

What challenges and opportunities for climate change, biodiversity, sustainable & healthy diets

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SUSFANS European SFNS foresight approach

SCENARIO NARRATIVES REVIEW

EU FOOD SYSTEM CHALLENGES

AGRO-FOOD-
NUTRITION
POLICIES

CONTEXTUAL
SCENARIOS

INNOVATIONS

SUSFANS FORESIGHT

FINAL
FORESIGHT
& POLICY
GUIDANCE

SUSFANS
EUROPE
TOOLBOX
TOUR
(CZ, DK,
FR, IT)

CLOSING
SEMINARS
(Brussels)

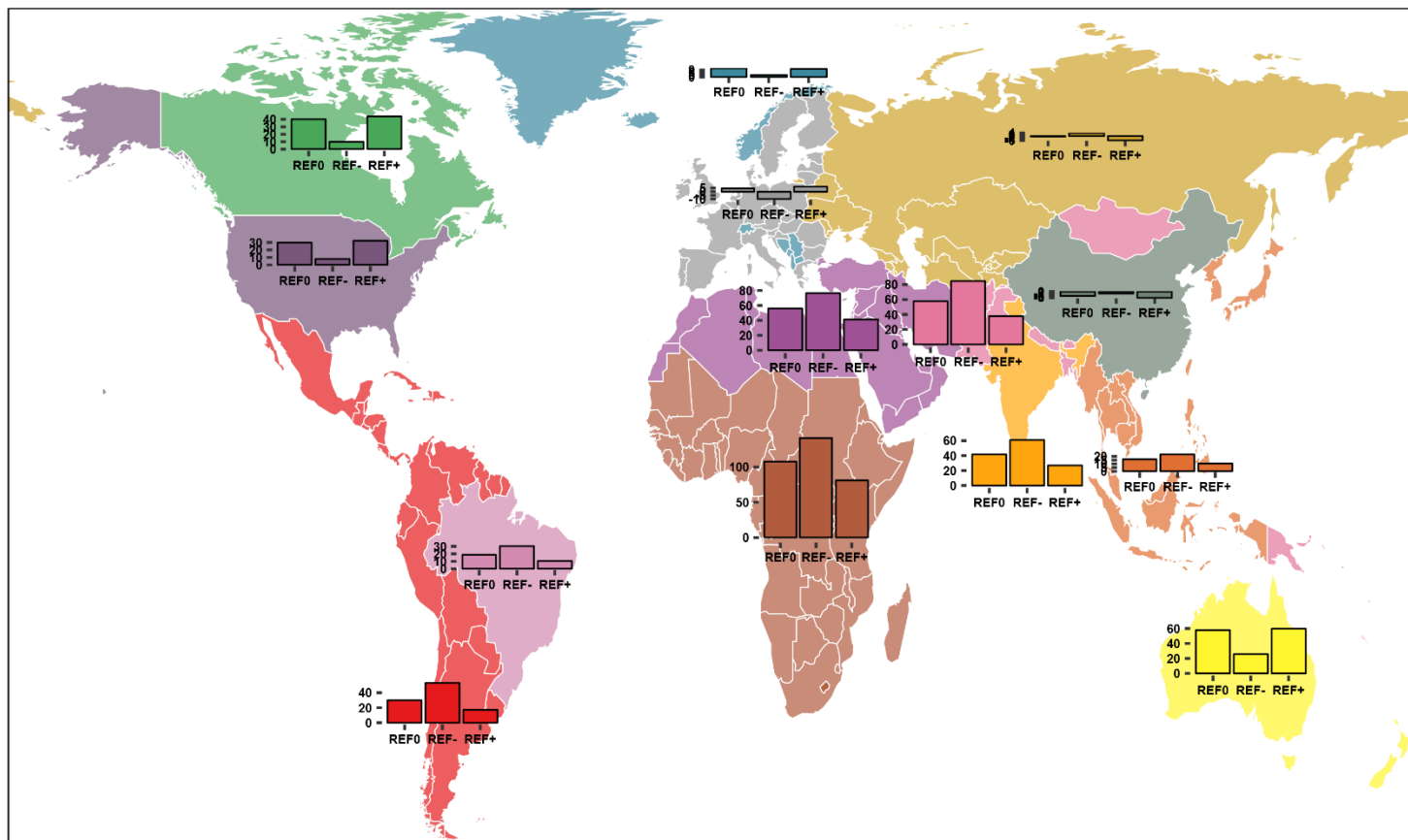
Challenges to sustainable FNS in Europe

Contextual scenarios *building on the stakeholder consultation* focusing on the main challenges and drivers for the sustainable FNS in Europe

- Demographic and income trends
- Technological change
- International trade policies
- Climate change: Impacts & Mitigation
- Policy context: Current agricultural and fisheries policies

Population growth: World

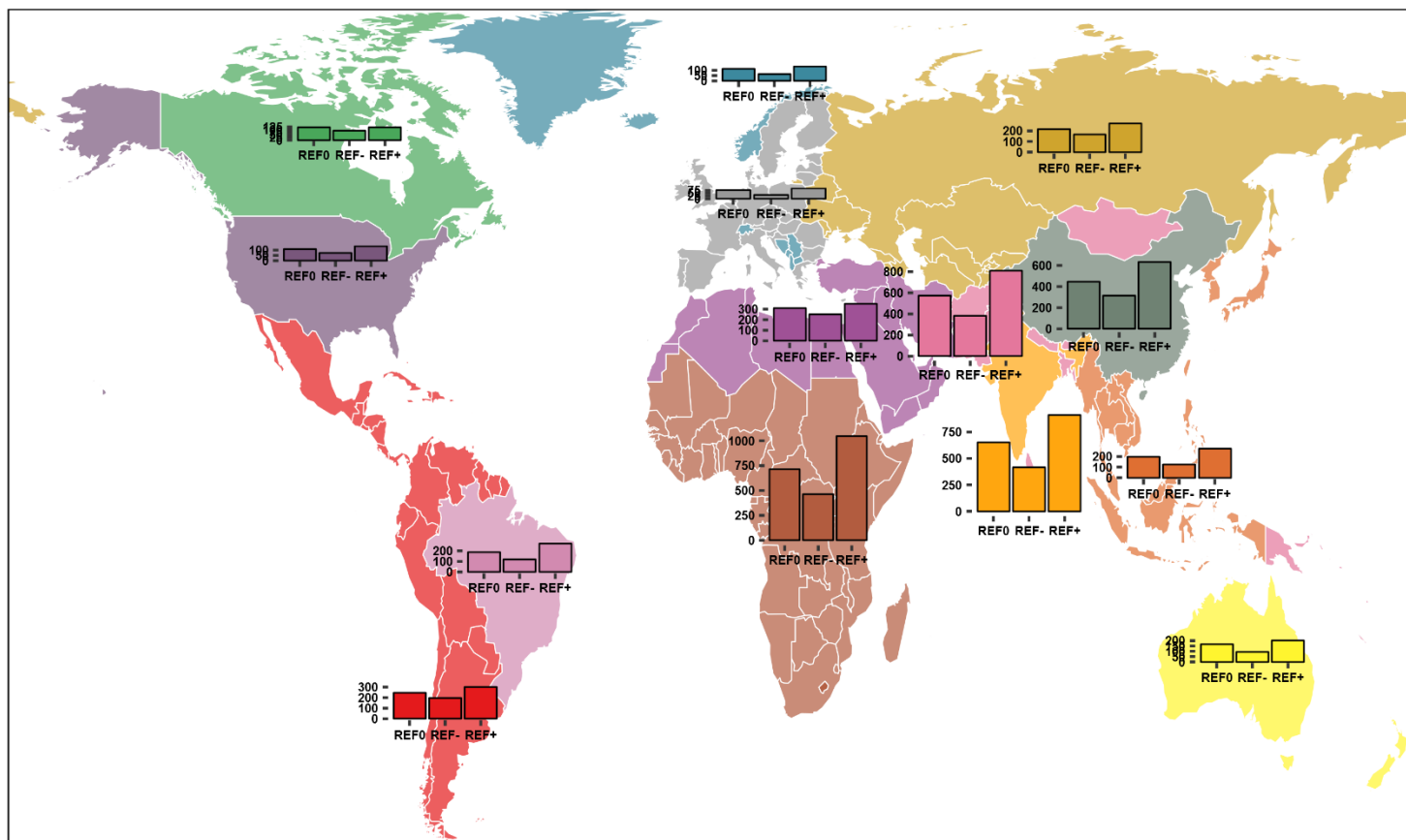
Total population change between 2010 and 2050 [%]



Source: Own calculations based on EC (2016a), KC and Lutz (2017, IIASA SSP Database)

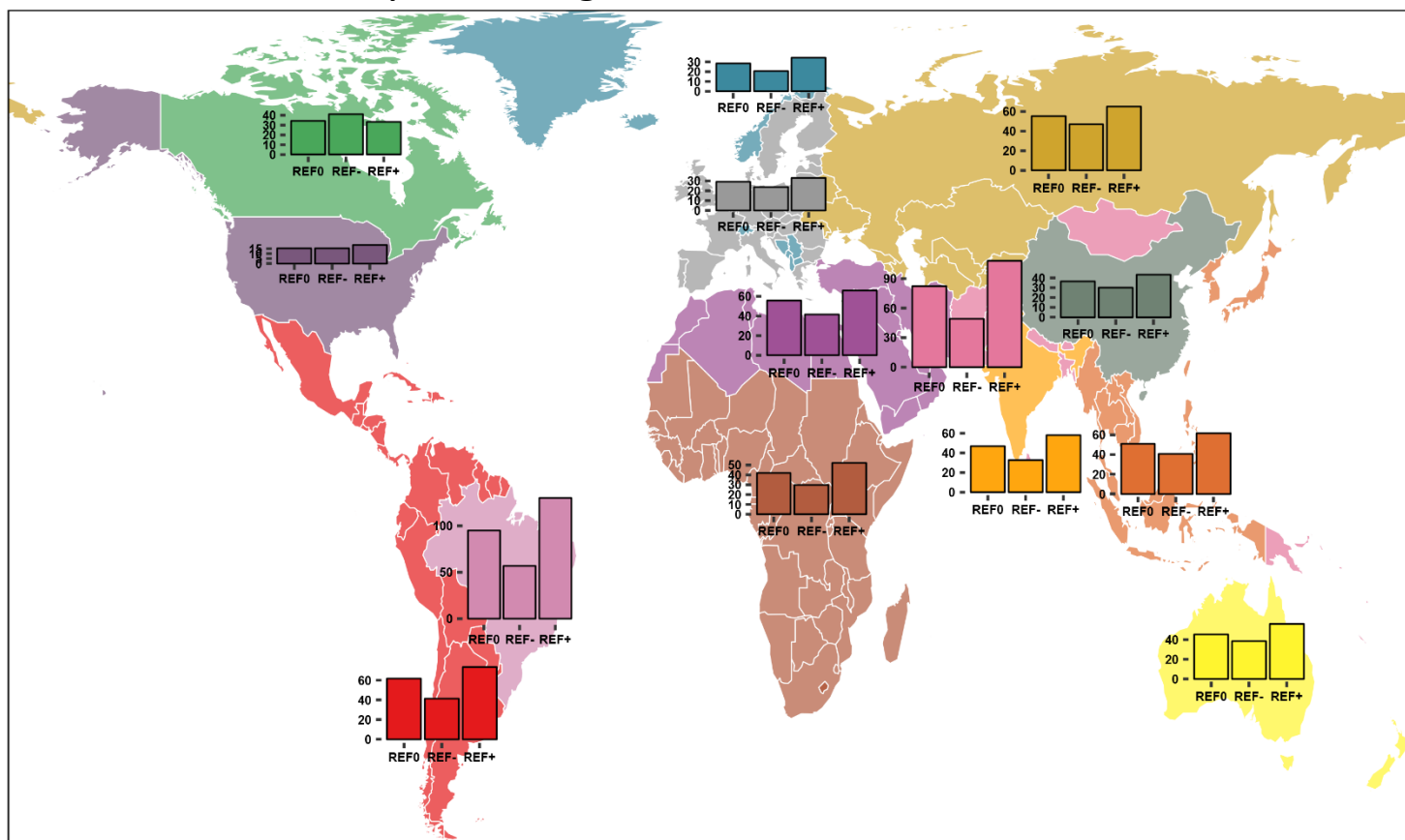
Economic growth

GDP change between 2010 and 2050 [%]



Crop yields

Wheat yield change between 2010 and 2050 [%]



Source: Own calculations based on CAPRI model baseline and Havlík et al. (2012)

Modelling tools in SUSFANS

Macro-economy

MAGNET

Complete economy
Income effects
Long run
Global, countries

Diet & health

SHARP

Product detail
Specific diet needs
Short run

EU4

DIET

Consumers preferences
Health & environment
Short run

EU3

Agricultural production

GLOBIOM

Spatial detail
Environmental impacts
Long run
Global, grid

CAPRI

EU detail
Production detail
Long run
Global, EU, NUTS2

Modelling tools in SUSFANS



Population, GDP, consumer preferences

Demand
Markets

Food

Fibers

Energy

Ind

MARKET & TRADE: EU + WORLD → PRICES

FEED

FEED

FEEDSTOCK

FEED

BIOMASS

Production

Land use

Land cover

EPIC

Crop model



Worldwide:
18 crops (FAO + SPAM)
Management systems:
low/high input & irrigated

EU28:
9 additional crops,
crop rotations.
Management options:
fertilizer, irrigation & tillage

Cropland

RUMINANT

Digestibility model



→ Feed intake
→ Animal production
→ GHG emissions

7 animals
(FAO + Gridded livestock)

Cattle & Buffalo
Sheep & Goat
Pig
Poultry

8 different systems

Grassland

BIOENERGY

Processing



→ MJ biofuel
→ MJ bioelectric
→ Coproducts

Perennial crops
Short rotation coppice

Conversion technologies
First generation biofuels
Second generation
biofuels
Biomass power plants

Short rotation
plantations

G4M

Global Forest model



→ Harvestable wood
→ Harvesting costs

Downscaled FAO FRA at
grid level

Area
Carbon stock
Age
Tree size
Species
Rotation time
Thinning

Managed forest

Natural
forest

Other
natural land

Gridded representation of world land use

Seafood

MARKET, TRADE,
PRICES

TBD

Fish model

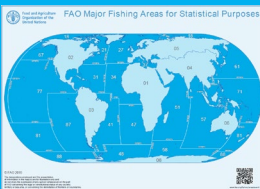


→ Feed supply, intake
→ Fish processing
→ GHG emissions

Worldwide:
11 species groups

Capture/aquaculture
Freshwater/marine
Small-/large-scale
Fishmeal and fish oil
5 feed crops

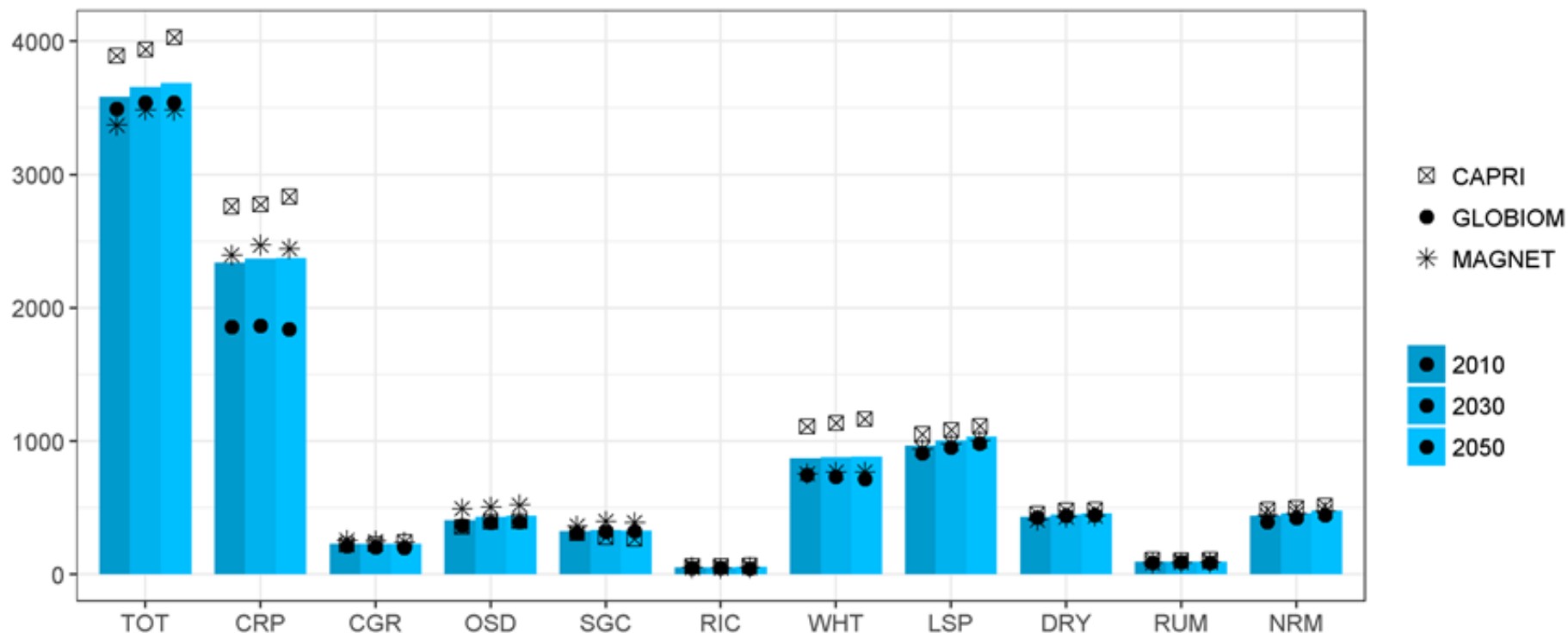
Water surface



FAO Fishing Areas / 0.5° Grid

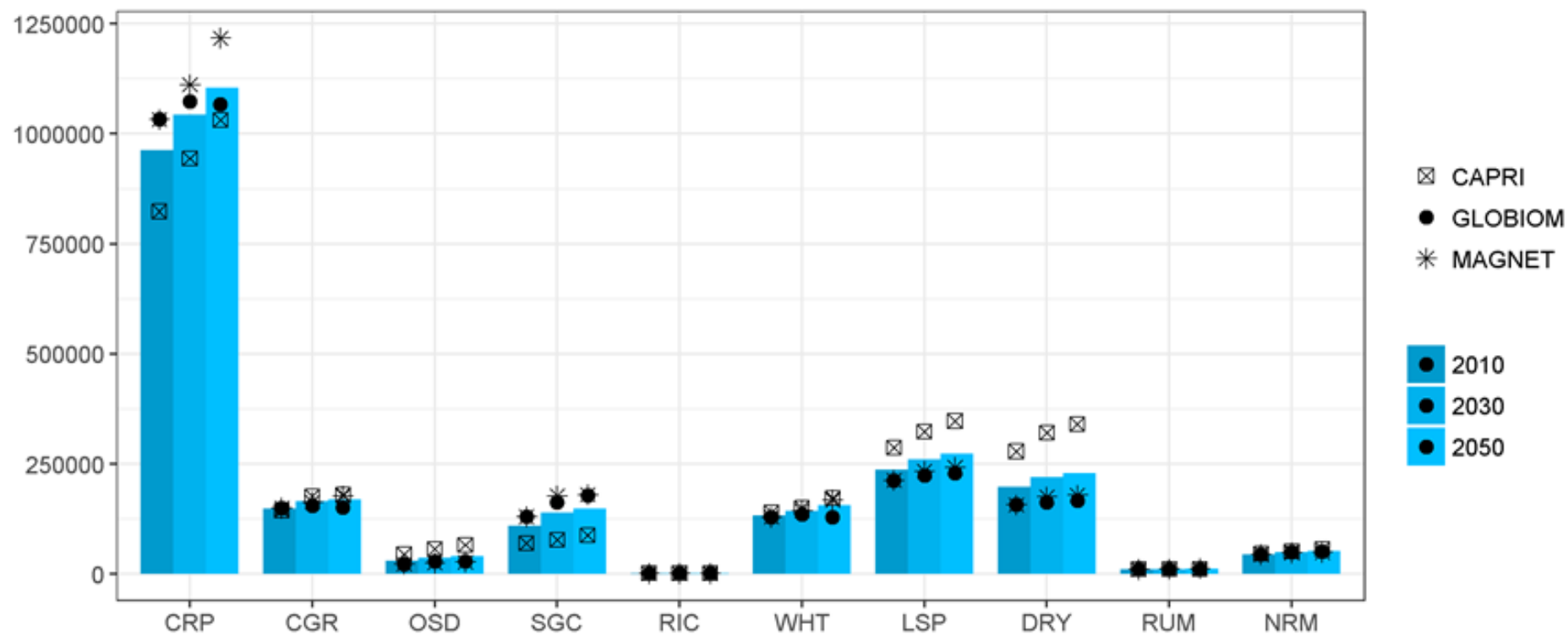
Baseline scenario: EU28

Calorie consumption [kcal/capita/day]



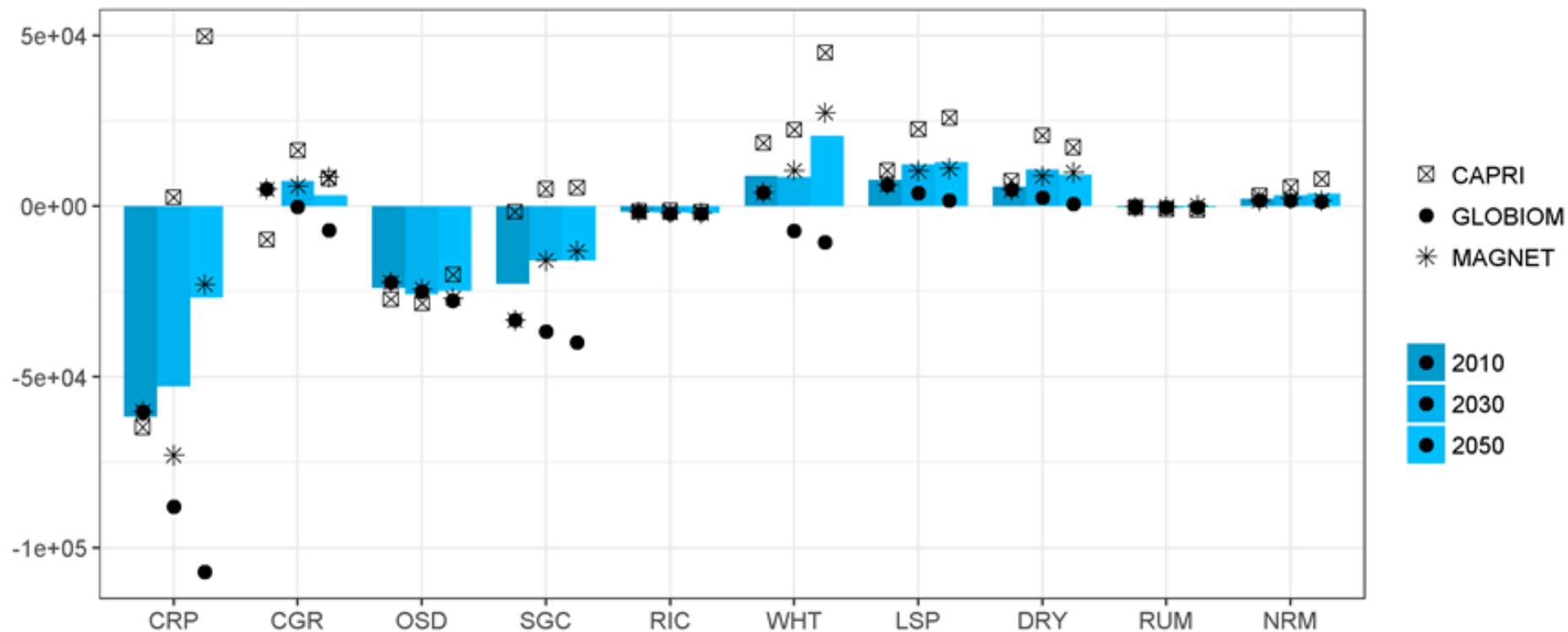
Baseline scenario: EU28

Crop and livestock production [1000 t]



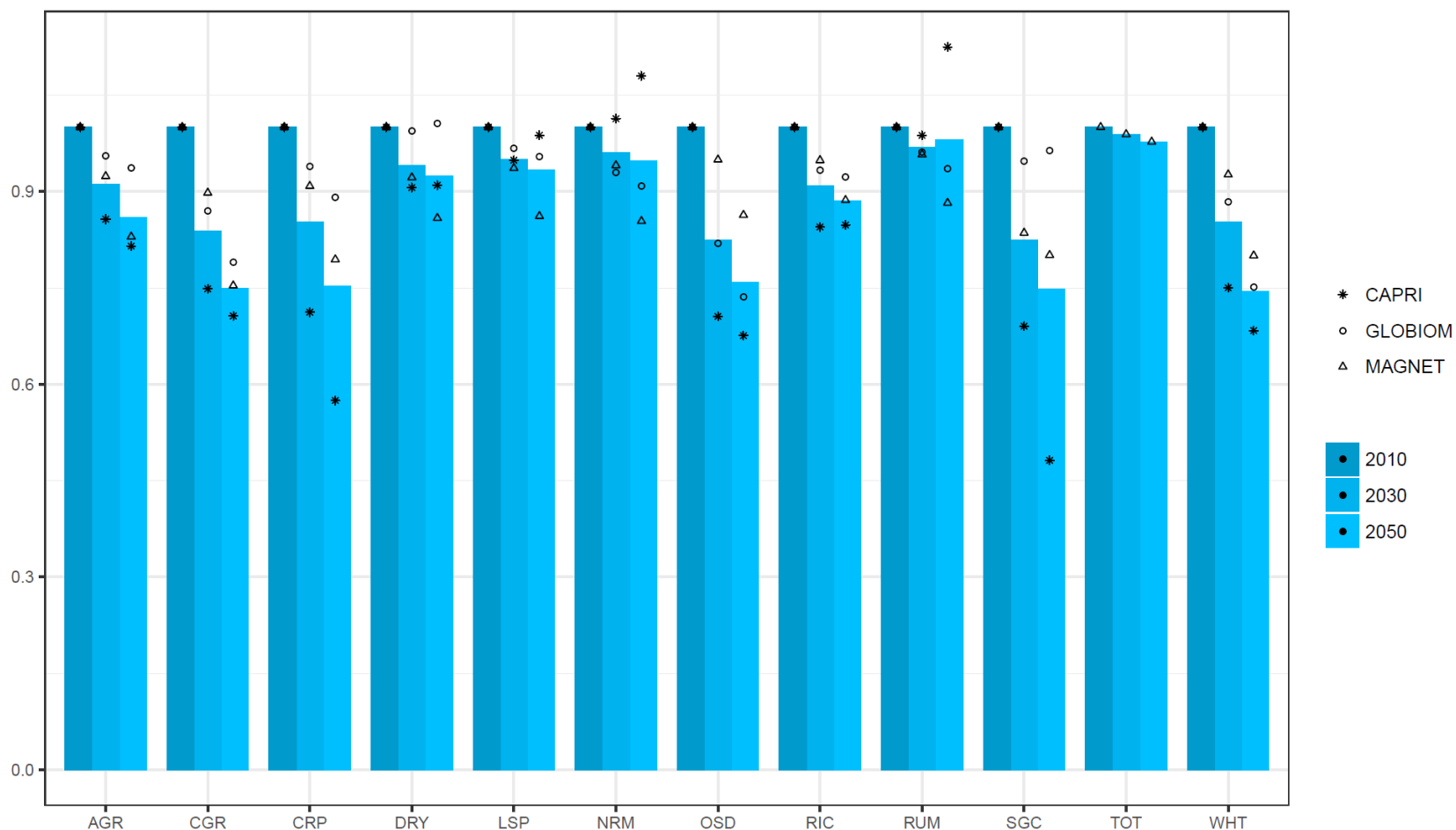
Baseline scenario: EU28

Crop and livestock net trade [1000 t]

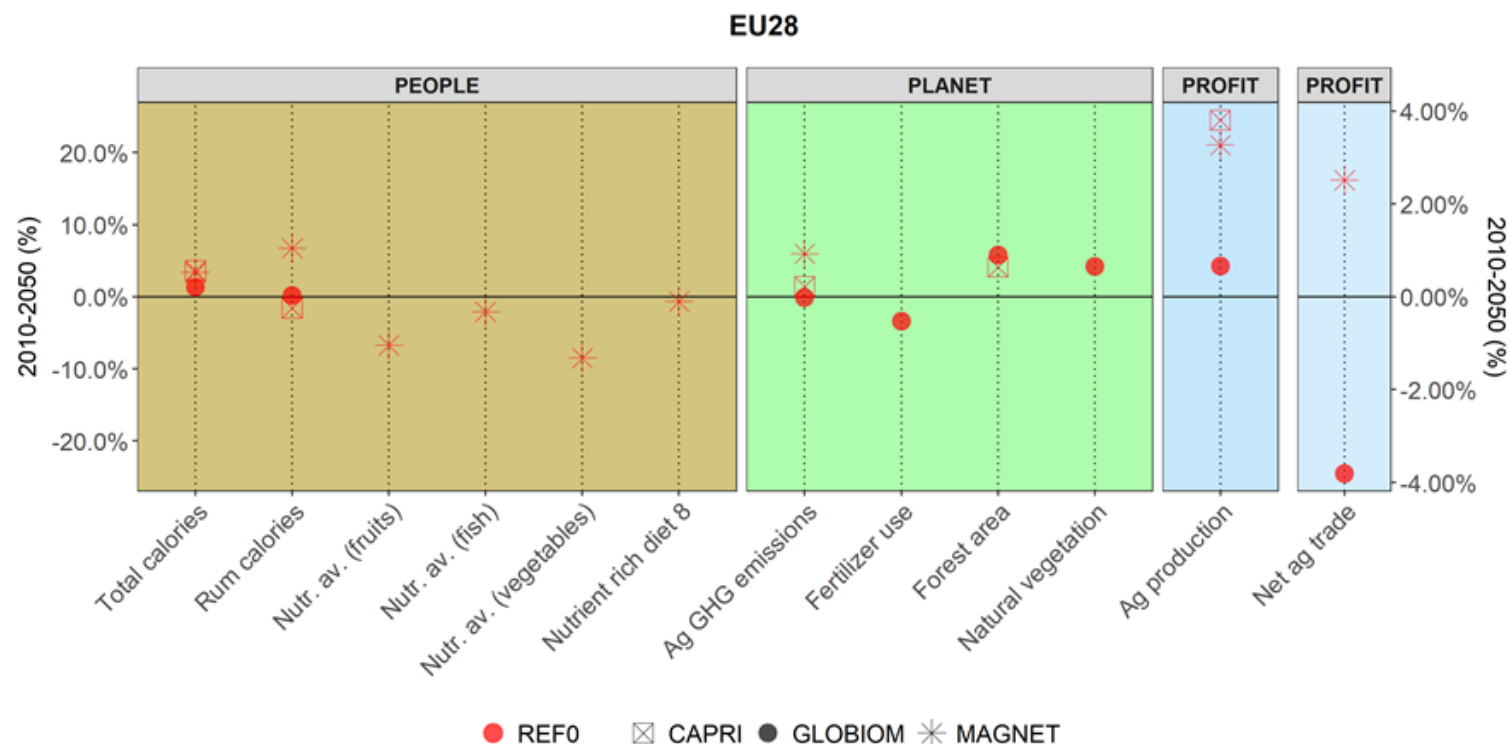


Baseline scenario: EU28

Producer prices [2010 = 1]

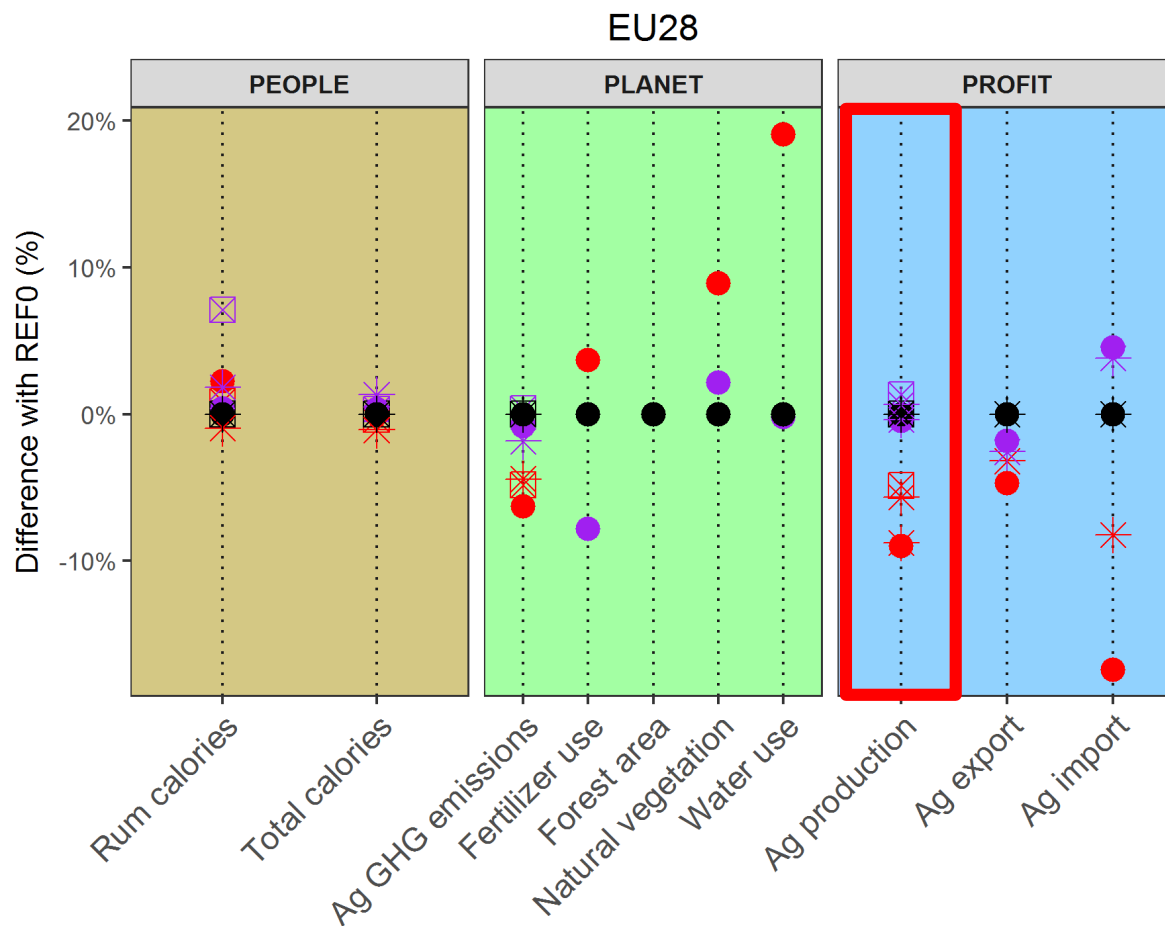


Baseline scenario 2050

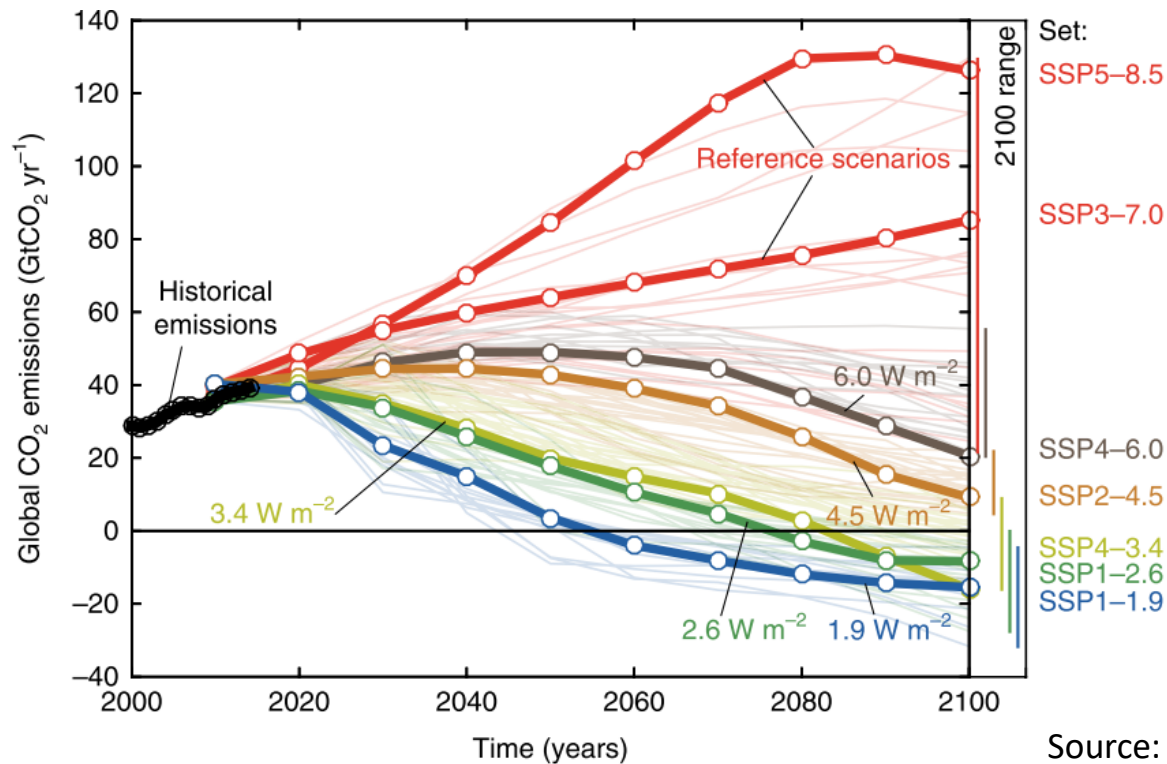


- Stagnation - economic, slightly deteriorating diets and improving environment

Contextual scenarios 2050



Climate mitigation challenge



Source: Rogelj et al. NCC 2018

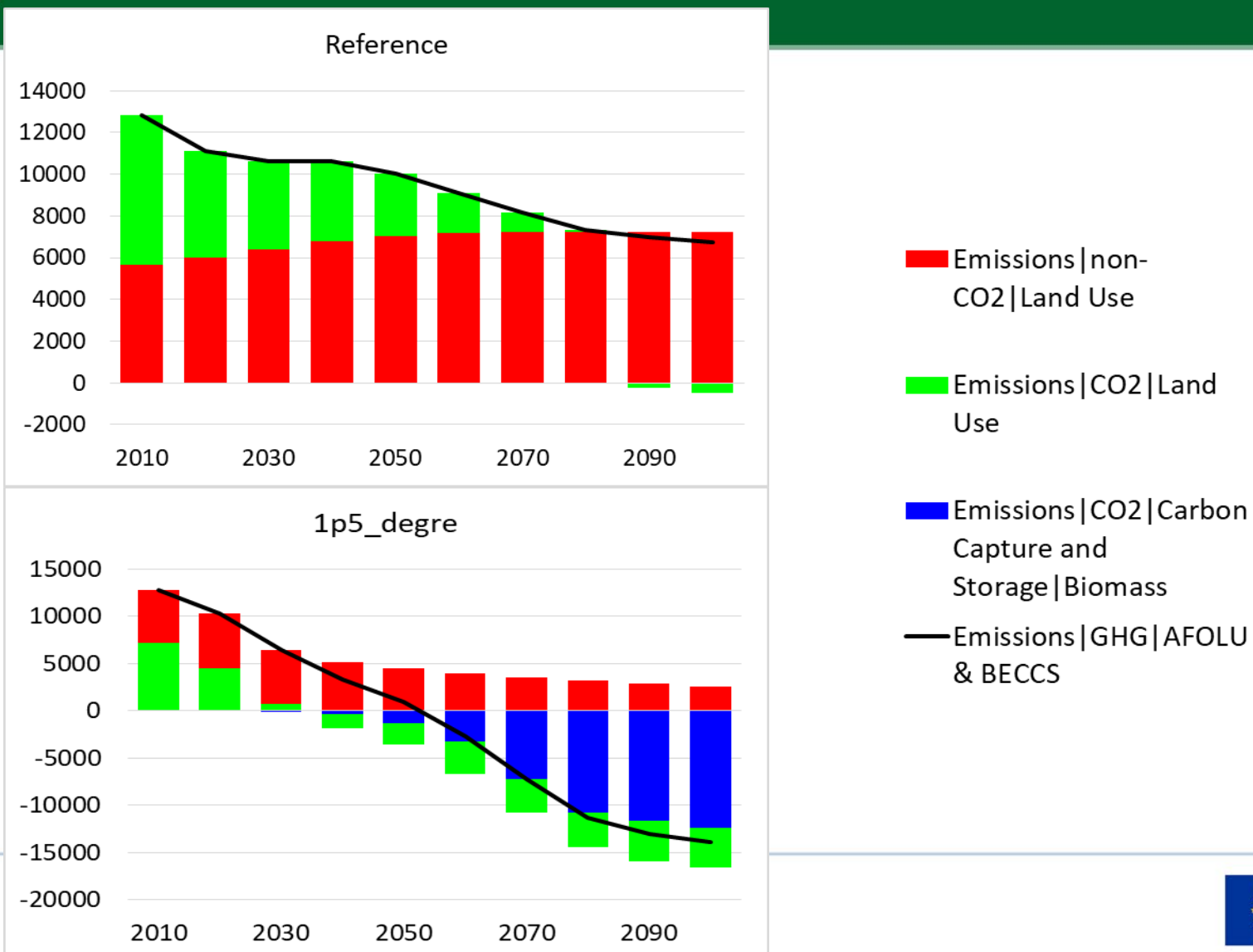
Carbon neutrality compatible with 2 degrees: 2055-2080
1.5 degrees: 2045-2070

EU Longterm strategy

- 2020 targets: 20% GHG reduction, bioenergy and energy efficiency
- 2030 targets/NDC: 40% GHG reduction
 - -43% ETS: covering power plants and large industrial installations
 - -30% non-ETS covering smaller industries, transport, ag. non-CO₂ ...
 - Limited access to LULUCF credits
No specific target for agriculture yet
- 2050 climate strategy: GHG neutral by 2050
 - Long-Term Strategy “A clean planet for all”

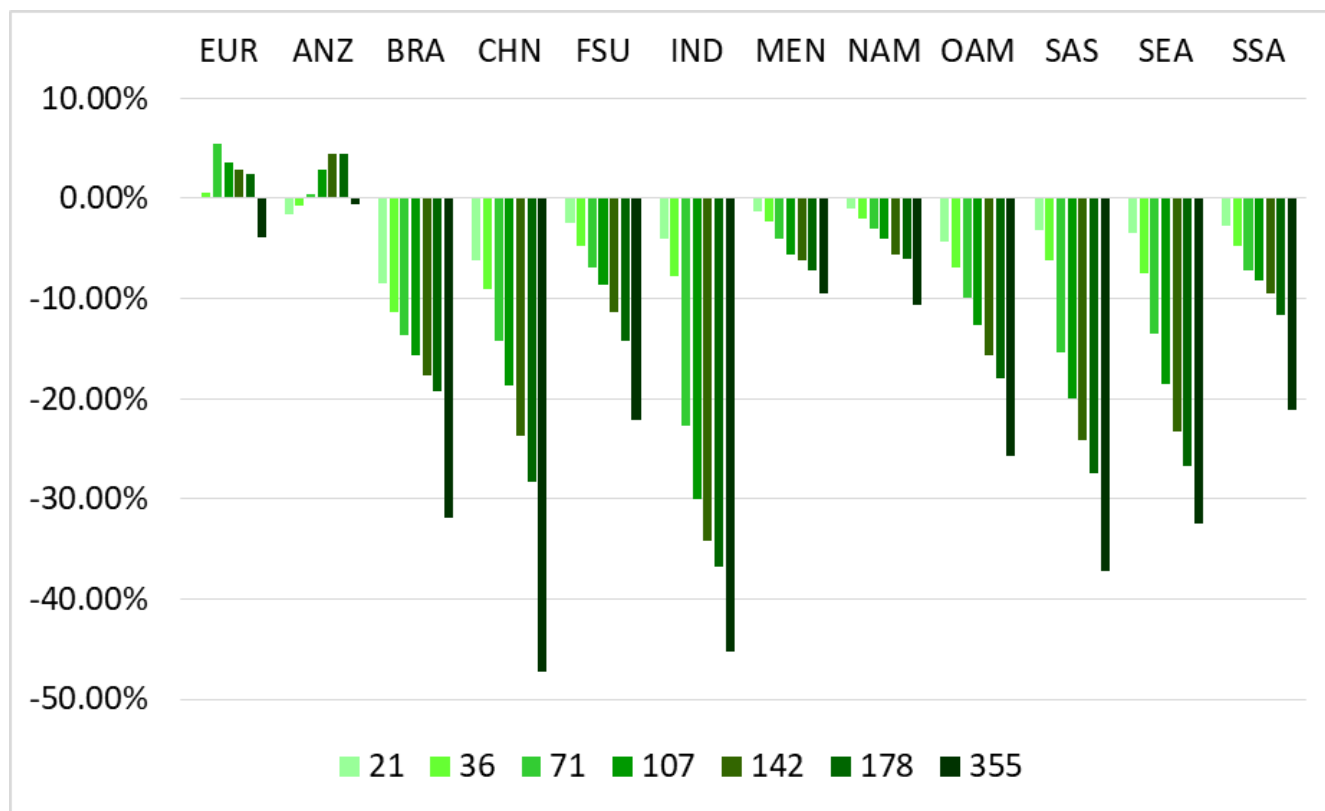
Total land use related GHG emissions

[MtCO₂eq]



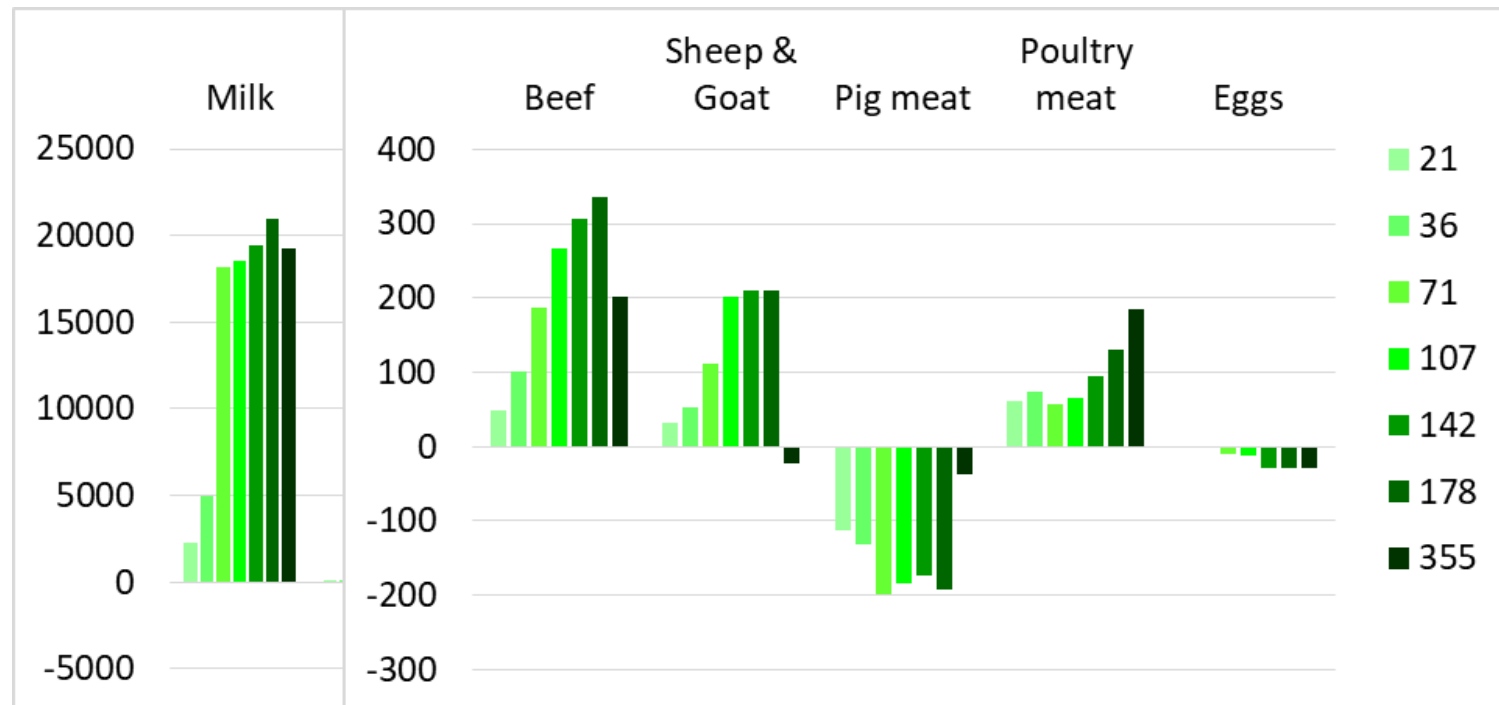
Climate mitigation & EU food system

- Global milk production change compared to baseline by 2030 [%]



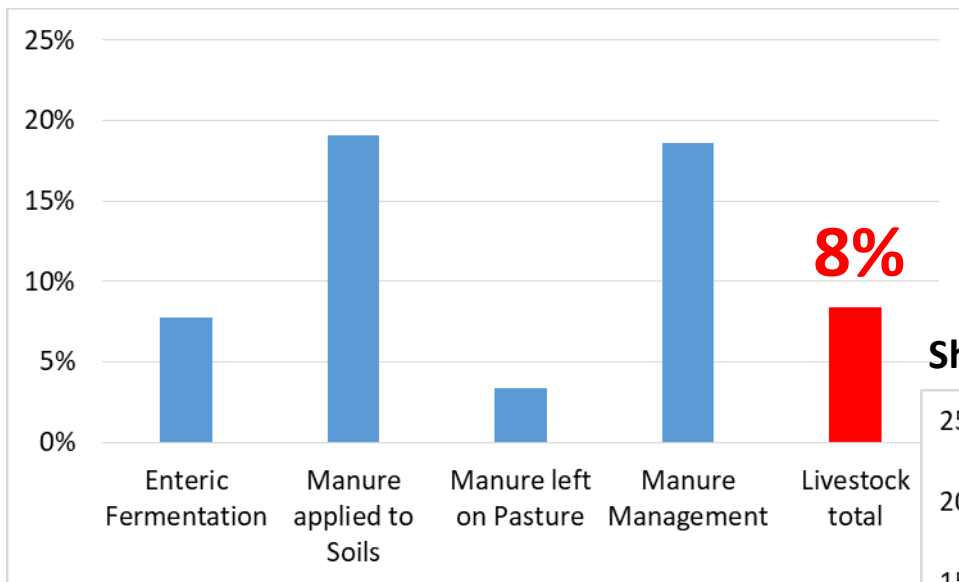
Climate mitigation & EU food system

- EU net trade absolute difference compared to baseline by 2030 [1000 tonnes]



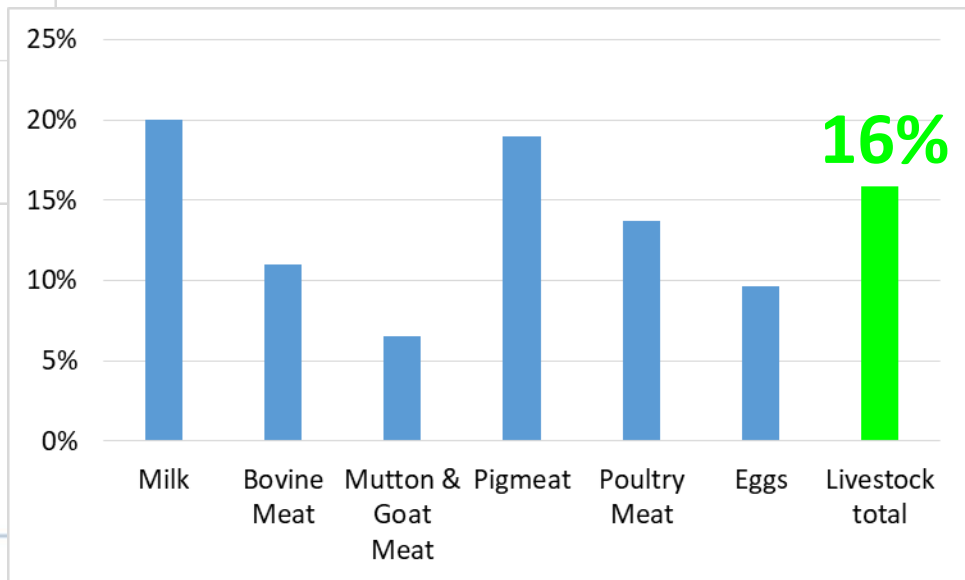
Climate mitigation & EU food system

Share of EU livestock emissions in Global emissions



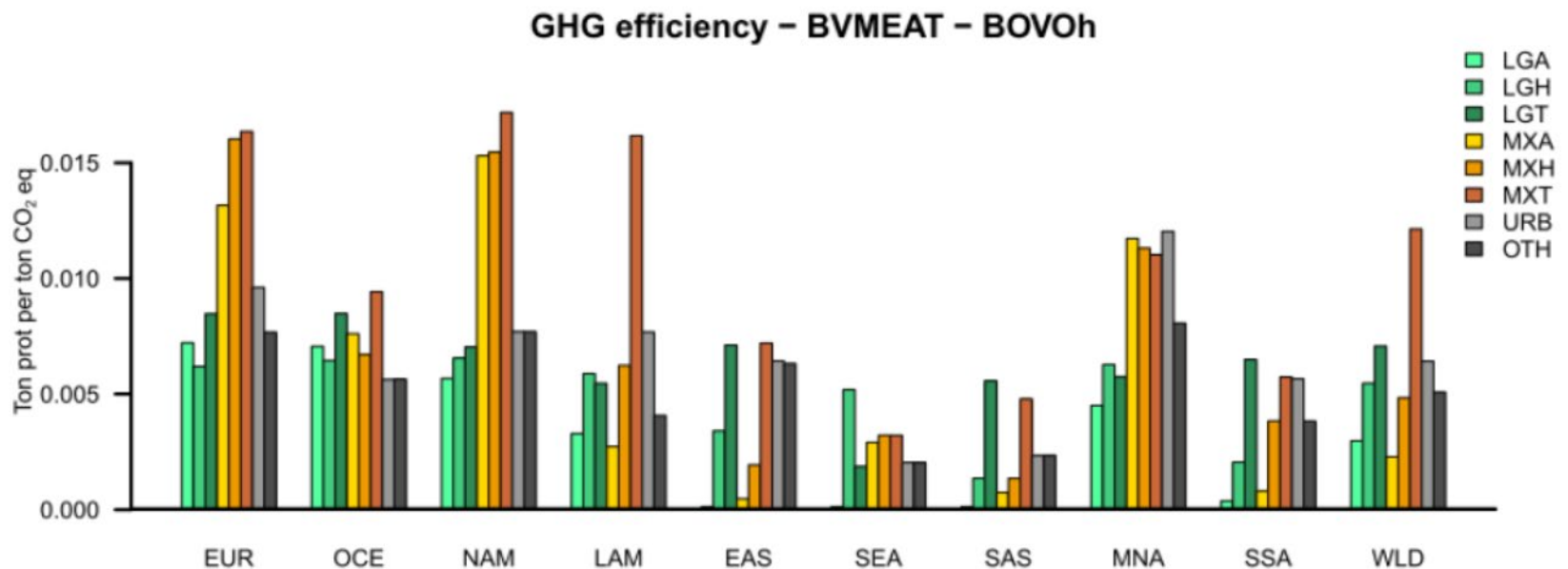
Source: FAOSTAT

Share of EU livestock production in Global production



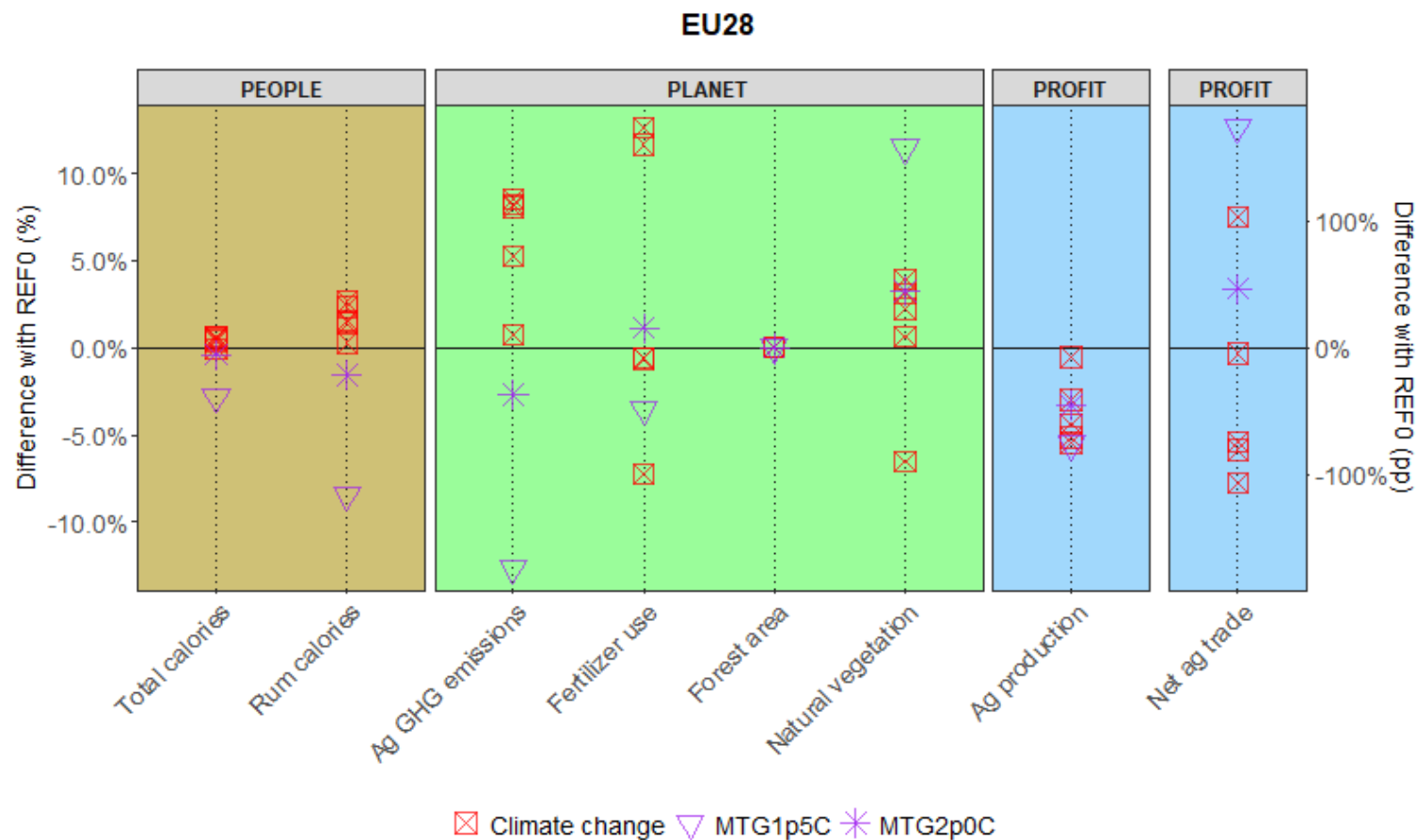
Climate mitigation & EU food system

- Large GHG efficiency differences between production systems and regions prevail



Source: Herrero et al. PNAS 2013

Climate mitigation & EU food system



Sustainable pathways for EU food system

- Pathway 1: “Quality for Europe”
- Pathway 2: “Safety for the World”



EU SFNS Pathway 1: “Quality for Europe”

- Decreasing domestic demand allows for extensification of agri production
- EU consumers supplied with organic farming-like diversified products
- Exports play a negligible role, limited to specialist markets
- Income growth in EU agribusiness through premium prices
- Benefits from reduced pollution for health and environment in the EU
- Limited contribution to the global sustainability challenges: food security, biodiversity, climate mitigation



EU SFNS Pathway 2: “Safety for the World”

- Next to the safety of EU agri/food products the exceptional environmental performance is recognized in international markets
- EU becomes the supplier No1 of standardized “clean” agri/food products and major contributor to the solution of global sustainability challenges
- Source of EU agri-business growth is volume sustained through export demand at reasonable prices
- Global solutions sometimes at the expense of EU consumers and EU environment





Thank you!

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