CMIP
Coupled Model Intercomparison Project

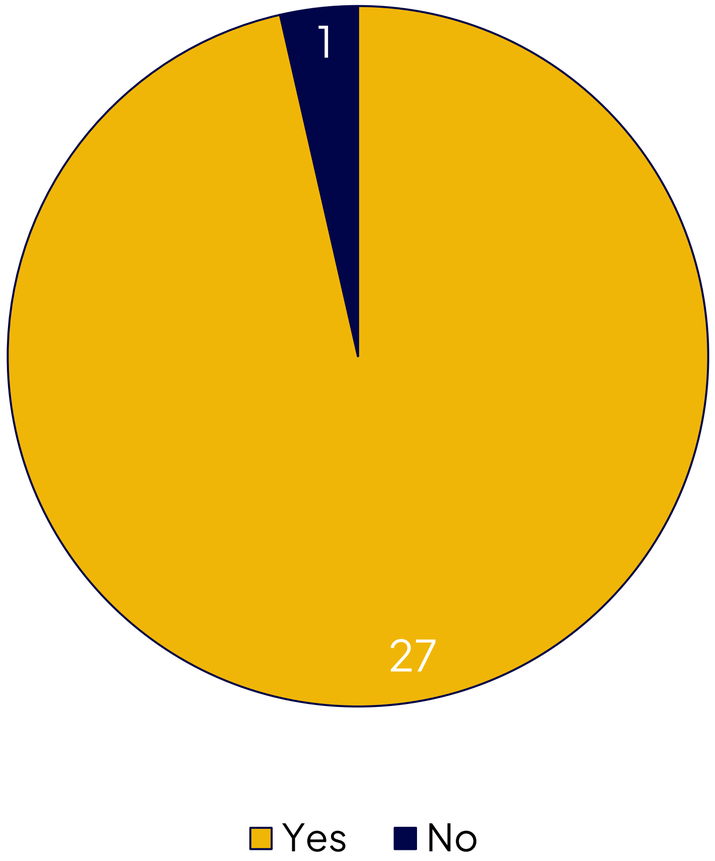
Fast Track v2 survey analysis: Modelling centres/groups

CMIP International Project Office

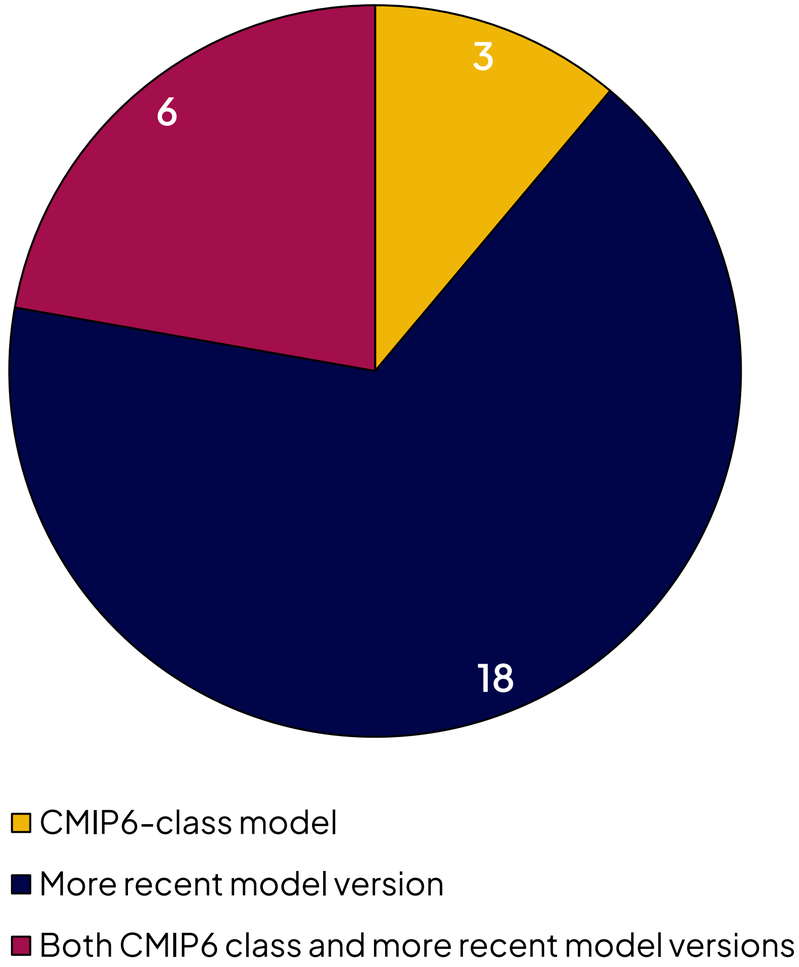
March 2024

Section 1: Respondent information and model configuration

Do you plan to contribute simulations to the CMIP AR7 Fast Track given the timeline outlined (data delivery by end 2026)?

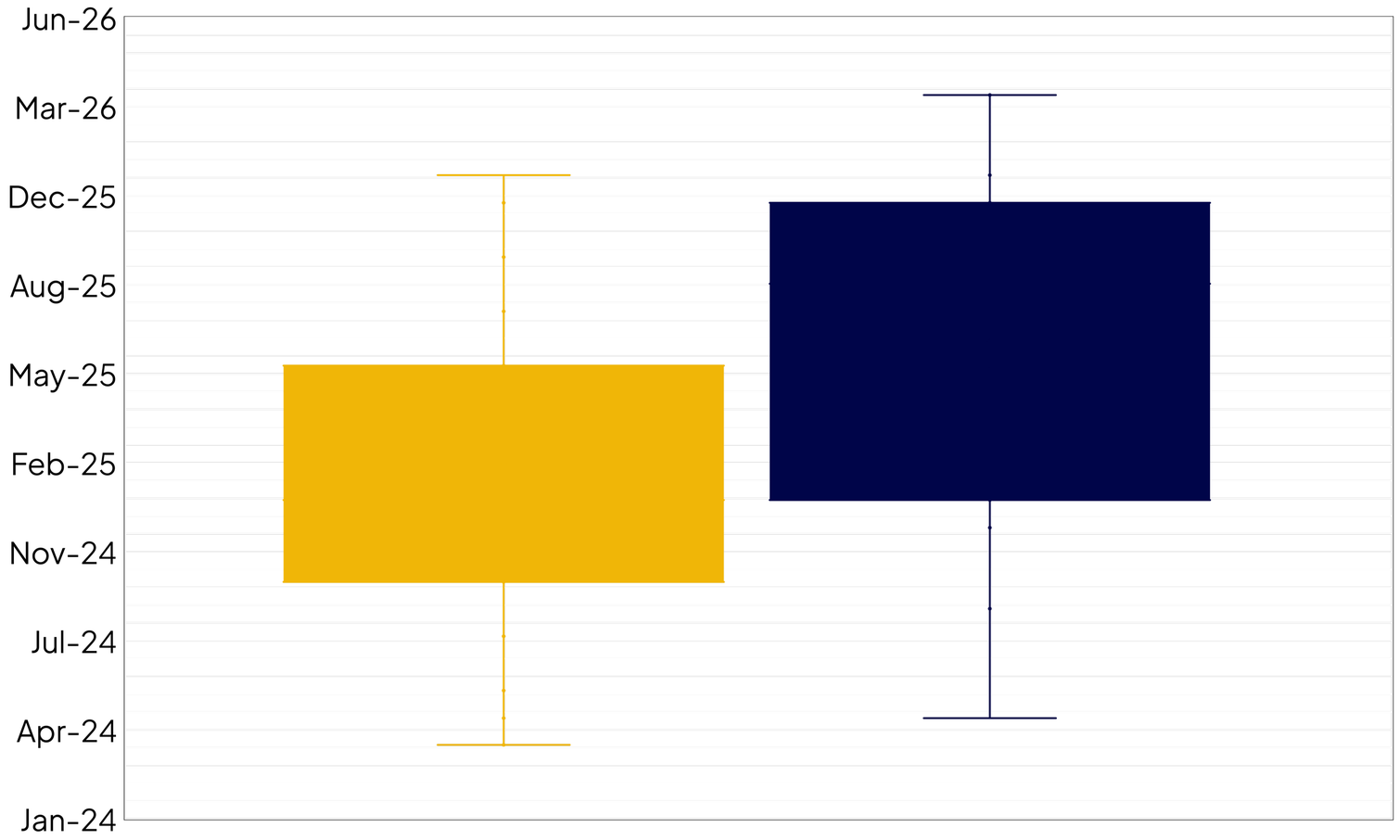


Does your centre/group plan to run the Fast Track with a CMIP6-class model or a more recent version?

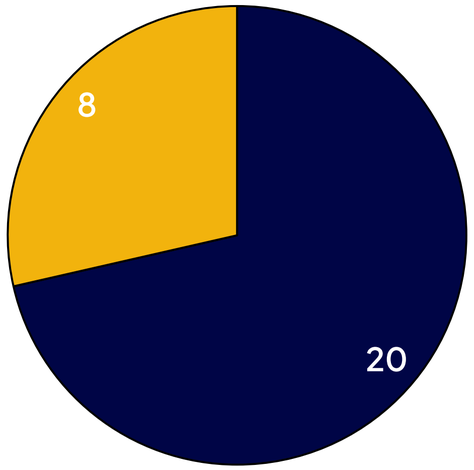


Modelling centre/group readiness

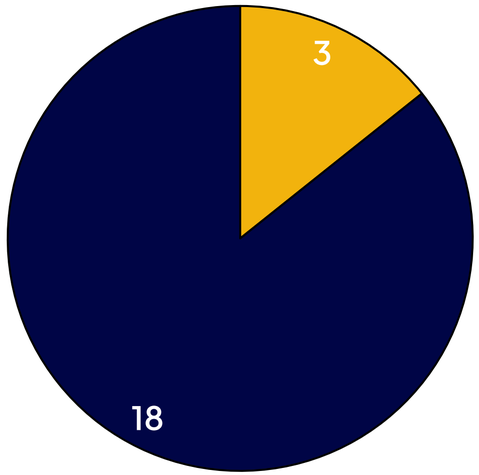
Modelling centres/groups were asked to provide estimates of when they would initiate spin up (yellow) and start running piControl (navy blue).



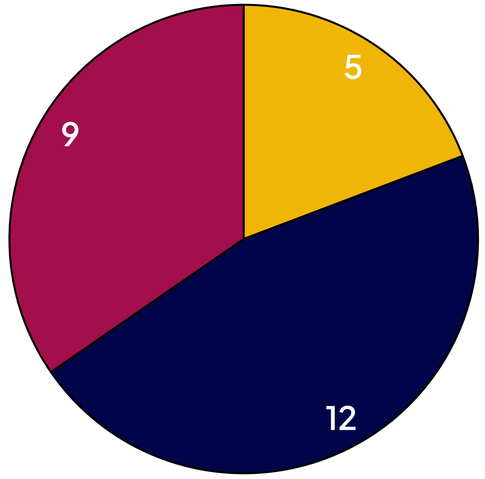
Is your modelling centre/group capable of running with CO_2 emissions?



If yes, would you plan to run all historical/scenarios as emission forced runs or also run concentration forced runs?



Does your centre/group plan to run with dynamic vegetation demography, prescribed vegetation demography, or both?



What resolution do you plan to run your model at for the Fast Track?

Highest resolution = 25km

Many around 100km

Some not decided on resolution yet

Section 2: Experiment review

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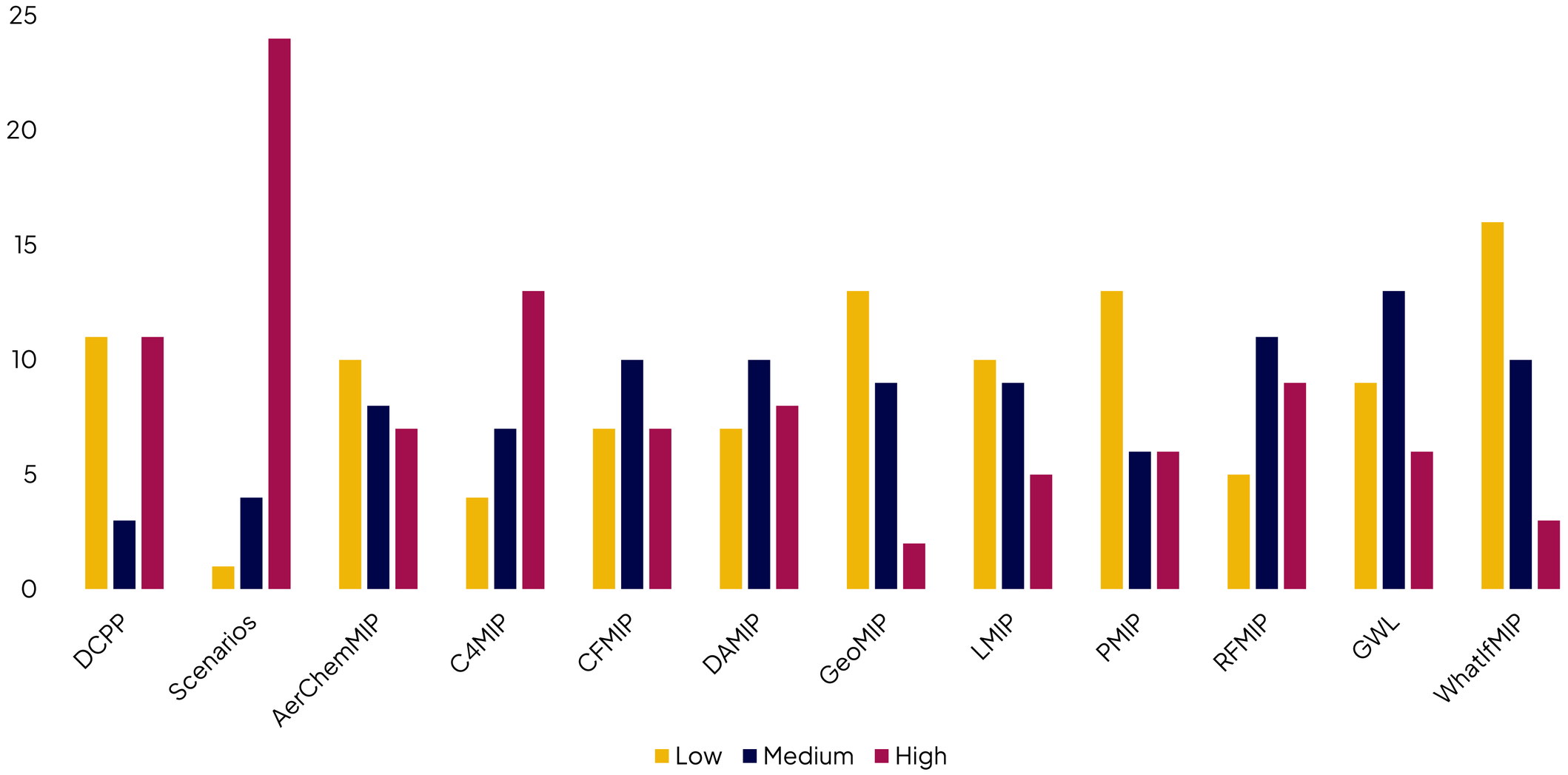
Overall prioritisation of proposed experiments



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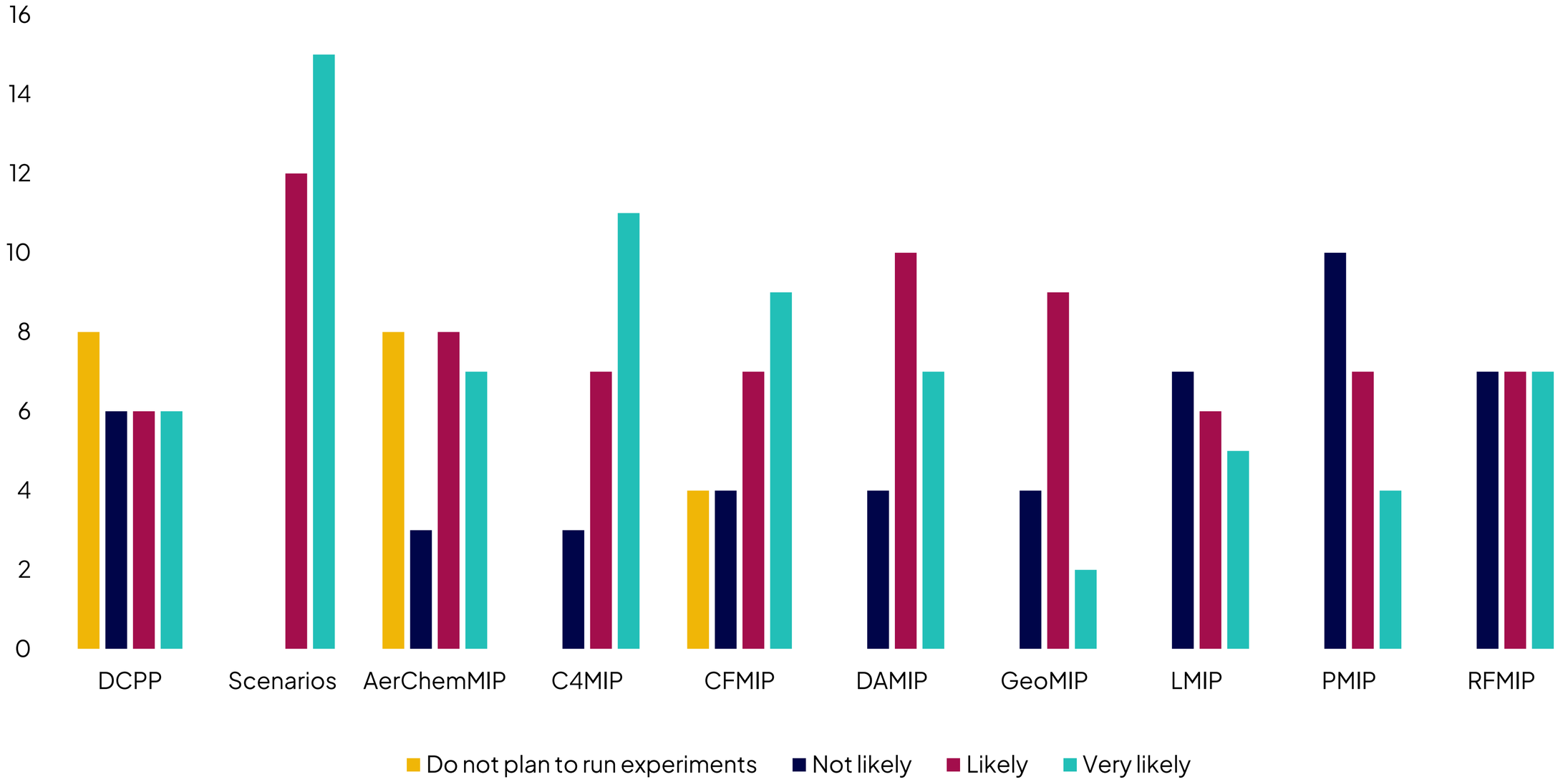
Overall likelihood of running before end of 2026



	DCPP	Scenarios	AerChemMIP	C4MIP	CFMIP	DAMIP	GeoMIP	LMIP	PMIP	RFMIP
1		**		**	**	*		*		*
2		**	**		**	**				
3		*		*		*			**	
4	*	*	*	*		*	*			*
5		*								
6	**	**	*	**	**	**		*	*	**
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8		**	**	**	**	*	*	*		**
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25	**	**	**	**		**	*	*	*	**
26		**	*		*	*	*		*	*
27		*								
28		*		**		**			**	

	Low priority
	Medium priority
	High priority
	Do not plan to run experiments
*	Likely to run before 2026
**	Very likely to run before 2026

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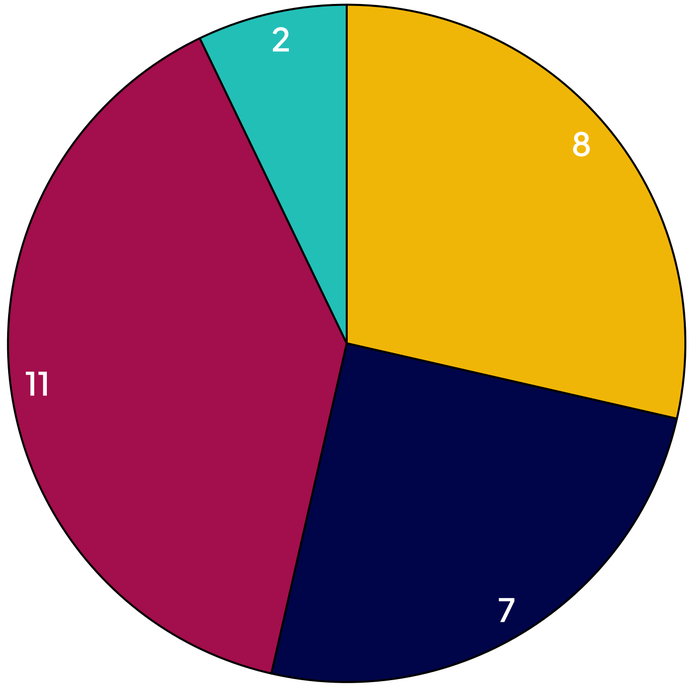
Should the CMIP Panel reduce the number of experiments to limit number of simulation years?



Yes No No, but provide ongoing guidance . Other

Those who selected yes suggested removal of following experiments:

- C4MIP Joos pulse (2 responses) – *C4MIP have asked for this to be removed from their proposal*
- PMIP LIGabrupt (2 responses)
- 0p5CO2
- newGEOMIP
- DCPP
- flat10-cdr experiment is likely to be equivalent to one of the scenario proposed in ScenarioMIP and could be of minor interest in this context.
- What-if-MIP vegetation experiments – felt not be ready for FT/CMIP7 inclusion but can be done as community activities/projects

Plus, suggestions to:

- Have fewer scenario runs
- Prioritizing and streamlining experiments for each MIP could be one approach.
- Fewer ensemble members

If **supporting reduction through coordination** across modelling centres/groups suggestions included:

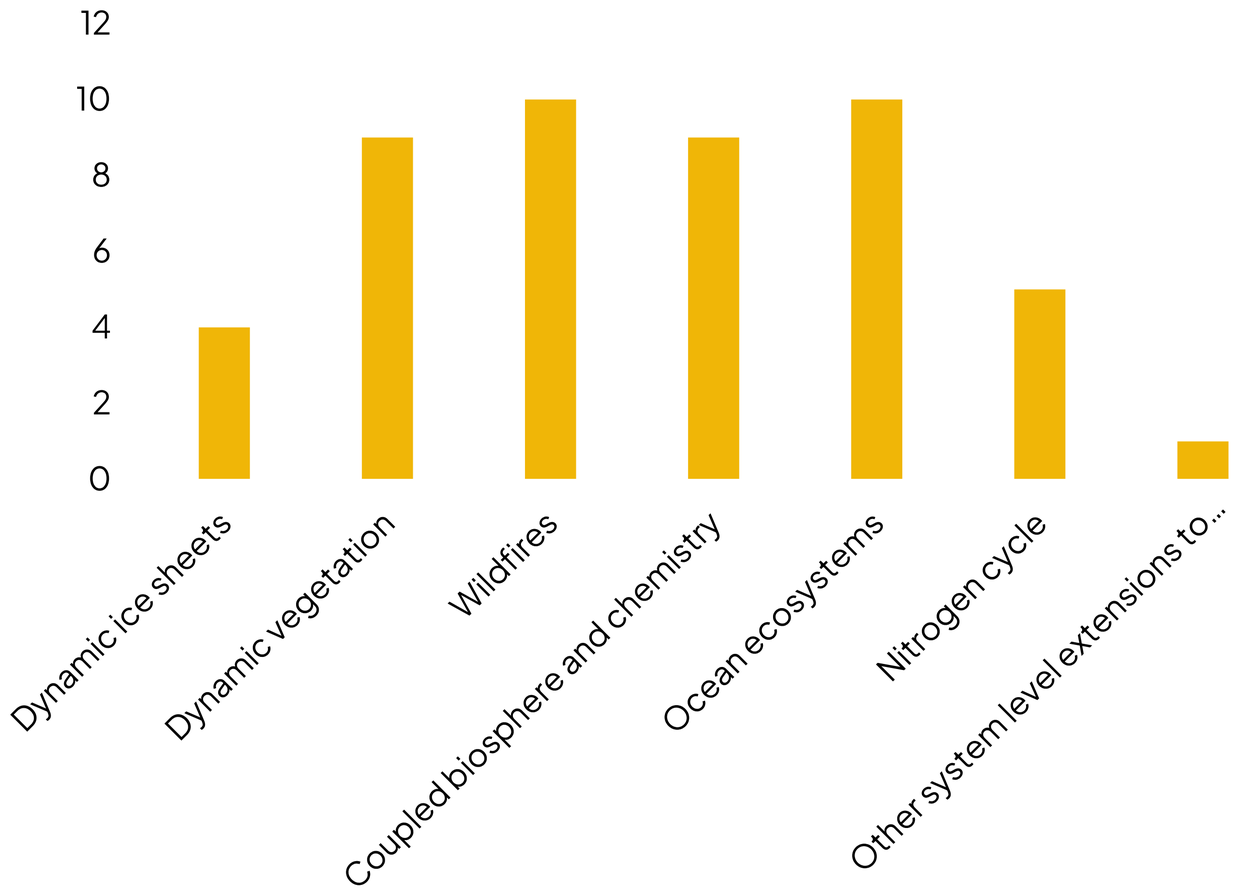
- Probably needs coordination from both sides. For modelling centres, an indication of which experiments they want to prioritise vs which they could do 'if needed/requested'. For MIPs, some thinking around how many models need to run an experiment and how they would select which models e.g. by considering model families, or by climate sensitivity or by model capability etc.
- Provide the final data request and final and fixed forcings as soon as possible so that one iteration of model integration suffices.
- We could run a larger number of model simulations/experiments, if supercomputer CPU time from other centres could be used (INPE).
- We may prioritize additional ensemble members for ScenarioMIP over some of the other CMIP7 Fast Track experiments. If there was additional guidance to help us optimize across centres, we would be interested in that discussion.

If **no or other** comments included:

- The panel has done us a service by separating out a limited number of experiments for fasttrack. Out of these, we feel that we can ourselves select which are of the most interest, and feasible with our models.
- We will likely only run DECK and ScenarioMIP (at least for the fast track timeline). The number of simulation years is therefore not a big issue for us.
- The number of simulations is fine, but we should make sure the number does not grow too much though. Some coordination on aerosol-focussed experiments maybe possible.
- We are comfortable groups can perform selected FT experiments without committing to all. No need therefore to reduce the list

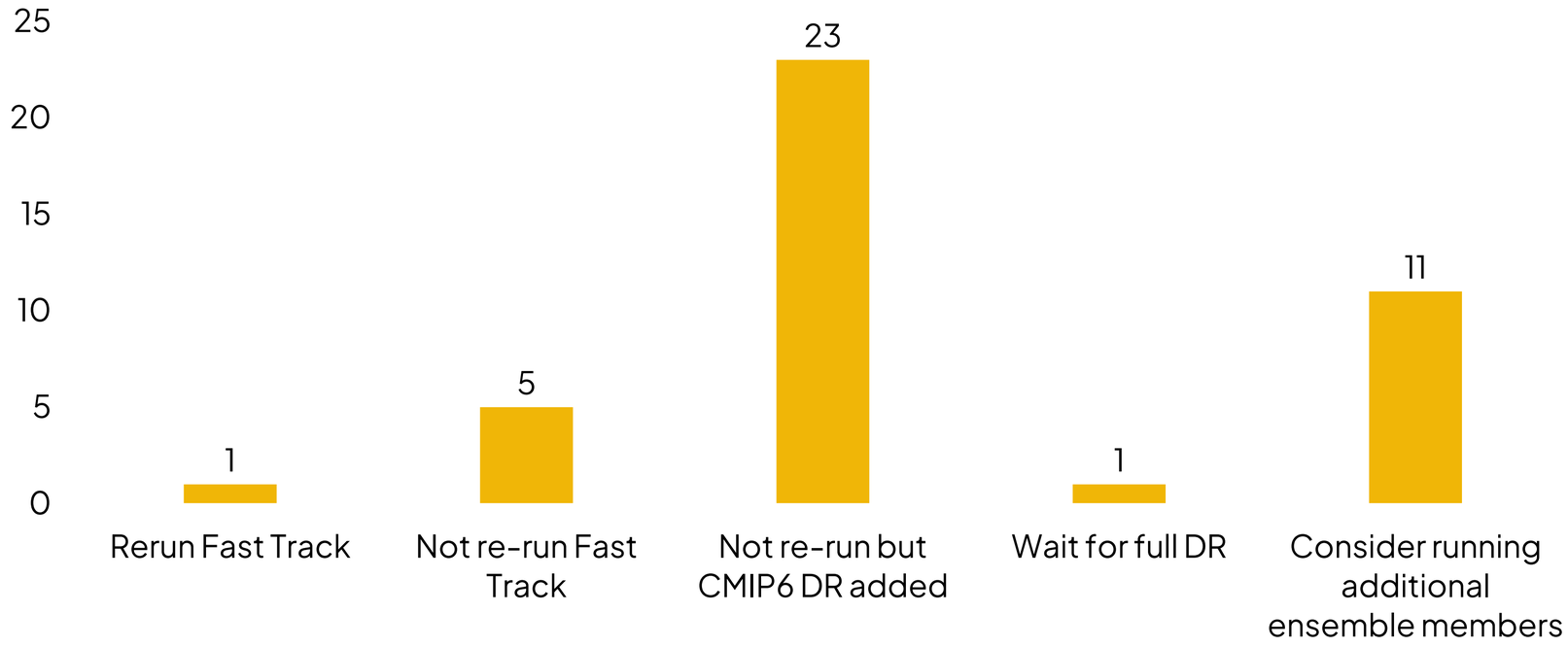
Section 3: Data Request

Do you expect that your output will require additional variables to accommodate new ESM capabilities in a next generation model?



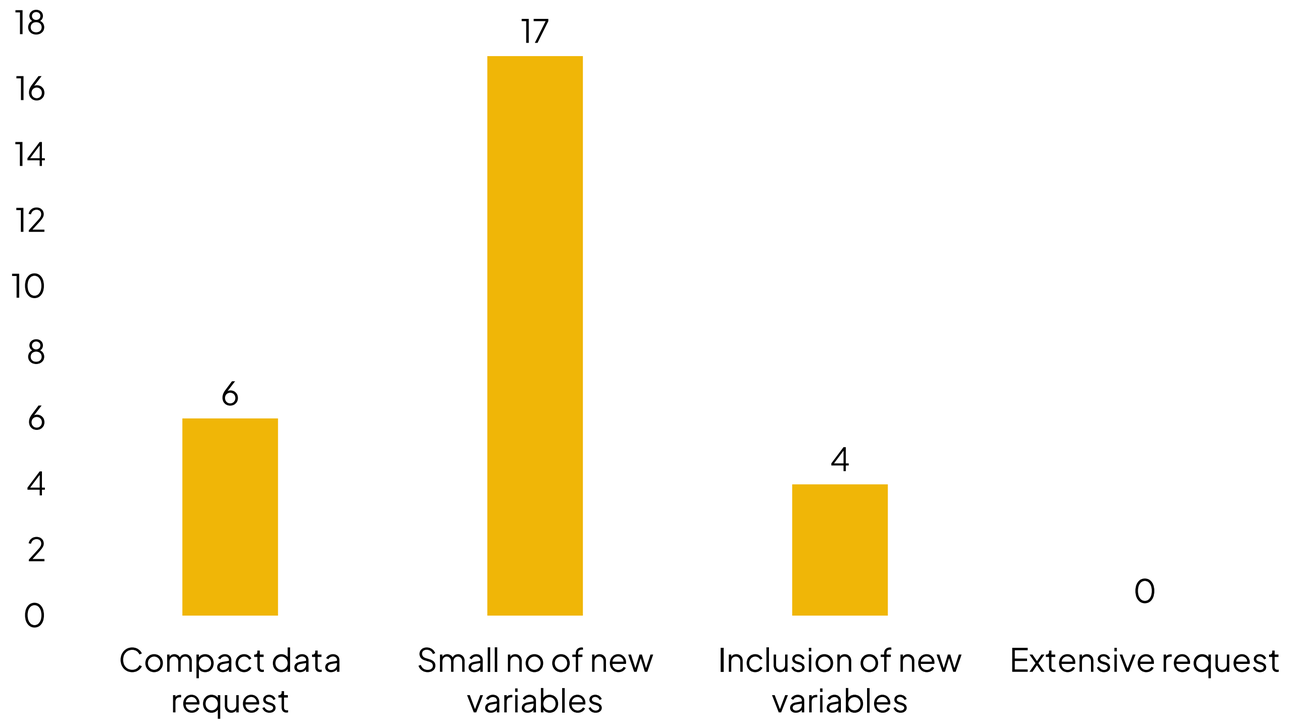
There will likely be a limited Fast Track data request issued in 2024 and then a subsequent broader request that would satisfy all the requirements of the CMIP7 MIPs in 2026/7. How would you handle this situation? *The timeline of the AR7 Fast Track data request is subject to confirmation of CMIP and IPCC AR7 timelines.*

1. We would re-run the Fast Track once the broader harmonized data request is available.
2. We would not re-run the Fast Track for the second data request and would only produce the variables for the Fast Track data request.
3. **We would not re-run the Fast Track for the second data request but would do our best to save the relevant output by following the CMIP6 data request in addition to the Fast Track request.**
4. We would not run the Fast Track experiments on the Fast Track timeline and would wait until the fully data request to run any experiments.
5. We would not re-run all the Fast Track experiments but would consider running additional ensemble members for some of the experiments.



If running the AR7 Fast Track experiments, which of the following characterizes your hopes for the data request?

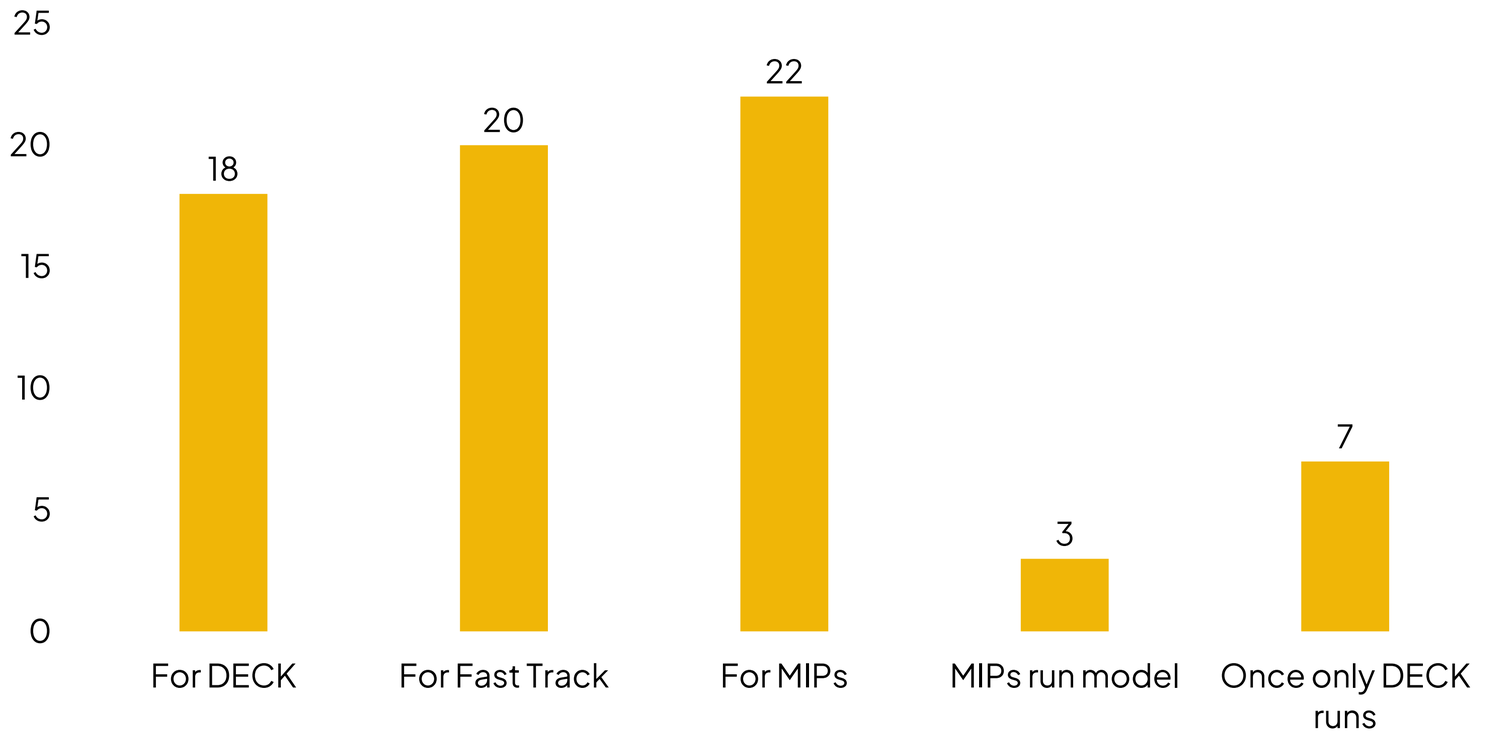
1. A compact data request of variables which have already been configured for the CMIP6 data request.
2. As above, but with a small number of new variables to reflect revised community priorities.
3. Inclusion of new variables to enable analysis of new model components.
4. An extensive request to enable exploitation of simulations by a broad range of community MIPs.



If you are working on a model[s] for use in CMIP Community MIPs after the Fast Track, do any of the following apply?

[Please select the number of all the statements which apply]

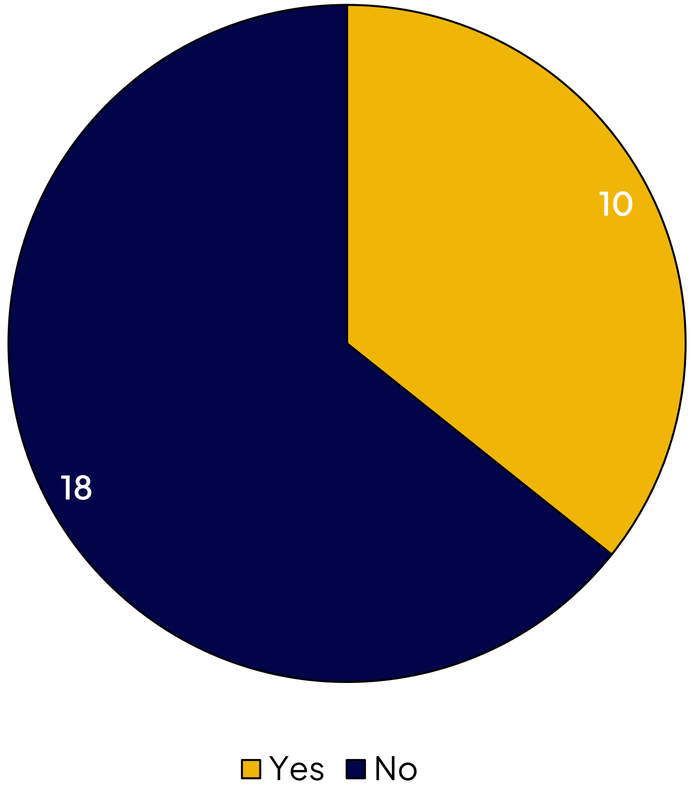
1. We will be running our model for the DECK experiments.
2. We will be running our model for a selection of Fast Track experiments.
3. We will be running out model for a selection of Community MIPs.
4. We will support Community MIPs using our model but expect them to run the model[s] and publish output.
5. We expect DECK experiments to run only once and to generate diagnostics for a broad range of Community MIPs.



Section 4: Forcings

Guidance requirements

Do you have any comments or concerns around the current plans for the delivery of forcing datasets?



- Concern around potential delays to the currently proposed timelines and too frequent updates
- Having piControl forcings as early as possible was highlighted as particularly urgent.
- Longer run times of high-resolution models requires even more urgent delivery of forcings.
- Clarity requested on the updates to the forcings and “freezing” of the AR7 Fast Track forcing datasets to ensure comparability across simulations.
- Concern around need for re-running piControl runs due to updated forcings even if utilising CMIP6-class model.
- Request for regular sharing of changes to the forcing dataset delivery schedule.
- Queries regarding impact of potential annual updates.
- Request that the 1850 forcings do not change between the provisional forcing dataset and the final forcing dataset, if possible, allowing for running of (potentially) spinup, pre-industrial controls, and idealized experiments before the forcing datasets are finalized, thereby allowing more time to run other CMIP7 Fast Track experiments.

S5: Guidance requests and final comments

Guidance requirements

Respondents to question on requirement for guidance had the following suggestions, and requested that guidance be made available as soon as possible:

- For the spin-up, it would be good to know what we should be aiming for in terms of stability, especially for interactive carbon cases.
- There is a balance to be struck between clarity of general guidance, and being overly prescriptive in a way which could modelling centres from delivering the best product.
- It would be valuable to provide at least some guidance on the residual trend acceptable in piControl simulations. At least provide a limit for global mean sea surface temperature which would ensure relatively stable climate states in piControl simulations.
- We would do our best to be responsive to the recommendations, though if it requires a significant change in how we operate, we cannot guarantee compliance.
- According to recent studies, techniques for the rapid spin-up of Earth System Models (ESMs), including marine biogeochemistry (for example), are being developed. It would be beneficial to include an introduction to these methods.
- If possible (assuming no copyright or other issues), it would be great to include code, encompassing general-purpose software or algorithms related to techniques aiding the rapid spin-up of Earth System Models (ESMs), in future releases.

Final comments

- Question need for DECK/Scenarios ensembles (given planned for AerChemMIP and DAMIP).
- Need to ensure time taken for publishing data is recognised as likely to make end 2026 deadline more ambitious.
- It may be useful to repeat a survey every 6 months to see how modelling centres are progressing.
- A couple of questions ask about dynamic vegetation demography - we are aiming for vegetation demography (i.e. modelling stand age) but not dynamic vegetation where vegetation types change due to changing climate.
- One area of uncertainty going into CMIP7 is how the expanding list of community MIPs will unfold, and how well coordinated it will be with fast-track. The more coordination the panel can conduct, the better we feel this will allow us to advance the science.
- We encourage the panel to clearly define the CMIP7 Fast Track set of experiment as an operational part of CMIP. We feel that the current status is confusing and makes some groups pushing toward more background science to be done with the Fast Track exercise. Our objective is to limit the burden associated with the Fast Track experiments (and its strict time line) to be able to work efficiently on a future version of the model. This latter would allow to make a real step to address science questions within Community MIPs and elsewhere.
- We emphasize that we absolutely need the DR for the Fast Track experiments to be set and frozen before we start to run the experiments early in 2025. Similarly, the plans for the forcing updates appear challenging. There is a risk that the time line (early 2026) to provide scenario forcing is too late for groups to provide simulations by mid-2026.
- Would it be possible to ask the modelling centres to keep track of the carbon footprint associated with preparing and running CMIP simulations plus storing the output ?
- We expect that tools prepared for CMIP6 can also be used for the Fast Track.
- GeoMIP is the only MIP that uses new scenarios (except for ScenarioMIP), and thus the timing of the new scenario delivery would be critical for completing GeoMIP simulations.