

DECIPHER

Holistic decision-making for climate & environment

Towards climate resilience: Integrated assessment of mitigation, adaptation and biodiversity conservation pathways

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Brussels, 16 October 2025

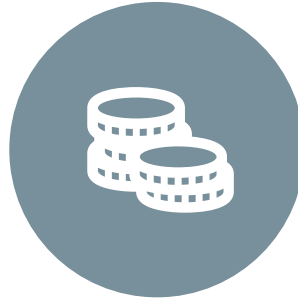


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Increasing challenges to sustainability and wellbeing



ONGOING CLIMATE AND
BIODIVERSITY CRISIS



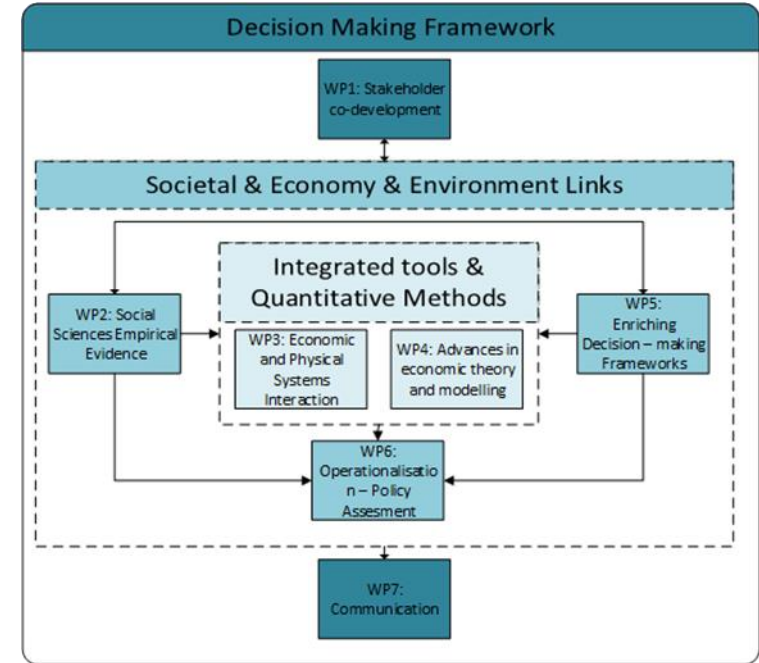
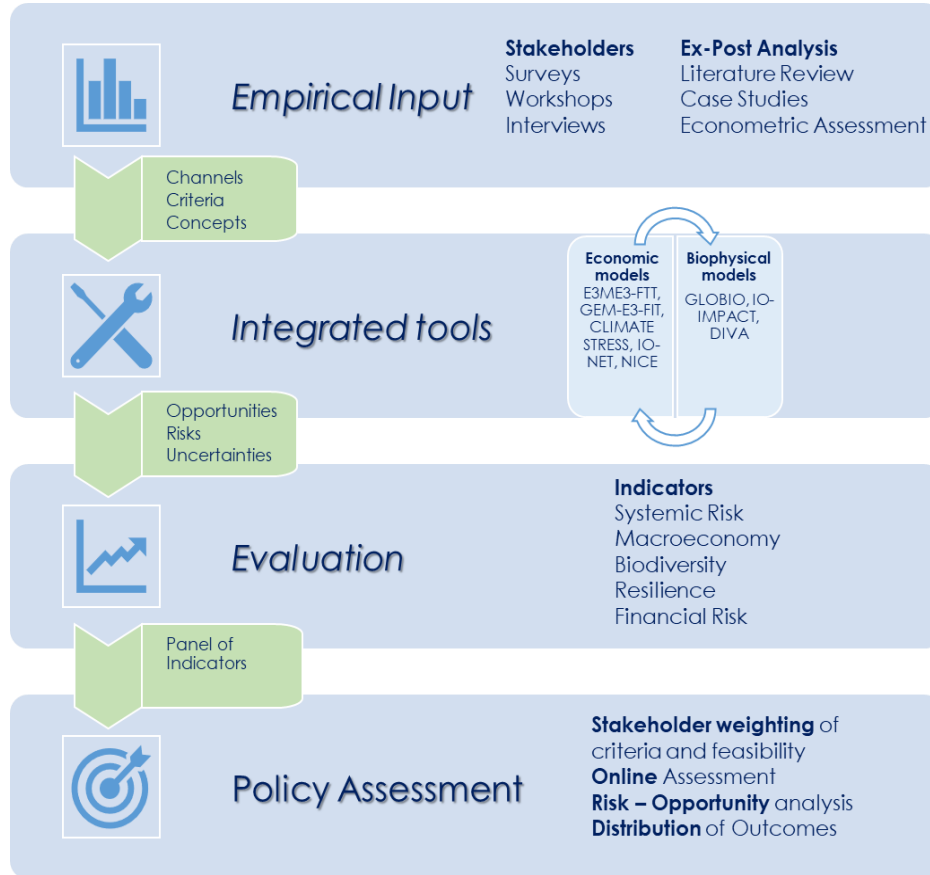
INCREASING ECONOMIC
FRAGMENTATION AND
INEQUALITIES



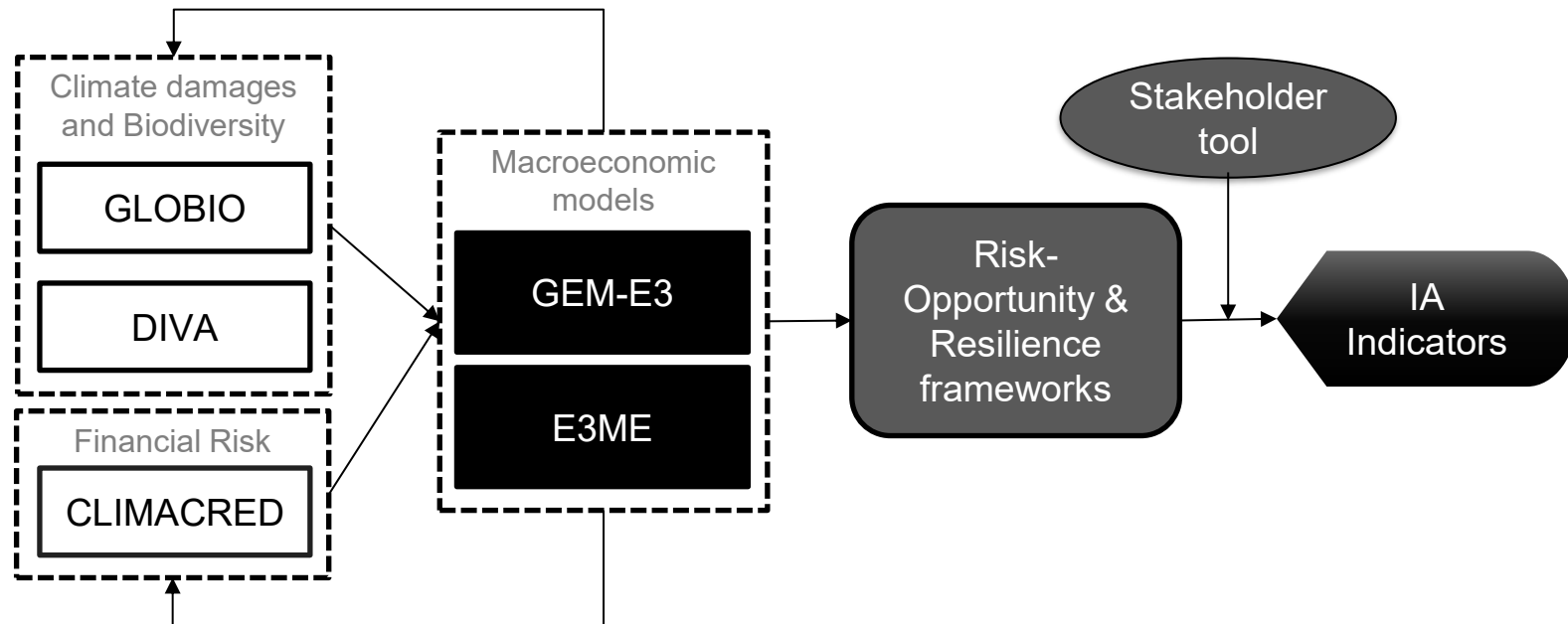
GEOPOLITICAL CRISIS

DECIPHER Objective

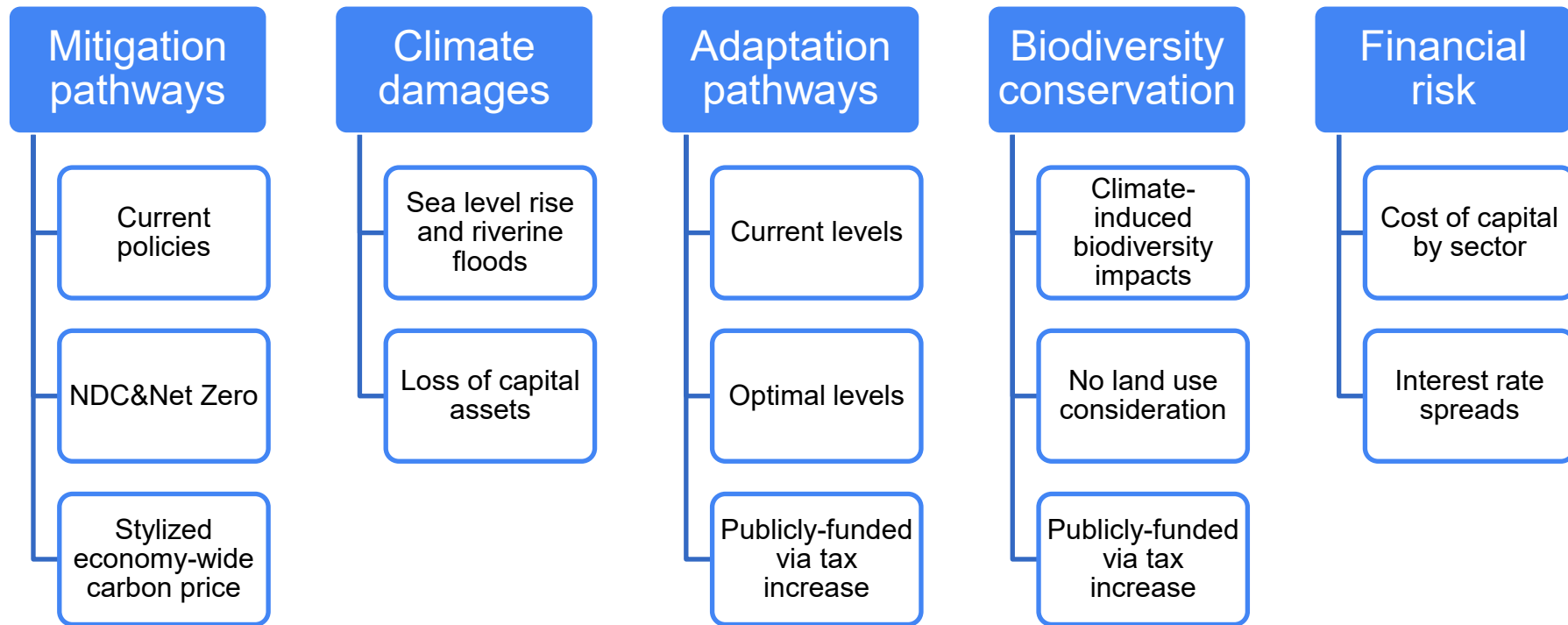
CREATING KNOWLEDGE	EMPIRICAL	Gain an advanced understanding of the factors and dynamics that shape policy and political decision-making on climate and the environment through a social science lens
	ANALYTICAL	Build an iterative knowledge co-creation process for more transparent, inclusive and representative policy design and evaluation
		<ul style="list-style-type: none">• Develop a new generation of state-of-the-art economic models featuring feedback loops with physical system models• Embed systemic risks and uncertainty and capture behavioural and knowledge dynamics• Improve the representation of the economy-climate-biodiversity nexus
APPLYING KNOWLEDGE		Perform a stakeholder-led impact assessment to highlight enhanced capacities of the DECIPHER decision-making framework
DIFFUSING KNOWLEDGE		Close interaction with stakeholders, universities and academia to demonstrate the advanced holistic decision-making framework accounting for stakeholders' priorities



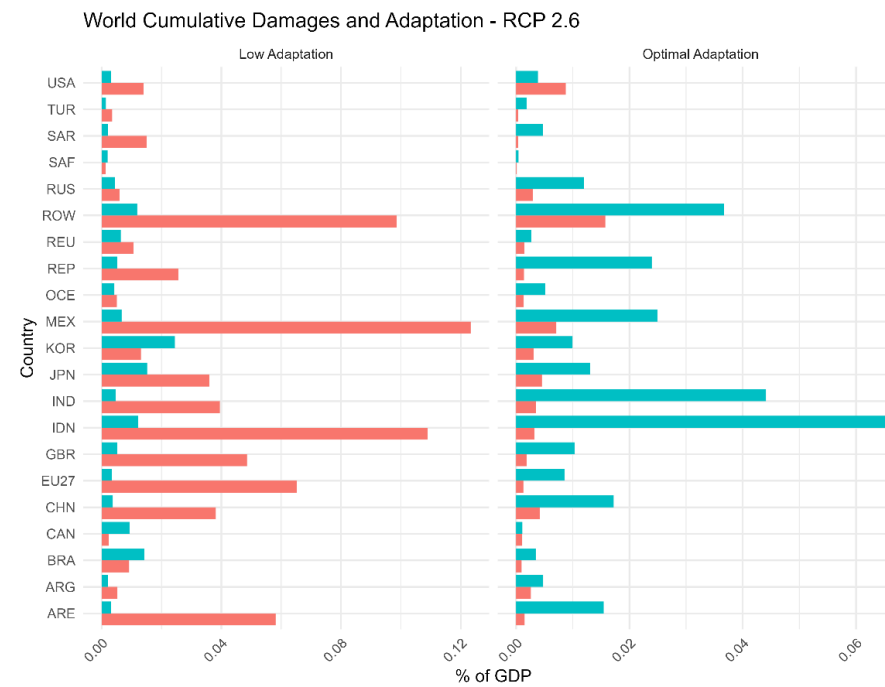
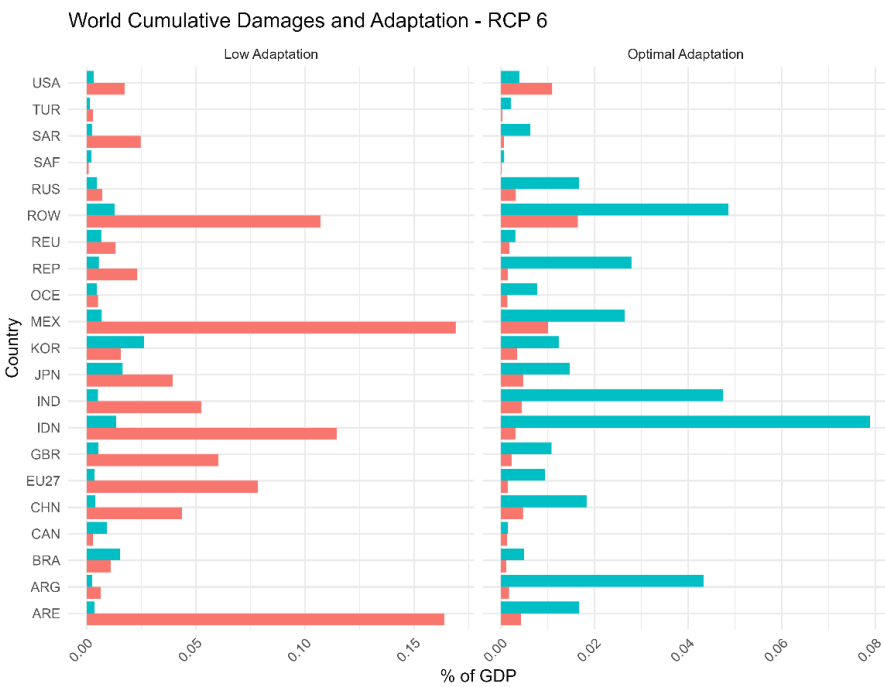
DECIPHER Impact Assessment framework



Scenario framework

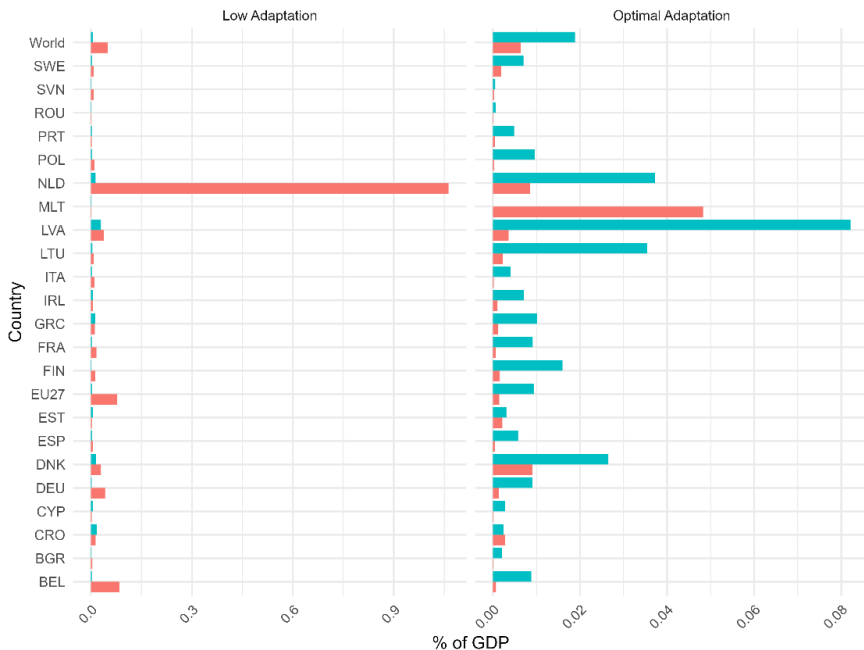


Cumulative 2025-2050 global flood damages (median) and adaptation costs (current or optimal) are only a small fraction of GDP under both Current policies and NDC/LTS

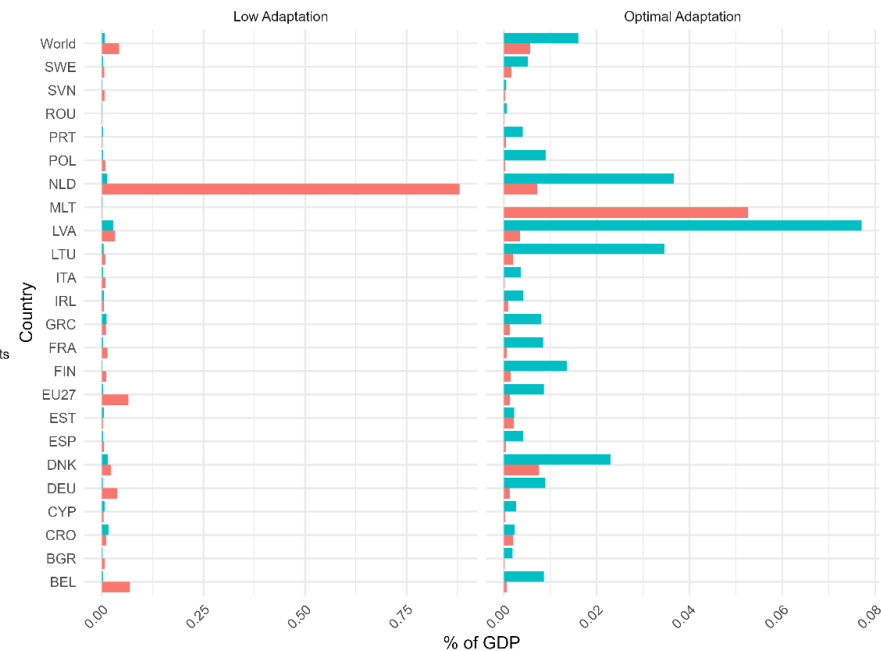


Cumulative 2025-2050 EU27 flood damages (median) and adaptation costs (current or optimal) are only a small fraction of GDP under both Current policies and NDC/LTS

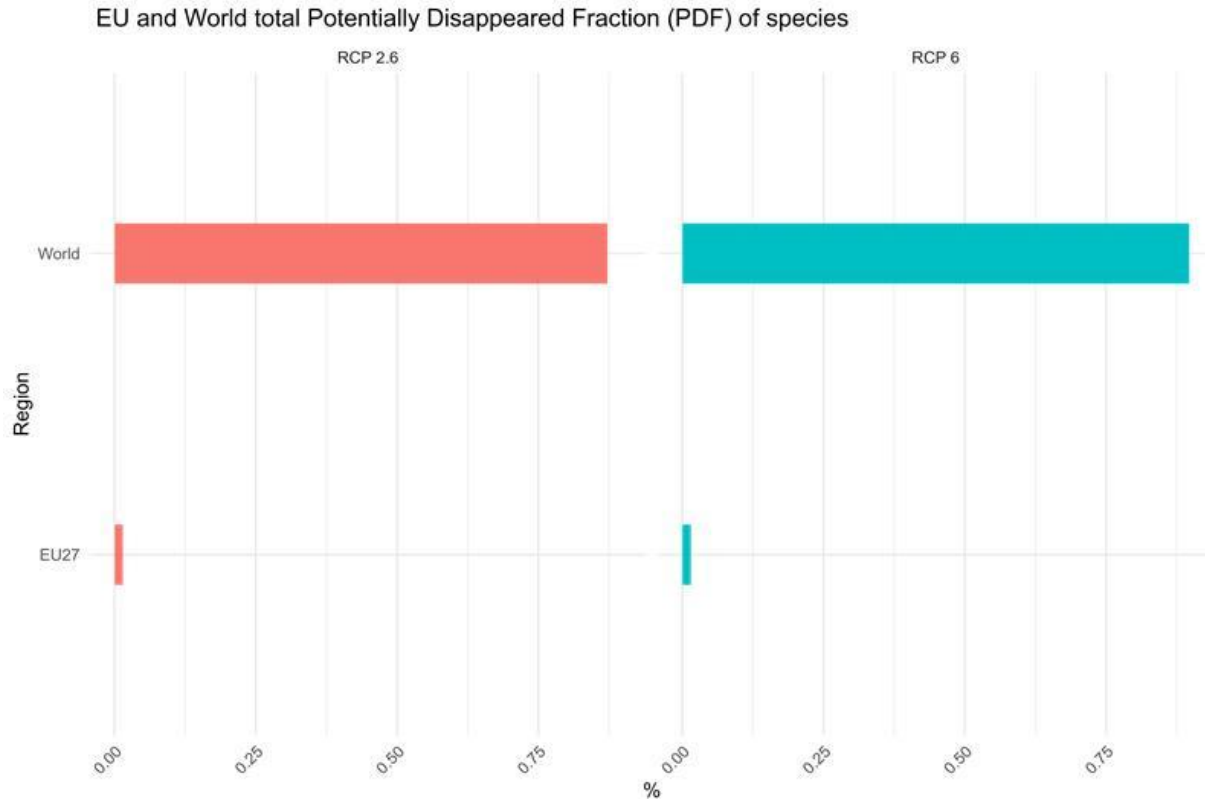
EU Cumulative Damages and Adaptation - RCP 6



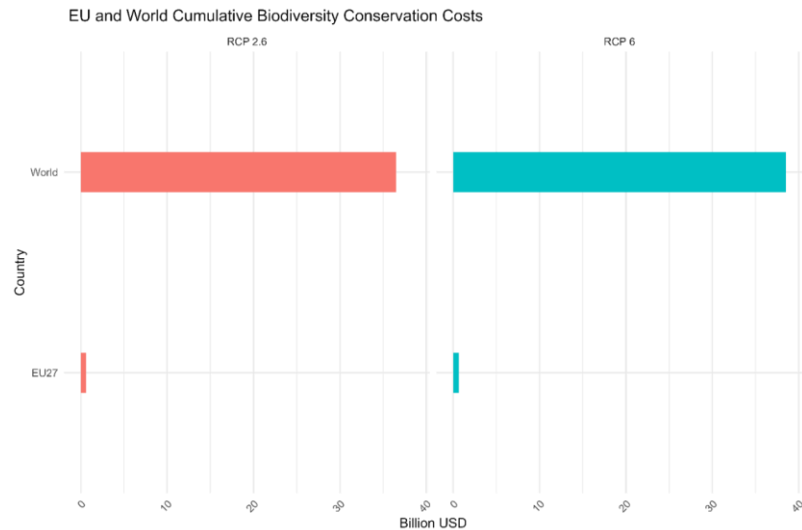
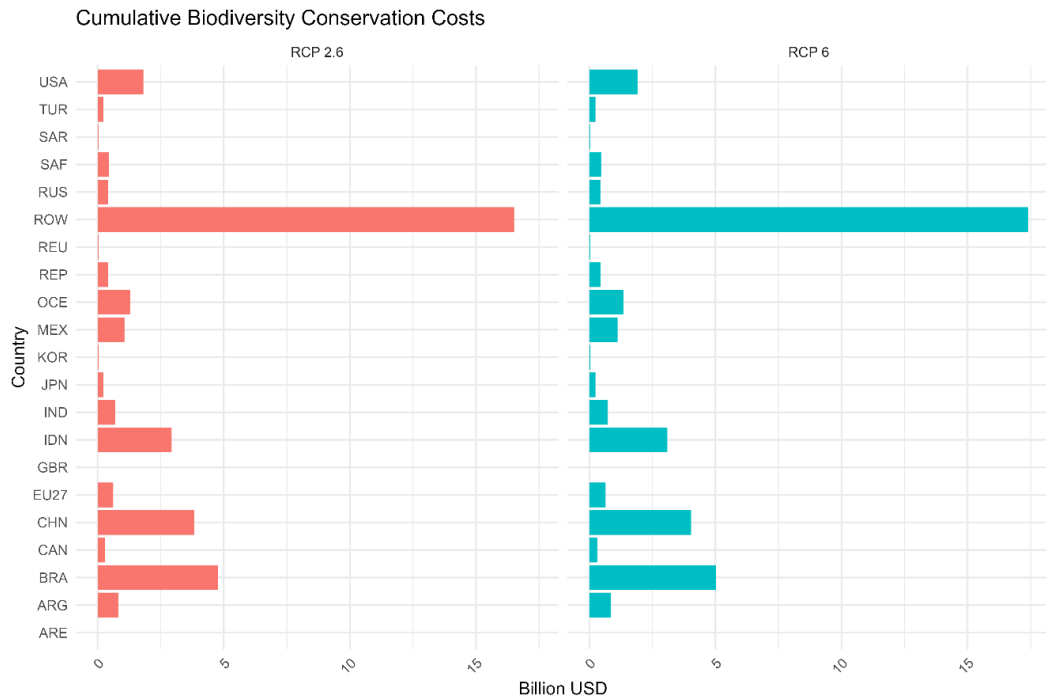
EU Cumulative Damages and Adaptation - RCP 2.6



Biodiversity implications associated to temperature increase in Current Policies and NDC/LTS

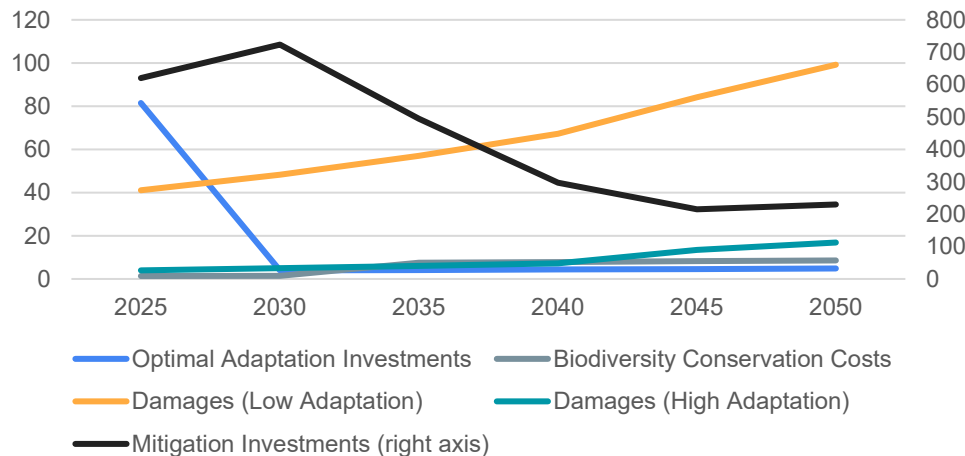


Biodiversity conservation costs associated with impacts on species due to temperature increase are affordable

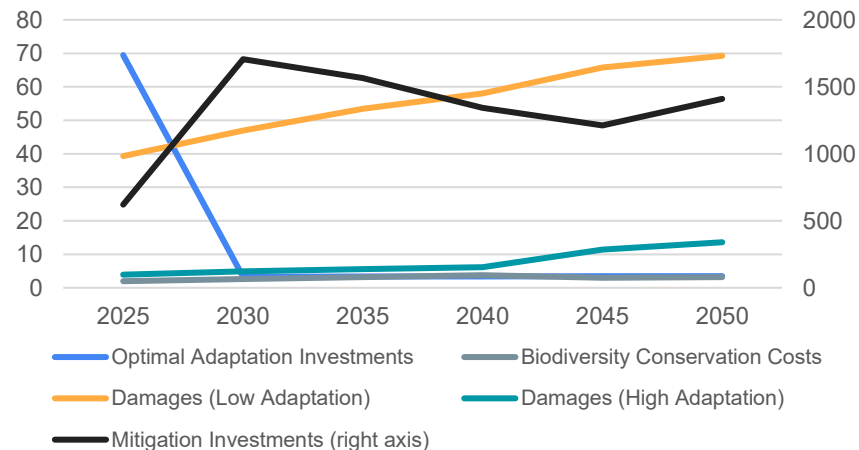


Financing challenges: Power supply mitigation investments and adaptation costs| World

Current Policies - World

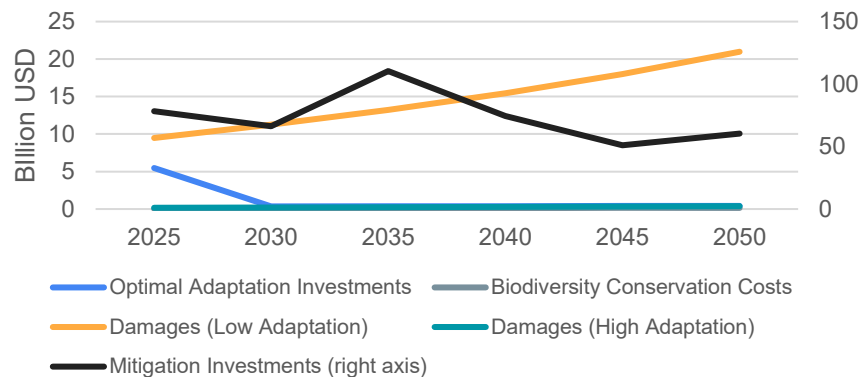


NDC/LTS - World

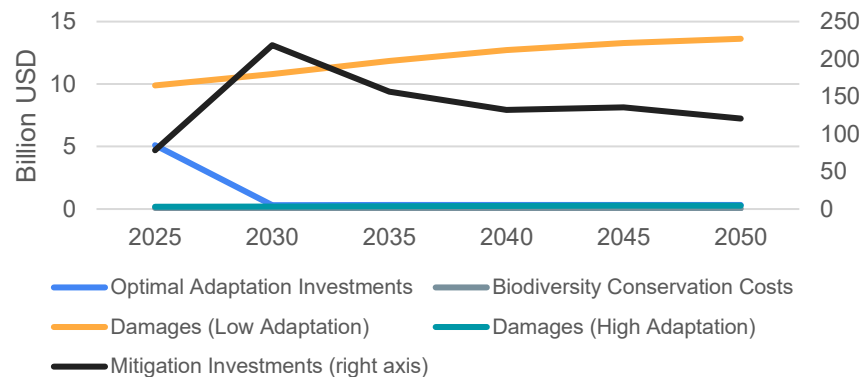


Financing challenges: power supply mitigation investments and adaptation costs | EU27

Current Policies - EU27

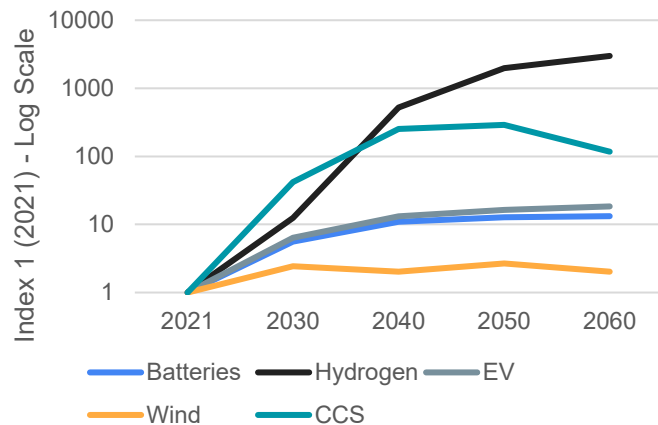


NDC/LTS - EU27

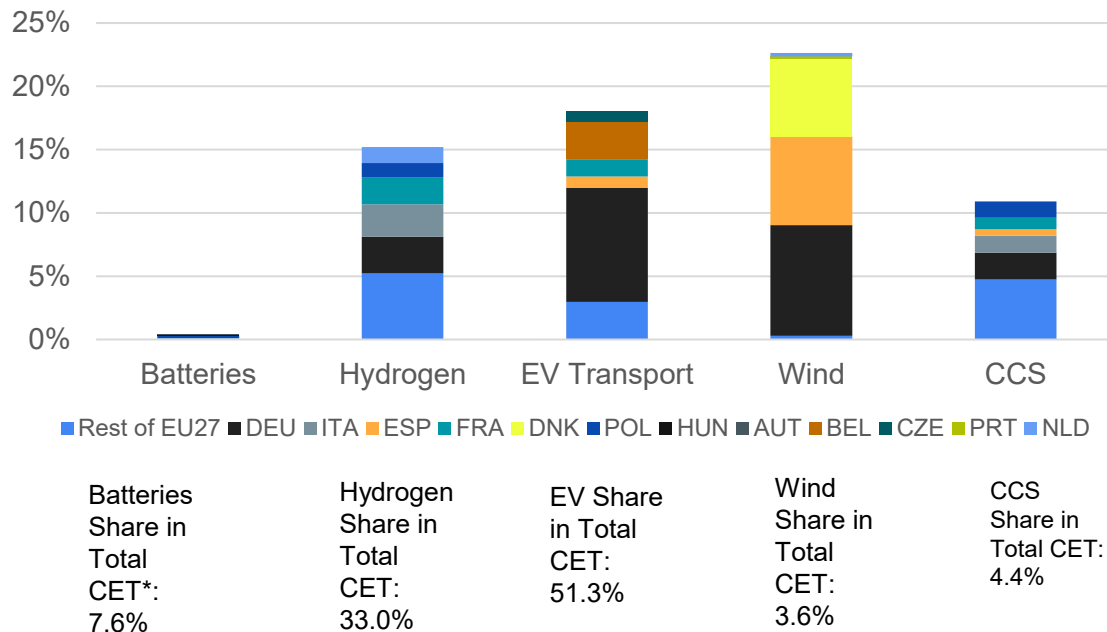


Transition risk opportunities: Emerging markets

MARKET SIZE FOR CET UNDER NDC LTS INDEX 2021



EU27 MS Market Shares in Global Manufacturing, NDC LTS Scenario (2021-2060)

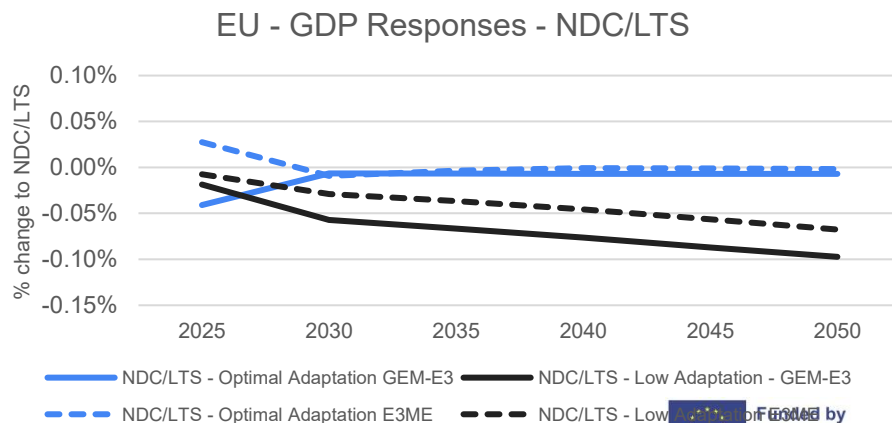
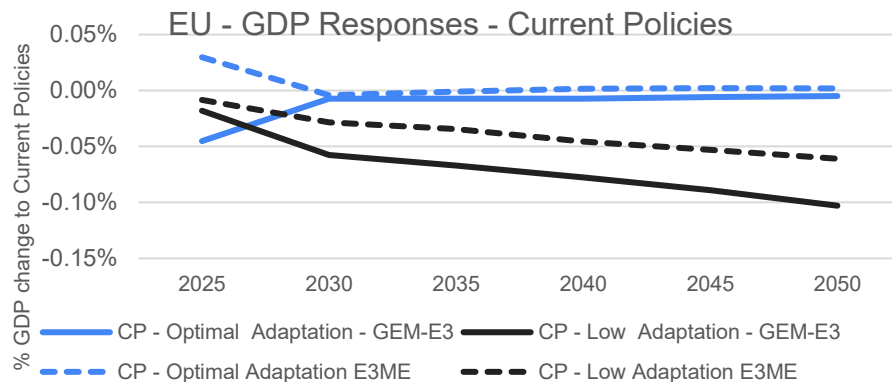


Source: GEM-E3 model

Note that Hydrogen refers to hydrogen fuel, not equipment manufacturing.

Minor GDP impacts in the medium-term when only considering median flood impacts and adaptation costs

- No substantial temperature differences between RCP 6 and 2.4 by 2050
- Adapting in a timely manner can mitigate macroeconomic costs from future climate damages and reduce potential output loss
- Consideration of adaptation costs as having the potential to contribute or not to the productive capacity of the economy is critical for the 2 macro-models

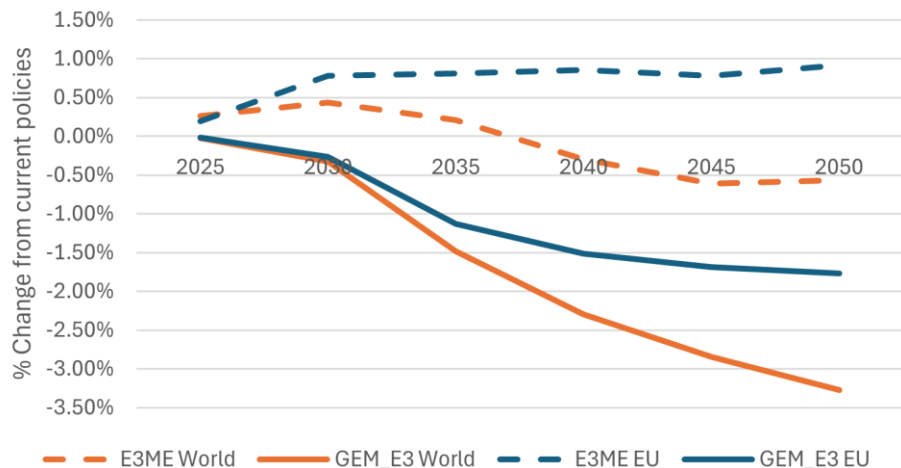


Transition risk and opportunities prevail in the medium-term DECIPHER

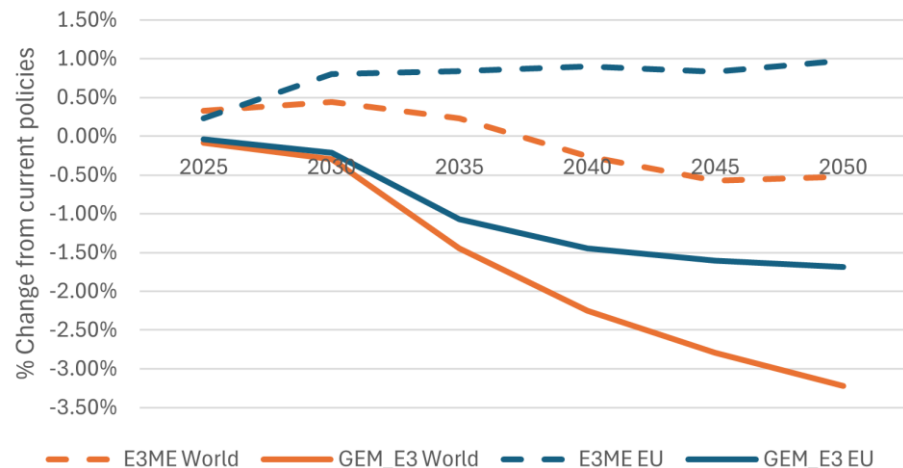
- Integrated run with mitigation, flood damages, adaptation costs and biodiversity conservation for two different climate policy scenarios
- Assumptions on ease of financing of investments are driving diverging macro impacts across the 2 models

GDP % change from Current Policies

NDC/LTS - Low Adaptation

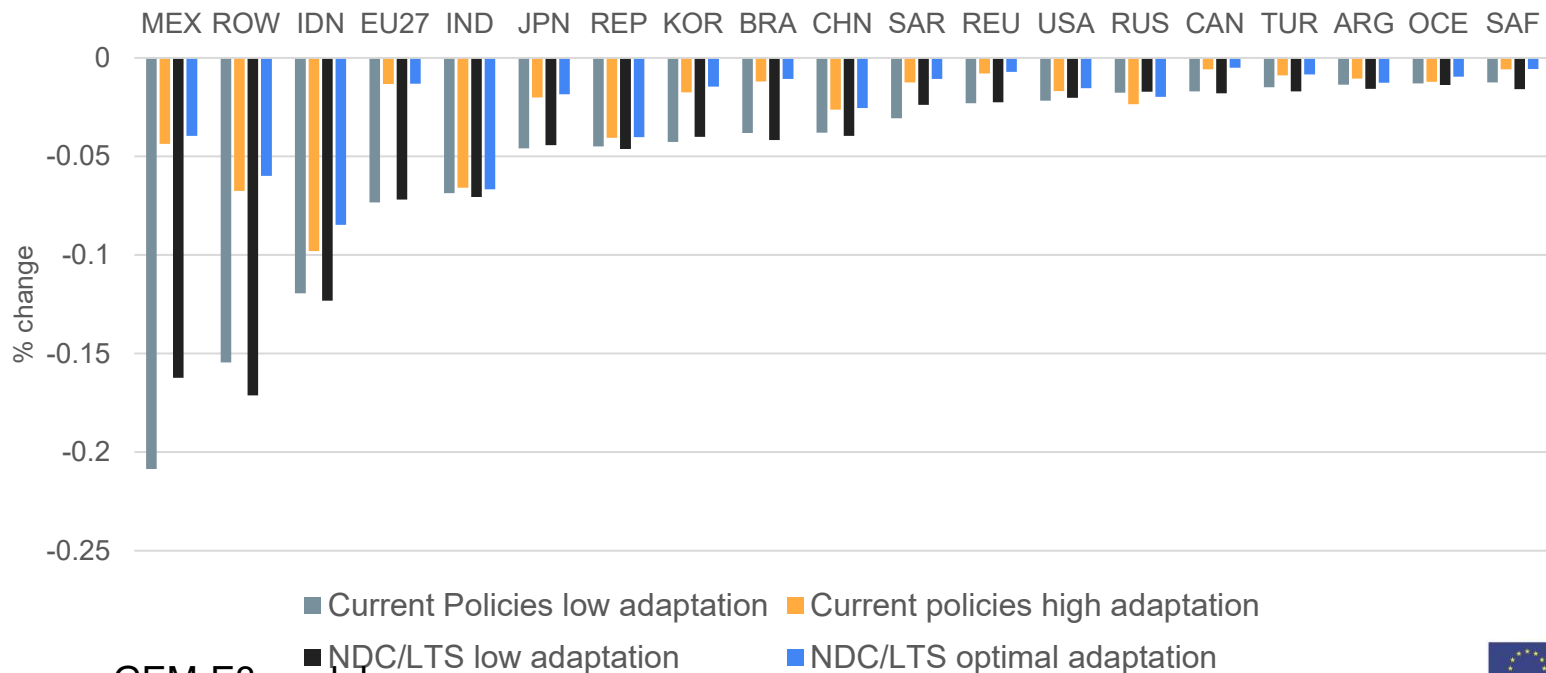


NDC/LTS - High Adaptation



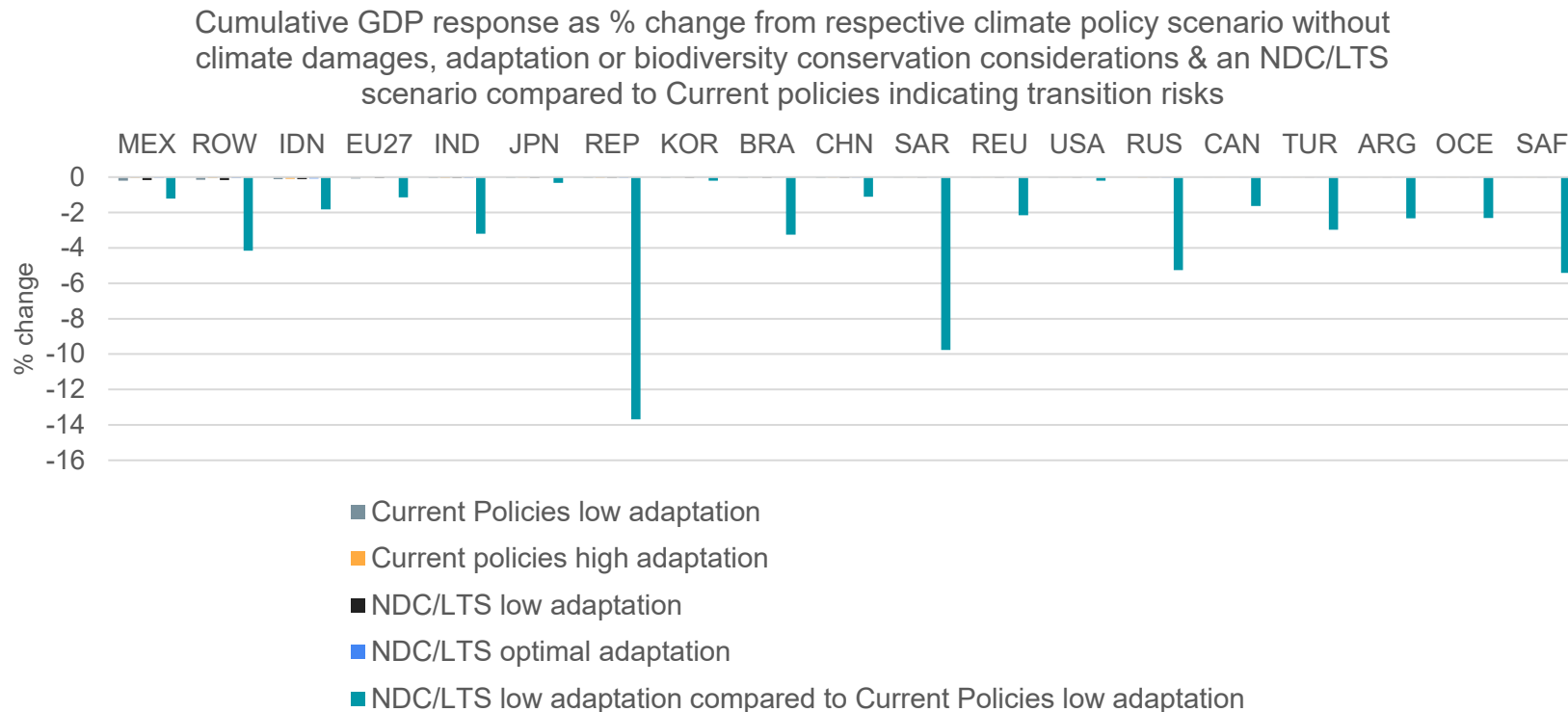
Global asymmetric distribution of impacts driven by flood damages

Cumulative GDP response as % change from respective climate policy scenario without climate damages, adaptation or biodiversity conservation considerations



Source: GEM-E3 model

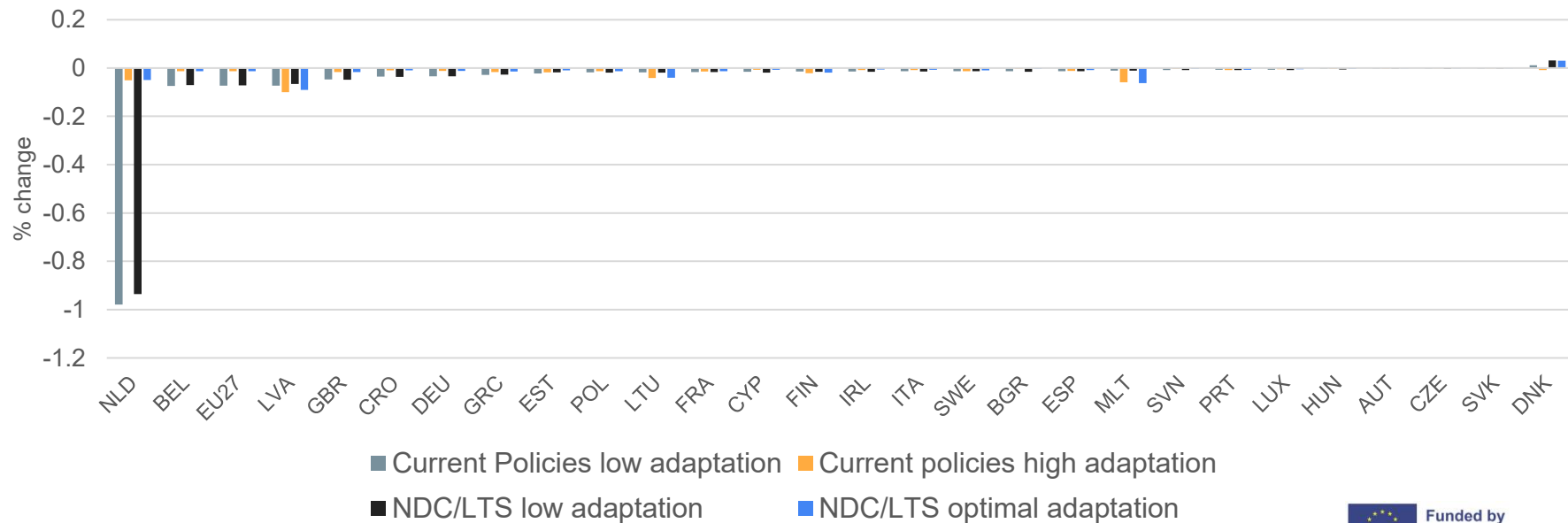
Global asymmetric distribution of impacts driven transition risk



Source: GEM-E3 model

EU27 asymmetric distribution of impacts driven by flood damages

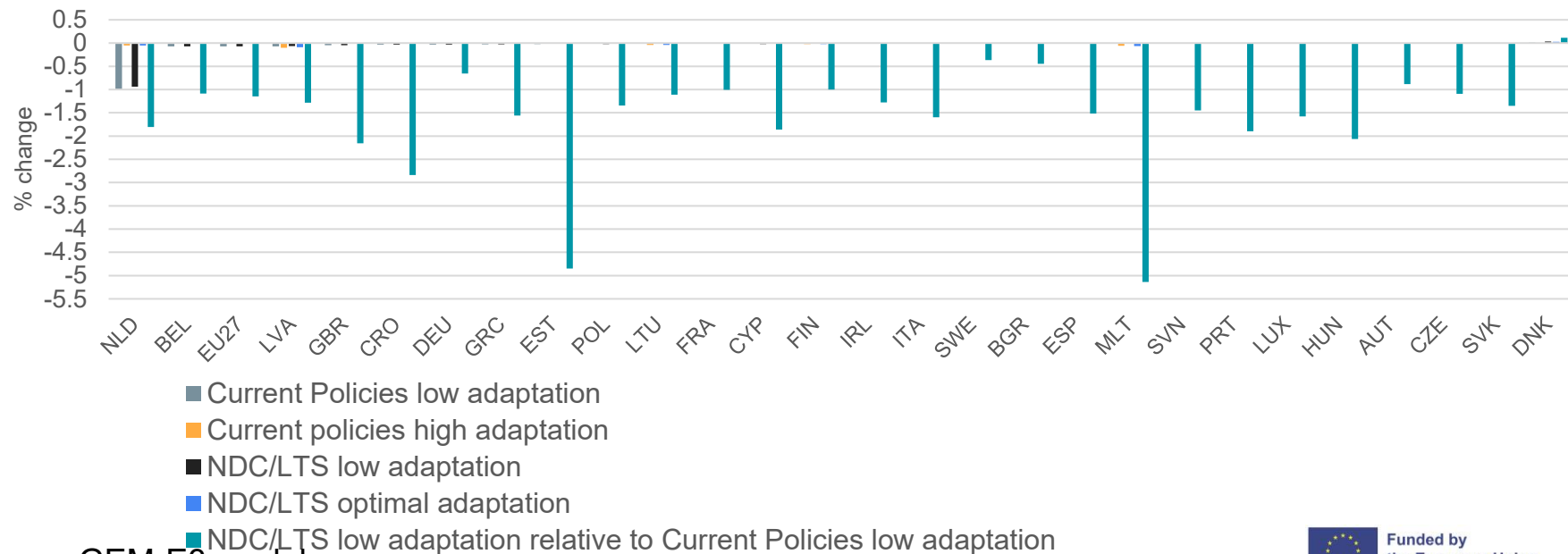
Cumulative GDP response EU27 MS as % change from respective climate policy scenario without climate damages, adaptation or biodiversity conservation considerations



Source: GEM-E3 model

EU27 asymmetric distribution of impacts driven by transition risk

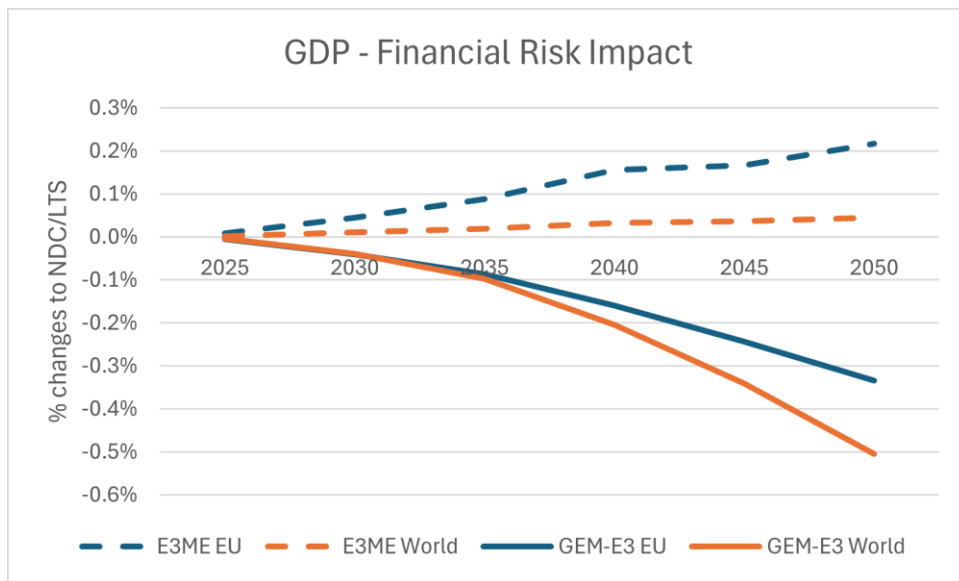
Cumulative GDP response EU27 MS as % change from respective climate policy scenario without climate damages, adaptation or biodiversity conservation considerations + an NDC/LTS scenario compared to Current policies



Source: GEM-E3 model

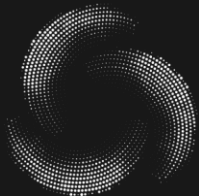
Financial risk considerations amplify macroeconomic impacts

- Considering financial implications of sectoral performance on the cost of capital and the economy-wide interest rate via a link of macro models with the CLIMACRED financial model
- GDP impacts are amplified, below the example of NDC/LTS Optimal adaptation



Key takeaways

- **Financing gap:** Availability and cost of financing of investments is a key driver of macroeconomic impacts both for mitigation and adaptation investments
- In the medium term **transition risks** prevail at the global and EU27 level
- High **regional asymmetries** can highlight different driving forces concerning transition and physical risk
- Partial consideration of **climate damages**, only slow-onset flood risks. Further inclusion of damages needed for an integrated assessment
- Next step focus on **bottom-up integration of further impacts** versus top-down damage function approaches, while considering for **feedback loops and cascading effects**
- **Median climate damages** are underestimating risks, **extreme** climate damages should be also considered
- Incorporating **financial risk** is critical at the sectoral level
- First step for integration of **biodiversity** impacts and conservation requirements, linking response functions with temperature with no consideration of land use changes



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