The 2021 EU Agricultural Outlook Conference

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# EU climate mitigation action & international trade

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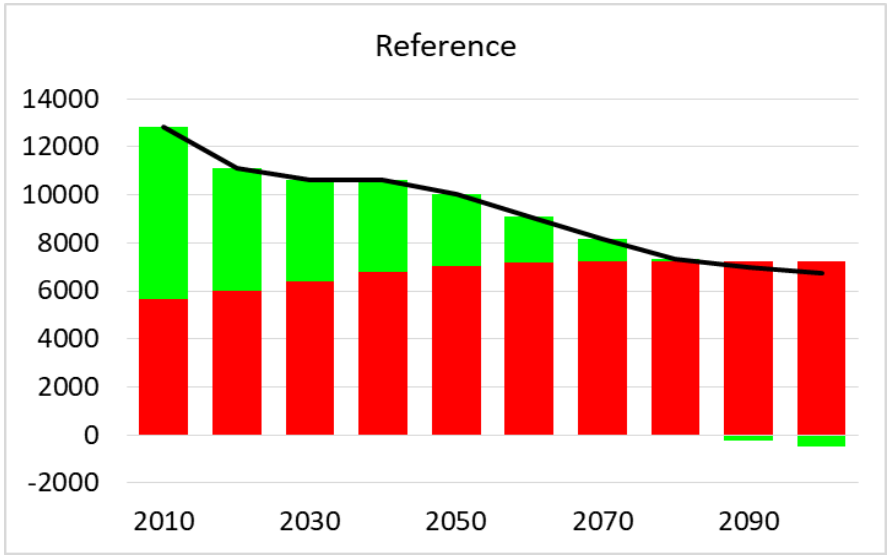
# Land-based mitigation contribution to 1.5° C

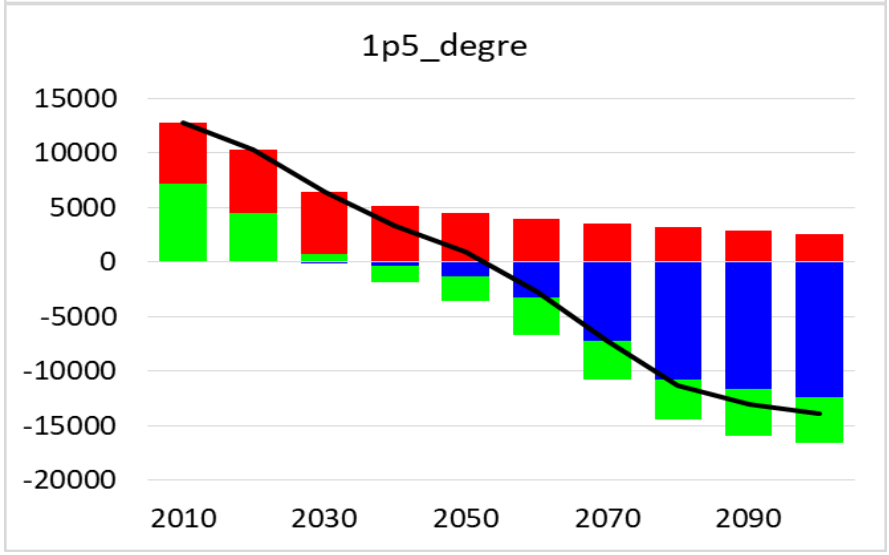
Emissions|non-CO2|Land Use

Emissions|CO2|Land Use

Emissions|CO2|Carbon Capture and Storage|Biomass

Emissions|GHG|AFOLU & BECCS



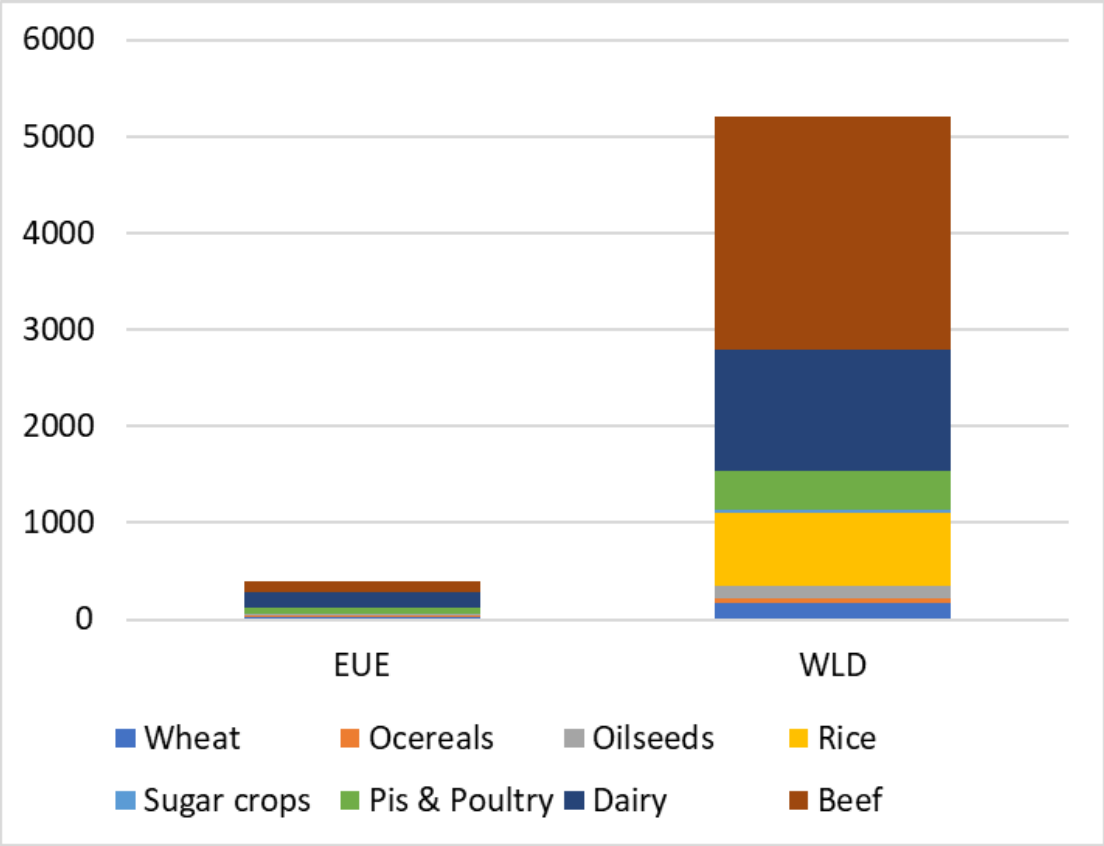

Source: Rogelj et al. NCC 2018

**World 1.5° C trajectory**
AFOLU emissions net zero by 2050
Total emissions net zero by 2060-2080

**EU: "Fit for 55"**
AFOLU climate neutrality by 2035

# Agricultural GHG emissions

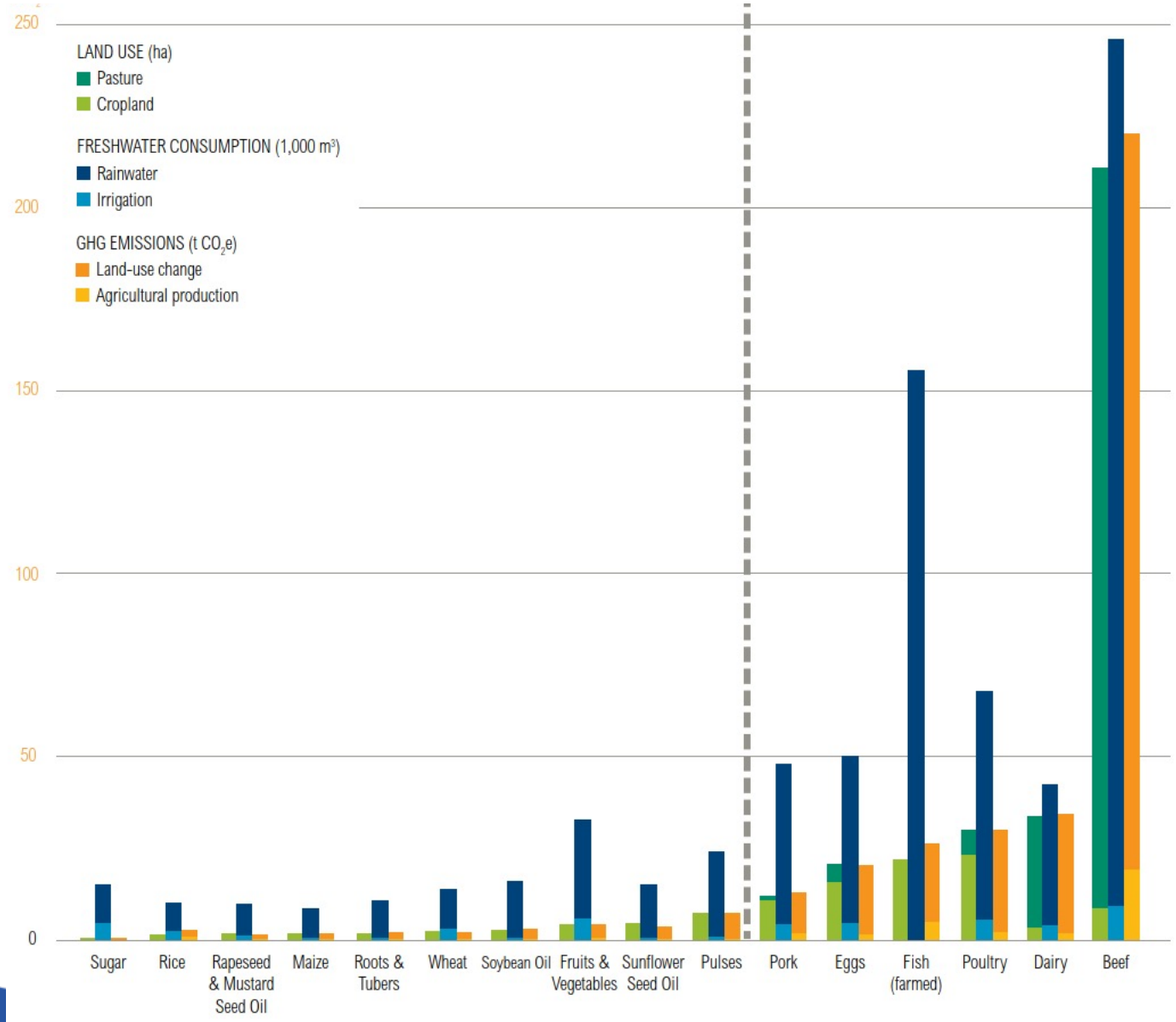
**Total agricultural GHG emissions in mio tCO2eq**




- EU: 8% of global GHG emissions
- Livestock:80% of EU and Global emissions
- Beef: 29% in EU and 46%globally
- Dairy: 38% in EU and 24% globally

Source: FAOSTAT

# GHG intensity across products



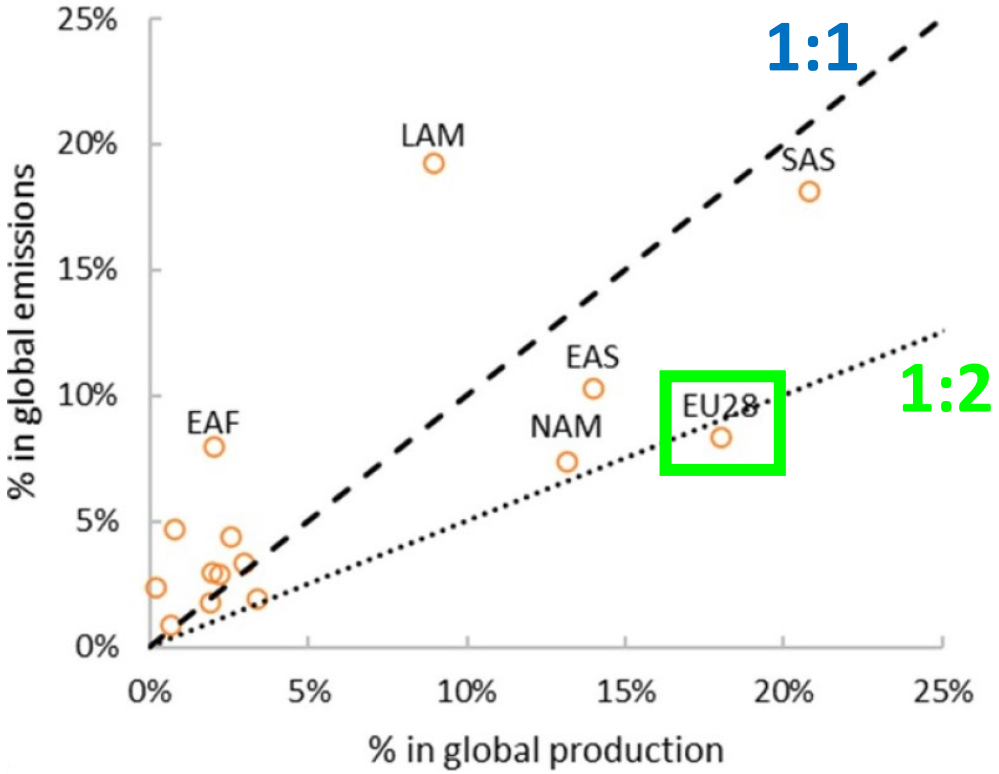

Land Use Change

Agricultural production

Source: Ranganathan et al. WRI 2016

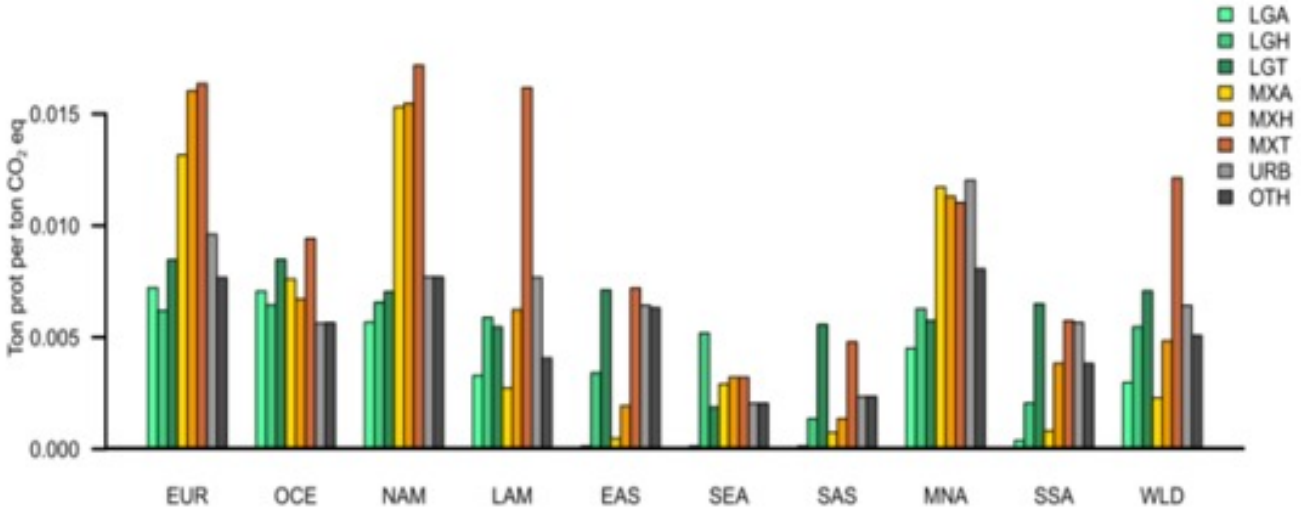
# GHG efficiency in livestock: Direct emissions

**GHG efficiency of livestock production**




Source: FAOSTAT

**GHG efficiency of beef production**

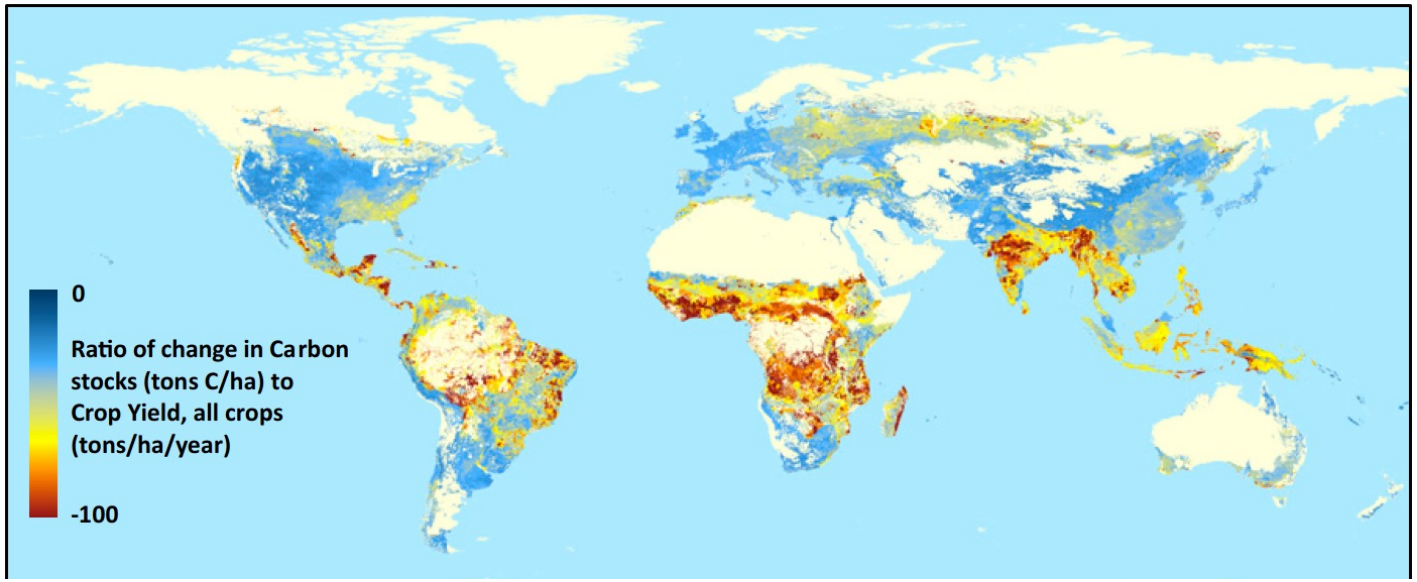



Source: Herrero et al. PNAS 2013

# GHG efficiency in crop sector: Land Use Change

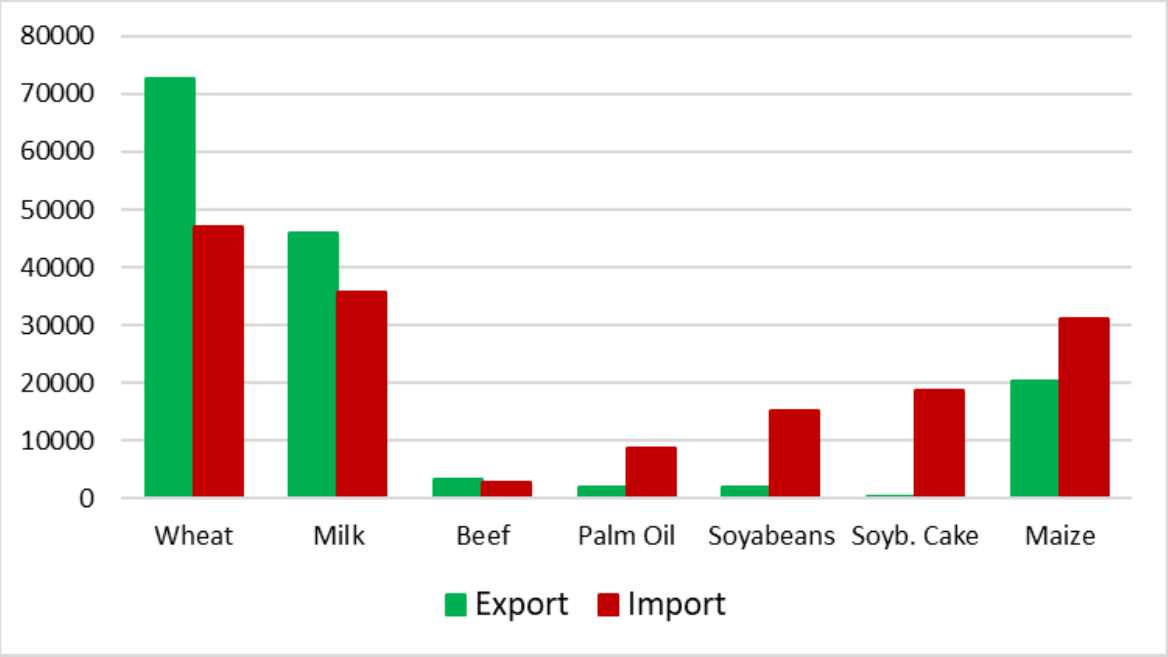
For each unit of land cleared

- the tropics lose nearly two times as much carbon (~120 tons·ha−1 vs. ~63 tons·ha−1) and
- produce less than one-half the annual crop yield compared with temperate regions (1.71 tons·ha−1·y−1 vs. 3.84 tons·ha−1·y−1).




Source: West et al. PNAS 2010

# EU trade in selected key products




Source: FAOSTAT

## Main trading partners and GHG implications

Wheat (Imports): North America & Former Soviet Un.

Wheat (Exports): Africa & Middle East

Oil palm (Imports): South East Asia & South America

Soybeans / cake (Imports): South and North America

Maize (Exports): Middle East & Africa

Maize (Imports): Former Soviet Union & Americas

Beef (Exports): Middle East, Africa, Eastern Asia

Beef (Imports): South America (80%)

# Can unilateral EU policies deliver any climate benefits?

ENVIRONMENTAL RESEARCH
LETTERS

LETTER

## How much multilateralism do we need? Effectiveness of unilateral agricultural mitigation efforts in the global context

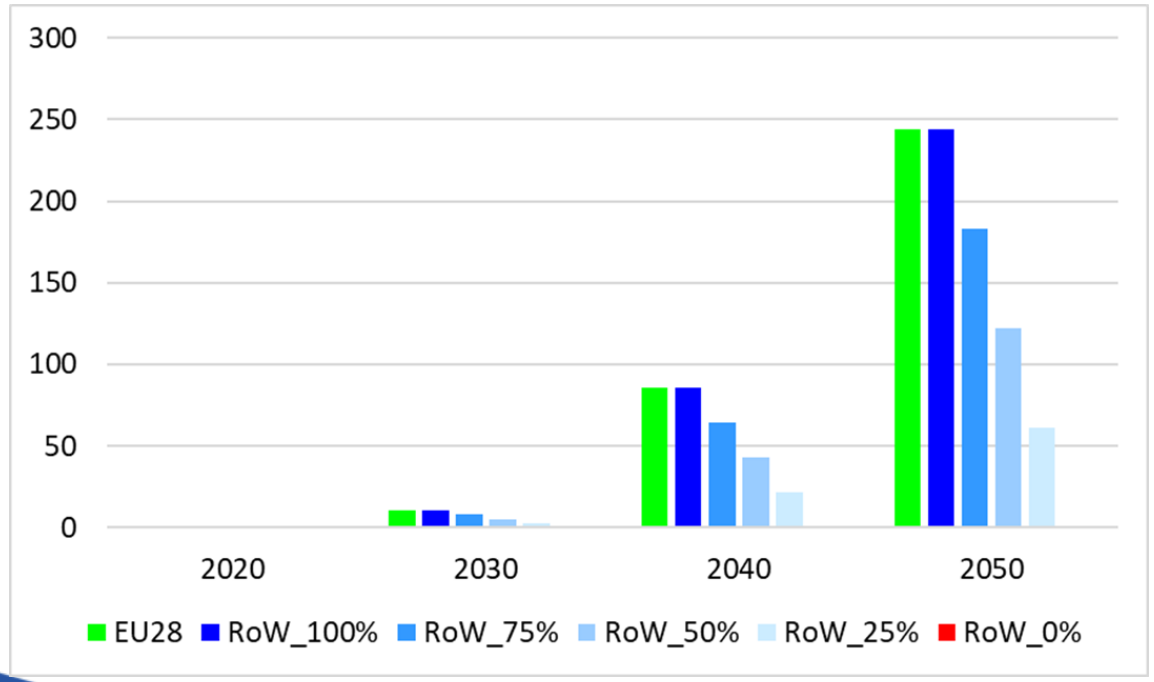
Stefan Frank[1,*], Petr Havlík[1], Andrzej Tabeau[2], Peter Witzke[3], Esther Boere[1], Mariia Bogonos[4], Andre Deppermann[1], Michiel van Dijk[1,2], Lena Höglund-Isaksson[1], Charlotte Janssens[1,5], Monika Kesting[3], Hans van Meijl[2], Ignacio Pérez-Domínguez[4] and Hugo Valin[1]

# Analytical framework

1.5 degree compatible mitigation in the EU

+ different levels of engagement in RoW

**Carbon price (USD/$tCO_2eq$) agricultural non-$CO_2$ emissions**



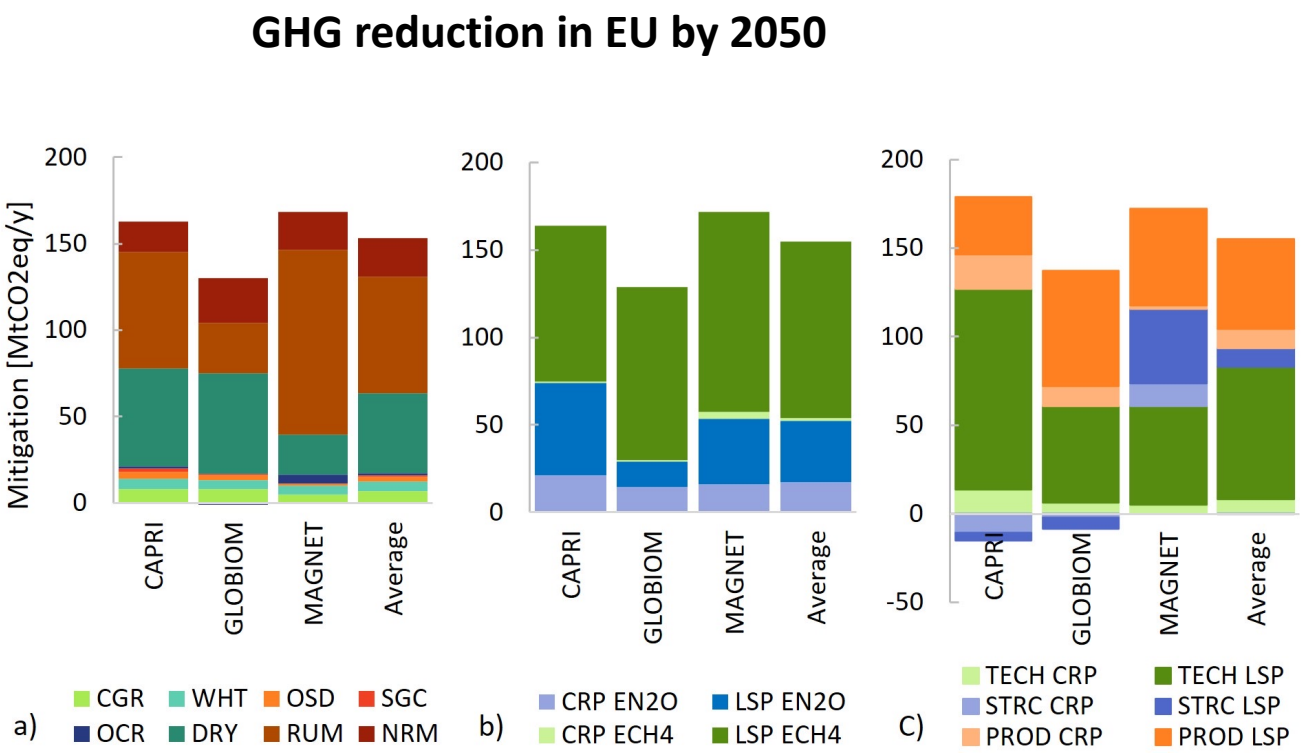

**Model ensemble**

CAPRI

GLOBIOM

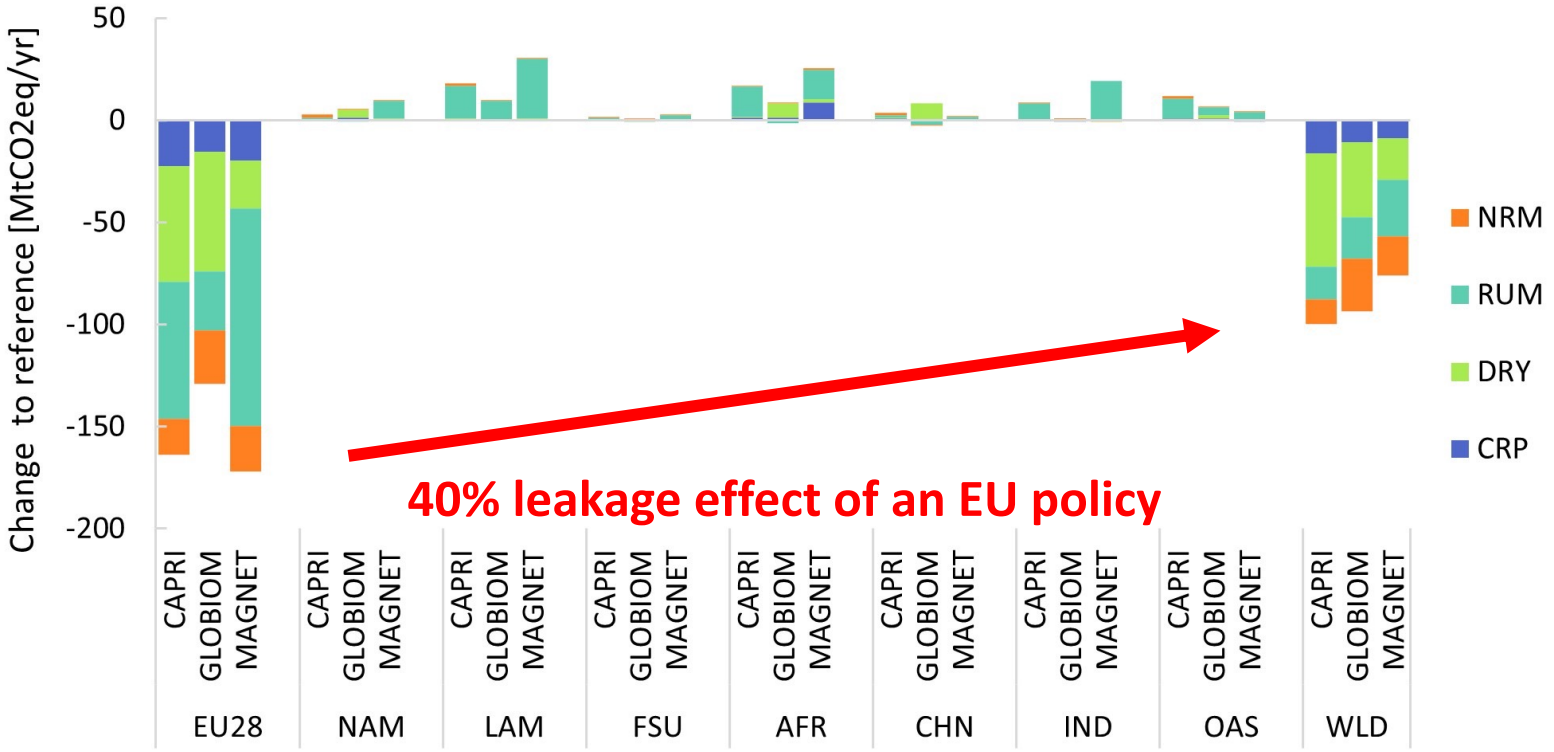
MAGNET

# EU agricultural sector mitigation: Unilateral action



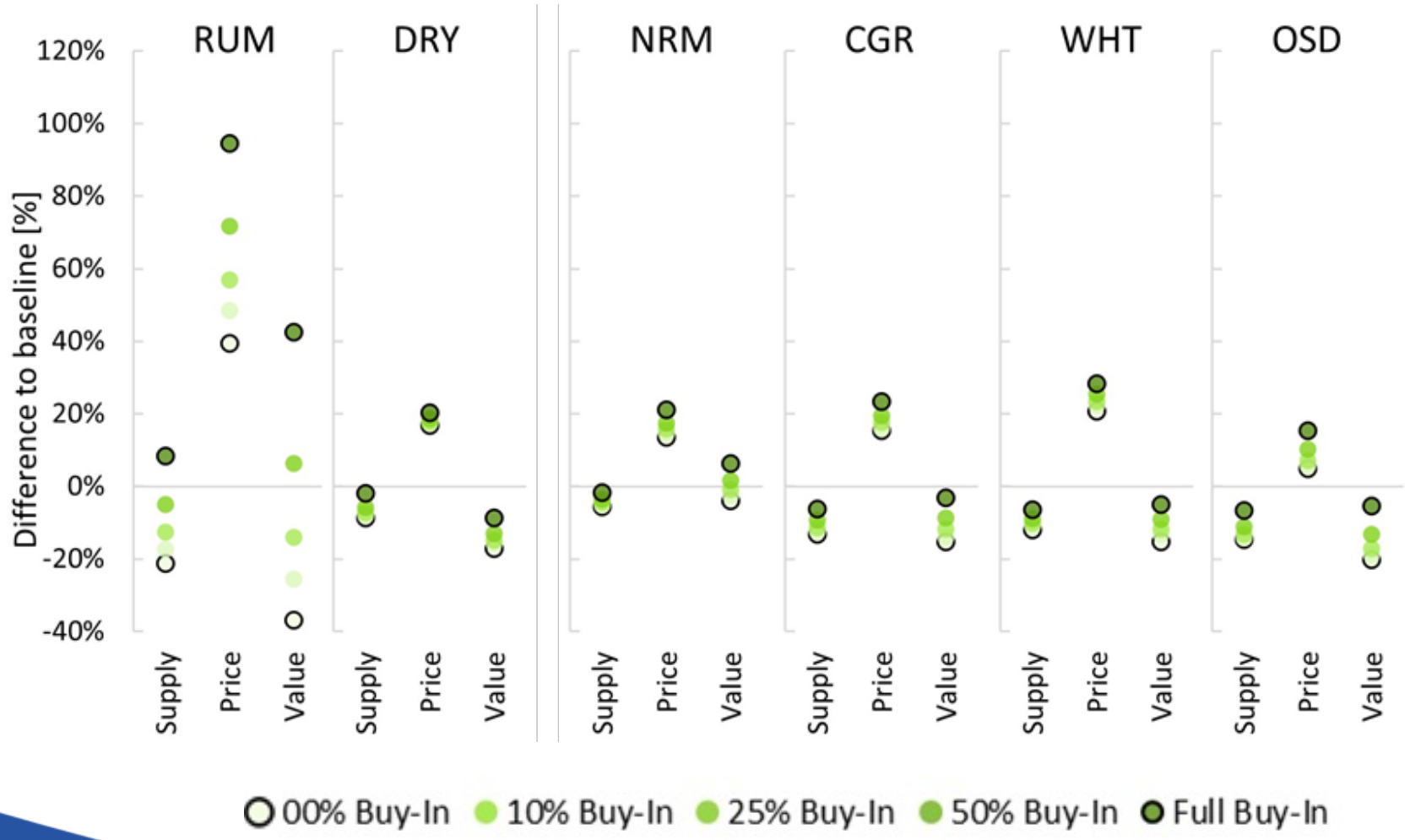

- EU mitigation: 155 $MtCO_2eq\ yr^{-1}$ (36%)
- Livestock sector contributes 90%
- Beef and dairy contribute 75%
- $CH_4$ represents 65%
- Mitigation options: Technological > Production level > Structural change

# Global agricultural sector mitigation: Unilateral action



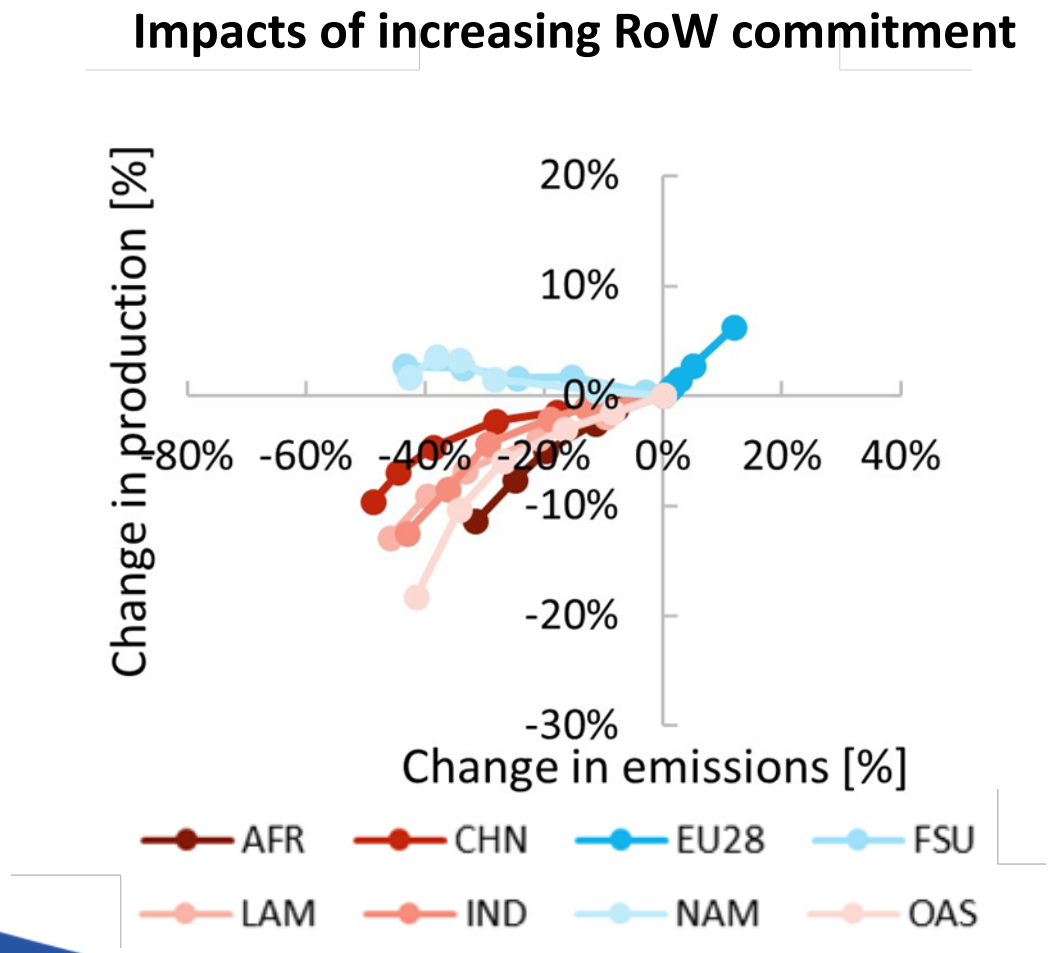

- Global mitigation: 90 $MtCO_2eq\ yr^{-1}$
- Leakage mostly through beef
- Latin America increasing exports to EU and substituting for EU imports in Africa
- Africa partly compensating loss of EU exports domestically

# EU agricultural sector with increasing RoW commitments




- **Unilateral action**
  → decreasing EU production and farmers revenues unless compensated
- **Coordinated multilateral action**
  → Opportunities for EU farmers because of GHG efficiency

# Winners and losers of a multilateral action

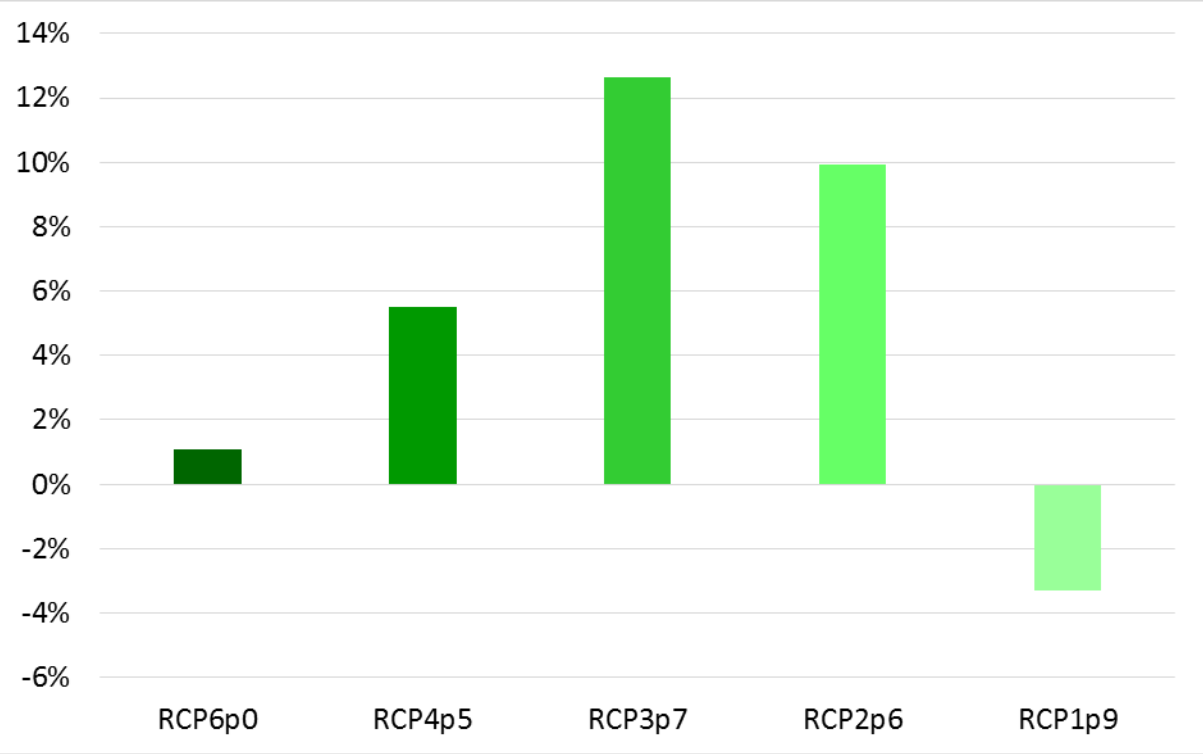



- High income regions benefit from their GHG efficiency
- Sometimes increasing production & absolute emissions
- Low and Middle income countries, without transfers of technologies, reducing production and GHG emissions

# Trade & Climate mitigation: Good servant but a bad master

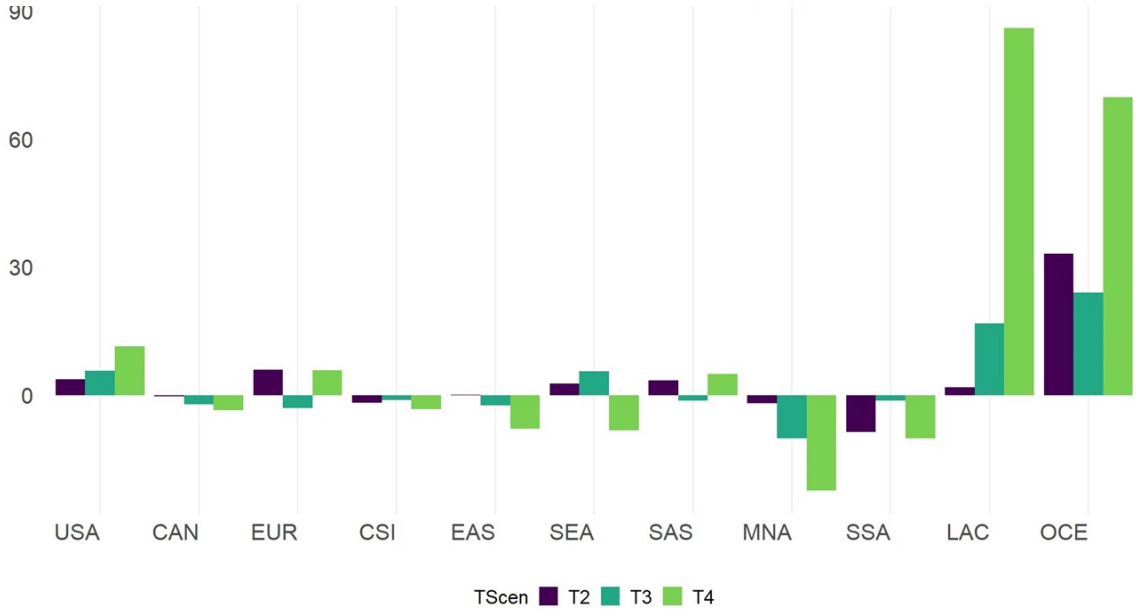
- Trade as a means of mitigation under a coordinated global climate policy

**Global beef trade volume compared to Reference by 2050**




- Trade liberalization without climate mitigation policies detrimental

**AFOLU emissions compared to Reference by 2050 [%]**



Thank you for attention!