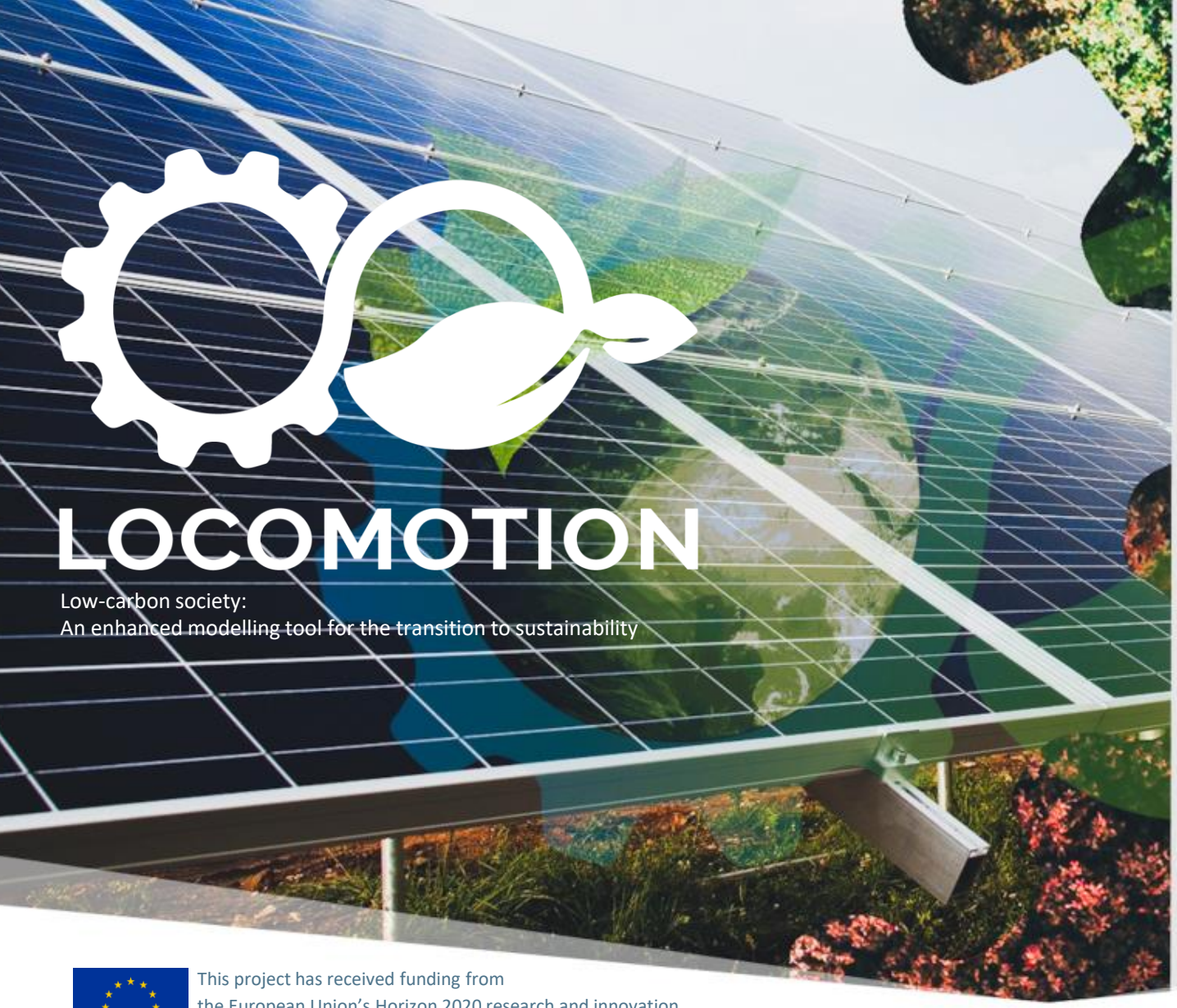

LOCOMOTION

Low-carbon society:
An enhanced modelling tool for the transition to sustainability

WP6 Environmental Module

EGU2022

Tomás Calheiros (FC.ID)

With contributions from Tiago C. Lourenço (FC.ID), Margarita Mediavilla (GEEDS-UVa), Noelia Ferreras Alonso (CARTIF, UVa), Iván Ramos-Diez (CARTIF, UVa), Tiziano Distefano (UNIPI) and other colleagues from the WP6

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 821105.

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"LOCOMOTION aims to enhance the existing MEDEAS IAMs to provide policy-makers and relevant other stakeholders with and open source, well-documented model to assess the feasibility, effectiveness, costs and impacts of different sustainability policy options"

The project

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Universidad de Valladolid

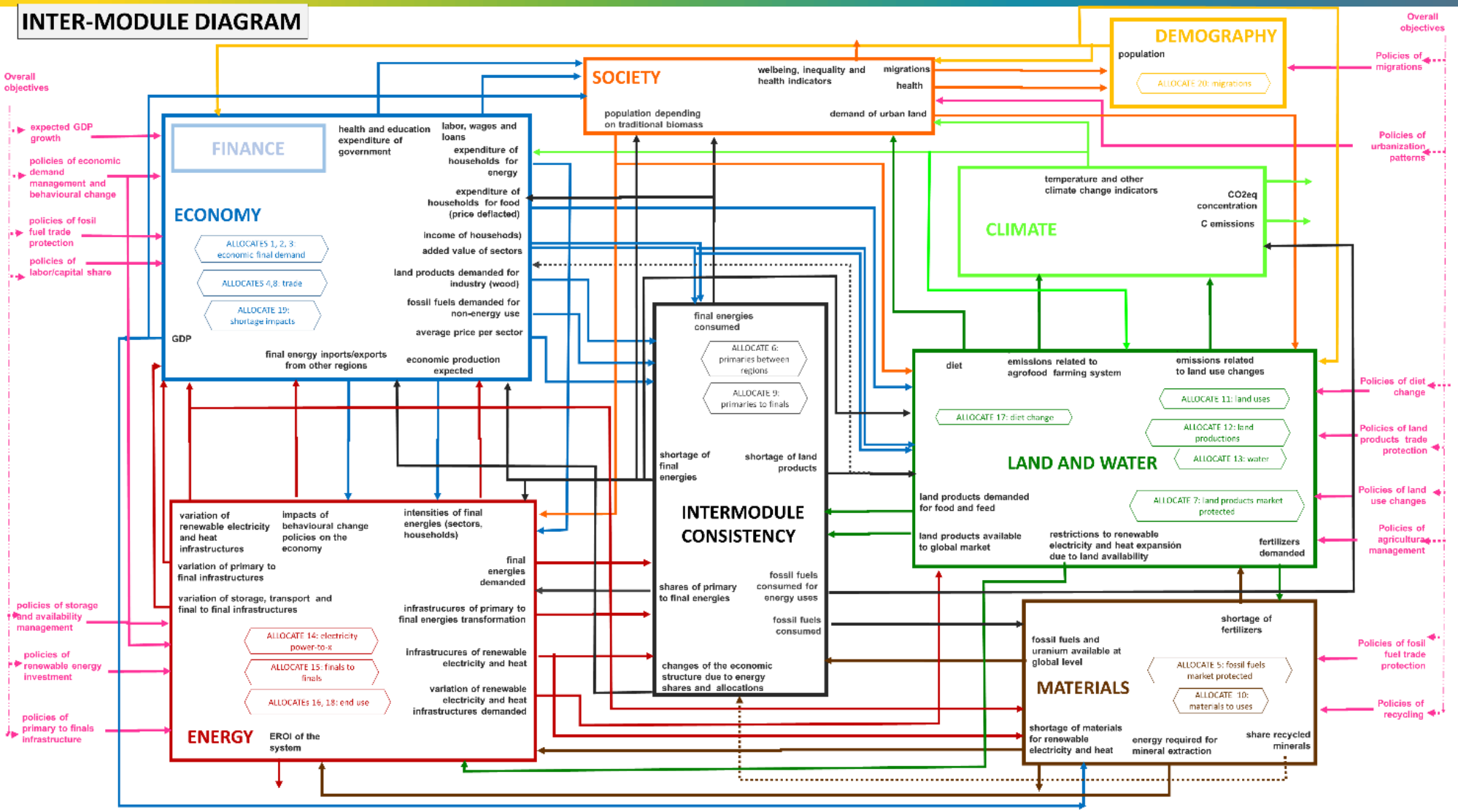
- Duration: 1st June 2019 – 31th May 2023
- Coordinator: Universidad de Valladolid (Spain)
- Partners:

UNIPI | SDEWES | AEA | BC3

CESAR | UoI | CRES | FC.ID

UNU-EHS | EEB | CREAF | CARTIF

WILLIAM MODEL: INTER-MODULE DIAGRAM



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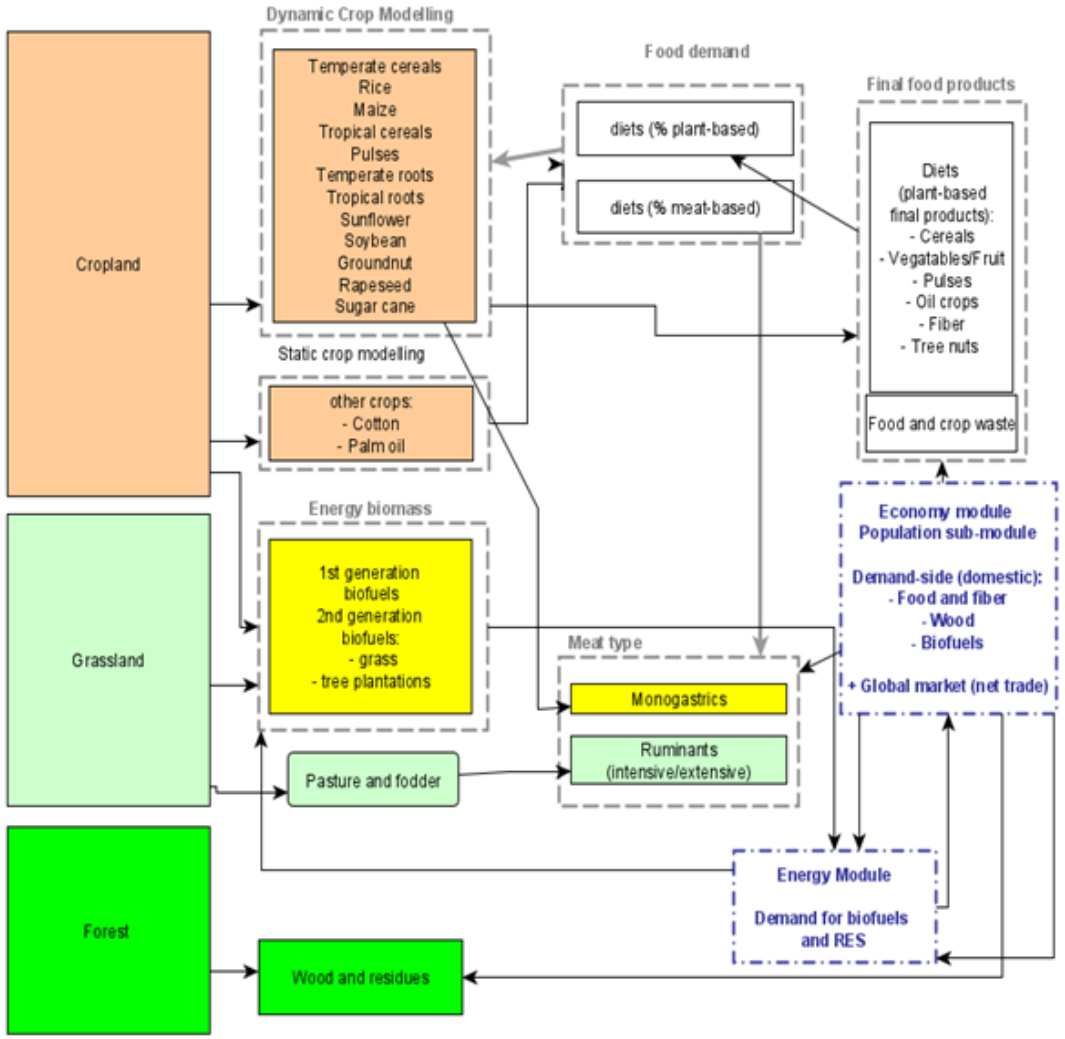
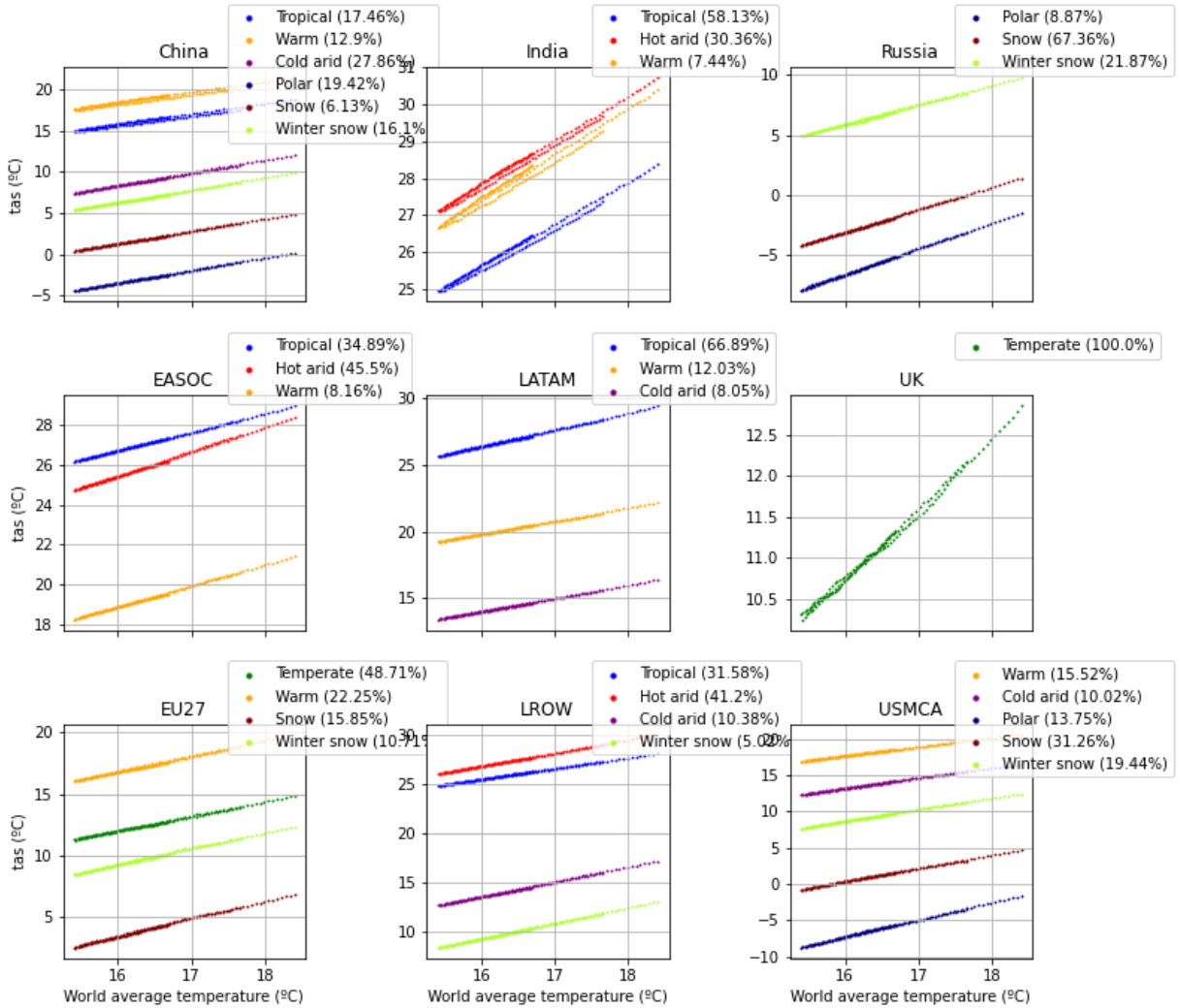
ENVIRONMENTAL MODULE



- For Land: diets, land uses, croplands, yields, forests, wood production, land products availability,
- For water: water demand, water availability
- For climate: land use emissions, land impacts, temperature

Prediction of local avg. temperature based on global avg. temperature

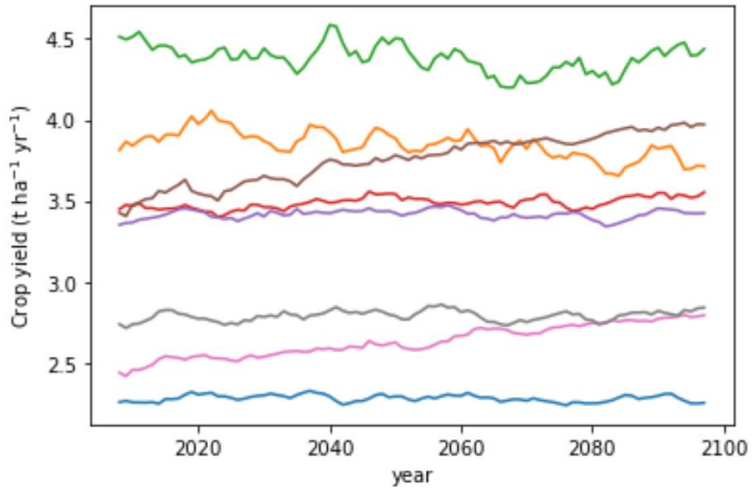


Linear relations were found using data from 12 Global Circulation Models from CMIP6 for 3 SSPs each

$$\Delta T(region) = \alpha_{region} \cdot \Delta T_{global}$$

α obtained for each of the 9 LOCOMOTION regions, each country and each climatic zone

Prediction of crop yields climate damage as a function of avg. local temperature and global atmospheric CO2 concentration



Joint adjustment for temperature and CO2 impacts

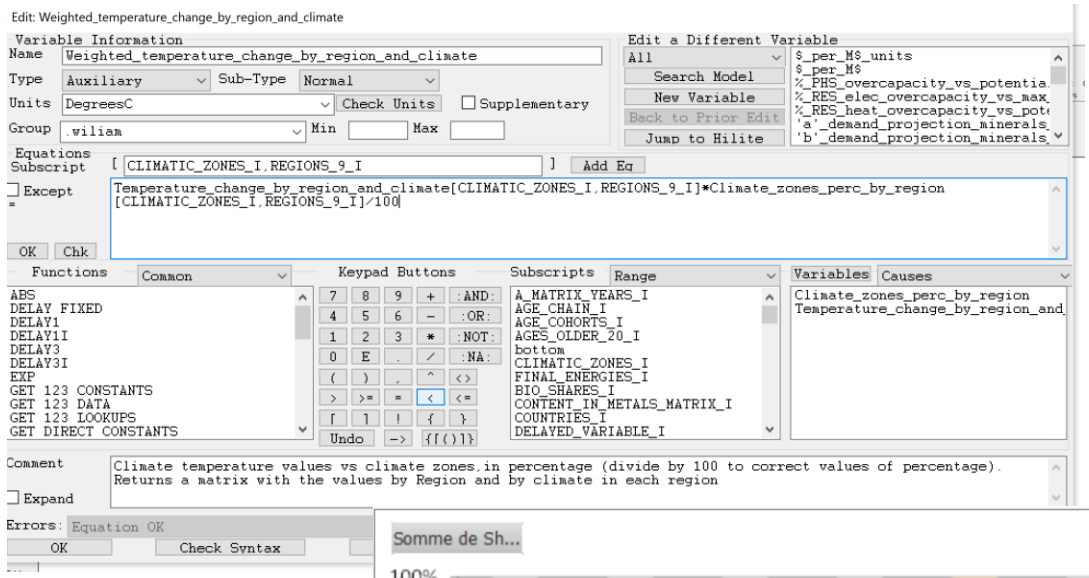
Example from rainfeed wheat

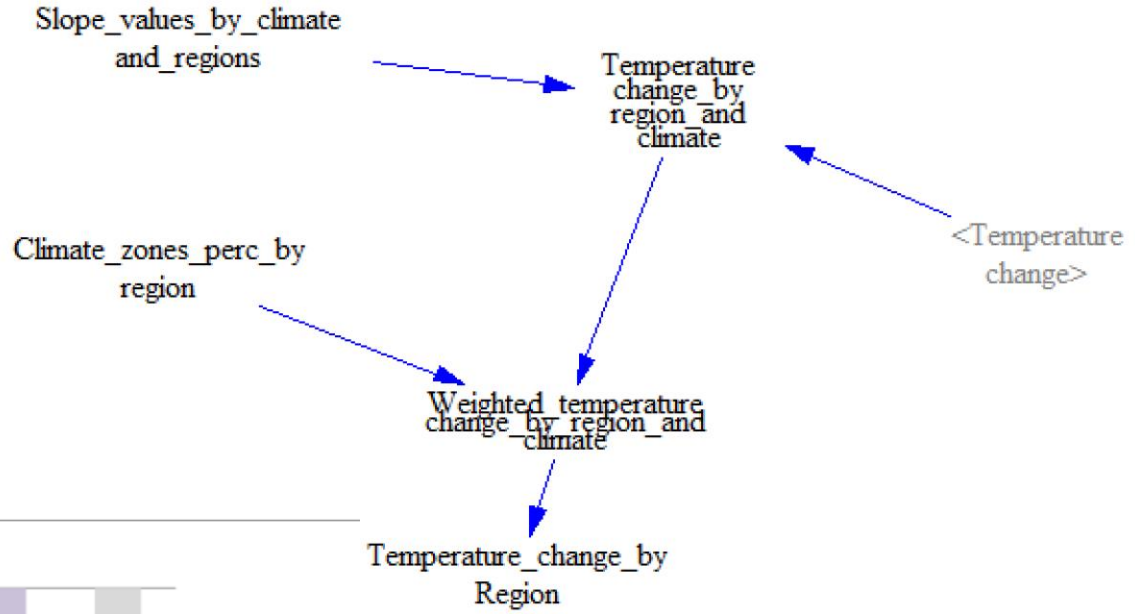
	a1	stderr-a1	a2	stderr-a2	b1	stderr-b1	b2	stderr-b2
Tropical	-0.077579	0.005936	0.009625	0.001147	0.245129	0.033496	150.000000	1.643344
Hot arid	-0.122746	0.014828	0.010797	0.002498	0.423055	0.085551	149.999976	30.721789
Temperate	-0.107607	0.023371	0.014036	0.006880	0.259732	0.074347	149.999997	90.105845
Warm	-0.039589	0.009753	0.005679	0.002243	0.140583	0.040055	149.999990	162.576340
Cold arid	-0.035507	0.008945	0.004490	0.001480	0.104067	0.020221	50.000000	0.832749
Polar	0.006586	0.008773	-0.000249	0.000915	0.168114	0.041557	90.049964	20.331265
Snow	0.019427	0.007838	-0.000592	0.001194	0.076693	0.038469	149.999990	78.554036
Winter snow	-0.032781	0.008465	0.003216	0.001325	0.120755	0.018803	50.000001	24.586858

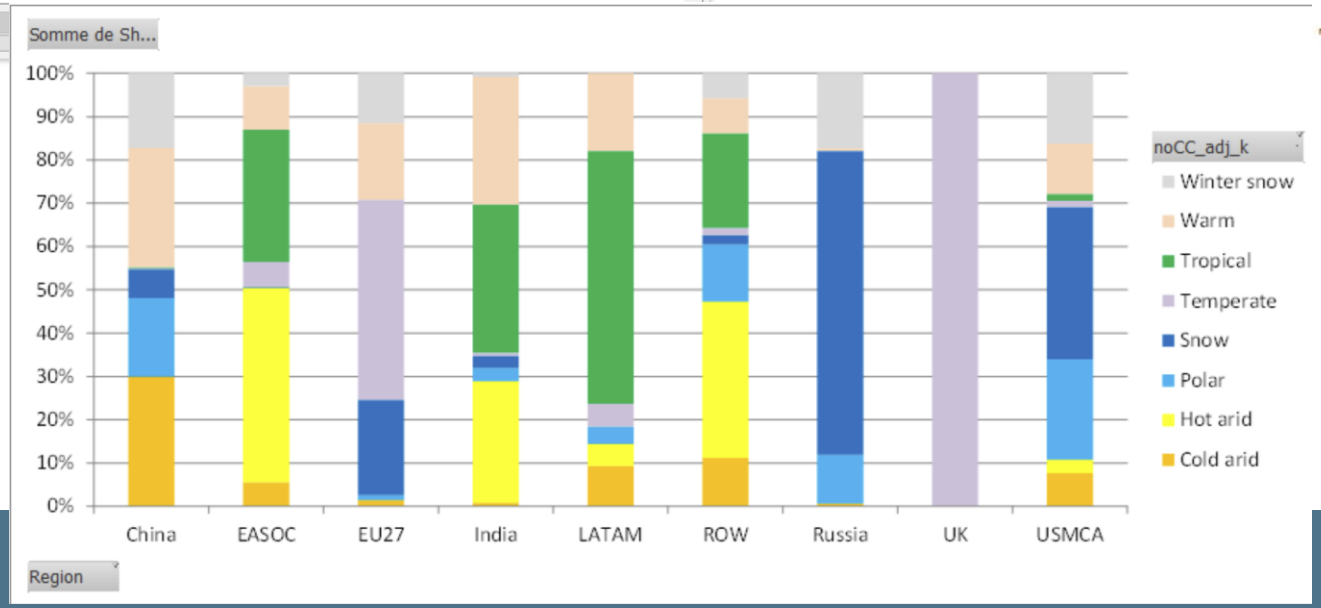
$$Y(region) = Y_0(region)\ \ (1 + a_1\,\Delta T(region) + a_2(\Delta T(region))^2 + b_1\,\frac{\Delta CO_2}{\Delta CO_2 + b_2})$$

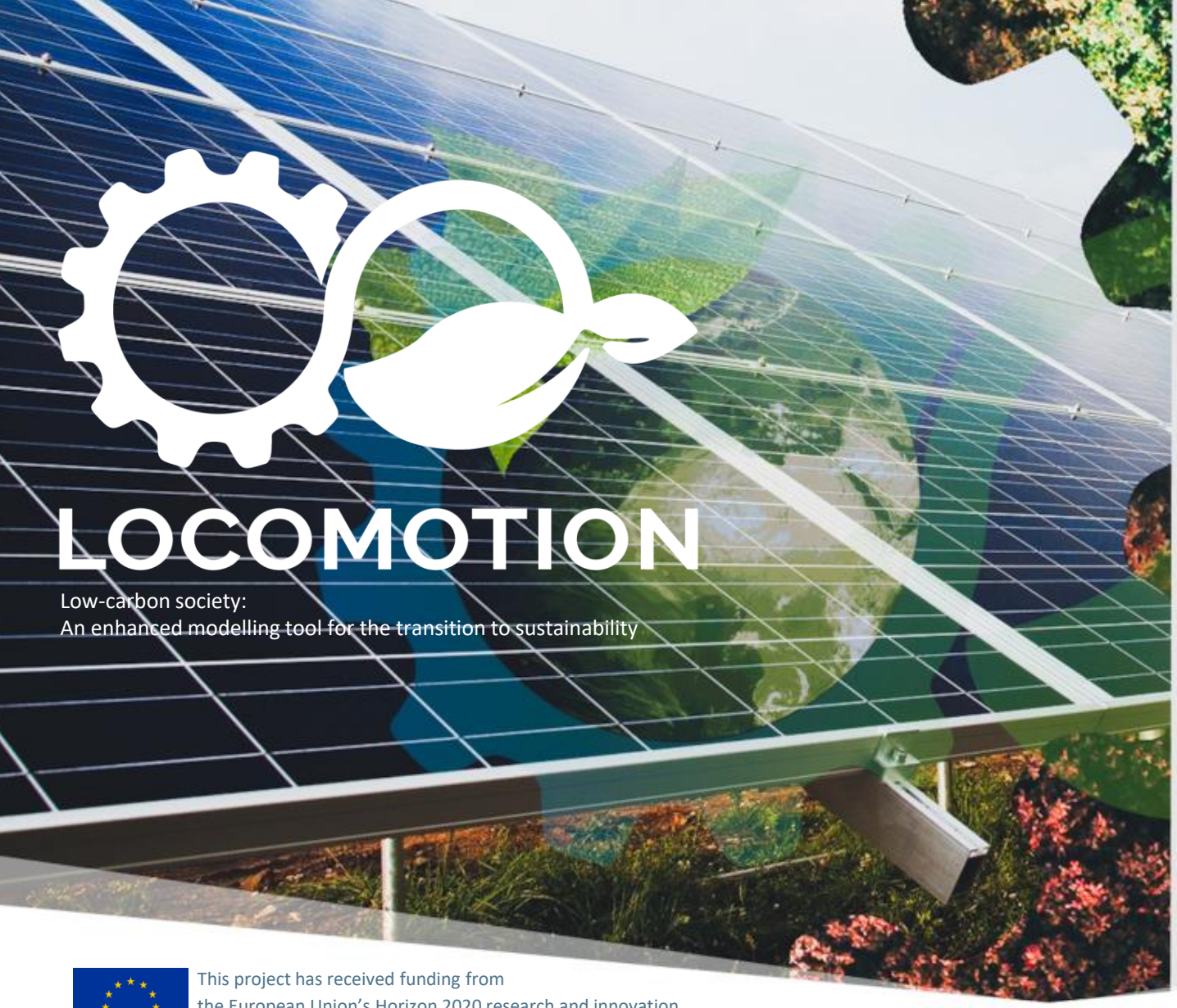
Deliverable 6.3. CC impacts and adaptation module

Achievements:









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Thank you!

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