



INITIATIVE ON
Foresight

Asia and Pacific Food Security Forum 2024
Asian Development Bank
Manila, Philippines
April 9, 2024

The Future of Food and Agriculture in Asia and the Pacific

Mark W. Rosegrant
Research Fellow Emeritus
International Food Policy Research Institute

With Timothy B. Sulser, Shahnila Dunston, Abhijeet Mishra, Nicola Cenacchi, and Keith Wiebe

This is not an ADB material. The views expressed in this document are the views of the author/s and/or their organizations and do not necessarily reflect the views or policies of the Asian Development Bank, or its Board of Governors, or the governments they represent. ADB does not guarantee the accuracy and/or completeness of the material's contents, and accepts no responsibility for any direct or indirect consequence of their use or reliance, whether wholly or partially. Please feel free to contact the authors directly should you have queries.



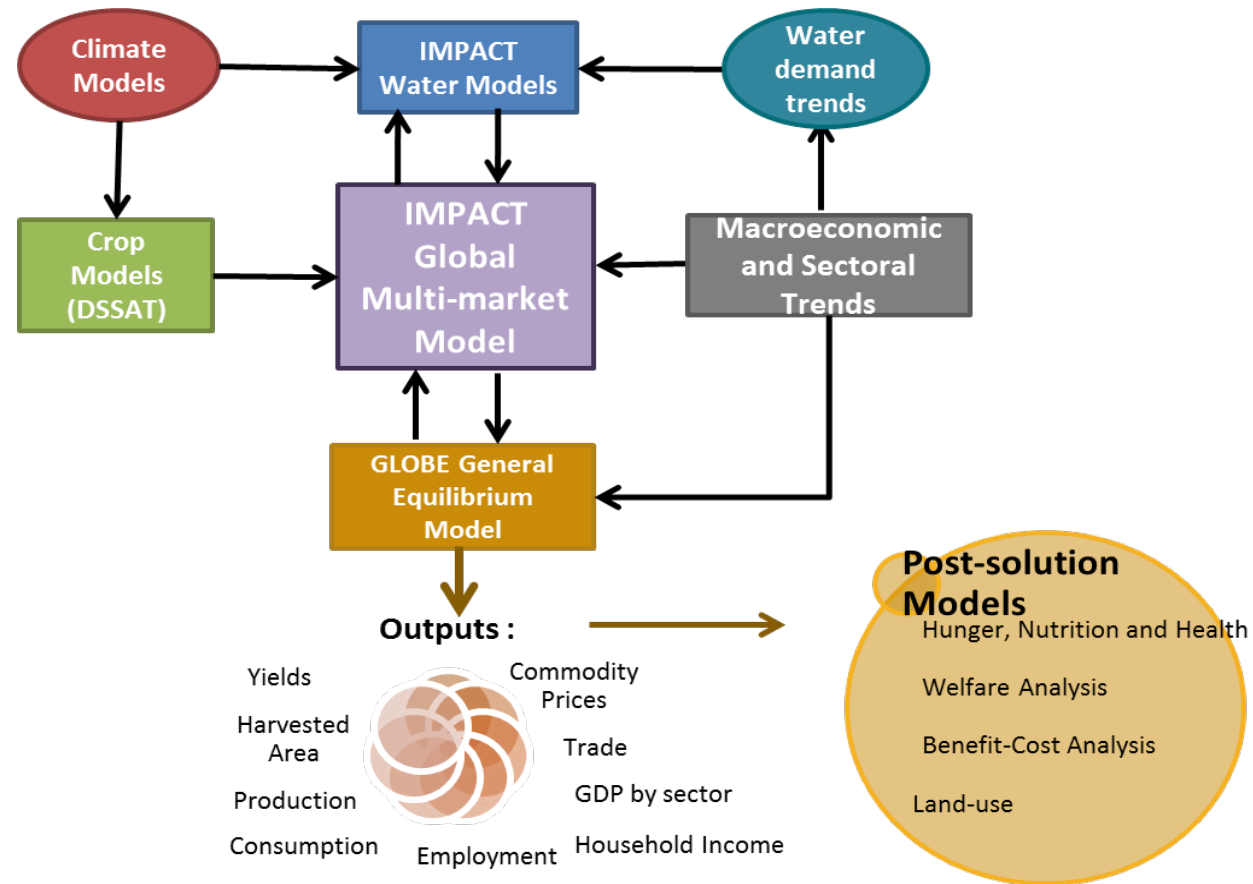
Goals of Asian Agricultural Policy

- *Ending hunger*
- *Achieving food and nutrition security*
- *Promoting sustainable resource-conserving agriculture*
- → Achieving these goals requires meeting key food system challenges

Asian Food System Challenges

- **Climate change puts pressure on food systems** and reduces productivity. Agriculture is a major contributor to greenhouse gas (GHG) emissions, so sustainable intensification is needed to reduce GHG emissions.
- **Water scarcity is increasing** with growing demand and the rising cost of developing new water resources.
- **Agricultural productivity growth is slowing** in many countries while agricultural research and development expenditures have declined.
- **Agricultural input subsidies distort production** decisions and crowd out productive investments.
- **Value chains are often inefficient**, with high marketing margins and high volumes of food loss and waste
- → **This presentation** discusses the prospects for meeting these challenges under alternative investment scenarios for Asian agriculture.

IFPRI's IMPACT Modeling Framework



- Linked climate, water, crop and economic models
- Generates estimates of production, consumption, hunger, and environmental impacts
- High level of disaggregation
 - 158 countries + 154 water basins = 320 national/sub-national regions
 - 60 crop and livestock commodities

Scenarios for Asian Food Systems to 2050

Reference scenario

- Population and income trends from SSP 2
- “Business-as-usual” projections of agricultural investment and productivity growth
- Climate change scenario RCP 7.0 (IPSL climate model)

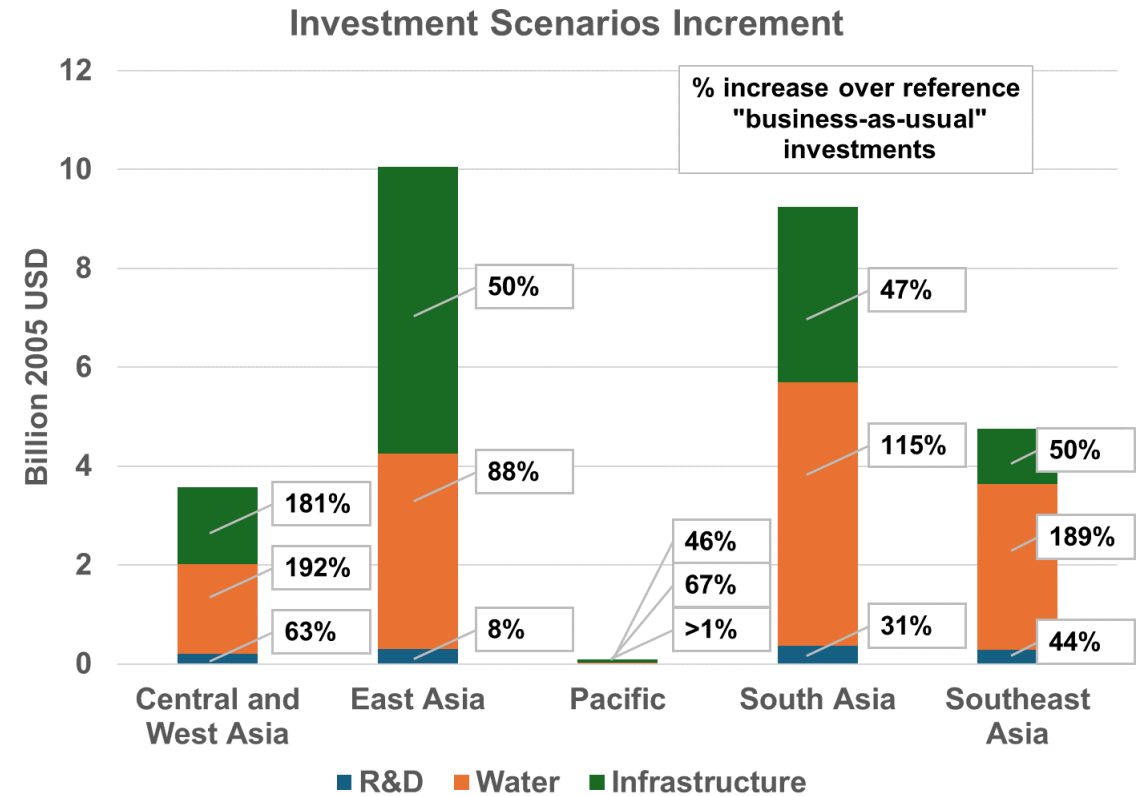
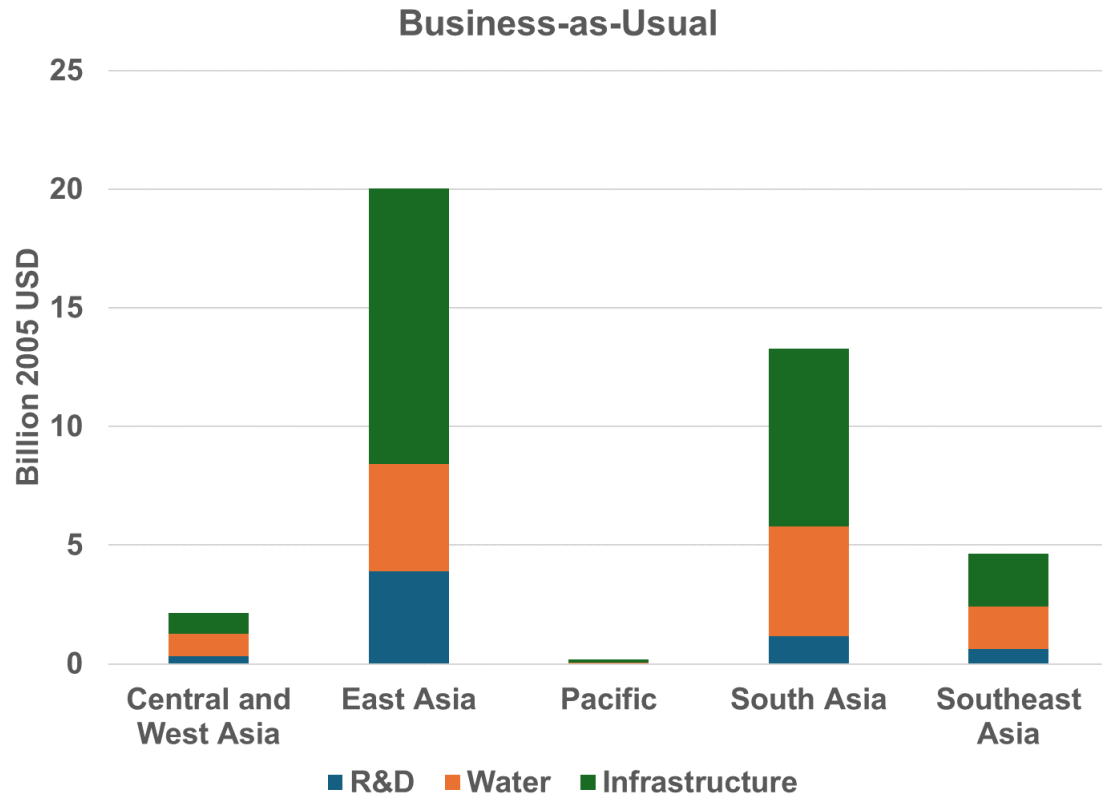
Alternative investment scenarios

- Agricultural R&D
- Water
- Rural infrastructure
- Repurposing subsidies

Summary of Investment Scenarios

Scenario grouping	Scenario name	Scenario description
Investment in agricultural productivity growth	Hi-IARCs	Increase in investment across the IARCs (CGIAR) portfolio
	Hi+NARS	Increase in investment across the IARCs portfolio plus increased National Agricultural Research System investments (NARS)
	Hi+NARS+EFF	Increase in investment across IARCs and NARS plus increased research efficiency
Investment in irrigation and water use efficiency	IRREXP	Increased investment to expand irrigation
	IRREXP-WUE	Increased investments to expand irrigation plus increased investments in water use efficiency
Investment in rural infrastructure	RMM/PHL	Investment in rural roads, rail, and electrification to improve market efficiency through the reduction of transportation costs and marketing margins
Comprehensive Investment	COMP	Combines the Hi+NARS+EFF, IRREXP-WUE, RMM/PHL scenarios
Repurposing subsidies	RPP	Redirect 30% of subsidy payments to producers to the investment categories above, for the eight countries with data: Bangladesh, China, India, Indonesia, Kazakhstan, Philippines, Thailand, and Viet Nam

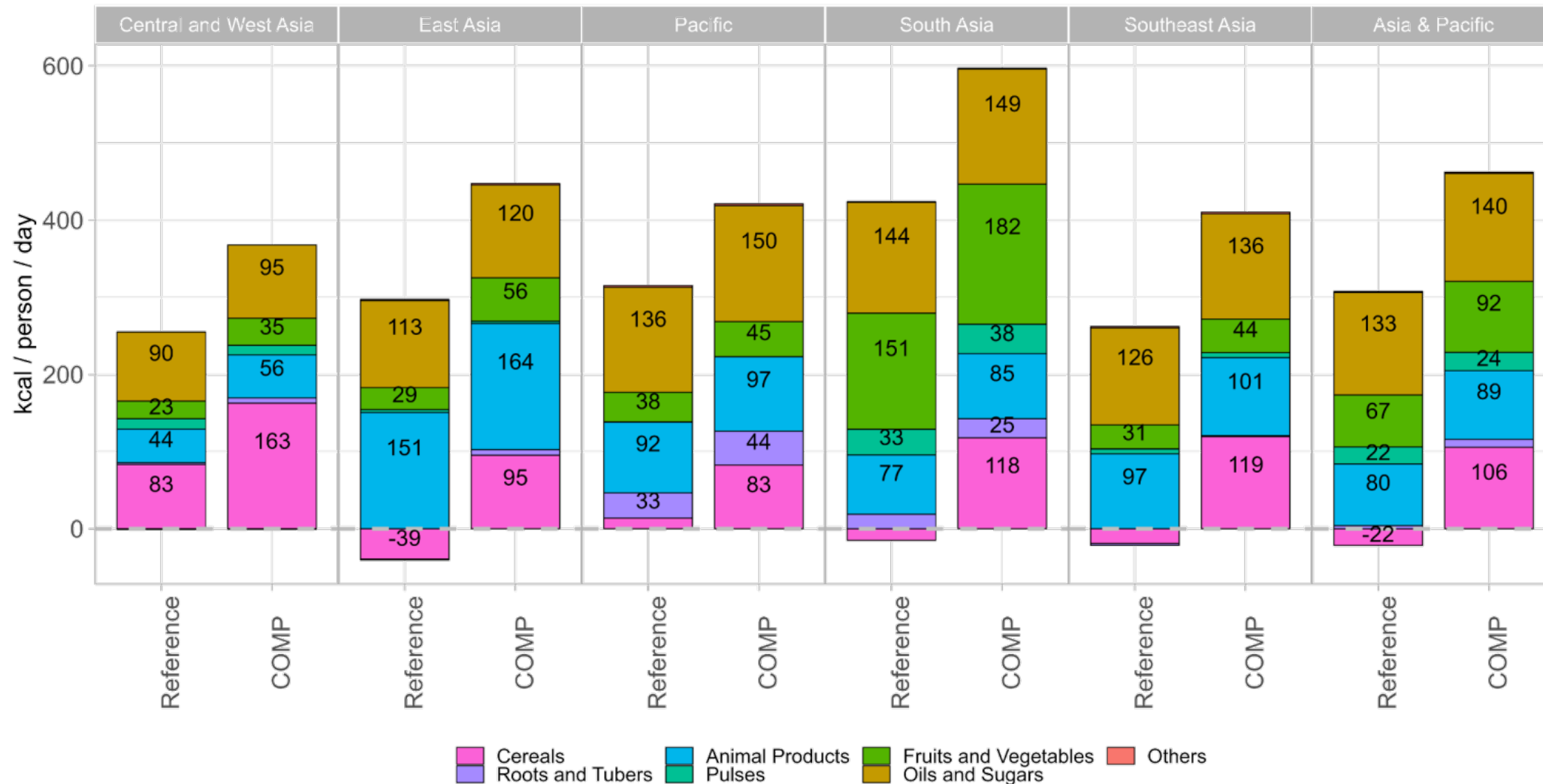
Annual Investment Costs, 2020 to 2050



Total Annual Investments Billion USD						
	Central and West Asia	East Asia	Pacific	South Asia	Southeast Asia	Asia & Pacific
REF_CC	2.13	20.03	0.19	13.30	4.66	40.31
COMP	5.70	30.08	0.28	22.54	9.42	68.02
% Total Increase for COMP	168%	50%	47%	69%	102%	69%

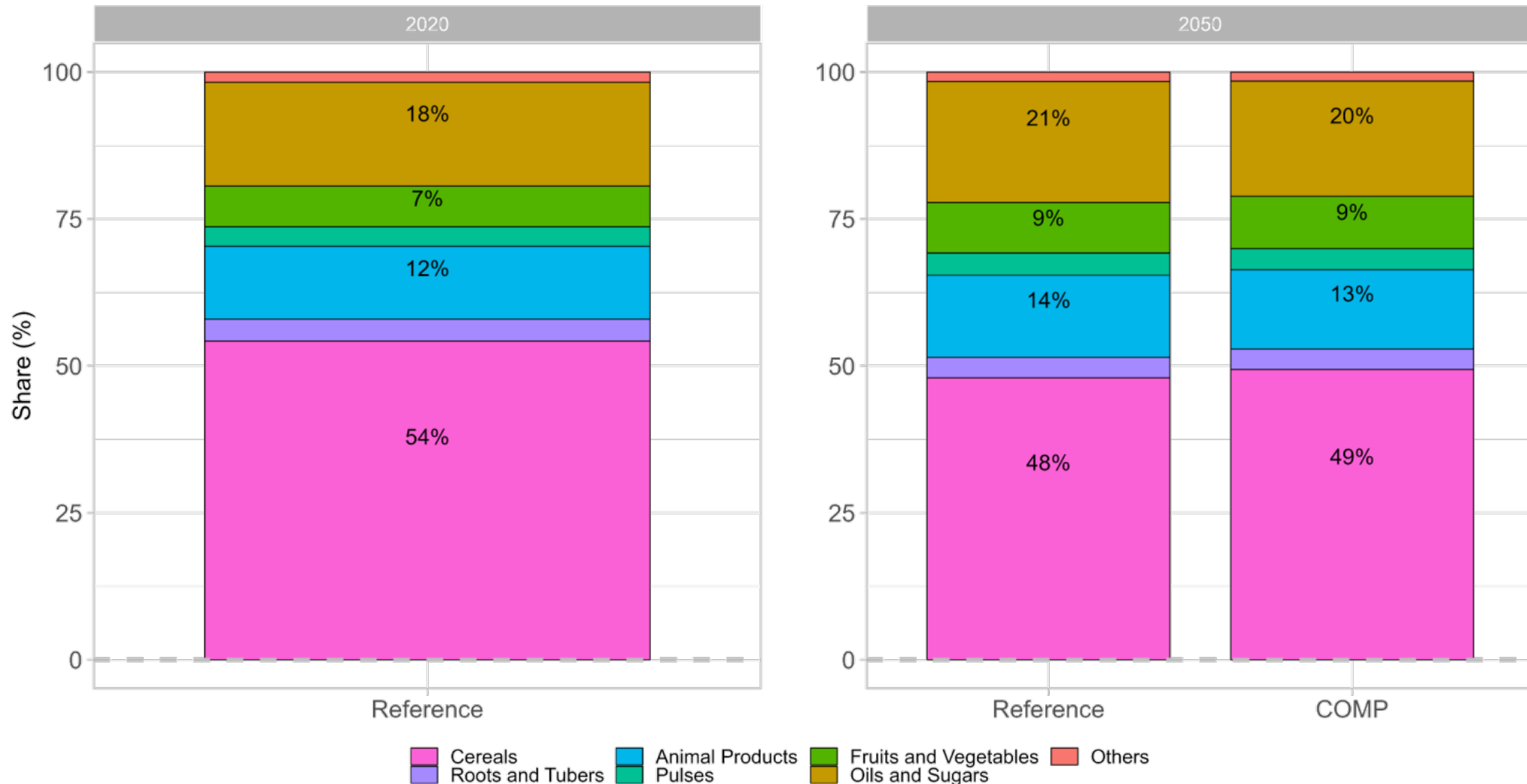
Increased investments boost food consumption

Changes in kcal availability in 2050 compared to 2020



Diets Are Projected to Diversify

Share of food groups in total kcal



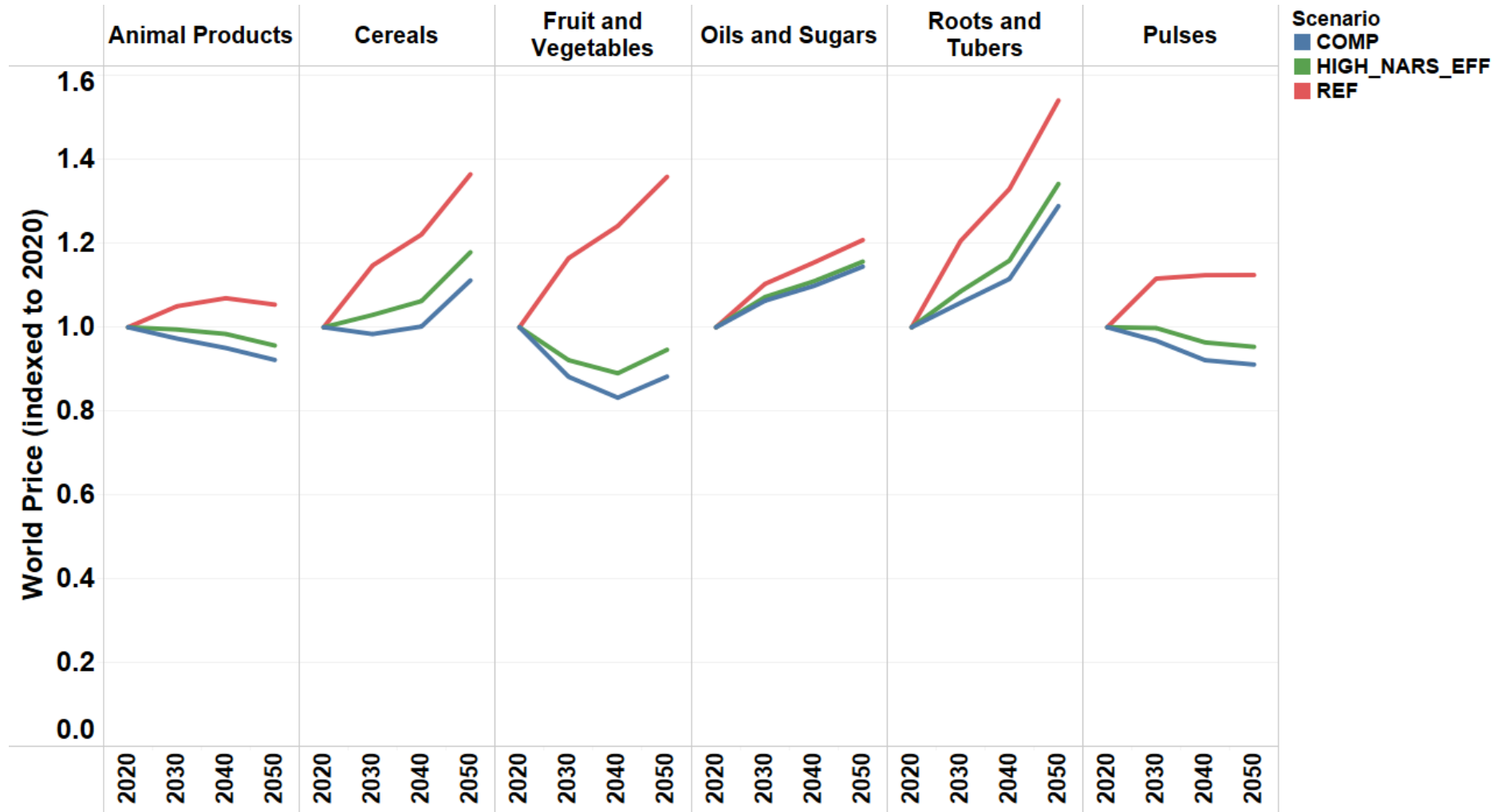
Projected Crop Yields, Alternative Scenarios

(aggregate crop yields, mt/ha)



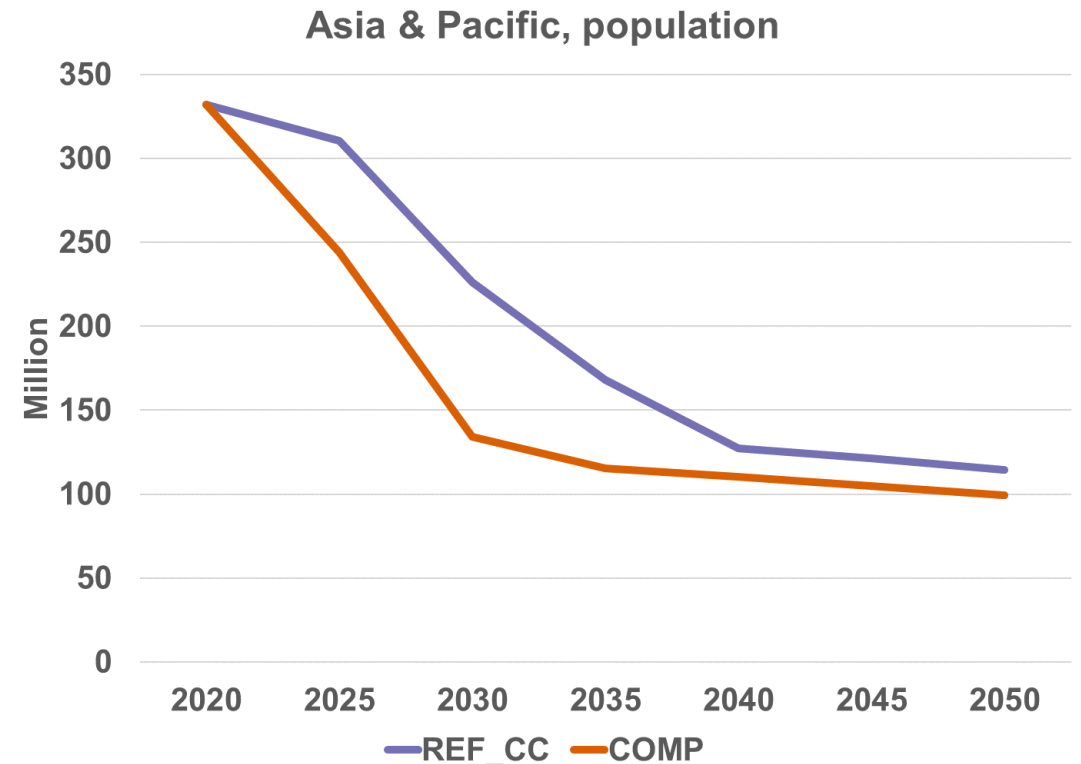
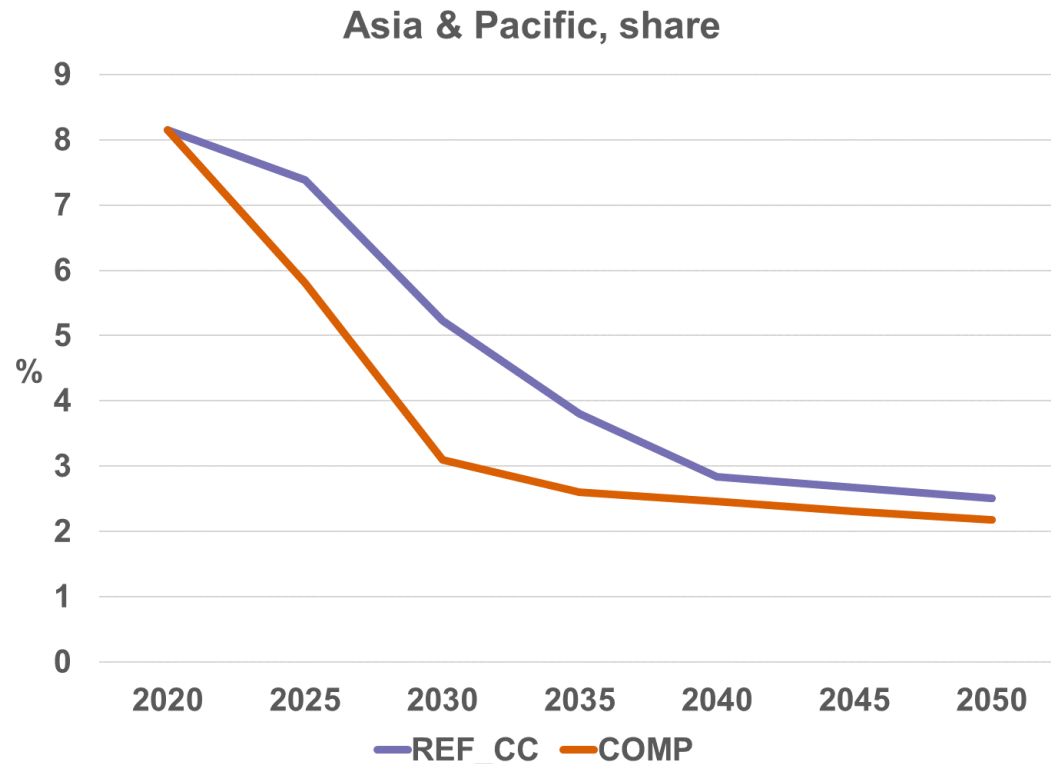
Projected Food Prices, Alternative Scenarios

(indexed to 2020)



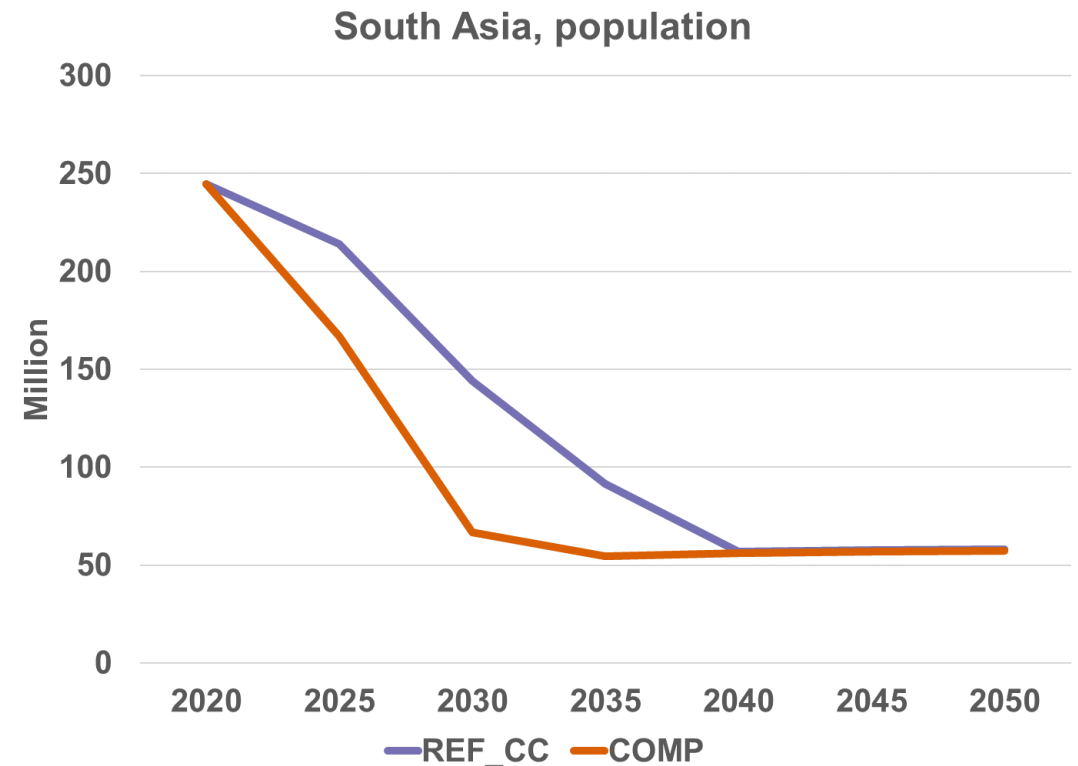
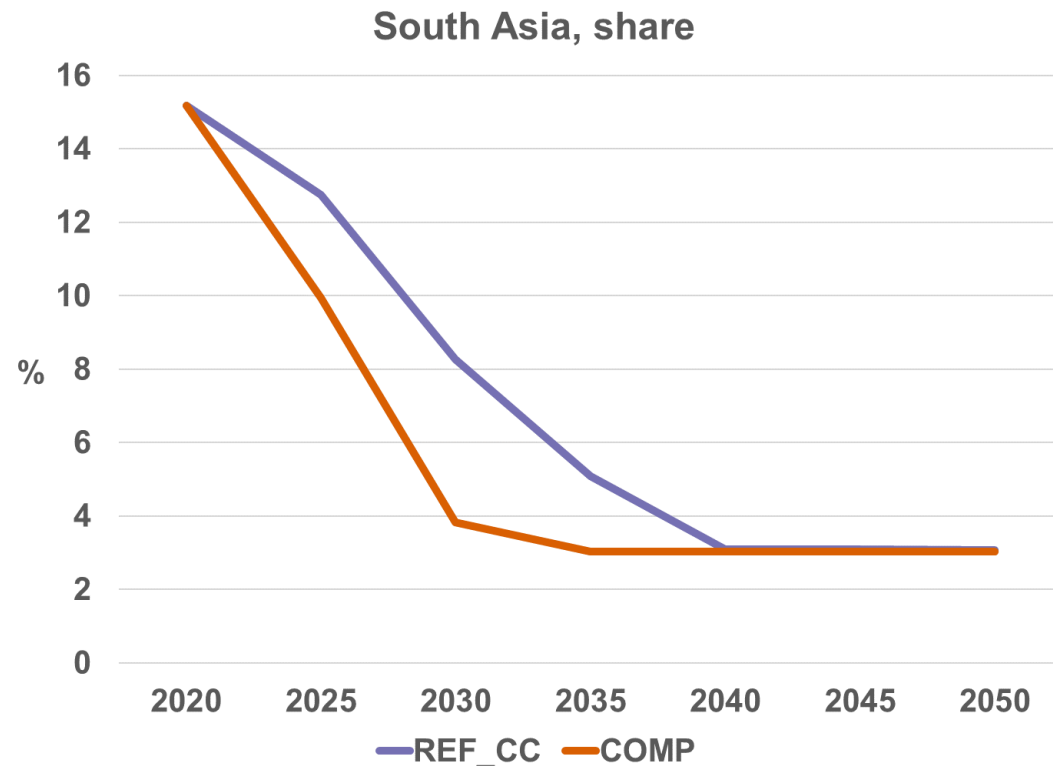
Risk of hunger, 2020 to 2050

(Share and population hungry, Asia & Pacific)



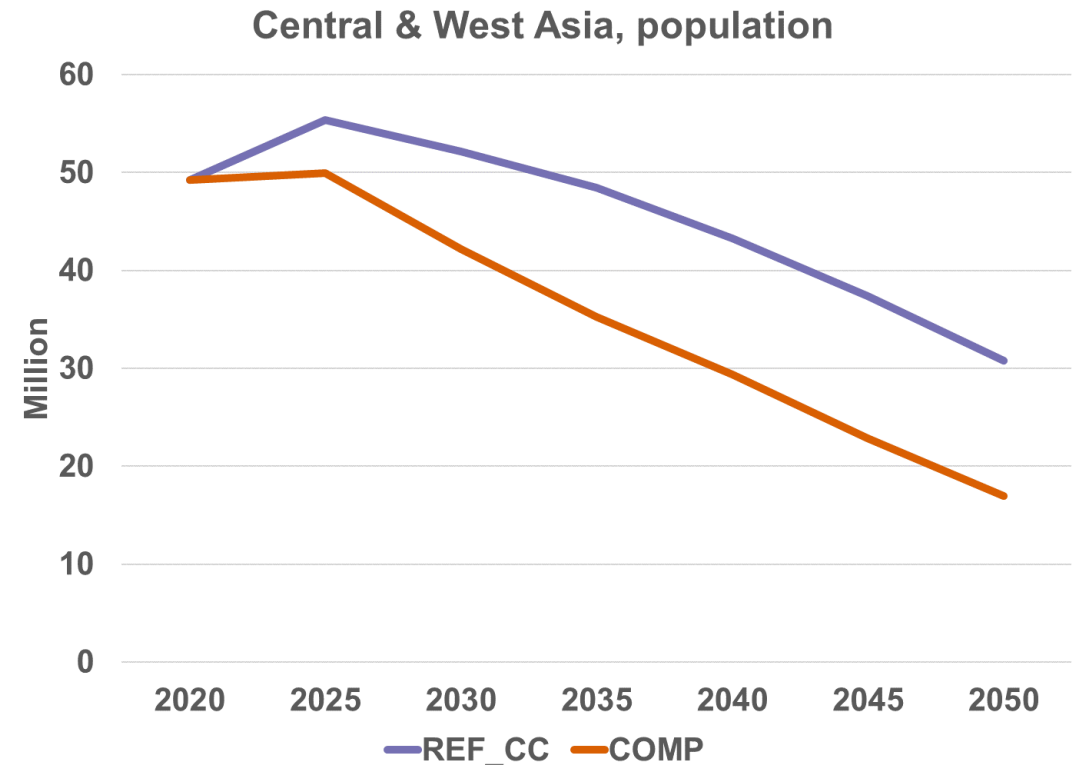
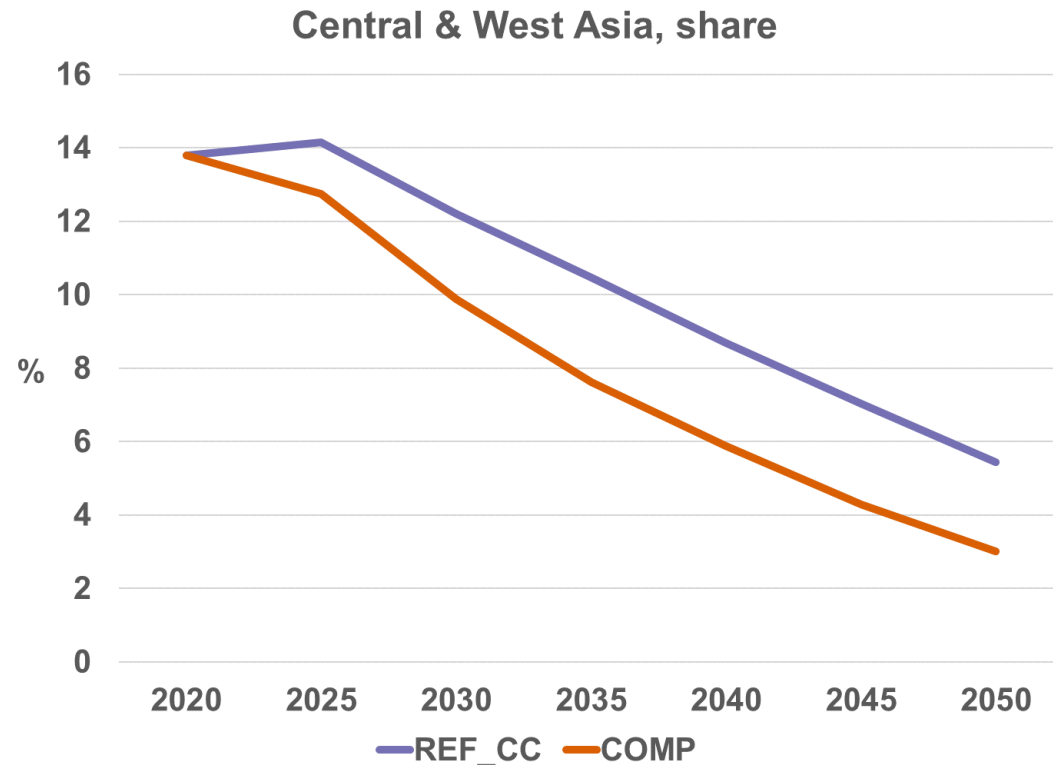
Risk of hunger, 2020 to 2050

(Share and population hungry, South Asia)



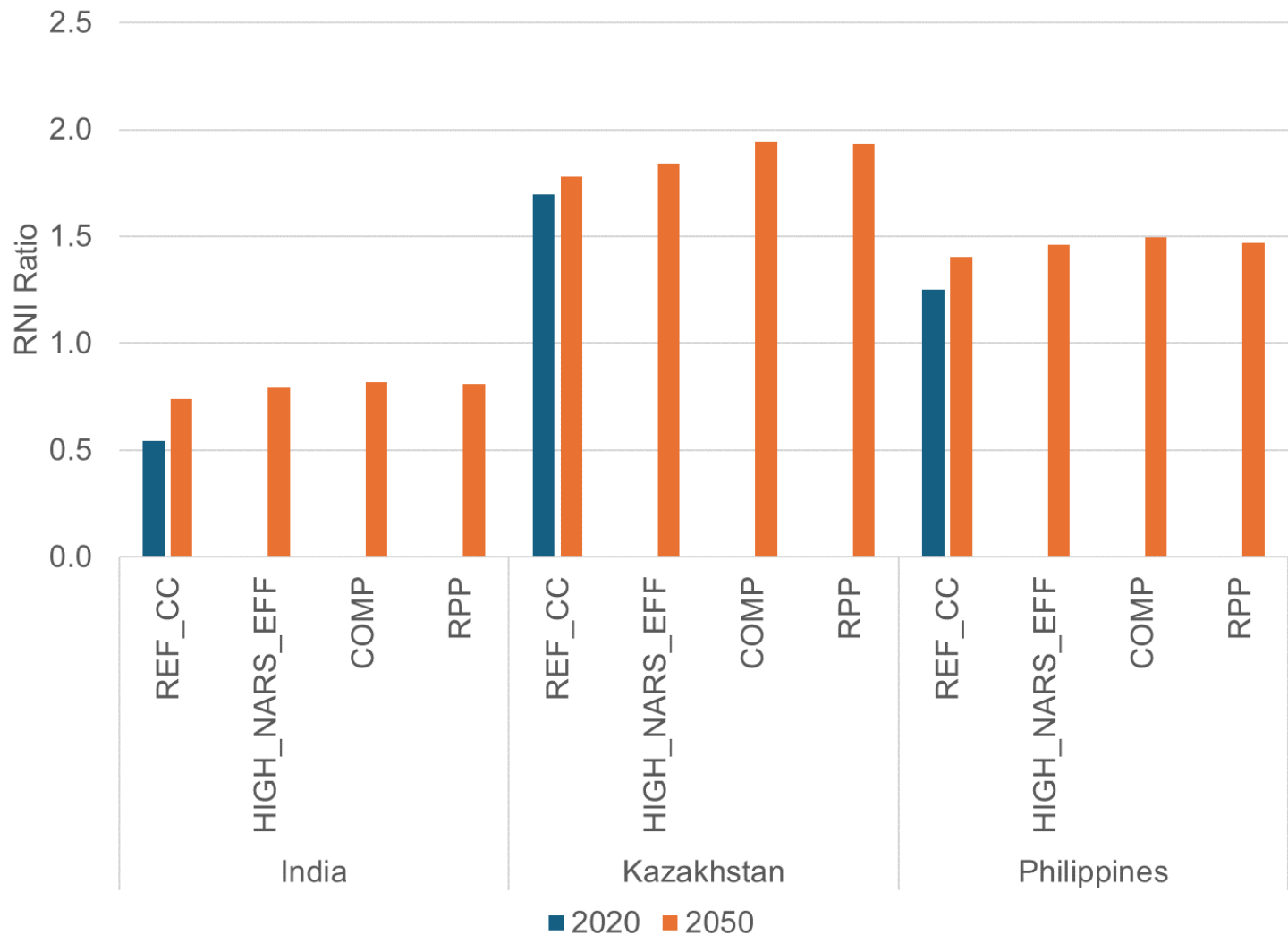
Risk of hunger, 2020 to 2050

(Share and population hungry, Central & West Asia)



Projected nutrient availability for selected countries (iron)

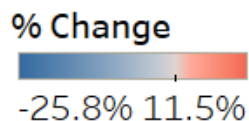
- Investments increase availability of important nutrients for the population
- Nutrient availability compared to recommended intakes (RNI Ratio)
- Some countries fall short, other countries have availability that meets or exceeds recommendations
- Distributional concerns; some can access and afford these nutrients, others cannot



Projected Water Use

(percent change relative to reference scenario)

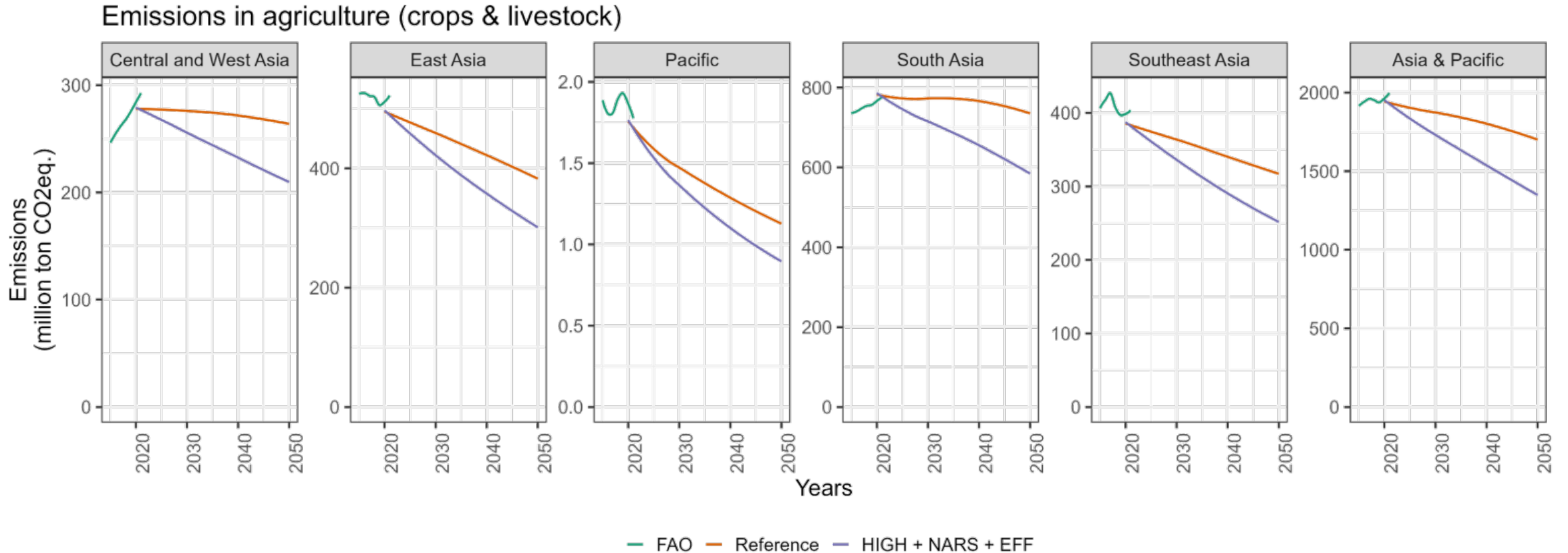
			ASIA & PACIFIC	Central & West Asia	East Asia	Pacific	South Asia	Southeast Asia
Blue Water	2030	IRREXP	1.4%	0.4%	-0.2%	0.3%	1.5%	8.3%
		IRREXP_WUE	-5.3%	-1.4%	-7.5%	-19.2%	-4.8%	-11.1%
	2050	IRREXP	1.9%	0.3%	-0.3%	0.2%	2.1%	11.5%
		IRREXP_WUE	-7.4%	-1.7%	-11.6%	-25.8%	-6.3%	-14.4%
Green Water	2030	IRREXP	1.2%	2.4%	-0.1%	-0.1%	1.3%	2.3%
		IRREXP_WUE	1.1%	2.4%	-0.1%	-0.1%	1.1%	2.2%
	2050	IRREXP	2.1%	3.8%	-0.2%	-0.1%	2.6%	3.3%
		IRREXP_WUE	1.8%	3.6%	-0.2%	-0.2%	2.2%	3.0%



Blue water: water in surface reservoirs and aquifers, delivered via irrigation

Green water: water held in soils and available to plants, from rainfall

Investment in Agricultural R&D Reduces Agricultural GHG Emissions



Emissions calculated based on AR6 GWP100 for N2O and CH4
 Emissions in agriculture are calculated using emissions for Barley, Beans, Beef, Dairy, Lamb, Maize, Millet,
 Other Cereals, Pork, Potato, Poultry, Rice, Sorghum, Soybean, Sugarcane, Wheat.
 All values correspond to descriptions of FAO Tier 1 method of emission calculations

Investment in rural infrastructure and repurposing subsidies can be best-buy investments

- Increased investment in rural infrastructure, markets, IT, and cell phone towers reduces post-harvest losses by 50% percent in the ADB region, increasing production by 1–5%, lowering food prices, and reducing hunger by 16 million people (9%) by 2035 compared to the reference scenario.
- Repurposing agricultural sector government subsidies in 8 countries (Bangladesh, China, India, Indonesia, Kazakhstan, Philippines, Thailand, and Viet Nam) alone benefits the entire ADB region, increasing total agricultural output by 17% and reducing hunger by 51 million people (30%) by 2035 compared to the reference scenario.

Conclusions

- Increased investments in agricultural productivity growth, irrigation and water use efficiency, and rural infrastructure are highly effective in
 - increasing agricultural production
 - cutting food prices and boosting consumption
 - reducing hunger rapidly to achieve SDG2 hunger goals
 - reducing GHG emissions and water use
- Investments in health, nutrition, clean water and sanitation, and education are needed to further reduce hunger and childhood malnutrition
- Those who are still vulnerable must be reached through income transfers and safety nets that help them through short-term stresses or disasters

Conclusions

- The impact of these investments would be further increased by improvements in the enabling environment for sustainable intensification, including
 - extension and innovation systems to enhance uptake of technology
 - gender-responsive policies and investments to increase women's access to land, finance, natural resources, and information
 - design of GHG emission reduction policies including carbon payments
 - increasing access to farmer and sectoral finance to support private investment
- A well-targeted portfolio of investments and policy reforms can meet the goals of Asian agricultural policy even in the face of significant food system challenges

Key questions for discussion

- Rural-urban migration and innovations in crop breeding, farming systems, and digital technologies are improving economies of scale, with pressure to consolidate land ownership or operational size of farms. How can growth and the welfare of small farmers be balanced?
- How can agriculture, health, and nutrition policies be integrated for maximum impact?
- Should investments be allocated specifically to different crops to encourage further diet diversification?
- How can policy makers address the political economy challenge of repurposing agricultural subsidies?

Thank you