



**TAKE THE
INITIATIVE!**

**#EUGreenWeek
13–17 MAY 2019**



Green Week 2019

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16-05-2019

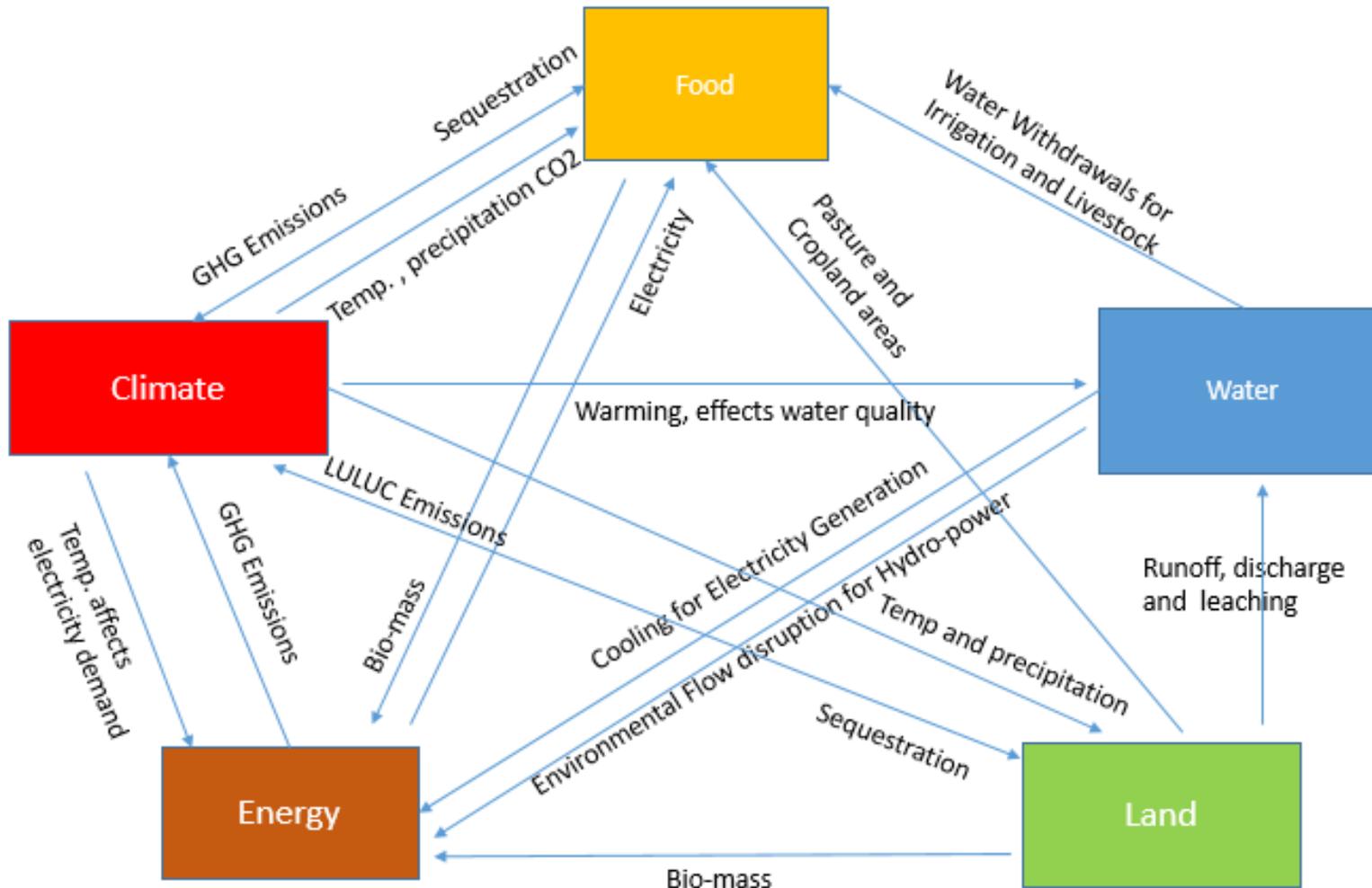
Nexus in Europe

Wageningen Economic Research; PBL Netherlands Environmental Assessment Agency
Potsdam Institute for Climate Impact Research; Universidad Politécnica de Madrid
Cambridge Econometrics

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 689150 SIM4NEXUS



The food, water, land, energy, climate nexus



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Case study summary

- Focus on Nexus interactions
- Focus on Europe
- Explore the transition from Current Trends (SSP2) to a Low Carbon Economy (2 degree) Scenarios until 2050.
- We use various models explore this each with its own focus and level of detail on various Nexus interactions
- Each model chooses different mitigation pathways best suited to achieve the low carbon economy.



Case study summary

- The European Case study has a similar approach to the Global case study
- Global case study explores the interaction between the Nexus and the SDGs
- The European Case study examines the transition pathways to a low carbon economy in Europe and the impact of that transition on the Nexus elements.
- Both case studies explore these nexus interactions quantitatively using models.

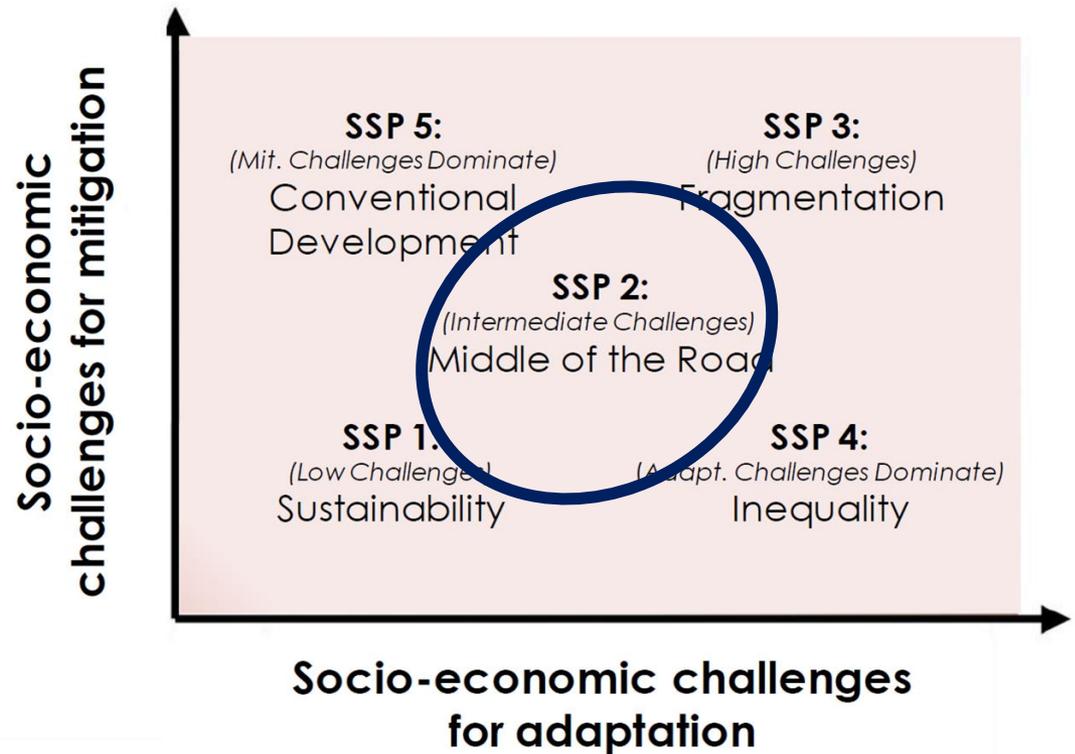
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Current trends and Low Carbon-Economy

- SSP2 population and GDP middle of the road (models used their own approximation).
- 2 degree emission pathway (RCP 2.6 van Vuuren et al. 2011)



Source: O'Neill et al. (2017)

Methods

Models	Model type	Economic Coverage	Nexus focus	Main Climate Policies
MAGNET	General Equilibrium	Full Economy	Energy and Agriculture	Carbon Tax on all emissions; Land Based mitigation from IMAGE
IMAGE	Integrated Assessment	Linked to MAGNET	Land, Agriculture, Energy	Carbon tax on energy and industry, protection of all forests with carbon storage of >10 tC/ha, mitigation in agriculture based MAC from Lucas et al. (2007)
CAPRI	Partial Equilibrium	Agriculture	Agriculture	Price on non-CO2 emissions in Agriculture
E3ME	Econometric	Full Economy	Energy and Climate	Carbon tax, investments in energy efficiency and renewable energy, regulations on energy efficiency, vehicle emission etc...
MAGPIE	Partial Equilibrium	Agriculture	Agriculture	Increase in Bio-energy demand consistent with Popp et al. (2018); Land based mitigation reforestation based on NDCs; mitigation in agriculture based MAC from Lucas et al. (2007)

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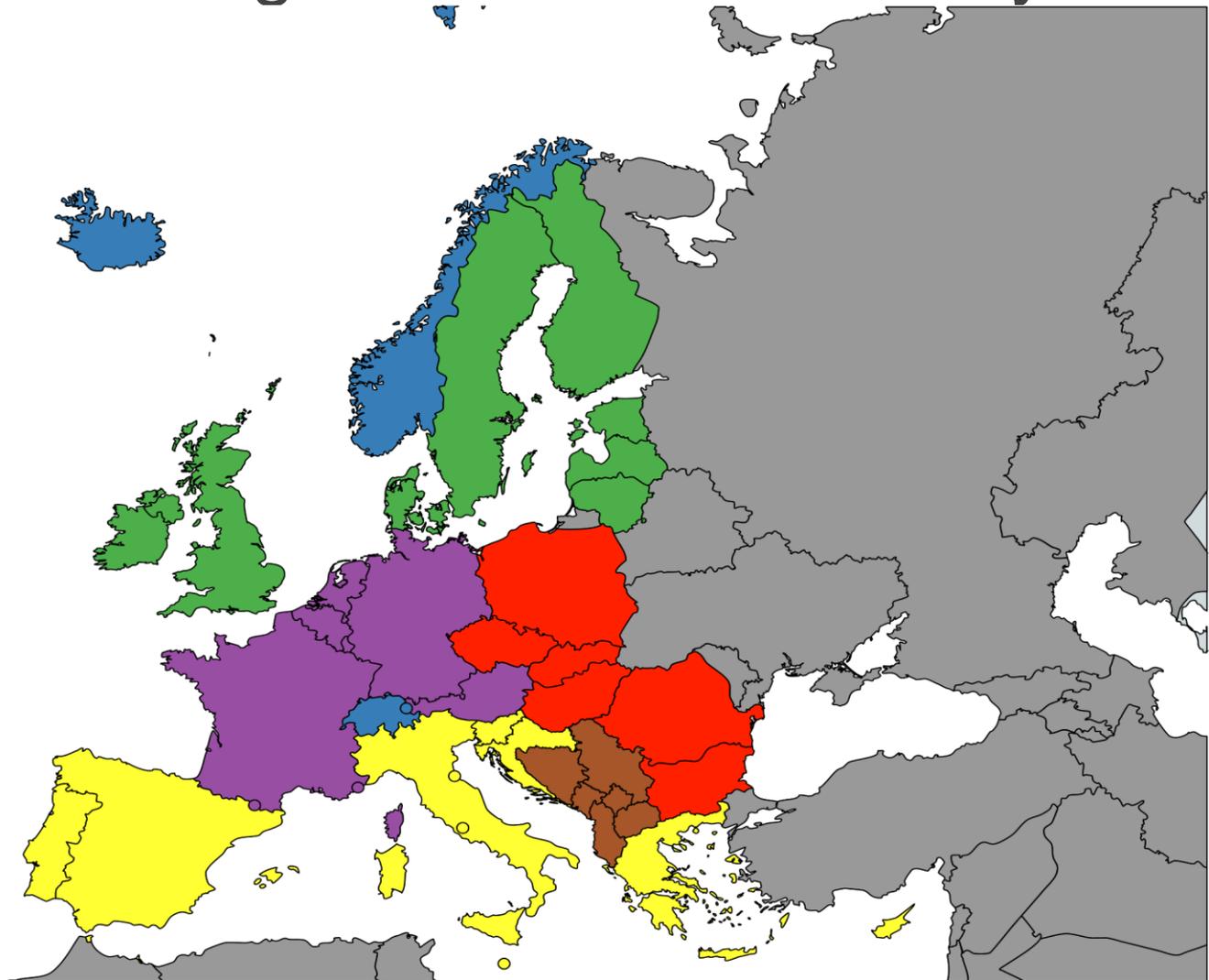


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European regions in the case study

S4N European case

- Non-EU Western Europe
- EU Northern Europe
- EU Western Europe
- EU Eastern Europe
- EU Southern Europe
- Non-EU Eastern Europe
- rest of the World



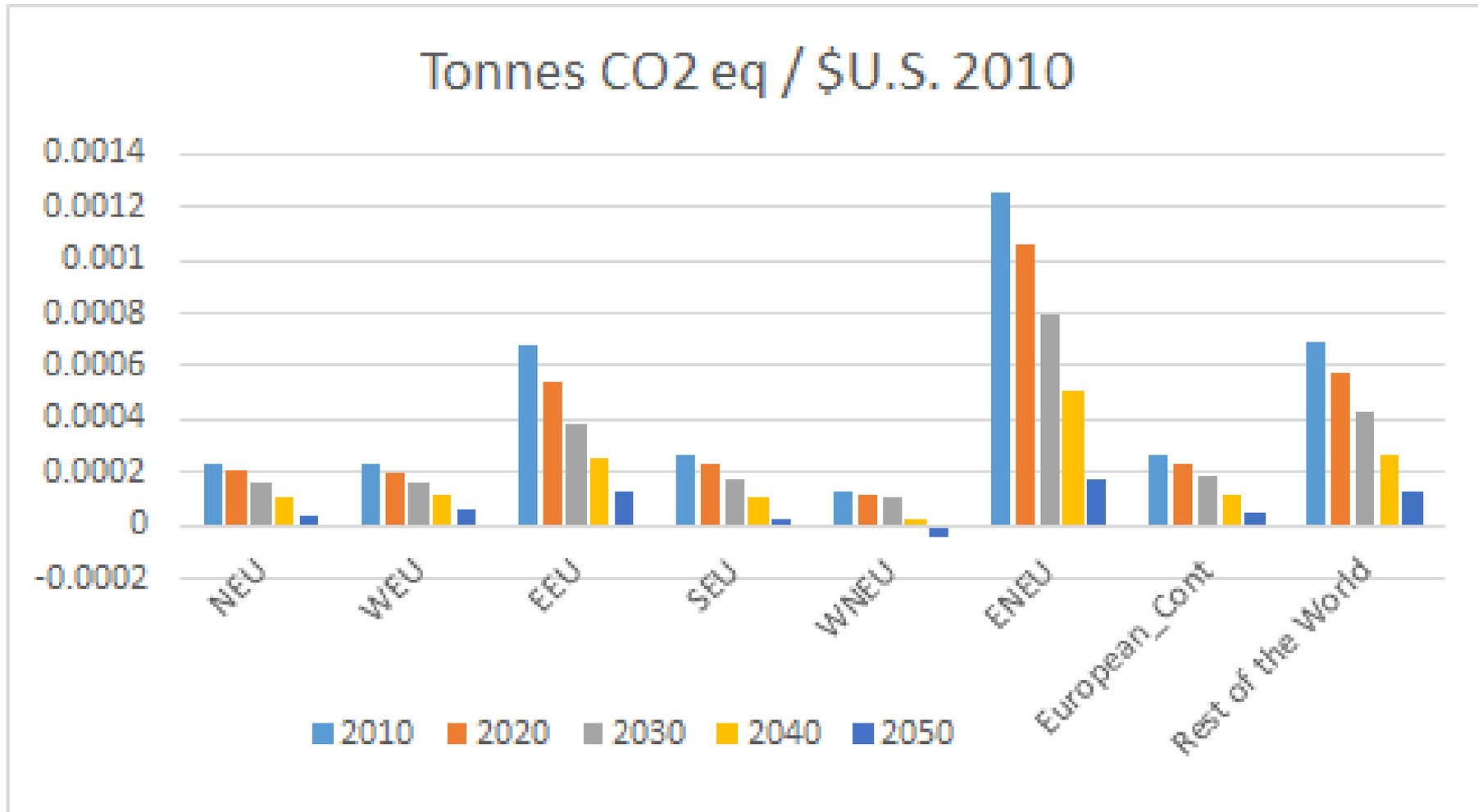
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Emissions per unit of GDP

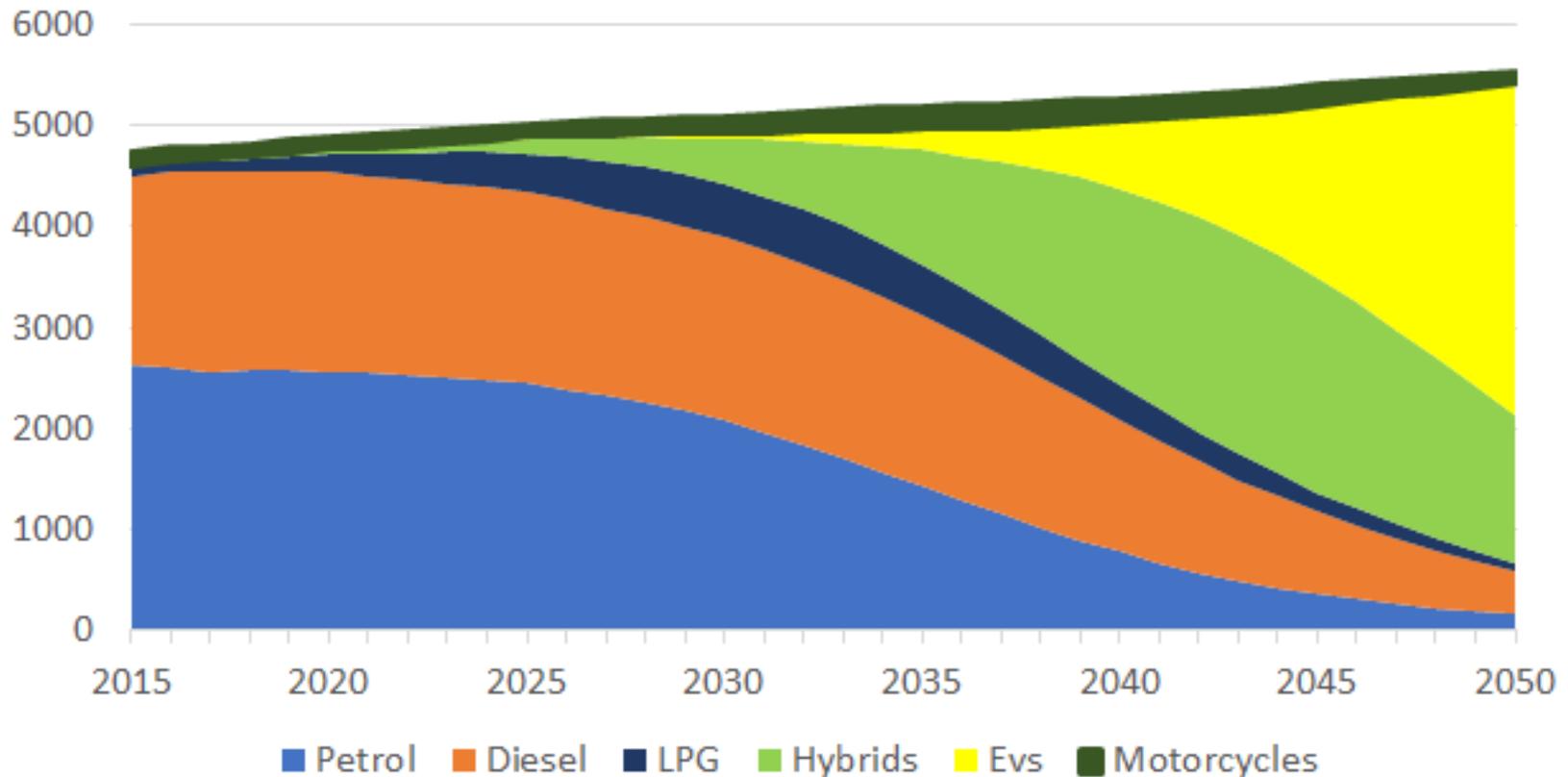


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EU28 Vehicle shares by technology, Bpkm/y, 2-degree



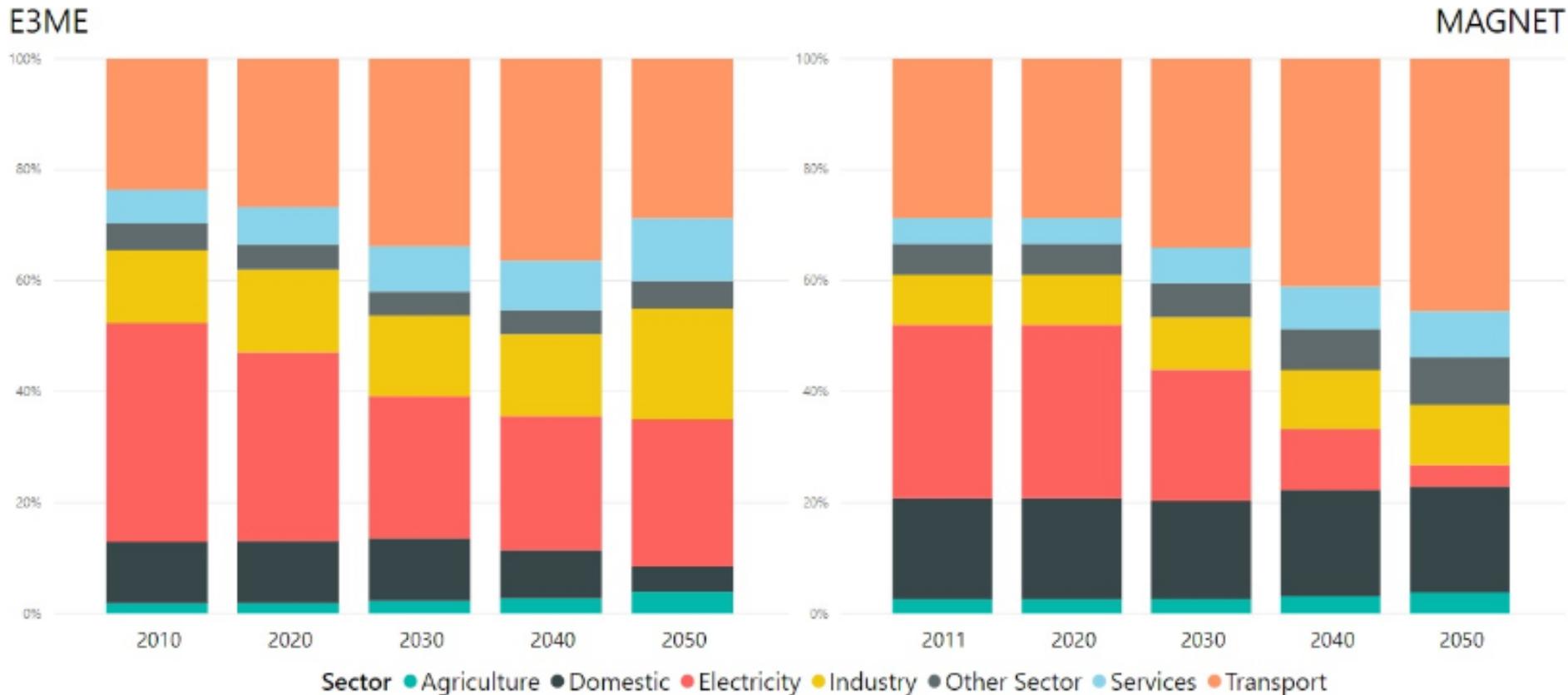
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Source of emissions Europe

CO2 EMISSION FROM ENERGY USE BY SECTOR
2 DEGREE; EUROPE

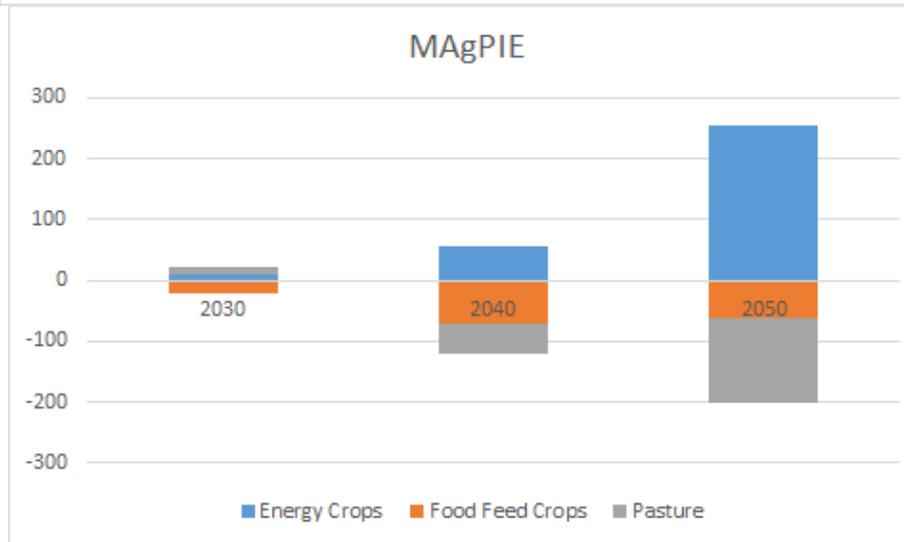
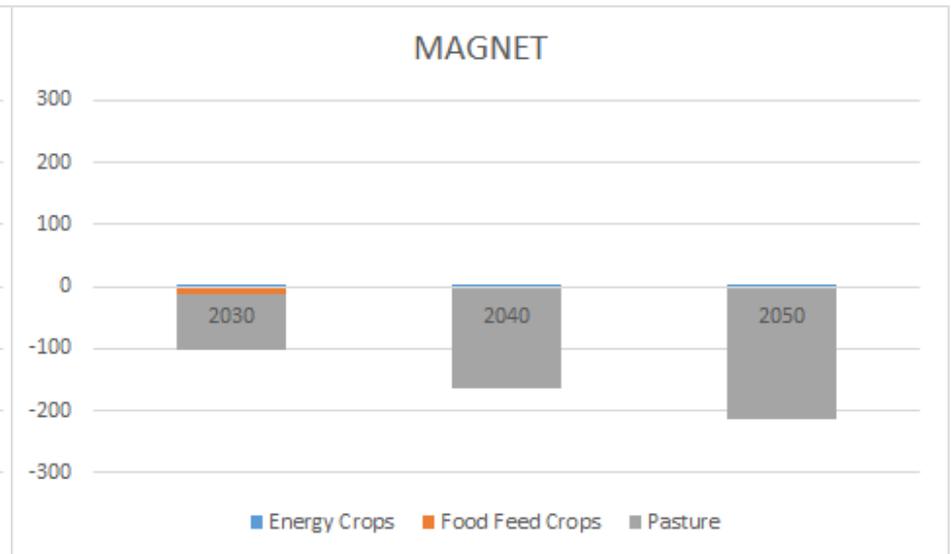
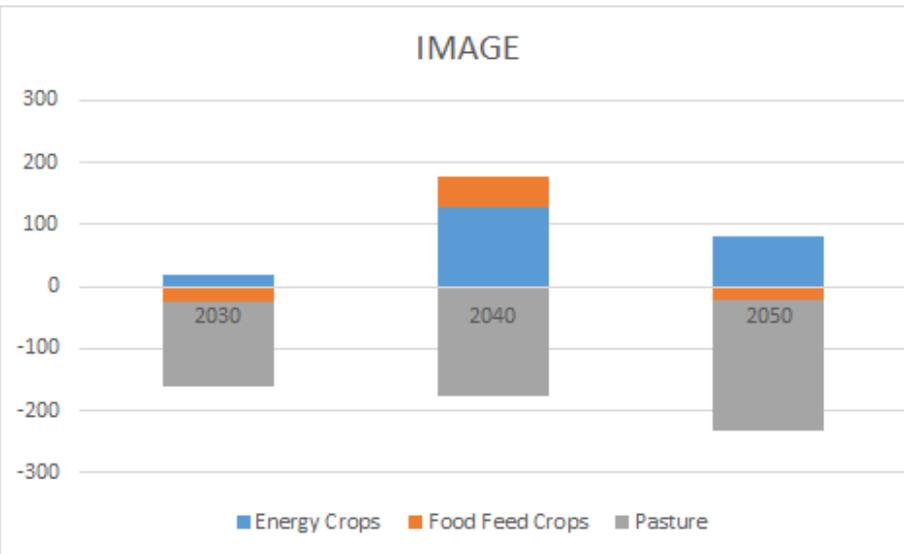


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Change in Ag Land Use; Million Ha; World

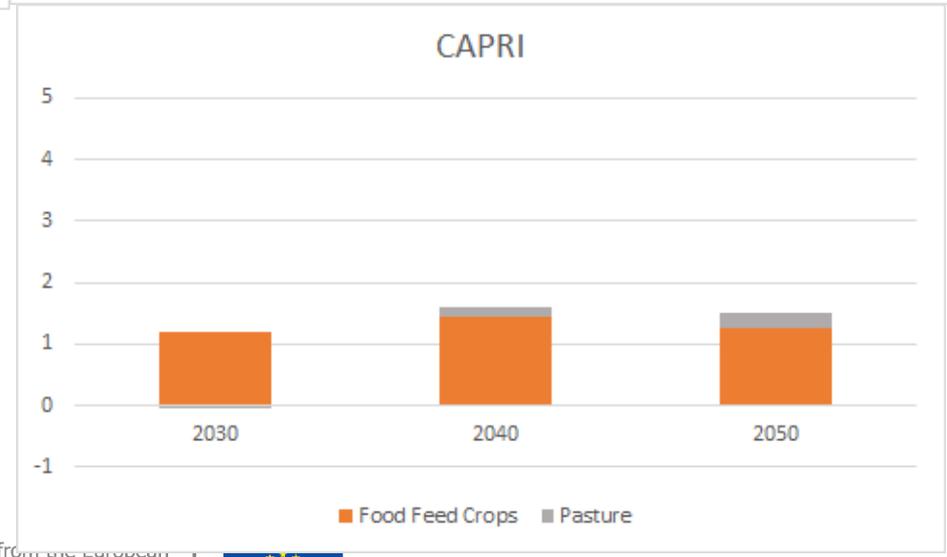
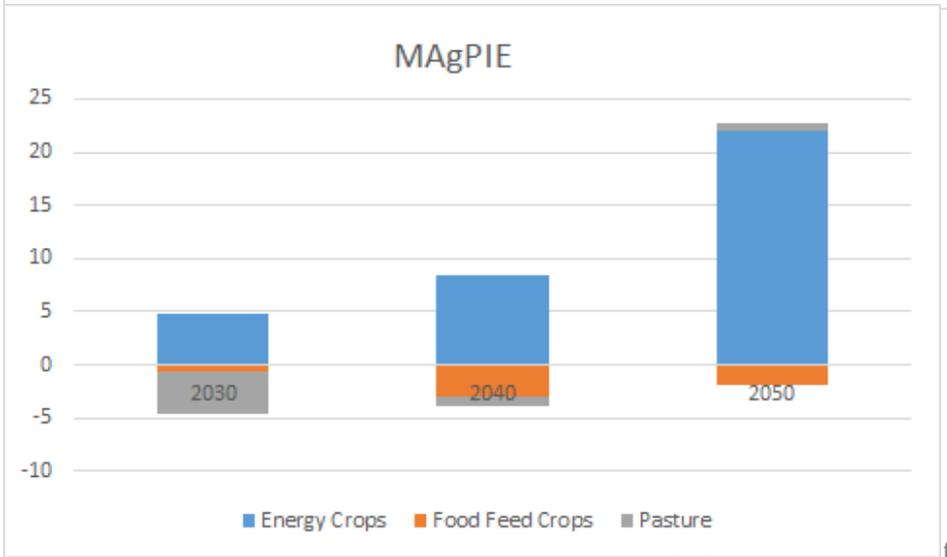
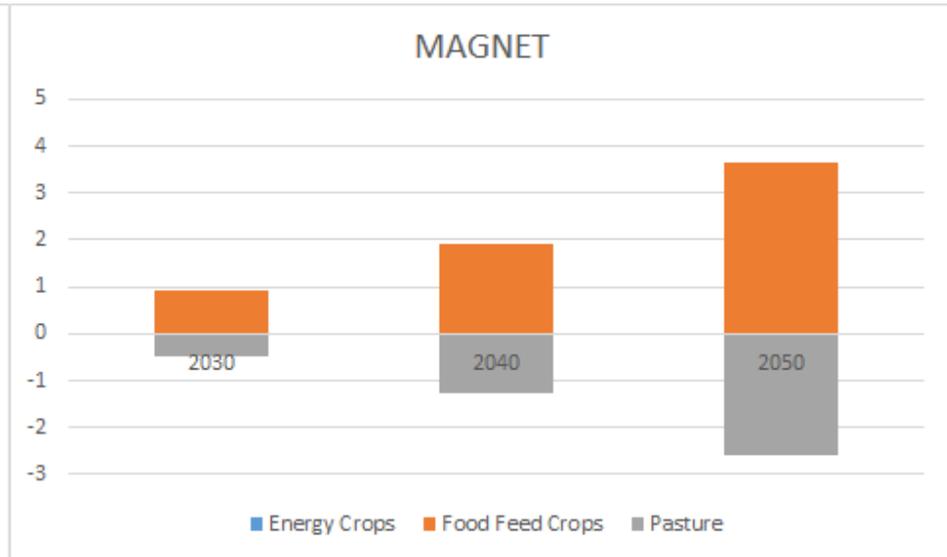
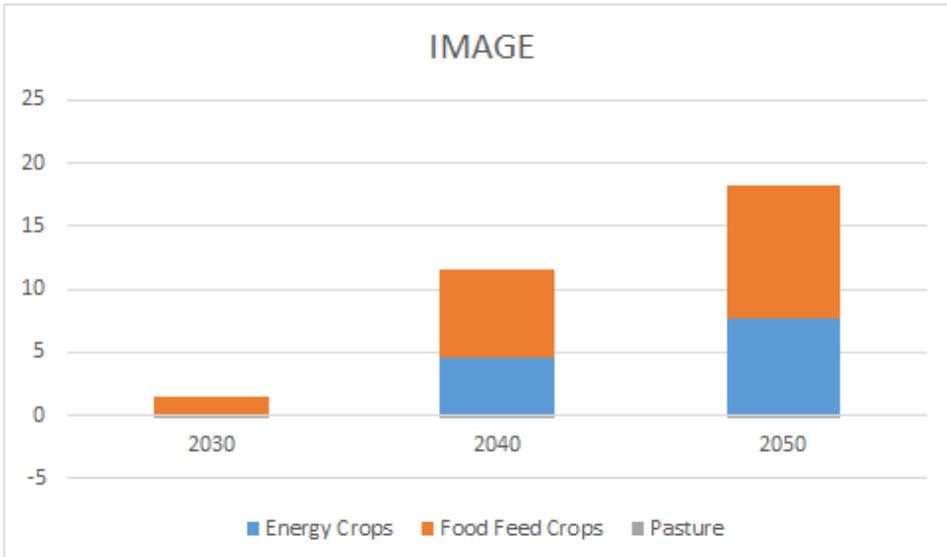


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Change in Ag Land Use; Million Ha; Europe

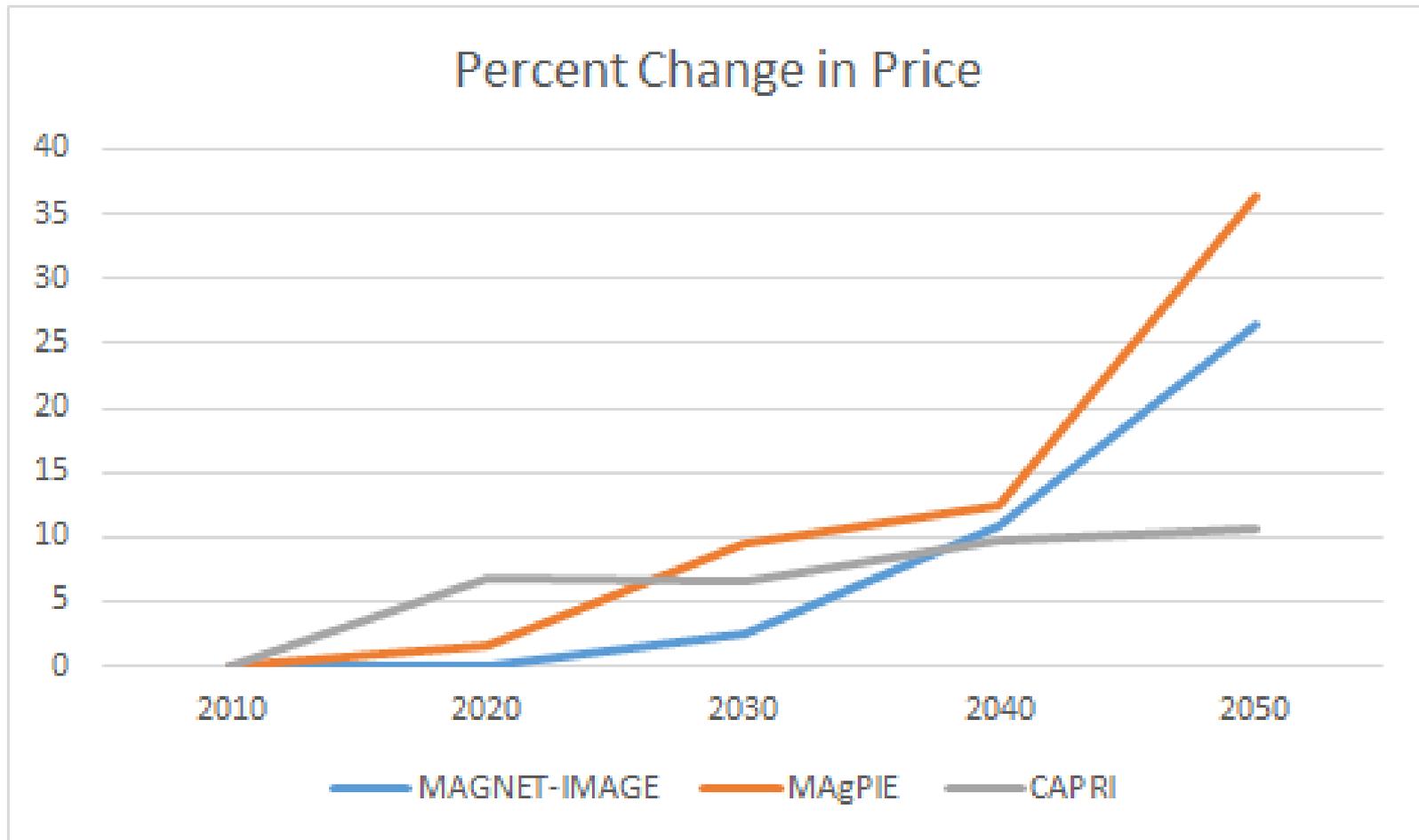


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Price of Agricultural production in Europe: baseline and mitigation scenario



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Summary-Discussion points

- Europe as a whole is better positioned to make the transition to a low carbon economy compared to the rest of the world.
- The transition to cleaner technology not only affects the internal transition of a sector (e.g. transport) but also other polluting sectors as well as it is the combined emissions reduction that needs to be realized.



Summary-Discussion points

- Agricultural Climate mitigation policies shift production away from livestock towards crop production.
- This reduces the pressure on land and allows an increase in crop production.
- The ability of citizens to make the shift in diet from meat to plant based will affect determine the resulting rise in average food prices.
- The impact of increased production of bio-energy on agriculture and food will be small if the required bio-mass can be taken from residues and waste products and/or grown on degraded land not otherwise used for production.



Other Scenarios to explore alternative pathways to the low carbon economy

- Resource efficiency and the Nexus
 - Improvements in energy efficiency, savings, faster uptake of green energy technology and CCS.
 - Improved agricultural yields and irrigation efficiency and costs.
- Shift from Meat to plant based diets
- Adjustments in Bio-Energy Targets
- Europe as a first mover: I.e. Europe meets its climate commitments ahead of the rest of the world.

