FeliX ISE

An Interactive Simulation Environment for Exploring Behaviour Change in the Food System through an Integrated Assessment Model

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Motivations

Changing Roles of IAMs
Effective climate action increasingly depends on inclusive decision-making processes and transformations across technological, economic, and socio-cultural domains. Integrated Assessment Models (IAMs) need to improve accessibility for non-experts to foster more inclusive and participatory decision-making for climate action (Van Beek et al., 2020).

Approaching the Accessibility Gap with Tools
This work aims to enhance participatory scenario development through an Interactive Simulation Environment (ISE)—a tool that packages the FeliX IAM* into a user-friendly and interactive interface. This is part of several tool-development efforts to mainstream IAMs for broader use (Curley et al., 2024).

Target Audiences
This tool is primarily designed for non-experts including consumers, students, and supply chain actors; while also serving secondary users such as facilitators, educators, and policymakers to support the processes. The tool aims to address both *educational* and *participatory* needs.

Key Education Needs
- Looking beyond knowledge transfer, to social, emotional and action-oriented learning (UNESCO & SERI, 2024)

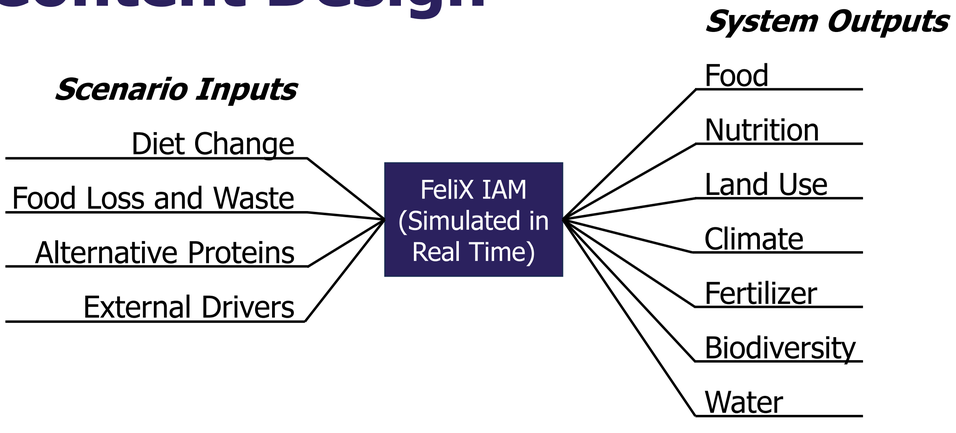
Key Participatory Needs
- Reduce power imbalances between non-experts and experts (Galang et al., 2025)
- Encourage inclusivity, integration and pluralism
- Greater focus on process-oriented potentials

Full of Economic-Environment Linkages and Integration dX/dt (FeliX)* (IIASA, 2024)

- A **system dynamics-**based global IAM simulated from 1900 to 2100
- Includes **nine modules** to represent the dynamic **Earth-Human** system
- Integrating modules based on interacting **feedback loops** within and between them

https://iiasa.github.io/felix_docs/

Content Design

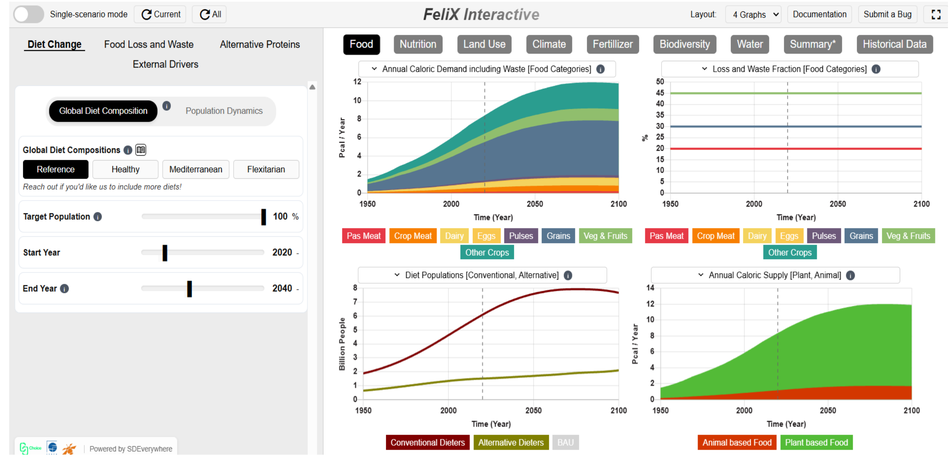


Scan Me!

climatechoice.github.io/felix/

The ISE scopes FeliX into an input–output format, allowing users to customize **scenario inputs**—behavioural levers and external drivers—and observe resulting impacts on **system outputs** that capture impacts on the environment and health.

Composition Design

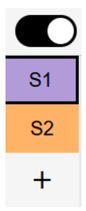


The interface is divided into two sections, left and right, based on the input-output format, with additional tabs to explore sub-variables.

Novel Features

Multi-Scenario Mode

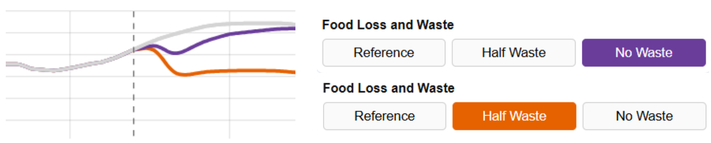
Interface supports parallel development of scenarios and allows comparisons in real time.



Toggle between Single-Scenario to Multi-Scenario Modes.

Choose different input values for Scenario 1 and Scenario 2

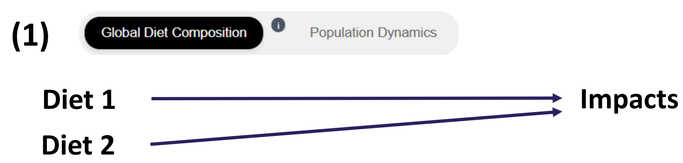
Colours and **layouts** are employed to facilitate comparisons of inputs and outputs between the different customized scenarios.



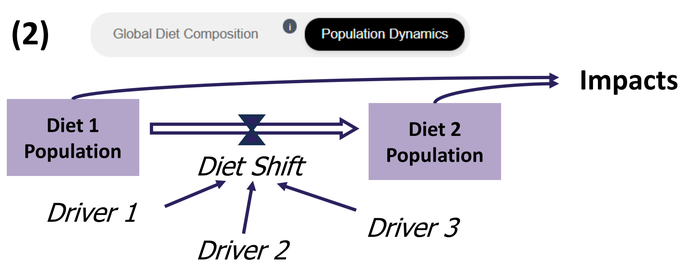
Alternative Lenses

Interface provides alternative sets of scenario inputs to accommodate differing mental models.

"What if I change **my diet**?"



"What are the drivers of **large-scale diet shifts**?"

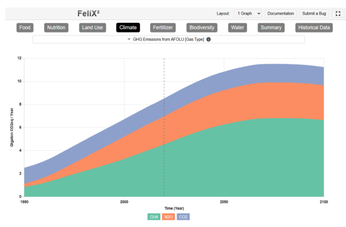


Multi-Graphs Layouts

Interface supports various ways to view scenario outputs depending on needs and questions.

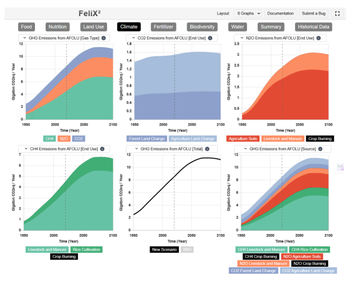
Smaller graph counts enable focused inquiries of specific variables.

e.g. Meeting Goals, Targets



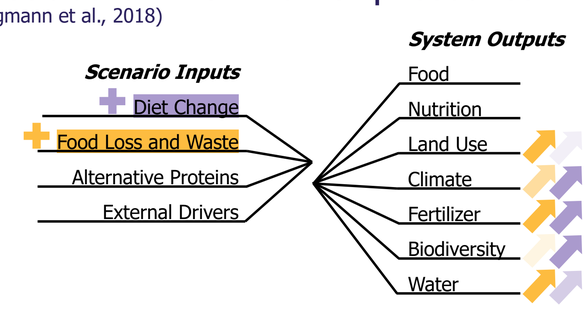
Larger graph counts allow for broader exploration on system variables and scenario outcomes.

e.g. Trade-offs, Complexities



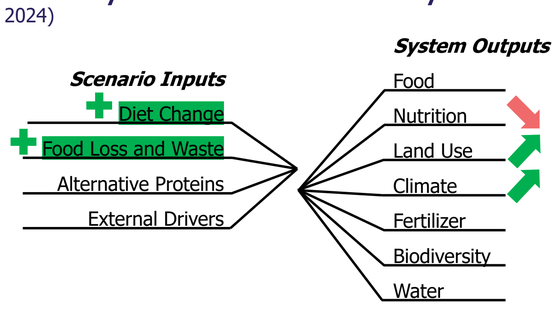
Sample Scenario Narratives

"**Combinations of Actions** are needed to reduce environmental pressures"
(Springmann et al., 2018)



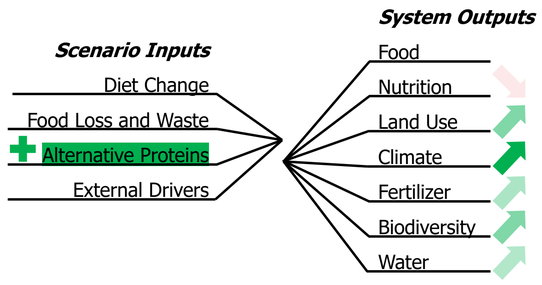
By testing individual inputs, users see how no single solution can address all environmental challenges. This emphasises the need for synergistic combinations of actions to keep us within planetary boundaries.

"**Interlocking Policy Priorities** between Sustainability and Food Security"
(IPES Food, 2024)



Users can observe that efforts to improve behaviour often involve trade-offs between *Nutrition* and *Environmental* outcomes, describing the interconnected nature of challenges within the global food system.

"**Food Innovations** are needed to alter the global food landscape "
(FAO, 2025)



Users can explore how emerging technologies, i.e. *Alternative Proteins*, help with global challenges. This highlights opportunities and challenges, particularly in terms of land use and resource inputs.

Curley, A., Xexakis, G., Zuiderwijk, A., Minkman, E., & Okur, Ö. Policy Support Platforms on Climate Change Mitigation and Adaptation: An Assessment Framework. Available at SSRN 5071766.
International Panel of Experts on Sustainable Food Systems (IPES-Food). (2024, May 7). We cannot afford another lost year for food and climate action. https://ipes-food.org/we-cannot-afford-another-lost-year-for-food-and-climate-action/
International Institute for Applied Systems Analysis. (2024). *FeliX Documentation*. https://iiasa.github.io/felix_docs/
Food and Agriculture Organization of the United Nations. (2025, April 22). Forty-four emerging food innovations by 2050. FAO. https://www.fao.org/food-safety/news/news-details/en/c/1736833/
Galang, E. I. N. E., Bennett, E. M., Hickey, G. M., Baird, J., Harvey, B., & Sherren, K. (2025). Participatory scenario planning: A social learning approach to build systems thinking and trust for sustainable environmental governance. Environmental Science & Policy, 164, 103997.
Springmann, M., Clark, M., Mason-D'Croz, D., Wiebe, K., Bodirsky, B. L., Lassaletta, L., ... & Willett, W. (2018). Options for keeping the food system within environmental limits. Nature, 562(7728), 519-525.
UNESCO & Monitoring and Sustainability Education Research Institute, University of Saskatchewan. (2024). Education and climate change: Learning to act for people and planet, Paris, UNESCO
Van Beek, L., Hajer, M., Pelzer, P., Van Vuuren, D., & Cassen, C. (2020). Anticipating futures through models: the rise of Integrated Assessment Modelling in the climate science-policy interface since 1970. Global Environmental Change, 65, 102191.

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