Assessing Environmental and Socioeconomic Consequences of a Food System Transformation.
An Overview of Economic Modelling Supporting the Second EAT–Lancet Commission

Cornell University
Cornell CALS
College of Agriculture and Life Sciences
Global Development
FOOD SYSTEMS & GLOBAL CHANGE

June 2026

5 Themes

Healthy Diets

Reviewing the evidence on diet and health, including all forms of malnutrition, and recognizing the diversity of local dietary cultures

Food System Boundaries

Identifying the impact and share of sustainable food systems within all nine planetary boundaries

Justice in Food Systems

Identifying the social foundations for just food systems, proposing justice boundaries

Food System Modelling Ensemble

Testing scenarios for healthy, sustainable, and just food systems, based on an unprecedented collaborative effort between 10 of the world's leading modelling institutions

Food Systems Transformation

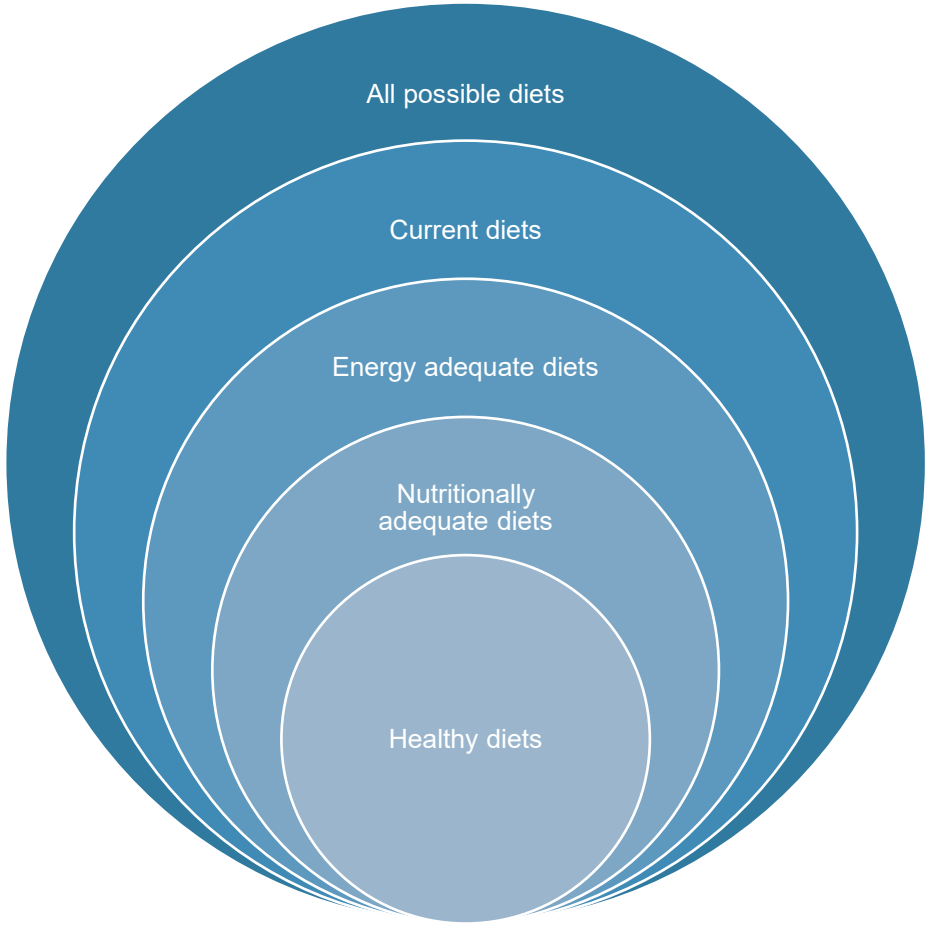
Exploring solutions, barriers, and actions for just transformative actions towards healthy, sustainable, and just food systems

2025 EAT-*Lancet* Commission

Defining the healthy diet?

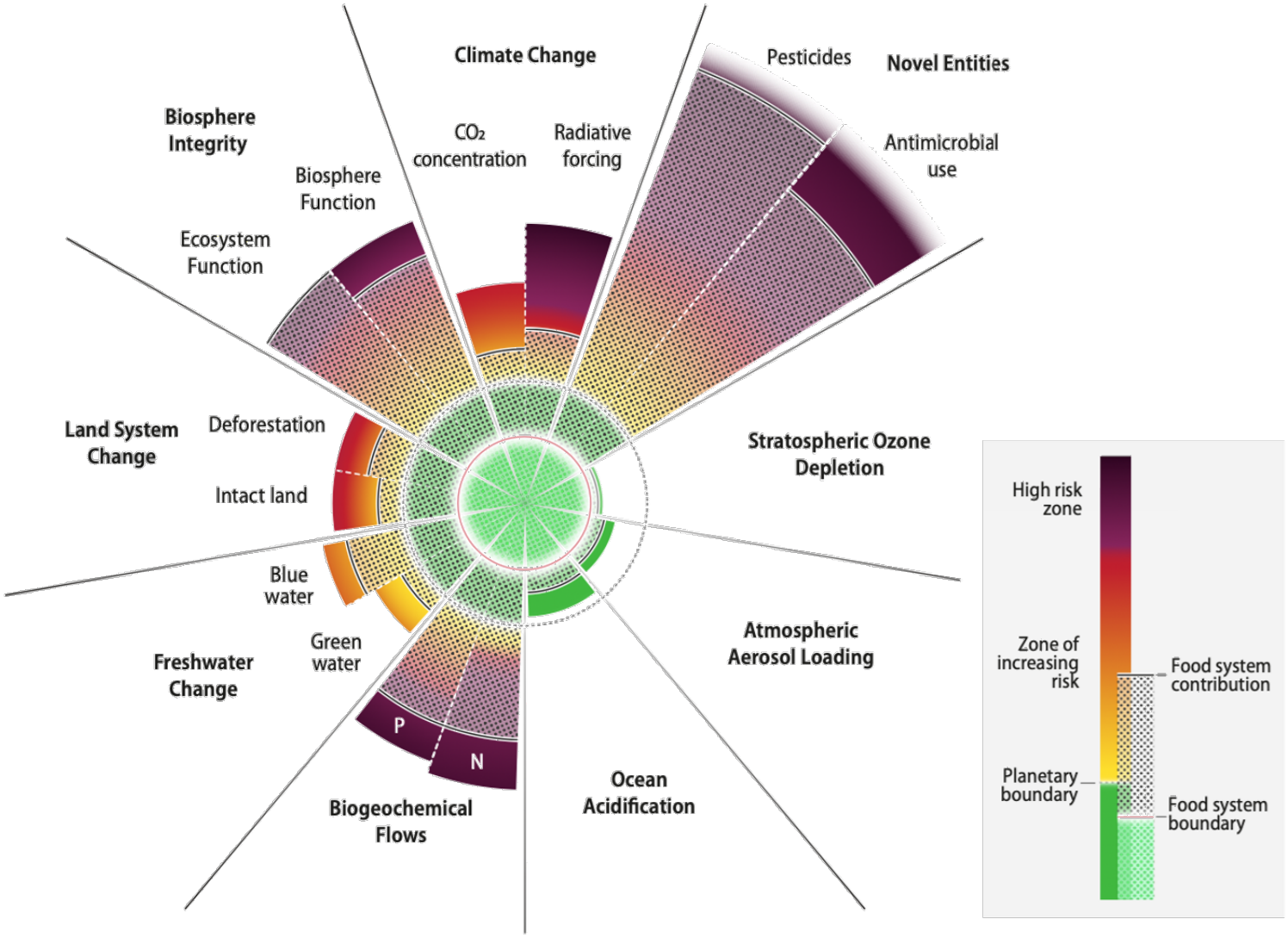
- Regional variation based on current consumption preferences (i.e., what staples, fruits, vegetables etc. that are consumed varies by region)
- Nutritional and energy requirements differentiated by age and gender
- Minimizes dietary risk factors
  - High sodium consumption
  - Low whole grain consumption
  - Low fruit, vegetable, and legume consumption
  - Low nuts and seeds
  - Low aquatic food consumption
  - Red and processed meats
  - High consumption of added sugars and fats
  - High consumption of highly processed foods

- Note environmental impacts are not part of defining the healthy diet



Food System Boundaries

- All 9 planetary boundaries assessed
  - Current food system pressure
  - Propose food system boundaries
  - Assess how sustainable and ecological
  - intensification can reduce the food system impacts
- Food Systems dominate five of six transgressions



Modelling an EAT-Lancet aligned future

A multi-model ensemble with a number of complementary modelling approaches

Assessing the consequences of

- Dietary change,
- Improved agricultural productivity,
- Reduced food loss and waste,
- Potential complementarities with climate action (i.e. 1.5C)

- **Results include impacts on:**
  - Environmental parameters
  - Food production quantities
  - Labour force in food production sectors
  - Agricultural producer prices and food expenditure

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Part of Cornell's work leading on the modelling assessment for EAT-Lancet Commission 2.0

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Building blocks to project food systems to 2050

BAU:

Conventional Diets

Based on recent dietary trends associated with increasing income

Increasing consumption of food, particularly of animal sourced foods

Increased productivity

Continued agricultural productivity based on historic trends

Includes estimated biophysical impacts of climate change on crop, livestock, and labor productivity

Population and GDP

Based on the middle of the road shared socioeconomic pathway (SSP2)

Population increases to 9.6 bn by 2050,

Policy environment

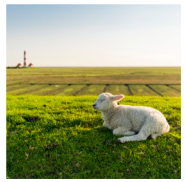
Based on implemented climate and trade policy in 2024

EL:

Healthy Diet

Defined to reduce dietary risk factors

Mostly plant-based with moderate consumption on animal-sourced foods, and limited processed foods



Increased productivity

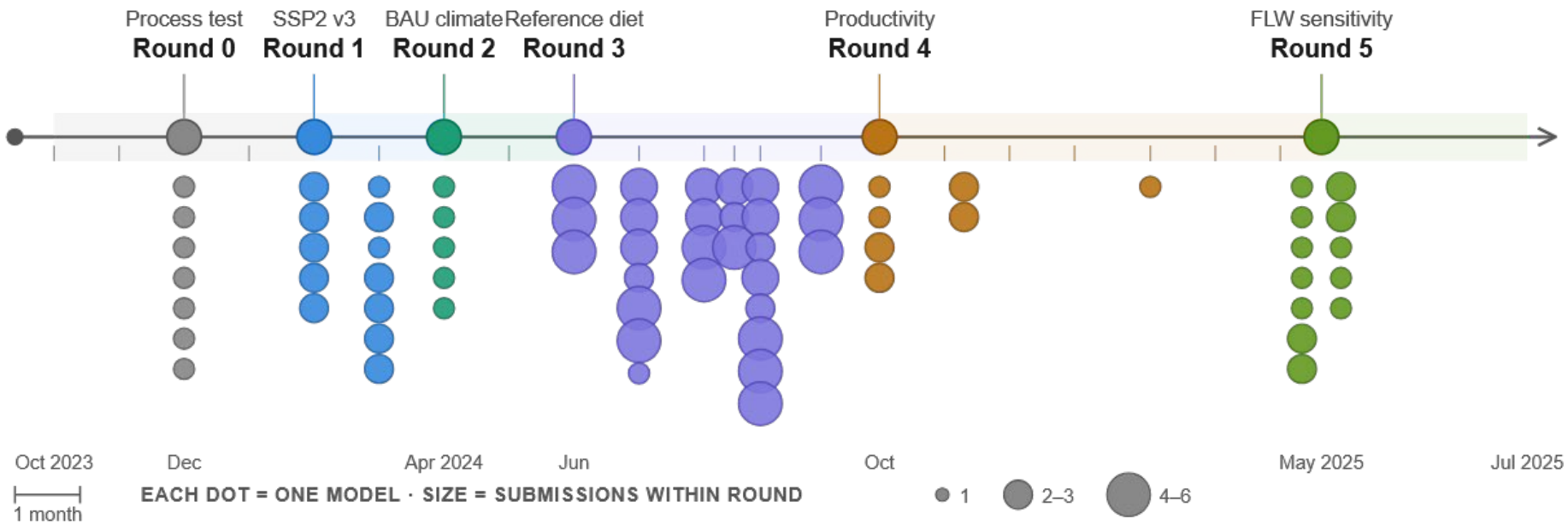
Builds on BAU productivity projections

Assumes additional productivity growth aligned with more optimistic and sustainable SSP1 pathway

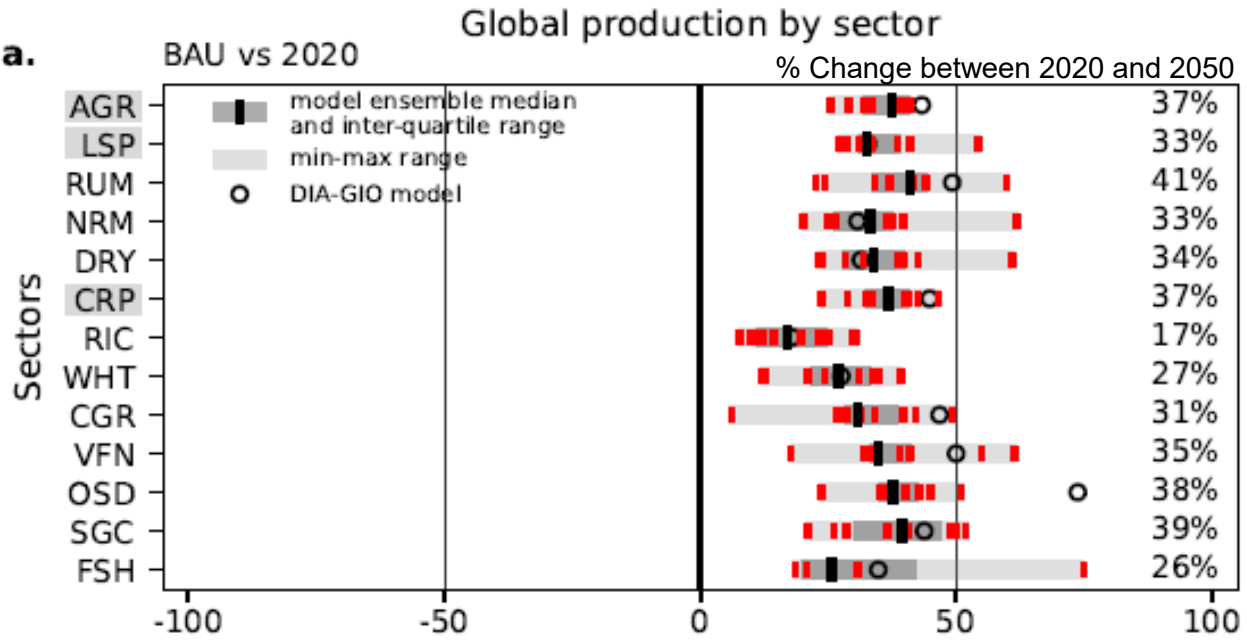
Reduced Food Loss and Waste

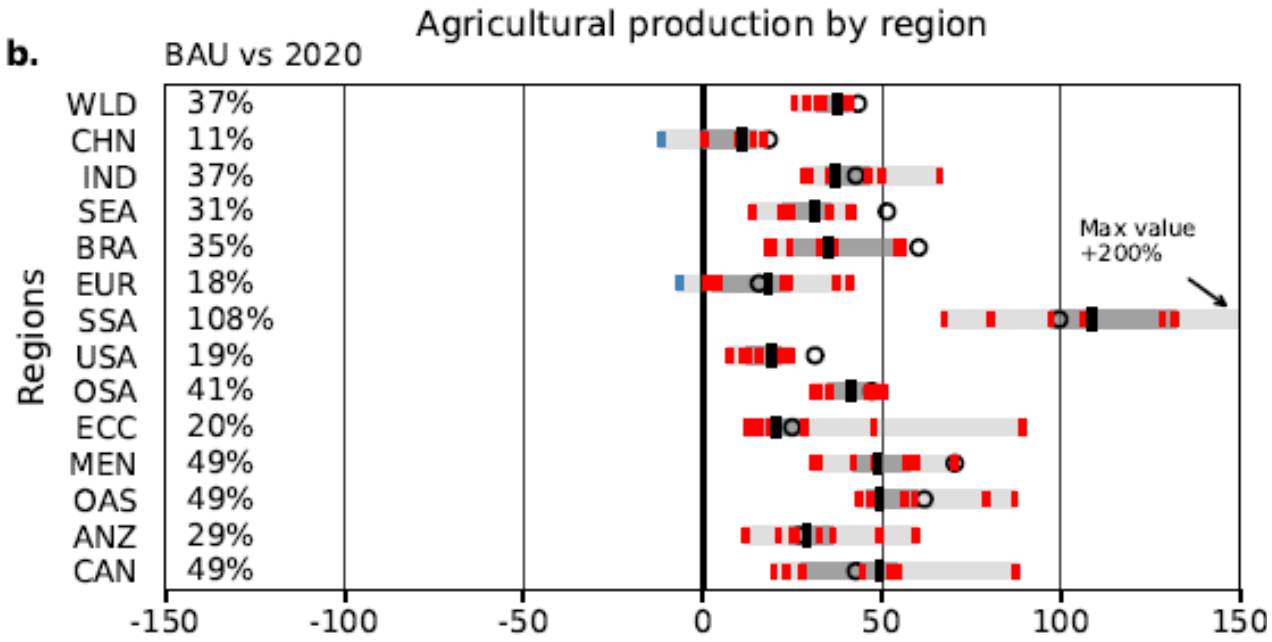
Halving of consumer food waste in line with SDG targets

Iterative Process comparing, revising…rinse repeat



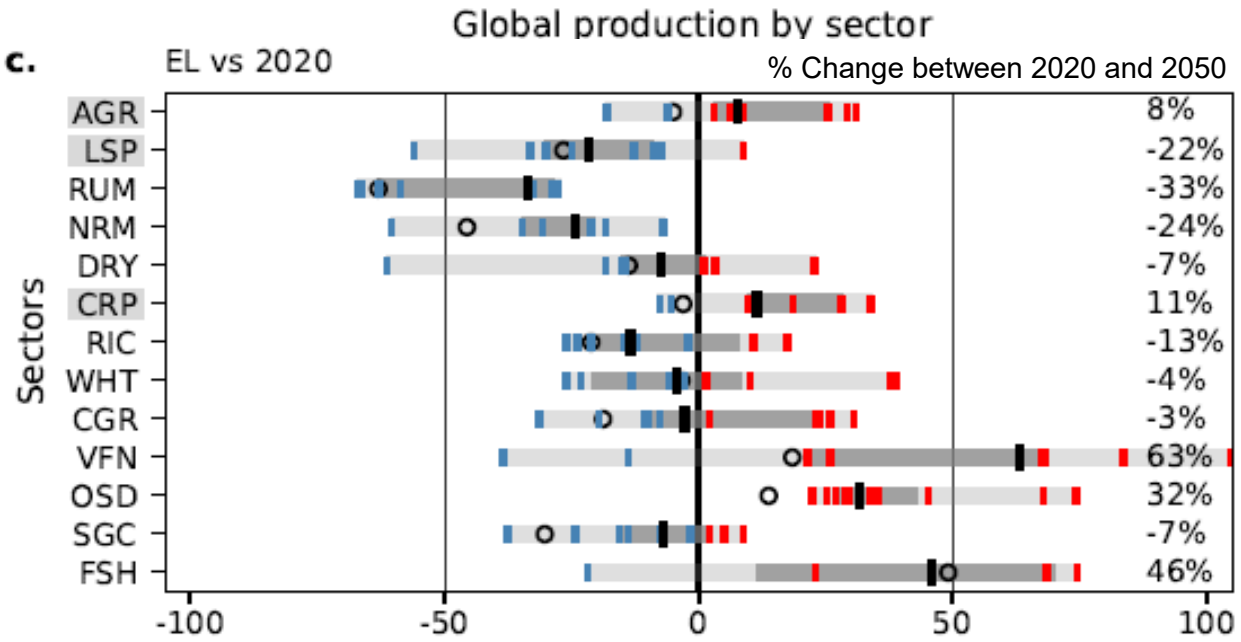
A food system transformation would restructure global food systems

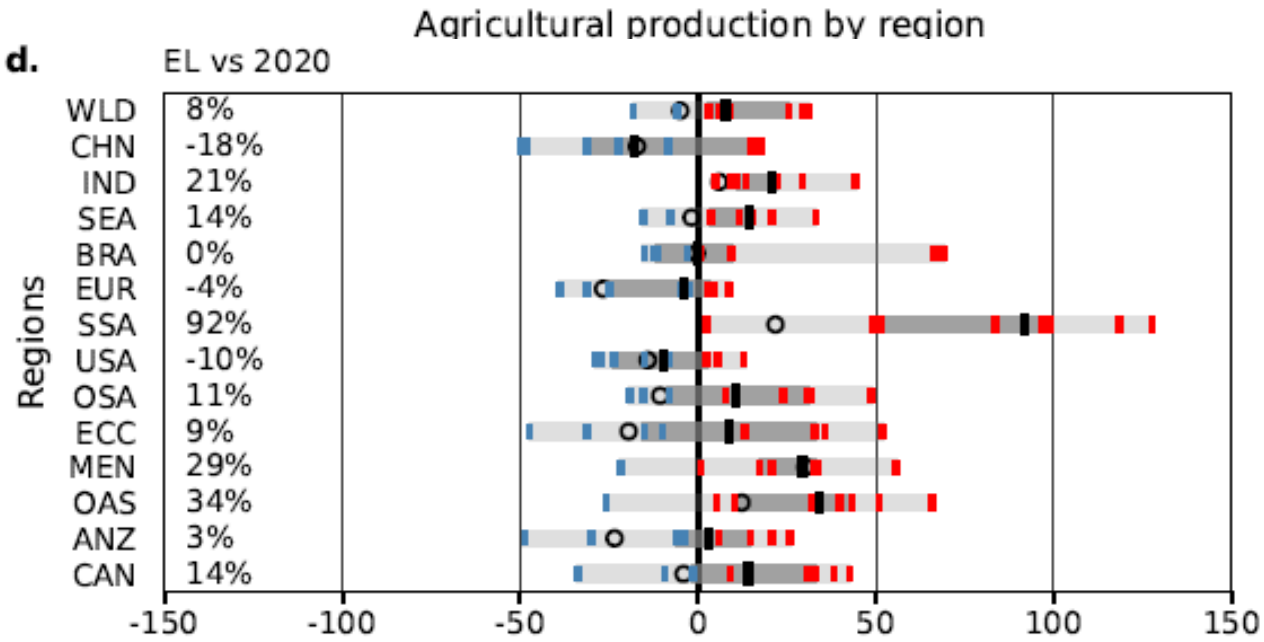




- By 2050, continuing business as usual would have us increase agricultural production for almost all regions and sectors
- Faster growth in more resource intensive agricultural products

A food system transformation would restructure global food systems





- By 2050, we still see aggregate growth globally, but at a slower rate
- Some sectors shrink, but others would need to expand to supply a healthy diet for all
- Regional differences. Low-income regions still grow, but high-income regions may shrink
- Agricultural labour declines in all scenarios, but food system transformation has a bigger impact on where agricultural labour would be needed than in total employment

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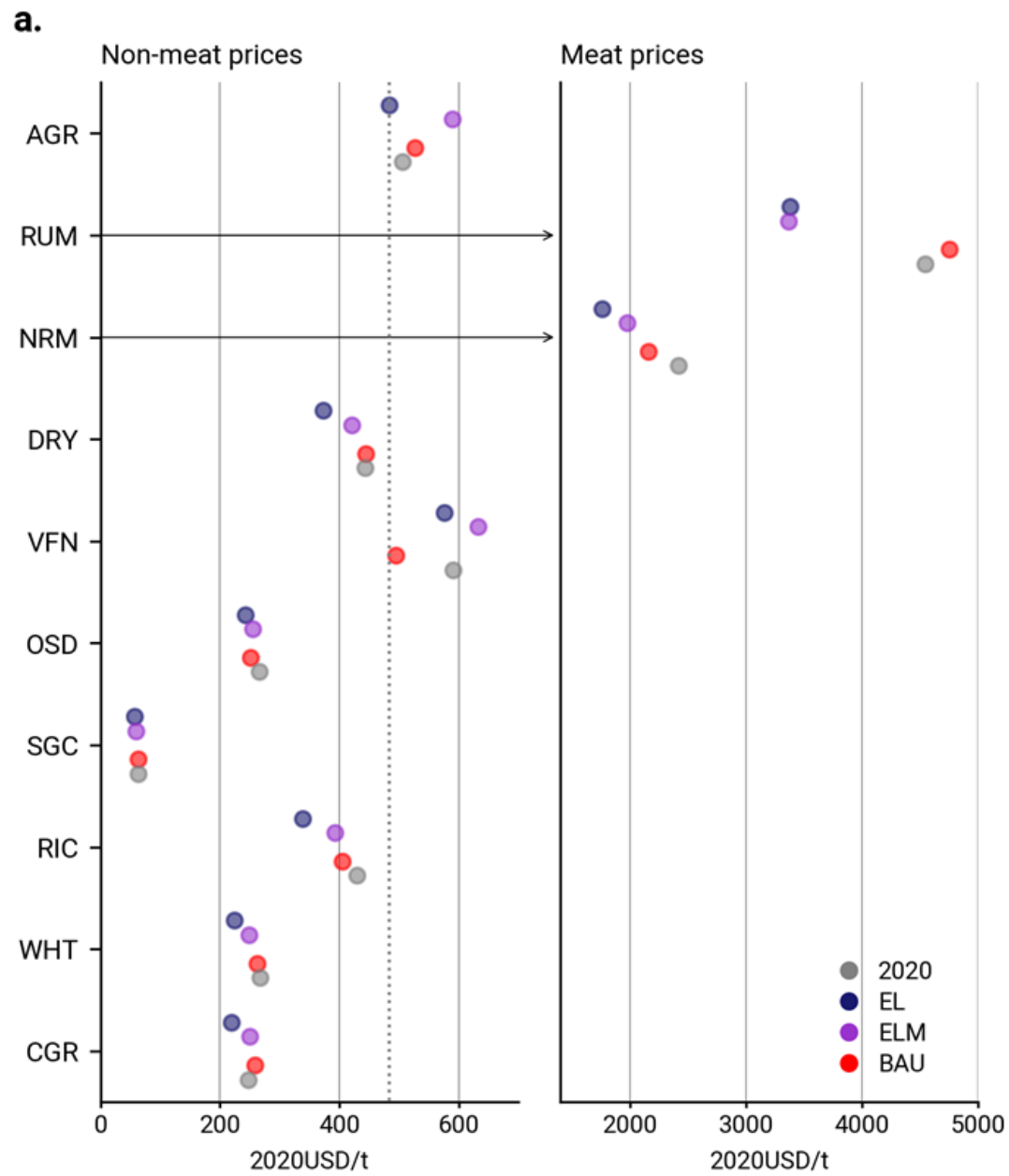
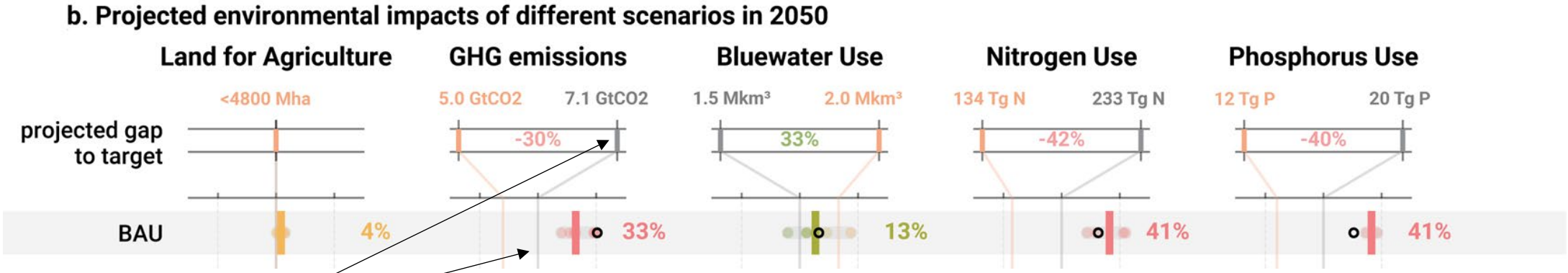
EAT AgMIP

Potential price consequences

- Relatively modest change in average ag prices across all scenarios compared to 2020
- Meat prices prices would decline, but vegetable, fruit, nut and legume prices would increase
- An EL transformed food system would be less resource intensive than a BAU one, suggesting producing a healthy diet for all could be cheaper than BAU diet globally.
- Food projected to become more affordable over time, but the consequences of a food system transformation on affordability varies by region

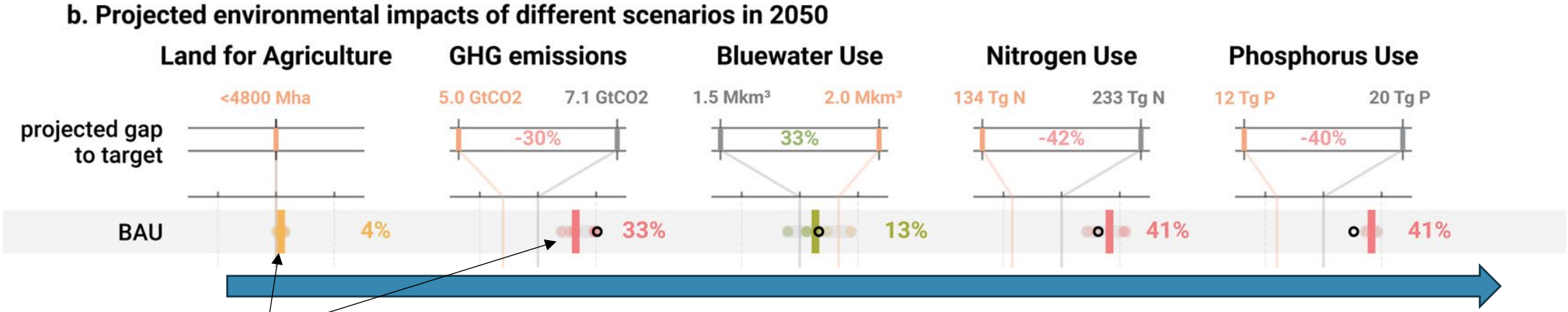


Summary of Global Environmental Results



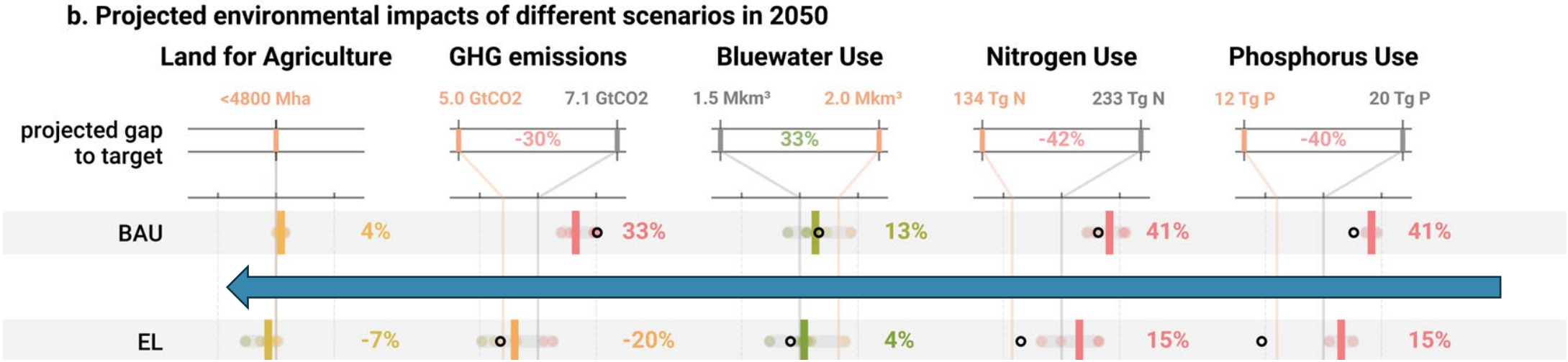
Current levels

Summary of Global Environmental Results



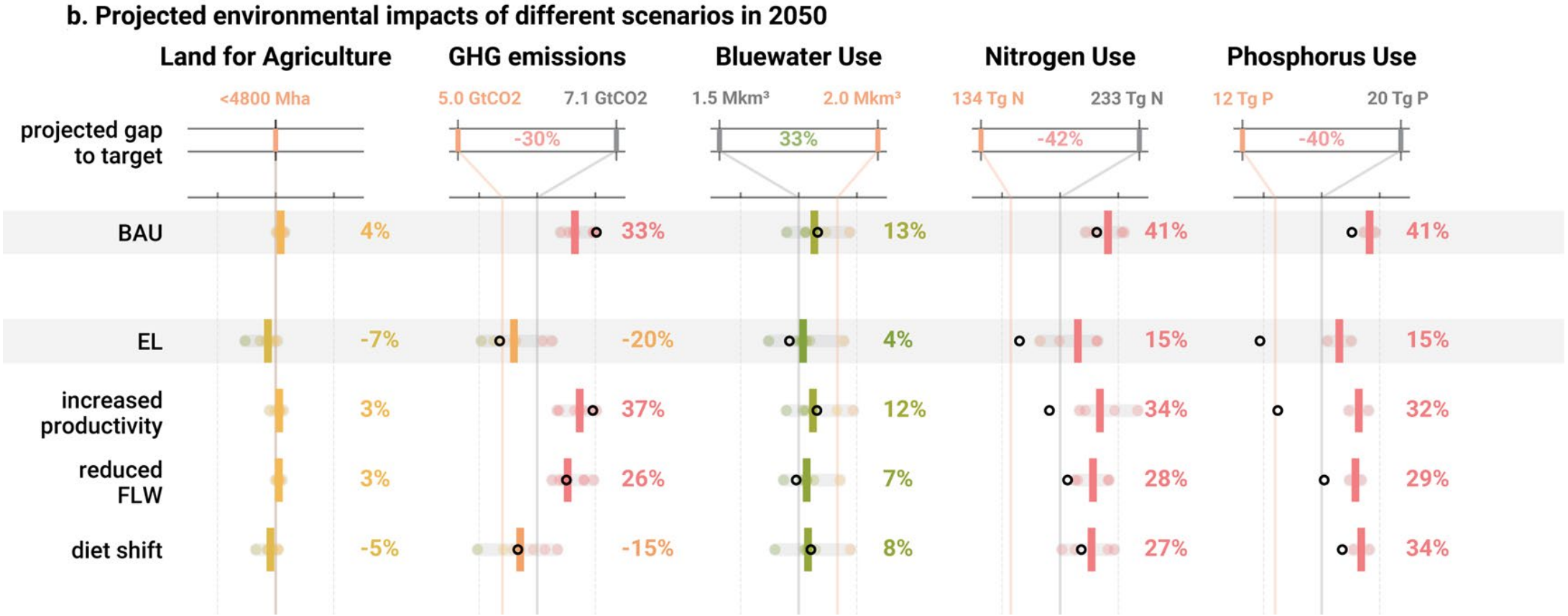
2050 Projections

Summary of Global Environmental Results



- Substantial progress in reducing environmental pressure across all dimensions
- Approaching safe zones for land, emissions, and bluewater boundaries
- Achieving nitrogen and phosphorus boundaries could be more challenging requiring more targeted interventions

Summary of Global Environmental Results



- Diet contributes substantially to reducing emissions, land-use and water, less so on nitrogen and phosphorous
- Productivity increase and FLW reduction have modest environmental impacts on their own, but when combined with diets have important complementarities

Where does the ensemble agree, and where does it disagree?

1 Scenario agreement

BAU shows tighter agreement than EL

Model ranges widen in EL relative to BAU, driven primarily by DIET and by driver interactions.

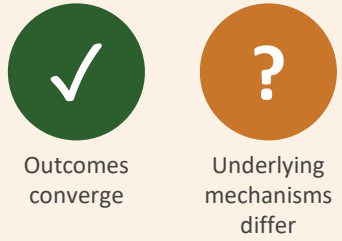
2 Driver agreement

PROD > FLW > DIET

DIET produces the widest model ranges; its complexity carries through into the combined EL scenario.

3 FLW representation

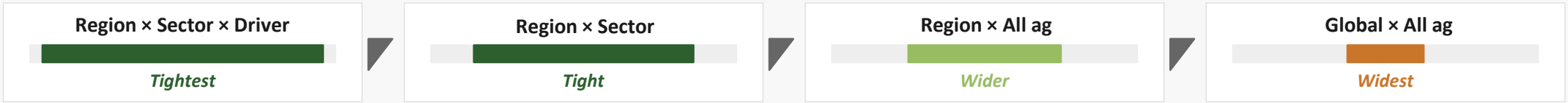
FLW agrees on outcomes, not on mechanism



Models implement food loss and waste in substantially different ways — worth deeper investigation for future intercomparisons.

4 Scale of aggregation

Greater agreement at aggregate levels; spread widens as we disaggregate



Disaggregating from world × all-agriculture to region × sector × driver widens the ensemble range. Strong global signals can mask substantial regional and sectoral heterogeneity.

5 Outcomes of Interest

Greater agreement across environmental outcomes reflecting clear causal pathway of production changes to environmental outcomes. Wider ranges across socioeconomic outcomes in particular prices, and labor

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Final Remarks

1. Work remains to assess the consequences of a food system transformation on global trade networks.

2. Future food system transformations should focus more on developing plausible transition pathways to facilitate assessments of the process of change.

3. More attention is needed to understand and better represent food loss and waste across multiple classes of models

4. Regional transformations differ greatly. More work is needed to look at more disaggregated levels to understand what differences across the ensemble tell us about transforming food systems.

Thank you

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