



Net0 Pathways through improved IAMs across Sectors, dimensions, and scales

Deliverable 5.3

*Final scenario data of integrated
SDG scenario analysis*

Deliverable 5.3

30 June 2026



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Deliverable Title	Final scenario data of integrated SDG scenario analysis
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Brief Description	This deliverable presents scenario projections of integrated sustainability scenarios. This forms part of the Sustainability-MIP whose aim is to explore and assess the current landscape of sustainability scenario modelling. Sustainability-MIP aims to be inclusive towards models and methodologies beyond PRISMA, and thus this deliverable also includes results from outside PRISMA. The scenarios analysis shows that sustainability-focused scenarios generally reduce environmental pressures compared to baseline projections. Furthermore, sustainability actions may present synergies and trade-offs. The scenarios present varied narratives for achieving sustainability, with contrasting transformation narratives focusing on technical fixes and efficiency improvements, sufficiency, or a mix. The Sustainability-MIP will continue throughout the remainder of the PRISMA project, focusing on synergies and trade-offs of sustainability transitions. All the scenario projections are available on the PRISMA scenario explorer: https://prisma-internal.apps.ece.iiasa.ac.at/
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Author(s)	Vassilis Daioglou, Isabela Tagomori Schmidt, Shinichiro Fujimori, Jon Sampedro, Jonathan Moyer, Deva Sahadevan, Ethan Sullivan, Barry Huges, Modamed Ifran, José Solórzano, Yutang Xiong, Taylor Hanna, Collin J. Meisel, Oliver Fricko, Akshaya Thakku Rajan, Isabelle Weindl, Miodrag Stevanovic, Jessica Strefler Gonzalo Parrado, Mathijs Harmsen, Johannes Emmerling
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1 Introduction

1.1 Sustainability Scenarios

The simultaneous achievement of environmental and social targets is increasingly prominent in national and international policy agendas. This has become visible through frameworks including the Sustainable Development Goals (SDGs), the Planetary Boundaries framework, the triple planetary crisis, decent living needs and standards, as well as specific mentions within the Paris Agreement (Rao and Min, 2018; Rockstrom et al. 2009; UNFCCC, 2015).

Integrated Assessment Models (IAMs) are frequently used for developing scenarios that explore how to meet climate goals and associated issues by using internally consistent model quantifications in combination with scenario narratives to look into possible future trends and the transitions required to meet a set of goals (Nakicenovic et al., 2000; Weyant, 2017). More recently, IAMs have also been used to identify pathways consistent with the SDGs (Schmidt Tagomori et al., 2024; Soergel et al., 2021, 2024). Such analyses have indicated a number of synergies and trade-offs across various sustainability goals. For example, climate policy alone may exacerbate poverty and lead to greater needs for scarce materials. On the other hand, decarbonization of energy systems helps improve air quality. Halting biodiversity loss and climate change have clear benefits synergies, however mitigation strategies may increase pressures on biodiversity (Deetman et al, 2021; Hanssen et al, 2022; Harmsen et al., 2020; Kok et al. 2023; Kulkarni et al. 2025, Prutz et al. 2026). Thus, policy coordination with cross-sectoral action is needed to achieve multiple targets in a just way.

However, scenario-based approaches that systematically capture a large scope of sustainability goals and indicators remain limited (Orbons et al., 2024), and there is a clear bias towards quantifying climate, energy and infrastructure-related themes (van Soest et al., 2019). Thus, the understanding of the relationship between different goals and actions remains partially, providing limited policy advice.

1.2 Sustainability-MIP

In the Sustainability Model Intercomparison Project we aim to explore and assess the current landscape of sustainability scenario modelling. In the first phase of the project a survey was conducted to get an overview of the extent and quality of coverage of different sustainability domains in existing models. In the second phase we are comparing model projections of different scenarios that achieve one or more sustainability goals. Here we present preliminary results and insights from both phases of the Sustainability MIP.

The first phase consists of surveying model characteristics and capabilities via a survey of open-ended questions about the theoretical background, resolution, and represented

dynamics of different models. Modelling teams self-classified their models regarding energy, land/food, economics, climate, water, inequality, poverty, pollution, materials, biodiversity, health, education, oceans and conflict/peace. Dynamic links between domains were provided by assigning whether each pair of dimensions affects one another, in any direction and the number of associated links.

Model	Poverty	Land/food	Health	Education	Inequality	Water	Energy	Economics	Pollution	Materials	Climate	Biodiversity	Oceans	Conflict/peace
Model 1	Focus	Focus	Focus	NA	Focus	Limited	Focus	Focus	Focus	NA	Focus	Focus	NA	NA
Model 2	NA	Focus	NA	NA	NA	Limited	Focus	Limited	Limited	Exo	Focus	Post	NA	NA
Model 3	Focus	Focus	Exo	Exo	Focus	Limited	Focus	Focus	Focus	Focus	Exo	Post	NA	NA
Model 4	NA	Focus	NA	NA	NA	NA	Focus	Limited	NA	Exo	Focus	NA	NA	NA
Model 5	Limited	Focus	Post	NA	Limited	Focus	Focus	Limited	Post	Limited	Focus	Post	Post	NA
Model 6	Focus	Limited	Focus	Focus	Limited	Limited	Limited	Focus	Limited	Limited	Limited	NA	NA	Focus
Model 7	Focus	Focus	Focus	Focus	Focus	Focus	Focus	Focus	Focus	Focus	Focus	Limited	Limited	Exo
Model 8	NA	Focus	Exo	Limited	Limited	Limited	Focus	Focus	NA	Focus	Focus	NA	Limited	NA
Model 9	Limited	Focus	Post	NA	Limited	Limited	Focus	Exo	Limited	Limited	Limited	Post	NA	NA

Figure 1. Results from model questionnaire concerning coverage of different sustainability domains across 9 responding models. Focus = Primary focus area of the model with key dynamic represented; Limited = Some representation of this system but known to be incomplete; Post = Results concerning this domain determined based on post-processing of model results, no explicit dynamics represented; Exo = Completely exogenous to model; NA = No representation whatsoever.

The second phase consists of gathering scenario projections across a wide range of scenarios and models. Building upon the responses from the survey we developed a scenario protocol that is purposefully not prescriptive but allows for interpretation of “sustainability” in order to be as inclusive as possible across (i) abilities of different modelling teams to produce results, and (ii) allow for multiple narratives of sustainable transitions.

The protocol has two parts. **Part A** is based on submission of *baseline* and *sustainability* scenarios as represented by the models. Furthermore, we requested a brief description of how the different modelling teams represent and interpret their *sustainability* scenarios. The purpose of this scenario collection is to survey the existing scenario landscape and investigate the consistency of model projections and reporting. As shown in Figure 1, there is inconsistent coverage of different sustainability domains across models. This “partial” representation by models means that inevitably sectors, systems, dynamics or other determining factors of sustainability outcomes are ignored or under-represented, and the scenarios submitted will inevitably have sustainability blind-spots and potential inconsistencies across all sustainability dimensions. This makes it impossible to define clear protocols and consistent “sustainability” scenario projections. Furthermore, sustainability transitions can follow multiple different narratives (technology driven, lifestyle and behavioural driven, post-growth, mixed, etc.), with no single clear set of “actions” that would lead to a “sustainable” outcome. For these reasons, part-A of the protocol was purposefully vague in defining what “sustainability” may be, with individual modelling teams given freedom to interpret it within the context of the capabilities of their modelling framework.

This deliverable consists of the scenario projections submitted by modelling teams for this

first part.

Part B is a more comprehensive model intercomparison exercise that builds on the different models' capabilities and strengths. For this part sustainability is grouped into six broad categories: *Climate mitigation, nature protection, resource efficiency, access to services, health, and Governance/society/peace*. Models are requested to produce scenarios focusing on measures and outcomes focusing on achieving relevant goals. The second part is currently ongoing with the first set of results expected in the summer of 2026.

2 Model Submissions

A total of seven modelling teams responded to the call for scenarios for part-A of Sustainability-MIP, resulting in a total of 26 distinct scenarios (baselines and sustainability). Below we give a brief summary of the scenarios submitted.

All the scenario projections are available on the PRISMA scenario explorer: <https://prisma-internal.apps.ece.iiasa.ac.at/>

2.1 Types of scenarios

The freedom of interpretation allowed in part-A of the protocol led to a number of different types of sustainability scenarios. These are listed in Table 1, together with a brief description of the scenario narrative which defines the baseline or leads to sustainable outcomes. The "Scenario Name" is a standardized name used for this MIP which defines the types of scenario (Baseline or transformation towards Sustainability), and an indication of the baseline and/or type of transformation, shown in square brackets. While the specific "actions" may differ across scenarios and/or models, these transformations can broadly be summarized as follows:

- **Tech:** A focus on technological solutions in order to achieve sustainability goals. This includes efficiency improvements, electrification, active use of technologies to remove pollutants and provide access to services.
- **Access:** A scenario narrative specifically focused on achieving sustainability goals related to access to services – thus not a wholistic sustainability transformation, and only relevant for one scenario.
- **Soci:** A transformation focused on socio-economic, behavioural, and cultural transformations which reduce pressures on and improve outcomes of environmental and social systems. This may include post-growth and sufficiency narratives.
- **Nature:** Transitions focused on nature-based solutions.
- **Mix:** A broad package of actions across land, energy, material, and other systems, and may include elements of all of the above transformations without any specific focus

It is important to note that for most scenarios, there is ultimately a mix of all of the above types of transformations – the transformation type indicated in the “Scenario Name” is only indicative of the main focus of this scenario. Details for each scenario are available in the listed literature.

Table 1. Summary of the 26 scenarios submitted as part of Part-A of the Sustainability-MIP. The “Scenario Name” is a standardized name used for this MIP which defines the types of scenario (Baseline or transformation towards Sustainability), and an indication of the baseline and/or type of transformation, shown in square brackets. The “Scenario Narrative” gives a very brief overview of the socioeconomic baseline and types of actions which allow for improved sustainability outcomes. Details can be found in the listed references.

Model	Scenario Name	Scenario Narrative	Reference
AIM 3.0	Sustainable [Mix]	SSP1+Sustainability	<i>forthcoming</i>
AIM 3.0	Baseline [SSP2]	SSP2	<i>forthcoming</i>
GCAM 8s	Baseline [SSP2]	SSP2	<i>forthcoming</i>
GCAM 8s	Sustainable [Tech]	SSP2+Sustainability	<i>forthcoming</i>
IFs 8.54	Sustainable [Mix]	SSP1+Sustainability	Moyer et al. (2026)
IFs 8.54	Sustainable [Mix_a]	Energy focus	
IFs 8.54	Baseline [SSP2]	SSP2	Moyer et al. (2026)
IFs 8.54	Sustainable [Access]	Access and cleaner energy	Hughes (2025)
IMAGE 3.4	Baseline [SSP2_CP]	SSP2 with implemented policies	Soergel et al. (2024)
IMAGE 3.4	Sustainable [Tech]	SDP - Economic Innovation	Soergel et al. (2024)
IMAGE 3.4	Sustainable [Mix]	SDP - Managed Commons	Soergel et al. (2024)
IMAGE 3.4	Sustainable [Soci]	SDP - Resilient Communities	Soergel et al. (2024)
IMAGE 3.4	Baseline [SSP2]	SSP2	UNEP (2025)
IMAGE 3.4	Sustainable [Tech_a]	GEO7- SSP2+ Technological Transformation	UNEP (2025)
IMAGE 3.4	Sustainable [Soci_a]	GEO7- SSP2 + Behavioural Transformation	UNEP (2025)
MESSAGEix-GLOBIOM-GAINS 2.1-M-R12	Baseline [SSP2]	SSP2	<i>Forthcoming</i>
MESSAGEix-GLOBIOM-GAINS 2.1-M-R12	Sustainable [Tech]	SSP2-VL + LED	<i>Forthcoming</i>
MESSAGEix-GLOBIOM-GAINS 2.1-M-R12	Sustainable [Mix]	SSP1-VL	<i>Forthcoming</i>
REMIND-MAGPIE 3.2-4.6	Sustainable [Tech]	SDP - Economic Innovation	Soergel et al. (2024)
REMIND-MAGPIE 3.2-4.6	Sustainable [Soci]	SDP - Resilient Communities	Soergel et al. (2024)
REMIND-MAGPIE 3.2-4.6	Sustainable [Mix]	SDP - Managed Commons	Soergel et al. (2024)
REMIND-MAGPIE 3.2-4.6	Baseline [SSP2_CP]	SSP2 with implemented policies	Soergel et al. (2024)
WILIAM v1.4	Sustainable [Tech]	Technology focus	Parrado et al. (under review)

WILIAM v1.4	Sustainable [Soci]	Behaviour and sufficiency	Parrado et al. (under review)
WILIAM v1.4	Sustainable [Nature]	Natural sinks and solutions	Parrado et al. (under review)
WILIAM v1.4	Sustainable [Mix]	Sustainability focus	Parrado et al. (under review)

2.2 Reporting completeness

The protocol makes an explicit request for 320 potential output variables covering many different aspects including agricultural production, for availability and demand, fertilizer use, land cover, provision of energy services, energy demand (primary, final, sectoral), carbon capture and removal, emissions, material demand and recycling, water withdrawal and quality, consumption, GDP and value added, inequality (economic and gender), policy costs, health, and biodiversity.

As different models have different capabilities, final reporting by the models is patchy. In total, 215 variables are reported by at least one model. Variables that are represented poorly (represented by 2 or less models) mostly concern detailed sub-variables (i.e. availability of specific appliances, recycling of specific materials, specific poverty metrics, etc.). Representation of Ocean Acidification is particularly poor, with only one model (WILIAM) presenting results.

Variables with improved representation (5 or more models) include high aggregation levels of agricultural production, carbon capture and removal, energy demand, emissions, food availability, land cover, water for irrigation, and global mean temperature change.

3 Future work

Sustainability-MIP is an ongoing process, and further model projections from other modelling teams are still expected. The next phase of Sustainability-MIP will focus on Part B of the scenario protocol, where we will compare and contrast the outcomes of scenarios focusing on individual sustainability dimensions. This will provide clearer insights on potential synergies and trade-offs between sustainability goals and also provide a more complete dataset of different sustainability scenarios.

Furthermore, a thorough analysis of these scenarios is also going to be done. As previously highlighted, different models have different capabilities on representation of sustainability domains, so we aim to dive into the methodologies and the outcomes to provide more robust

insights on the outcomes. Thus, we aim to assess sustainability scenarios not only across “transformation narratives”, but also across “model types”.



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Appendix 1 – Sustainability-MIP protocol (v2.2, April 2026)

Contact: Isabela Schmidt Tagomori (isabela.tagomori@pbl.nl), Vassilis Daioglou (vassilis.daioglou@pbl.nl)

1. Introduction

The Sustainability Model Intercomparison Project (SusMIP) aims to assess pathways that support achieving the United Nations Sustainable Development Goals (SDGs). This project involves multiple modelling teams submitting scenarios to enable comparison across models. The ultimate goals are to:

- Get a stock-take of the coverage of sustainability indicators across models, including the methods used to calculate them;
- Understand how similar or different models behave across shared indicators;
- Assess pathways that meet multiple sustainability goals simultaneously;
- Understand critical synergies, trade-offs, and enabling conditions.

2. Background

The SusMIP derives from the Workshop on Sustainable Development Goals at the Lorentz Centre in July 2023. The current exercise does not have specific funding. However, it has important synergies with similarly funded ongoing Horizon Europe projects, including PRISMA.

3. Scenario set up

Part 1. Scoping of existing scenarios

Part 1 is intentionally designed to be as simple as possible. Each modelling team is required to submit two scenarios. It is not necessary to run new scenarios. Instead, modelling teams can save time using scenarios already finalized for other projects. If a team has already submitted existing scenarios around the time of the first workshop in Leiden, there is no need to resubmit. However, teams are welcome to update their submission, should they wish to do so. Table 1 summarizes the set up for existing scenarios.

Table 2. Set up for existing (Part 1) scenarios

Baseline scenario (SusMIP_Baseline)	SSP2 assumptions for GDP and Population. Represents business-as-usual. Although harmonizing GDP and population projections to the SSP2 baseline is encouraged for comparability, it is not a strict requirement, allowing flexibility for teams with distinct regional or national model configurations.
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Sustainability scenario (SusMIP_Sustainable) Note: teams can submit more than 1 scenario; make sure to label them e.g. SusMIP_Sustainable_a; SusMIP_Sustainable_b; SusMIP_Sustainable_c etc.	A scenario considered to achieve “sustainability”. This definition will depend on what indicators the model can adequately represent and should be supported as much as possible by relating the outcome to the SDGs. A key requirement is to achieve SDG 13 by limiting the global mean temperature increase by 2100 to less than 2 degrees Celsius. Modelling teams can submit up to three “Sustainability” scenarios, as long as the underlying narratives of these scenarios are distinct (i.e. different SSPs or SDPs).
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Time horizon and regional scales are specified as:

- Time horizon: all scenarios are defined till 2100, but models with a shorter time horizon (e.g., up to 2050) are still encouraged to participate, ideally with 5- or 10-year time steps.
- Ideally model base year should be 2025 or thereabouts.
- Regional scale: models can follow their native regional setup, ideally including the world as a region.

Part 2. Integrated sustainability scenarios

Part 2 is a comprehensive model intercomparison exercise that builds on the different models’ capabilities and strengths. In this context, SDGs are clustered according to common objectives, as presented in Table 3. In some cases we provide a **Suggestion** on how different scenarios can be implemented (Appendix 1), but ultimately this decision is based on individual model teams capabilities and focus areas.

In all cases, unless otherwise stated, the goals should be met *by 2035 or the soonest feasible thereafter, according to your model.*

Table 3. Definitions of sustainability dimensions for integrated sustainability scenarios, including proposed implementation.

Sustainability dimension	Proposed implementation
Climate Protection	Warming consistent with C3 (< 2 degrees (67%) at all times). OPTIONAL: Carbon price differentiation. To improve plausibility of short-term developments, it is suggested to adopt differentiated carbon prices across regions. It is up to the teams to decide how carbon price differentiation is done.
Nature Protection (SusMIP_Nature)	Water:

		• Constrain the available surface water based on environmental flow requirements for wet and dry seasons. Land/Oceans: • Protection of land/oceans in line with meeting biodiversity and ecosystem service goals. Food: • Sustainable production strategies, such as integrated crop-livestock-forestry (ICLF) systems; agroforestry; low impact agriculture.
Resource (SusMIP_Resources)	Efficiency	Energy: • Lifestyle and technological changes in all sectors that lead to reduction in energy and resource demands – in line with <i>Low Energy Demand</i> type scenarios (Grubler et al. 2018). Water: • Constrain the available surface water based on environmental flow requirements for wet and dry seasons. • Models are free to implement water efficiency improvements in multiple sectors. Food: • Reduce food waste in middle and high income countries to the lowest level among them in three stages of the supply chain (primary, processing, and consumption); • Changes towards a healthier diet: alternative consumption patterns based on the definitions of the EAT-Lancet commission (Willett et al., 2019). Universal convergence to this diet by 2050; • Note: This scenario does not assume universal access to food, only changing diets. Access levels should be in line with baseline/endogenous levels.

Access* (SusMIP_Access) * Including access to clean water, clean energy	Energy: • Universal access to electricity in all households per region; • Phasing out of inefficient cookstoves and universal adoption of modern cooking and heating fuels (LPG, kerosene, electricity); • Universal access to “Decent Living” energy services or energy use. Water: • Universal access to clean water and sanitation. Food: • Strong improvements in equity of food availability (i.e., calories more evenly spread between people) to ensure universal access to healthy food intake levels. Note: doesn’t directly impact IAMs but how the indicator of “people at risk of hunger” is calculated. Poverty • Ensure entire population is above poverty thresholds.
Health (SusMIP_Health)	Food: • Changes towards a healthier diet: alternative consumption patterns based on the definitions of the EAT-Lancet commission (Willett et al., 2019). Universal convergence to this diet by 2050. Energy: • Universal access to electricity in all households per region by 2035; • Phasing out of inefficient cookstoves by 2035 and universal adoption of modern cooking and heating fuels (LPG, kerosene, electricity);

	Adoption of end-of-pipe technologies, reducing the emission intensity of air pollutants.
Peace (SusMIP_Peace)	Conflict: - Eliminating civil war onsets by 2040 Governance: - Improving governance capacity/effectiveness/efficiency/transparency - Increasing government revenue Society: - Improving relevant societal indicators including gender equality, labour participation rate, education, etc.
Sustainable Development	Combination of all above sustainability options relevant for your model. This is essentially a form of updated SusMIP_Sustainable from Part A.

All scenarios include ambitious climate action. All models should try to reach a well-below 2 degree pathway, as follows:

However, we would also like to have versions of the scenarios without ambitious climate action, in order to better understand how each of the sustainability dimensions may influence climate action.

The final list of scenarios is shown in Table 4. Priorities can be interpreted as:

- Top: Should be submitted to be eligible
- High: Should be submitted if scenario sustainability dimension is relevant for model. At least one "High priority" scenario should be submitted
- Medium: These scenarios are not mandatory but highly recommended. Should only be submitted for "High" scenarios that have also been submitted

Table 4. Final list of scenarios for the Sustainability-MIP

Sustainability dimension	Climate mitigation	Scenario Name	Priority
None	No climate targets. Preferably including currently implemented policies. May be similar to or same as Part 1 Baseline	SusMIP_P2_Baseline	Top
Climate Protection	In line with C3	SusMIP_P2_Climate	Top
Nature &	In line with C3	SusMIP_P2_Nature	High

Climate			
Resource & Climate	In line with C3	SusMIP_P2_Resources	High
Access & Climate	In line with C3	SusMIP_P2_Access	High
Health & Climate	In line with C3	SusMIP_P2_Health	High
Peace & Climate	In line with C3	SusMIP_P2_Peace	High
Sustainable Development	In line with C3	SusMIP_P2_Sustainability	High
Nature	None	SusMIP_P2_Nature_nomitig	Medium
Resource	None	SusMIP_P2_Resources_nomitig	Medium
Access	None	SusMIP_P2_Access_nomitig	Medium
Health	None	SusMIP_P2_Health_nomitig	Medium
Peace	None	SusMIP_P2_Peace_nomitig	Medium
Sustainable Development	None	SusMIP_P2_Sustainability_nomitig	Medium

4. Variable harmonization, reporting and submission

All files needed for result submission can be found here: [Protocol](#)

Scenario naming

Please follow the naming outlines in Table 2 (Part 1) and Table 4 (Part 2). Note: variants can be submitted with “_a” added to the scenario naming (e.g. SusMIP_P2_Nature_a; SusMIP_P2_Nature_b, etc.).

Model reporting template

Requested model outputs are shown in **SusMIP_template.xlsx** – The model output variables should follow the [IAMC reporting](#) data format, presenting model output results as a structured excel/csv dataset with the columns “Model”, “Scenario”, “Region”, “Variable”, “Unit”, and the yearly data (see worksheet “data”).

When submitting results please also the name of the model when reporting, as follows:

[model name]_SusMIP_template.xlsx

The file **[model name]_SusMIP_template.xlsx** should be emailed to vassilis.daoglou@pbl.nl and isabela.tagomori@pbl.nl.

Implementation Tracker

To allow for comparison between models and submitted scenarios, we need to gather qualitative information on how the different sustainability scenarios were implemented by different teams. Please fill in the **Implementation_Tracker.xlsx**. Please do this by making a copy of the worksheet labelled “Template”, rename to your model name, and fill in relevant information to provide a synopsis of how different scenarios were implemented.

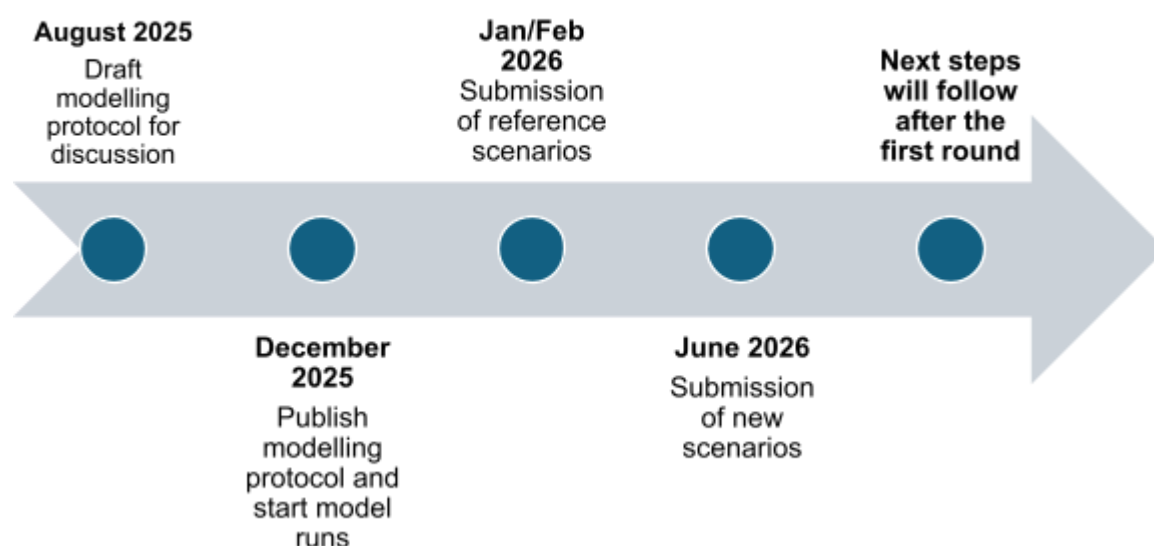
5. Future work and Expected outcomes

Teams are requested to fill in a questionnaire indicating how different scenarios were implemented. The questionnaire will be shared with all teams.

A model intercomparison research paper looking at sustainability from the lens of SDG indicators – After submission of the reporting and variables templates, data processing will be performed to ensure consistency among results and attach metadata to the indicators. This database will be used to write a research paper (or multiple papers) assessing the coverage of sustainability indicators across models, the pathways that meet multiple sustainability goals simultaneously by 2035 and how they relate to different groups of models, and highlighting the critical synergies, trade-offs, and enabling conditions to meet the goals. Potential focus areas:

- a. Perform a taxonomy of different model types and paradigms, identifying which areas of sustainability they can focus on. Describe the science and policy implications and insights from different modelling paradigms.
- b. Assess how key variables in models are affected across sustainability scenario, to better understand main leverage points, synergies, and tradeoffs (GDP and macro-economics, provision of environmental and energy services, justice and equity)
- c. Update to the SDG Dashboard allowing for multiple models – The SDG tool is a process that also produces the input data for the PICASSO SDG Dashboard. However, the current version of the dashboard can only present IMAGE model results. Provided there is funding for an external data scientist to update the website to accommodate multiple models, all the results from the SusMIP will be uploaded there.

6. Timeline



7. References

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Appendix 1

Suggestions for implementation:

- Water flows:

Variable Monthly Flow (VMF) by Pastor et al. (2014).

- Land protection:

Protection of 30% of all terrestrial area per ecoregion, preventing the expansion of agriculture in these areas (Kok et al., 2023). Allocation of protected areas: i) current protected areas retrieved from the World Database on Protected Areas (WDPA) are assumed to remain protected; ii) key biodiversity areas and intact forest landscapes are protected up to 2050; and iii) additional remaining natural land, where areas with higher range size rarity index are allocated first.

- Diet change:

Maximum level of 275 kcal/cap/day for animal products, a minimum level of 900 kcal/cap/day vegetables, fruits, nuts, legumes and vegetable oils, and a maximum level of 110 kcal/cap/day for sugars. Any baseline outcomes below maximum levels or above minimum levels were not adjusted. The final restriction was set for cereals to let the full diet reach the recommended target of 2100 kcal/cap/day as average diet.

- Decent living standards:

“Decent Living Standards” according to Kikstra et al. (2024), Kikstra et al. (2021), Rao et al. (2018).

- Pollutants:

Theoretical maximum feasible reduction (TMFR) emission factor values from GAINS.

