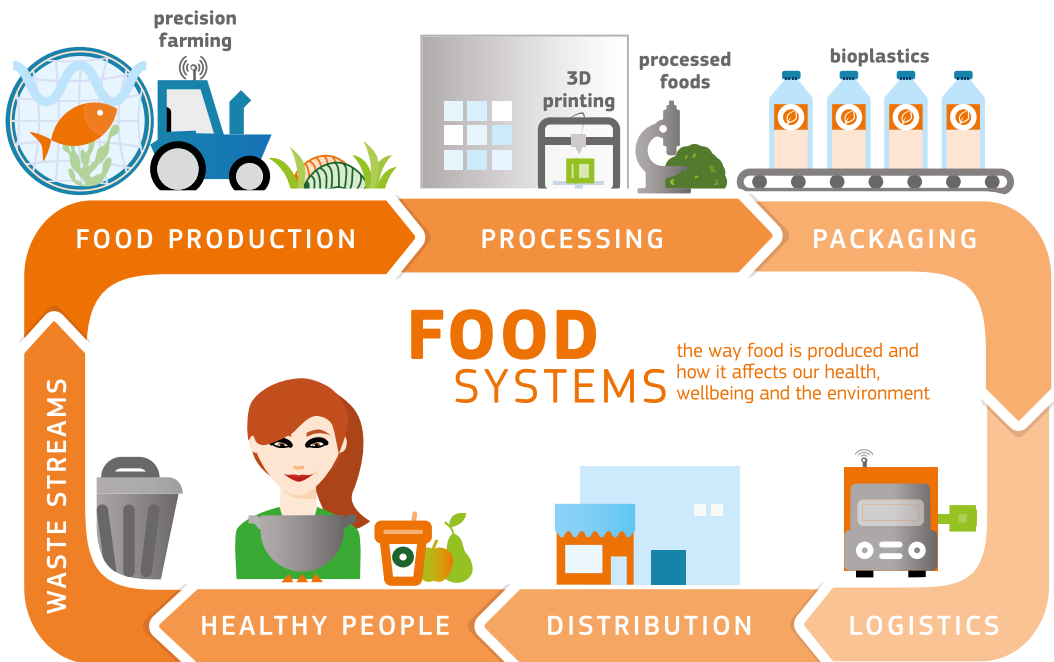
The initiative is also closely aligned with the EU commitment to the UN Sustainable Development Goals (SDGs). In this respect FOOD 2030 endorses the "the wedding cake" approach to viewing the economic, social and ecological aspects of the Sustainable Development Goals (SDGs).

This implies that economies and societies are seen as embedded parts of the biosphere. This moves development away from the current sectorial approach where social, economic, and ecological development are seen as separate parts towards an economy serving society within the safe operating space of the planet. Using this model one can argue that all the sustainable development goals are directly or indirectly connected to sustainable and healthy food.

In conclusion this publication outlines the FOOD 2030 philosophy towards a coherent and focused food-system approach, whereby R&I can flourish, European competiveness can grow, and global challenges can be addressed. It also provides an insight into past and ongoing efforts to build more sustainable food systems by showcasing a wide variety of EU R&I achievements across the different food chain sectors as illustrated below. They in turn provide the basis and inspiration for identifying future food systems R&I challenges.

Nutrition for sustainable and healthy diets

Nutrition for sustainable and healthy diets

The first FOOD 2030 priority focuses on fostering R&I on nutrition for sustainable and healthy diets. The challenges under this priority include tackling malnutrition and obesity; improving nutrition for healthy ageing; sourcing protein alternatives to reduce meat consumption; developing new food authenticity and safety systems; reviving forgotten crops for nutrition and resilience; and supporting healthier and more sustainable diets in Africa. This priority aims at supporting the further development and implementation of EU food safety policies, the EU Nutrition Policy Framework and relevant targets of the Sustainable Development Goals 2, 3, 8 and 10.

2 in 10

adult Europeans who are OBESE (and half the adults are OVERWEIGHT), contributing to a rise in ill-health and non-communicable diseases, such as diabetes.

23 million

number of Europeans who fall ill every year from FOODBORNE DISEASES.

⊙ Tackling malnutrition and obesity

Unhealthy and unsustainable diets impact human health, the environment and the economy. In Europe, some 33 million people are at risk of malnutrition while over 20 % of the adult population is obese. Almost half of the world's adult population is expected to be overweight or obese by 2030. Adopting healthy and sustainable diets is in line with SDG 3 (Ensure healthy lives and promote well-being for all at all ages).

Childhood obesity leads to an increase in the risk of being obese in adulthood. In addition, obesity increases the risk of disease and ill health. The rise in childhood obesity may lead to 60 million obese children by 2020. Early exposure to environmental factors, such as the nutritional environment in utero and early post-natal nutrition can influence the risk of childhood obesity. Reducing childhood and infant obesity relates to the UN's call to address the nutritional needs of adolescent girls, pregnant and lactating women, and older persons, one of the targets of SDG 2 (End hunger, achieve food security and improved nutrition and promote sustainable agriculture).

⊙ Improving nutrition for healthy ageing

The number of Europeans over 65 will double in the next 50 years while the over 80s will almost triple. While life expectancy will continue to increase, unhealthy ageing can place a heavy burden on both healthcare systems and families. Heart attacks, strokes, diabetes and cancer cost EU economies EUR 115 billion or 0.8 % of GDP annually. Improving healthy ageing through nutrition is relevant to achieving one of the targets of SDG 10 (Reduce inequality within and among countries), which aims to empower and promote the social, economic and political inclusion of all by 2030.

⊙ Supporting protein alternatives to meat

The ever-increasing global demand for protein cannot be sustainably met through conventional farming alone, given its large carbon footprint. This has created an opportunity for the alternative proteins market, which is set to double by 2024. R&I support for alternative proteins can help end hunger and ensure everyone has access to safe, nutritious food by 2030, one of the targets of SDG 2.

⊙ Ensuring food authenticity and developing future safety systems

Food safety remains a global concern, with related social and economic costs unacceptably high. Almost one-third of all deaths from food-borne diseases occur in children under five, although they make up just 9 % of the global population. Setting up increasingly robust and ICT-enabled fraud and food safety systems – including early warnings and coordinated management of national and global health risks – would help to strengthen the capacity of all countries for early warning, risk reduction and managing health risks, a target of SDG 3.

⊙ Recovering forgotten crops for nutrition and resilience

Most of the global population is fed on only 30 crops, some of which are sensitive to disease and are water intensive. Increasing diversity by reviving forgotten crops is one of the targets of SDG 2, which aims to maintain the genetic diversity of seeds, cultivated plants and animals by 2030.

⊙ Promoting healthy and sustainable African diets

Hunger and malnutrition are still prevalent in Africa. Improving the diet and ensuring better access to nutrition and diversified foods would contribute to SDG 8 (Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all).

RELEVANT R&I ACHIEVEMENTS

A range of EU-funded initiatives has been launched to tackle these challenges and provide sustainable nutrition and health for all. The EU projects showcased herein focus on reducing hunger and malnutrition, providing high-quality, affordable and nutritious produce, ensuring high levels of food safety and traceability, reducing the incidence of non-communicable diet-related diseases, and helping all citizens and consumers adopt sustainable and healthy diets for good health and well-being.

Printing healthy meals for elderly patients

By harnessing the potential of smart 3D print technology, EU-funded researchers have developed tailored meals for elderly patients with swallowing disorders. This pioneering work has made an important contribution towards improved nutrition for healthy ageing.

The challenge of ensuring nutritional well-being among the elderly will only increase given Europe's ageing population.

Many senior citizens are affected by dysphagia – difficulties in swallowing or chewing food. The EU-funded PERFORMANCE project addressed this condition by developing and validating a personalised food supply chain for those in nursing care, assisted living facilities or at home.

The process works like this. Individual food preferences are sent to manufacturers via specially developed software, which results in specially textured meals prepared using an innovative 3D printer. Digestible food is created from easy-to-swallow ingredients then reshaped to replicate the real thing: for example, a pureed chicken fillet can be 'printed' into a fillet shape. Meals can also be tailored for portion size, nutritional value and texture preferences. Food items are then packed and shipped frozen, ready to be heated in the microwave.

This innovative process could dramatically improve the quality of life of people with dysphagia, who are often fed a porridge-like pureed mix of ingredients. This can significantly impair enjoyment and lead to nutritional deficiencies if meals are avoided.

In nursing homes, it is estimated that up to 60 % of people suffer from the condition.

The 3D printing technology pioneered by PERFORMANCE could open up a new high-growth market in Europe for appetising, cost-effective personalised meals for the elderly, bringing benefits to a vulnerable segment of society. Completed in 2015, many of the products developed within the project have the potential to be brought to market as single standalone solutions.

FOOD 2030 > HEALTHY PEOPLE

FP7-KBBE > Specific Programme "Cooperation": Food, Agriculture and Biotechnology

PERFORMANCE (312092) > Development of Personalised Food using Rapid Manufacturing for the Nutrition of elderly Consumers

CORDIS > http://cordis.europa.eu/project/rcn/105482_ en.html

HORIZON-MAGAZINE > https://horizon-magazine. eu/article/transforming-mealtimes-3d-printed-food_ en.html

WEBSITE > http://www.performance-fp7.eu/

Creating a market for quality plant protein

The EU-funded PROTEIN2FOOD project is applying innovative and sustainable processing methods to produce high-quality, cost-effective and resource-efficient protein from seed crops and grain legumes. By offering an attractive alternative to animal protein, the project will contribute towards improved nutrition and enhanced environmental protection.

tal assessments, researchers are attempting to achieve a better understanding of the genetic mechanisms that drive protein formation in seeds, as well as the conditions that influence plant performance.

Researchers are also interested in how plant protein interacts with other components in the food matrix, and what this means for final food products. Support for protein-rich food prototypes with exceptional market potential will be offered towards the end of the project.

Ultimately, the team hopes to enhance protein production by 25 % through new effective breeding techniques and increase by 10 % arable land in the EU destined for protein-crop production.

There is increased awareness in Europe that global meat demand is unsustainable, which might explain why more and more consumers are willing to replace animal protein with plant-based protein. This project has sought to support this dietary transition by improving the quality and quantity of plant-based protein, and by developing adapted plant sources that have a positive impact on the environment and biodiversity as well as on human health.

PROTEIN2FOOD began in 2015 by selecting highly nutritious seed crops and legumes with high protein quantity. Through genetic, agronomic and food process engineering as well as sensory, socio-economic, and environmen-

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FOOD 2030 > PRODUCTION & HEALTHY PEOPLE

H2020-EU.3.2. - SOCIETAL CHALLENGES >
Food security, sustainable agriculture and forestry, marine, maritime and inland water research, and the bioeconomy

PROTEIN2FOOD (635727) > Development of high quality food protein through sustainable production and processing

CORDIS > http://cordis.europa.eu/project/rcn/193345_en.html

WEBSITE > http://www.protein2food.eu

Finding solutions to vitamin D deficiency

An EU-funded project has found that about 1 in 8 Europeans suffer from vitamin D deficiency, putting them at risk of developing serious medical problems. The project's evidence sets the stage for effective food-based strategies to address this preventable threat.

Vitamin D plays a key role in helping the body absorb calcium and phosphorous and is vital for ensuring bone density and strong teeth, as well as proper foetal development and a resilient immune system.

For humans, the major source of vitamin D is sunshine. But due to weather and other issues such as staying indoors most of the day for work or school, European residents of all ages, genders, life-stages and ethnicities are not getting enough exposure to the sun's rays to absorb their fair share of the nutrient.

The EU-funded ODIN project determined that about 13 % of Europeans are vitamin D deficient, providing firm evidence of a significant public health risk. According to the research, those most in danger of developing low levels include ethnic minorities, pregnant women and infants, as well as adolescents and young adult Caucasians.

ODIN found that vitamin D fortified foods can help counter deficiency. One such study of postmenopausal women in Greece found that vitamin D-enriched, reduced-fat Gouda cheese prevented a lack of the nutrient during winter months in the Mediterranean country. Another study showed that vitamin D-enriched eggs could also have a beneficial effect in sunlight-sparse months.

FOOD 2030 > HEALTHY PEOPLE

KBBE.2013.2.2-03 > Food-based solutions for eradication of vitamin D deficiency and health promotion throughout the life cycle

ODIN (613977) > Food-based solutions for Optimal vitamin D Nutrition and health through the life cycle.

CORDIS > http://cordis.europa.eu/project/rcn/110558_en.html

WEBSITE > http://www.odin-vitd.eu/

Developing award-winning food scanners of the future

A non-invasive food scanner, capable of delivering real-time results to help people accurately manage their food intake, recently won a European Commission Horizon Prize. The innovation provides a low cost solution to help tackle Europe's high levels of childhood obesity, as well as other food–related problems such as food allergies and food intolerance. It also suggests that future food authenticity and safety systems could soon be placed in the hands of citizens themselves.

The Commission launched the competition in order to address the lack of low-cost food intake management solutions on the market. The winning solution had to be portable and mobile and capable of analysing food composition, nutrition facts and potentially harmful ingredients precisely, quickly and efficiently. It also had to be able to provide feedback to users on their health and lifestyle.

Horizon Prizes reward breakthrough solutions – achieved through the EU's Horizon 2020 Programme – to major societal challenges. According to the European Academy of Allergy and Clinical Immunology about 17 million Europeans suffer from food allergies, with 3.5 million under 25 years of age. Around 43 million preschool children or nearly 7 % of all under-fives are overweight.

A total of three innovators were recognised as delivering breakthrough food scanning solutions. The winner, Finnish start-up Spectral Engines, developed a food scanner prototype based on near infrared spectroscopy, with a Bluetooth connection to a mobile device and data connection to a Cloud server. The prototype is compact and provides real-time results at a low price.

The two runners-up were SCiOscan of Israel (one of the countries associated to Horizon 2020) and Tellspec, a London-based branch of a Canadian company. The Commission noted that their solutions also represented a positive step forward towards non-invasive food scanning. All three winning companies will now use prize money totalling EUR 1 million to further develop their products for the market.

FOOD 2030 > HEALTHY PEOPLE

SPECTRAL ENGINE WEBSITE > http://www.spectralengines.com/

SCIOSCAN WEBSITE > https://www.consumerphysics.com/

TELLSPEC WEBSITE > http://www.tellspec.com/

Climate-smart and environmentally sustainable food systems

Climate-smart and environmentally sustainable food systems

It is vital that natural resources – water, soil, land and sea – are used responsibly within the Earth's capacity to ensure they are available to future generations. The second priority of FOOD 2030 addresses this challenge through R&I to make climate-smart food systems that are adaptive to climate change, conserve natural resources, and contribute to climate change mitigation. For example, the Commission supports R&I projects that demonstrate sustainable aquaculture approaches, make precision farming techniques available for small farmers, develop photosynthesis for food & energy, and encourage the sustainable use of land to keep soils healthy. This priority is relevant to the Common Agriculture Policy, the EU Strategy on Adaptation to Climate Change, EU environmental policies, the Paris climate agreement (COP21) and relevant targets of the Sustainable Development Goals 2, 7, 14 and 15.

~ 11 %
EU arable land affected by moderate to high level of **EROSION**

13 %
of GROUNDWATER monitoring stations in EU with over-the-limit NITRATE levels, mostly caused by agriculture
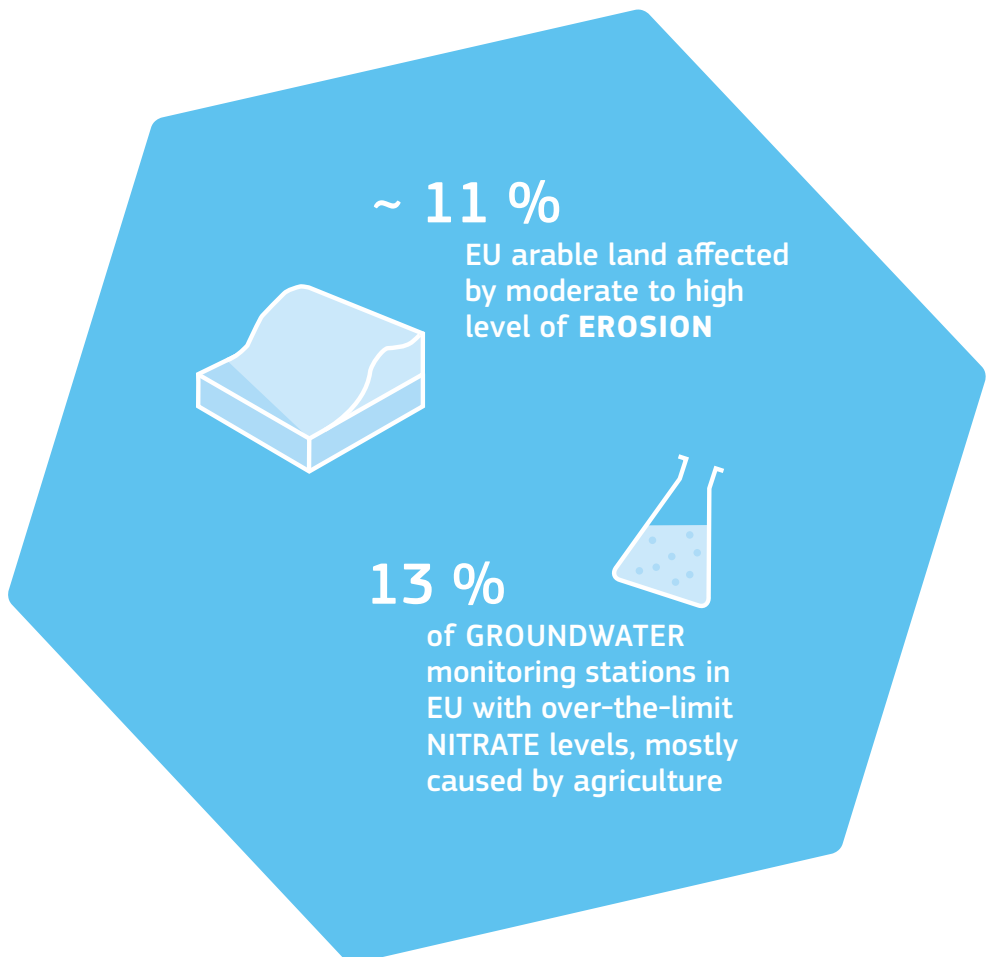
⊙ Demonstrating sustainable aquaculture for Europe

Sustainable aquaculture is needed to reduce pressure on wild fish stocks while meeting the growing global demand for protein. There is room for improvement here. The EU is the largest global importer of seafood products, and accounts for 24 % of the total value of world trade. The EU aims to increase its self-sufficiency through the sustainable production of high quality seafood that makes the best use of marine space with minimal environmental impact. Demonstrating sustainable aquaculture will contribute towards the UN call for countries to sustainably manage and protect marine and coastal ecosystems by 2020, one of the targets of SDG 14, which aims at conserving and sustainably using the oceans, seas and marine resources for sustainable development.

⊙ Enabling precision farming for small farmers

Agricultural inputs such as water, energy, fertilisers, and pesticides are often inefficiently used. While precision farming – which relies on satellite images and other observing and information technologies – can achieve operational efficiencies, these tools are often too expensive for small farmers. Rural areas also suffer from low broadband and 4G connectivity. To overcome these barriers, affordable precision tools targeted at small and medium-sized farms, are needed. This high-tech agricultural transition will help to attract innovative young farmers into the industry and also encourage urban-rural linkages and co-ownership. This objective contributes to one of the targets of SDG 2, which aims at doubling the agricultural productivity and incomes of small-scale farmers by 2030.

⊙ Boosting photosynthesis for food & energy

Enhancing natural photosynthesis and artificial photosynthesis could help increase crop yields and boost alternative energy production. In the case of enhanced photosynthesis, plants can be engineered with enzymes to speed up the process of converting carbon dioxide into sugars, with an estimated increase of up to 60 % in rice and wheat yields. Furthermore, bacteria and algae can be used to make fuels from sunlight, carbon dioxide and water. Such innovations could drastically decrease land use for the production of biofuels and reduce competition with food and feed production. Artificial photosynthesis further allows the development of biofuel cells and bio-batteries, contributing to SDG 7, which aims at ensuring access to affordable, reliable, sustainable and modern energy for all.

⊙ Fighting climate change through healthy soils

While up to 90 % of the food we produce is grown on soil, up to 25 % of this valuable resource has already been degraded. Billions of tonnes continue to be lost to erosion every year. Ensuring responsible land use is vital if we are to adequately feed an estimated world population of about over 9 billion in 2050, with limited land and increasing competition from biomass. In addition, physical methods of CO_2 storage face public criticism and their sustainability has still to be proven, while the carbon sink potential of soils and biomass has the potential to be further exploited. Lastly, the world needs sustainable ways to protect biodiversity and ensure land use and management for competing uses through better governance, management practices, implementation of the 'food first' principle, and efficiency-based biomass cascading with a more holistic approach to linking primary production and end users. Properly managing land will help combat desertification, and halt and reverse land degradation and halt biodiversity loss, one of the targets of SDG 15, which aims at protecting, restoring and promoting sustainable use of terrestrial ecosystems, sustainably managing forests, combating desertification, reversing land degradation and halting biodiversity loss.

RELEVANT R&I ACHIEVEMENTS

The following section showcases a selection of successful EU initiatives that support healthy, productive and biodiverse ecosystems at the production phase of the food value chain.

Strengthening sustainable aquaculture using climate models

The EU-funded CERES project is using predictive models to anticipate the impact of climate change on European fisheries and aquaculture. The project aims to help European industry develop tailor-made solutions to achieve sustainable aquaculture production and a secure seafood supply.

Climate change will affect both Europe's inland and marine waters. To minimise risks and maximise benefits, the seafood industry needs information about how climate change is likely to impact stocks of fish, as well as aquaculture productivity. Identifying mitigation measures at an early stage means that potentially negative climate change impacts can be avoided.

CERES, which ends in 2020, is analysing projected climate-related changes to inland and marine waters, and the likely responses of species such as salmon, sea bass, mussels, oysters and tuna. All industries dependent on these species will be able to directly benefit from suggested solutions. Targeted sectors include fisheries and aquaculture, both inland and marine, across Europe, from the high-latitude oceans to the Mediterranean.

The project results will contribute towards strengthening sustainable aquaculture, an important consideration given estimates that 65 % of seafood consumption will come from aquaculture by 2030. At present, annual EU consumption of seafood is just over 23 kg per person, with only 5.54 kg coming from aquaculture.

The project team is using a combination of biological and conceptual models, and will integrate the expertise of producers – including farmers and fishermen – along with data from public administration and other research sources. Throughout the modelling and mapping process, dialogue with industry will take place in the form of workshops, focus groups and interviews to ensure that CERES' outputs are as relevant as possible to the actual situation on the ground – and in the water.

FOOD 2030 > FOOD PRODUCTION

H2020-EU.3.2. > SOCIETAL CHALLENGES - Food security, sustainable agriculture and forestry, marine, maritime and inland water research, and the bioeconomy

CERES (678193) > Climate change and European aquatic RESources

CORDIS > http://cordis.europa.eu/project/rcn/200289_en.html

WEBSITE > https://ceresproject.eu/
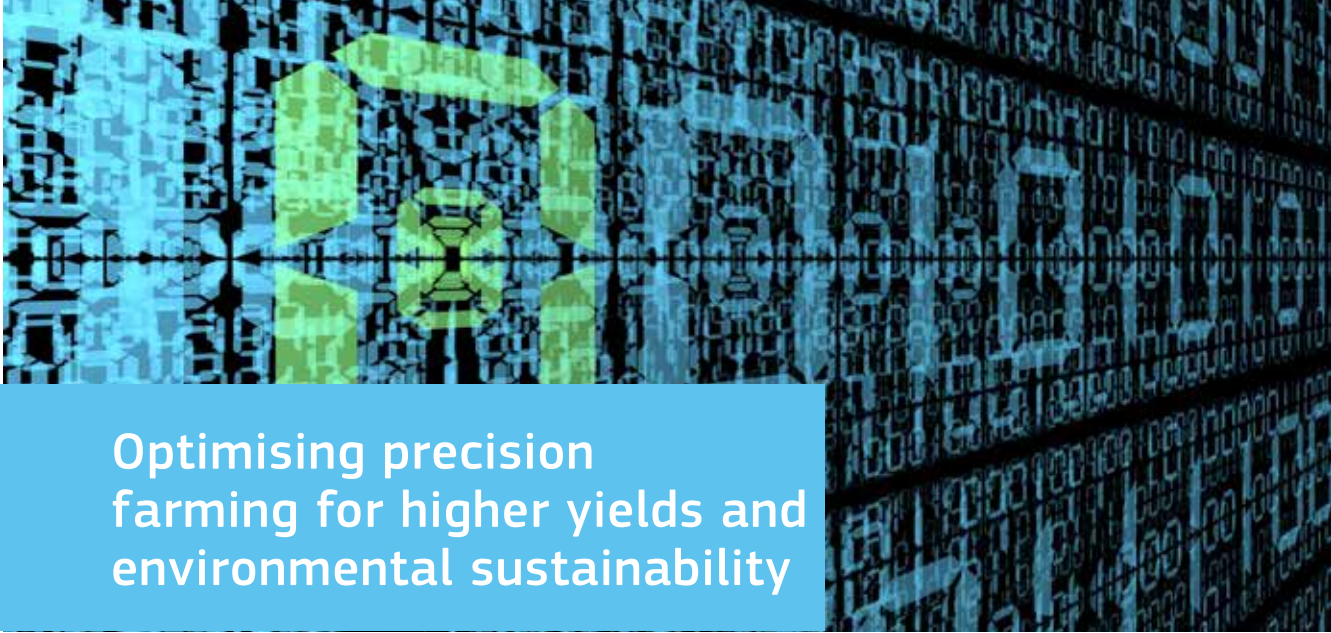
Optimising precision farming for higher yields and environmental sustainability

The EU-funded FATIMA project seeks to implement sustainable crop production through monitoring and optimising the use of inputs like water, energy, nutrients and fertilisers. By putting precision farming tools in the hands of farmers, the project is demonstrating how high yields and increased farm incomes can be achieved while using fewer resources.

From the beginning, the project has sought to bring together leading-edge agronomic knowledge, crop modelling and information and space technology to provide farmers with easy-to-use timely information on crop input requirements. FATIMA has worked with a range of end users including farmers, managers, agricultural decision makers and the agribusiness sector, to develop tools for a wide range of farm types.

Direct practical applications range from high-resolution precision farming for high-value crops to soil organic matter restoration practices. These provide maps of fertiliser and water requirements that can be used for precision farming and to manage crop water consump-

tion. The project has also developed a range of other products to support sustainable crop management techniques backed by innovative water-energy footprint frameworks.

Precision farming means that farmers achieve a better return on their investment by saving on water, pesticide and fertiliser costs. In addition, the project team has worked on innovative policy instruments that can be combined with these innovative technologies to promote the transition towards sustainable farming systems.

The project team is currently implementing and demonstrating these tools in eight pilot areas representative of key European intensive crop production systems in Spain, Italy, Greece, Netherlands, Czech Republic, Austria, France and Turkey. Due for completion in 2018, the project will integrate and make available all gathered information through a participatory online platform.

FOOD 2030 > FOOD PRODUCTION

H2020-EU.3.2. > SOCIETAL CHALLENGES - Food security, sustainable agriculture and forestry, marine, maritime and inland water research, and the bioeconomy

FATIMA (613817) > FArming Tools for external nutrient Inputs and water MAnagement

CORDIS > http://cordis.europa.eu/project/rcn/193262_en.html

WEBSITE > http://fatima-h2020.eu/?lang=fr

Tweaking enzymes to boost photosynthesis

An EU-funded Marie Skłodowska-Curie fellowship has enabled one researcher to investigate the potential of enzyme genetic modification to enhance photosynthesis in wheat. Improved photosynthesis could help achieve a 60 % increase in yields of certain crops, enabling European farmers to contribute towards climate-smart and environmentally sustainable food systems.

Meeting the needs for a growing food security in a changing climate is one the key challenges facing agricultural research, and in particular the impact of heatwaves on food production. Given that photosynthesis is one of the greatest contributors to crop yield, its decrease under heat stress can severely affect food production. The risk of rising global temperatures means that heat stress has become an increasingly important factor for wheat farmers to consider.

The HEATWHEAT project was launched in 2016 based on the understanding that photosynthesis is highly susceptible to even moderately elevated temperatures. This susceptibility can be mostly attributed to the enzyme RuBisCO activase (RCA). This is one of the least thermostable photosynthesis proteins, and also the principal activation partner for the photosynthetic core enzyme Rubisco, which drives carbon fixation and hence plant growth.

The project's main aim has been to experiment with RCA to improve photosynthetic performance, and therefore the yield potential of wheat. This will be achieved through the sourcing and transfer of heat-stable variants of RCA from relatives of wheat that have evolved in hot climates.

Improved variants of wheat RCA will be incorporated into elite wheat germplasm by means of genetic modification and breeding programmes. Due for completion in 2018, the project has huge potential to dramatically improve yield production in wheat under future climate scenarios.

Enriching soils for sustainable land use

The production of a carbon-rich conditioning product that can help keep soil healthy and encourage more sustainable land use is being scaled up thanks in part to EU funding. The innovative technology, called Novihum, replaces natural humus in degraded and arid soils, significantly increasing crop yields while reducing water use and pollution.

Soil is a vital – though often neglected – tool for increasing the resilience and security of food production, as recognised by the UN's declaration of 2015 as the International Year of Soils. Healthy soil helps to reduce erosion, enhance drought tolerance and ensure long-term land fertility. However, intensive farming is depleting soil of crucial nutrients that are needed to grow food, and around 1 000 km^2 of land is taken every year for buildings, roads and other infrastructure.

Novihum, which is achieved by enriching abundant lignite (brown coal) in a highly efficient industrial process, is currently being run through a new pilot facility in Germany, where profitable commercial production can be tested and refined. Due to end in 2018, the project aims to successfully demonstrate Novihum's potential benefits to the agricultural sector, which is under increasing pressure to use land efficiently and sustainably.

The commercial potential of a product such as Novihum – which is affordable, easy to use and good for the environment – is therefore significant. As demand for food production increases and available arable land decreases, the issue of soil quality will become ever more important. Global annual sales of such a soil humus conditioning product for the agriculture, horticulture, urban farming and landscape sectors in the EU, US and Middle East have been estimated to be in the order of up to EUR 360 million.

The European Enterprise Network, co-financed under the EU's programme for the competitiveness of SMEs (COSME), will help to establish a sophisticated global customer base and facilitate successful market entry.

FOOD 2030 > FOOD PRODUCTION

FUNDED UNDER: H2020-EU.2.3.1. > Mainstreaming SME support, especially through a dedicated instrument

H2020-EU.3.2. > SOCIETAL CHALLENGES - Food security, sustainable agriculture and forestry, marine, maritime and inland water research, and the bioeconomy

SCALING UP NOVIHUM (683550) > A Sustainable Soil Solution: Scaling up Novihum, an innovation to convert bad soil into better, make brown coal clean and barren land green, and profitably advance food security in Europe and beyond

CORDIS > http://cordis.europa.eu/project/rcn/198529_en.html

PROJECT VIDEO > http://een.ec.europa.eu/success-story/novihum-sustainable-soil-solution-feed-future

Circular
and resource efficient
food systems
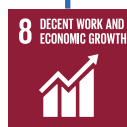
Circular and resource efficient food systems

The third FOOD 2030 priority aims to foster R&I to achieve circularity and resource efficiency in food systems. Circularity implies sustainable, resource-efficient food systems that, for example, would reduce the 1.3 billion tonnes of food lost and wasted per year along the food chain globally. Challenges in this area include: achieving zero food waste in food systems; tackling waste streams from primary production; efficiently recycling food waste; rethinking food packaging and labelling to engage consumers; and responding to an increasing demand for more tailored and local food. This priority aims at supporting the modernisation of the Common Agricultural Policy, the EU Circular Economy Package including the Waste Directive and Climate Action policies and relevant targets of the Sustainable Development Goals 2, 8 and 12.
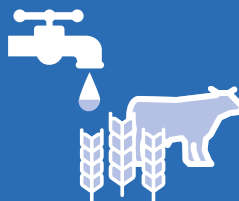
123 kg
average amount of
FOOD WASTE by each
European, per year

+50%
of FRESHWATER
in EU is used
by agriculture

⊙ Achieving zero food waste

Food waste is a problem along the entire food supply chain. One third of the global food supply ultimately goes uneaten, costing the global economy billions every year. This uneaten food accounts for about 8 % of greenhouse gas emissions. If food loss and waste were attributed to a single country, it would be the world's third largest emitter after China and the USA. Achieving zero food waste would help to feed a fast growing global population, while reducing the food sector's environmental footprint. Zero waste food systems can help achieve SDG 12, which aims at ensuring sustainable consumption and production patterns.

⊙ Tackling primary production waste streams

Improving farm operations will help to reduce a significant amount of waste produced throughout the food system. Around 1.4 billion tonnes of manure is produced in the EU annually. Only about 25 % of the phosphorous contained in wastewater is currently reused. The aquaculture sector is also responsible for releasing antibiotics into the environment. With some 65 % of seafood consumption expected to come from aquaculture by 2030, this is an issue that needs to be addressed.

⊙ Converting food waste into bio-based products

Some 88 million tonnes of food was wasted in the EU in 2012, with 11 % of this attributed to the primary production phase. In addition, about one third of the global food supply ultimately goes uneaten, costing the global economy billions. Developing end uses for this waste will help return nutrients into the food supply chain and create new economic opportunities through added value products. In turn this will help the EU meet SDG 8, which aims at promoting sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all.

⊙ Rethinking food packaging and labelling

Engaging consumers through reformulated food packaging and labelling will help to reduce the amount of waste produced in households across Europe. While over 311 million tonnes of plastic were produced in the EU in 2014, over 40 % of this was for single-use packaging. The end result is that 8 million tonnes of plastic waste ends up in the sea each year. Reducing unnecessary packaging waste can substantially reduce waste generation through prevention, reduction, recycling and reuse by 2030. This is one of the targets of SDG 12.

⊙ Sharing data for short-circuit food systems

Europe requires food systems that respond directly to local consumer food demand. In fact, 34 % of consumers are interested in personalised food and groceries, while 22 % would be happy to share data in return for more personalised products and services. In addition, 52 % of European consumers check if their food is local. Customised, localised and diversified food supplies would help the EU ensure one of the targets of SDG 2, which aims at ensuring the proper functioning of food commodity markets and their derivatives and facilitating timely access to market information, including on food reserves, to help limit extreme food price volatility.

RELEVANT R&I ACHIEVEMENTS

The research projects showcased in this section demonstrate how resource-efficient circular economy principles can be implemented across the whole food system, while reducing their ecological footprint.

Turning fish waste into functional food

The EU-funded SECUREFISH project has developed novel technology that turns fish discards into value added products, helping to reduce waste and encourage resource efficiency. The technology was developed with a focus on low- and middle-income countries.

The project aimed to reduce post-harvest losses in communities heavily dependent on fishing while achieving economic and environmental benefits. SECUREFISH delivered innovative tools that enable processors to extract nutritional proteins and peptides from fish discards. These ingredients can then be sold to manufacturers as ingredients for nutritious food products.

The project also introduced renewable energy sources to ensure that new production techniques are environmentally and economically sustainable, and helped to build up local SME skills to increase self-reliance.

Fish-preserving technologies were first developed based on traditional approaches. These included a hybrid wind (or biomass) and solar tunnel drier, a modified solar-energy-assisted extruder and an atmospheric freeze-drier. The quality of dried fillets was then enhanced by adding plant polyphenols extracted from local seaweeds. A range of new functional fish products were then developed and tested in Ghana, Namibia and Malaysia.

Another project goal was the recovery and conversion of waste by-products into high-value products such as gelatine, hydrolysates and functional peptides. Acid/alkali and enzymatic hydrolysis methods were used to extract proteins from waste skin and bones including from UK salmon and Lake Victoria's Nile perch.

Other work focused on quality control parameters, risks, nutritional properties and the carbon footprint of fish products. The information gained was compiled into a quality management tool for conducting safety and risk assessments and ensuring nutritional and functional quality.

FOOD 2030 > PROCESSING & LOGISTICS

FP7-KBBE > Specific Programme "Cooperation": Food, Agriculture and Biotechnology

SECUREFISH (289282) > Improving Food Security by Reducing post-harvest Losses in the Fisheries Sector

CORDIS > http://cordis.europa.eu/project/rcn/101659_en.html

WEBSITE > http://www.securefish.net/

Finding high-tech solutions for efficient food production

The EU funded project RESFOOD has developed ready-to-market technological solutions, practices and management strategies to help food producers boost crop cultivation, achieve processing efficiencies and valorise waste. These innovations will contribute towards the development of a truly viable circular European economy.

Producing food uses 70% of all water. RESFOOD developed ICT solutions to address this issue. The RESFOOD team demonstrated that it is possible to recycle 50 % of the wash water used on a production line after treatment by UF and UV disinfection – without influencing the quality of the product. This solution was tested at full scale at a production line with a variety of vegetables.

The project also developed a water-efficient washing machine for fresh-cut food. Technology demonstrations showed that the new machine reduced water consumption from 1.8 litres per kg to 1.3 litres per kg. The new machine reduces water consumption by channelling water from the outfeed belt back into the machine. This machine was nominated for the 2015 Food Tech Innovation Award. Food and water safety has also been one of the RESFOOD

priorities, leading the way on a new optical bio-sensing system for rapid and onsite analysis of bacteria in water. The project showed that the prototype system proved to be robust and performed well during two rounds of pilot tests.

RESFOOD partners also honed a process called IS profiling, which uses polymerase chain reaction (PCR) to detect bacteria by determining the length of a bacterial amplicon (a piece of DNA or RNA). The team achieved the necessary CE-IVD certification for the kit and it is now on the market. A portable filtering device which was also developed during the project and which accompanies the kit also has market potential.

FOOD 2030 > PROCESSING & WASTE STREAMS

FP7-ENVIRONMENT > Specific Programme "Cooperation": Environment (including Climate Change)

RESFOOD (308316) > Resource efficient and safe food production and processing

CORDIS > http://cordis.europa.eu/project/rcn/105519_en.html

WEBSITE > http://www.resfood.eu/web/

Use waste water to produce biodegradable packaging

The EU-funded PHBOTTLE project has successfully developed a new biodegradable material from waste streams that can be used in plastic packaging. Made from the fermented wastewater of processed juice, the innovation could save industry millions in production costs and tap into growing consumer demand for environmentally friendly products.

PHBOTTLE focused on juice processing wastewater because it contains high amounts of organic substances, including fermentable sugars such as glucose, fructose and maltose. The concentration of these fermentable sugars can reach 70 % of the total organic load, which researchers realised makes juice wastewater an ideal and cheap source of raw material to produce PHB (poly-hydroxybutyrate), a type of biopolymer.

PHB has several useful properties as a raw material for food packaging. It is moisture and vapour resistant, and does not dissolve on contact with water. The material has see-through properties and offers protection against oxygen entering a package. All these factors help to stop food from spoiling, which makes this organic compound useful for making biodegradable juice packaging.

Additionally, there are clear potential uses for this biopolymer across a range of other sectors such as cosmetics and pharmaceuticals.

The project successfully demonstrated how 'green chemistry' – a scientific approach to developing products and processes that reduce the use and generation of hazardous substances – can benefit both European industry and consumers and lead to new innovations.

FOOD 2030 > PROCESSING & WASTE STREAMS

FP7-NMP > Specific Programme "Cooperation": Nanosciences, Nanotechnologies, Materials and new Production Technologies

PHBOTTLE (280831) > New sustainable, functionalized and competitive PHB material based in fruit by-products getting advanced solutions for packaging and non-packaging applications

CORDIS > http://cordis.europa.eu/project/rcn/103432_en.html

WEBSITE > http://www.phbottle.eu/

Taking cooperative action to reduce food waste

The EU-funded REFRESH project aims to help reduce avoidable waste and limit the environmental impact of food production through knowledge and innovation. Various platforms and pilot projects are being tested to see how best industry and consumer can collaborate in achieving more sustainable practices.

Some 88 million tonnes of food intended for human consumption are lost annually along the EU supply chain, equivalent to 20 % of all food produced in the EU. About half of this is household food waste. Achieving reductions here will go some way towards the objective of reducing food waste across Europe by 30 % by 2025, cutting waste management costs, and maximising the value from unavoidable food waste and packaging materials.

REFRESH began by seeking to gain a better understanding of the drivers of food waste, focusing in particular on insights from behavioural sciences. Knowledge gleaned from this research will be turned into implementable reports and tools designed to encourage better decision-making by both industry and individual consumers.

The project then aims to develop strategic agreements to reduce food waste with governments, business and local stakeholders in four pilot countries: Spain, Germany, Hungary and the Netherlands. Businesses and other stakeholders will also be asked to participate in testing new approaches to reduce food waste and replicate these approaches in other countries.

EU policy recommendations to support the national implementation of food waste policy frameworks will also be developed, as will technological innovations designed to improve valorisation of food waste during food processing. Finally, ICT-based platforms and tools will help to support the uptake of new and existing solutions to reduce food waste long after the project is completed in 2019.

FOOD 2030 > WASTE STREAMS

H2020-EU.3.2. **>** SOCIETAL CHALLENGES - Food security, sustainable agriculture and forestry, marine, maritime and inland water research, and the bioeconomy

REFRESH (641933) > Resource Efficient Food and dRink for the Entire Supply cHain

CORDIS > http://cordis.europa.eu/project/rcn/197850_en.html

WEBSITE > http://eu-refresh.org/

Tackling food waste with ICT networks

The EU-funded SavingFood project is working with donors, volunteers and charities in four EU countries to redistribute surplus food to people in need. An ICT platform and behavioural change strategy have been developed to support engagement and ensure that the project's results can be sustainably implemented.

The project has developed various offline and online interventions to better understand and support food surplus behaviour in Hungary, Belgium, UK and Greece. Central to this is the project's ICT platform, co-designed with stakeholders, which aims to remove current practical barriers to food redistribution.

For example, by enabling food donors to describe their donation in terms of type of food and quantity and by giving charities the opportunity to describe their exact food needs, matching offer and demand of food surplus can be done in a more efficient way. Notifications about crucial actions in the process of food surplus redistribution, another characteristic of the platform, allows volunteers to be reminded of food saving activities they registered for, while pilot coordinators can follow the status of food surplus transactions. A carpooling module

responds to the practical problem that many volunteers face of getting to farms where leftover crops can be harvested.

Tools to influence behaviour have also been designed. These include motivational videos, which will be distributed via online channels in the pilot countries, as well as a number of awareness raising events where citizens can meet local food redistribution organisations and participating donors. For food donors specifically, the project has designed a food waste calculator that allows owners of a restaurant, a supermarket or a shop to easily calculate how much money he would actually save by joining SavingFood. The tool also calculates how much CO_2 emissions can be avoided.

Extracting high value protein from vegetable residues

The EU-funded GreenProtein project is producing high-added value, food-grade and fully functional proteins out of vegetable residues from the packed salad processing sector. This will contribute significantly towards revalorising vegetable processing waste, and open up new markets for high-value functional ingredients.

Food waste represents a significant economic cost to industry. In addition, the EU currently imports 77 % of the protein it requires — for food and feed — representing an important vulnerability for our economy, risking self-sufficiency and food security.

The ultimate goal of the project is to develop and demonstrate a new integrated process capable of valorising more than 40 % of residual waste into high added value additives. This will not only reduce waste and create new revenue streams for industry, but also contribute towards rural development and employment in rural areas.

The project is focusing in particular on RuBisCO, a protein found in all green vegetables and plants. It represents around half of the total protein content of green leaves.

The primary objective will be to extract and purify food-grade, fully functioning, RuBisCO protein on an industrial scale into a type of protein gel. This protein gel has many valuable food industry applications such as gelling, foaming and emulsifying, with excellent market projection in growing markets such as high protein, vegan and halal foodstuff.

To demonstrate how this can be achieved, the project – started in 2016 and due to end in 2021 – will construct a pilot plant and fine-tune the biorefinery process to produce the added value ingredients. This in turn will demonstrate how to significantly improve the environmental performance and cost efficiency of salad processing.

The main outcome of the project will be the revalorisation of some 74 million kilos of discards from the salad processing industry every year.

FOOD 2030 > WASTE STREAMS

H2020-EU.3.2.6. **>** Bio-based Industries Joint Technology Initiative (BBI-JTI)

GREENPROTEIN (720728) > Revalorisation of vegetable processing industry remnants into high-value functional proteins and other food ingredients.

CORDIS > http://cordis.europa.eu/project/rcn/205400_en.html

WEBSITE > http://greenproteinproject.eu/

Food systems **innovation** and empowering communities

2 ZERO HUNGER

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE

11 SUSTAINABLE CITIES AND COMMUNITIES

16 PEACE, JUSTICE AND STRONG INSTITUTIONS

Food systems innovation and empowerment of communities

The fourth FOOD 2030 priority focuses on developing a healthy innovation ecosystem that supports new business models and the delivery of value-added products that benefit society. The priority will help to create new jobs across the EU and foster thriving urban, rural and coastal economies and communities. Through closer partnerships with industry and society, markets can function in a responsible manner, foster fair trade and pricing, inclusiveness and sustainability. Challenges in this area to be addressed by R&I include: achieving sustainable and accessible food in cities and regions, engaging citizens in food science and policy, developing a sharing economy for food production and consumption, and implementing data-driven food and nutrition systems. This priority aims to support the European Commission's Digital Single Market Strategy, the EU Urban Agenda, and Europe for Citizens programme among other policy priorities, as well as relevant targets of the Sustainable Development Goals 2, 9, 11 and 16.

~ 8 % of the EU population is affected by FOOD POVERTY (cannot afford a decent meal every other day)

15% MONTHLY INCOME SPENT ON FOOD by an average family in most EU countries

3 out of 4 Europeans LIVE IN CITIES and urban areas.

⊙ Ensuring sustainable and accessible food in cities

Urbanisation poses environmental, health and social challenges for cities and their inhabitants. Some 75 % of EU citizens live in urban environments. This share is expected to rise to 80 % by 2020. Many European cities have to deal with food poverty and food deserts – areas where nutritious food such as fresh fruit and vegetables are not available due to a lack of outlets. Providing sufficient, accessible, safe and nutritious food can be a complex challenge. By connecting producers to consumers and citizens in food systems however, new solutions such as urban and vertical farming can emerge. Investment in related R&I contributes to achieving inclusive and sustainable urbanisation and capacity for participatory, integrated and sustainable human settlement planning and management, one of the targets set for SDG 11, which aims at making cities and human settlements inclusive, safe, resilient and sustainable.

⊙ Engaging citizens in food systems and science policy

European citizens often feel that their views are not integrated into science and policymaking. A key challenge is to connect citizens with scientists and policymakers in order to increase trust and ownership of both 'problems' and 'solutions'. Tackling this challenge from a food systems perspective will help to ensure responsive, inclusive, participatory and representative decision-making at all levels, one of the targets of SDG 16, which aims at promoting peaceful and inclusive societies for sustainable development, providing access to justice for all and building effective, accountable and inclusive institutions at all levels.

⊙ Fostering a sharing economy for food production and consumption

Rural or semi-rural areas account for about 88 % of the EU's area and 55 % of all jobs. These areas play a key economic role in every European country. However, small farmers face a variety of specific challenges, such as accessing expensive production equipment that is not used by other farmers. Likewise, a great deal of food is wasted by consumers during the 'last mile' of the food supply chain. Connecting local small producers with citizens – through sharing equipment and logistic services for example – can help to reduce food waste and create local food hubs. Investment in related R&I helps the EU and other countries develop quality, reliable, sustainable and resilient infrastructure, including regional and trans-border infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all. This target contributes to SDG 9, which aims at building resilient infrastructure, promoting inclusive and sustainable industrialization and fostering innovation.

⊙ Implementing data-driven food and nutrition systems

A huge variety of data is generated throughout the food system. However, the value of this data is not fully realised in a way that could help to strengthen consumer trust. Big data could also help the food and drink sector to better target R&I investments, which currently represent only 0.27 % of the sector's turnover. This is half as much as in the US and only a third as much as in Japan. Tackling this problem would also help the EU adopt measures to ensure the proper functioning of food commodity markets and their derivatives and facilitate timely access to market information, including on food reserves, in order to help limit extreme food price volatility. This target is part of SDG 2, which aims at ending hunger, achieving food security and improved nutrition and promoting sustainable agriculture.

RELEVANT R&I ACHIEVEMENTS

Research projects in this area provide an example of what has already been done to stimulate innovation and empower communities.

Achieving efficient food production in cities

Through an analysis of existing food chains in urbanised areas and the subsequent application of innovative tech-based solutions, the EU-funded FOODMETRES project has contributed towards delivering more sustainable and accessible food for cities. The project has shown how data-driven food and nutrition systems can bring sustainable benefits.

Establishing sustainable food systems – particularly in increasingly concentrated urban areas – requires innovative technology and planning. FOODMETRES developed three metropolitan footprint tools based on state-of-the-art European datasets in order to frame, communicate and manage the impacts of urban food consumption on metropolitan regions.

Two of these tools – the Metropolitan Foodscape Planner (MFP) and the Metropolitan Areas Profiles and Scenario (MAPS) tool – allow the provision of detailed insights on the ecological footprint of urban food consumption as well as indications of optimal food sheds for higher food security. A Common Operational Data Protocol (CODP) was established for case study research, and a

FOODMETRES data repository made available to stakeholders. Through these European data-driven tools, the project has sought to bridge the gap between trade and consumption on one hand and regional reality and local actors and consumers on the other.

The project team applied these tools to different food chains ranging from community-backed agriculture in London, Ljubljana and Berlin, to subsistence farming methods in Nairobi and large-scale greenhouse glass production in Rotterdam-Westland. Stakeholder workshops were held in order to establish new production networks and ensure dissemination of research results. It is hoped that the project's pioneering new technology will influence the development of sustainable urban food production chains in Europe and beyond.

FOOD 2030 > FOOD PRODUCTION, PROCESSING & DISTRIBUTION

FP7-KBBE > Specific Programme "Cooperation": Food, Agriculture and Biotechnology

FOODMETRES (312185) > Food Planning and Innovation for Sustainable Metropolitan Regions

CORDIS > http://cordis.europa.eu/project/rcn/105259_en.html

WEBSITE > http://www.foodmetres.eu/

Driving digital innovation for participatory food systems

Innovative ICT solutions are being developed by the EU-funded CAPSELLA project, which will enable farmers' communities and networks to develop more sustainable food systems. This in turn will help European society move beyond conventional, industrialised food production that has often been characterised by inefficiencies and high external inputs like water and fertiliser.

Conventional food production has become increasingly unsustainable due to unacceptable levels of food waste and shrinking farmers' incomes. Alternative data-driven systems are needed that reduce external inputs, promote agricultural biodiversity and engage consumers more in the food supply chain.

The CAPSELLA project is addressing these challenges through raising awareness within farming communities and the broader public about the benefits of using open data, and by promoting the use of ICT to achieve efficiencies. These tools will address three key scenarios: promoting functional agro-biodiversity in cropping systems; increasing on-farm genetic diversity conservation and informal seed systems; and achieving transparency of the food chain in the processes related to the production, including the distribution and consumption of food.

The key deliverable will be the CAPSELLA cloud platform. This will include a rich set of components and a number of added-value functions providing data for targeted communities. Infrastructure will be offered for building innovative ICT applications, enabling and encouraging the development of smart applications from the ground up.

Community-driven data-powered ICT solutions will be tested by the communities engaged in the project through a number of pilots. CAPSELLA, which also has a strong societal and business sustainability focus through various incubation activities, ends in 2018.

FOOD 2030 > FOOD PRODUCTION & DISTRIBUTION

H2020-EU.2.1.1. > INDUSTRIAL LEADERSHIP - Leadership in enabling and industrial technologies - Information and Communication Technologies (ICT)

CAPSELLA (688813) > Collective Awareness PlatformS for Environmentally-sound Land management based on data technoogies and Agrobiodiversity

CORDIS > http://cordis.europa.eu/project/rcn/199880_en.html

WEBSITE > http://www.capsella.eu/

Increasing public debate on food and nutrition security

The EU-funded Big Picnic project aims to engage the public in food systems and science policy through increasing collaboration and conversations on food security issues. The ultimate goal is to help organisations implement local community activities with citizens and stakeholders responsible for R&I.

Will there be enough fertile land to grow the food for an increasing population? Is it possible to adapt food production to climate change? And how do we define responsible research and innovation in relation to food security? The Big Picnic project wants citizens to debate the issues and articulate their views. The project aims to encourage grassroots engagement to achieve this.

Big Picnic, a three-year project ending in 2019, has identified a need for both in-depth familiarisation with the issues surrounding food security and a deeper understanding of the context in which grassroots engagement can be fostered. It brings together botanic gardens, universities, an institute for art, science and technology and an international NGO, spanning 12 European countries along with Uganda.

These partners are designing fifteen travelling exhibitions, which will offer information, activities and participatory events to spread the word about food security and get people talking. Partners have been encouraged to try out new approaches and to identify their target audiences and goals. Co-creative methods – the idea that everyone is an expert on one issue or another – should inform participatory processes that involve institutions and community partners.

Communities will also take part in around 90 Science Cafés, which are designed to inspire debate and capture public opinion. Through the face-to-face interactions, the project is expected to reach around 8 000 people. Technology, take home challenges and social media will expand Big Picnic's potential audience to 300 000.

FOOD 2030 > HEALTHY PEOPLE

H2020-EU.5.C. > Integrate society in science and innovation issues, policies and activities in order to integrate citizens' interests and values and to increase the quality, relevance, social acceptability and sustainability of research and innovation outcomes in various fields of activity from social innovation to areas such as biotechnology and nanotechnology

BIGPICNIC (710780) > Big Picnic:Big Questions - engaging the public with Responsible Research and Innovation on Food Security

CORDIS > http://cordis.europa.eu/project/rcn/203174_en.html

WEBSITE > https://www.bigpicnic.net/

Building food-related sharing economies in cities

The EU-funded SHARECITY project is guiding cities towards more sustainable pathways through applying the sharing economy to food production and consumption. This will help to conserve resources, prevent waste and provide new forms of socio-economic relationships.

Understanding how and why people consume – and the nature of relationships they develop with the products they acquire and use – has long been a focus of social scientists. While the cultural diversity and long history of food sharing has been well documented, modern ICT is pushing this concept into new spaces. However, little is known about these emerging food sharing practices and their impacts.

The SHARECITY project aims to establish the significance and potential that food sharing economies can bring to cities by developing a deeper theoretical understanding of contemporary food sharing and generating comparative international empirical data about food sharing activities within cities. It will also assess the impact of food sharing activities and explore how food sharing in cities might evolve in the future.

SHARECITY, due for completion in 2020, will provide conceptual insights that bridge sharing, social practice and urban transitions theories. The project will generate a typology of food sharing economies; a database of food sharing activities in 100 global cities; in-depth food sharing profiles of seven cities from the contrasting contexts of USA, Brazil and Germany, Greece, Portugal, Ireland and Australia; and a sustainability impact toolkit to enable examination of city-based food sharing initiatives.

It will also offer up scenarios for future food sharing in cities after assessing current food sharing and open new opportunities to better understand how, why and to what end people share food within cities in the 21st Century.

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datasets from the EU. Data can be downloaded and reused for free, both for commercial and
non-commercial purposes.

The European Commission publication "Future Proofing our Food Systems through Research and Innovation" provides a glimpse of how European research and innovation is actively contributing to food system transformation.
It provides evidence and backup to support the ongoing FOOD 2030 process of encouraging an open debate amongst stakeholders; to break down silos and engage in meaningful conversations about the future food systems we want.
The publication gathers together examples of evidence based food system research and innovation from across the whole spectrum of the framework programme and the food chain. It also clearly demonstrates EU research and innovation outcomes relevant to economic societal and environmental policy development and needs.

Research and Innovation policy

Publications Office