



Towards sustainable

Food

Solutions, trends, innovation and beyond

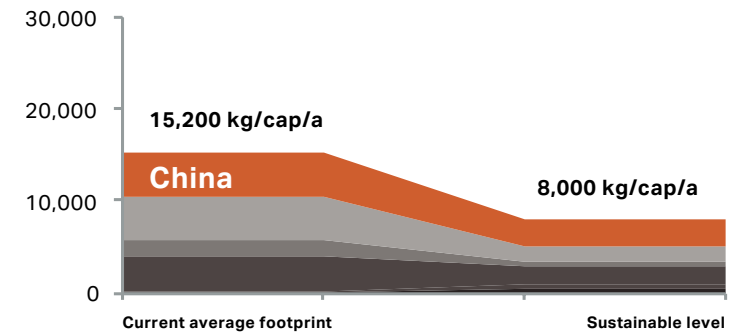
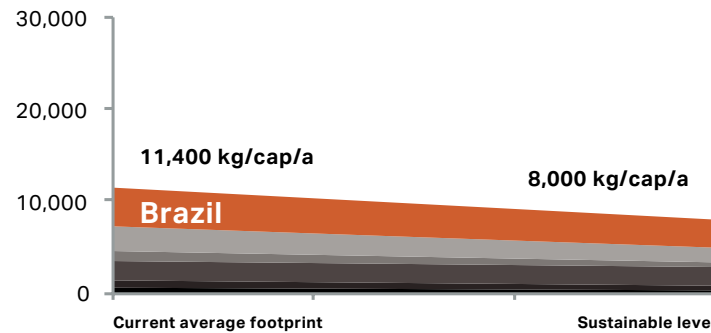
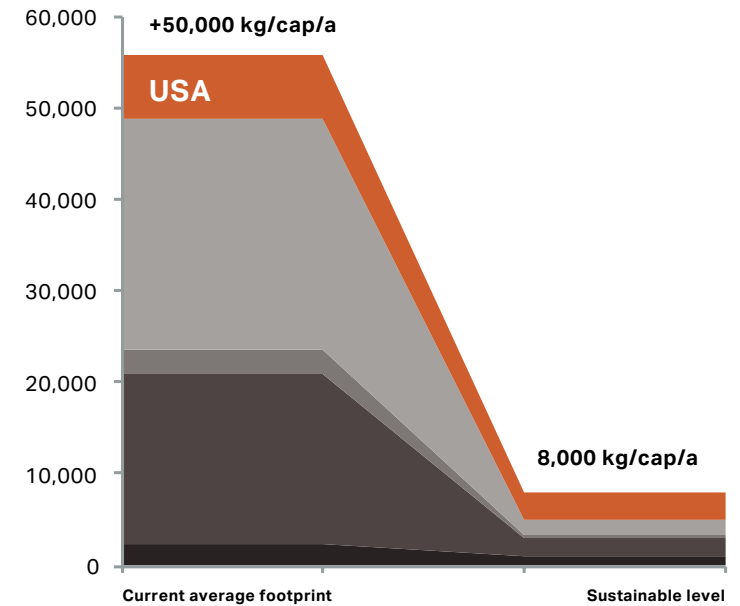
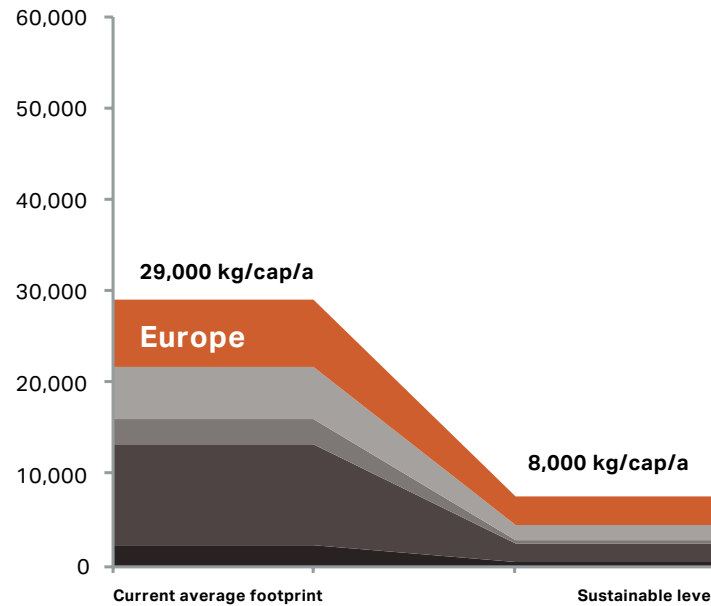
Food contributes 25% to the European lifestyle material footprint, but there is real potential for reduction

What is a lifestyle material footprint?

A lifestyle material footprint shows the material intensity of resources that go into the products we consume as part of our lifestyles. All numbers refer to calculated kilogrammes of materials used per person per year.

How are they calculated?

You can find out further details on the calculation of the lifestyle material footprint in our [explanatory document](#). The data we use here for Europe comes from the EU's Spread2050 Project, while the Brazil and India data has been drawn from CSCP and D-Mat analysis following research performed for WBCSD in 2015, The US footprint is an estimate based on CSCP and D-mat internal data on material intensities for Europe, combined with recent US official household consumption data publicly available online.



● Food & nutrition ● The home ● Household goods ● Mobility ● Leisure

Meat, overeating and waste are inflating food footprints

MEAT

36% of Europe’s average food footprint comes from meat, fish and eggs.

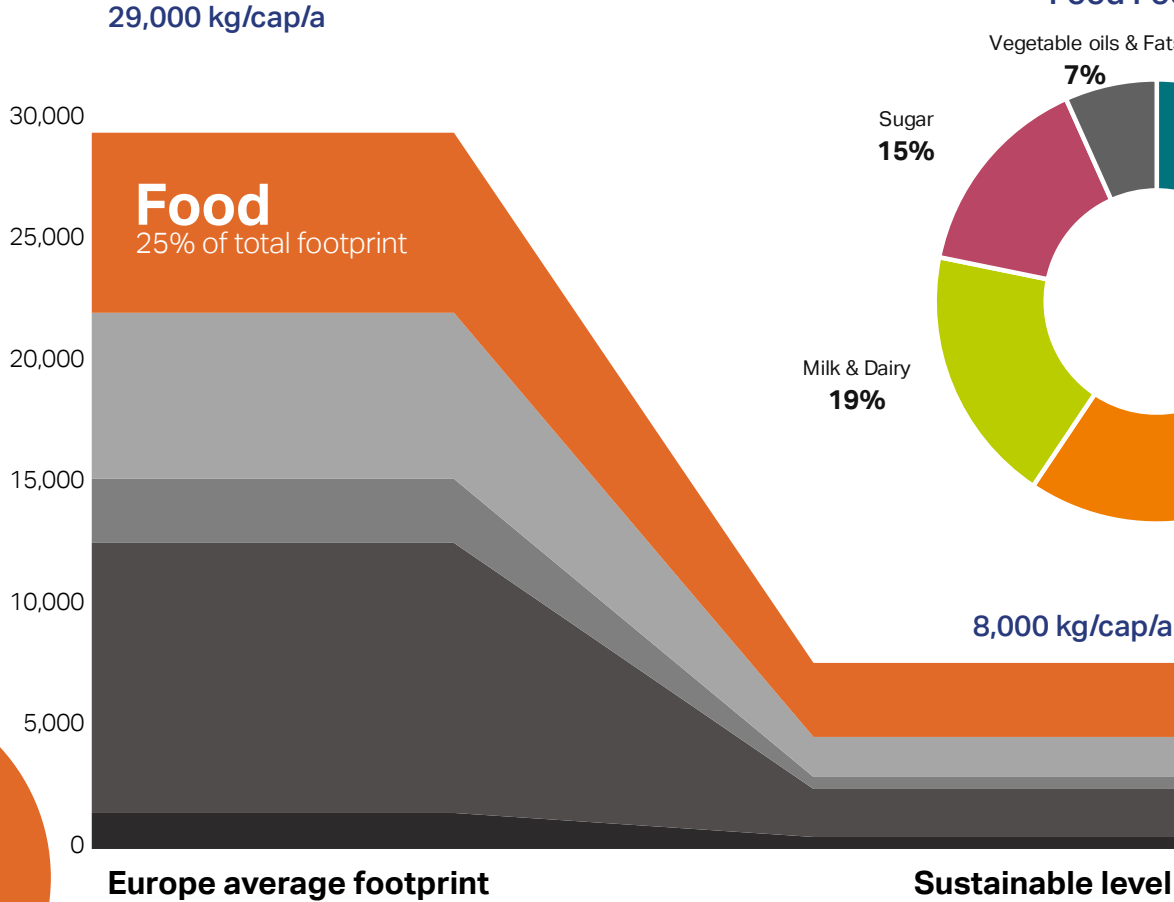
OVEREATING

More than 53% of Europe’s population is estimated to be overweight.

WASTE

The average European wastes about 125kg of food every year, of which 97kg is considered to be edible.¹

The challenge:
Reaching an environmentally sustainable level will require a **59% reduction** in the average European food footprint.



- Food & nutrition
- The home
- Household goods
- Mobility
- Leisure

What does a Europe that eats sustainably look like?

Living more sustainably will require dramatic reductions in impacts, but what can we achieve today? How far do current technologies take us? What business models, policies and behaviors will be required? We have asked these questions to help us imagine what more sustainable diets will look like.

People eat less meat and dairy products. We buy our food from far more local sources. We use modern technology and appliances to help us reduce the energy required for cooking and the amount of food that goes to waste at home. We start to produce our own vegetables indoors or at urban farms.



Solution pathways

delivering more sustainable food are already available today

Food solutions

1 Healthier diets

2 Reduction of food waste

3 Urban farming, regional sourcing

1 Healthier diets



The hotspot Animal-based protein

According to the WHO and the FAO, humans need around 50g of protein a day.²

However, a 2016 report by the World Resources Institute, based on 2009 data, showed people in the European Union consume 85g a day, of which 50g is animal-based and 35g plant-based.³ Reducing that average animal-based protein intake (from meat and dairy) by 70% could reduce the average food footprint by 37%, and the total average lifestyle material footprint by 9%.



Trend More organic, less time, less meat

Organic: People are increasingly interested and concerned about how and where their food is produced. The organic category in Europe grew 7.4% in 2014. Market share for organic food in Europe varies between 2% and 8% with Denmark, Switzerland, Austria and Sweden amongst the leaders (organic consumption in Sweden went up a massive 40% in 2014 and 2015).¹⁰ Total retail sales of organic products are highest in Germany and France, with increases of 10-11% in 2015. There is still considerable room for market growth (if not land availability for actual growth). The total market share of organic foods is only around 1% of global agriculture production.⁴

Health-related apps and personalization: The number of health-related apps for Apple iOS devices alone has more than doubled in two years to over 165,000.¹³ Apps can perform tasks such as mapping individual health profiles and creating personalized shopping lists.¹⁴

Ready to eat: The demand for processed or pre-cooked meals is growing as people have less time to buy and cook food.⁴

Meatless Meat: The meat alternatives – or meatless meat – market is growing. Sales of plant-based meat alternatives reached \$553 million in 2012 in the US – a growth spurt of 8 percent from 2010.¹⁵



The innovation frontier Personalization

Personalization: Following the health trend, the next innovation frontier may well be more **personalized food** – based on genomes with services and products identifying the exact nutritional needs of each individual.¹⁴

Other areas of innovation will be:

- Medical food – a merged offering between supermarket and pharmacy.¹⁴
- Technology that combines health and sustainability information into individual service guides.
- New food products based on alternative sources such as insect protein and algae.

1 Healthier diets

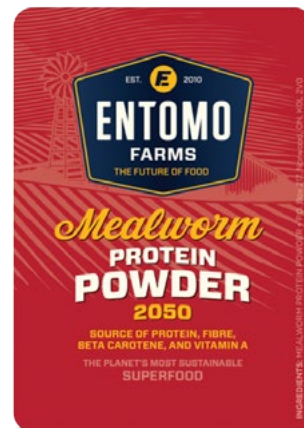
Examples of existing solutions

Tech products

What you measure, you can manage: apps such as GreenApes⁶ or the Food Navi app from GOE mbh⁷ can help people pursue healthier and more sustainable diets.

Food products

Foods based on plant-based protein such as soya & wheat are growing in popularity all the time.^{8,9} Alternative sources are also on the rise: the Canadian company Entomo Farms sells flour made from roasted grasshoppers and mealworms, as well as protein powders, whole roasted and baked crickets.



Source: Entomo Farms

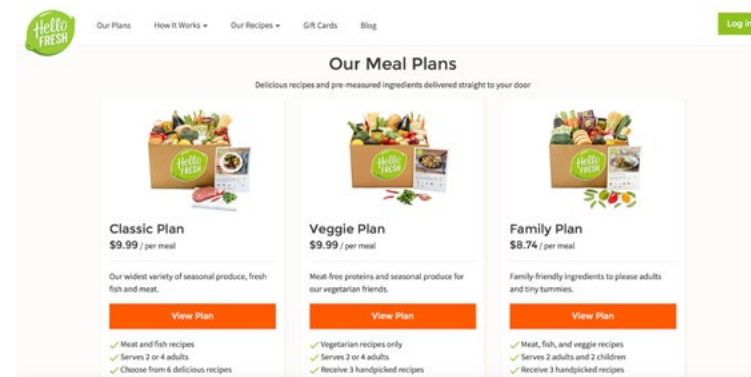
Services

eCommerce makes it much easier for people to get fresh products and meal kits on demand, through sites like HelloFresh and Gusto.¹⁰

Government policy

In Belgium, manufacturers and retailers have signed a voluntary convention with the health minister to cut the nation's calorie intake by 5%.¹¹

In China, new dietary guidelines drawn up by the health ministry in June 2016 aim to reduce meat consumption by 50% through recommended diets.¹²



Source: HelloFresh

2 Reduction of food waste



The hotspot Avoidable edible waste

An average European consumer wastes 125kg of food a year, of which 97 kg is avoidable as it is considered edible food.

Halving this amount of avoidable food waste across fruits, vegetables, cereals and milk could reduce the average food footprint by 3.1% and average lifestyle material footprint by 0.62%. The impacts would be greater if the reduction focussed on products that are more resource intensive, particularly cheese and meat.



Trend One-person households and waste legislation

Most waste comes from the home

Nearly a third of all food is lost or wasted globally, costing \$940 billion a year.²² In the EU, about 20% of total food produced is wasted with households responsible for 53% of this wastage.⁴

One-person households

The rising number of one-person households drives food waste, because food is often only available, or is cheaper if purchased, in larger quantities, leading people to buy too much.⁴

Food-waste legislation

In view of the Sustainable Development Goals (SDGs) and the need to supply a growing population with food, countries are becoming far more focussed on the need to reduce food waste. Some countries, including France and Italy, have already passed stringent legislation on food waste.²¹



The innovation frontier Technology to reduce waste

The innovation frontier for food waste is all about how technology can drive better visibility, recovery and use of food that would otherwise be wasted:

- Thanks to technology that enables better monitoring, we're seeing the creation of new products from would-be waste that accrues within the food-processing industry.
- Innovation is optimizing stock-keeping, particularly for retailers.
- M2M (Machine to Machine) technology – the 'Internet of Things' – is helping to identify expiring products before they can't be sold.
- New business models are exploring the value and economic potential of food waste.
- We need more sustainable food offerings for single households.

2 Reduction of food waste



Examples of existing solutions

Smart products

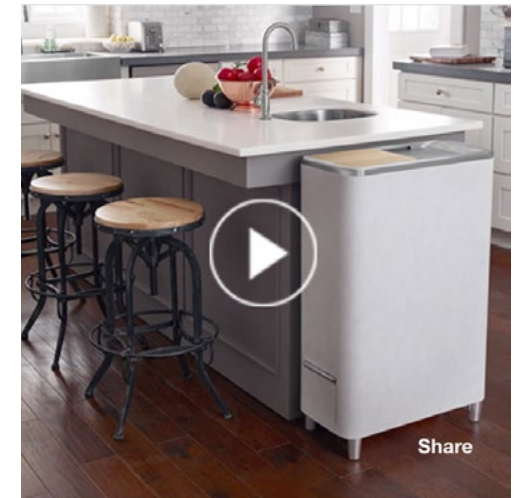
- Smart fridges can monitor food spoilage, and have the potential to reduce food waste by up to 30%.
- Bar-code scanners in the fridge can synchronize stock and sell-by dates with a shopping app on your phone and even suggest recipes.¹⁷
- Research into food waste apps such as experimental "Pantry", suggest that domestic food waste could be reduced by up to 34%.¹⁸
- Enzymes exist that can extend the shelf life of baking products, reducing waste.
- Eversa enables conversion of waste cooking oil into biodiesel. Zera converts domestic waste into Fertilizer.

Business models

WeFood is Copenhagen's first food-waste supermarket. It's run by charity Folkekirkens Nødhjælp in collaboration with Denmark's largest supermarket chains, food importers and other key organisations in the value chain.¹⁶

Government policies

In France and Italy there are now laws to prevent supermarkets throwing away food – and incentives to reduce waste. In some cases these involve agreements with charities to donate food rather than throw it away.^{19,20}



Kitchen / January 5, 2017

Turn waste into wonderful

See how the Zera™ Food Recycler turns food waste into fertilizer.

https://www.youtube.com/watch?time_continue=63&v=1MpM8fq73G8

3 Urban farming, regional sourcing



The hotspot Transport related to food

The distance consumers travel to buy food, and the distance travelled by the food itself (food miles), both contribute to our food footprints. Regional sourcing and urban farming have the potential to reduce both.²³ In certain cases, however, rebound effects caused by local production have been identified. These include inefficient production due to restrictions of scale or energy demands, intensive land use, introduction of pesticides into urban environment, and demand for unseasonal foods.



Source: instagreen



Trend Urban farming and online shopping

Urban production

It is estimated there will be 9.5 billion people on the earth in 2050. With a minimum calorie intake of 6,280KJ (1500 kcal) per person per day, land used for agriculture will need to expand by 850 million hectares. This area is not available, so we need to consider alternative areas and ways of cultivation, including urban farming.²⁸

Interest in provenance

We're seeing a growing interest in locally and regionally sourced products, supported by the trend towards online buying (today every third consumer in Germany orders food or pet food online on a regular basis).¹⁴



The innovation frontier Urban growing infrastructure

Urban gardening innovation:

With the growing demand for fresh produce and the development of urban gardens, farms, aquaponic and aeroponic systems, we're likely to see a growing number of commercially and privately-managed urban gardens or farms. This will drive new and integrated city architecture, municipal incentives, risk management and regulations, and products and services providing the required infrastructure.

'Eat on demand' services will grow, with fast delivery of high-quality fresh food. This will require more local food centres, franchises and retail stores able to prepare meals. Sharing concepts may also play an important role, with urban gardens providing housing blocks in the city with fresh food.

Indoor farming infrastructure:

Indoor farming will become more accessible, with water and light automatically controlled, providing people with organically grown vegetables. This will require indoor farming infrastructure, which will ultimately become as common as the 'Billy' IKEA book shelf.

Alternative delivery and pick-up modes

will increase, enabled by technology, to cater for the growing importance of local and regional products.¹⁴

3 Urban farming, regional sourcing



Examples of existing solutions

Physical products

We're seeing more efficient and affordable equipment for urban agriculture, allowing people to grow food in the city in a simple and ecological way. These include growbeds with integrated irrigation systems, aquaponic systems and advances in LED lighting.²⁵

Tech products

These include online platforms and apps enabling regional and local sourcing such as Regiomino.²⁶

Consumer services

Food-on-demand services such as InstaGreen use aeroponic technology to grow vegetables at central locations, from which they're distributed to customers' local units where they continue growing until harvested fresh. Clients pay a monthly fee for the service.²⁴

City policies

Shrinking cities such as Dessau-Roßlau in Germany are putting up municipal land for free for urban gardening. This reduces the cost for the cities to manage the land, and also plays a part in making the city more attractive to newcomers.²⁷



Source: GrowUp Urban Farms

Solution pathways

Summary



1



Healthier living

Hotspot: Animal-based protein drives 36% of food footprint

Solutions: tech and services enabling a healthier, fresher diet

Trends: more organic, less meat – and all delivered quicker

Innovation frontier: personalization of food

2



Reduction of food waste

Hotspot: Of 125kg of food wasted, 97kg is avoidable

Solutions: Smart fridges and food-waste supermarkets

Trend: one-person households and waste legislation

Innovation frontier: tech to highlight and help reduce waste

3



Urban farming, regional sourcing

Hotspot: Emissions related to getting food from farm to plate

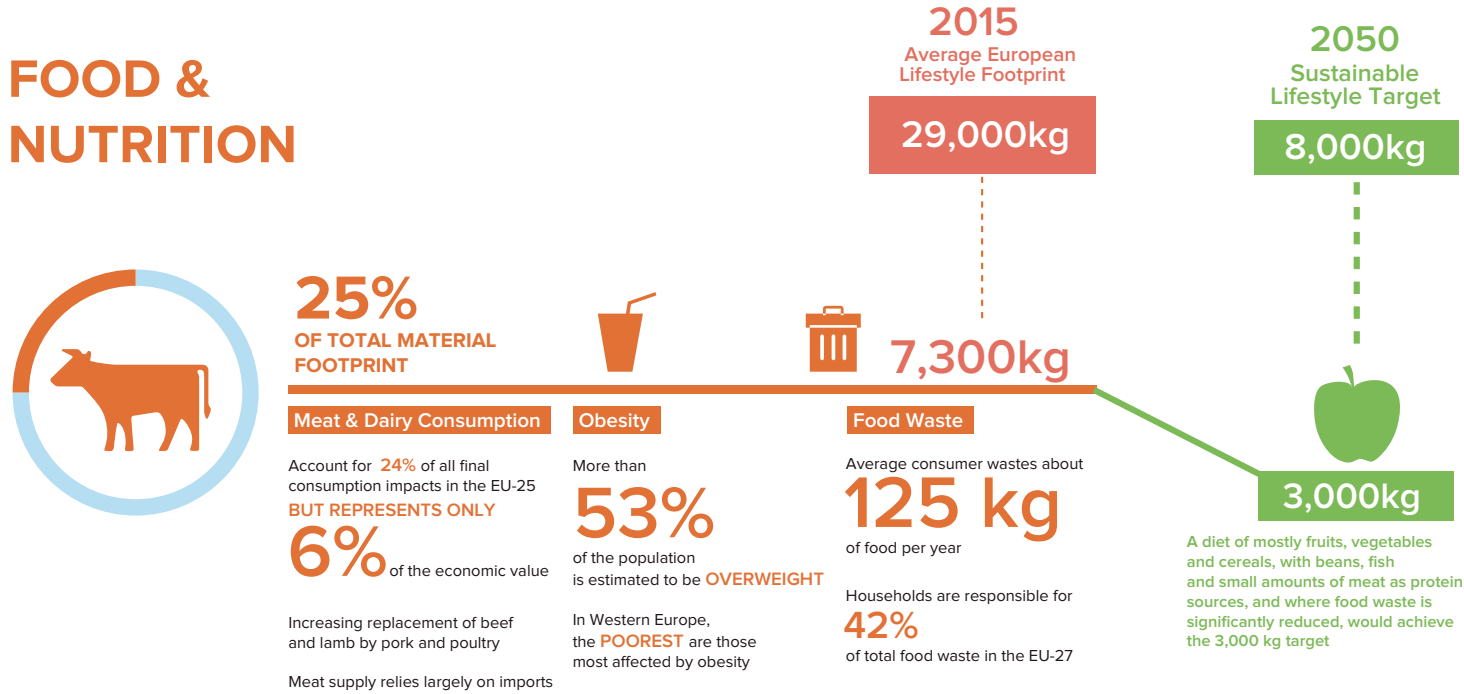
Solutions: Tech to grow and buy food with a lighter footprint

Trend: Urban farming and online buying

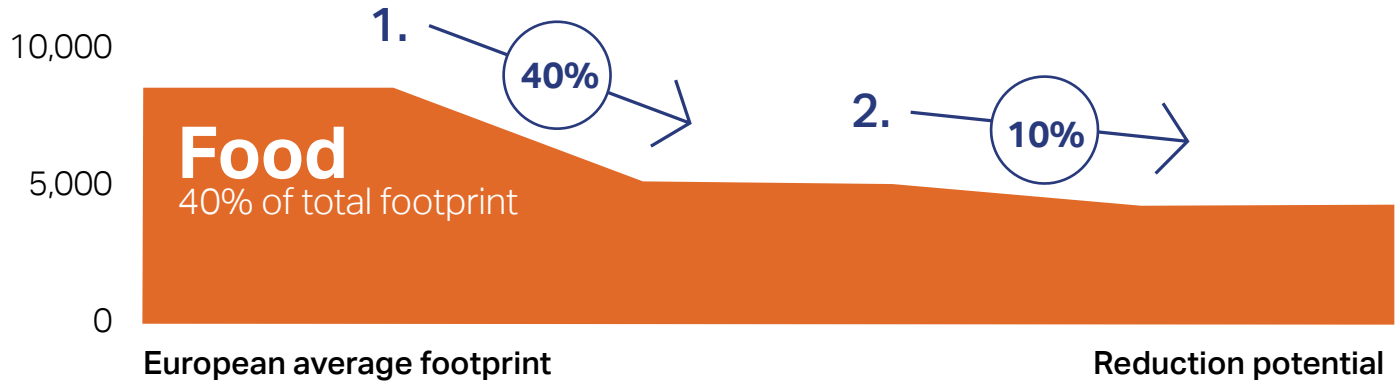
Innovation frontier: Urban growing infrastructure

Food Footprint and reduction potential

FOOD & NUTRITION



1. If we adopted production, diets and cooking habits in line with the three discussed pathways, we could reduce the average European food footprint by 40% - well on the way to the 59% needed
2. Fully cutting meat from a diet alongside the other three action pathways described would increase the footprint savings by a further 10% to 50%, getting very close to the 59% reduction required to achieve the environmentally sustainable level for food.



Other benefits (sweetspots) provide even more incentives for enjoying more sustainable food

A healthier diet means improved health and reduced food miles

As well as resulting in higher environmental impacts, high meat consumption has negative health impacts such as an increased risk of cancer, diabetes and heart disease. Globally, close to a million premature deaths a year are attributable to high processed-meat consumption, and tens of thousands more premature deaths are related to the overconsumption of red meat.⁴

Eating fresh and local will also have an impact on our mobility footprint. In 2005 for example, the import of fruits, nuts and vegetables into California by airplane released more than 70,000 tons of CO₂, equivalent to more than 12,000 cars on the road.⁵

Less waste, more money in our pockets

Food waste reduction also leads to reduced costs. In addition, when food is sold close to expiry date or after already becoming 'waste' – as per the recent food-waste supermarket trend – food can be bought at a 30-50% reduced cost.¹⁶

Businesses also benefit – specifically those who find ways to develop new products from the waste generated by the food processing industry (e.g. bio-fertilizer made from food waste).

Urban farming stimulates closer communities and better physical and mental health

Urban food-growing projects stimulate social cohesion, an interest in food and physical exercise in green spaces.^{24, 4} For older adults, and people suffering from mental illness who live in inner-city neighbourhoods, this is particularly beneficial. It promotes social ties and a sense of community, both important for health and well-being. Social isolation has been significantly associated with increased mortality.⁴

There are economic benefits too, in particular for businesses who can find new ways to generate profit from new (and old) business models such as delivering food directly from farm to consumer.



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**World Business Council
for Sustainable Development**

Maison de la Paix
Chemin Eugène-Rigot 2B
CP 2075, 1211 Geneva 1
Switzerland