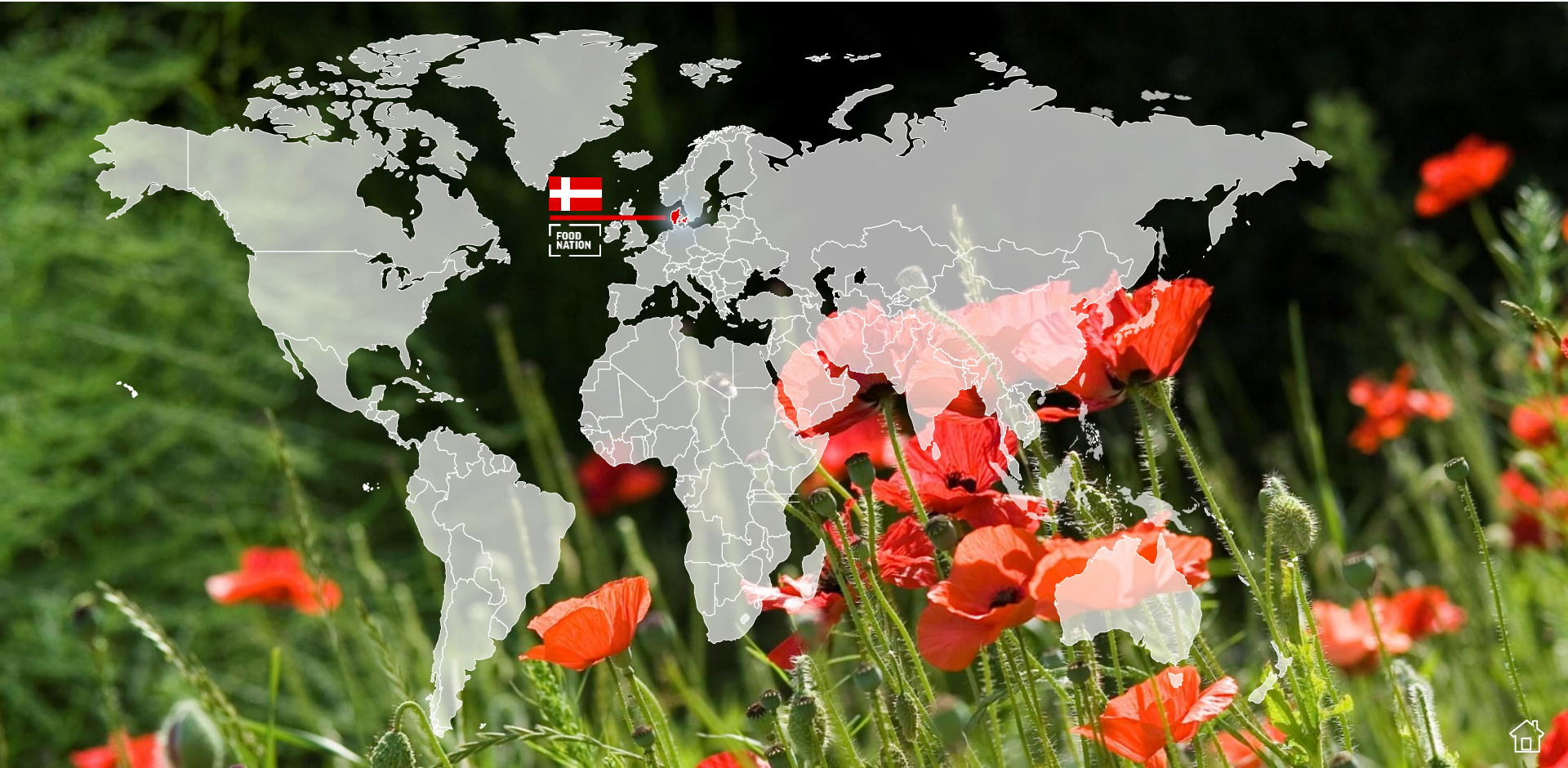
FOOD NATION

Solutions of tomorrow
By Denmark

Denmark is a small country with a long track record as a food nation



Cooperative food companies were born in Denmark during the 1870's

Historical highlights

1882

The **cooperative movement** was born in Denmark

1898

Denmark was the **first country** making **pasteurising mandatory** for dairy production

1971

First **Ministry** of **Environment** in the world was **established in Denmark**

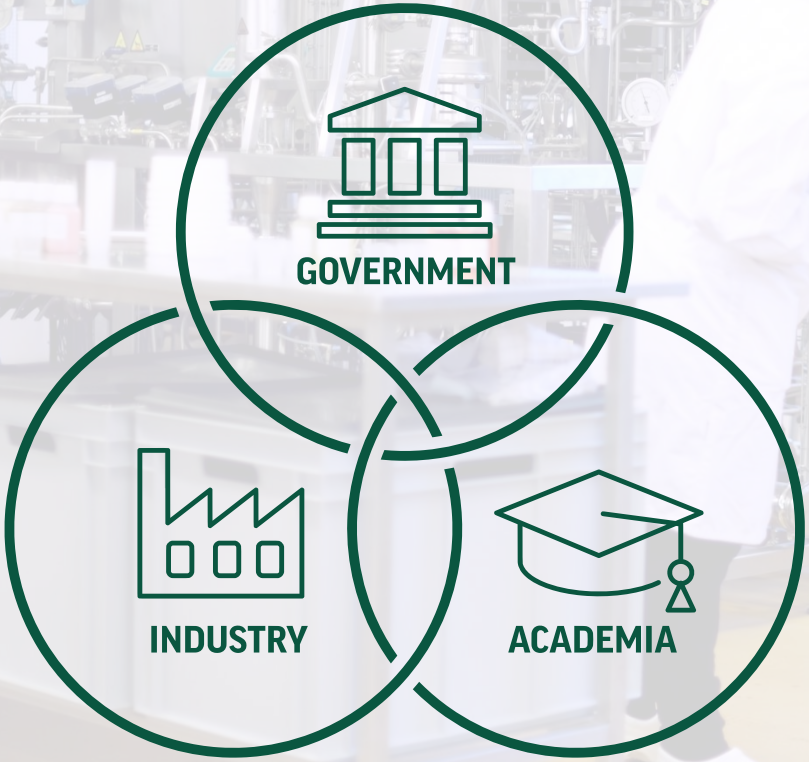
1987

The **first country** to implement state-controlled **organic label**: The red “Ø”

2010

Danish restaurant, Noma, wins **best restaurant in the world** for the first time

And today we stand stronger by breaking boundaries and building bridges



The DNA of the Danish food cluster makes it much more than the sum of the parts

The agriculture and **food industry** has a **vital role** to play to realize several of the **17 Sustainable Development Goals**

Food production has a big impact on these three goals

Providing enough food to feed the growing world population is one of the biggest challenges of the 21st century

The 800 million
undernutritioned
today must be fed

By 2050 10 billion
people will cause a
booming food demand

Zero hunger will require
Food production during the next 40 years equals
production value from the last 8000 years

Global warming escalates
the challenge of floodings,
droughts, less farmland

We need to produce and consume responsible

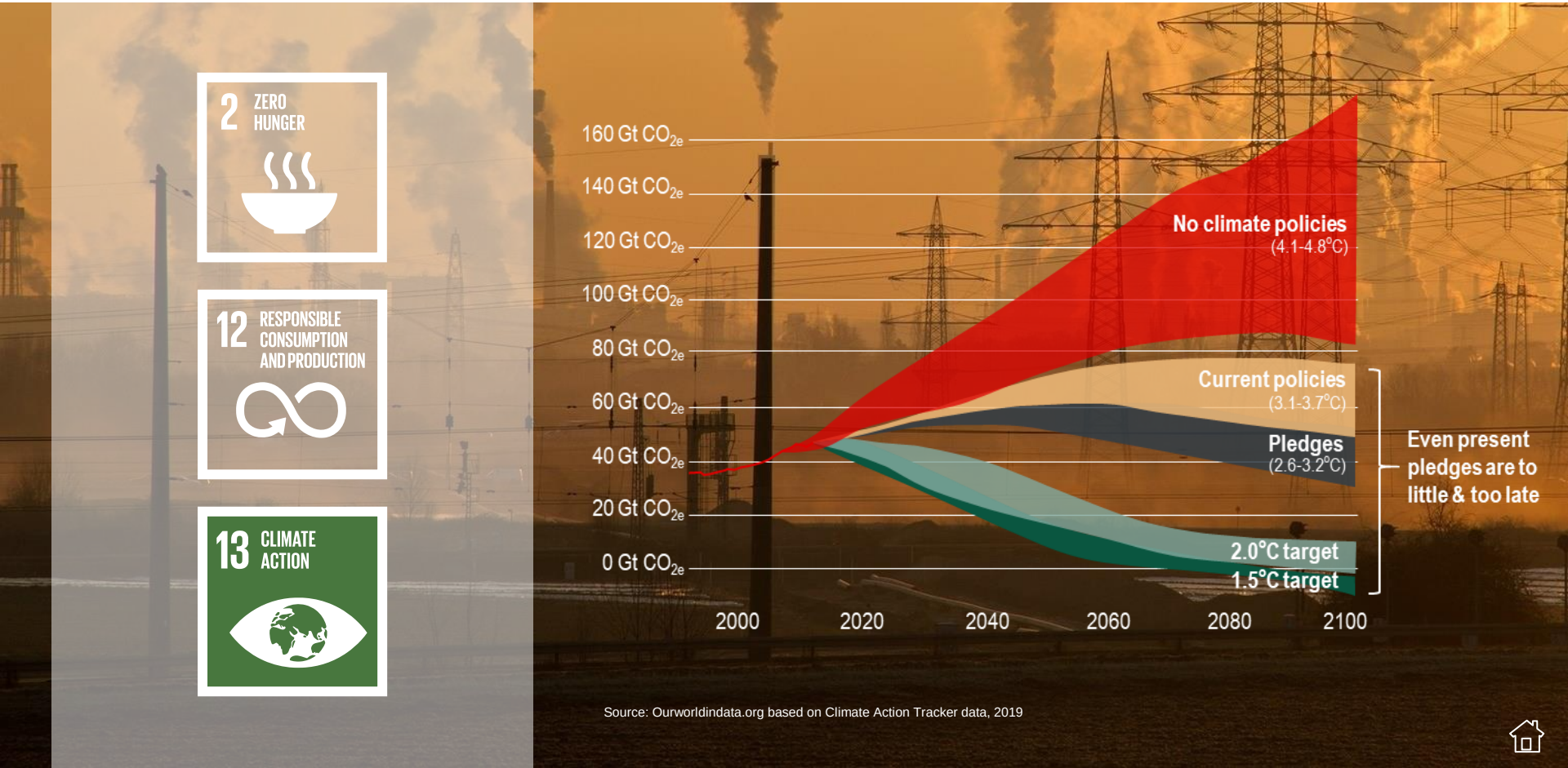
2.2 billion people
are obese today

A middle class of 5 billion
will be a reality by 2050

Responsible production
need to deal with pollution of soil, air and oceans and in sustainable ways

Responsible consumption
requires that we significantly lower present food loss and waste of 30-40%

Global warming is the biggest challenge of our century
in 2018 IPCC lowered the target from 2 to 1.5 degree if the catastrophe is to be avoided

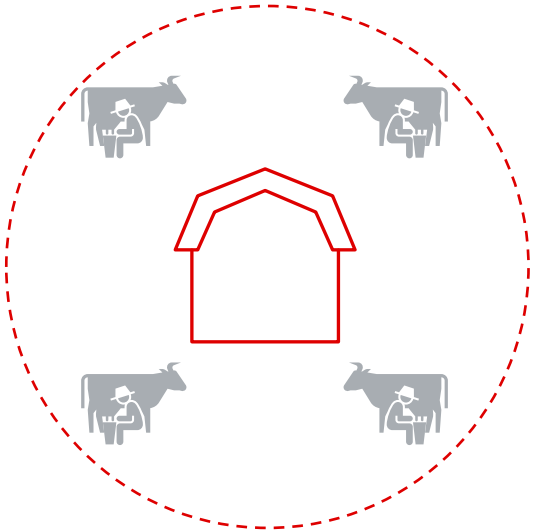


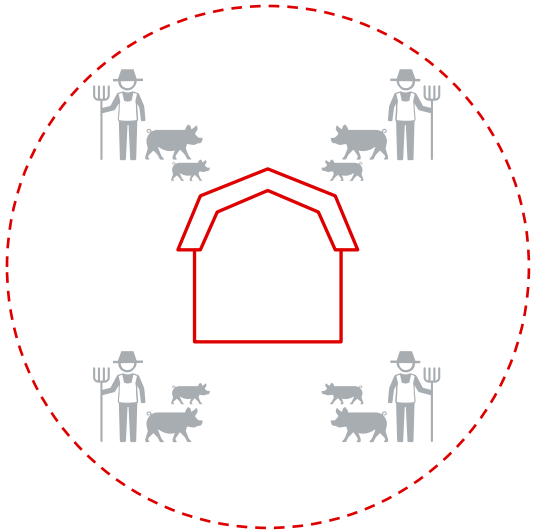
Source: Ourworldindata.org based on Climate Action Tracker data, 2019

Collaboration is the essence of Denmark's DNA within food and agriculture.

Denmark was one of the first countries with a **cooperative movement** for farmers.

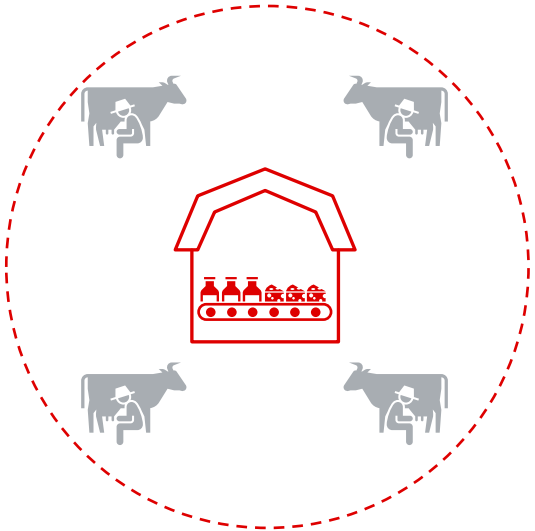
Up until the 1870s farmers had
very **limited coordination** & **cooperation**

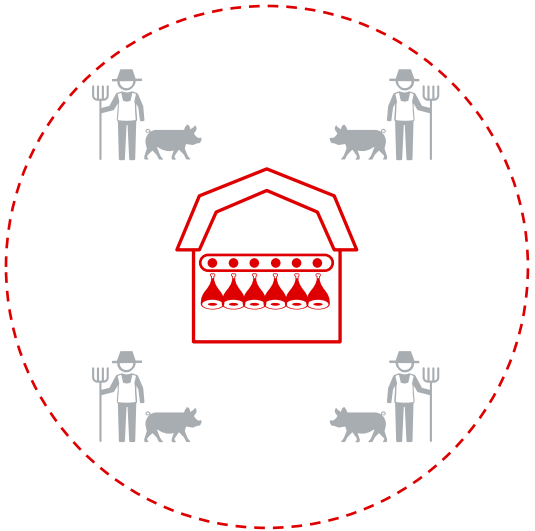




But then pioneering farmers **joined forces**
and established the **world's first cooperatives**

The cooperatives were **owned by the farmers** and turned into successful dairies, slaughter houses and farm supply





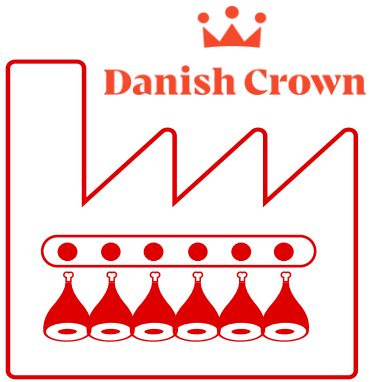
The cooperatives are still owned by the farmers

and they have turned into huge, successful companies

World's

#1 Organic dairy

#7 Overall dairy products



World's

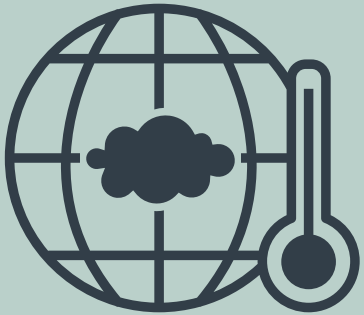
#1 Exporter of pork meat

#1 First bacon exporter

Europe's

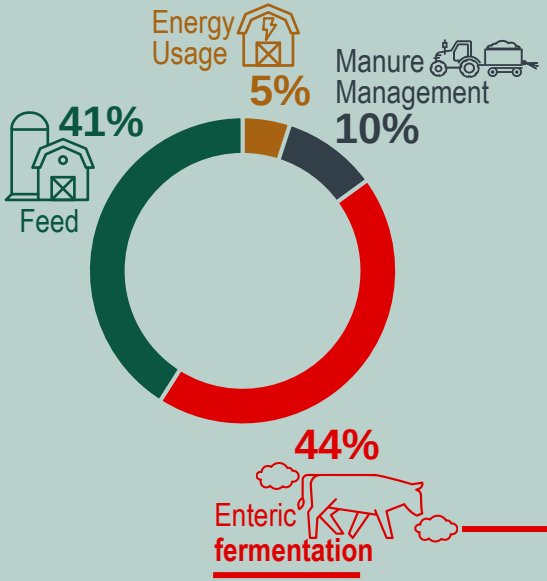
#1 Farm supply company

The Danish **stronghold** of increasingly **sustainable agriculture and food production** is addressing a huge **global challenge**

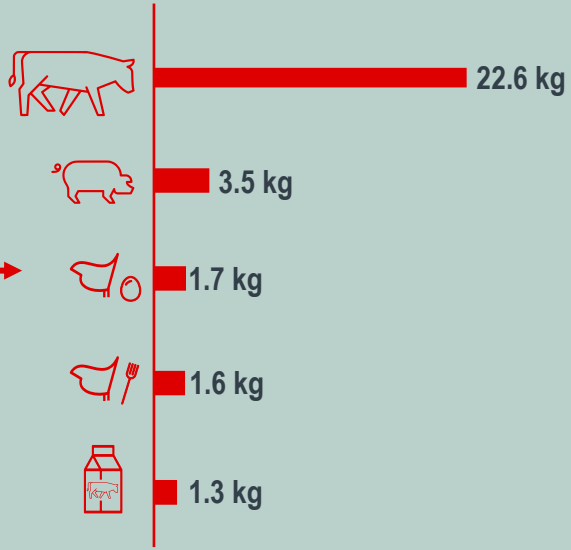


12%

Agriculture's share of global green house emissions



Sources of emissions



CO_2 kg emission per 100g of protein

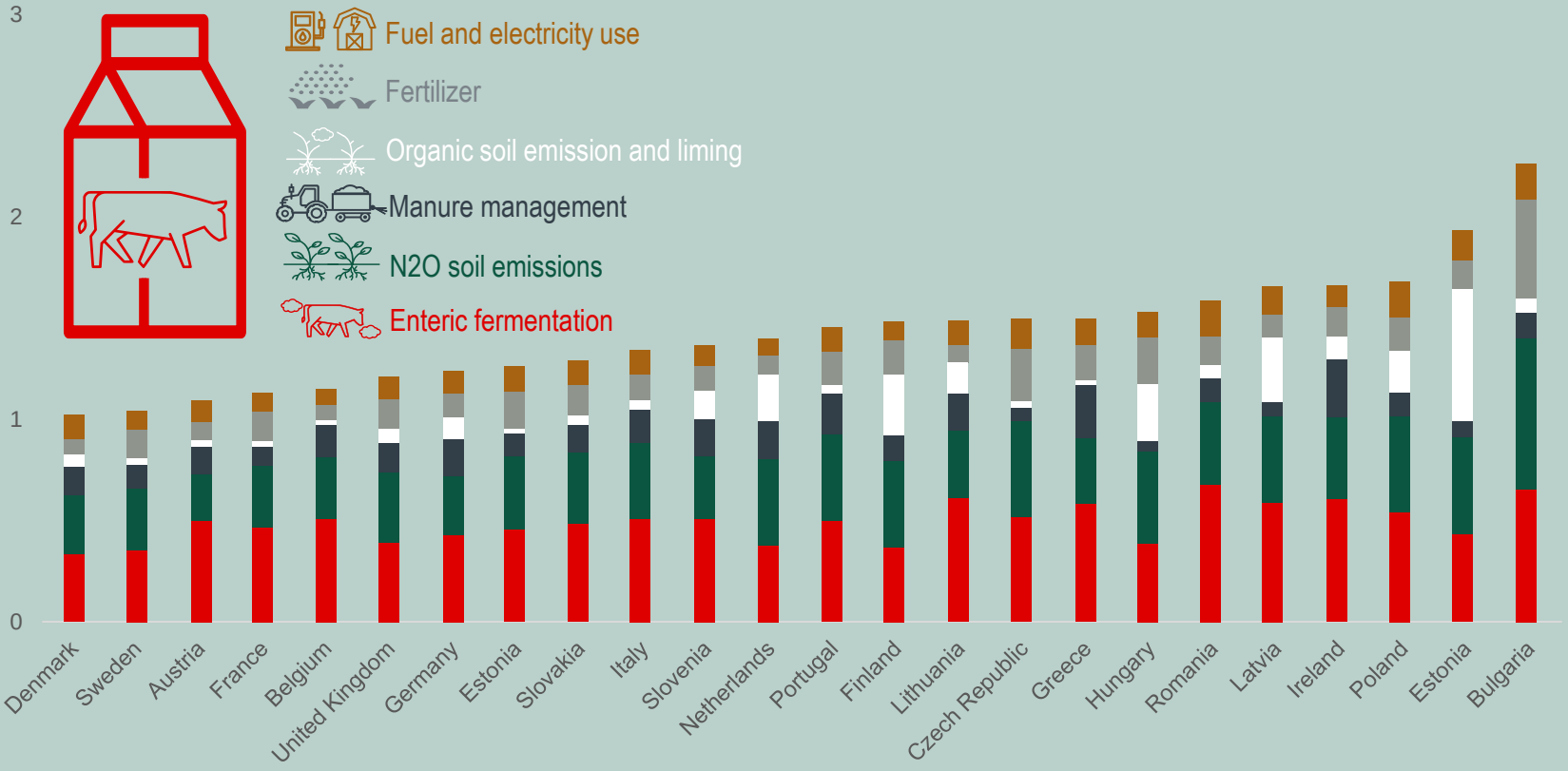
Source: Climate Analysis Indicator Tool, World Resource Institute, 2021

Source: UN's Food and Agriculture Organzation

Source: Lesschen, J.P., 2011

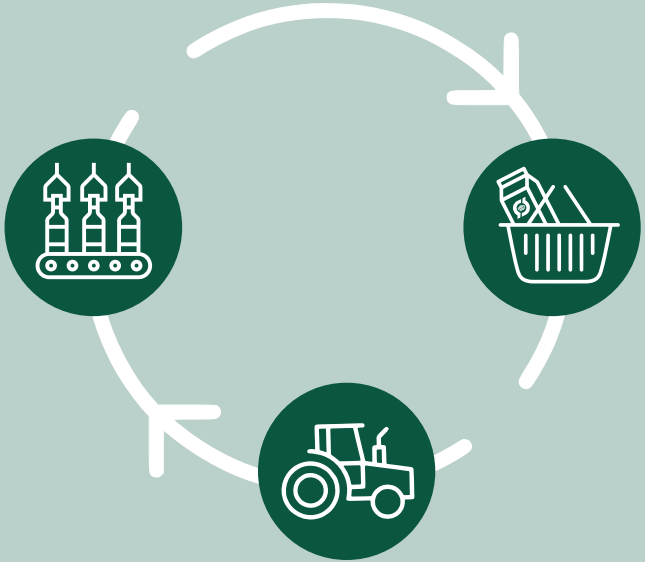
Many measures can reduce the emissions – Denmark is a leading example

Kg emission per kg milk



Source: Lesschen, J.P., 2011

The **food processing** industry must aim for **zero waste – utilizing side streams** becoming feed, energy, medicine and more.



70% of EU food waste occours from household, food service and retail

Primary producers focus on **increasing crop yield**, **feed** efficiency and **circular utilisation** of resources

To reach our ambitious goals everyone has to contribute

Farmers

Practical knowledge & development

Academia

Research & innovation

Industry

New products & increased effectiveness

Government

Dedicated resources & incentives

Consumers

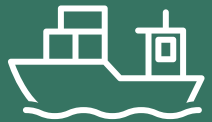
Awareness & sustainable consumption

Five examples of how the stakeholders of the food arena have already improved

Water

Milk carton

Shipping



Packing

Recycling

Water

Danish slaughterhouses reduced water consumption from 600 to 150 litres per pig

Initiator: DRIP public-private partnership to reduce ground water consumption

Milk carton

Shipping

Packing

Recycling

Milk carton

Arla Foods removed fossil-based plastic layer to biobased on milk carton

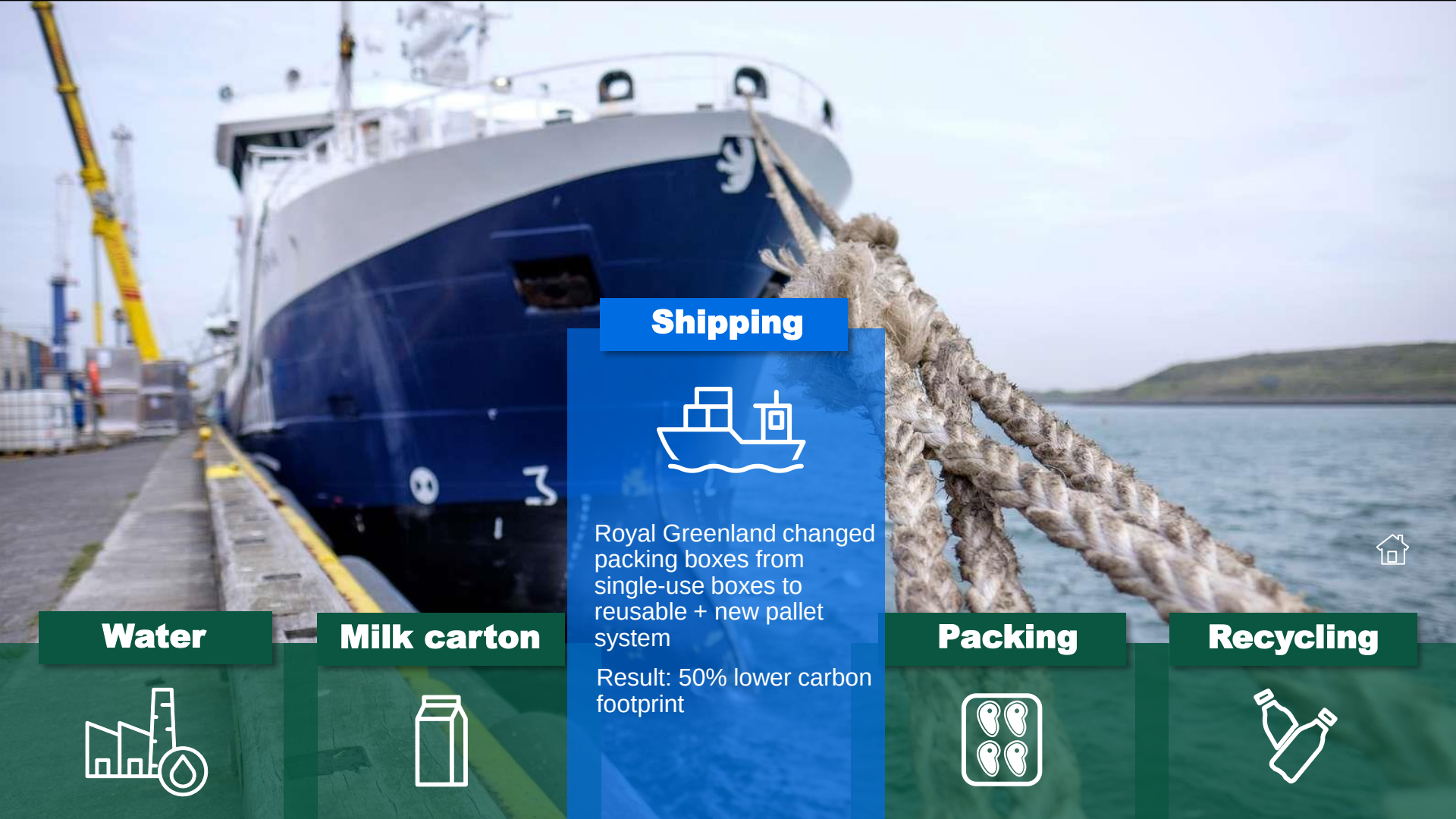
Result: 20% lower carbon footprint

Water

Shipping

Packing

Recycling



Shipping

Royal Greenland changed packing boxes from single-use boxes to reusable + new pallet system

Result: 50% lower carbon footprint

Water

Milk carton

Packing

Recycling

Water

Milk carton

Shipping

Packing

Danish Crown now uses recyclable trays for food packing – with more than 55 million trays each year

Result: 50% lower carbon footprint

Recycling

Recycling

Since 1922 Denmark has operated a deposit and return system.

Result: 90% of deposit-marked bottles and cans are returned and recycled

Water

Milk carton

Shipping

Packing

Through a continuing commitment to **make the best** of **limited resources**, **Danish innovative technology** is tackling the **challenges** that face the **global** food **supply.**

38% Of ice free land is already used for agriculture

Innovative technology is key to cope with challenges

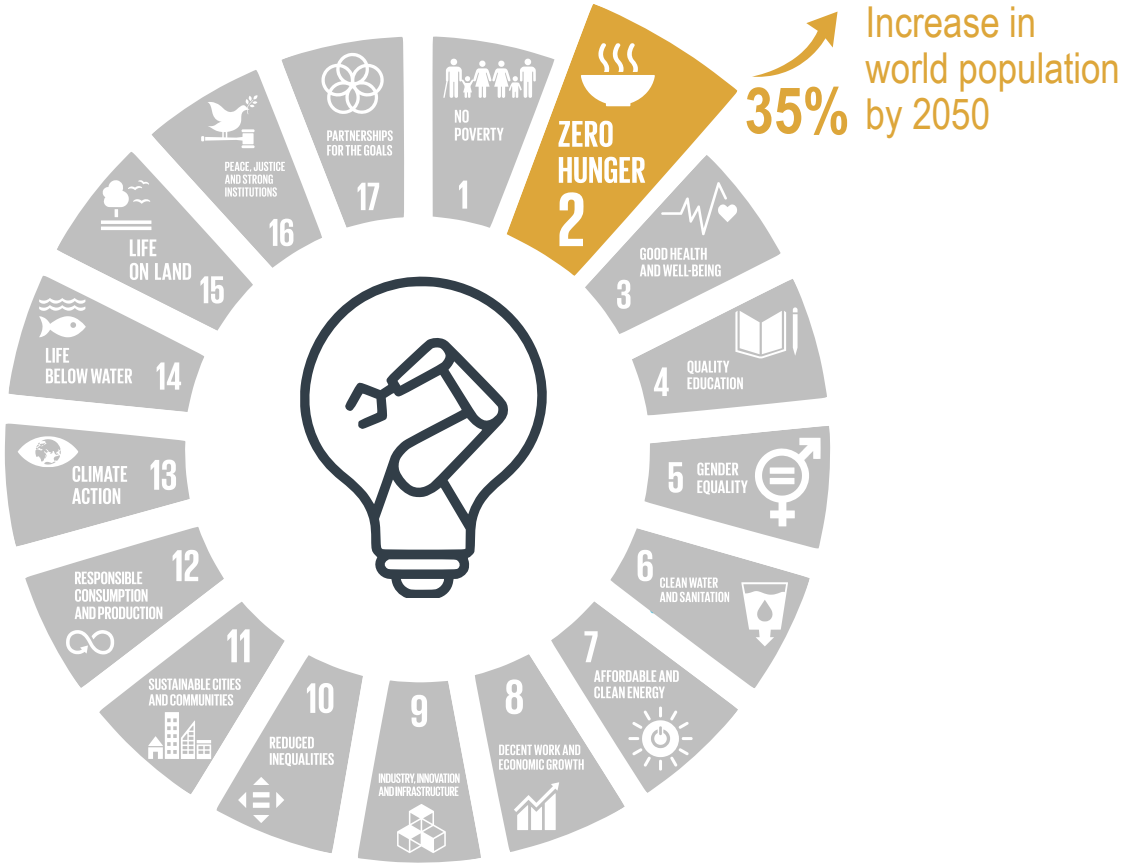
The **food** and **agriculture** industry is facing massive challenges such as:

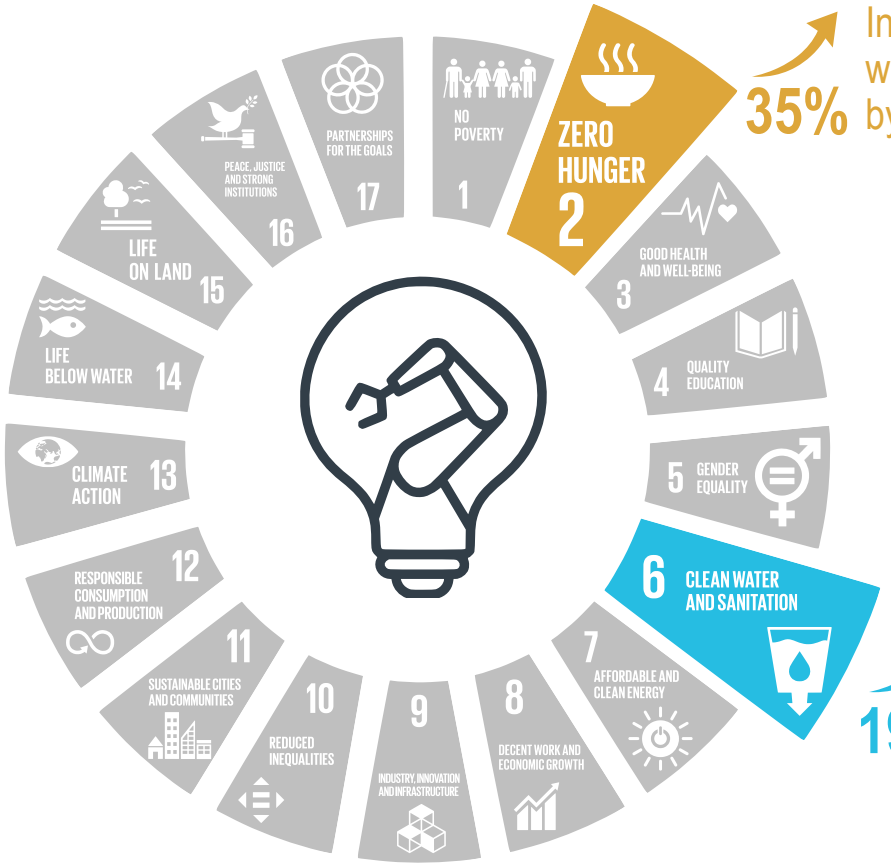
- **Minimizing** the **CO2-emissions**
- **Feeding** a growing global **population**
- **Reduce energy** and **water** consumption and transform towards more **sustainable energy alternatives**

With **innovative technology** we will support a **green transition** and reduce global warming by:

- Produce **more** with **less**
- **Minimize** environmental **footprint**
- **Secure** food **safety** and **quality**

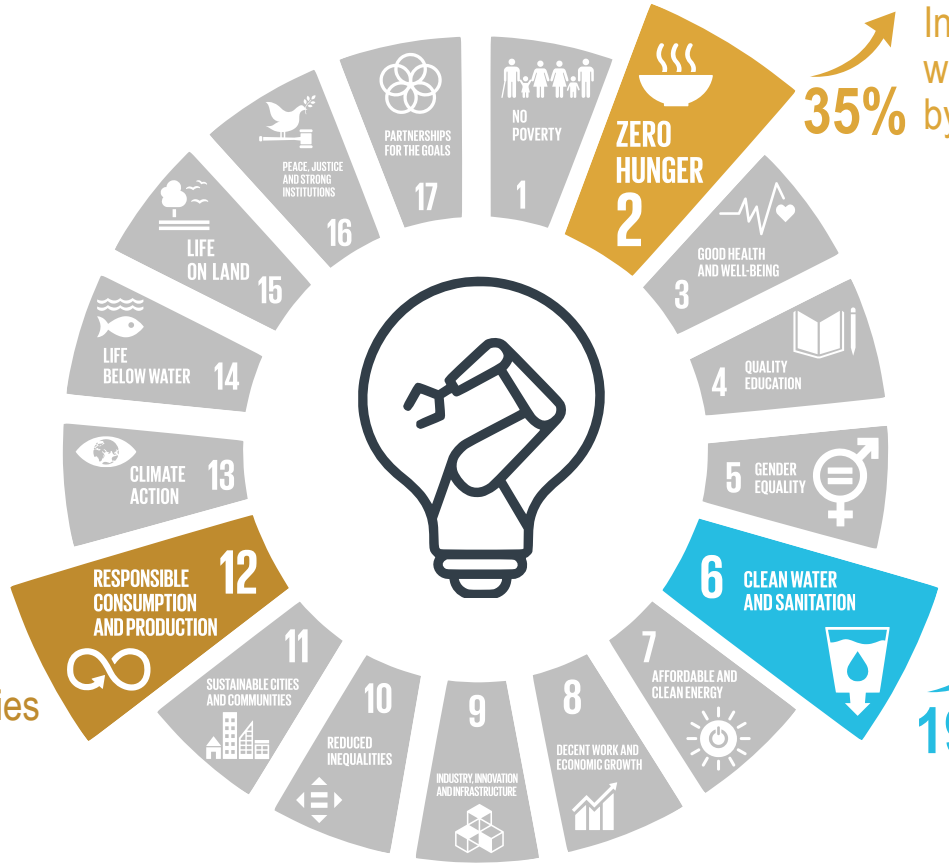

Some of the challenges within the 17 SDG's
that innovative technology needs to address
1 NO POVERTY
2 ZERO HUNGER
3 GOOD HEALTH AND WELL-BEING
4 QUALITY EDUCATION
5 GENDER EQUALITY
6 CLEAN WATER AND SANITATION
7 AFFORDABLE AND CLEAN ENERGY
8 DECENT WORK AND ECONOMIC GROWTH
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE
10 REDUCED INEQUALITIES
11 SUSTAINABLE CITIES AND COMMUNITIES
12 RESPONSIBLE CONSUMPTION AND PRODUCTION
13 CLIMATE ACTION
14 LIFE BELOW WATER
15 LIFE ON LAND
16 PEACE, JUSTICE AND STRONG INSTITUTIONS
17 PARTNERSHIPS FOR THE GOALS


ZERO HUNGER 2
35%
Increase in world population by 2050
NO POVERTY 1
GOOD HEALTH AND WELL-BEING 3
QUALITY EDUCATION 4
GENDER EQUALITY 5
CLEAN WATER AND SANITATION 6
AFFORDABLE AND CLEAN ENERGY 7
DECENT WORK AND ECONOMIC GROWTH 8
INDUSTRY, INNOVATION AND INFRASTRUCTURE 9
REDUCED INEQUALITIES 10
SUSTAINABLE CITIES AND COMMUNITIES 11
RESPONSIBLE CONSUMPTION AND PRODUCTION 12
CLIMATE ACTION 13
LIFE BELOW WATER 14
LIFE ON LAND 15
PEACE, JUSTICE AND STRONG INSTITUTIONS 16
PARTNERSHIPS FOR THE GOALS 17



35% Increase in world population by 2050

19% Increase in global agricultural water consumption by 2050



35% Increase in world population by 2050

19% Increase in global agricultural water consumption by 2050

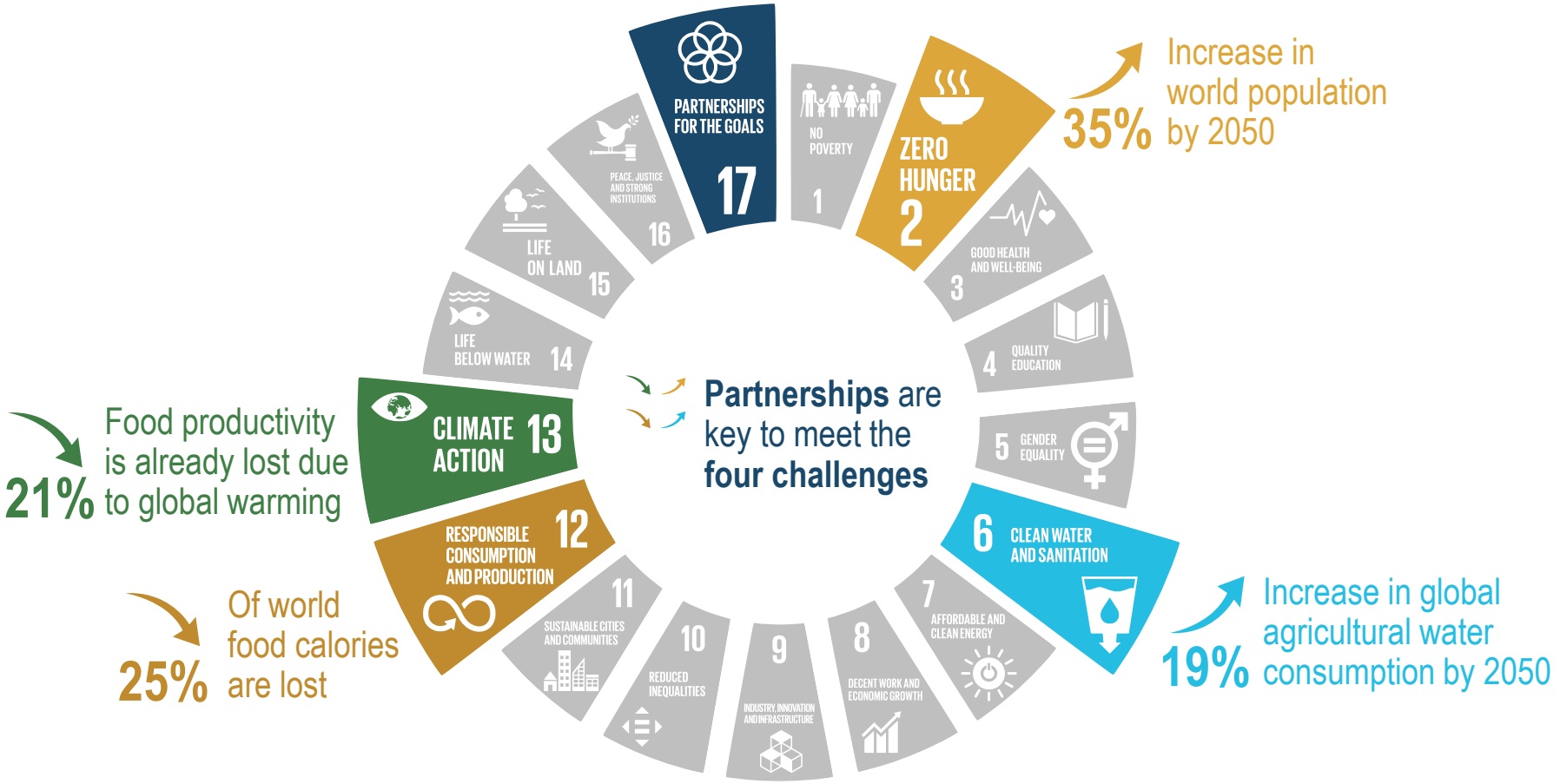
25% Of world food calories are lost

35% Increase in world population by 2050

21% Food productivity is already lost due to global warming

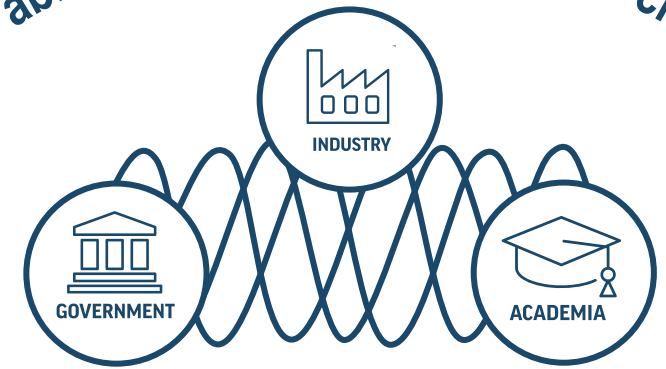
25% Of world food calories are lost

19% Increase in global agricultural water consumption by 2050


PARTNERSHIPS FOR THE GOALS 17
NO POVERTY 1
ZERO HUNGER 2
GOOD HEALTH AND WELL-BEING 3
QUALITY EDUCATION 4
GENDER EQUALITY 5
CLEAN WATER AND SANITATION 6
AFFORDABLE AND CLEAN ENERGY 7
DECENT WORK AND ECONOMIC GROWTH 8
INDUSTRY, INNOVATION AND INFRASTRUCTURE 9
REDUCED INEQUALITIES 10
SUSTAINABLE CITIES AND COMMUNITIES 11
RESPONSIBLE CONSUMPTION AND PRODUCTION 12
CLIMATE ACTION 13
LIFE BELOW WATER 14
LIFE ON LAND 15
PEACE, JUSTICE AND STRONG INSTITUTIONS 16
Partnerships are key to meet the four challenges
35% Increase in world population by 2050
19% Increase in global agricultural water consumption by 2050
25% Of world food calories are lost
21% Food productivity is already lost due to global warming

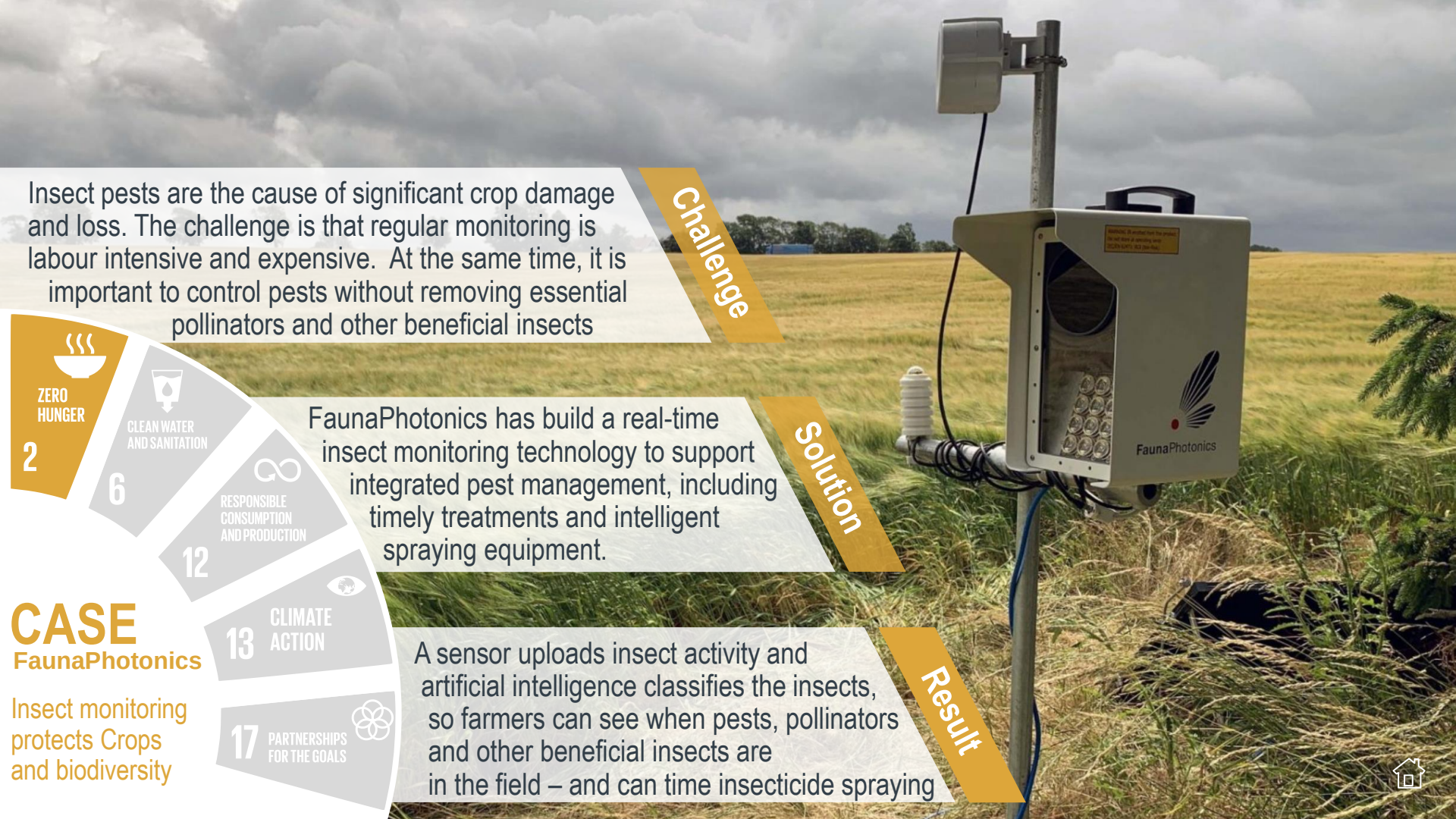
2 6 12 13 17

Denmark's ability to contribute solving the challenge is



rooted in the cooperative movement and
the Danish collaborative model

Let's explore **cases** of how **innovative technology** will **benefit** the **SDG's**



ZERO HUNGER 2

CLEAN WATER AND SANITATION 6

RESPONSIBLE CONSUMPTION AND PRODUCTION 12

CLIMATE ACTION 13

PARTNERSHIPS FOR THE GOALS 17

CASE
FaunaPhotonics

Insect monitoring protects Crops and biodiversity

Challenge

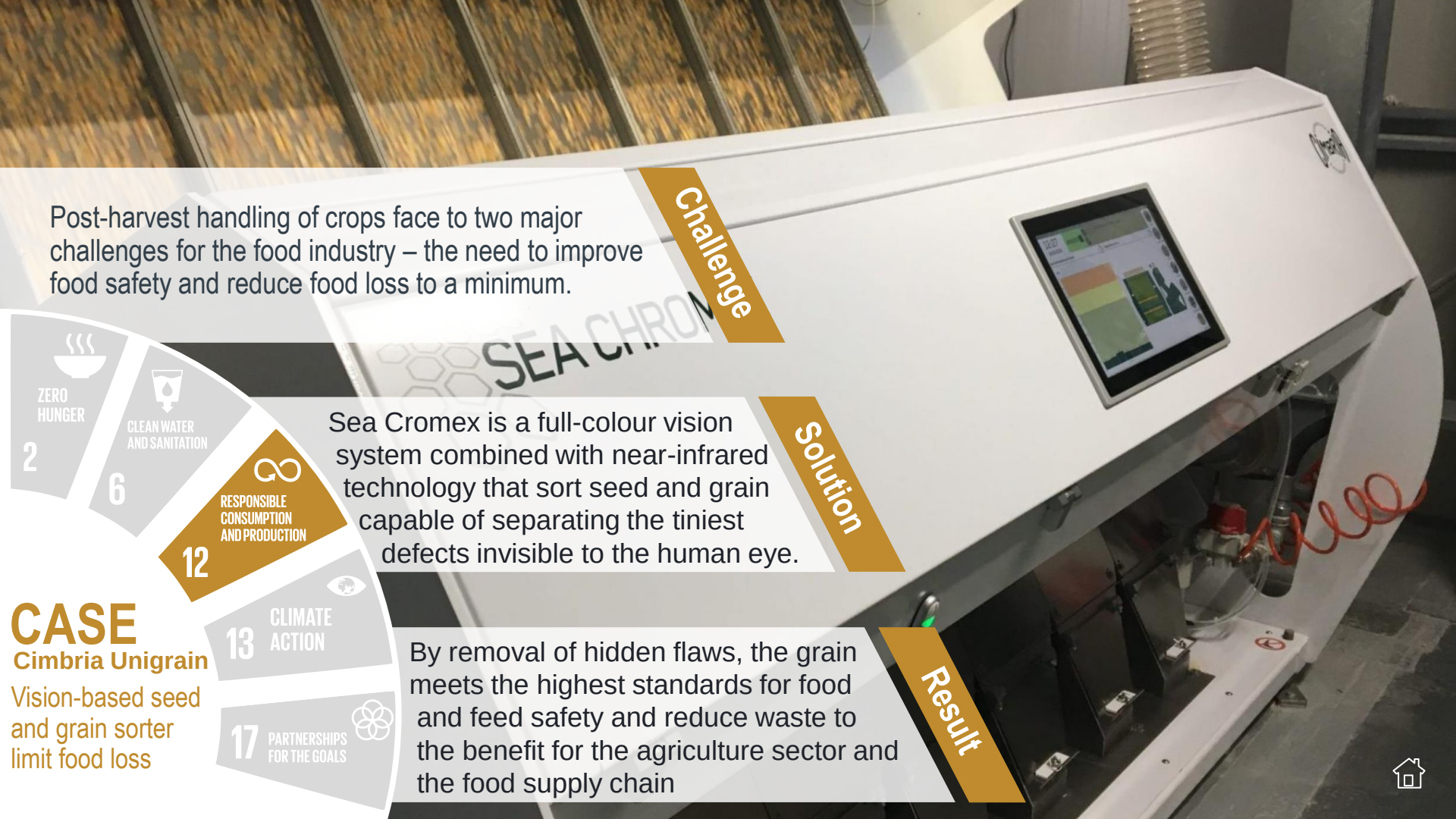
Insect pests are the cause of significant crop damage and loss. The challenge is that regular monitoring is labour intensive and expensive. At the same time, it is important to control pests without removing essential pollinators and other beneficial insects

Solution

FaunaPhotonics has build a real-time insect monitoring technology to support integrated pest management, including timely treatments and intelligent spraying equipment.

Result

A sensor uploads insect activity and artificial intelligence classifies the insects, so farmers can see when pests, pollinators and other beneficial insects are in the field – and can time insecticide spraying



Challenge

Post-harvest handling of crops face to two major challenges for the food industry – the need to improve food safety and reduce food loss to a minimum.

Solution

Sea Cromex is a full-colour vision system combined with near-infrared technology that sort seed and grain capable of separating the tiniest defects invisible to the human eye.

Result

By removal of hidden flaws, the grain meets the highest standards for food and feed safety and reduce waste to the benefit for the agriculture sector and the food supply chain

2 ZERO HUNGER

6 CLEAN WATER AND SANITATION

12 RESPONSIBLE CONSUMPTION AND PRODUCTION

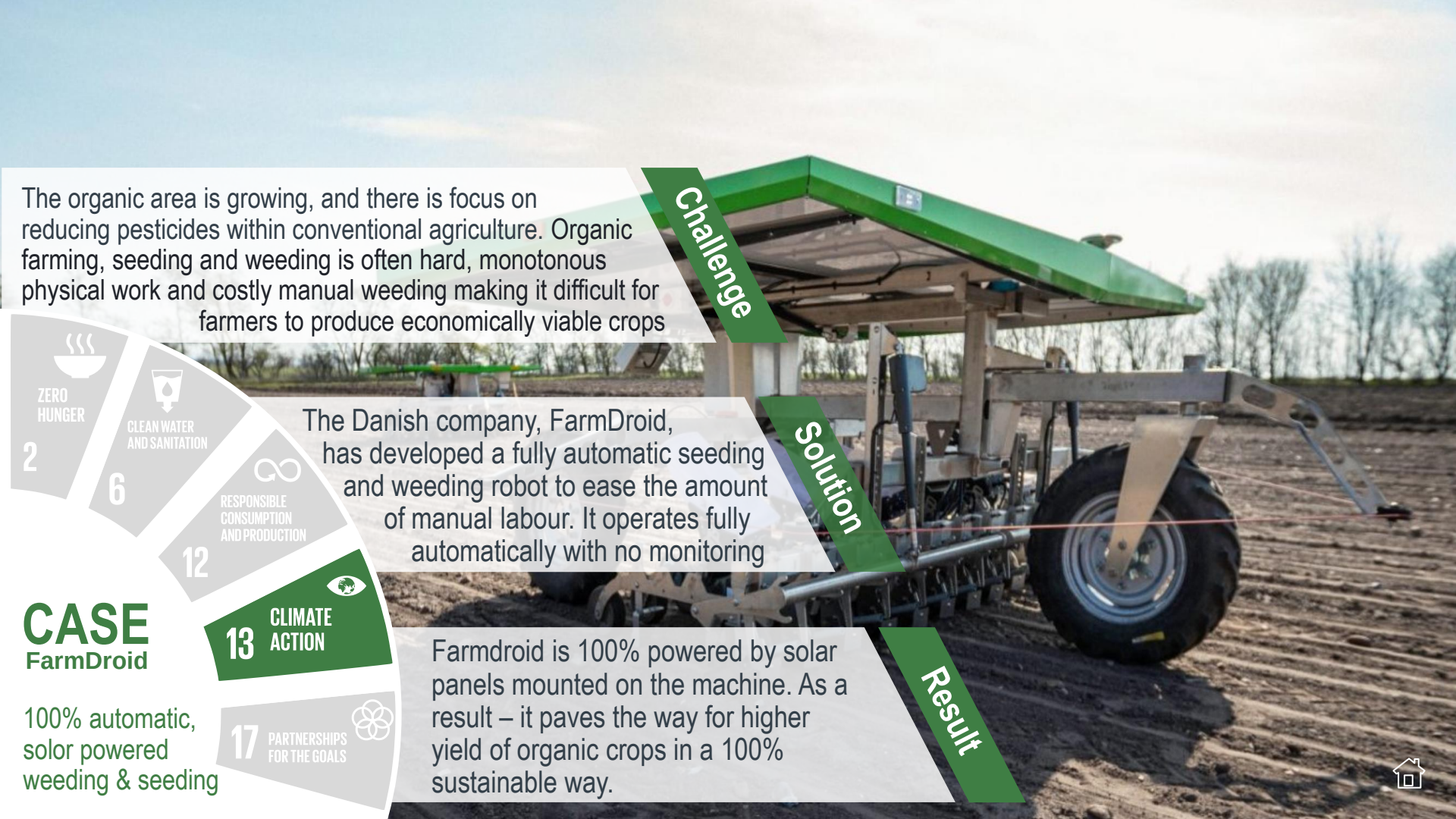
13 CLIMATE ACTION

17 PARTNERSHIPS FOR THE GOALS

CASE

Cimbria Unigrain

Vision-based seed and grain sorter limit food loss



CASE
FarmDroid

100% automatic, solor powered weeding & seeding

Challenge

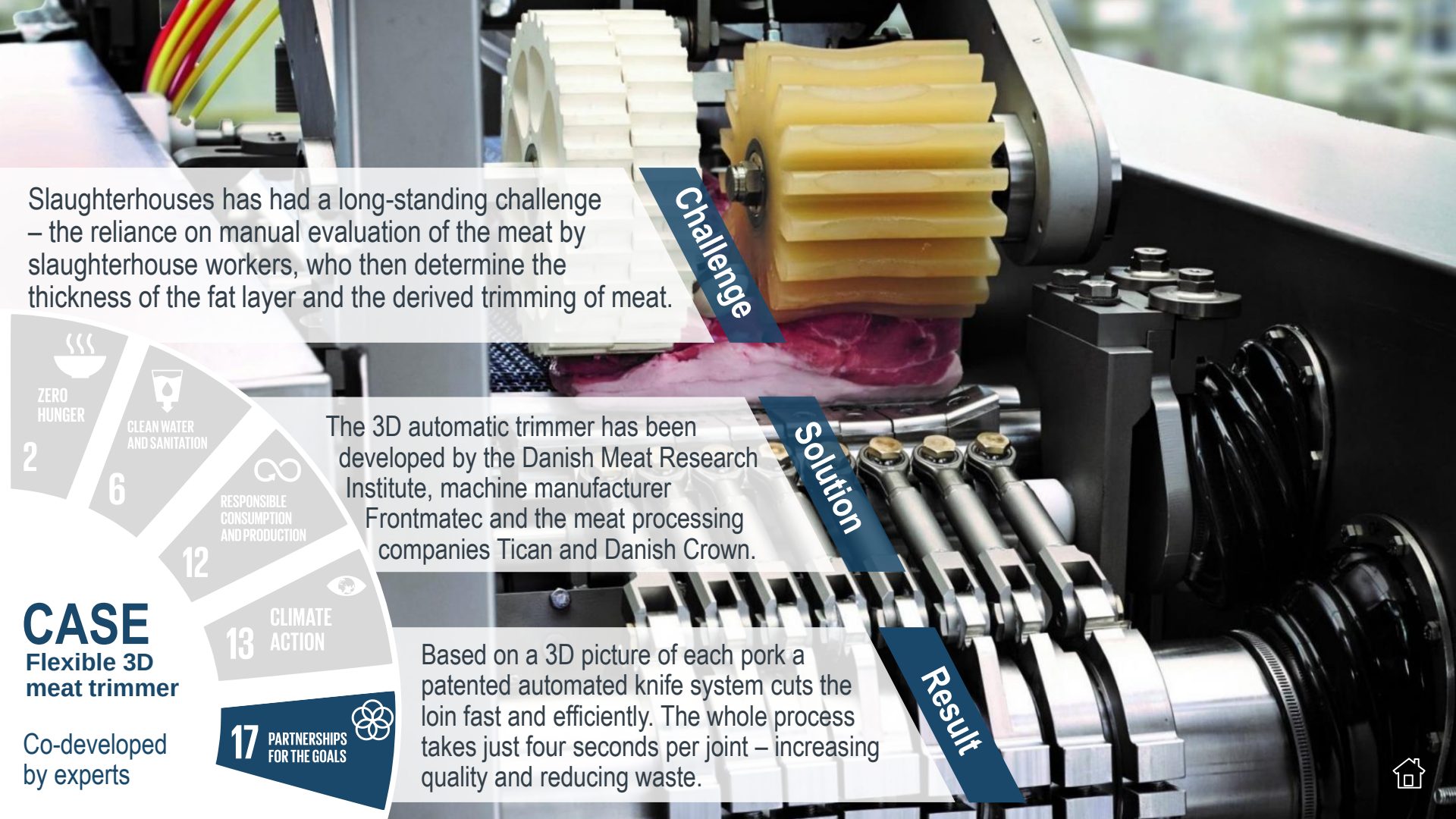
The organic area is growing, and there is focus on reducing pesticides within conventional agriculture. Organic farming, seeding and weeding is often hard, monotonous physical work and costly manual weeding making it difficult for farmers to produce economically viable crops

Solution

The Danish company, FarmDroid, has developed a fully automatic seeding and weeding robot to ease the amount of manual labour. It operates fully automatically with no monitoring

Result

Farmdroid is 100% powered by solar panels mounted on the machine. As a result – it paves the way for higher yield of organic crops in a 100% sustainable way.



Slaughterhouses has had a long-standing challenge – the reliance on manual evaluation of the meat by slaughterhouse workers, who then determine the thickness of the fat layer and the derived trimming of meat.

Challenge

The 3D automatic trimmer has been developed by the Danish Meat Research Institute, machine manufacturer Frontmatec and the meat processing companies Tican and Danish Crown.

Solution

Based on a 3D picture of each pork a patented automated knife system cuts the loin fast and efficiently. The whole process takes just four seconds per joint – increasing quality and reducing waste.

Result

2 ZERO HUNGER

6 CLEAN WATER AND SANITATION

12 RESPONSIBLE CONSUMPTION AND PRODUCTION

13 CLIMATE ACTION

17 PARTNERSHIPS FOR THE GOALS

CASE

Flexible 3D meat trimmer

Co-developed by experts

Biogas meets scarcity of fertilizer for organic production

Challenge

An increasing demand for organic products in domestic and foreign markets is challenged by a scarcity of approved fertilisers for certified organic vegetable production.

Solution

Biogas is made from degradable waste, garbage, and by-products from agriculture. The by-product – leftovers from the degassing process at the biogas plants – are used as a green fertiliser in agriculture.

Result

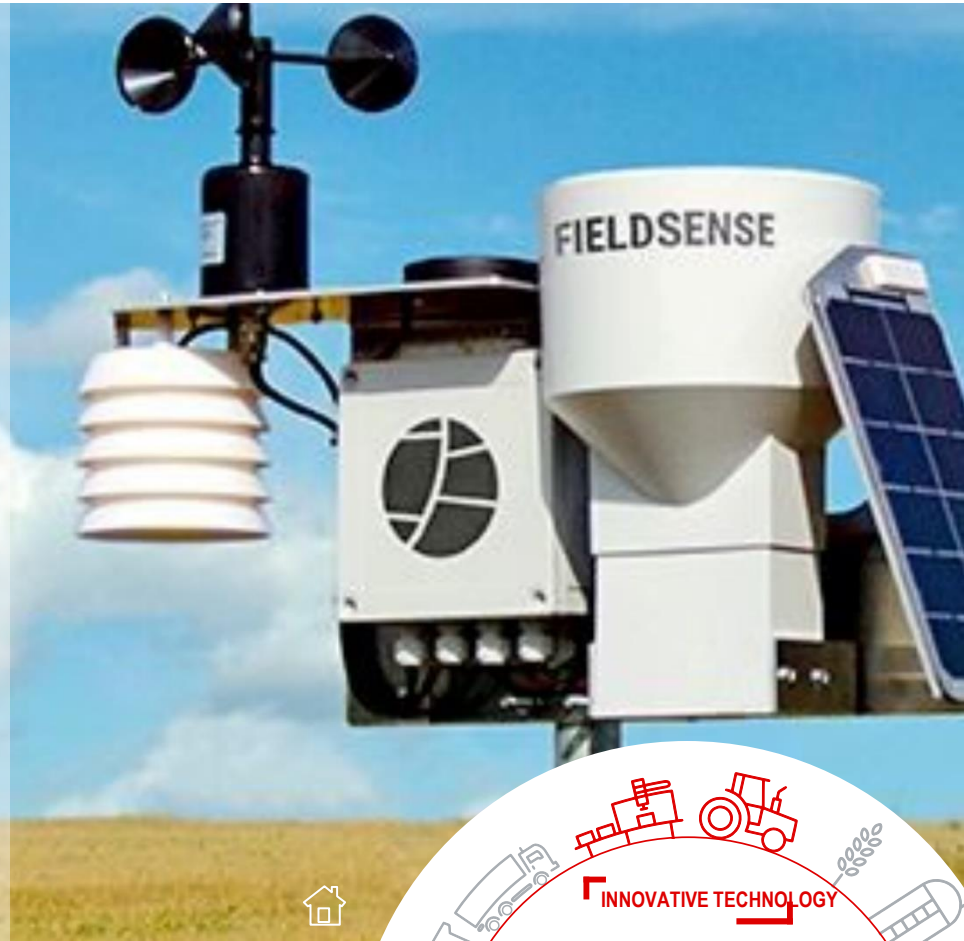
The biogas production partakes in a circular economy in which slurry from animal husbandry is returned to the farms as a fertiliser far more effective than its untreated original.

Smarter farming through collaboration

Challenge:
In food production, the weather has an immense impact on agricultural production

Solution:
FieldSense, an agro tech startup, has partnered with Danish Agro to create a weather station that sends about rainfall, soil temperature, air temperature, wind speed, humidity

Result:
Farmers can now micromanage harvesting due to their new weather stations



Thanks to Collaboration, Danish Milk Can be Screened Faster

Challenge:
Screening methods are often too slow to thoroughly analyse milk and maintain high quality

Solution:
In a new collaboration project between Arla Foods and FOSS, a new, faster screening method, GoodProduct, is created.

Result:
A screening method so fast that the dairies have time to act before it is too late – for instance the dairies can now call back the milk truck, as opposed to recalling milk that has already been purchased by the Danish consumers.