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Supplement of

The IPCC Sixth Assessment Report WGIII climate assessment of mitigation pathways: from emissions to global temperatures

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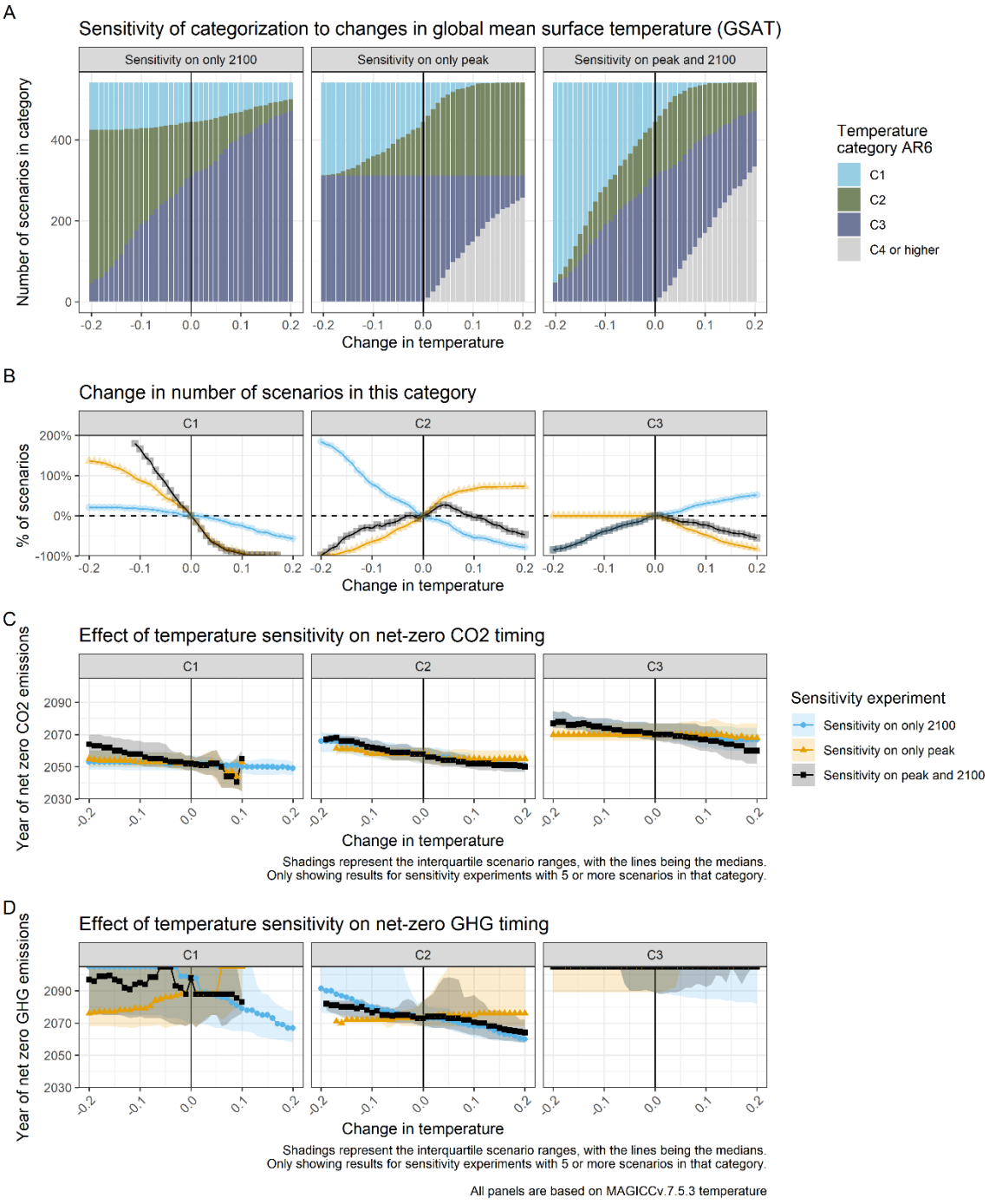
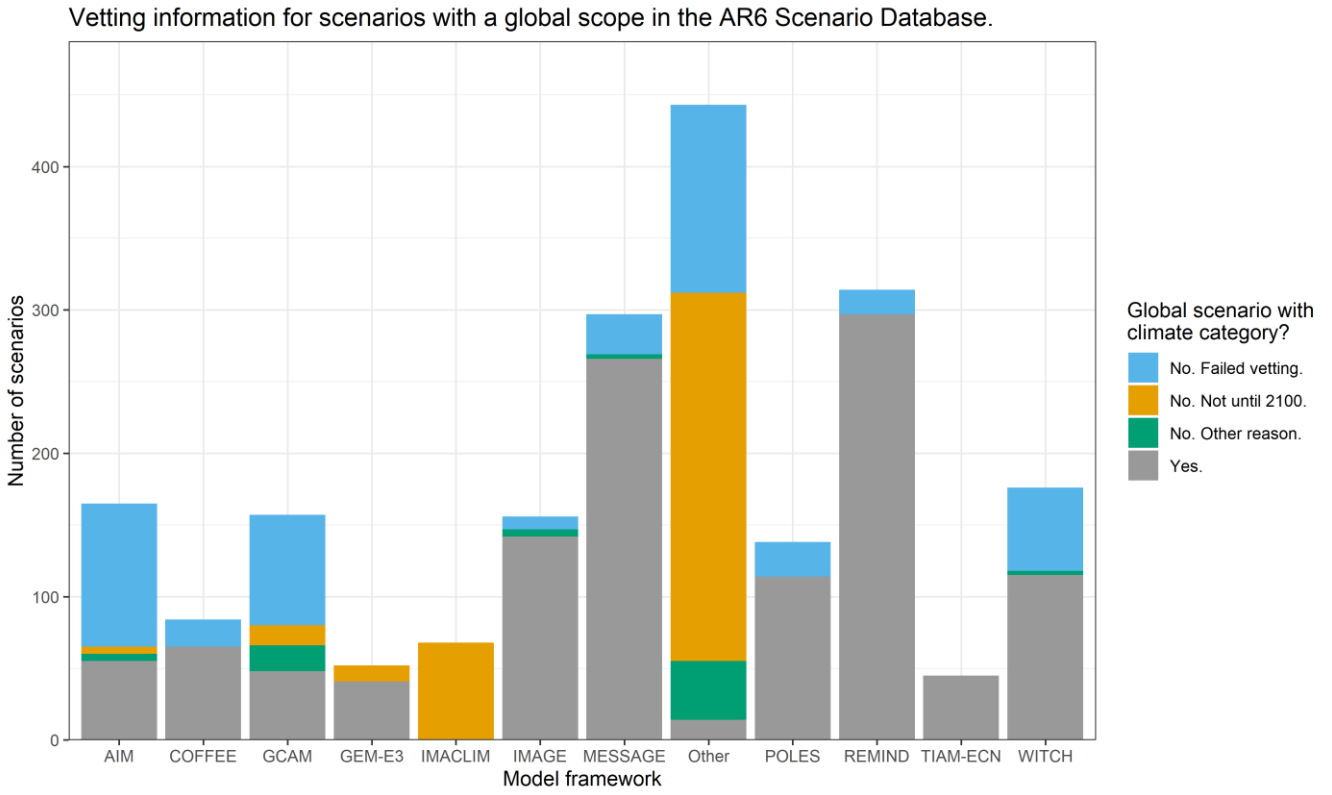


Supplement Fig. S1: sensitivity to temperature estimate changes of number of scenarios and net zero CO_2 and GHG characteristics.

Sect. S1: Vetting process for the climate assessment in AR6 WGIII

As explained in more detail in Annex III section 3.1 (IPCC, 2022a) of the Working Group III contribution to the IPCC Sixth Assessment Report (AR6 WGIII), a vetting process was undertaken for all scenarios reporting global data. Of the 2266 scenarios submitted to the scenario database during the 22-month long open call, about three quarters passed the vetting criteria, while 1202 passed also the additional criteria specified in Annex III section 3.2.1 (IPCC, 2022a). Vetting scenarios was therefore done both to ensure reasonable historical alignment for energy and emissions and minimum variable coverage. For the climate assessment process, the vetting ensures a certain level of confidence that only scenarios with sufficient, quality emissions data remained in the climate assessment. This was done to prevent the harmonization and infilling procedures behaving in unexpected ways for scenarios with either low levels of emissions data or reporting errors. For instance, if important quantitative information on the development of either land-use related emissions or methane mitigation is not provided, it would be possible that the climate outcome is not consistent with the storyline because there is uncertainty in whether the infilled emissions pathways are in line with the storyline and these large emissions sources do affect global mean surface temperature outcomes significantly. Another example would be that it is possible that some of the methods in the harmonisation process project very large future deviations from original scenario data if there are very high starting deltas (i.e., if there is a big difference between the modelled pathway and the historical data).

To provide an overview of the reason that scenarios were filtered out, we provide three illustrations. **Supplement Fig. S2** shows by model framework how many scenarios were excluded because of the vetting process, grouped by high-level reason. **Supplement Table S1** shows a disaggregation of the vetting and how many scenarios were affected by these vetting rules. The selected vetting rules and the threshold values come from the assessment of the IPCC writing team, based on their expert judgement. **Supplement Table S2** shows a summary of the number of scenarios that passed vetting by climate category and model framework.



Supplement Fig. S2: Vetting information for the scenarios in the AR6 Scenario database (Byers et al., 2022). This figure shows how many scenarios of different model framework passed vetting criteria and were suitable to receive a climate assessment in IPCC AR6 WGIII (IPCC, 2022b). If a scenario both failed vetting and did not provide information until 2100, it is shown as "No. Not until 2100.".

	Reference Value	Range	Number of scenarios out of range
CO_2 (total) in 2019	44,251 MtCO2	± 40%	23
CO_2-FFI in 2019	37,646 MtCO2	± 20%	55
CH4 in 2019	379 MtCH4	± 20%	139
CO_2-FFI percentage change 2010-2020	-	0 - 50%	74
CCS from energy in 2020	-	0-250 Mt/CO2	77
Primary Energy in 202	578 EJ	± 20%	73
Electricity Nuclear in 2020	9.77 EJ	± 30%	266
Electricity Solar and Wind in 2020	8.51 EJ	± 50%	377

Supplement Table S1: The vetting criteria applied for the selection of global scenarios for the climate assessment based on Annex III Table II.4 of AR6 WGIII (IPCC, 2022a).

Model framework	C1	C2	C3	C4	C5	C6	C7	C8	Total
AIM	4	3	17	8	13	4	6	0	55
C-ROADS-5.005	3	2	0	0	0	0	0	1	6
COFFEE 1.1	1	4	14	15	21	9	1	0	65
GCAM	6	6	13	9	6	1	6	1	48
GEM-E3_V2021	2	10	12	6	5	3	3	0	41
IMAGE	7	9	34	18	22	16	34	2	142
MESSAGE	20	43	59	39	57	20	28	0	266
POLES	4	10	26	24	20	11	19	0	114
REMIND	41	44	84	16	34	19	48	11	297
WITCH	9	2	31	14	24	9	12	14	115
EPPA 6	0	0	1	3	0	1	2	0	7
TIAM-ECN 1.1	0	0	20	6	10	4	5	0	45
MERGE-ETL 6.0	0	0	0	1	0	0	0	0	1
Total	97	133	311	159	212	97	164	29	**1202**

Supplement Table S2: Overview of number of classified scenarios by modelling framework and temperature classification.

Variable name	Description	Variants reported in AR6DB	Note
AR6 climate diagnostics|Atmospheric Concentrations|CH4|*	Atmospheric concentration of methane.	Percentiles: 5, 10, 16.7, 33, 50, 67, 83.3, 90, and 95.	Available for MAGICC, FaIR, and CICERO.
AR6 climate diagnostics|Atmospheric Concentrations|CO2|*	Atmospheric concentration of carbon dioxide.	Percentiles: 5, 10, 16.7, 33, 50, 67, 83.3, 90, and 95.	Available for MAGICC, FaIR, and CICERO.
AR6 climate diagnostics|Atmospheric Concentrations|N2O|*	Atmospheric concentration of nitrous oxide.	Percentiles: 5, 10, 16.7, 33, 50, 67, 83.3, 90, and 95.	Available for MAGICC, FaIR, and CICERO.
AR6 climate diagnostics|Effective Radiative Forcing|*	Total effective radiative forcing.	Percentiles: 5, 10, 16.7, 33, 50, 67, 83.3, 90, and 95.	Available for MAGICC, FaIR, and CICERO.
AR6 climate diagnostics|Effective Radiative Forcing|Aerosols|*	Effective radiative forcing for all aerosols.	Percentiles: 5, 10, 16.7, 33, 50, 67, 83.3, 90, and 95.	Available for MAGICC, FaIR, and CICERO.
AR6 climate diagnostics|Effective Radiative Forcing|Aerosols|Indirect Effect|*	Partial effective radiative forcing for all aerosols: the indirect forcing.	Percentiles: 5, 10, 16.7, 33, 50, 67, 83.3, 90, and 95.	Available for MAGICC, FaIR, and CICERO.
AR6 climate diagnostics|Effective Radiative Forcing|Aerosols|Direct Effect|*	Partial effective radiative forcing for all aerosols: the direct forcing.	Percentiles: 5, 10, 16.7, 33, 50, 67, 83.3, 90, and 95.	Available for MAGICC, FaIR, and CICERO.
AR6 climate diagnostics|Effective Radiative Forcing|Aerosols|Direct Effect|BC|*	Direct effective radiative forcing effect for black carbon.	Percentiles: 5, 10, 16.7, 33, 50, 67, 83.3, 90, and 95.	Available for MAGICC, FaIR, and CICERO.
AR6 climate diagnostics|Effective Radiative Forcing|Aerosols|Direct Effect|OC|*	Direct effective radiative forcing effect for organic carbon.	Percentiles: 5, 10, 16.7, 33, 50, 67, 83.3, 90, and 95.	Available for MAGICC, FaIR, and CICERO.
AR6 climate diagnostics|Effective Radiative Forcing|Aerosols|Direct Effect|Sulfur|*	Direct effective radiative forcing effect for sulfur.	Percentiles: 5, 10, 16.7, 33, 50, 67, 83.3, 90, and 95.	Available for MAGICC, FaIR, and CICERO.
AR6 climate diagnostics|Effective Radiative Forcing|Basket|Anthropogenic|*	Effective radiative forcing for total anthropogenic emissions caused forcing.	Percentiles: 5, 10, 16.7, 33, 50, 67, 83.3, 90, and 95.	Available for MAGICC, FaIR, and CICERO.
AR6 climate diagnostics|Effective Radiative Forcing|Basket|Greenhouse Gases|*	Effective radiative forcing for total greenhouse gases.	Percentiles: 5, 10, 16.7, 33, 50, 67, 83.3, 90, and 95.	Available for MAGICC, FaIR, and CICERO.
AR6 climate diagnostics|Effective Radiative Forcing|Basket|Non-CO2 Anthropogenic|*	Effective radiative forcing for anthropogenic emissions excluding carbon dioxide.	Percentiles: 5, 10, 16.7, 33, 50, 67, 83.3, 90, and 95.	Available for MAGICC, FaIR, and CICERO.
AR6 climate diagnostics|Effective Radiative Forcing|Basket|Non-CO2 Greenhouse Gases|*	Effective radiative forcing for total greenhouse gases excluding carbon dioxide.	Percentiles: 5, 10, 16.7, 33, 50, 67, 83.3, 90, and 95.	Available for MAGICC, FaIR, and CICERO.
AR6 climate diagnostics|Effective Radiative Forcing|C2F6|*	Effective radiative forcing for hexafluoroethane.	Percentiles: 5, 10, 16.7, 33, 50, 67, 83.3, 90, and 95.	Available for MAGICC, FaIR, and CICERO.
AR6 climate diagnostics|Effective Radiative Forcing|C6F14|*	Effective radiative forcing for perfluorohexane.	Percentiles: 5, 10, 16.7, 33, 50, 67, 83.3, 90, and 95.	Available for MAGICC, FaIR, and CICERO.
AR6 climate diagnostics|Effective Radiative Forcing|CF4|*	Effective radiative forcing for tetrafluorohexane.	Percentiles: 5, 10, 16.7, 33, 50, 67, 83.3, 90, and 95.	Available for MAGICC, FaIR, and CICERO.

AR6 climate diagnostics|Effective Radiative Forcing|CH4|*	Effective radiative forcing for methane.	Percentiles: 5, 10, 16.7, 33, 50, 67, 83.3, 90, and 95.	Available for MAGICC, FaIR, and CICERO.
AR6 climate diagnostics|Effective Radiative Forcing|CO2|*	Effective radiative forcing for carbon dioxide.	Percentiles: 5, 10, 16.7, 33, 50, 67, 83.3, 90, and 95.	Available for MAGICC, FaIR, and CICERO.
AR6 climate diagnostics|Effective Radiative Forcing|F-Gases|*	Effective radiative forcing for the basket of fluorinated gases.	Percentiles: 5, 10, 16.7, 33, 50, 67, 83.3, 90, and 95.	Available for MAGICC, FaIR, and CICERO.
AR6 climate diagnostics|Effective Radiative Forcing|HFC125|*	Effective radiative forcing for HFC125.	Percentiles: 5, 10, 16.7, 33, 50, 67, 83.3, 90, and 95.	Available for MAGICC, FaIR, and CICERO.
AR6 climate diagnostics|Effective Radiative Forcing|HFC134a|*	Effective radiative forcing for HFC134a.	Percentiles: 5, 10, 16.7, 33, 50, 67, 83.3, 90, and 95.	Available for MAGICC, FaIR, and CICERO.
AR6 climate diagnostics|Effective Radiative Forcing|HFC143a|*	Effective radiative forcing for HFC143a.	Percentiles: 5, 10, 16.7, 33, 50, 67, 83.3, 90, and 95.	Available for MAGICC, FaIR, and CICERO.
AR6 climate diagnostics|Effective Radiative Forcing|HFC227ea|*	Effective radiative forcing for HFC227ea.	Percentiles: 5, 10, 16.7, 33, 50, 67, 83.3, 90, and 95.	Available for MAGICC, FaIR, and CICERO.
AR6 climate diagnostics|Effective Radiative Forcing|HFC23|*	Effective radiative forcing for HFC23.	Percentiles: 5, 10, 16.7, 33, 50, 67, 83.3, 90, and 95.	Available for MAGICC, FaIR, and CICERO.
AR6 climate diagnostics|Effective Radiative Forcing|HFC245fa|*	Effective radiative forcing for HFC245fa.	Percentiles: 5, 10, 16.7, 33, 50, 67, 83.3, 90, and 95.	Available for MAGICC, FaIR, and CICERO.
AR6 climate diagnostics|Effective Radiative Forcing|HFC32|*	Effective radiative forcing for HFC32.	Percentiles: 5, 10, 16.7, 33, 50, 67, 83.3, 90, and 95.	Available for MAGICC, FaIR, and CICERO.
AR6 climate diagnostics|Effective Radiative Forcing|HFC4310mee|*	Effective radiative forcing for HFC43-10.	Percentiles: 5, 10, 16.7, 33, 50, 67, 83.3, 90, and 95.	Available for MAGICC, FaIR, and CICERO.
AR6 climate diagnostics|Effective Radiative Forcing|N2O|*	Effective radiative forcing for nitrous oxide.	Percentiles: 5, 10, 16.7, 33, 50, 67, 83.3, 90, and 95.	Available for MAGICC, FaIR, and CICERO.
AR6 climate diagnostics|Effective Radiative Forcing|SF6|*	Effective radiative forcing for sulfur hexafluoride.	Percentiles: 5, 10, 16.7, 33, 50, 67, 83.3, 90, and 95.	Available for MAGICC, FaIR, and CICERO.
AR6 climate diagnostics|Heat Uptake|*	Total earth system heat uptake (land, ocean, cryosphere and atmosphere), equivalent to the the energy imbalance at the top of the atmosphere.	Percentiles: 5, 10, 16.7, 33, 50, 67, 83.3, 90, and 95.	Available for MAGICC, FaIR, and CICERO.
AR6 climate diagnostics|Raw Surface Temperature (GMST)|*	Raw global-mean air ocean blended temperature change (GMST i.e. a blend of 2m air temperature over land and surface temperatures over the ocean; raw to distinguish it from the GSAT output which is	Percentiles: 5, 10, 16.7, 33, 50, 67, 83.3, 90, and 95.	Available for MAGICC, FaIR, and CICERO.

	adjusted to match the WG1 best-estimate historical warming between 1850-1900 and 1995-2014).		
AR6 climate diagnostics|Raw Surface Temperature (GSAT)|*	Raw global-mean surface air temperature change (GSAT i.e. 2m air temperature; raw to distinguish it from the GSAT output which is adjusted to match the WGI best-estimate historical warming between 1850-1900 and 1995-2014).	Percentiles: 5, 10, 16.7, 33, 50, 67, 83.3, 90, and 95.	Available for MAGICC, FaIR, and CICERO.
AR6 climate diagnostics|Surface Temperature (GSAT)|*	Global-mean surface air temperature change to be used for e.g. scenario categorisation (this output has been adjusted to match the WGI best-estimate historical warming between 1850-1900 and 1995-2014).	Percentiles: 5, 10, 16.7, 33, 50, 67, 83.3, 90, and 95.	Available for MAGICC, FaIR, and CICERO.
AR6 climate diagnostics|Net Atmosphere to Land Flux|CO2|MAGICCv7.5.3|50.0th Percentile	Net flux of carbon dioxide from the atmosphere to the land (not including AFOLU and other anthropogenic emissions). A positive value indicates uptake of carbon dioxide from the land (i.e. the land is acting as a carbon sink), a negative value indicates release of carbon dioxide from the land (i.e. the land is acting as a carbon source).	Percentiles: 5, 10, 16.7, 33, 50, 67, 83.3, 90, and 95.	Available for MAGICC.
AR6 climate diagnostics|Net Atmosphere to Ocean Flux|CO2|MAGICCv7.5.3|50.0th Percentile	Net flux of carbon dioxide from the atmosphere to the ocean. A positive value indicates uptake of carbon dioxide from the ocean (i.e. the ocean is acting as a carbon sink), a negative value indicates release of carbon dioxide from the ocean (i.e. the ocean is acting as a carbon source).	Percentiles: 5, 10, 16.7, 33, 50, 67, 83.3, 90, and 95.	Available for MAGICC.
AR6 climate diagnostics|Net Land to Atmosphere Flux due to Permafrost|CH4|MAGICCv7.5.3|50.0th Percentile	Net flux of methane from the land to the atmosphere due to the permafrost feedback. A positive	Percentiles: 5, 10, 16.7, 33, 50, 67, 83.3, 90, and 95.	Available for MAGICC.

	value indicates release of methane from the land.		
AR6 climate diagnostics|Net Land to Atmosphere Flux due to Permafrost|CO2|MAGICCv7.5.3|50.0th Percentile	Net flux of carbon dioxide from the land to the atmosphere due to the permafrost feedback. A positive value indicates release of carbon dioxide from the land.	Percentiles: 5, 10, 16.7, 33, 50, 67, 83.3, 90, and 95.	Available for MAGICC.

Supplement Table S3: Global climate variables reported in the AR6 Scenarios Database hosted by IIASA (AR6DB).

Variable name	Used as input for the IPCC AR6 workflow to calculate global temperature change?
Emissions|BC	Yes.
Emissions|BC|AFOLU	No.
Emissions|BC|AFOLU|Agriculture	No.
Emissions|BC|AFOLU|Land	No.
Emissions|BC|Energy	No.
Emissions|BC|Energy|Demand|Industry	No.
Emissions|BC|Energy|Demand|Residential and Commercial	No.
Emissions|BC|Energy|Demand|Residential and Commercial|Commercial	No.
Emissions|BC|Energy|Demand|Residential and Commercial|Residential	No.
Emissions|BC|Energy|Demand|Transportation	No.
Emissions|BC|Energy|Supply	No.
Emissions|BC|Industrial Processes	No.
Emissions|BC|Other	No.
Emissions|BC|Waste	No.
Emissions|C2F6	No.
Emissions|CF4	No.
Emissions|CH4	Yes.
Emissions|CH4|AFOLU	No.
Emissions|CH4|AFOLU|Agriculture	No.
Emissions|CH4|AFOLU|Agriculture|Livestock	No.
Emissions|CH4|AFOLU|Agriculture|Livestock|Enteric Fermentation	No.
Emissions|CH4|AFOLU|Agriculture|Livestock|Manure Management	No.
Emissions|CH4|AFOLU|Agriculture|Rice	No.
Emissions|CH4|AFOLU|Land	No.
Emissions|CH4|Energy	No.
Emissions|CH4|Energy|Demand|Industry	No.
Emissions|CH4|Energy|Demand|Residential and Commercial	No.
Emissions|CH4|Energy|Demand|Residential and Commercial|Commercial	No.
Emissions|CH4|Energy|Demand|Residential and Commercial|Residential	No.
Emissions|CH4|Energy|Demand|Transportation	No.
Emissions|CH4|Energy|Supply	No.
Emissions|CH4|Industrial Processes	No.
Emissions|CH4|Industrial Processes|Chemicals	No.
Emissions|CH4|Industrial Processes|Steel	No.
Emissions|CH4|Other	No.
Emissions|CH4|Waste	No.
Emissions|CO	Yes.
Emissions|CO|AFOLU	No.
Emissions|CO|AFOLU|Agriculture	No.
Emissions|CO|AFOLU|Land	No.
Emissions|CO|Energy	No.
Emissions|CO|Energy|Demand|Industry	No.
Emissions|CO|Energy|Demand|Residential and Commercial	No.
Emissions|CO|Energy|Demand|Residential and Commercial|Commercial	No.
Emissions|CO|Energy|Demand|Residential and Commercial|Residential	No.
Emissions|CO|Energy|Demand|Transportation	No.
Emissions|CO|Energy|Supply	No.
Emissions|CO|Industrial Processes	No.
Emissions|CO|Other	No.
Emissions|CO|Waste	No.

Emissions|CO2	Yes. (*)
Emissions|CO2|AFOLU	Yes.
Emissions|CO2|AFOLU|Agriculture	No.
Emissions|CO2|AFOLU|Land	No.
Emissions|CO2|Energy	Yes. (*)
Emissions|CO2|Energy and Industrial Processes	Yes.
Emissions|CO2|Energy|Demand	No.
Emissions|CO2|Energy|Demand|AFOFI	No.
Emissions|CO2|Energy|Demand|Industry	No.
Emissions|CO2|Energy|Demand|Industry|Cement	No.
Emissions|CO2|Energy|Demand|Industry|Chemicals	No.
Emissions|CO2|Energy|Demand|Industry|Chemicals|Ammonia	No.
Emissions|CO2|Energy|Demand|Industry|Chemicals|High value chemicals	No.
Emissions|CO2|Energy|Demand|Industry|Chemicals|Methanol	No.
Emissions|CO2|Energy|Demand|Industry|Chemicals|Other	No.
Emissions|CO2|Energy|Demand|Industry|Non-ferrous metals	No.
Emissions|CO2|Energy|Demand|Industry|Other	No.
Emissions|CO2|Energy|Demand|Industry|Pulp and Paper	No.
Emissions|CO2|Energy|Demand|Industry|Steel	No.
Emissions|CO2|Energy|Demand|Other Sector	No.
Emissions|CO2|Energy|Demand|Residential and Commercial	No.
Emissions|CO2|Energy|Demand|Residential and Commercial|Commercial	No.
Emissions|CO2|Energy|Demand|Residential and Commercial|Commercial|Heating	No.
Emissions|CO2|Energy|Demand|Residential and Commercial|Commercial|Heating|Cooking	No.
Emissions|CO2|Energy|Demand|Residential and Commercial|Commercial|Heating|Space	No.
Emissions|CO2|Energy|Demand|Residential and Commercial|Commercial|Heating|Water	No.
Emissions|CO2|Energy|Demand|Residential and Commercial|Residential	No.
Emissions|CO2|Energy|Demand|Residential and Commercial|Residential|Heating	No.
Emissions|CO2|Energy|Demand|Residential and Commercial|Residential|Heating|Cooking	No.
Emissions|CO2|Energy|Demand|Residential and Commercial|Residential|Heating|Space	No.
Emissions|CO2|Energy|Demand|Residential and Commercial|Residential|Heating|Water	No.
Emissions|CO2|Energy|Demand|Transportation	No.
Emissions|CO2|Energy|Demand|Transportation|Aviation	No.
Emissions|CO2|Energy|Demand|Transportation|Aviation|Freight	No.
Emissions|CO2|Energy|Demand|Transportation|Aviation|Passenger	No.
Emissions|CO2|Energy|Demand|Transportation|Freight	No.
Emissions|CO2|Energy|Demand|Transportation|Maritime	No.
Emissions|CO2|Energy|Demand|Transportation|Maritime|Freight	No.
Emissions|CO2|Energy|Demand|Transportation|Maritime|Passenger	No.
Emissions|CO2|Energy|Demand|Transportation|Passenger	No.
Emissions|CO2|Energy|Demand|Transportation|Rail	No.
Emissions|CO2|Energy|Demand|Transportation|Rail|Freight	No.
Emissions|CO2|Energy|Demand|Transportation|Rail|Passenger	No.
Emissions|CO2|Energy|Demand|Transportation|Road	No.
Emissions|CO2|Energy|Demand|Transportation|Road|Freight	No.
Emissions|CO2|Energy|Demand|Transportation|Road|Passenger	No.
Emissions|CO2|Energy|Demand|Transportation|Road|Passenger|2W&3W	No.
Emissions|CO2|Energy|Demand|Transportation|Road|Passenger|Bus	No.

Emissions|CO2|Energy|Demand|Transportation|Road|Passenger|LDV	No.
Emissions|CO2|Energy|Supply	No.
Emissions|CO2|Energy|Supply|Electricity	No.
Emissions|CO2|Energy|Supply|Gases	No.
Emissions|CO2|Energy|Supply|Heat	No.
Emissions|CO2|Energy|Supply|Liquids	No.
Emissions|CO2|Energy|Supply|Other Sector	No.
Emissions|CO2|Energy|Supply|Solids	No.
Emissions|CO2|Industrial Processes	Yes. (*)
Emissions|CO2|Industrial Processes|Cement	No.
Emissions|CO2|Industrial Processes|Chemicals	No.
Emissions|CO2|Industrial Processes|Chemicals|Ammonia	No.
Emissions|CO2|Industrial Processes|Chemicals|High value chemicals	No.
Emissions|CO2|Industrial Processes|Chemicals|Methanol	No.
Emissions|CO2|Industrial Processes|Chemicals|Other	No.
Emissions|CO2|Industrial Processes|Non-ferrous metals	No.
Emissions|CO2|Industrial Processes|Other	No.
Emissions|CO2|Industrial Processes|Pulp and Paper	No.
Emissions|CO2|Industrial Processes|Steel	No.
Emissions|CO2|Other	Yes. (*)
Emissions|CO2|Waste	Yes. (*)
Emissions|F-Gases	No.
Emissions|HFC	No.
Emissions|HFC|HFC125	Yes.
Emissions|HFC|HFC134a	Yes.
Emissions|HFC|HFC143a	Yes.
Emissions|HFC|HFC227ea	Yes.
Emissions|HFC|HFC23	Yes.
Emissions|HFC|HFC245fa	No.
Emissions|HFC|HFC32	Yes.
Emissions|HFC|HFC43-10	Yes.
Emissions|HFC|Industrial Processes	No.
Emissions|Kyoto Gases	No.
Emissions|N2O	Yes.
Emissions|N2O|AFOLU	No.
Emissions|N2O|AFOLU|Agriculture	No.
Emissions|N2O|AFOLU|Agriculture|Livestock|Manure Management	No.
Emissions|N2O|AFOLU|Agriculture|Managed Soils	No.
Emissions|N2O|AFOLU|Land	No.
Emissions|N2O|Energy	No.
Emissions|N2O|Energy|Demand|Residential and Commercial|Commercial	No.
Emissions|N2O|Energy|Demand|Residential and Commercial|Residential	No.
Emissions|N2O|Energy|Demand|Transportation	No.
Emissions|N2O|Industrial Processes	No.
Emissions|N2O|Industrial Processes|Chemicals	No.
Emissions|N2O|Other	No.
Emissions|N2O|Waste	No.
Emissions|NH3	Yes.
Emissions|NH3|AFOLU	No.
Emissions|NH3|AFOLU|Agriculture	No.
Emissions|NH3|AFOLU|Land	No.
Emissions|NH3|Energy	No.
Emissions|NH3|Energy|Demand|Industry	No.

Emissions|NH3|Energy|Demand|Residential and Commercial	No.
Emissions|NH3|Energy|Demand|Transportation	No.
Emissions|NH3|Energy|Supply	No.
Emissions|NH3|Industrial Processes	No.
Emissions|NH3|Other	No.
Emissions|NH3|Waste	No.
Emissions|NOx	Yes.
Emissions|NOx|AFOLU	No.
Emissions|NOx|AFOLU|Agriculture	No.
Emissions|NOx|AFOLU|Land	No.
Emissions|NOx|Energy	No.
Emissions|NOx|Energy|Demand|Industry	No.
Emissions|NOx|Energy|Demand|Residential and Commercial	No.
Emissions|NOx|Energy|Demand|Residential and Commercial|Commercial	No.
Emissions|NOx|Energy|Demand|Residential and Commercial|Residential	No.
Emissions|NOx|Energy|Demand|Transportation	No.
Emissions|NOx|Energy|Supply	No.
Emissions|NOx|Industrial Processes	No.
Emissions|NOx|Other	No.
Emissions|NOx|Waste	No.
Emissions|OC	Yes.
Emissions|OC|AFOLU	No.
Emissions|OC|AFOLU|Agriculture	No.
Emissions|OC|AFOLU|Land	No.
Emissions|OC|Energy	No.
Emissions|OC|Energy|Demand|Industry	No.
Emissions|OC|Energy|Demand|Residential and Commercial	No.
Emissions|OC|Energy|Demand|Residential and Commercial|Commercial	No.
Emissions|OC|Energy|Demand|Residential and Commercial|Residential	No.
Emissions|OC|Energy|Demand|Transportation	No.
Emissions|OC|Energy|Supply	No.
Emissions|OC|Industrial Processes	No.
Emissions|OC|Other	No.
Emissions|OC|Waste	No.
Emissions|PFC	No.
Emissions|PFC|C2F6	Yes.
Emissions|PFC|C6F14	Yes.
Emissions|PFC|CF4	Yes.
Emissions|PM2.5	No.
Emissions|SF6	Yes.
Emissions|Sulfur	Yes.
Emissions|Sulfur|AFOLU	No.
Emissions|Sulfur|AFOLU|Agriculture	No.
Emissions|Sulfur|AFOLU|Land	No.
Emissions|Sulfur|Energy	No.
Emissions|Sulfur|Energy|Demand|Industry	No.
Emissions|Sulfur|Energy|Demand|Residential and Commercial	No.
Emissions|Sulfur|Energy|Demand|Residential and Commercial|Commercial	No.
Emissions|Sulfur|Energy|Demand|Residential and Commercial|Residential	No.
Emissions|Sulfur|Energy|Demand|Transportation	No.
Emissions|Sulfur|Energy|Supply	No.
Emissions|Sulfur|Industrial Processes	No.
Emissions|Sulfur|Other	No.

Emissions|Sulfur|Waste	No.
Emissions|VOC	Yes.
Emissions|VOC|AFOLU	No.
Emissions|VOC|AFOLU|Agriculture	No.
Emissions|VOC|AFOLU|Land	No.
Emissions|VOC|Energy	No.
Emissions|VOC|Energy|Demand|Industry	No.
Emissions|VOC|Energy|Demand|Residential and Commercial	No.
Emissions|VOC|Energy|Demand|Residential and Commercial|Commercial	No.
Emissions|VOC|Energy|Demand|Residential and Commercial|Residential	No.
Emissions|VOC|Energy|Demand|Transportation	No.
Emissions|VOC|Energy|Supply	No.
Emissions|VOC|Industrial Processes	No.
Emissions|VOC|Other	No.
Emissions|VOC|Waste	No.

Supplement Table S4: Global emissions variables reported by the IAM modelling frameworks as available in the AR6 Scenarios Database hosted by IIASA (AR6DB), marking the variables that were used in the IPCC AR6 WGIII climate assessment workflow. (*) = only used in exceptional cases if not all information if captured in the combination of "Emissions|CO2|AFOLU" and "Emissions|CO2|Energy and Industrial Processes".

Variable name	Description	Note
AR6 climate diagnostics|Emissions|Kyoto Gases (AR5-GWP100)	Total greenhouse gases falling under the Kyoto Protocol, here calculated as the sum of C2F6, C6F14, CF4, CO2, CH4, HFC125, HFC134a, HFC143a, HFC227ea, HFC23, HFC32, HFC43-10, N2O, SF6. Calculated using 100-year global warming potential from the IPCC Fifth Assessment Report.	Based on IAM-reported emissions, i.e. "Emissions|*".
AR6 climate diagnostics|Emissions|Kyoto Gases (AR6-GWP100)	Total greenhouse gases falling under the Kyoto Protocol, here calculated as the sum of C2F6, C6F14, CF4, CO2, CH4, HFC125, HFC134a, HFC143a, HFC227ea, HFC23, HFC32, HFC43-10, N2O, SF6. Calculated using 100-year global warming potential from the IPCC Sixth Assessment Report.	Based on IAM-reported emissions, i.e. "Emissions|*".
AR6 climate diagnostics|Harmonized|Emissions|BC	Harmonized anthropogenic black carbon emissions.	
AR6 climate diagnostics|Harmonized|Emissions|CH4	Harmonized anthropogenic methane emissions.	
AR6 climate diagnostics|Harmonized|Emissions|CO	Harmonized anthropogenic carbon monoxide emissions.	
AR6 climate diagnostics|Harmonized|Emissions|CO2	Harmonized anthropogenic carbon dioxide emissions.	This basket was not used directly for climate simulations.
AR6 climate diagnostics|Harmonized|Emissions|CO2|AFOLU	Harmonized anthropogenic carbon dioxide emissions from agriculture, forestry and other land use (IPCC category 3).	
AR6 climate diagnostics|Harmonized|Emissions|CO2|Energy and Industrial Processes	Harmonized anthropogenic carbon dioxide emissions from energy use on supply and demand side, including fugitive emissions from fuels (IPCC category 1A, 1B) and industrial processes.	
AR6 climate diagnostics|Harmonized|Emissions|F-Gases	Harmonized anthropogenic fluorinated gases emissions, including SF6, HFCs, and PFCs.	This basket was not used directly for climate simulations.
AR6 climate diagnostics|Harmonized|Emissions|HFC	Harmonized anthropogenic hydrofluorocarbons emissions.	This basket was not used directly for climate simulations.
AR6 climate diagnostics|Harmonized|Emissions|HFC|HFC125	Harmonized anthropogenic HFC125 emissions.	

AR6 climate diagnostics|Harmonized|Emissions|HFC|HFC134a	Harmonized anthropogenic HFC134a emissions.	
AR6 climate diagnostics|Harmonized|Emissions|HFC|HFC143a	Harmonized anthropogenic HFC143a emissions.	
AR6 climate diagnostics|Harmonized|Emissions|HFC|HFC227ea	Harmonized anthropogenic HFC227ea emissions.	
AR6 climate diagnostics|Harmonized|Emissions|HFC|HFC23	Harmonized anthropogenic HFC23 emissions.	
AR6 climate diagnostics|Harmonized|Emissions|HFC|HFC32	Harmonized anthropogenic HFC32 emissions.	
AR6 climate diagnostics|Harmonized|Emissions|HFC|HFC43-10	Harmonized anthropogenic HFC43-10 emissions.	
AR6 climate diagnostics|Harmonized|Emissions|Kyoto Gases (AR5-GWP100)	Total greenhouse gases falling under the Kyoto Protocol, here calculated as the sum of C2F6, C6F14, CF4, CO2, CH4, HFC125, HFC134a, HFC143a, HFC227ea, HFC23, HFC32, HFC43-10, N2O, SF6. Calculated using 100-year global warming potential from the IPCC Fifth Assessment Report.	Based on harmonised emissions, i.e. "AR6 climate diagnostics|Harmonized|Emissions|*".
AR6 climate diagnostics|Harmonized|Emissions|Kyoto Gases (AR6-GWP100)	Total greenhouse gases falling under the Kyoto Protocol, here calculated as the sum of C2F6, C6F14, CF4, CO2, CH4, HFC125, HFC134a, HFC143a, HFC227ea, HFC23, HFC32, HFC43-10, N2O, SF6. Calculated using 100-year global warming potential from the IPCC Sixth Assessment Report.	Based on harmonised emissions, i.e. "AR6 climate diagnostics|Harmonized|Emissions|*".
AR6 climate diagnostics|Harmonized|Emissions|N2O	Harmonized anthropogenic nitrous oxide emissions.	
AR6 climate diagnostics|Harmonized|Emissions|NH3	Harmonized anthropogenic ammonia emissions.	
AR6 climate diagnostics|Harmonized|Emissions|NOx	Harmonized anthropogenic NOx emissions.	
AR6 climate diagnostics|Harmonized|Emissions|OC	Harmonized anthropogenic organic carbon emissions.	
AR6 climate diagnostics|Harmonized|Emissions|PFC	Harmonized anthropogenic perfluorocarbons emissions.	This basket was not used directly in for infilling or climate simulations.
AR6 climate diagnostics|Harmonized|Emissions|PFC|C2F6	Harmonized anthropogenic hexafluoroethane emissions.	
AR6 climate diagnostics|Harmonized|Emissions|PFC|C6F14	Harmonized anthropogenic perfluorohexane emissions.	
AR6 climate diagnostics|Harmonized|Emissions|PFC|CF4	Harmonized anthropogenic tetrafluorohexane emissions.	
AR6 climate diagnostics|Harmonized|Emissions|SF6	Harmonized anthropogenic sulfur hexafluoride emissions.	

AR6 climate diagnostics|Harmonized|Emissions|Sulfur	Harmonized anthropogenic sulfur emissions.	
AR6 climate diagnostics|Harmonized|Emissions|VOC	Harmonized anthropogenic volatile organic compound emissions.	
AR6 climate diagnostics|Infilled|Emissions|BC	Infilled (and harmonized) anthropogenic black carbon emissions.	
AR6 climate diagnostics|Infilled|Emissions|CCl4	Infilled (and harmonized) anthropogenic CCl4 emissions.	
AR6 climate diagnostics|Infilled|Emissions|CFC11	Infilled (and harmonized) anthropogenic CFC11 emissions.	
AR6 climate diagnostics|Infilled|Emissions|CFC113	Infilled (and harmonized) anthropogenic CFC113 emissions.	
AR6 climate diagnostics|Infilled|Emissions|CFC114	Infilled (and harmonized) anthropogenic CFC114 emissions.	
AR6 climate diagnostics|Infilled|Emissions|CFC115	Infilled (and harmonized) anthropogenic CFC115 emissions.	
AR6 climate diagnostics|Infilled|Emissions|CFC12	Infilled (and harmonized) anthropogenic CFC12 emissions.	
AR6 climate diagnostics|Infilled|Emissions|CH2Cl2	Infilled (and harmonized) anthropogenic CH2Cl2 emissions.	
AR6 climate diagnostics|Infilled|Emissions|CH3Br	Infilled (and harmonized) anthropogenic CH3Br emissions.	
AR6 climate diagnostics|Infilled|Emissions|CH3CCl3	Infilled (and harmonized) anthropogenic CH3CCl3 emissions.	
AR6 climate diagnostics|Infilled|Emissions|CH3Cl	Infilled (and harmonized) anthropogenic CH3Cl emissions.	
AR6 climate diagnostics|Infilled|Emissions|CH4	Infilled (and harmonized) anthropogenic methane emissions.	
AR6 climate diagnostics|Infilled|Emissions|CHCl3	Infilled (and harmonized) anthropogenic CHCl3 emissions.	
AR6 climate diagnostics|Infilled|Emissions|CO	Infilled (and harmonized) anthropogenic carbon monoxide emissions.	
AR6 climate diagnostics|Infilled|Emissions|CO2	Infilled (and harmonized) anthropogenic carbon dioxide emissions.	This basket was not used directly for climate simulations.
AR6 climate diagnostics|Infilled|Emissions|CO2|AFOLU	Infilled (and harmonized) anthropogenic carbon dioxide emissions from agriculture, forestry and other land use (IPCC category 3).	

AR6 climate diagnostics|Infilled|Emissions|CO2|Energy and Industrial Processes	Infilled (and harmonized) anthropogenic carbon dioxide emissions from energy use on supply and demand side, including fugitive emissions from fuels (IPCC category 1A, 1B) and industrial processes.	
AR6 climate diagnostics|Infilled|Emissions|F-Gases	Infilled (and harmonized) anthropogenic fluorinated gases emissions, including SF6, HFCs, and PFCs.	This basket was not used directly for climate simulations.
AR6 climate diagnostics|Infilled|Emissions|Halon1202	Infilled (and harmonized) anthropogenic Halon1202 emissions.	
AR6 climate diagnostics|Infilled|Emissions|Halon1211	Infilled (and harmonized) anthropogenic Halon1211 emissions.	
AR6 climate diagnostics|Infilled|Emissions|Halon1301	Infilled (and harmonized) anthropogenic Halon1301 emissions.	
AR6 climate diagnostics|Infilled|Emissions|Halon2402	Infilled (and harmonized) anthropogenic Halon2402 emissions.	
AR6 climate diagnostics|Infilled|Emissions|HCFC141b	Infilled (and harmonized) anthropogenic HCFC141b emissions.	
AR6 climate diagnostics|Infilled|Emissions|HCFC142b	Infilled (and harmonized) anthropogenic HCFC142b emissions.	
AR6 climate diagnostics|Infilled|Emissions|HCFC22	Infilled (and harmonized) anthropogenic HCFC22 emissions.	
AR6 climate diagnostics|Infilled|Emissions|HFC	Infilled (and harmonized) anthropogenic hydrofluorocarbons emissions.	This basket was not used directly for climate simulations.
AR6 climate diagnostics|Infilled|Emissions|HFC|HFC125	Infilled (and harmonized) anthropogenic HFC125 emissions.	
AR6 climate diagnostics|Infilled|Emissions|HFC|HFC134a	Infilled (and harmonized) anthropogenic HFC134a emissions.	
AR6 climate diagnostics|Infilled|Emissions|HFC|HFC143a	Infilled (and harmonized) anthropogenic HFC143a emissions.	
AR6 climate diagnostics|Infilled|Emissions|HFC|HFC152a	Infilled (and harmonized) anthropogenic HFC152a emissions.	
AR6 climate diagnostics|Infilled|Emissions|HFC|HFC227ea	Infilled (and harmonized) anthropogenic HFC227ea emissions.	
AR6 climate diagnostics|Infilled|Emissions|HFC|HFC23	Infilled (and harmonized) anthropogenic HFC23 emissions.	

AR6 climate diagnostics|Infilled|Emissions|HFC|HFC236fa	Infilled (and harmonized) anthropogenic HFC236fa emissions.	
AR6 climate diagnostics|Infilled|Emissions|HFC|HFC245ca	Infilled (and harmonized) anthropogenic HFC245ca emissions.	
AR6 climate diagnostics|Infilled|Emissions|HFC|HFC32	Infilled (and harmonized) anthropogenic HFC32 emissions.	
AR6 climate diagnostics|Infilled|Emissions|HFC|HFC365mfc	Infilled (and harmonized) anthropogenic HFC365mfc emissions.	
AR6 climate diagnostics|Infilled|Emissions|HFC|HFC43-10	Infilled (and harmonized) anthropogenic HFC43-10 emissions.	
AR6 climate diagnostics|Infilled|Emissions|Kyoto Gases (AR5-GWP100)	Total greenhouse gases falling under the Kyoto Protocol, here calculated as the sum of C2F6, C6F14, CF4, CO2, CH4, HFC125, HFC134a, HFC143a, HFC227ea, HFC23, HFC32, HFC43-10, N2O, SF6. Calculated using 100-year global warming potential from the IPCC Fifth Assessment Report.	Based on infilled emissions, i.e. "AR6 climate diagnostics|Infilled|Emissions|*".
AR6 climate diagnostics|Infilled|Emissions|Kyoto Gases (AR6-GWP100)	Total greenhouse gases falling under the Kyoto Protocol, here calculated as the sum of C2F6, C6F14, CF4, CO2, CH4, HFC125, HFC134a, HFC143a, HFC227ea, HFC23, HFC32, HFC43-10, N2O, SF6. Calculated using 100-year global warming potential from the IPCC Sixth Assessment Report.	Based on infilled emissions, i.e. "AR6 climate diagnostics| Infilled |Emissions|*".
AR6 climate diagnostics|Infilled|Emissions|N2O	Infilled (and harmonized) anthropogenic nitrous oxide emissions.	
AR6 climate diagnostics|Infilled|Emissions|NF3	Infilled (and harmonized) anthropogenic nitrogen trifluoride emissions.	
AR6 climate diagnostics|Infilled|Emissions|NH3	Infilled (and harmonized) anthropogenic ammonia emissions.	
AR6 climate diagnostics|Infilled|Emissions|NOx	Infilled (and harmonized) anthropogenic NOx emissions.	
AR6 climate diagnostics|Infilled|Emissions|OC	Infilled (and harmonized) anthropogenic organic carbon emissions.	

AR6 climate diagnostics|Infilled|Emissions|PFC	Infilled (and harmonized) anthropogenic perfluorocarbons emissions.	This basket was not used directly for climate simulations.
AR6 climate diagnostics|Infilled|Emissions|PFC|C2F6	Infilled (and harmonized) anthropogenic C2F6 emissions.	
AR6 climate diagnostics|Infilled|Emissions|PFC|C3F8	Infilled (and harmonized) anthropogenic C3F8 emissions.	
AR6 climate diagnostics|Infilled|Emissions|PFC|C4F10	Infilled (and harmonized) anthropogenic C4F10 emissions.	
AR6 climate diagnostics|Infilled|Emissions|PFC|C5F12	Infilled (and harmonized) anthropogenic C5F12 emissions.	
AR6 climate diagnostics|Infilled|Emissions|PFC|C6F14	Infilled (and harmonized) anthropogenic C6F14 emissions.	
AR6 climate diagnostics|Infilled|Emissions|PFC|C7F16	Infilled (and harmonized) anthropogenic C7F16 emissions.	
AR6 climate diagnostics|Infilled|Emissions|PFC|C8F18	Infilled (and harmonized) anthropogenic C8F18 emissions.	
AR6 climate diagnostics|Infilled|Emissions|PFC|cC4F8	Infilled (and harmonized) anthropogenic cC4F8 emissions.	
AR6 climate diagnostics|Infilled|Emissions|PFC|CF4	Infilled (and harmonized) anthropogenic tetrafluoromethane emissions.	
AR6 climate diagnostics|Infilled|Emissions|SF6	Infilled (and harmonized) anthropogenic sulfur hexafluoride emissions.	
AR6 climate diagnostics|Infilled|Emissions|SO2F2	Infilled (and harmonized) anthropogenic sulfuryl fluoride emissions.	
AR6 climate diagnostics|Infilled|Emissions|Sulfur	Infilled (and harmonized) anthropogenic sulfur emissions.	
AR6 climate diagnostics|Infilled|Emissions|VOC	Infilled (and harmonized) anthropogenic volatile organic compound emissions.	
AR6 climate diagnostics|Native-with-Infilled|Emissions|Kyoto Gases (AR5-GWP100)	Total greenhouse gases falling under the Kyoto Protocol, here calculated as the sum of C2F6, C6F14, CF4, CO2, CH4, HFC125, HFC134a, HFC143a, HFC227ea, HFC23, HFC32, HFC43-10, N2O, SF6. Calculated using 100-year global warming potential from the IPCC Fifth Assessment Report.	Based on IAM-reported emissions, i.e. “Emissions|*” where reported, supplemented with infilled emissions (i.e. “AR6 climate diagnostics|Infilled|Emissions|*”) where IAM-reported emissions are not available.

AR6 climate diagnostics|Native-with-Infilled|Emissions|Kyoto Gases (AR6-GWP100)	Total greenhouse gases falling under the Kyoto Protocol, here calculated as the sum of C2F6, C6F14, CF4, CO2, CH4, HFC125, HFC134a, HFC143a, HFC227ea, HFC23, HFC32, HFC43-10, N2O, SF6. Calculated using 100-year global warming potential from the IPCC Sixth Assessment Report.	Based on IAM-reported emissions, i.e. "Emissions|*" where reported, supplemented with infilled emissions (i.e. "AR6 climate diagnostics|Infilled|Emissions|*") where IAM-reported emissions are not available.

Supplement Table S5: Global emissions variables added to the AR6 Scenarios Database hosted by IIASA (AR6DB) produced in the climate assessment process in IPCC AR6 WGIII.

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