



2nd HYDRA Webinar

Integrated Assessment Models in action: insights from HYDRA, NEVERMORE & CHOICE

31 October 2025 | 11-12:30 AM

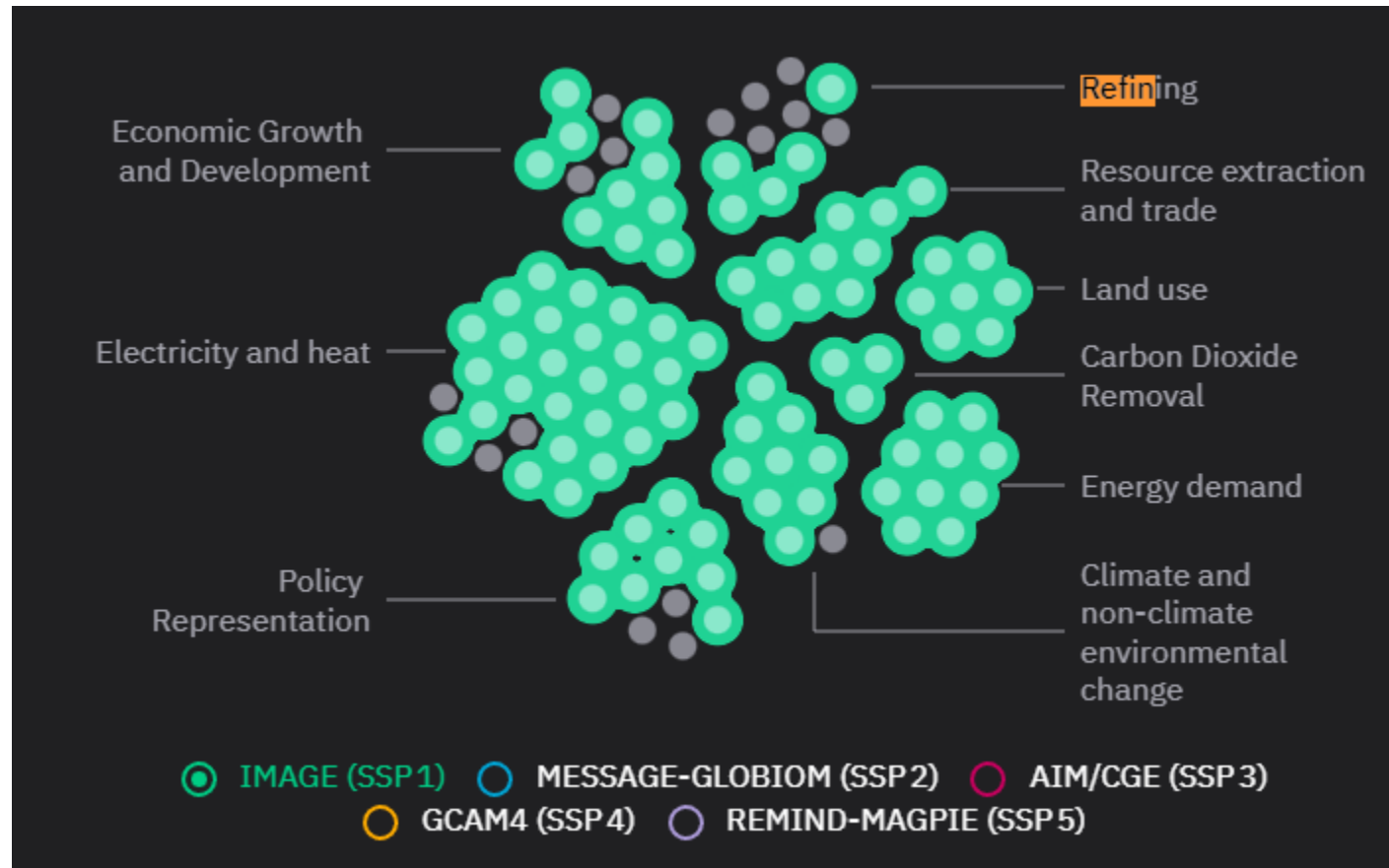
Modelling Suite of the CHOICE Project: Enabling Stakeholder Engagement, Capturing Demand Heterogeneity, and Facilitating Integrated Assessments

Sibel Eker, IIASA (with input from Marta Kozicka)



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High degree of technological resolution in the IAM world

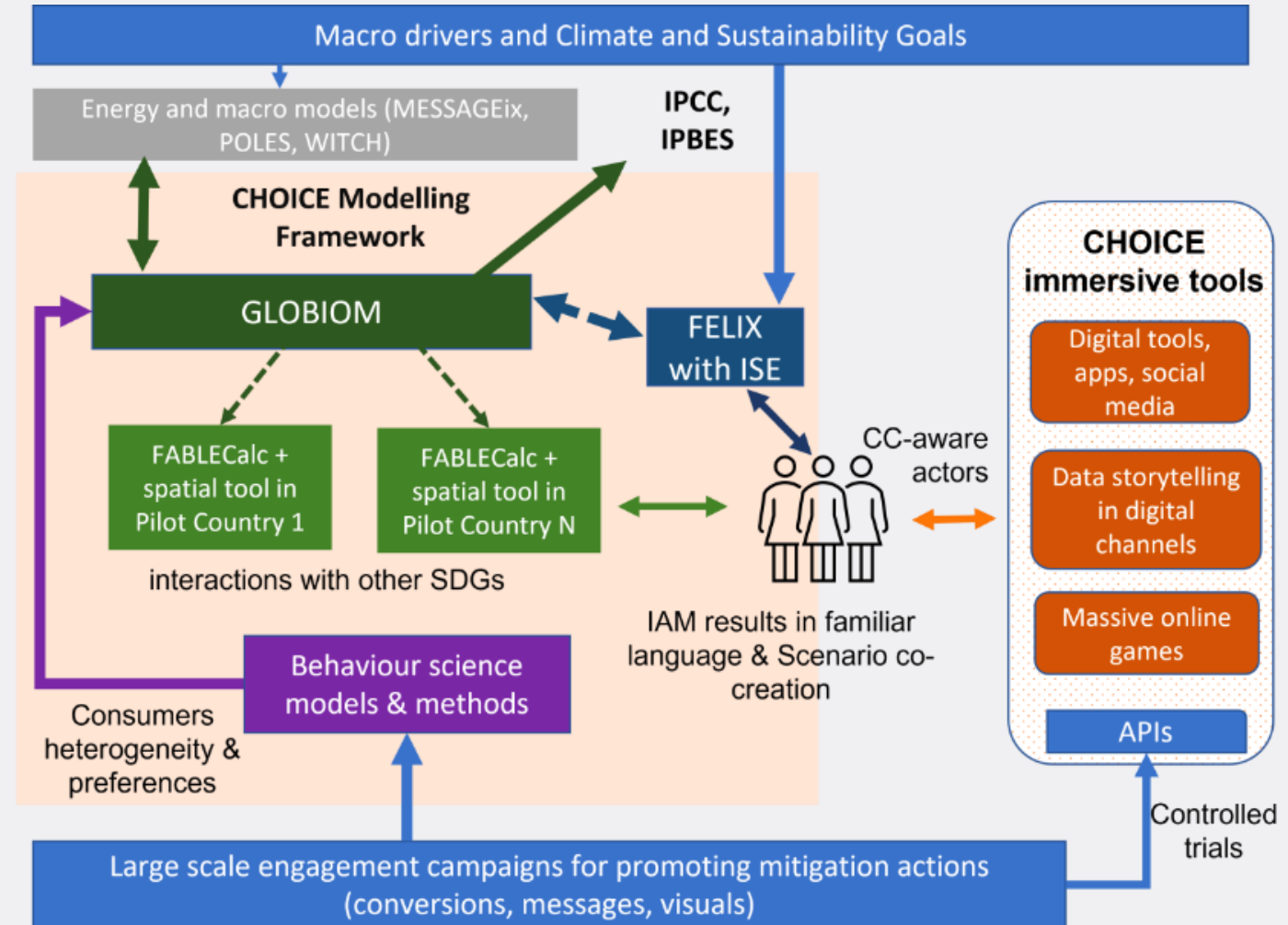


CHOICE Concept

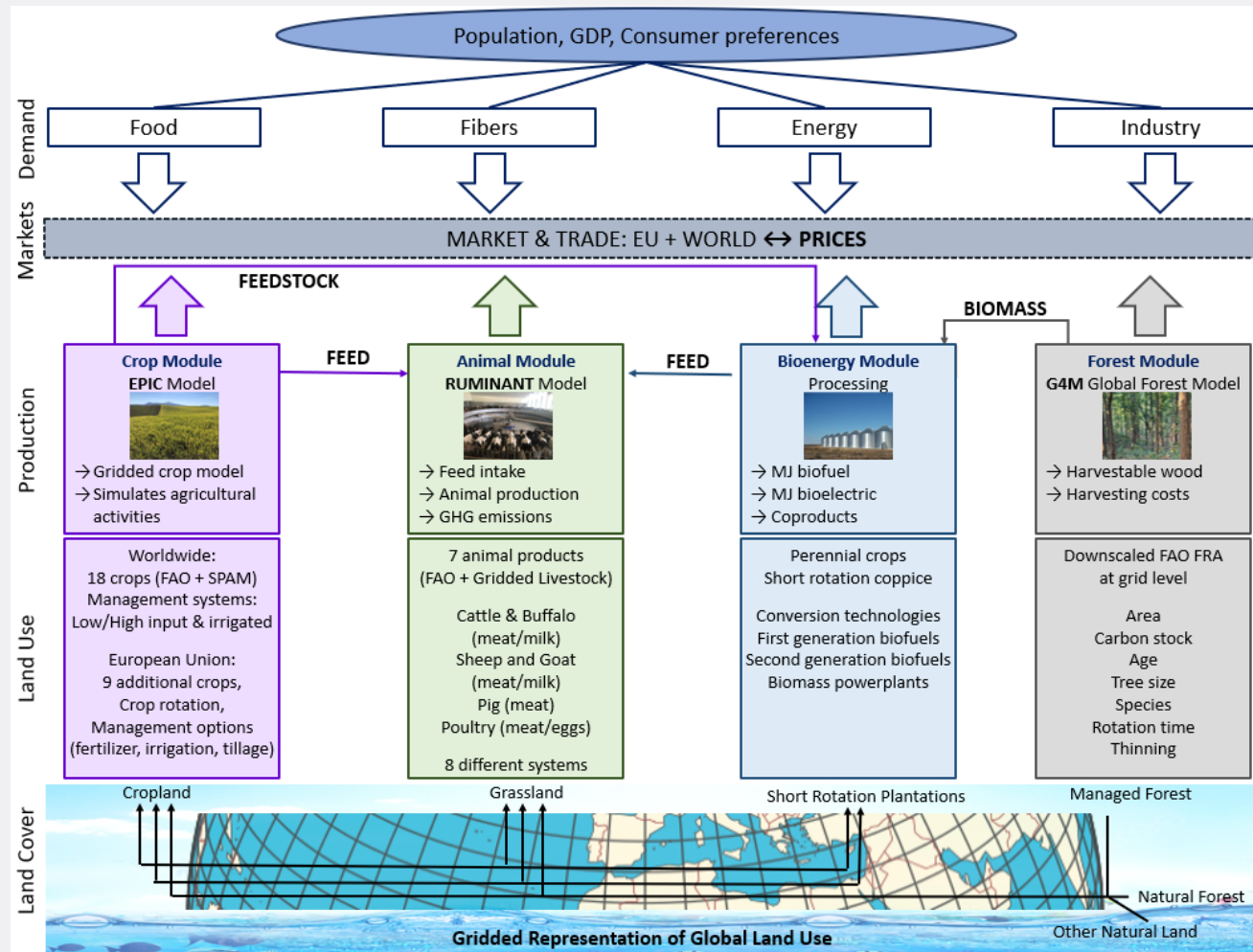
- ❑ **Stakeholder Profiling:** Identify relevant stakeholder profiles aligned with mitigation actions;
- ❑ **Strategic Communication:** Develop large-scale communication strategies informed by marketing and behavioral science insights;
- ❑ **Optimized Campaigns:** Optimize campaign design using Randomized Controlled Experiments (RCTs) for evidence-based decision-making;
- ❑ **Behavioral Change Modeling:** Model behavioral change along the value chain and upscale to continental and global levels;
- ❑ **IAM Enhancement:** Improve Integrated Assessment Models (IAMs) with enhanced representation of behavioral change, value chains, and stakeholder engagement;
- ❑ **Stakeholder Engagement:** Utilize the FeliX model for interactive stakeholder engagement, coupled with GLOBIOM for detailed land-use modeling;
- ❑ **Custom Software Architecture:** Create a custom web-based simulation architecture to involve stakeholders in pilot demonstrations;



FOOD SYSTEMS



Global Biosphere Management Model (GLOBIOM)



- Partial equilibrium model
- Trade: spatial equilibrium
- Homogenous goods
- Flexible demand regions aggregates (59 regions)
- Spatially explicit supply
- Leontief production functions
- Recursively dynamic: 1 to 10 years time step
- Optimization model
- Linear programming
- GAMS
- Open access strategy under development

Heterogenous consumer in GLOBIOM – some results

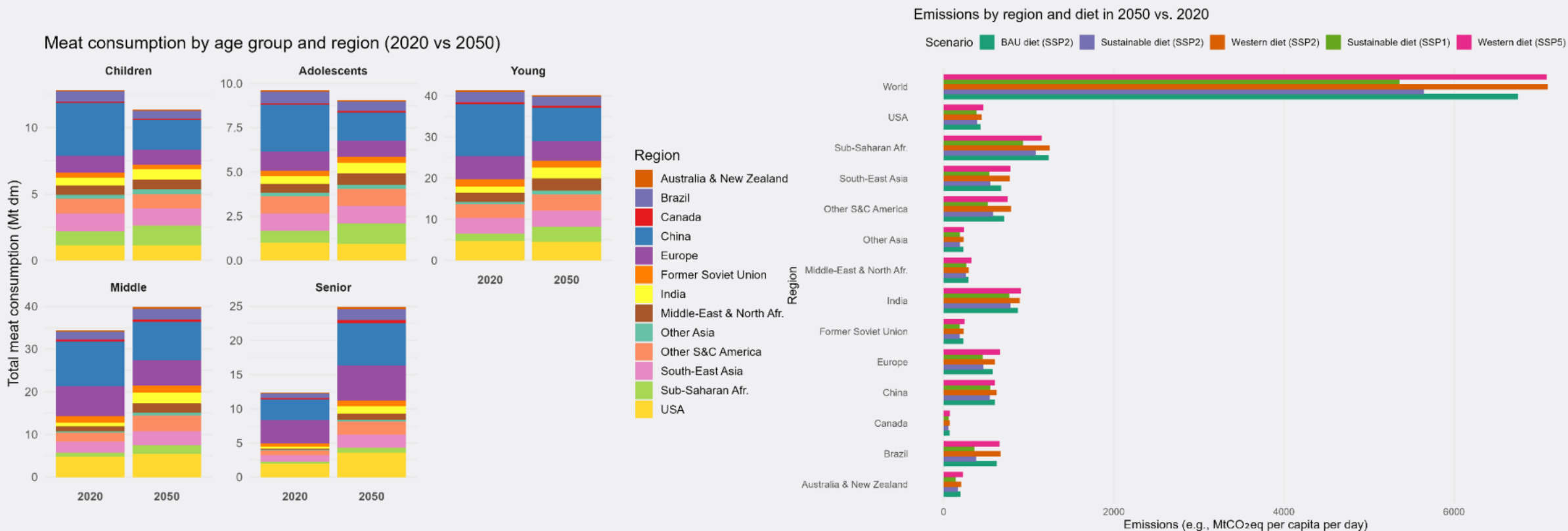
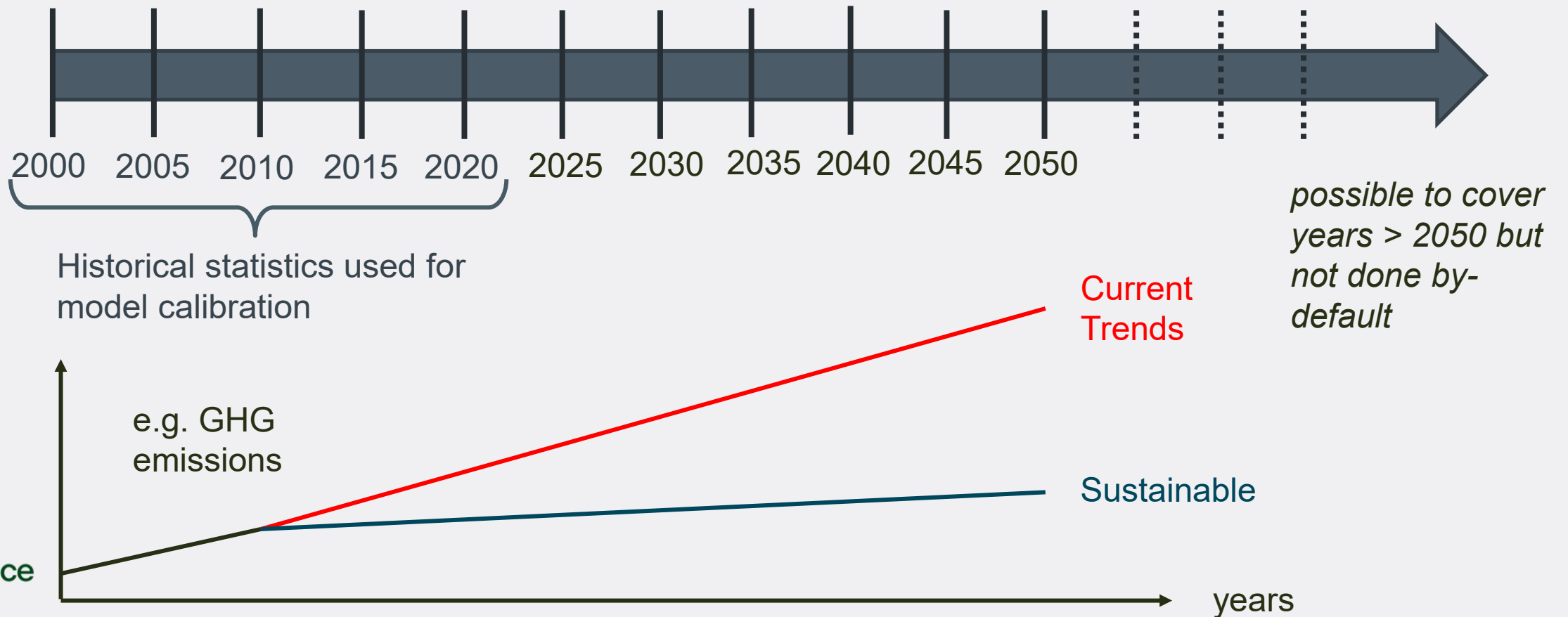


Figure Distribution of meat consumption by age group and region in the business-as-usual scenario in 2020 vs 2050

Figure AFOLU emissions in across different combinations of SSPs and diets

The FABLE Calculator

All FABLE **country** teams have used the Excel-based FABLE Calculator to develop the first generation of pathways towards sustainable land-use and food systems which are presented in the FABLE 2019 Report and all countries but India for the FABLE 2020 Report.



The FABLE Calculator

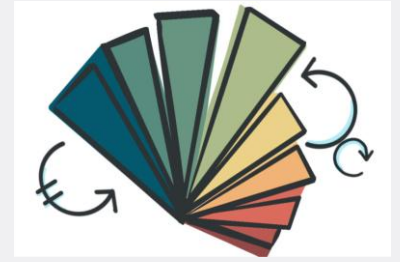
Spatially explicit module for FABLE-C

- R package DownscalR developed by IIASA team
- Developed an open R project to easily run the downscaling model on any FABLE land transition matrices
- Compute downscaled GHG emissions based on spatially explicit emission factors

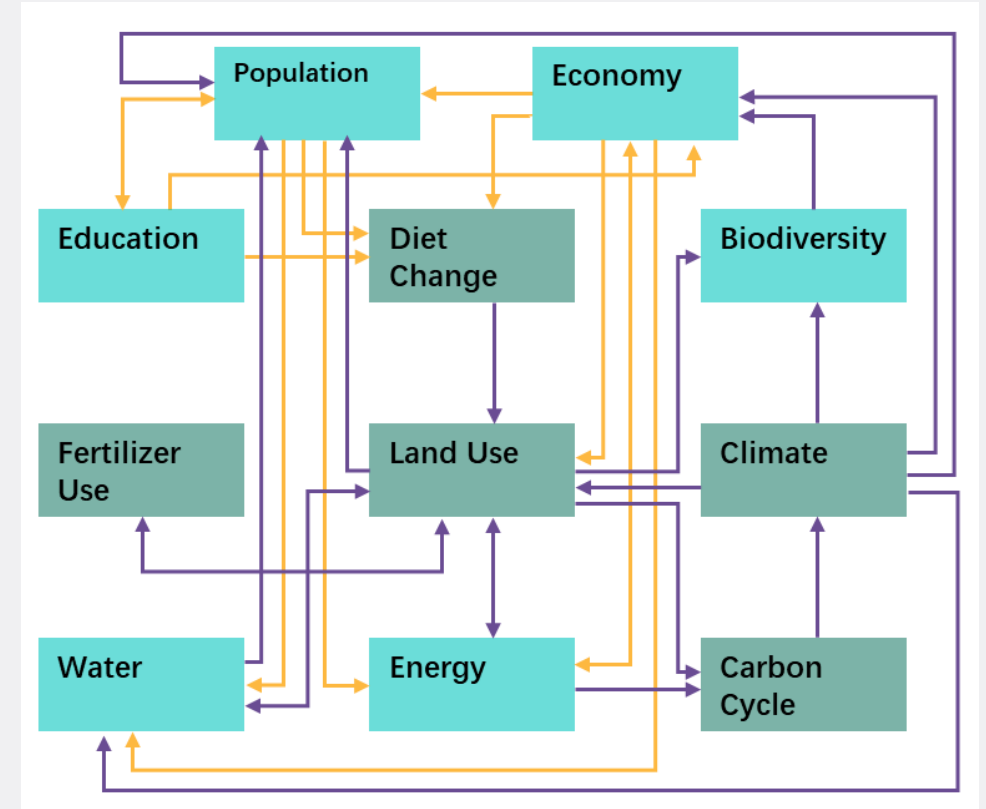
Capacity building

- FABLE Calculator's link to pilots
 - Spain
 - South Africa
 - Colombia
- Online training material, serious game, online interface

FeliX Model

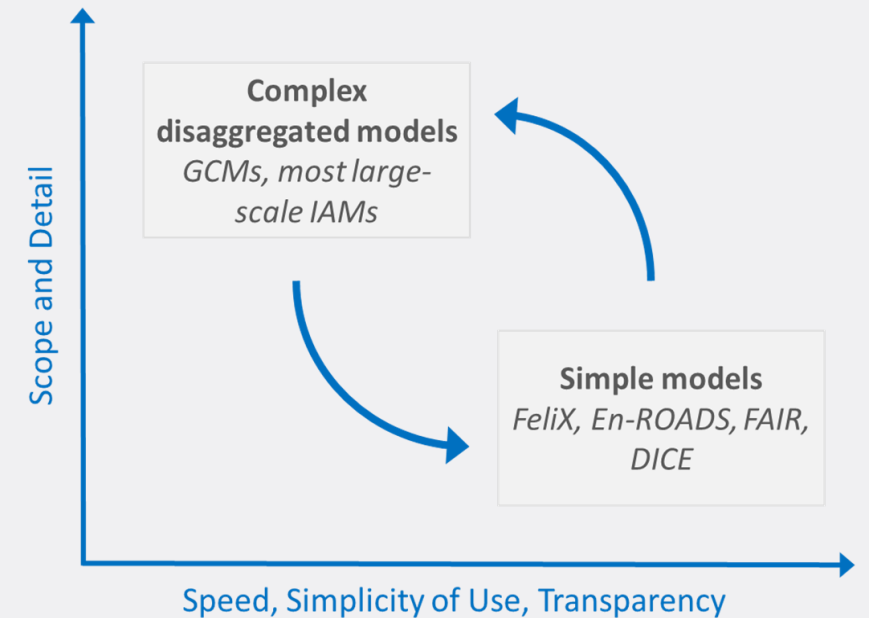


- A global (5-regional) model of population, economy, climate, energy, land use, food, biodiversity systems and their interactions
- Descriptive, time-continuous simulation model (system dynamics)
- Initially developed to support Global Earth Observations at IIASA (2006-2009), used in climate change mitigation and sustainability scenarios
- Open access and fully documented
 - <http://github.com/iiasa/Felix-Model>
 - https://iiasa.github.io/felix_docs/



Why simple models?

- Feedbacks and nonlinearities between human and earth systems
- Exploring uncertainties through speed, scope and accessibility
- Facilitating **stakeholder participation** in modeling, possibly as an interface to larger detailed models



Source: Climate Interactive

FeliX ISE

Stakeholder engagement

1. Custom Scenario Building

- Variety of Input Designs (i.e. sliders, switches) and Output Designs (i.e. line, stacked-area, spider plots)

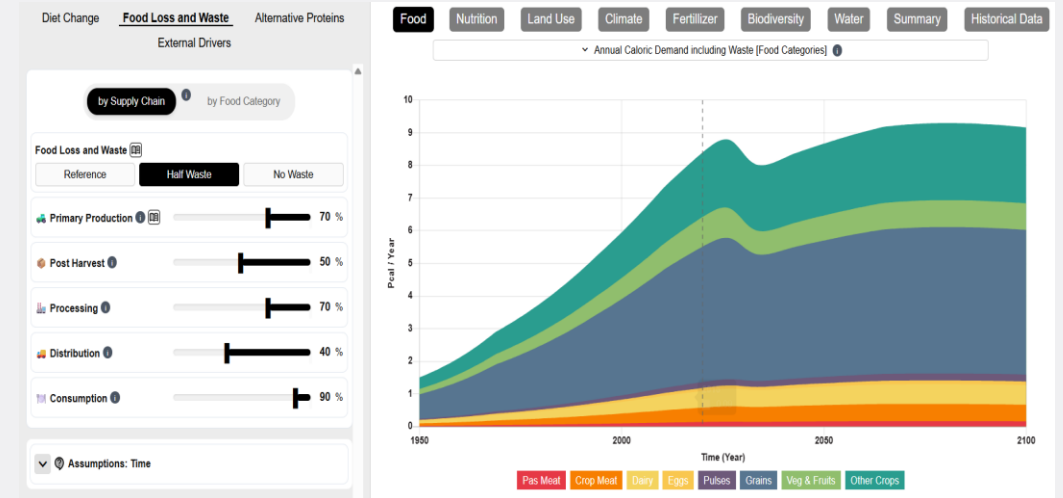
2. Scenario Comparison Tools

- Multiple Models Running in Parallel
- UX Design Supports Scenario Comparisons

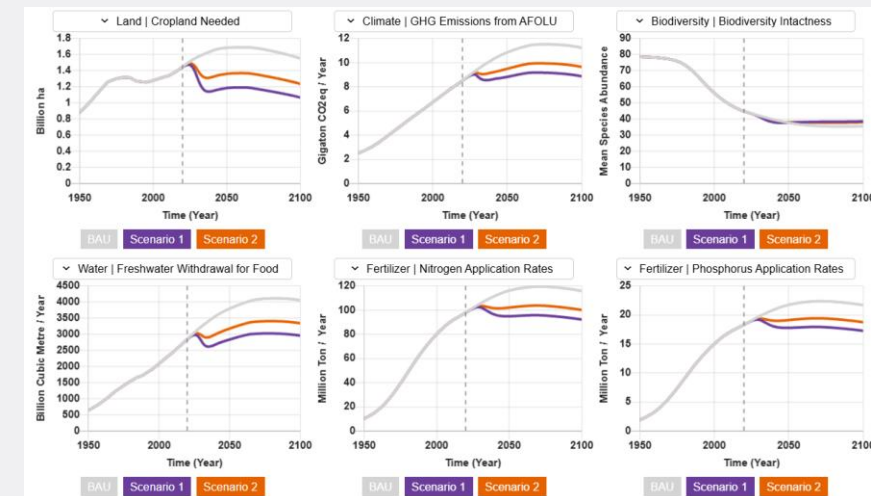
3. Real-Time Output Updates

- Efficient Computations with Web Workers

<https://climatechoice.github.io/felix/>



(1) Sample Input Sliders and Output Graphs

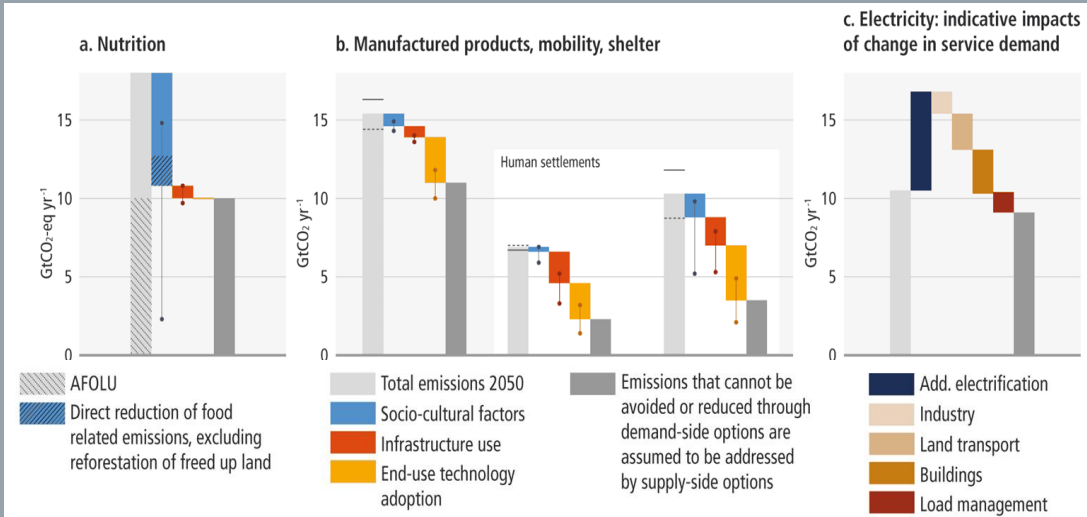


(2) Scenario Comparison Designs

Behavior changes

Human-Earth feedbacks

Demand-side mitigation



Source : IPCC WG3 (2022)

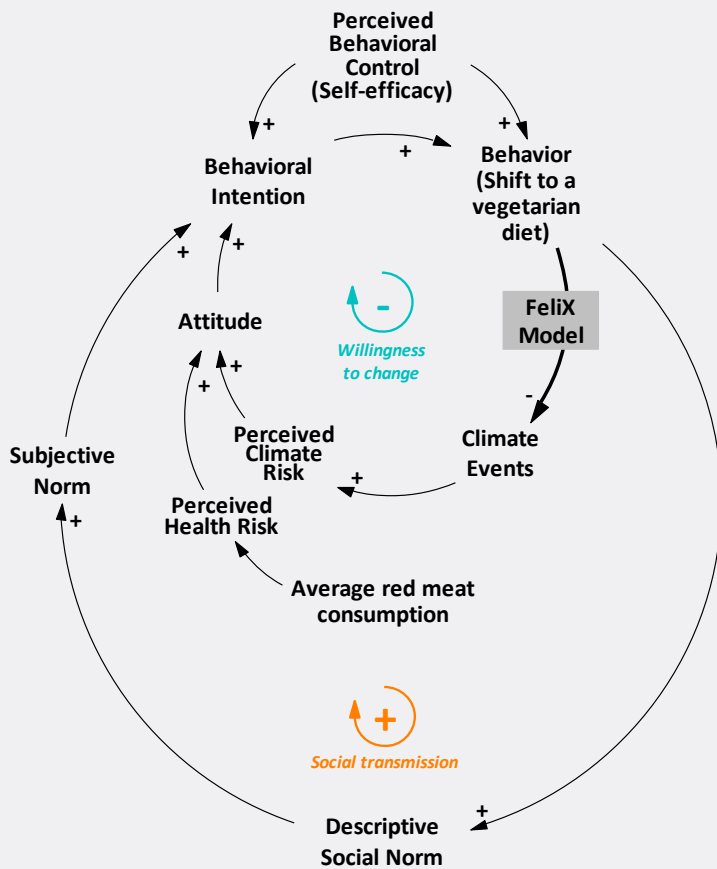


Source : UNEP(2020) *Emission Gap Report*

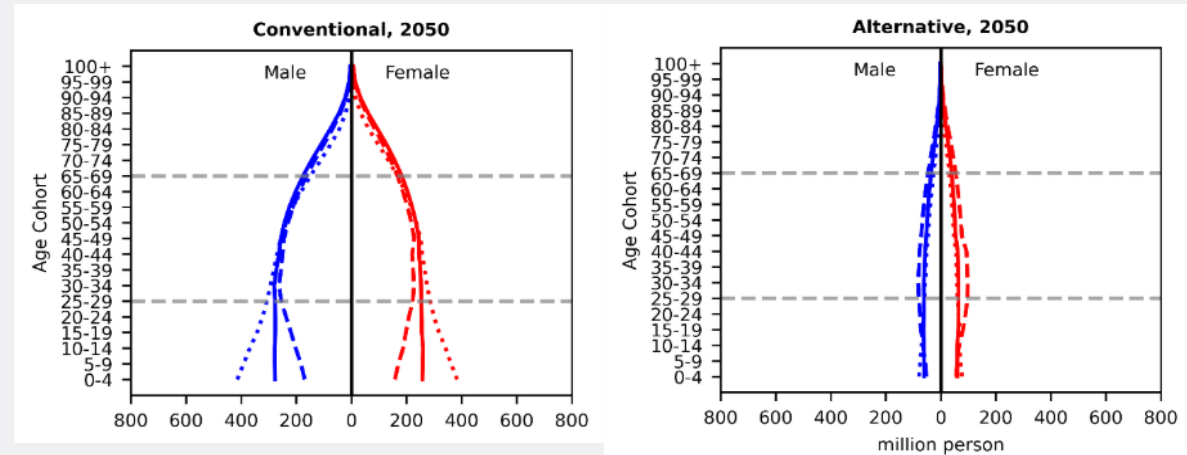
Drivers of low-carbon behavior

Behavior changes

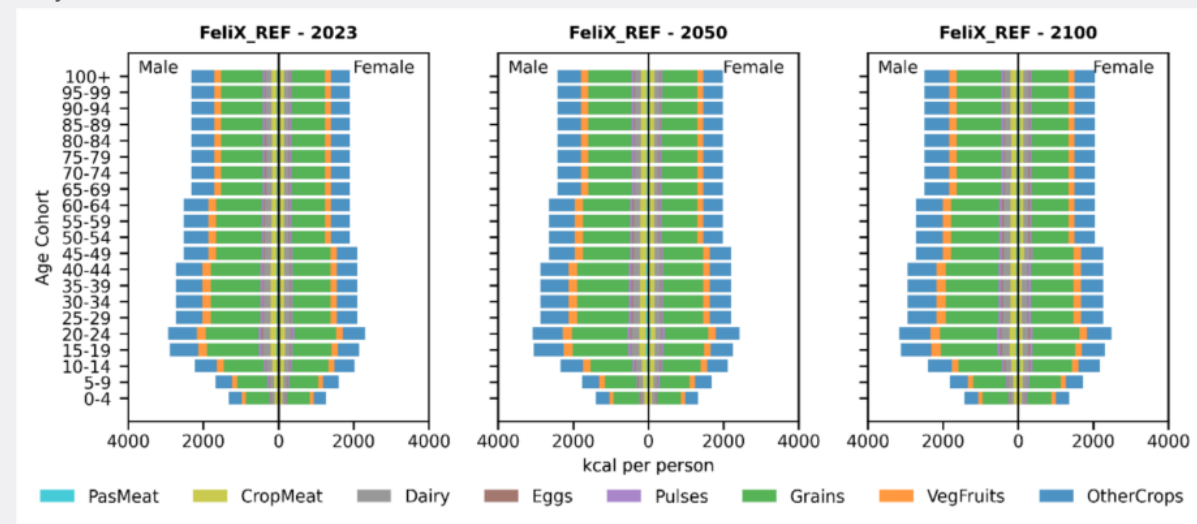
Human-Earth feedbacks



Projects population of consumer segments, e.g conventional and alternative diet followers

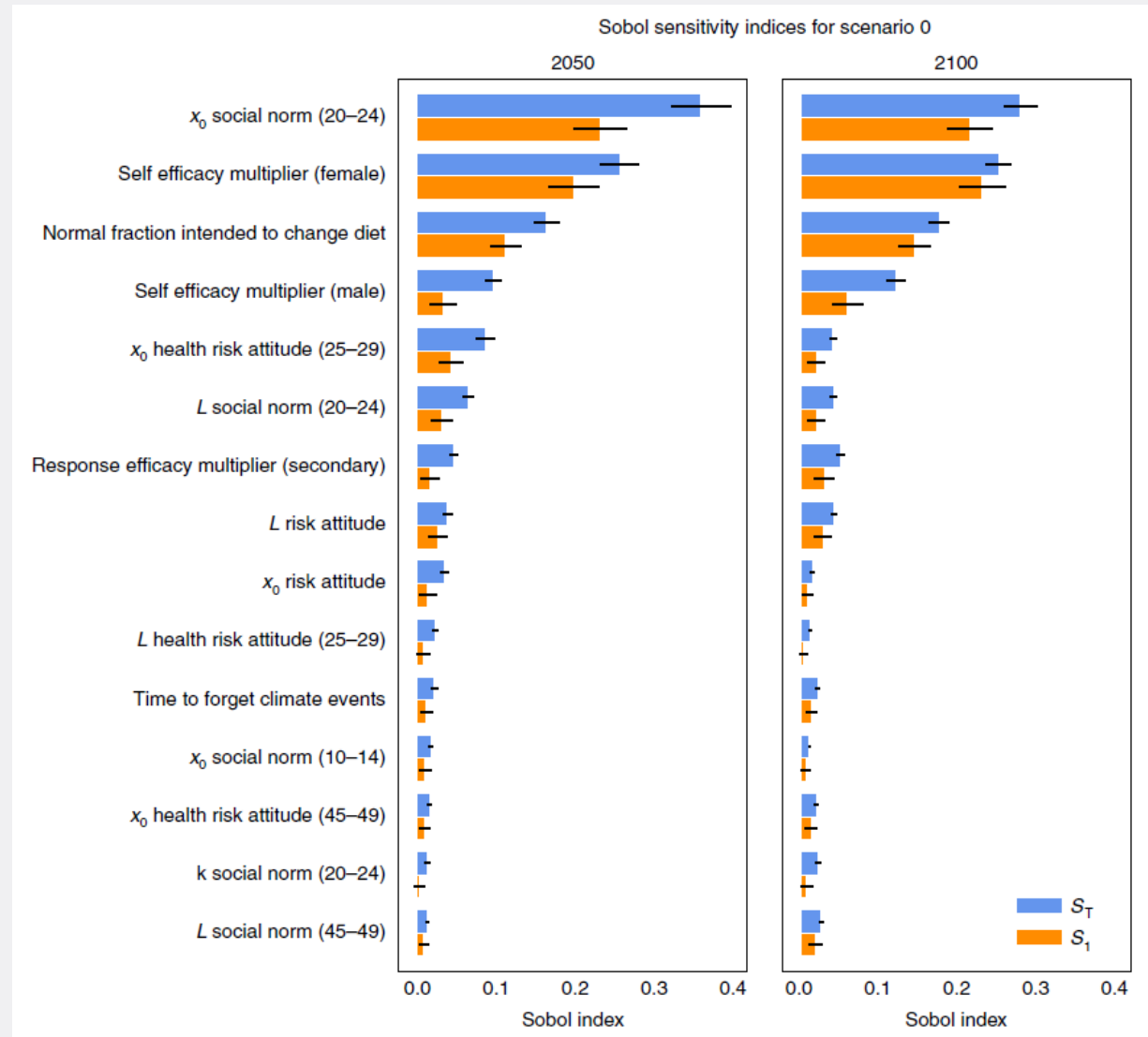


Projects demand for various food



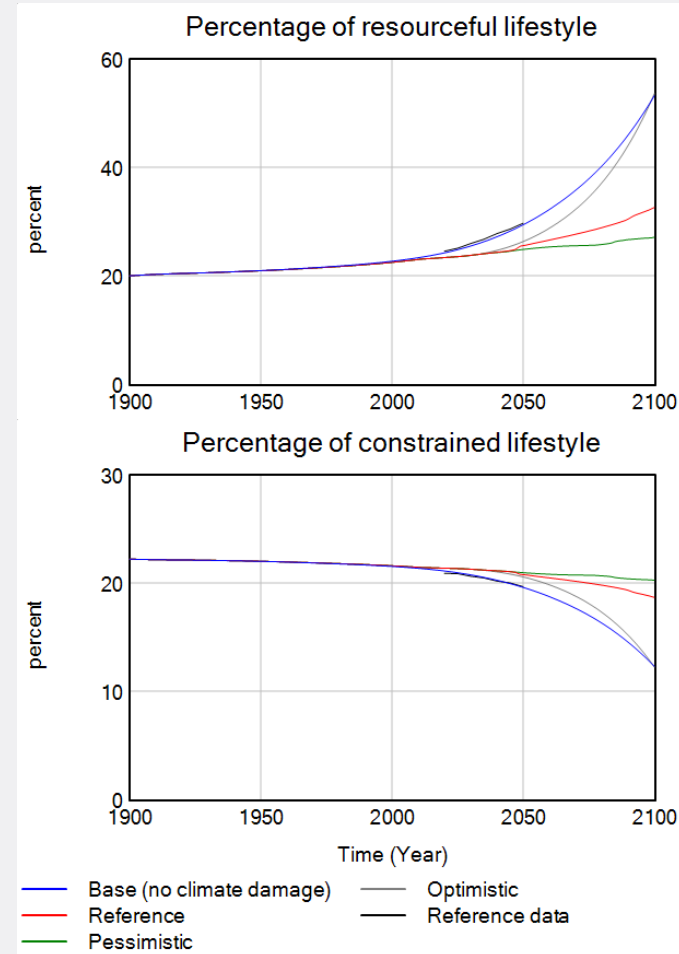
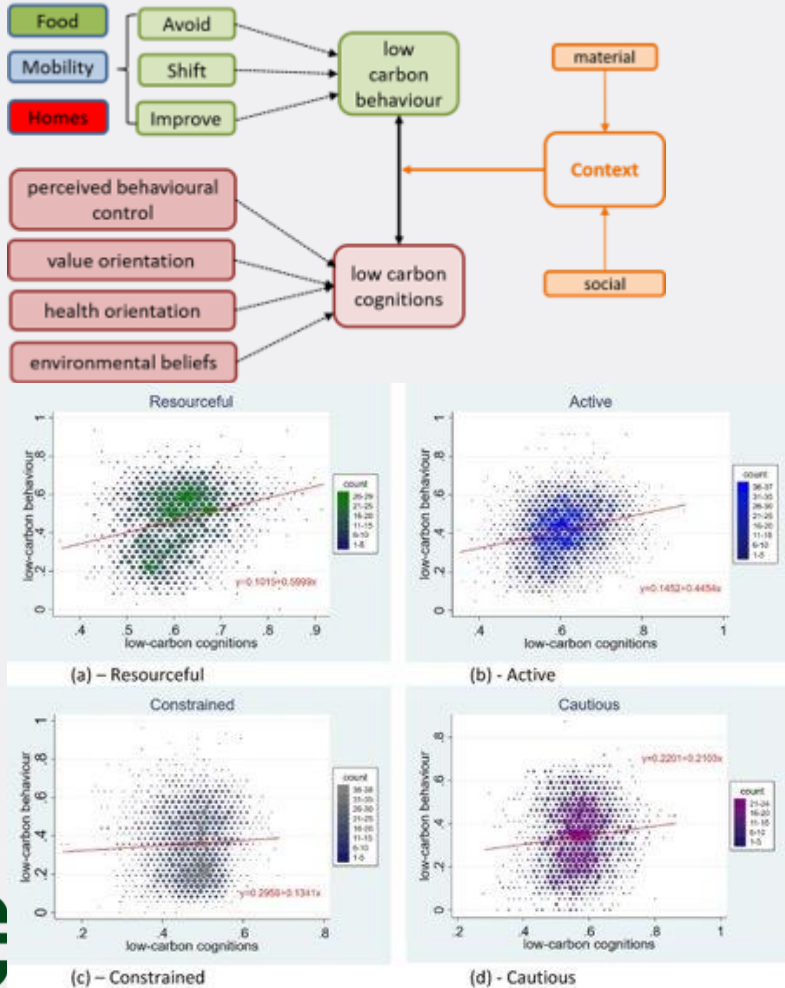
Behavior changes

Human-Earth feedbacks



Behavior changes

Lifestyles for population segmentation to capture multiple behaviors



Swamy et al. (in preparation)



Three models with different strengths

- Technoeconomic representation and detailed analysis
- Ease of use for participatory and country level scenario development
- Fully coupled Human-Earth feedbacks
- Social dynamics of behavior changes with a population segmentation approach





Sibel Eker

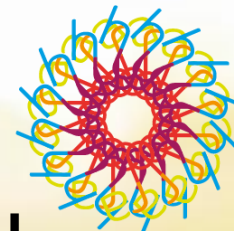
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