

11 Energy

11.1 Scenarios

Those models that do not account for varying societal conditions (population, GDP, etc.) should keep these fixed at year 2005 levels throughout the simulations (**2005soc** scenario in Group 1 and Group 2). However, the “present-day” representation of the installed renewable power generation should reflect 2015 conditions, since the installed power in 2005 was still very restricted and scattered. Models that only account for the weather-induced changes in power generation, without representing population or GDP effects, should name these scenarios **2015soc**. However, as soon as other socio-economic drivers are considered and fixed at 2005 levels, the scenarios should be called “2005soc”, even though they represent a mixture of both conditions. Those models that do not account for varying societal conditions only need to run the first pre-industrial period of Experiment I (1661-1860, see option 2 of Experiment I below). The models focusing on the simulation of future projections (e.g. some IAMs) need to run experiment variations associated only with the periods post-2006. Group 3 runs are only relevant for models that are able to represent future changes in societal conditions.

Climate & CO ₂ scenarios	
picontrol	Pre-industrial climate and 286ppm CO ₂ concentration. The climate data for the entire period (1661-2299) are unique – no (or little) recycling of data has taken place.
historical	Historical climate and CO ₂ concentration.
rcp26	Future climate and CO ₂ concentration from RCP2.6
rcp60	Future climate and CO ₂ concentration from RCP6.0
Human influence & land-use scenarios	
1860soc	Pre-industrial society
histsoc	Varying society
2005soc	Representation of fixed year 2005 society
2015soc	Representation of fixed year 2015 society
rcp26soc	Varying society according to SSP2+RCP2.6
rcp60soc	Varying society according to SSP2+RCP6.0
2100rcp26soc	Representation of fixed year 2100 society according to the last year of rcp26soc.

Table 27 ISIMIP2b scenarios for energy sector simulations.

Experiment		Input	Pre-industrial 1661-1860	Historical 1861-2005	Future 2006-2099	Extended future 2100-2299
I	no climate change, pre-industrial CO ₂	Climate & CO ₂	picontrol	picontrol	picontrol	picontrol
	varying society up to 2005, then fixed at 2005 levels thereafter	Human & LU	Option 1: 1860soc	Option 1: histsoc	2005soc	2005soc
			Option 2*: 2005soc	Option 2*: 2005soc		
Ib	no climate change, pre-industrial CO ₂	Climate & CO ₂	picontrol	picontrol	picontrol	picontrol
	varying society up to 2015, then fixed at 2015 levels thereafter	Human & LU	Option 1: 1860soc	Option 1: histsoc	2015soc	2015soc
			Option 2*: 2015soc	Option 2*: 2015soc		
II	RCP2.6 climate & CO ₂	Climate & CO ₂	Experiment I	historical	rcp26	rcp26
	varying society up to 2005, then fixed at 2005 levels thereafter	LU etc.		Option 1: histsoc	2005soc	2005soc
				Option 2*: 2005soc		
IIb	RCP2.6 climate & CO ₂	Climate & CO ₂	Experiment Ia	historical	rcp26	rcp26
	varying society up to 2015, then fixed at 2015 levels thereafter	Human & LU		Option 1: histsoc	2015soc	2015soc
				Option 2*: 2015soc		
III	RCP6.0 climate & CO ₂	Climate & CO ₂	Experiment I	Experiment II	rcp60	not simulated
	varying society up to 2005, then fixed at 2005 levels thereafter	LU etc.			2005soc	

IIIb	RCP6.0 climate & CO ₂	Climate & CO ₂	Experiment Ia	Experiment IIa	rcp60	not simulated
	varying society up to 2015, then fixed at 2015 levels thereafter	Human & LU			2015soc	
IV	no climate change, pre-industrial CO ₂	Climate & CO ₂	Experiment I	Experiment I	picontrol	picontrol
	varying society up to 2100 (SSP2+RCP2.6), then fixed at 2100 levels thereafter	LU etc.			rcp26soc	2100rcp26soc
V	no climate change, pre-industrial CO ₂	Climate	Experiment I	Experiment II	picontrol	not simulated
	varying society up to 2100 (SSP2+RCP6.0), then fixed at 2100 levels thereafter	LU etc.			rcp60soc	
VI	RCP6.0 climate & CO ₂	Climate	Experiment I	Experiment II	rcp26	rcp26
	varying society up to 2100 (SSP2+RCP2.6), then fixed at 2100 levels thereafter	LU etc.			rcp26soc	2100rcp26soc
VII	RCP6.0 climate & CO ₂	Climate	Experiment I	Experiment II	rcp60	
	varying society up (SSP2+RCP6.0)	LU etc.			rcp26soc	

11.2 Output data

Table 28 Variables to be reported by energy models

Variable	Variable name	Unit	Comments
Energy Demand			
Total energy demand	ed_tot	EJ/time step	
Energy demand residential	ed_res	EJ/time step	

Energy demand industry	ed_ind	EJ/time step	
Energy demand transport	ed_trans	EJ/time step	
Energy Supply			
Solar power	p_sol	EJ/time step	
Wind power	p_wind	EJ/time step	
Gross hydropower	p_hydgross	EJ/time step	
Actual hydropower	p_hydact	EJ/time step	
Thermoelectric power total	p_therm	EJ/time step	Including nuclear, biomass, fossil-fueled power plants
Biomass production	prod_biom	EJ/time step	
Total energy extraction	extr_tot	EJ/time step	Sum of coal/shale/gas extraction
Economics			
Primary energy costs		US\$2005/GJ	
Final energy costs		US\$2005/GJ	Sum of average cost of electricity of all power plant technologies
Solar power costs		US\$2005/GJ	
Wind power costs		US\$2005/GJ	
Hydropower costs		US\$2005/GJ	
Thermoelectric power costs		US\$2005/GJ	Sum of average cost of electricity of coal/gas/nuclear/biomass-fueled plants
Adaptation costs		US\$2005/GJ	
Electricity prices		US\$2005/GJ	